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FOIS online, 20 Juillet 2023

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Co-Located with the 13th International Conference on Formal Ontology in Informations Systems (FOIS 2023) https://onto4fair.github.io/2023-fois.html

Paper discussion (presenter: Romain David, ResearcheData steward of ERINHA)

Converging on a Semantic Interoperability Framework for the European Data Space for Science, Research and Innovation (EOSC)*. Romain David, Kurt Baumann, Yann Le Franc, Barbara Magagna, Lars Vogt, Heinrich Widmann, Thomas Jouneau, Hanna Koivula, Bénédicte Madon, Wolmar Nyberg Åkerström, Milan Ojsteršek, Andrea Scharnhorst, Chris Schubert, Zhengdong Shi, Letizia Tanca and Sadia Vancauwenbergh.

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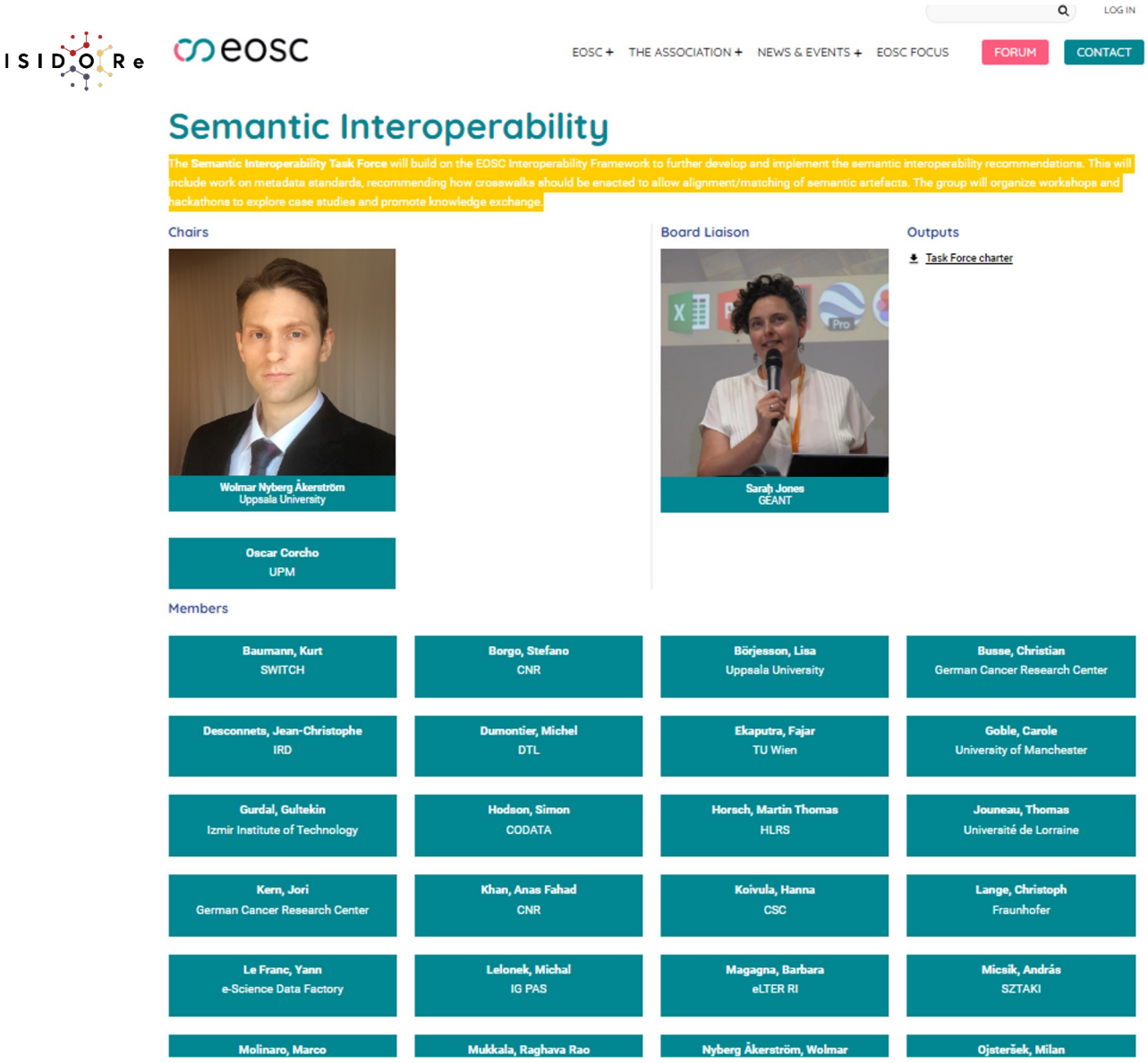

