



Semantic Artefact Governance Workshop

16.30 - 18.30 CEST

28 Sept 2023

Lecce (Italy) & *Online*



Co-located with
OntoPortal
Workshop 2023



OntoPortal Workshop Public Session

Sept. 27th, 16h-18h CEST



2nd OntoPortal
Alliance Workshop

27-29 September 2023
Lecce, Italy

   **FAIR-IMPACT**
Expanding FAIR solutions across EOSC

The workshop features 2 public online events

- Sept. 27th, 16h-18h CEST
 - OntoPortal public session on Ontology development lifecycle
- Sept. 28th, 16h30-18h30 CEST
 - [FAIR-IMPACT Semantic Artefact governance workshop](#)






FAIR-IMPACT
Expanding FAIR solutions across EOSC

FAIR-IMPACT Semantic Artefact Governance workshop

September 28th 2023, 16:30-18:30 CET
Hybride (Online & Lecce, Italy)

Nina Grau (INRAE)
Nicola Fiore (LifeWatch)
Clement Jonquet (INRAE)



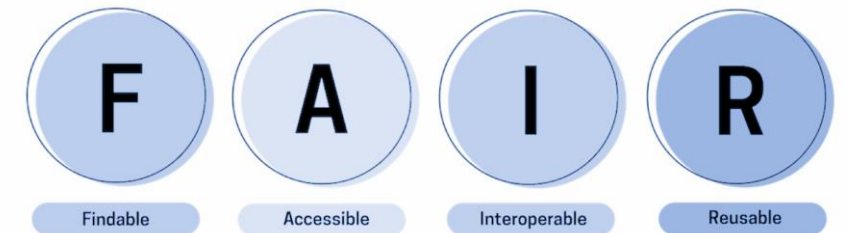
European Open Science Cloud ( EOSC) = provide an **environment for hosting and processing research data** to support EU science, towards:

- seamless **access**
- **FAIR** management
- **reliable reuse** of research data and all other digital objects produced along the research life cycle (e.g., methods, software, publications... semantic artefacts)

<https://eosc-portal.eu/about/eosc>

FAIR-IMPACT project objectives:

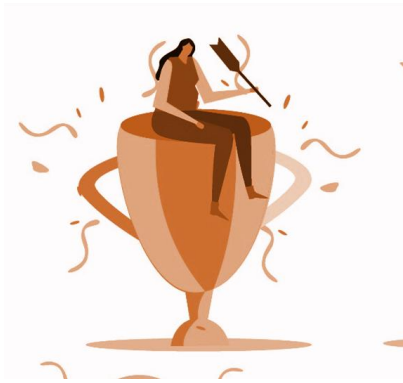
Support the **implementation of FAIR-enabling practices, tools and services** across scientific communities



From '[Making data FAIR](#)' blog

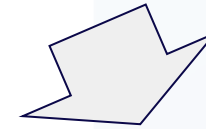
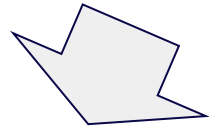
Importance of data governance

“In a 2006 survey of 359 North American organizations that had deployed business intelligence and analytic systems, a program for the governance of data was reported to be **one of the five success "practices"** for deriving business value from data assets. “



Vijay Khatri and Carol V. Brown. 2010. [Designing data governance](#). Commun. ACM 53, 1 (2010), 148–152.

Make an **inventory of semantic artefact governance models** that will be relevant for **communities within the EOSC ecosystem**




Existing disciplines-based or community-driven semantic artefact **governance**



Relevant decisions

that can be applied to other disciplines / groups



Greater and more harmonised use of **semantic artefacts** throughout the EOSC ecosystem, leading to semantic interoperability **within and between disciplines.**

⇒ T4.1: *Review and produce governance models for the management of semantic artefacts*

Semantic artefact governance in the EOSC roadmap

EOSC Interoperability Framework

- “(need for...) Repositories of semantic artefacts, rules with a **clear governance framework**.”
- “Need for documents explaining terms and conditions and acceptable use policies for services providing interoperability. For instance, providing clear descriptions of the **service-level agreements of those providing catalogues** and registries of semantic artefacts”

EOSC Strategic Research and Innovation Agenda

- “Develop **governance structures** for coordinating the work on metadata and ontologies within EOSC, both for specific disciplinary communities and for overall coordination.”
- “This governance should be built primarily around **existing discipline-based communities** but needs to be coordinated across these communities within EOSC”
- “The **work that these governance structures coordinate** should include
 - registries that describe metadata schemata in a standardised and machine-actionable way,
 - better researcher-focused tools and services working with these metadata,
 - crosswalks between existing metadata schemata,
 - and training and documentation.”

What do we mean by governance?



Governance

Refers to **what decisions** must be made to ensure effective management and use of resources and **who makes the decisions**



Management

Involves making and **implementing decisions.**

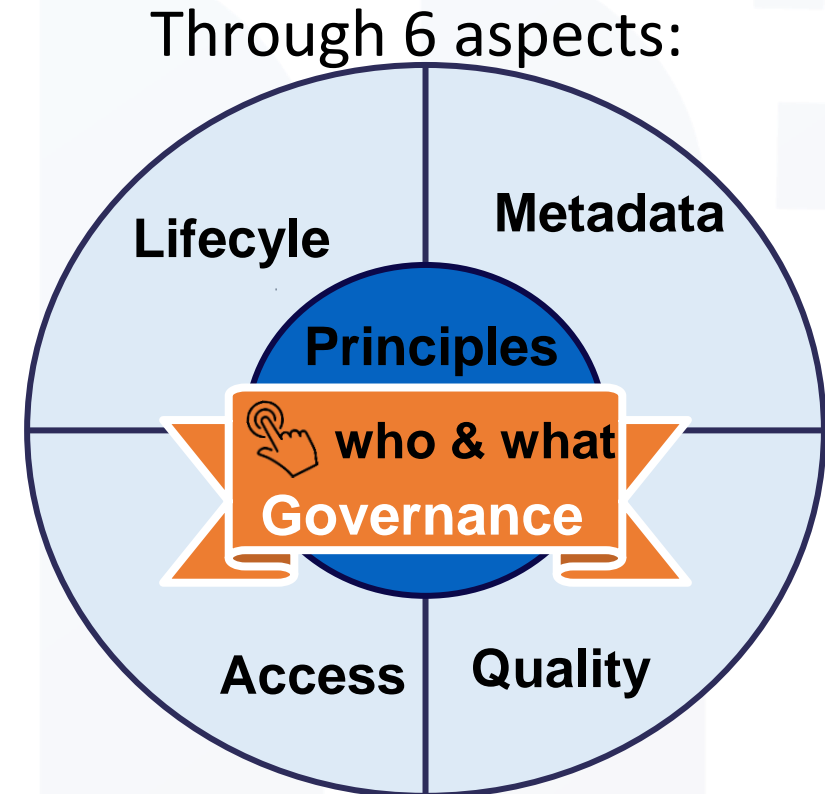
Weill, P. and Ross, J. W. *IT governance: How top performers manage IT decision rights for superior results*. Harvard Business School Press, Boston, MA, 2004.

General governance aspects examined

We will cover, the semantic artefact's

- **context** of use;
- concrete actions to guarantee their **quality** and **sustainability**;
- processes for their **implementation**, **versioning** and **maintenance**;

and the **stakeholders** involved in their design.



Surveyed communities

Because “one size does not fill all”



- CROP Ontology project
- OBO Foundry
- BASF
- INRAE Vocabularies
- IVOA



- NFDI4biodiversity
- EMBL-EBI
- SAREF
- AGROVOC



Guiding questions

- **Q1: Context / Principles**

- **Goals** of the Infrastructure/Project/Research entity ?
- What is the **nature** of the semantic artefacts and where and from whom do they come?
- Is your group of semantic artefacts hosted by one or several semantic artefact **catalogues**? Are those catalogues part of your publication processes?

- **Q2: Metadata**

- Which **information** do you require to describe your semantic artefacts?
- Which metadata **standards** do you use?

- **Q3: Quality**

- How do you assure the **quality** of your semantic artefacts?
- What are the recommended **good practices**? Are you following guidelines or high level principles?
- Do you enforce **reuses and imports** from other semantic artefacts?
- How do you collect **feedback** and issues from the users?

- **Q4: Access**

- Do you have **terms and conditions** for your semantic artefacts and **who** is responsible? How are they licensed?
- Do you have **machine accessible** endpoints available? Other services to share/support the ontologies?
- How do you **communicate** with semantic artefact users and get them notified?
- How do you ensure the **sustainability** of your semantic artefacts? (financially speaking but not only)

- **Q5: Lifecycle**

- How do you deal with the **maintenance**? Describe the processes to add new terms (method, periodicity and policy)?
- How do you deal with **retirement** or obsolescence?
- How do you manage the **versioning**?
- Do you manage **different languages** (for labels)?

