

Synthesis Discussion 2023 Ontology Summit

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Starting Vision - better use of “resources”, tools, methods, standards...

An integrated, convergent view from the BioMedical area

Heard from other communities, disciplines and practices like Earth science experience with approaches such as ontology design patterns.

If approaches, experience and tools differ between areas how do we bring these together to support the vision?

What do we need to do to organize and express what we have discussed and learned into our Communique?

(Maybe there will be some joint work ideas to report.)

James Overton -First Part for the Schedule:

Examples from the Open Bio Ontologies (OBO)

- **2023 01 25** **COB**; using a high-level, core reference model -organize & ground (Chris Mungall)
- **2023 02 01** **ROBOT**:A command line tool to automate ontology workflows. It includes commands that can be used manually or integrated in automated processes to develop & release (management+)
- **2023 02 08** **Ontology Development Kit (ODK)**: A toolkit for initializing a new ontology repository. The template includes a structured directory, a Makefile with automated release workflows, continuous integration testing, and full documentation. (develop) Nico Matentzoglu, Anita Caron and Charles Hoyt
- **2023 02 15** **OBO Dashboards** Using dashboards to monitor ontology standardisation and community activity (Charlie Hoyt, Nicolas Matentzoglu, Anita Caron) (evaluate & understand)
- **2023 02 22** **Ubergraph** provides a SPARQL endpoint for many OBO ontologies loaded and pre-reasoned with simple triples materialized (Jim Balhoff)
- **2023 03 01** **Ending with by a panel** (Chris Mungall, Cogan Shimizu, Krzysztof Janowicz)
- What is in common? How do we support reuse? What can be more broadly adopted?.....

Gary Berg-Cross : 2nd Part of the Summit Schedule

Branching out to other communities, disciplines and practices

- 2023 03 08 Modules & modular approaches to ontology development Cogan Shimizu
- 2023 03 15 Applied Ontology Engineering: The Missing Pieces Karl Hammar
- 2023 03 21/21 Intro Wikidata Andra Waagmeester and Tiago Lubiana
- 2023 03 29 A Synthesis session
- 2023 04 05 Science of Schema.org Adan Sheperd
- 2023 04 12 2nd Panel (Pascal Hitzler & TBD)
- 2023 04 19 - Ontology Development Martin Skjæveland
- 2023 04 26 2nd Synthesis sessions
- 2023 05 03 Communiqué development

Several resources (Wikidata etc.) that model the same domain (or portion of the domain), yet may differ on how concepts are modeled and/or relations between the concepts....?

The Starting 2023 Ontology Summit Vision

In this Summit we will ask how to help scientists & researchers make better use of the variety of ontologies (and other semantic resources).

We look for answers from a variety of perspectives and experiences.

Along the way we will consider the experience with and potentials of specific tools, and associated methods and standards such as:

- 1st part started with an upper level domain reference models in the BioMedical area;
 - Useful templates like ROBOT;
 - Points of convergence such as the Ontology Development Kit;
 - "Carrots and sticks" such as automated quality metrics and dashboards;
 - Improved integration for multiple ontologies ;
 - General approaches such as ontology design patterns.

Interoperability Overview from Nico's Slide (What about interoperability outside the OBO Foundry?)

Need expertise satisfying all layers
in a system

Shared vocabularies and upper level integration

RO standardises the relationships to be
used in OBO ontologies.

OMO standardises the annotation
properties to be used for term and
ontology metadata.

COB provides the upper layer for
biological and biomedical ontologies.
Term-reuse across OBO ontologies.

FA[IR]ness & Openness

Ontologies should be findable, accessible
and openly available.

Feb 1: OAK

Feb 22: Ubergraph

Mar 8, 15: Modules +
Patterns

Shared design patterns

DOSDP templates, ROBOT templates,
OTTr and other systems serve as tools to
abstract modelling patterns and share
them across ontologies.

Common formats and tools

ROBOT, OWL API, rdflib, fastobo, owltools,
dosdp-tools etc are able to read and write
ontologies in commonly understood
formats.

Scripts

Feb 1: ROBOT/OAK
Feb 8, 15: Tools

Credit: Nico Matentzogl

OBO Dashboards

Is a Meeting ground one of agreeing on Ontology Templates?

