

# Improving the FAIR level of OHDSI studies using interoperable metadata standards on a pilot website

**PRESENTERS:**  
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**BACKGROUND:**  
Making digital resources like databases and studies in OHDSI Findable, Accessible, Interoperable and Reusable (FAIR)<sup>1</sup> is beneficial for the OHDSI community<sup>2</sup>, because it will:

- allow scientists not yet familiar with OHDSI to find and understand OHDSI studies and databases
- increase opportunities for collaboration
- improve internal data sharing mechanisms

Implementation of standard, interoperable metadata for studies and databases in catalogues from projects like EHDEN<sup>3</sup> provides easy exchange of information, and will help to create a robust, worldwide view on the use of OMOP and OHDSI.



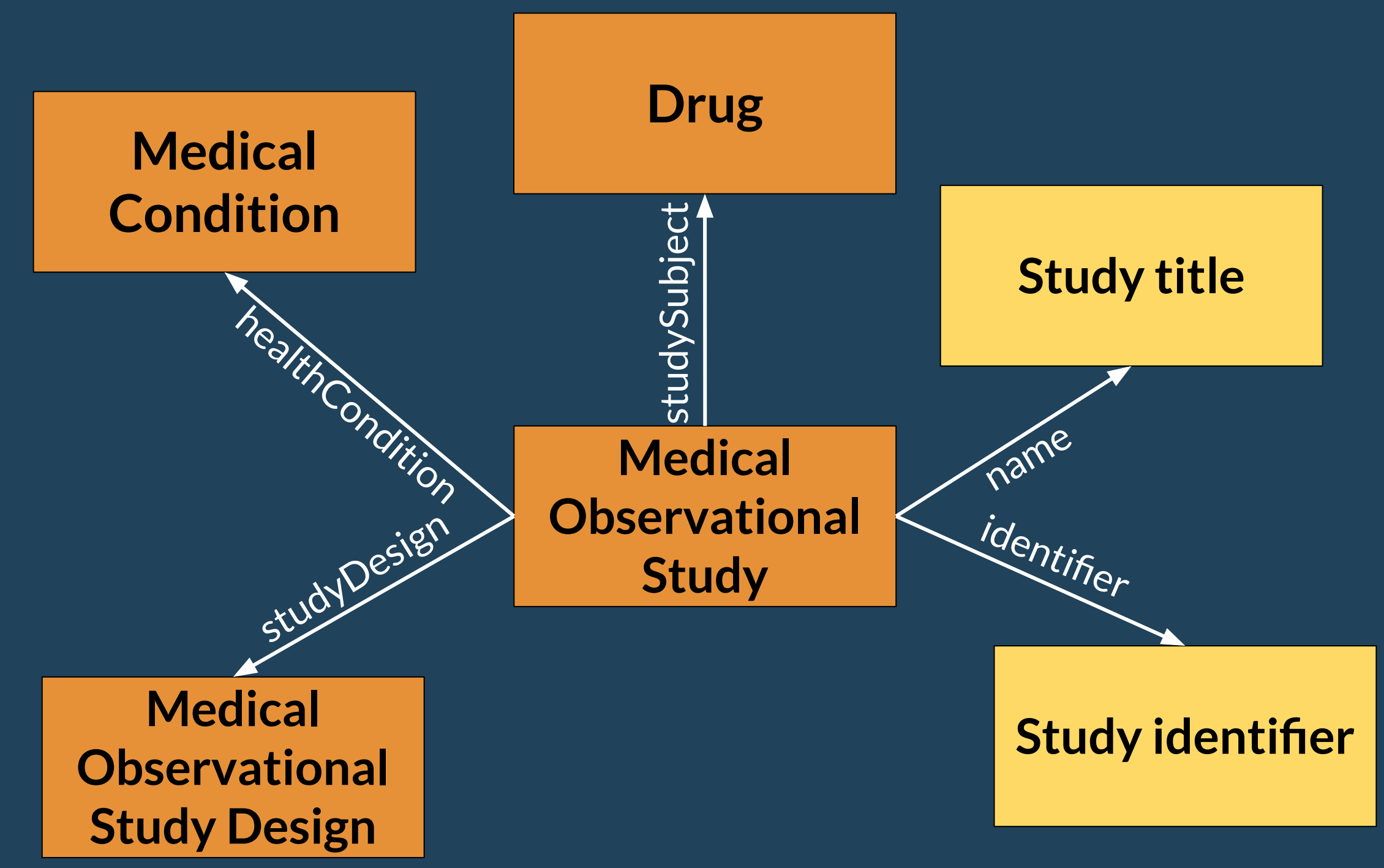
- METHODS:**
1. Assessment of OHDSI studies and databases against the 15 FAIR principles
  2. Creation of metadata standards for databases, studies and authors
  3. Proof-of-concept: COVID-19 study-a-thon website for dissemination of studies

