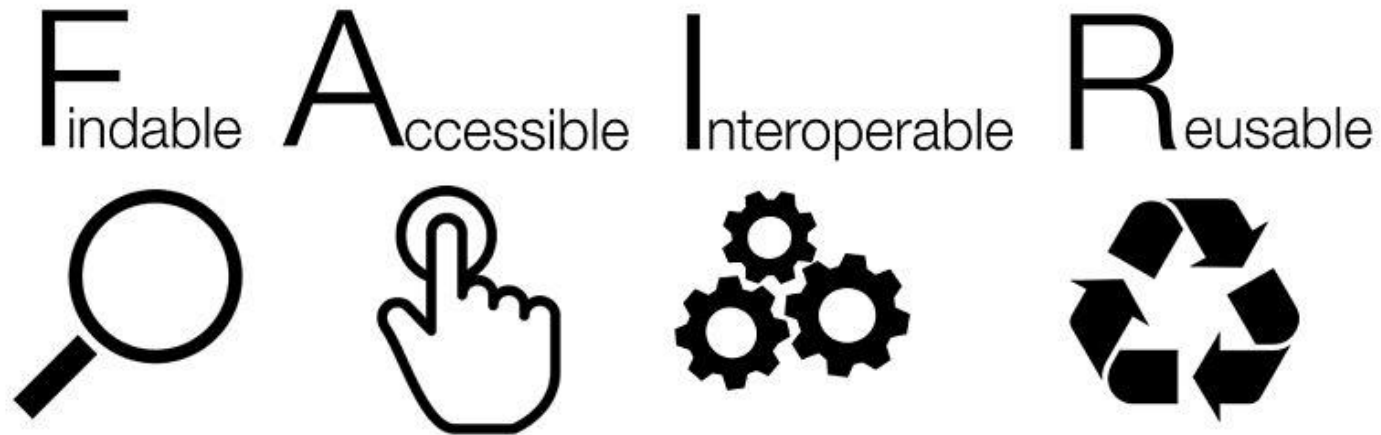# Viperlab Meta-Database
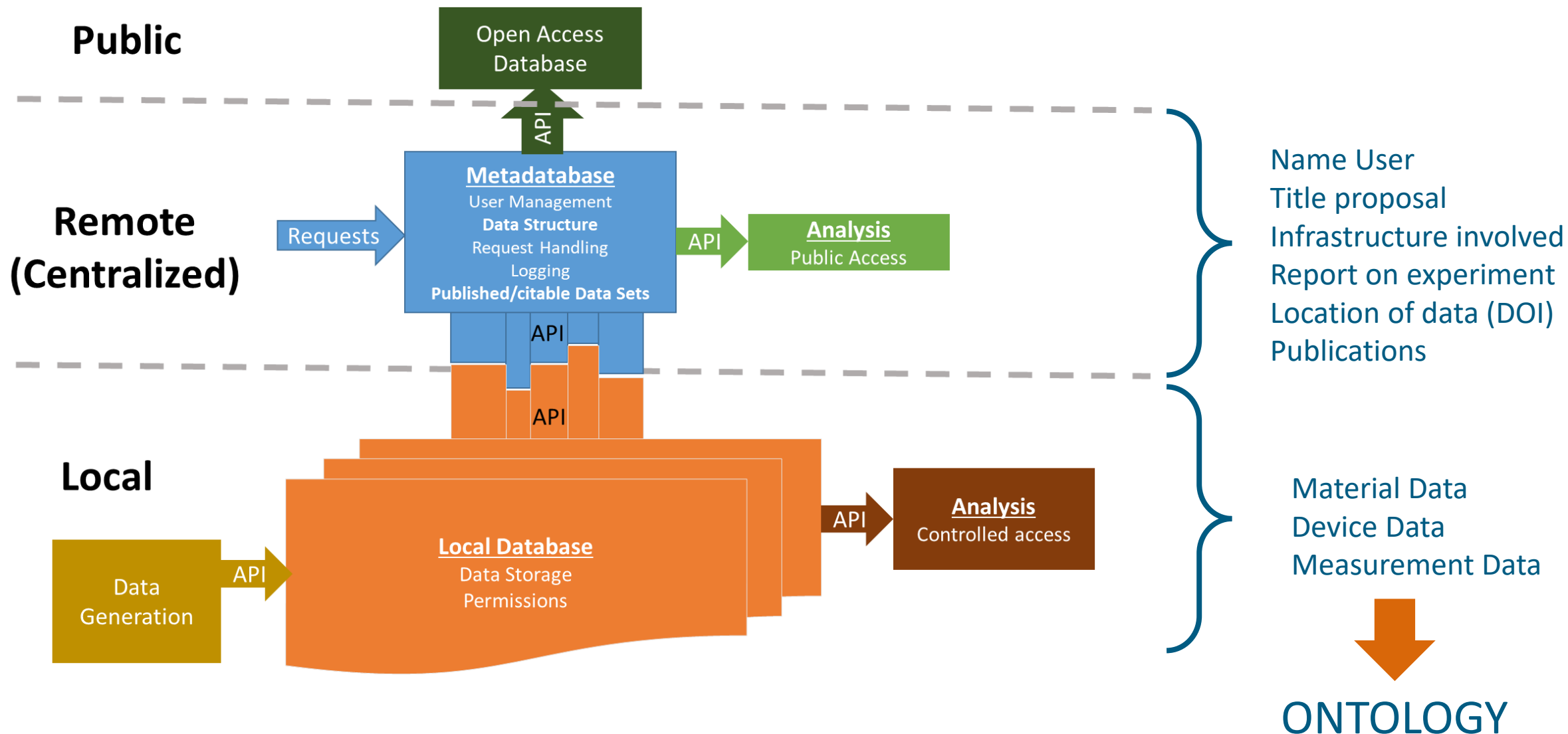
# Why a Meta-Database?