- **Q6: Stakeholders and decisions**

- Can you list the **stakeholders** involved in each of these governance aspects? (developer, curator, board, experts, committee...)?
- How are you **taking decisions** for each of the governance workflow steps?



FAIR-IMPACT
Expanding FAIR solutions across EOSC

1) Agronomic

“The Crop Ontology governance framework”

Elizabeth Arnaud & Marie-Angélique Laporte
Alliance Bioversity-CIAT, CGIAR

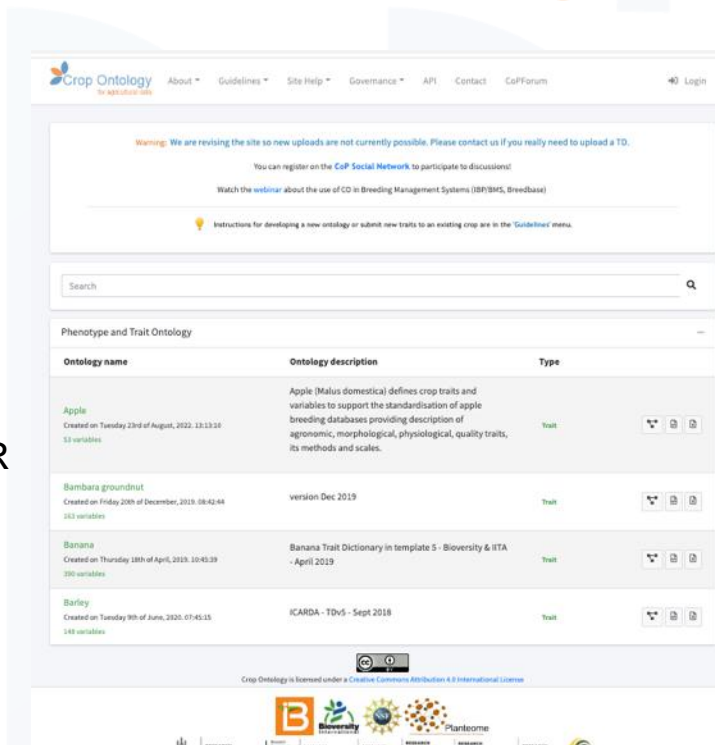


RECORDED
PRESENTATION

The Crop ontology governance framework Crop Ontology for agricultural data

a- Context / Principles (1 or 2 Slides)

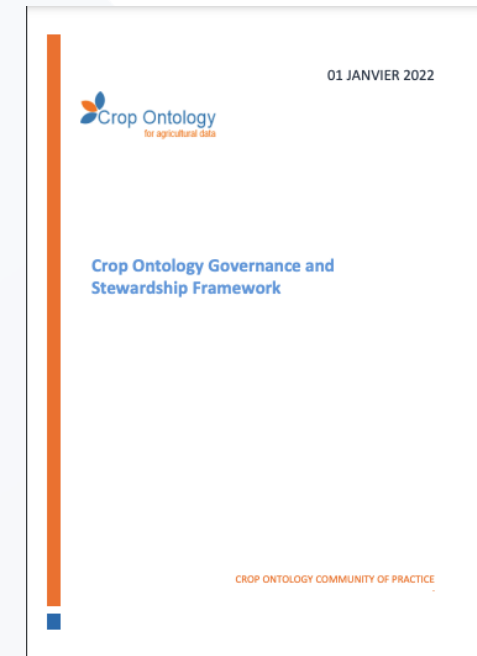
- Crop Ontology (CO; <https://croponontology.org/>), created in 2008: a framework to compose **phenotypic traits and variables** and their semantic relationships. It compiles to date concepts for **36 crops**, provided mainly by breeders, geneticists, food scientists.
- CO is developed by a **Community of curators and crop experts** from the CGIAR and partners, universities, consortia, etc and is available online under the **CC-by 4.0 license**.
- 11 CO crops are mapped to the species-neutral **Planteome Plant Trait Ontology** (<https://planteome.org/>) and a repository is created in the **Planteome Github** where the Trait Dictionary is available in csv and in OBO.
- indexed by Agroportal of LIRMM, the EMBL Ontology Lookup Service (OLS), ELIXIR FAirsharing (<https://fairsharing.org/>), and others.



Crop	Code
Andean Roots and Tubers	332
Apple	370
Bambara groundnut	366
Barley	323
Beet	333
Blueberry	371
Brachiaria (Forages)	345
Brassica	348
Cassava	334
Castor bean	347
Chickpea	338
Coconut	326
Coffee	361
Cotton	358
Cowpea	340
Faba bean	365
Finger Millet	328
Flax	362
Forages	342
Groundnut (Peanut)	337
Lentil	339
Maize	322
Melon	364
Mungbean	346
Musa (Banana)	325
Oat	350
Pearl Millet	327
Phaseolus (Common Bean)	335
Pigeon Pea	341
Potato	330
Protein crops	349
Quinoa	367
Rice	320
Sainfoin	369
Silphium	368
Sorghum	324
Soybean	336
Strawberry	372
Sugar Kelp	360
Sunflower	359
Sweet Potato	331
Vitis	356
Wheat	321
Woody plants	337
Yam	344
Walnut	363

The Crop ontology governance framework

- A **Governance and Stewardship framework** was published in 2022 with the input of the CoP: <https://cgspace.cgiar.org/handle/10568/118001>
- and in paper Devare, M., Arnaud, E., Antezana, E., King, B. (2023). *Governing Agricultural Data: Challenges and Recommendations*. In: Williamson, H.F., Leonelli, S. (eds) *Towards Responsible Plant Data Linkage: Data Challenges for Agricultural Research and Development*. Springer, Cham. https://doi.org/10.1007/978-3-031-13276-6_11
- **3 Advisory groups** were created following the Framework's recommendations:
 - **Curator Committee** includes 3 curators
 - **Scientific Advisory Committee** includes scientists leading research projects using CO
 - **Strategy Advisory Committee** includes scientists and informatics experts leading breeding databases or global information platforms, ontology registries (e.g. Agroportal)
- List of Committee's members available online: <https://croponontology.org/page/MembersAC>



1) The Crop ontology governance framework



b- Metadata (1 Slide)

- ❖ Name of the ontology
 - ❖ Short description
 - ❖ Curator(s) name(s) and affiliation
 - ❖ Contributor(s) and affiliation
 - ❖ Version
 - ❖ Link to a peer review paper if any
-
- No specific standard for the metadata is applied in Crop Ontology - a weakness
 - The metadata are not machine readable (published on our website)
 - use of **DOI with citation & version**

1) The Crop ontology governance framework



c- Quality

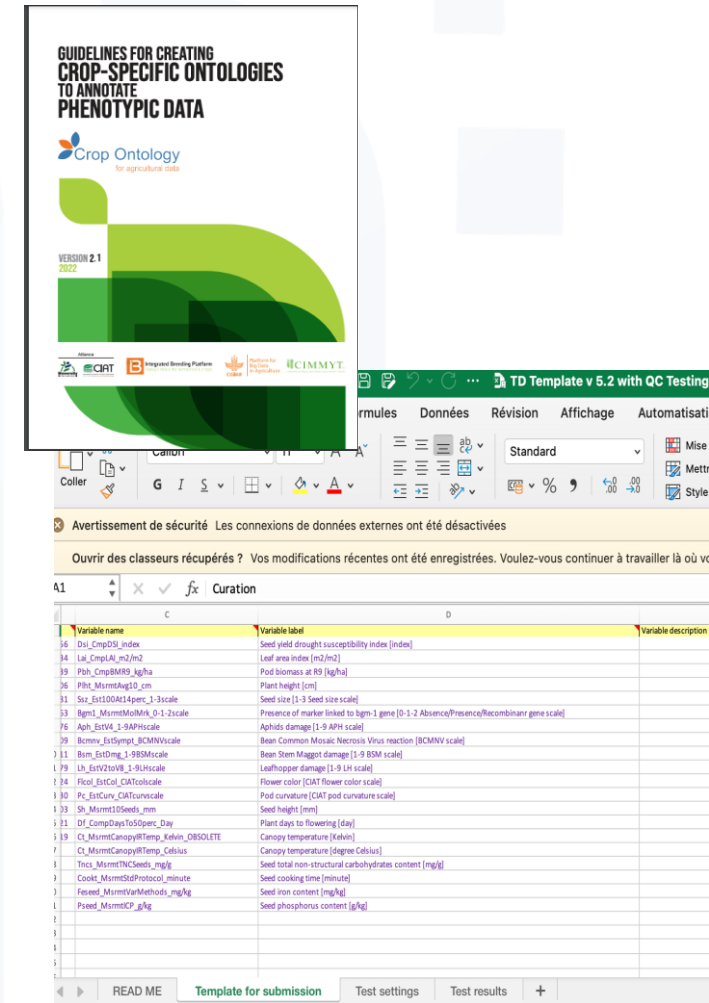
❖ Tools for Quality:

- Guidelines
- Trait Dictionary Template with Readme and an embedded Quality Control tool
- Helpdesk for technical curation and support
- Organized Workflow
- Planteome Github repository (<https://github.com/Planteome>)

❖ Priority setting of quality criteria for ontologies in agriculture done with the CoP -see Arnaud et al, 2022, Doi: 10.1016/j.patter.2020.100105 .