- RESULTS:**
1. There is room for improvement for OHDSI studies and databases, especially on F, A and I (Fig. 1). Rationale behind this score is documented in 'EHDEN Deliverable 4.5 - Roadmap for interoperability solutions'.<sup>4</sup> Improvement can be achieved by:
    - assigning studies and databases unique and persistent identifiers
    - adding rich and findable metadata that is machine-readable, interoperable and standardized



**Figure 1.** Result of FAIR assessment of studies and databases in OHDSI and EHDEN

# Putting FAIR into practice: Metadata standards for digital resources in OHDSI using JSON-LD and Schema.org



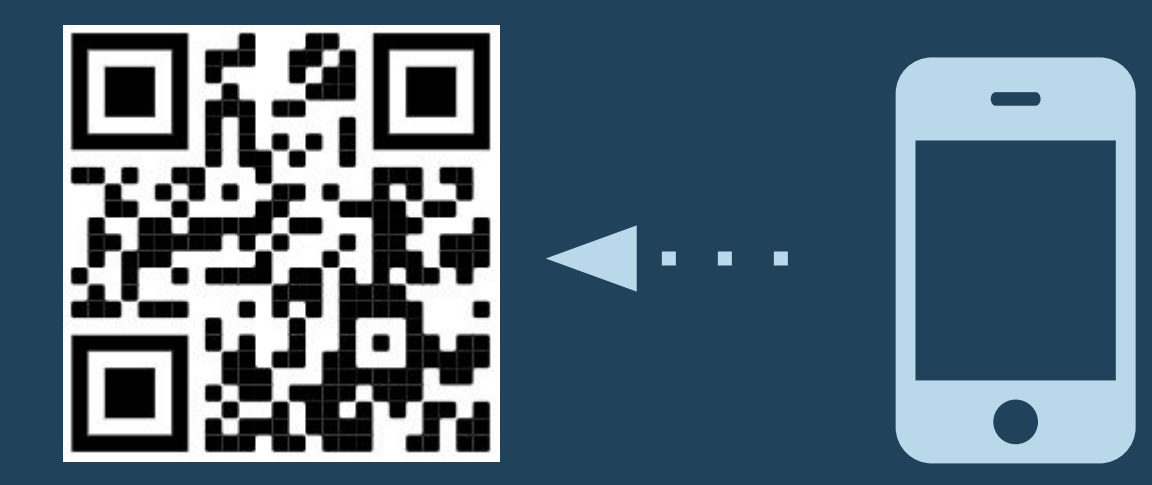
**Figure 2.** Part of the metadata model. Here, each class (orange) and relationship is represented as a Schema.org concept. Literals (yellow) are data types, e.g integers or strings.

```

{"context": "https://schema.org",
"@type": "MedicalObservationalStudy",
"name": "Covid19EstimationHydroxychloroquine",
"healthCondition": {
"@type": "MedicalCondition",
"name": "COVID-19"},
"studySubject": {
"@type": "Drug",
"name": "hydroxychloroquine"}
}
    
```

**Figure 3.** Example of standardized metadata in the machine-readable and interoperable JSON-LD format, using Schema.org concepts.

**Figure 4.** Example metadata of a study on the pilot website. The website displays rich and standardized metadata, and provides links to all important aspects (e.g. forum threads, authors, results) of a study or database.



Take a picture to go to the website, or go directly to [covid19.ohdsi.app](https://covid19.ohdsi.app)

- RESULTS CONT.:**
2. We created a metadata model using concepts of the Schema.org vocabulary.<sup>5</sup> Additionally we created a publicly available OHDSI ontology extension, for elements that could not be mapped to Schema.org concepts.<sup>6</sup> Part of the metadata model is shown in Fig. 2.
 

JSON-LD is used for metadata population. This format is used to structure linked data and is machine-readable, allowing metadata to be searchable with standard search engines. An example of the JSON-LD is shown in Fig. 3.
  3. To put FAIR into practice, we created a pilot website for dissemination of studies performed during the COVID-19 study-a-thon (Fig. 4). Metadata can easily be uploaded to the website by populating metadata templates in (human-readable) YAML (Fig. 5). This YAML is converted to JSON-LD, which is embedded in the HTML code of the website.

```

# Study title
title:

# Study description
description:

# Start date of the study,
use date format YYYY-MM-DD
start_date:

# End date of the study,
use date format YYYY-MM-DD
end_date:
    
```

**Figure 5.** Example of the YAML template used for study metadata

- REFERENCES:**
1. <https://www.go-fair.org/fair-principles/>
  2. <https://www.ohdsi.org/2020-eu-symposium-showcase-24/>
  3. <https://www.ehden.eu/>
  4. Van Bochove et al. (2020). EHDEN Deliverable 4.5 - Roadmap for interoperability solutions. WP4 - Technical implementation. (Work in progress).
  5. <https://schema.org/>
  6. <https://github.com/thehyve/ohdsi-schemas>

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