- **Collect relevant information in one place**

- **VAPO as single point of access**

- **Ensure FAIR (Findable, Accessible, Interoperable, Reusable) data**

# What does a Meta-database do?

# What is an ontology?

Woods Hole Oceanographic INSTITUTION

Oceanography, Data Ontology, and the Semantic Web
*SciPy 2020*

**Jaclyn Saunders***, Adam Shepherd, Danie Kinkade, and Mak Saito
jsaunders@whoi.edu

For related files, see: https://github.com/jaclynsaunders/SciPy_2020_Ocean_Data

The "Semantic Web" is essentially the transformation of the world wide web from a distributed file system ("Web 2.0") to a distributed database system ("Web 3.0").

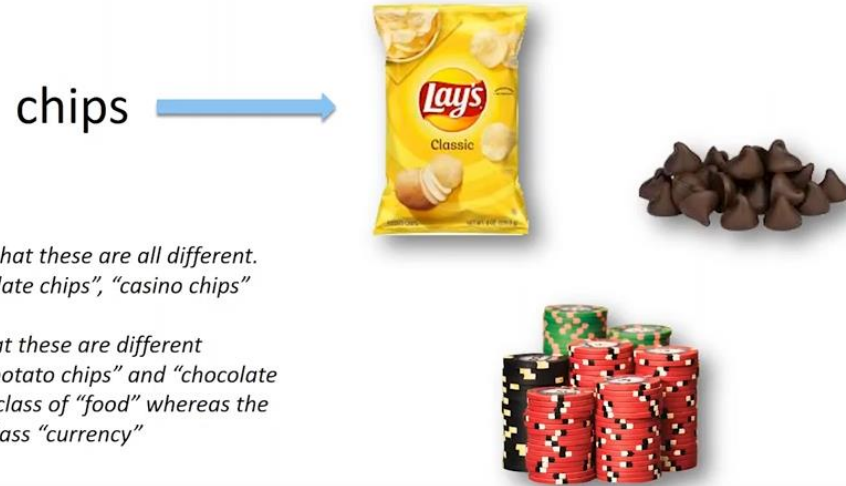- The Semantic Web contains the data and context through relationships with other data

WEB 2.0    WEB 3.0

Web 3.0

https://hackernoon.com/the-web-3-0-the-web-transition-is-coming-892108fd0d

(1) Jaclyn Sanders – Oceanography, Data Ontology, and the semantic Web, https://www.youtube.com/watch?v=gv55W--XCHw

# What is an Ontology?

□ *Semantics: the structure of word meanings and relations*

chips →

**Vocabulary:** *tells you that these are all different.* "potato chips", "chocolate chips", "casino chips"

**Ontology:** *tells you that these are different* "classes" of objects. "potato chips" and "chocolate chips" are both in the class of "food" whereas the "casino chips" are in class "currency"

□ At heart, all data in the semantic web is described in simple declarative statements ("triples").