❖ in Crop Ontology, we do not import concepts from other ontologies - we map the crop-specific concepts to the species-neutral Plant Trait Ontology (TO) to create an upper level entry point to the trait data.

❖ Feedback through: Issues posted in Github, helpdesk mail, Curator Committee meetings, surveys and our Community Forum (<https://community.cropontology.org/>)



Variable name	Variable label	Variable description
DH1_CropD3_index	Seed yield drought susceptibility index [index]	
Lai_CmplA2_m2/m2	Leaf area index [m2/m2]	
Pbh_CmpBMR9_kg/ha	Pod biomass at R9 [kg/ha]	
Pht_MsmMAug10_cm	Plant height [cm]	
Size_Est100A14perc_1-3scale	Seed size [1-3 Seed size scale]	
Bgm1_MsmMolMm_0-1-2scale	Presence of marker linked to bgm-1 gene [0-1-2 Absence/Presence/Recombinant gene scale]	
Aph_EstV4_1-9APHscale	Aphids damage [1-9 APH scale]	
Bcmr_EstMmp_BCMNVscale	Bean Common Mosaic Necrosis Virus reaction [BCMNV scale]	
Bsm_EstDmg_1-9BSMscale	Bean Stem Maggot damage [1-9 BSM scale]	
Lh_EstV2v8_1-9LHscale	Leathopper damage [1-9 LH scale]	
Ficol_EstCol_CIATooscale	Flower color [CIAT flower color scale]	
Pc_EstCur_CIATooscale	Pod curvature [CIAT pod curvature scale]	
Sh_MsmM10Seeds_min	Seed heights [mm]	
DT_CompDaysTo50perc_Day	Plant days to flowering [day]	
CT_MsmMCanopy@Temp_Kelvin_OBSOLETE	Canopy temperature [Kelvin]	
CT_MsmMCanopy@Temp_Celsius	Canopy temperature [degree Celsius]	
Trcs_MsmMTCSeeds_mg/g	Seed total non-structural carbohydrates content [mg/g]	
Cook_MsmMStProtocol_minute	Seed cooking time [minute]	
Feseed_MsmMVarMethods_mg/kg	Seed iron content [mg/kg]	
Pseeds_MsmMCP_g/kg	Seed phosphorus content [g/kg]	

1) The Crop ontology governance framework

d- Access (1 Slide)

- CO has no terms and conditions, apart the Governance and Data Steward Framework and the Licence CC-By 4.0
- All our ontologies are **available through our API** (https://croponontology.org/api_help). We implemented calls from the **Breeding API** (<https://brapi.org/>), in addition to some in house calls.
- **Keep Community noticed:** mainly through our Community Forum (<https://community.croponontology.org/>), GitHub alerts, emails, CGIAR Ontology Working Group meetings, Webinars. We also contribute to key conferences.
- Promoting the use, curators with the Alliance Bioversity-CIAT team be committed to provide solid support and maintenance.



1) The Crop ontology governance framework

e- Lifecycle (1 Slide)

- **Alliance Team coordinates since 2009 and provides:**
 - Ad Hoc Maintenance of the crop-specific ontologies
 - Maintenance of the tools
 - Creation of the Github repositories for the versioning
 - Proposal writing
- **Curators' approval**
 - **On New Terms** - must be submitted either with the Template or through the Term Request Form.
 - Concepts that does not apply anymore and are flagged with '**OBSOLETE**' + indication of the concept to be used
 - All our terms are in english, no other languages are currently supported.
- **Sustainability: CO financially supported overtime by research and data projects:** CGIAR Generation Challenge project, Climate Change CRP, NFS Planteome, CGIAR Roots, Tubers and Bananas CRP, CGIAR Platform for Big Data in Agriculture, CGIAR Digital Innovation initiative, 1000Farms projects, plus small grants allocated by partners for expert consultations/training.



1) The Crop ontology governance framework

f- Stakeholders and decisions (1 Slide)

Either address this during the previous slide or in a wrapup slide:

Priority audience: Breeding data managers and breeding database developers

There are several levels of decision making according to the item:

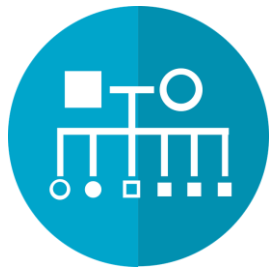
- Agreement to publishing a proposed ontology: Project Coordinator and Data steward (Crop code attributed)
- Crop specific ontology development and update: Curator(s) and crop expert group
- Extension of the domain (e.g. Food Science) or removal of obsolete ontologies (Scientific Advisory committee and curator committee)
- Strategic technical development: consultation of the Strategy advisory Committee
- Community consultation: Topics are posted in the Community Forum, surveys are launched on specific topics, webinars organized
- Web site improvements: upon feedback of curators
- The leaders of projects **financially** supporting Crop Ontology are priority decision-makers about the content (e.g. On farm trial project, Food technics, etc) with the guidance of the Advisory Committees



2) Biomedicine

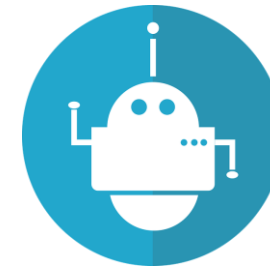
“OBO Foundry: principles and practices for open and reusable ontologies”

Deepak R. Unni
SIB Swiss Institute of Bioinformatics, Switzerland



Developing standards for a unified representation of ontologies: COB, RO, OMO

Develop infrastructure for effective and scalable ontology management and quality control: ROBOT, ODK, Dashboard

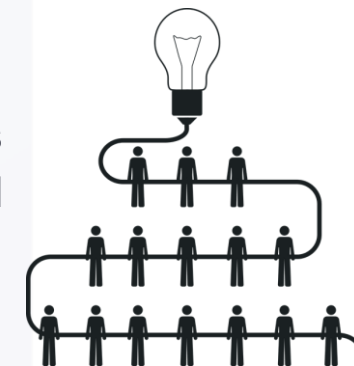


How does the OBO Foundry actively engage in the process of facilitating interoperability?



Creating OBO Principles for the development of open and FAIR ontologies

Building a community that facilitates collective growth and development of shared best practices.





a - Context / Principles

A registry of ontologies that have adopted the OBO Principles

Includes 184 active ontologies from:

- Biological domain
 - Gene Ontology (GO)
 - Genotype Ontology (GENO)
- Biomedical domain
 - Human Phenotype Ontology
 - Ontology for Biomedical Investigations (OBI)
 - Mondo Disease Ontology (Mondo)
 - Disease Ontology (DO)
- And domains adjacent to life sciences
 - Environment Ontology (ENVO)
 - Geographical Entity Ontology (GEO)
 - Population and Community Ontology (PCO)

Principle 2 ‘Common Format’: All ontologies MUST have at least one OWL product in RDF/XML syntax

OBO Library: find, use, and contribute to community ontologies

Download table as: [[YAML](#) | [JSON-LD](#) | [RDF/Turtle](#)]

Search Table

Search table ...

Ontology Domains: Group By Domain Hide Inactive Hide ...

Upper

ID ^	Title ^	Description	Quick Access
bfo	Basic Formal Ontology	The upper level ontology upon which OBO Foundry ontologies are built.	Home Download View Chat Share Bookmarks
cob	Core Ontology for Biology and Biomedicine	COB brings together key terms from a wide range of OBO projects to improve interoperability.	Home Download View Chat Share Bookmarks
ro	Relation Ontology	Relationship types shared across multiple ontologies	Home Download View Chat Share Bookmarks

Agriculture

ID ^	Title ^	Description	Quick Access
agro	Agronomy Ontology	Ontology of agronomic practices, agronomic techniques, and agronomic variables used in agronomic experiments	Home Download View Chat Share Bookmarks
pso	Plant Stress Ontology	The Plant Stress Ontology describes biotic and abiotic stresses that a plant may encounter.	Home Download View Chat Share Bookmarks