The **Semantic Interoperability Task Force** will build on the EOSC Interoperability Framework to further develop and implement the semantic interoperability recommendations.

This will include work on metadata standards, recommending how crosswalks should be enacted to allow alignment/matching of semantic artefacts. The group will organize workshops and hackathons to explore case studies and promote knowledge exchange.

Converging on a Semantic Interoperability Framework for the European Data Space for Science, Research and Innovation (EOSC) - david et al., 2023

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Some evidences

- Only machine-interpretable semantic artefacts can result in machine-actionable (meta)data.
- SI plays a central role in the design of large-scale infrastructures
- SI is particularly important in the context of interdisciplinary research
- Domain specific terminology and knowledge organising systems evolve around specific distinct bodies of work

NEED: to investigate further the diversity of approaches to solve SI, with the ultimate goal to map out practices across different stakeholders/actors, contexts and domains.

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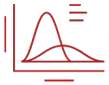

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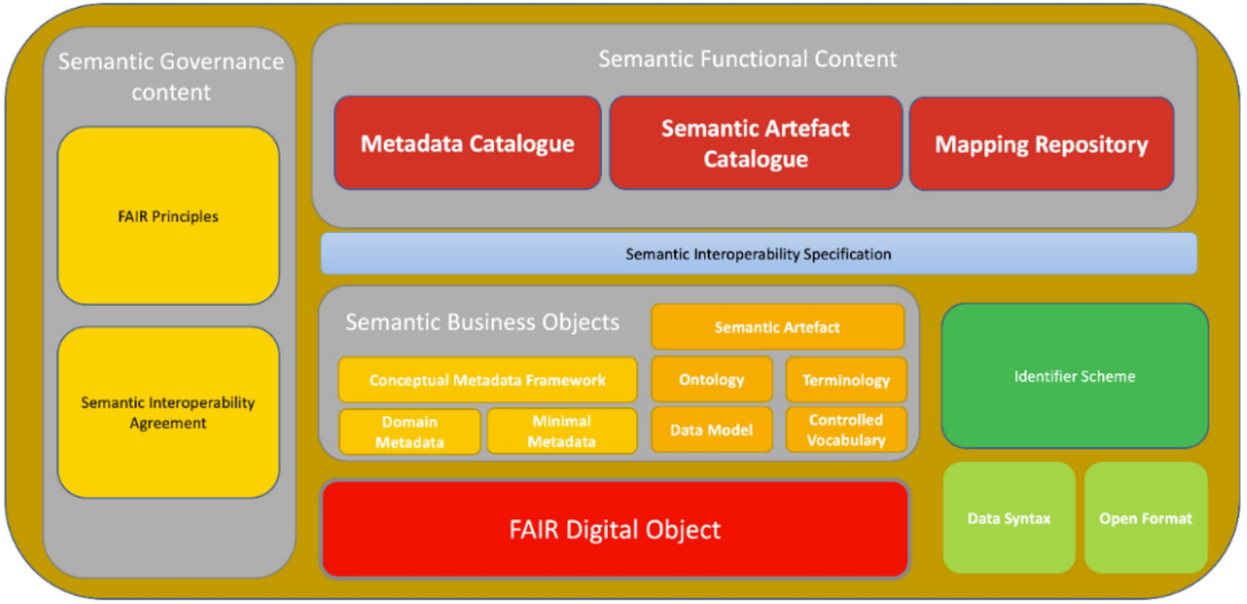

Figure 1: Semantic view on EOSC IF [2]: The EOSC Executive board Working Group on FAIR and architecture identified three main blocks to support SI (Figure 1): the Semantic Governance Content, the Semantic Business Objects and the Semantic Functional Content.