Reasonable Ontology Templates (OTTR) is a framework and language with supporting tools for representing ontology modelling patterns, and is designed to support interaction with OWL or RDF knowledge bases at a higher level of abstraction, using modelling patterns rather than OWL axioms or RDF triples. This includes:

- * building knowledge bases by instantiating templates;
- * improve the efficiency and quality of building, using, and maintaining KBs
- * communicating (presenting, transferring and visualising) the knowledge base as a set of template instances at different levels of abstraction; and
- * securing and improving the quality and sustainability of the knowledge base via structural and semantic analysis of the templates used to construct the knowledge base.

Ontology implementation

- Ont. Devel.
- Users
- Experts

- Ont. Devel.

- Ont. Devel.
- Users
- Experts

Where & how do
Ontology tools/resources
fit in such a model?

Ontology
requirements
specification

ORSD

6
Ontology
conceptualization

Ontology model

6, 7
Ontology reuse

- Ont. Devel.

6, 7
Ontology
encoding

Ontology code

2, 6, 8
Ontology
evaluation

Evaluated
ontology

Ontology
publication

Online ontology

Ontology
maintenance

Issues, bugs, etc.

Poveda-Villalón, , et al.
"Lot: An industrial
oriented ontology
engineering framework."
2022

Referenced artefacts from other activities

2

Data documentation &
examples

6

ORSD

The OBO Foundry Community (and other communities?)

A community of ontology developers committed to developing a **library of ontologies** that are:

- **open, interoperable ontologies,**
- **logically well-formed and**
- **scientifically accurate.**

Other communities may argue for this too...but are the communities interoperable?

OBO Foundry participants follow and contribute to the development of an evolving set of **principles** including

- open use,
- **collaborative** development,
- **non-overlapping and strictly-scoped content,** and
- **common** syntax and **relations,**
- based on ontology models that **work well**, such as the Gene Ontology (GO).

Are there examples of collaboration outside the community?

Share Practices & Use Tools to Automate Repetitive Tasks for OBO Sphere (ontology in general) Roles:

Database Curator:

annotating datasets, experiments and publications, requesting new terms from ontologies, suggest corrections to existing ontologies

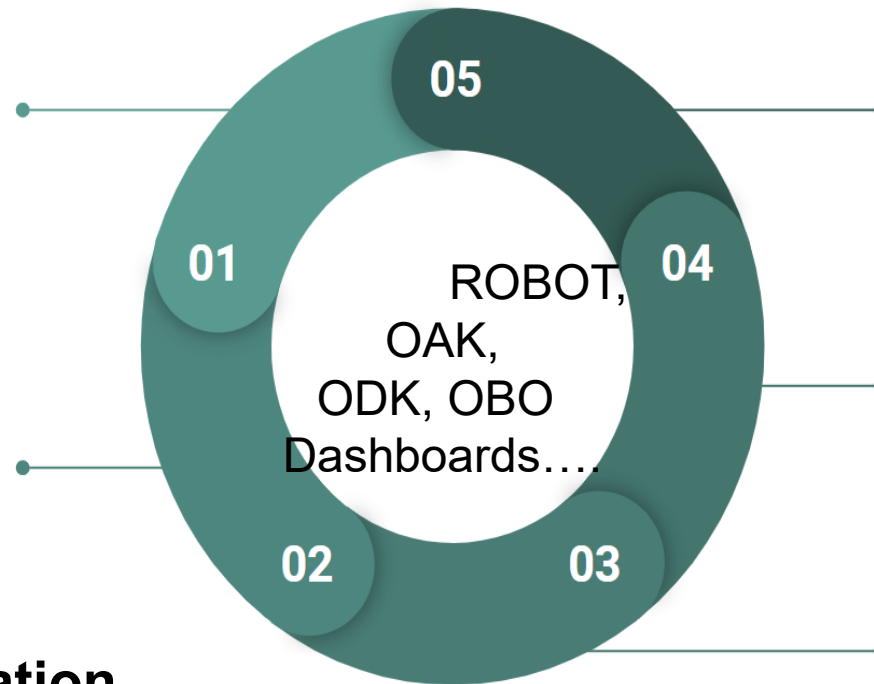
Wikidata?