<http://obofoundry.org>



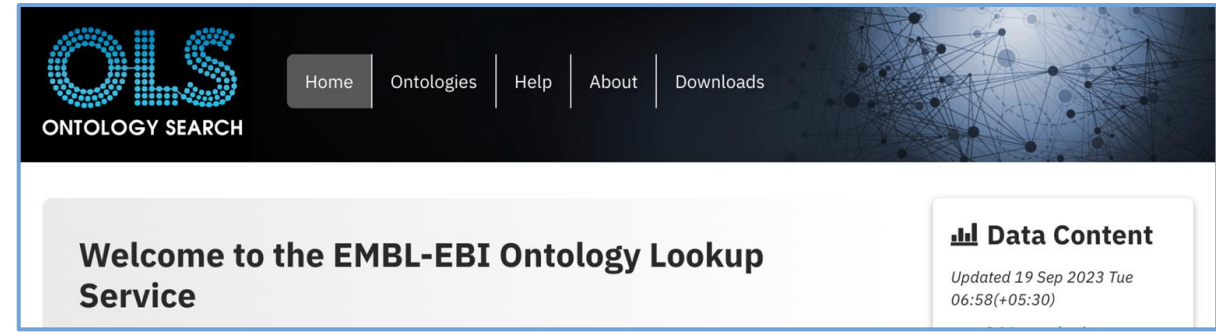
a - Context / Principles

Ontologies in OBO Foundry are represented in:

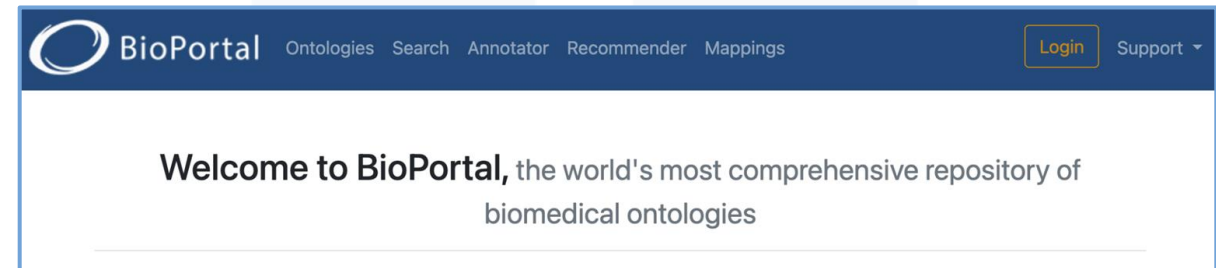
- [EBI Ontology Lookup Service \(OLS\)](#)
- [BioPortal](#)
- [Ontobee](#)

Individual ontology owners have to upload the necessary artifacts to these services

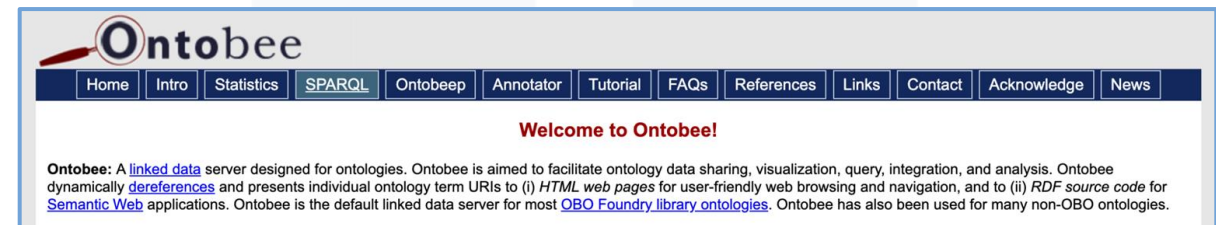
The registry provides link out to these services for term lookup and ontology exploration



The screenshot shows the OLS homepage with a dark header containing the OLS logo and navigation links: Home, Ontologies, Help, About, and Downloads. The main content area features a large grey box with the text "Welcome to the EMBL-EBI Ontology Lookup Service" and a smaller box on the right titled "Data Content" with the update information: "Updated 19 Sep 2023 Tue 06:58(+05:30)".



The screenshot shows the BioPortal homepage with a dark blue header containing the BioPortal logo and navigation links: Ontologies, Search, Annotator, Recommender, Mappings, Login, and Support. The main content area features a large white box with the text "Welcome to BioPortal, the world's most comprehensive repository of biomedical ontologies".



The screenshot shows the Ontobee homepage with a light grey header containing the Ontobee logo and a navigation menu: Home, Intro, Statistics, SPARQL, Ontobee, Annotator, Tutorial, FAQs, References, Links, Contact, Acknowledge, and News. The main content area features a large white box with the text "Welcome to Ontobee!" and a paragraph of introductory text: "Ontobee: A linked data server designed for ontologies. Ontobee is aimed to facilitate ontology data sharing, visualization, query, integration, and analysis. Ontobee dynamically dereferences and presents individual ontology term URIs to (i) HTML web pages for user-friendly web browsing and navigation, and to (ii) RDF source code for Semantic Web applications. Ontobee is the default linked data server for most OBO Foundry library ontologies. Ontobee has also been used for many non-OBO ontologies."



b - Metadata

OBO considers two sources of information for each ontology: the ontology itself and metadata provided by the ontology maintainers stored in the OBO Registry

The latter is a YAML snippet in a markdown file with metadata elements that describe the ontology.

Metadata elements:

- **id:** Unique name (typically the ontology prefix)
- **title:** The full name
- **description:** A short description of the ontology
- **domain:** The domain of the ontology
- **browsers:** Default browser for this ontology
- **contact:** Contact person
- **dependencies:** Other ontologies that are dependencies
- **license:** The license for the ontology
- **preferredPrefix:** The preferred prefix for term CURIEs
- **products:** Products that are created for this ontology
- **publications:** Relevant publications
- **repository:** The repository where the ontology is maintained
- **tracker:** The issue tracker for community engagement
- **usages:** Documented usage of this ontology
- **activity status:** Whether this ontology is still active

b - Metadata

The OBO Foundry Registry utilizes properties from:

- RDF Schema (RDFS)
- PROV Ontology (PROV-O)
- XML Schema Definition (XSD)
- Simple Knowledge Organization System (SKOS)
- Dublin Core (DC)
- Friend of a Friend (FOAF)
- Description of a Project (DOAP)

OBO Metadata Ontology (OMO): The OBO Foundry also has its own ontology to represent metadata in an ontology

- OMO standardizes the annotation properties to be used for term and ontology metadata



c - Quality

OBO Dashboard (2023-08-22)

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

Created with [ROBOT version 1.10.0-SNAPSHOT](#) and [OBO Metadata Schema](#).

A very basic analysis of the results can be found [here](#).

The OBO Dashboard operationalizes many of the OBO principles

Ontology (click for details)	Open	Format	URIs	Versioning	Scope	Definitions	Relations	Documented	Users	Authority	Naming	Maintained	Responsiveness	ROBOT Report	Summary
ado	✓	✓	✓	✓	✓	✗	?	✓	✗	✓	✓	?	✓	✗	✗
agro	✓	✓	✗	✓	✓	⚠	✓	✓	✓	✓	✓	✓	✓	⚠	✗
aism	✓	✓	✓	✓	✓	✗	?	✓	✗	✓	✗	✓	✓	✗	✗
amphx	✓	✓	✗	✓	✓	✗	✓	✓	✗	✓	✓	⚠	✓	✗	✗
apo	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✗	✓	✓	✗	✗
apollo_sv	✓	✓	✓	✓	✓	⚠	?	✓	✓	✓	✓	✓	✓	⚠	⚠



<http://dashboard.obofoundry.org>

c - Quality

Principle 5 'Scope': Ontologies are required to import from other ontologies, especially when dealing with terms that are outside the domain of the ontology.

Feedback from users:

- OBO specific feedback and discussions can originate from the OBO Discuss mailing list
- Specific discussions are directed to the OBO Foundry Issue Tracker
- Ontology specific feedback, new term requests, updates are directed to the individual ontology tracker
 - OBO Foundry keeps track of the issue trackers for each ontology represented in OBO
- For discussions that might be relevant to one (or more) ontology, we tag the contact (and any additional persons) to the GitHub issue.

d - Access

Principle 1 'Open': The ontology MUST be openly available to be used by all without any constraint other than (a) its origin must be acknowledged and (b) it is not to be altered and subsequently redistributed in altered form under the original name or with the same identifiers.