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EOSC SI Background

Investigating different existing community practices through a short survey and derived from the results a conceptual architecture centred around the concept of FAIR Digital Object

- The **Semantic Business Objects component** is both social and technical and aggregates different levels of formalisation of the semantics, i.e., semantic artefacts and metadata schemas.
- Along with this **Conceptual Metadata Framework**, two additional metadata goals have been considered:
  - minimum metadata (addressing general concepts)
  - domain metadata (addressing domain specific needs)
- Finally the third component, the **Semantic Functional content**, is a technical component considering the 3 different types of services that would be necessary to support SI:
  - the metadata catalogue,
  - the semantic artefact catalogue
  - and the mapping repository

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Beyond Technical, Social Challenges

Clear need of human understandable interfaces and more generics (FAIR) tools for metadata, metadata schema, mapping, but also:

...

Major *technico-social* challenges faced by semantic experts to be prioritised:

- Ontology selection, management and alignment taking into account semantic heterogeneity and conflict resolution (and developing robust mapping techniques).
- Ensuring quality and accuracy of semantic annotations and managing evolving ontologies (e.g. extensions of existing semantic artefacts);
- Addressing scalability and performance issues (and designing efficient reasoning algorithms or considering unstructured and semi-structured data plus Semantic data integration and fusion with compliance with semantic web standards);
- Promoting adoption of semantic technologies (by e.g. effective visualisation and user interface design) and collaboration and coordination among stakeholders;
- Addressing privacy and security concerns (e.g. interoperability with legacy systems).

Leveraging based on Users Experience (UX)

Converging on a Semantic Interoperability Framework for the European Data Space for Science, Research and Innovation (EOSC)

Romain David[1], Kurt Baumann[2], Yann Le Franc[3], Barbara Magagna[4], Lars Vogt[5], Heinrich Widmann[6], Thomas Jouneau[7], Hanna Koivula[8], Bénédicte Madon[9], Wolmar Nyberg Åkerström[10], Milan Ojsteršek[11], Andrea Scharnhorst[12], Chris Schubert[13], Zhengdong Shi[14], Letizia Tanca[15] and Sadia Vancauwenbergh[16]

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Abstract

Semantic interoperability (SI) is at the heart of the FAIR principles and of the design of large scale cross disciplinary infrastructures. The European Open Science Cloud (EOSC) is a European-wide effort towards such an infrastructure, aiming to deepen the regional research collaboration and realising a shared data space for science, research and innovation. In this context, the research community's voice is represented by the EOSC Association (EOSC-A) and a number of advisory groups with a broad range of representatives from different stakeholder organisations. The advisory group on metadata and data quality has formed a task force focusing on developing and implementing recommendations for SI (EOSC SI Task Force) with the ambition to converge on globally relevant and scalable SI solutions for EOSC. This paper provides context to SI in EOSC, the various components contributing to it, as well as some views on the socio-technical challenges to arriving at a consensus. In particular, the paper provides motivation for exploring the heterogeneity of SI solutions demonstrated across scientific communities and insight into the task force's planned approach to conduct a survey to identify relevant components and structures. The paper is also an invitation to the global community to align and engage with the task force's activities going forward.

Keywords

Semantic interoperability, European Open Science Cloud, Crosswalk, Roadmap, Interoperable, FAIR Principles, definitions, linked data, machine actionability

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EOSC SI Task Force will engage with various communities and collect information **through a landscaping exercise leveraging a survey (Magagna et al., 2023):**

Survey goals:

- To investigate how communities are addressing the SI challenge;
- To reveal possible hurdles for solving the problem; and
- To identify and describe resources supporting SI and catalogue them

Structured around:

- General information includes information about the represented community, created data types and used data repositories.
- FAIR related information asks about the awareness related to FAIR Principles and interoperability challenges and if the community has elaborated a roadmap for FAIR implementation including a strategy for SI.
- Metadata related information asks about the metadata schemas used to describe data, how this is generated, where it is exposed and whether it is used for data discoverability. We also want to know if schema crosswalks are used and if metadata quality is validated.
- Semantic interoperability related information: ask which semantic artefacts are used for metadata. We follow with questions about used services (e.g. SPARQL endpoints) supporting their management, mappings and crosswalks as well as their governance.