Ontology Curator:

developing and maintaining ontologies, adding terms to ontologies (and other changes), managing ontology releases

ROBOT, Glossary & semantic harmonization

Also Scientists and Researchers



Semantic Software Engineer

building widgets that exploit the logical and graph structure of ontologies, for example phenotypic profile matching, building ontology term browsers such as OLS.

Semantic ETL Engineer:

building ingests from public life science resources; glue together data from different sources; augment your the information in your data sources through inference

Ontology Pipeline Specialist:

developing ontology pipelines with make and ROBOT, building the release and quality control architecture, building infrastructure for application ontologies, implementing dynamic imports modules, transformations of and mappings to other ontologies.

Ontology Engineer/Developer:

developing design patterns for ontologies, specifying the logical structure of terms, responsible for ensuring the specification and

Standardising bottom-up is a very hard task

Different communities have different bottoms but maybe we can share the middle.

- The **OBO Foundry is fundamentally bottom-up**: we provide recommendations, but then it is up to the community to implement or reject them
- It is **hard to reach any degree of agreement** in a diverse culture like ours:
 - What belongs in COB? Measurement? Measurement Datum? Measurement Datum Recording Medium? **More communities makes harmonizing and agreeing more difficult.**
 - How should we encode synonyms?
- To satisfy some of the layers **requires a very high level of expertise**:
 - Shared design patterns require deep knowledge of OWL and template systems
 - Re-using shared vocabularies requires knowledge about ontology pipelines and OWL semantics
- It is very difficult and costly to determine whether any given ontology implements the recommendations.

Hence the need for dashboard overviews by the community.

OBO principles operationalised (useful for all ontologies)

OBO Dashboard (2022-12-15)

Dashboard for OBO Foundry ontologies. [Learn More!](#)

Created with [ROBOT version 1.9.1](#) and [OBO Metadata Schema](#).

Your ontology here

Ontology
(click for details)

ado

agro

aism

amphx

apo

apollo_sv

aro

bco

bfo

bspa

bto

caro



	Open	Format	URLs	Version	Scope	Definitions	Relations	Documented	Users	Authority	Naming	Maintained	Responsiveness	ROBOT Report	Summary
ado	✓	✓	✓	✓	✓	✗	?	✓	✗	✓	✓	✓	✓	✗	✗
agro	✓	✓	✗	✓	✓	Δ	✓	✓	✓	✓	✓	✓	✓	Δ	✗
aism	✓	✓	✓	✓	✓	✓	?	✓	✗	✓	✓	✓	✓	Δ	✗
amphx	✓	✓	✗	✓	✓	✗	✓	✓	✗	✓	✓	?	✓	✗	✗
apo	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✗	✓	✓	✗	✗
apollo_sv	✓	✓	✓	✗	✓	✗	?	✓	✗	✓	✗	✓	✓	✗	✗
aro	✗	✓	✗	✗	✓	✗	✓	✓	✗	✓	✓	✗	✓	✗	✗
bco	✓	✓	✓	✗	✓	✓	?	✓	✗	✓	✓	?	✓	✗	✗
bfo	✓	✓	✓	✓	✓	Δ	✓	✓	✓	✓	✓	✗	✓	✗	✗
bspa	✓	✓	✓	✓	✓	✗	?	✓	✗	✓	✗	✓	✓	✗	✗
bto	✓	✓	✓	✗	✓	✗	?	✓	✗	✓	✗	?	✓	✗	✗
caro	✗	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗	✗

<https://doi.org/10.1093/database/baab069>

<http://dashboard.obofoundry.org/>

The OBO Foundry helps address some challenges

- “When building an ontology, the heterogeneity between the needed conceptualization and that of available ontologies, as well as the deficiencies in some of such ontologies (concerning documentation, licensing, etc.) are important obstacles for reusing ontologies of the same domain of the ontology under development. A possible approach to lessen these problems could be the creation of communities similar to open software ones in charge of developing and maintaining ontologies.”
- Language heterogeneity
- General deficiencies in the documentation and,
- Lack of meaningful information about the ontology due to lack of agreement on minimal metadata (more to be developed for the Communique...)



More Discussion