- Creative Commons Attribution 3.0 Unported (CC BY 3.0) license or later (e.g. Attribution 4.0 International (CC BY 4.0))
- Creative Commons CC0 1.0 Public Domain Dedication (CC0 1.0)

Ontologies are accessible via OLS, BioPortal, Ontobee APIs and endpoints
OBO Foundry also keeps track of individual ontology-specific endpoints

e - Lifecycle

The OBO Foundry provides the ODK for managing the lifecycle of an ontology

Ontology Development Kit (ODK):

- a toolbox of various ontology related tools such as ROBOT, owltools, dosdp-tools
- bundled as a docker image a set of executable workflows for managing your ontology's continuous integration, quality control, releases and dynamic imports
- Provides functionalities like:
 - Get terms from external ontologies to re-use them
 - Workflow for dependency management
 - Workflow for releasing an ontology



odk
ONTOLOGY DEVELOPMENT KIT

e - Stakeholders and decisions

OBO is governed by a volunteer team consisting of ontology maintainers and stakeholders

OBO Operations Committee

- Technical Working Group
 - Manage and maintain the OBO Website, OBO Foundry PURL system, OBO Dashboard
 - Manage and curate the OBO Ontology Metadata Registry
 - Further the harmonisation of ontology and term level metadata across OBO ontologies
- Editorial Working Group
 - Refine wording of existing Principles
 - Draft wording for new Principles
 - Review & refine wording of SOPs, FAQs, other pages
- Outreach Working Group
 - Monitor and follow up discussions on mailing lists
 - Prepare documentation, educational materials, and the OBO Newsletter

e - Stakeholders and decisions

Each member of the OBO Operations Committee can have one (or more) roles:

- Registry Metadata Steward
- OBO New Ontology Request (NOR) Manager
- OBO Website Coordinator
- OBO Slack Community Manager
- OBO Newsletter Steward
- OBO Dashboard Maintainer

Each role is associated with an SOP that further clarifies responsibilities

- New Ontology Requests
- Reviewing Ontologies for OBO Membership
- Ontology Acceptance Email
- Changing ontology metadata in the registry
- Reviving obsolete, orphaned, or inactive ontologies

e - Stakeholders and decisions

Governance Task Team

- Advises the OBO Operations Committee
- Has members that are part of the OBO Operations Committee and external
- Make recommendations for improved governance within OBO Foundry
- Motivates better processes and documentation
- Codification of Code of Conduct

3) Chemistry

“Governance Operational Model for Ontologies (GOMO)”

Paola Espinoza Arias
(BASF)

3) “Governance Operational Model for Ontologies (GOMO)” by BASF

a- Context / Principles



- World's largest chemical company
- Its business is organized in several segments
- Standardization problem:
 - Heterogenous and siloed data
 - Ad-hoc practices
 - Poor coordination across stakeholders
- The GOMO framework defines common and standardized methodologies and techniques for ontology development, avoiding ad-hoc practices and enabling the reusability and interoperability of ontologies.



Iglesias-Molina, A., Bernabe-Diaz, J. A., Deshmukh, P., Espinoza-Arias, P., Fernandez-Izquierdo, A., Ponce-Bernabe, J. M., et al. (2022). *Ontology Management in an Industrial Environment: The BASF Governance Operational Model for Ontologies (GOMO)*. <https://doi.org/10.5281/zenodo.7007495>.

3) “Governance Operational Model for Ontologies (GOMO)” by BASF

a- Context / Principles

- Ontologies come from:
 - Stakeholders common needs
 - Operational divisions
 - Community groups
- One core catalogue of ontologies:

BASF
We create chemistry

Home | Ontologies | Search | SPARQL | Documentation | About

Welcome to the BASF Ontology Management Framework

Search OMF...

Examples: [diabetes](#), [GO:0098743](#)

[Looking for a particular ontology?](#)

Data Content
Updated 13 Sep 2023 21:39

- 73 ontologies
- 2,859,271 terms
- 3,048 properties
- 6,947 individuals

3) “Governance Operational Model for Ontologies (GOMO)” by BASF

b- Metadata

Information we require to describe semantic artefacts

Level	Ontology	Ontology Elements
Mandatory	Title, creator, contributor, created, issued, version info/IRI, prior version, preferred namespace URI/prefix, license, ontology owner/curator, confidentiality level	Label
Optional	Backward compatibility, incompatibility, organizational unit, diagram	Alternative label, definition, source, comment, created/modified by, creation/modification date, exact synonym

Standards for metadata definition

- rdfs (<http://www.w3.org/2000/01/rdf-schema>)
- skos (<http://www.w3.org/2004/02/skos>)
- obolnOwl (<http://www.geneontology.org/formats/obolnOwl>)
- dcterms (<http://purl.org/dc/terms>)
- schema (<https://schema.org>)
- GOMO metadata vocabulary



Garijo D, Poveda-Villalón M. (2020). **Best Practices for Implementing FAIR Vocabularies and Ontologies on the Web**. In: Giuseppe Cota, M.D., Pozzato, G.L. (eds.) Applications and Practices in Ontology Design, Extraction, and Reasoning. IOS Press, Netherlands (2020). <https://doi.org/10.3233/SSW200034>

3) “Governance Operational Model for Ontologies (GOMO)” by BASF

c- Quality

Set of 10 standards

PURL

- IRI structure

Deprecation

- Obsoleting OWL entities

Convention and format

- Naming convention
- Valid ontology formats

Mandatory/optional metadata

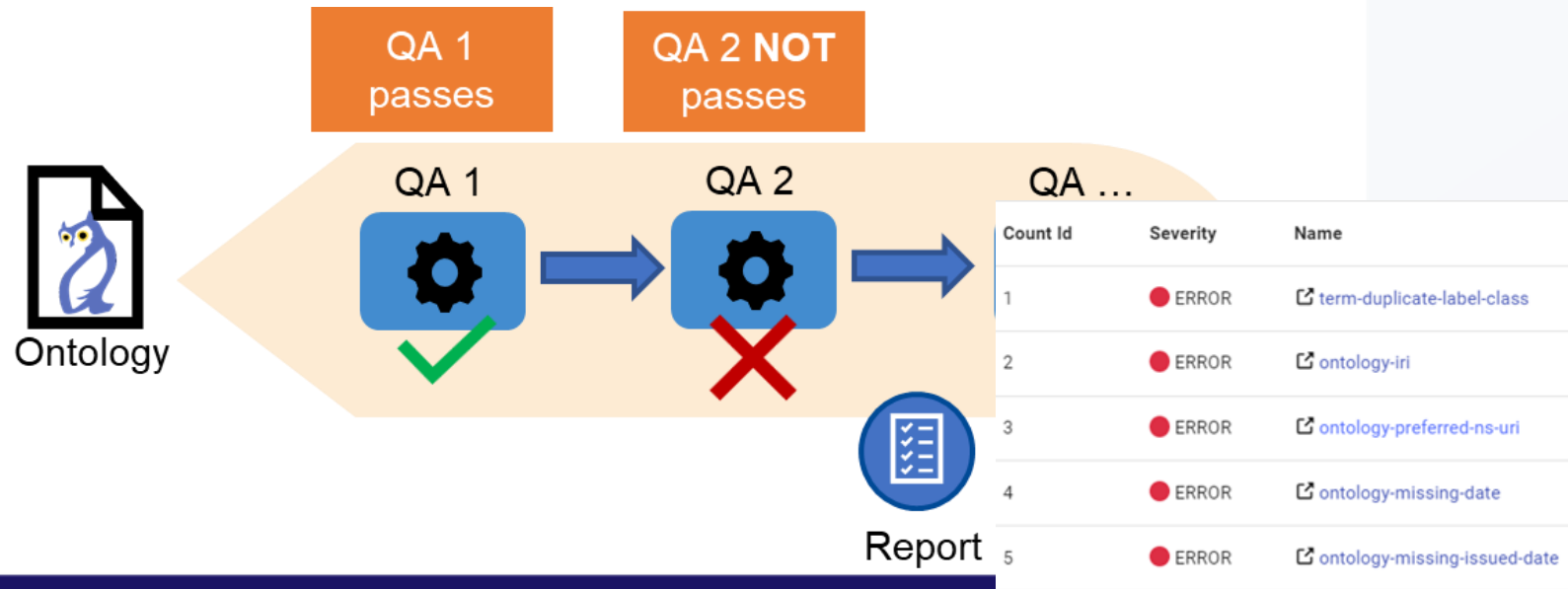
- Ontology
- Class and property (elements)

Version control repository

- Ontology repository structure
- Ontology version numbering

Documentation

- Documentation
- Ontology diagram notation



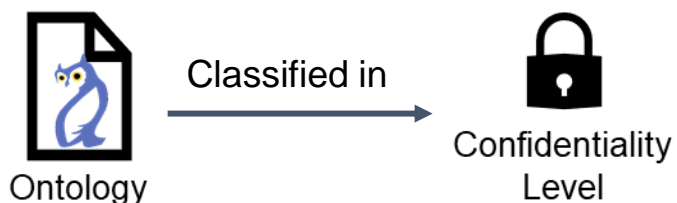
Changes/Feedback from users:

- GitLab Issue templates (preferred)
- Email
- Teams

3) “Governance Operational Model for Ontologies (GOMO)” by BASF

d- Access

Terms and conditions - Licensing



Communication with ontology users

Channel-based communication



Machine-accessible endpoints



OpenLink Virtuoso



OpenAPI

Ontology sustainability

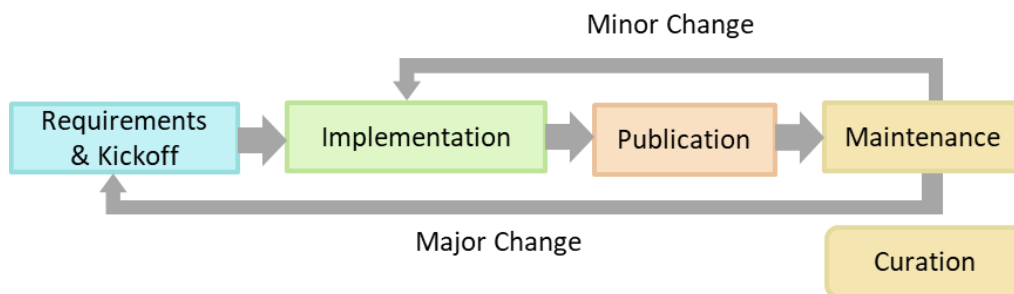
Depending on the type of ontology:

- *Core ontologies* are financed by a common budget provided by all organizational units of the company and are managed by a permanent core team
- *Domain ontologies* are financed by a budget ensured by the ontology owner and are managed by the respective domain ontology community

3) “Governance Operational Model for Ontologies (GOMO)” by BASF

e- Lifecycle

Maintenance



Versioning

Semantic versioning: <https://semver.org>

```

<https://ontology.basf.net/example> rdf:type owl:Ontology ;
owl:versionIRI < ontology.basf.net/example/1.0.0> ;
owl:versionInfo "1.0.0" .
  