Subject – Predicate – Object

Potato —type→ Food

***Potato*** is a ***type*** *of* ***Food***

**Subject:**
entities or "things"
come conceptual class

**Predicate:**
A property of the entity (subject)

**Object:**
• Entities – can be subject of another triple
• Literals – strings or numbers

An ontology defines a common vocabulary for researchers who need to share information in a domain. It includes machine-interpretable definitions of basic concepts in the domain and relations among them.[2]

(1) Jaclyn Sanders – Oceanography, Data Ontology, and the semantic Web, https://www.youtube.com/watch?v=gv55W--XCHw
(2) N. Noy: Ontology Development 101: A Guide to Creating Your First Ontology, https://protege.stanford.edu/publications/ontology_development/ontology101.pdf

# Why are Ontologies important?



Ontologies do not only introduce a sharable and reusable knowledge representation, but can also add new knowledge about the domain.
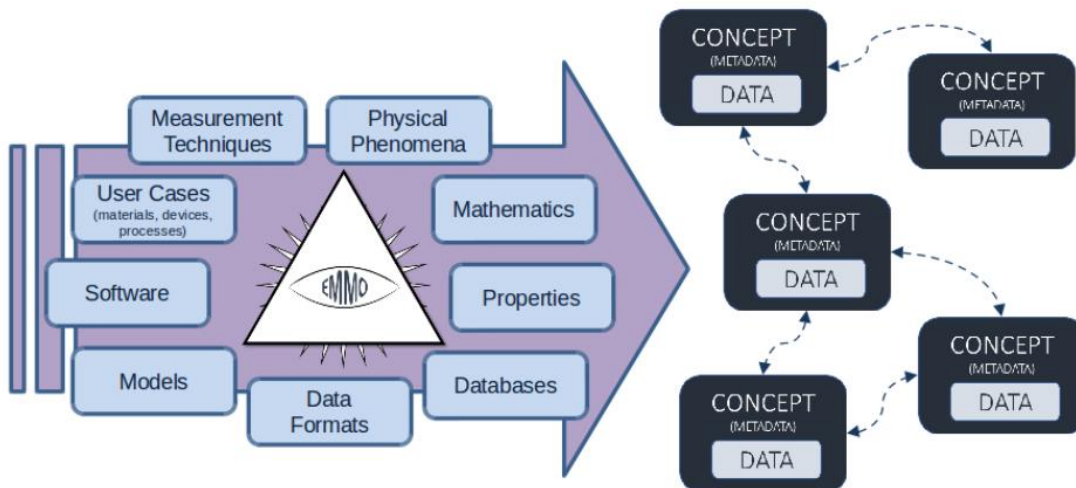
Figure reproduced from Ref. [1]