FOR INSTANCE ISIDORe'S CORE: THE RESEARCH INFRASTRUCTURES (RIs

RESEARCH INFRASTRUCTURES

Facilities, resources and services **made available to the research communities** to conduct research and foster innovation in their fields.

Include: any tools that are essential to **achieve excellence in research and innovation.**

17 RIs = over 150 providers of access to resources & services

instruct ERIC
eu-openscreen
infraVec2
TRANSVAC
EURO-BIOIMAGING
ecrin
INFRAFRONTIER mouse disease models
erinha European Research Infrastructure on Highly Pathogenic Agents
VETBIONET Veterinary Biocontained research facility Network
EVAg European Virus Archive Global
EMBRC EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE
eatris
BBMRI-ERIC
MIRRI MICROBIAL RESOURCE RESEARCH INFRASTRUCTURE
sonar global
elixir

+ National surveillance network: EMERGEN

UNDER GA

DMP paper

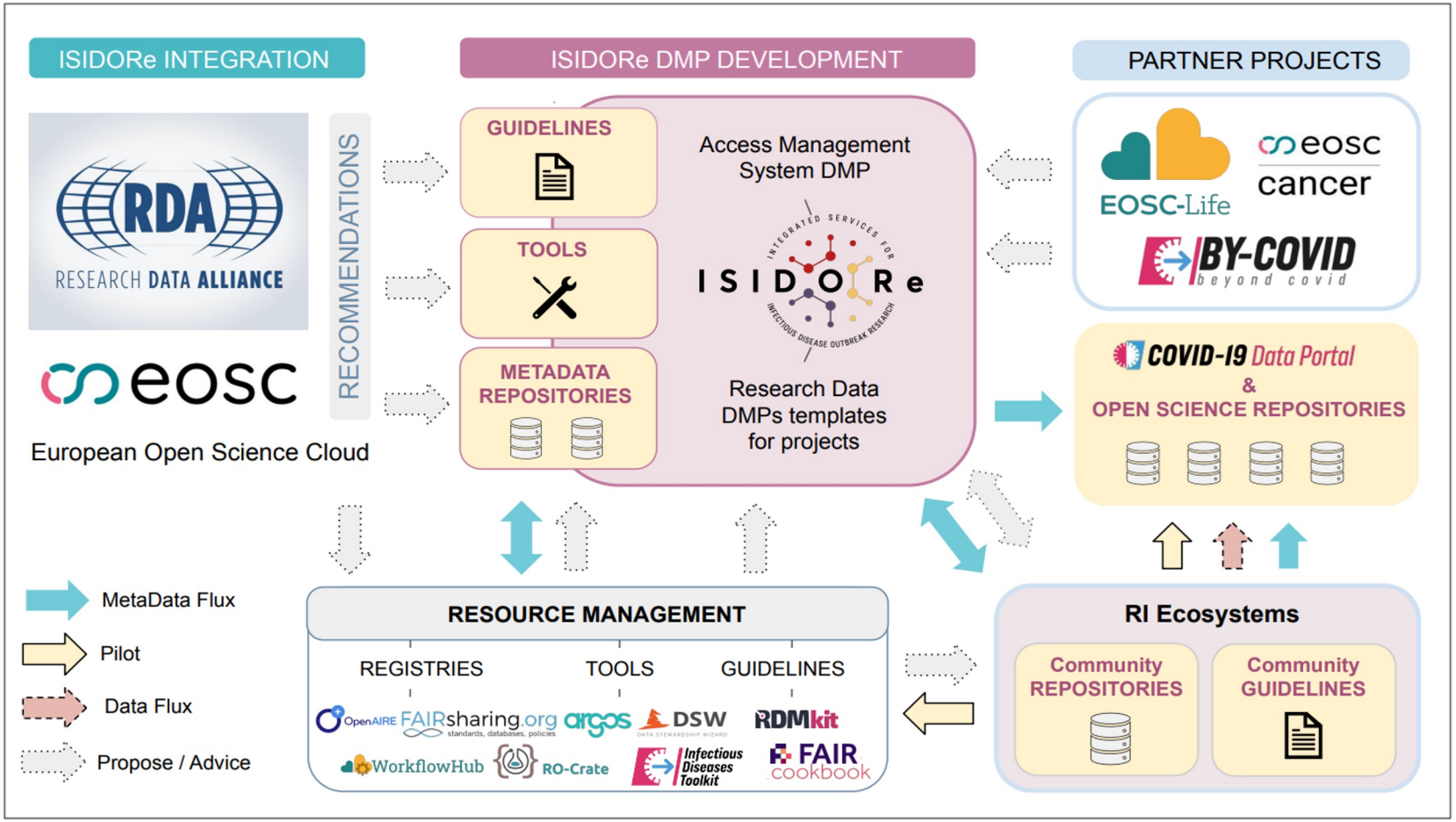
Accepted

David et al., 2023

and

David et al., 2022, interdisciplinary categorisations systems

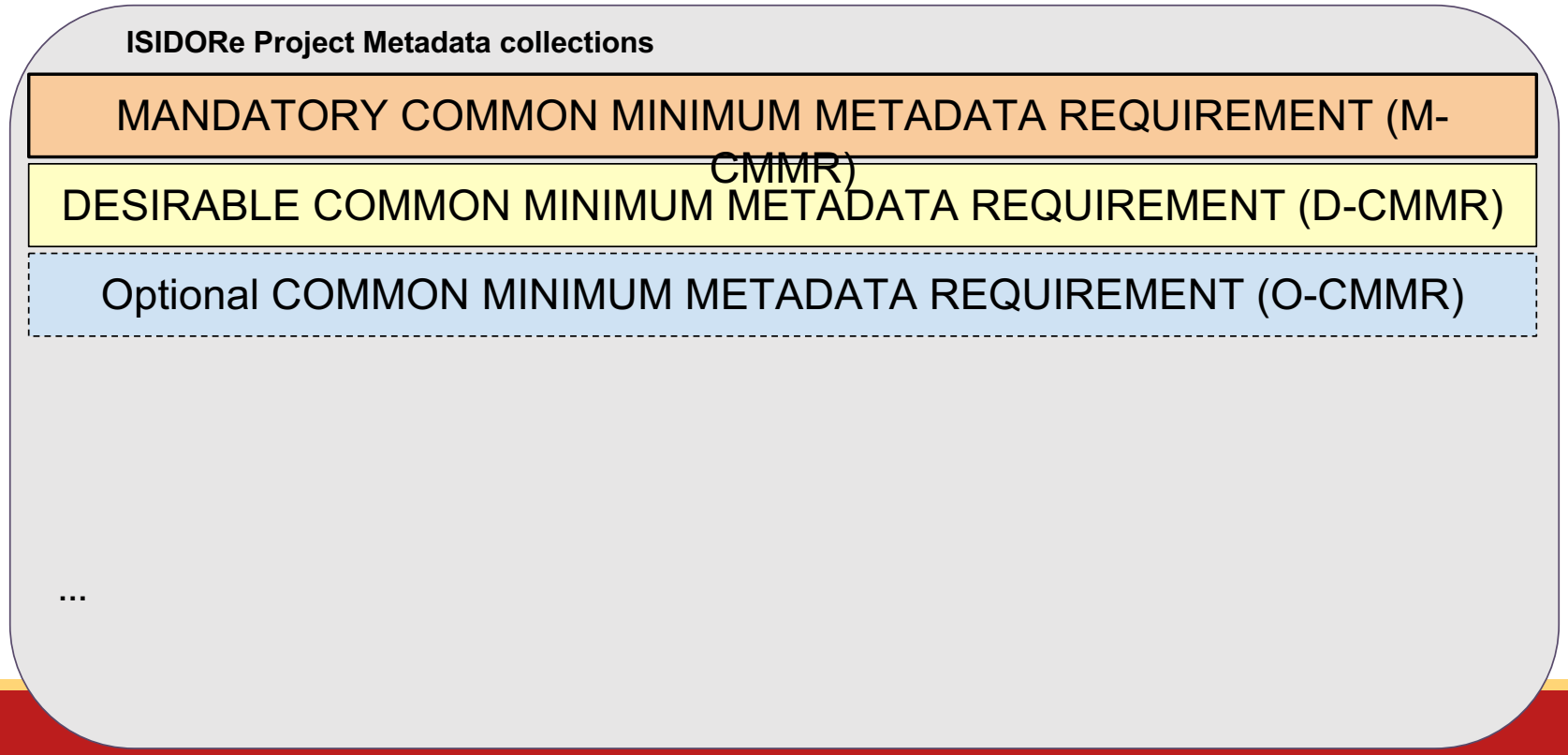
Richard et al., 2022 ISIDORe project



A paper is planned

Work on metadata Metadata for ISIDORe projects results

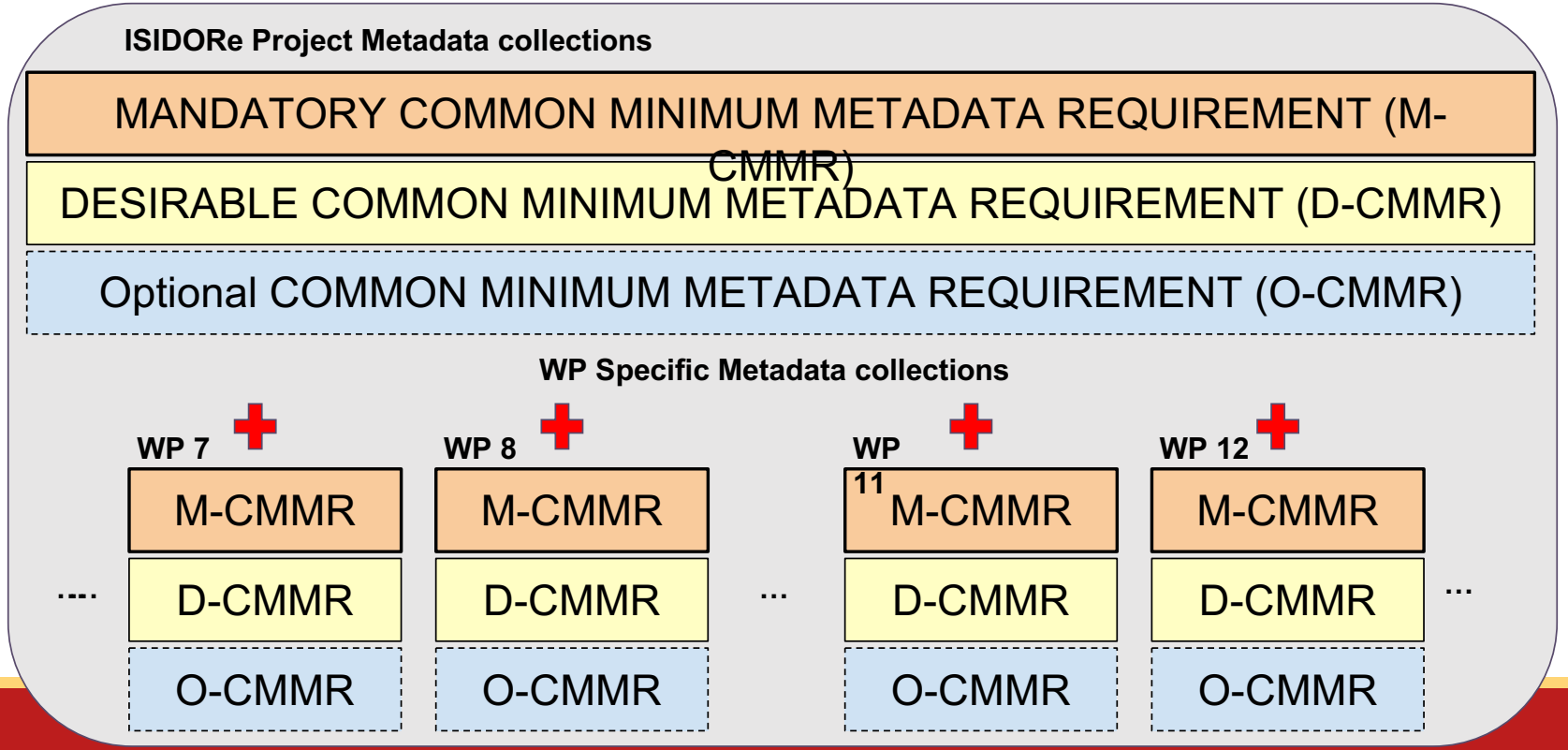
-> a step by step process (see David et al., 2020)