```

Retirement or obsolescence

Level	Metadata
Mandatory	Deprecated (<i>owl:deprecated</i>), comment (<i>rdfs:comment</i>)
Optional	Replaced by (<i>dcterms:isReplacedBy</i>)

Languages

```

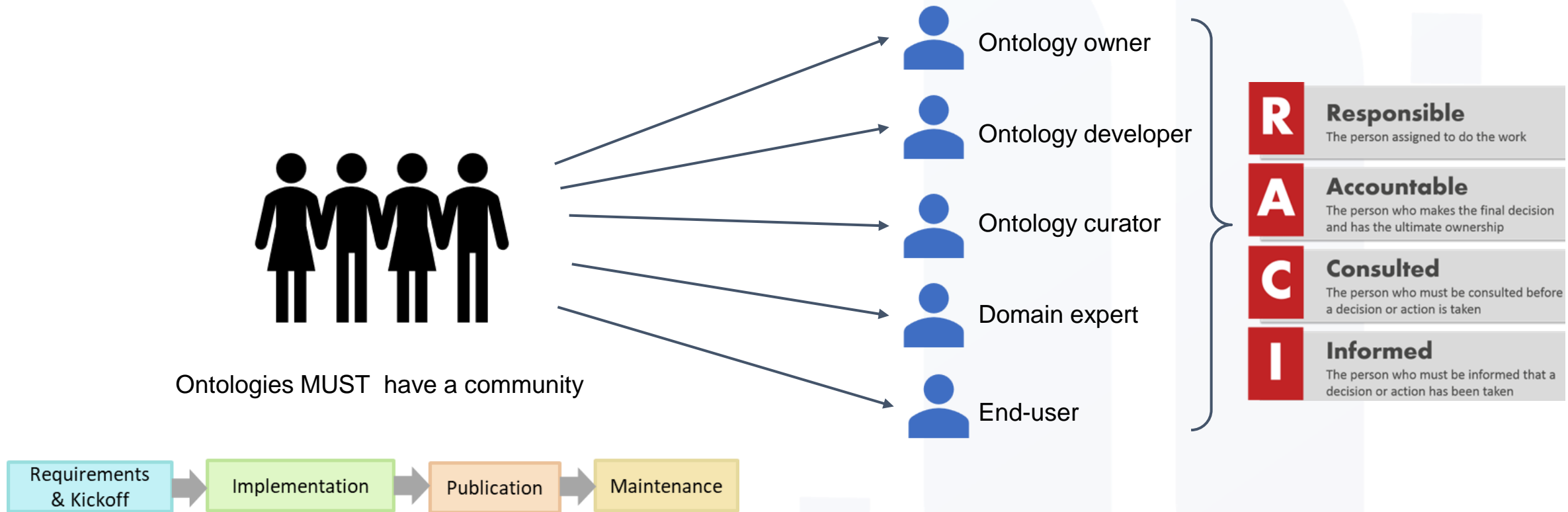
eppo:TRZAW rdf:type owl:Class ;
rdfs:label "soft wheat (winter)" @la;
oboInOwl:hasExactSynonym "vinterhvede" @da ,
"winter wheat" @en,
"wintertarve" @nl.
  
```



Ayllón-Benitez A., Bernabé-Díaz J.A, Espinoza-Arias P. et al. (2023). **EPPO Ontology: A semantic-driven approach for plant and pest codes representation**. In *Frontiers in Artificial Intelligence*, vol. 6, <https://doi.org/10.3389/frai.2023.1131667>

3) “Governance Operational Model for Ontologies (GOMO)” by BASF

f- Stakeholders and decisions



4) Agri-food

“Trends in vocabulary governance
at INRAE”

Sophie Aubin
(INRAE, Dipso)



the French National Research Institute for Agriculture, Food and the Environment

SCIENCE DEDICATED TO LIFE, HUMANS AND THE EARTH



Agriculture



Environment



Food



Global challenges

Climate change and risks,
One health, agrifood systems

Key figures



A community of
11,000+ people in 2020



2021 Budget:
€ 1045,44 million



15 innovation fields
and **450+ partners**



Involved with the regional higher
education and research ecosystem
in France:

- ▶ **18 research centers**
- ▶ **14 scientific divisions**
- ▶ **33 academic partnerships**



People and services to support researchers and drive the changes needed to **open science**



supports researchers in using, building and sharing **semantic artefacts**

What is the nature of our semantic artefacts? Who makes them?

Research teams (on specific topics)

- Wheat Trait and Phenotype **Ontology**
- Woody Plant **Ontology**
- **Ontology** for Food Processing Experiment
- ANAEE **Thesaurus**
- **Thesaurus** for Animal Physiology and Livestock Systems
- **Terminology** of French bread descriptors
- **Lexique** de pédologie
- etc.

Science support services (+generic)

- **Thésaurus** INRAE
- **Référentiel** des disciplines scientifiques INRAE


Where are they made accessible?

- quite a lot in **SA dedicated repositories**:



- some in generic repositories:



These repositories are recommended by 



[Publier un vocabulaire](#) (how to publish a SA)

Metadata

Minimal metadata recommended by



- **name** of the semantic resource;
- surname, first name and affiliation of **authors and other contributors**. Also indicate a global unique identifier for each person (e.g. ORCID) or organization (e.g. ROR), if available;
- **contact** address
- free text **description** (French and/or English)
- **version** information (status, number, etc.)
- **license**. We recommend the Etalab Open License and the Creative Commons CC-BY 4.0, which are equivalent.

+ all those required/possible in the repositories we use to share our SA

Metadata standards used:

- **MOD** (Metadata for Ontology Description and Publication Ontology)
- **DCAT, Datacite, DDI, Dublin Core**

—> those implemented in SA repositories or recommended by FAIRness assesment tools (O'FAIRe, FAIR checker, etc.)

Guidance: [Définir les métadonnées d'un vocabulaire](#)

Quality

Good practices, guidelines and high level principles

- FAIR principles
- Linked Open Terms
- OBO Foundry principles

Reuse of tiers SA is recommended BUT still difficult:

- poor sustainability guaranties;
- lack of good practices for maintenance and user-support

If no reuse, mapping is recommended (cf. [SSSOM](#))

Technical/syntactic quality

- thesaurus : [SKOS Play! Tester](#); [VocBench ICV](#); SHACL(?)
- ontology : in ontology editor (e.g. Protégé) / SA catalogs (e.g. Ontoport validation);

Scientific quality by the semantic artefact authors:

- editorial committees
- call to experts



Access

- **National policy** « [Plan national pour la science ouverte](#) » 2018 & 2021
- **Institutional data policy** :
 - Principle 1: Data must be shared and reused in accordance with the values of science
 - Principle 2: Data must be managed with a view to making it F.A.I.R.
 - Principle 3: Data should be "as open as possible, as closed as necessary".
 - Principle 4: Open data contributes to innovation and the creation of value for society.