(1) https://emmc.info/emmo-info/
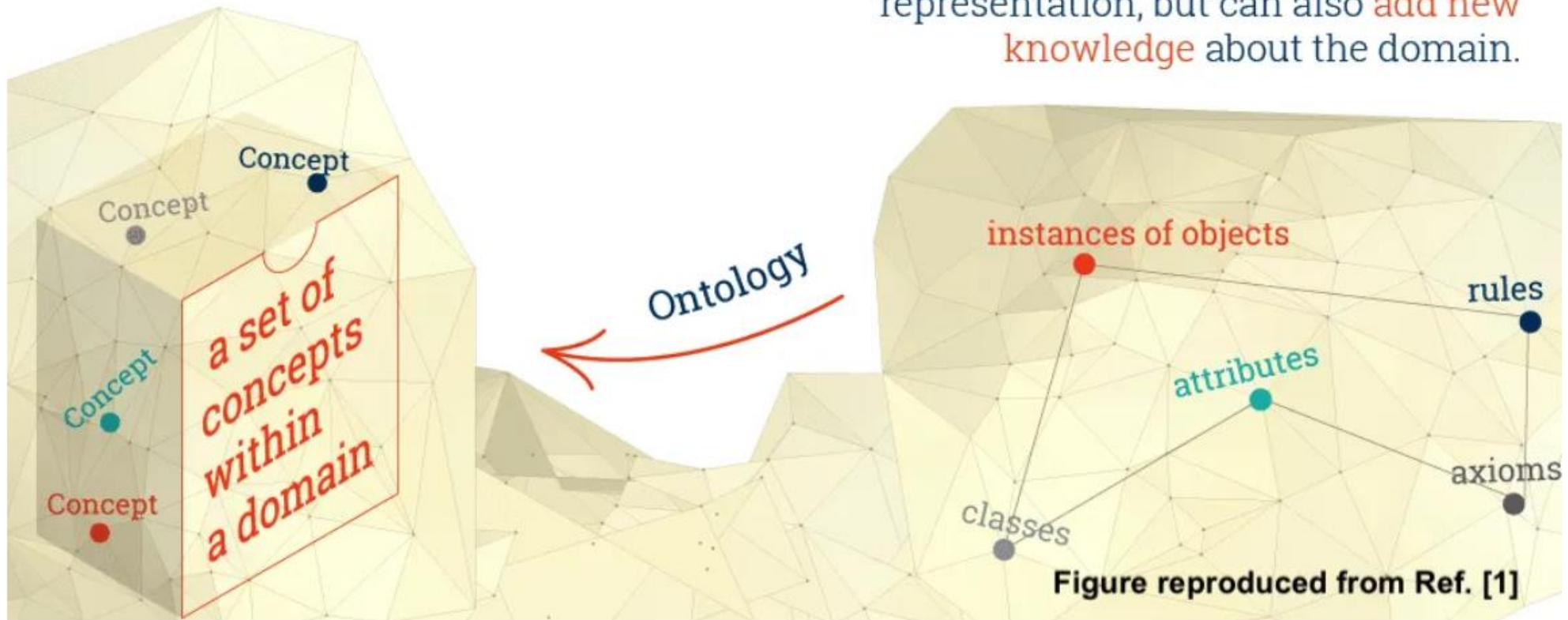
# The EMMO



The European Materials Modelling Council
EMMO Objective

ONTOLOGY
…built on firm physical science, ICT and analytical philosophy foundations

USER CASE
From real world entities…

INFORMATION
…to a digital

Elementary Multiperspective Material Ontology (EMMO)
A top-level ontology for applied sciences
https://emmc.eu/emmo

- **The EMMO provides an ontology framework for materials science.**
- **Domain experts develop specific „domain ontologies that can reference the EMMO**
- **BattINFO is an example of a domain ontology for batteries**
- **Ontologies are public domain. Typically they are found on GitHub**
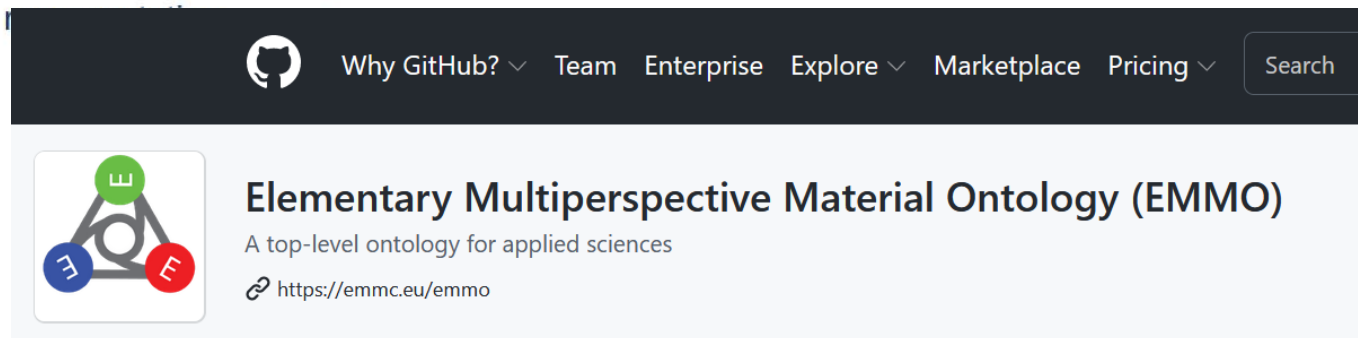
# BattINFO – a domain Ontology for Batteries