A paper is planned

Work on metadata

Metadata for ISIDORe projects results



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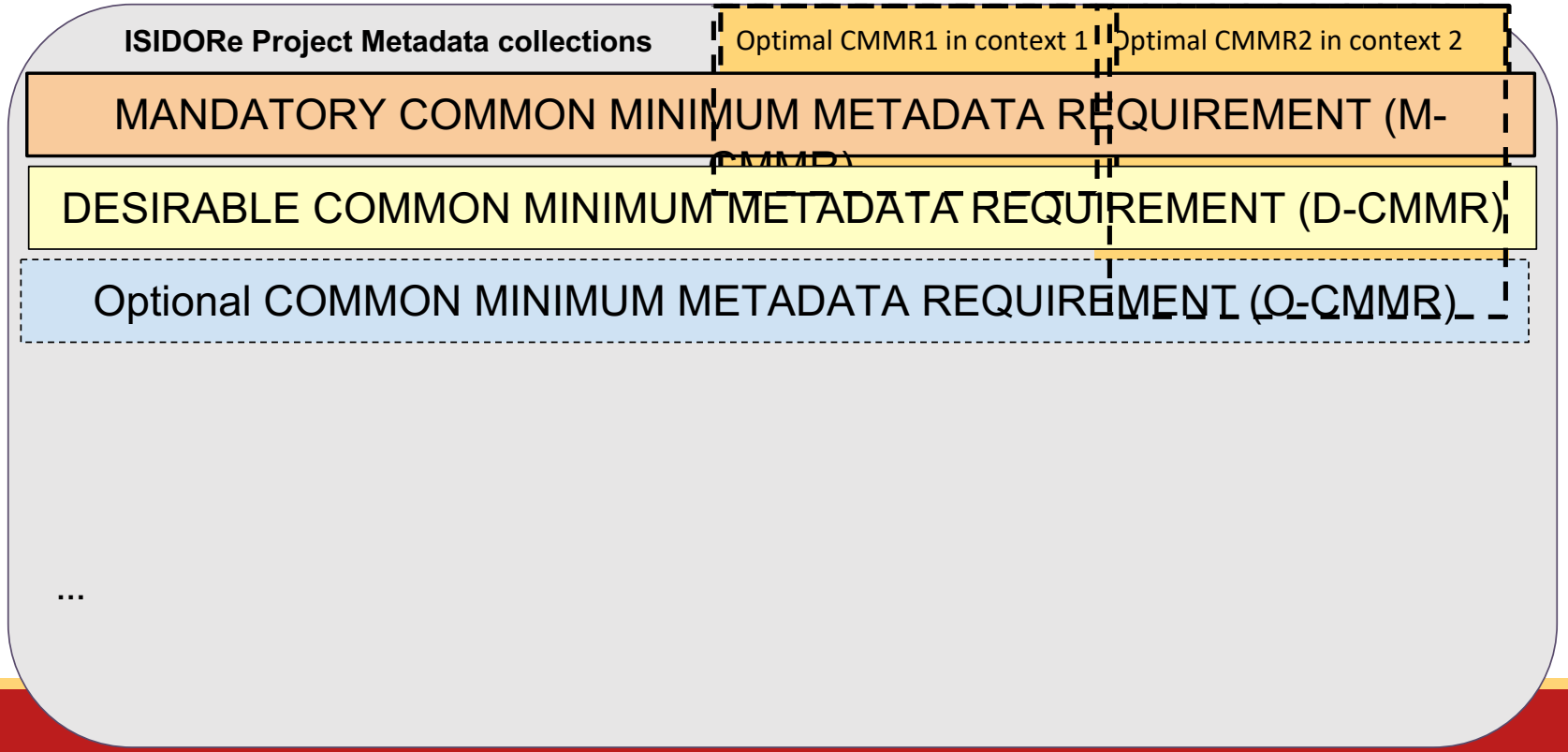
Work on metadata

Metadata for ISIDORe projects results

(extra slide)



Discussion

Please participate to the landscaping & the survey!

romain.david@erinha.eu

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