Machine accessible endpoints

	API	Sparql query
SA Metadata	Recherche Data Gouv, AgroPortal	AgroPortal, lab triple stores
Semantic artefacts	AgroPortal, skosmos, Loterre	AgroPortal, Loterre, lab triple stores

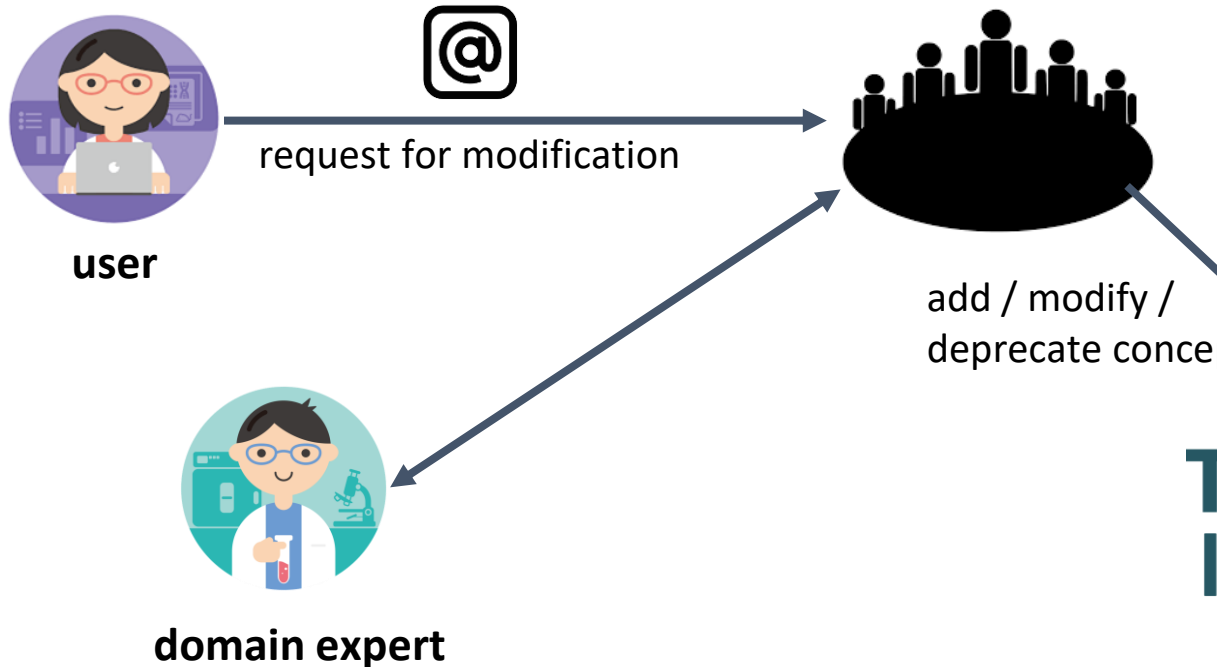
Communication with users

- Each producer is autonomous
- e.g. Thesaurus INRAE : [Website](#), emailing

Sustainability

good question...

Lifecycle



How?

- editorial guidelines
- regular meetings
- task groups
- shared spreadsheets
- VocBench

Concept obsolescence?

skos:deprecated
+
dct:isReplacedBy /
skos:changeNote

**1 release = a set of modifications = 1 version
(approx 3/year)**

Stakeholders and decisions for semantic artefacts at **INRAE**

	How to take decisions	Who is responsible
Publication repository	Institutional recommendations	SA authors
Minimal metadata	Community recommendations	SA authors
Ontology quality	Community recommendations	SA authors/curators
License / access policy	European/National policy	INRAE
Maintenance	Community recommendations	SA authors/curators

5) Astronomy & Astrophysics

“Semantics working group:
vocabulary governance in
astronomy”

Baptiste Cecconi

Observatoire de Paris, France

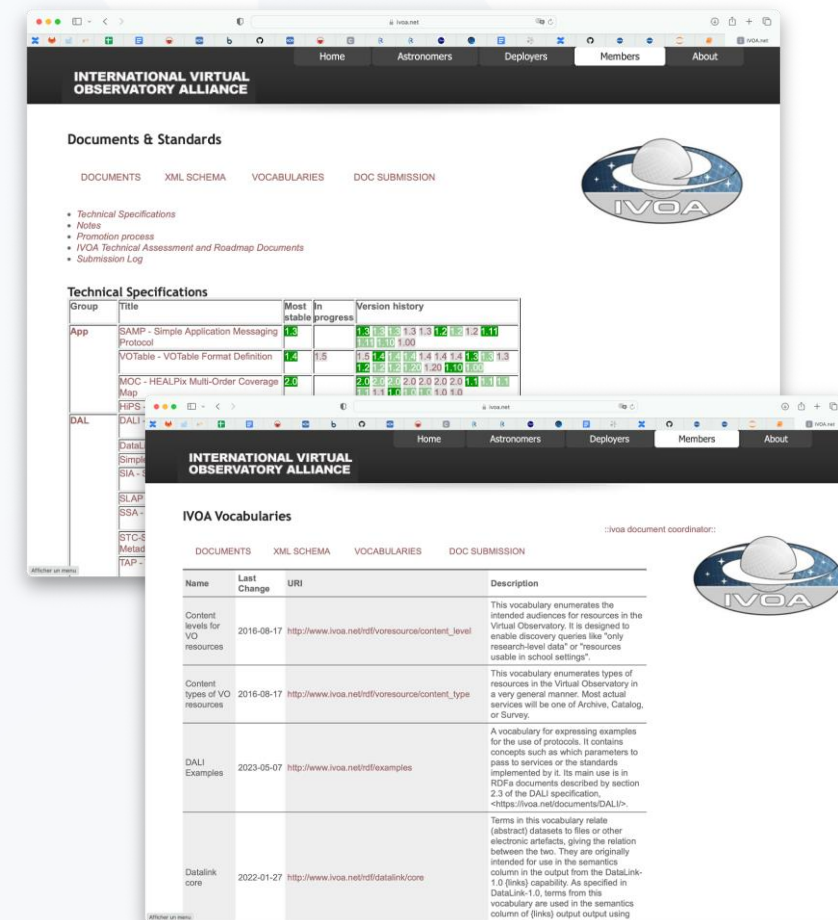
(representing IVOA)



5) “Semantics working group: vocabulary governance in astronomy” by IVOA

a- Context / Principles

- Goal of IVOA:
Set up and maintain an **interoperability framework for astronomy data**
This covers: a service registry, schemas, protocols and vocabularies
- Two types of semantic artefacts: data models (**schemas**) & controlled lists of terms (**vocabularies**)
 - developed by IVOA working groups
 - sometimes inspired by external work (but not so much)
- Where to find them?
⇒ **web pages with links** (no searchable catalogue for our semantic artefacts)
 - <https://www.ivoa.net/xml/> => schemas
 - <https://www.ivoa.net/rdf/> => vocabularies
 - <https://www.ivoa.net/documents/> => specifications



The image shows two overlapping screenshots of the IVOA website. The top screenshot displays the 'Documents & Standards' page, which includes a navigation menu (Home, Astronomers, Deployers, Members, About) and a list of documents under 'Technical Specifications'. The bottom screenshot shows the 'IVOA Vocabularies' page, which features a table listing various vocabularies with columns for Name, Last Change, URI, and Description.

Name	Last Change	URI	Description
Content levels for VO resources	2016-08-17	http://www.ivoa.net/xml/ivoaresource/content_level	This vocabulary enumerates the intended audiences for resources in the Virtual Observatory. It is designed to enable discovery queries like "only research-level data" or "resources usable in school settings".
Content types of VO resources	2016-08-17	http://www.ivoa.net/xml/ivoaresource/content_type	This vocabulary enumerates types of resources in the Virtual Observatory in a very general manner. Most actual services will be one of Archive, Catalog, or Survey.
DALI Examples	2023-05-07	http://www.ivoa.net/xml/ivoaexamples	A vocabulary for expressing examples for the use of protocols. It contains concepts such as which parameters to pass to services or the standards implemented by it. Its main use is in RDFa documents described by section 2.3 of the DALI specification, https://www.ivoa.net/documents/DALI/.
Datalink core	2022-01-27	http://www.ivoa.net/xml/ivoadatalink/core	Terms in this vocabulary relate (abstract) datasets to files or other electronic artefacts, giving the relation between the two. They are originally intended for use in the semantics column in the output from the DataLink 1.0 (link) capability. As specified in DataLink 1.0, terms from this vocabulary are used in the semantics column of (link) output using

5) “Semantics working group: vocabulary governance in astronomy” by IVOA

b- Metadata

- Most of our schemas are described by an overarching data model.
 - “schema of schemas” = UML profile-based language.
- **Our vocabularies are used to define controlled lists for our standards.**
 - Interoperability has been the driver from beginning of IVOA (findability, accessibility and reusability are by-products)
- We use our own standards...
 - ⇒ most of our vocabularies have recently been rewritten with SKOS or OWL information and are available in RDF/XML.

5) “Semantics working group: vocabulary governance in astronomy” by IVOA

c- Quality

- Several steps:
 - Addition, change or deprecation of concept/term is always a **consensus decision** of the IVOA DataModel (schemas) or Semantics (vocabularies) **working groups**.
 - Requirement of several (at least two) implementations + interoperability validation.
 - Once consensus is reached, the new recommendation is submitted to TCG (Technical Coordination Group) and an RFC (Request for Comments). All working groups can review and propose updates.
 - Finally there is a vote in TCG at the end of RFC.
 - Then Exec Committee adopts recommendation.
- For vocabularies, we have documents describing the process of updating them. We have a VEP (**vocabulary enhancement proposal**) process in place.
- We are in our own island (as of now) for vocabularies. A few prototypes of using external resources (IAU thesaurus, Instrument names with wikidata).
- Collecting feedback : VEP process + mailing list + GitHub issues (document development repo)

5) “Semantics working group: vocabulary governance in astronomy” by IVOA

d- Access

- Licensing:
 - vocabularies: licensed under CC0.
 - documents: CC-BY
 - schemas: note sure (associated with specification document ⇒ same license)
- machine accessible:
 - for vocabularies: IRI can be resolved knowing the vocabulary in use.
E.g: an attribute using the “Time Scales” controlled list (as specified in the schema), with value “UTC”, can be resolved to: <https://www.ivoa.net/rdf/timescale/#UTC>
 - Prototype OntoPortal => not integrated in any workflow
- No notification plan in place (newsletter could be used).
Semantics / DataModel mailing lists are the main way of communication
- Sustainability through community involvement: no dedicated funding at IVOA level (only project level).