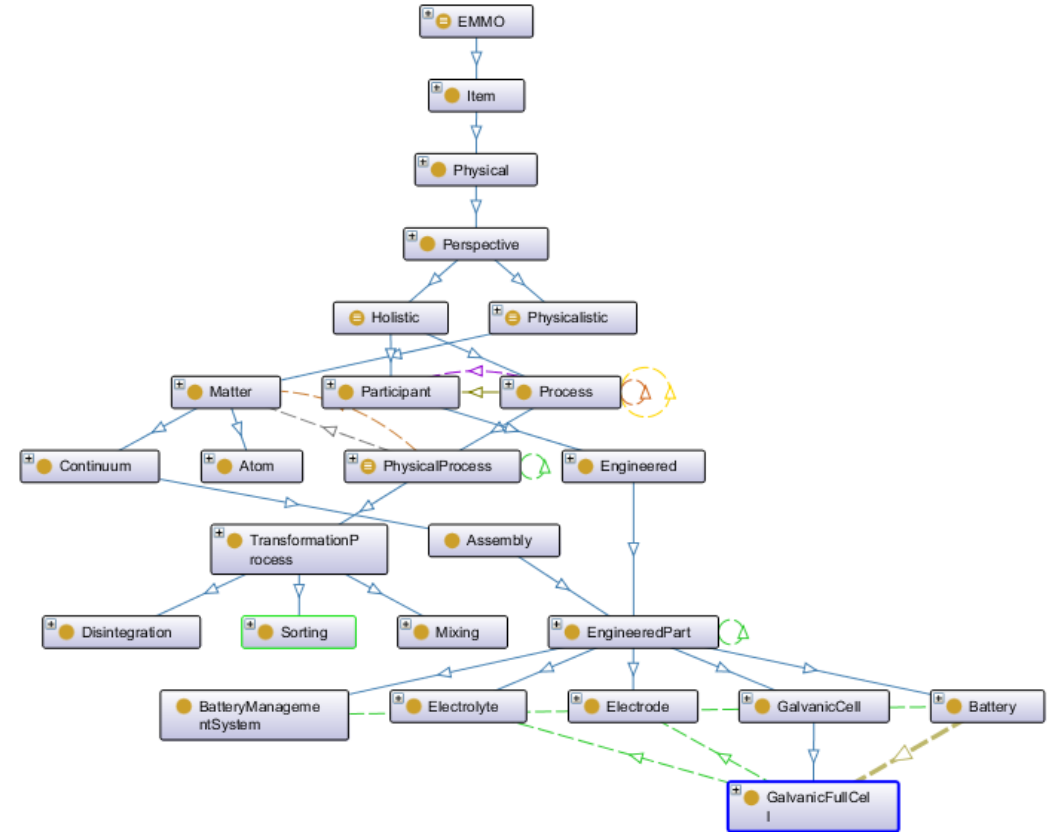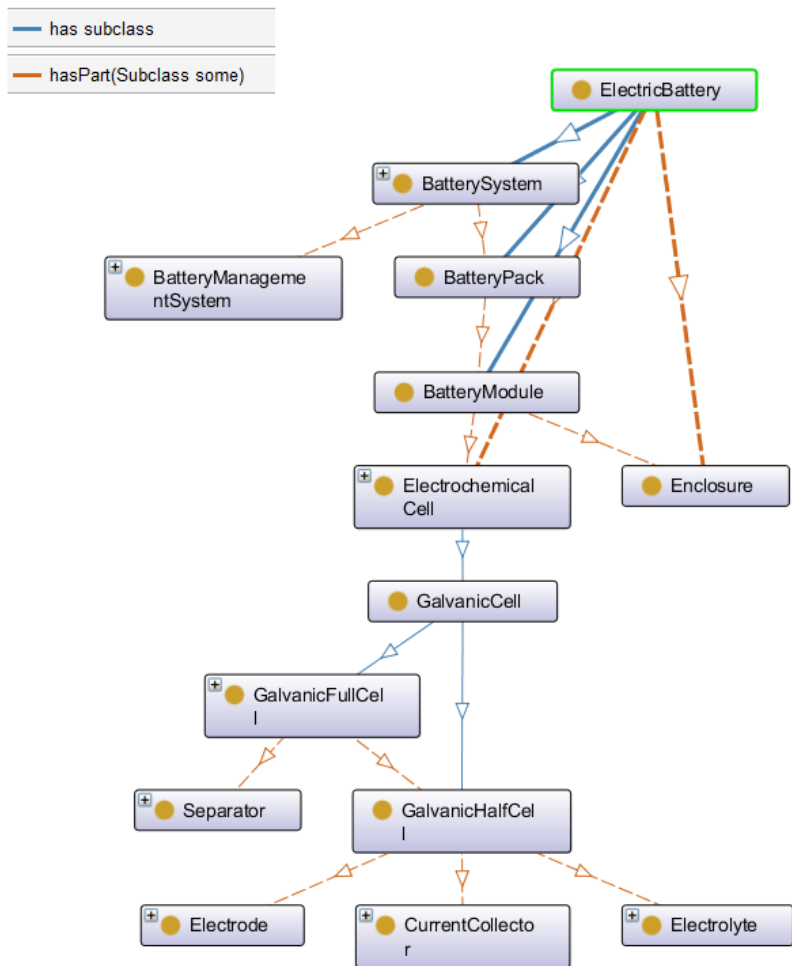https://github.com/Battery-Value-Chain-Ontology/ontology/blob/master/docs/BatteryDefinition.png

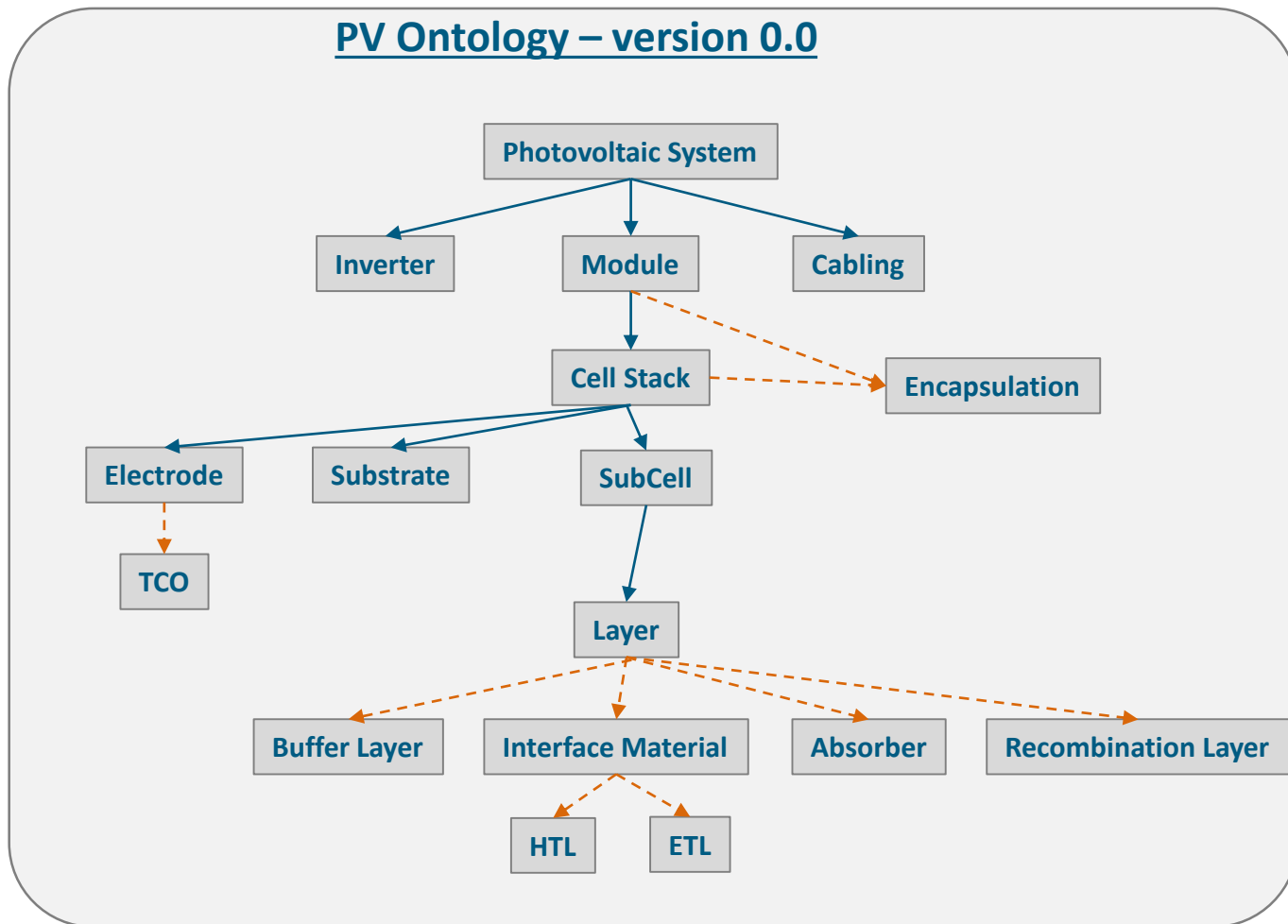https://github.com/Battery-Value-Chain-Ontology/ontology/blob/master/docs/overview.png
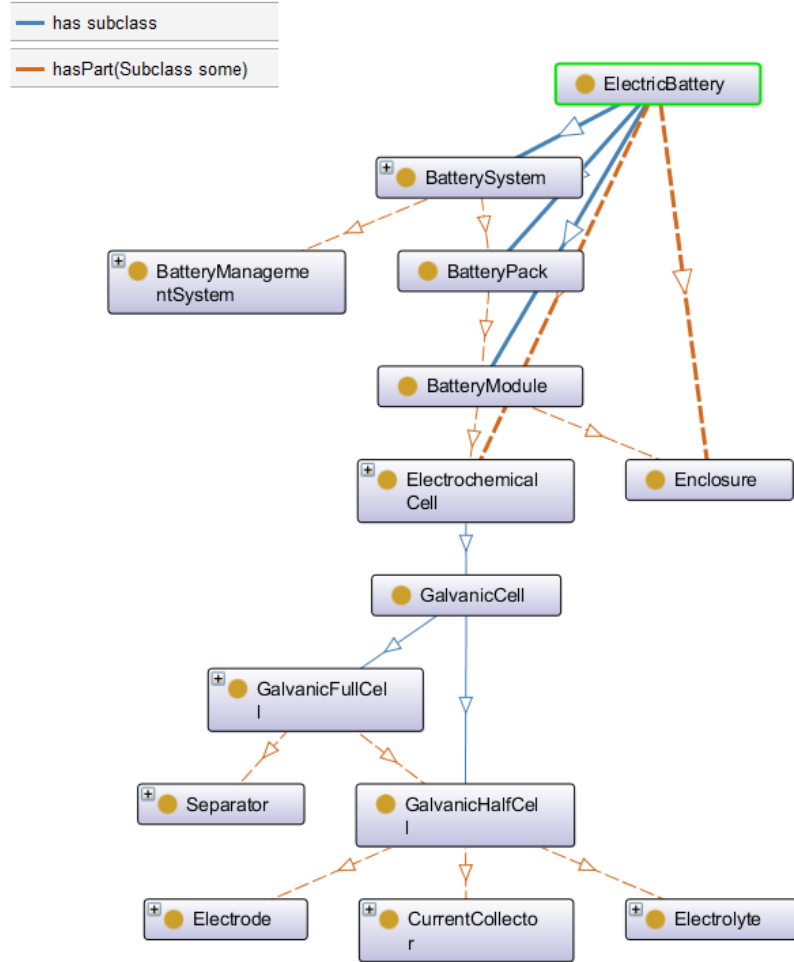
# A first version of a PV-Ontology



https://github.com/Battery-Value-Chain-Ontology/ontology/blob/master/docs/BatteryDefinition.png

# Thank you for your attention!

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