5) “Semantics working group: vocabulary governance in astronomy” by IVOA

e- Lifecycle

- Maintenance:
 - **Vocabularies: VEP proposal** (new terms, update definition, or deprecation), discussion in list until consensus. When reached: update of list.
 - endorsement by TCG (=> extra round of discussion at IVOA level)
 - **Schemas: strict release process** => github issues + mailing list => writing new version of specification + schemas => RFC => adoption.
- **Vocabulary** versioning:
 - **Most are based on release date.** e.g: <https://www.ivoa.net/rdf/timescale/2019-03-15/timescale.html#UTC>
 - One vocabulary is versioned (incl. proposed replacement for deprecated terms)
 - Retirement of term is difficult (very rare)
- Retirement/obsolescence of **schemas** is not formally imposed.
Latest major version is usually implemented (new features). Some old services are not maintained, but still work after years of operation => clients are usually not deprecating older version of protocols.
- All labels are in english (and so are terms, up to now)

5) “Semantics working group: vocabulary governance in astronomy” by IVOA

f- Stakeholders and decisions

- Stakeholders:
 - Many people involved in working groups: software client developers, data distribution framework developers, research scientists, data curators, data centre representatives.
 - TCG is composed of chairs and vice-chairs of WG (renewed every 3 years)
 - Exec Committee: national/regional virtual observatory representatives...
 - CSP (Committee on Science Priority): collect science requirements from communities
- Decision making:
 - **Exclusively bottom-up.**
Consensus in WG => vote (simple majority, but usually no vote if no consensus) in TCG and Exec.

6) Biodiversity

“Terminology governance at
NFDI4Biodiversity”

Naouel Karam



InfAI[®]
Institute for Applied Informatics



**NFDI 4
BIODIVERSITY**

6) “Terminology governance at NFDI4Biodiversity” by InfAI

a- Context

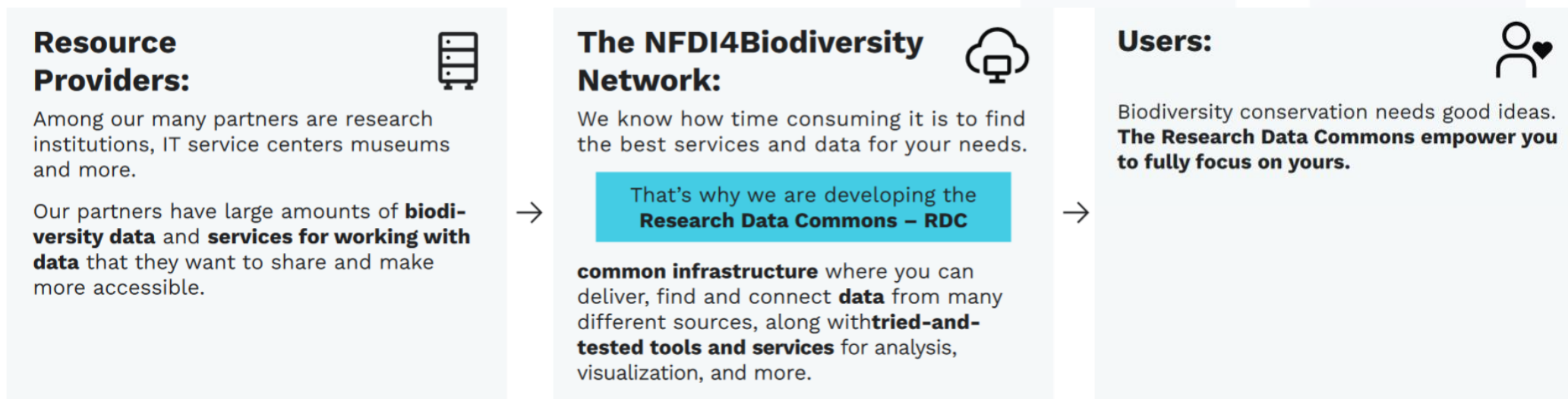


NFDI 4
BIODIVERSITY

We are a consortium of 50 partner organizations and part of the National Research Data Infrastructure in Germany (NFDI).

Our vision:

an infrastructure to empower data sharing and data-centred projects




6) “Terminology governance at NFDI4Biodiversity” by InfAI

a- Principles

Types of semantic artefacts:

- **taxonomies** of living organisms
- **Metadata** and **data standards** (like ABCD or ETS)
- Geographical **ontologies**


Hosted at



<https://biodivportal.gfbio.org>

Landing pages and Linked Data deployment at



Ecological Trait-data Standard

<https://terminologies.gfbio.org/terms/ets/pages/index.html>

German River Names

http://terminologies.gfbio.org/terms/RIVERS_DE/104540

6) “Terminology governance at NFDI4Biodiversity” by InfAI

b- Metadata

```
<dcterms:title xml:lang="en">Ecological Trait-data Standard (ETS)</dcterms:title>*  
<dcterms:description>The Ecological Trait-data Standard defines terms for the use in datasets  
containing quantitative and qualitative functional traits.</dcterms:description>*  
<rdfs:comment>For more information about this standard visit  
https://terminologies.gfbio.org/terms/ets/pages/</rdfs:comment>  
<rdfs:comment>To contribute to this standard, see https://github.com/EcologicalTraitData/ETS  
</rdfs:comment>  
<dc:creator xml:lang="en">Florian D. Schneider</dc:creator>  
<dc:creator xml:lang="en">Malte Jochum</dc:creator>  
<dc:creator xml:lang="en">Gaëtane LeProvost</dc:creator>  
<dc:creator xml:lang="en">Andreas Ostrowski</dc:creator>  
<dc:creator xml:lang="en">Caterina Penone</dc:creator>  
<dc:creator xml:lang="en">Nadja Simons</dc:creator>  
<dc:contributor xml:lang="en">David Fichtmueller</dc:contributor>  
<dc:publisher xml:lang="en">GFBio Terminology Service</dc:publisher>  
<dc:language>en</dc:language>  
<dcterms:modified>2019-03-25</dcterms:modified>*  
<owl:versionInfo>0.10</owl:versionInfo>*  
<owl:versionIRI rdf:resource="http://terminologies.gfbio.org/terms/ets/2019-03-15/ets.owl/">*  
<cc:license rdf:resource="http://creativecommons.org/licenses/by/4.0/">*
```

6) “Terminology governance at NFDI4Biodiversity” by InfAI

c- Quality



- **Standard transformation** pipeline for taxonomies into **OWL**, content quality is assured by our project partners developing the semantic artifacts
- **Validation** of OWL ontologies through a reasoner
- Enforcement of **release notes** and publication of **ontology changes**
- **Best practices** for reuse of top-level / reference ontologies like GeoNames > under development
- **FAIRness assessment** using **O'FAIRe**

Feedback from users is collected through **GitHub issues** for OWL ontologies

Specific workflows for taxonomies > planned centralised workflows through BiodivPortal

6) “Terminology governance at NFDI4Biodiversity” by InfAI

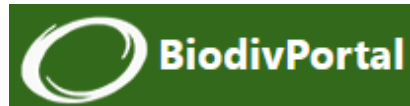
d- Access

Licencing

- CC BY
- Custom licenses in domain specific contexts

Access

- SPARQL endpoint, Linked Data deployment via the
- Download and access via



<https://bioportal.bioontology.org/ontologies/>



Notification

- Through mailing lists

Sustainability

- Institutions and national agencies fundings

6) “Terminology governance at NFDI4Biodiversity” by InfAI

e- Lifecycle

Maintenance

- Locally by institutions editorial committee > planned [term suggestion](#) workflows via BiodivPortal
- Periodical releases of OWL versions on GitHub

Retirement or obsolescence

- Term status is changed and link to accepted one maintained

Versioning

- [Release date](#) is used for taxonomies
- [SemVer](#) for ontologies

Languages: en, de, some geographical ontologies have alternative labels in hundred languages

6) “Terminology governance at NFDI4Biodiversity” by InfAI

f- Stakeholders and decisions

Stakeholders

- Taxonomies editorial committees
- Task groups like the TDWG ABCD task group
- Ontology managers
- Experts community

Decisions

- Taxonomies editorial boards
- Task groups consensus

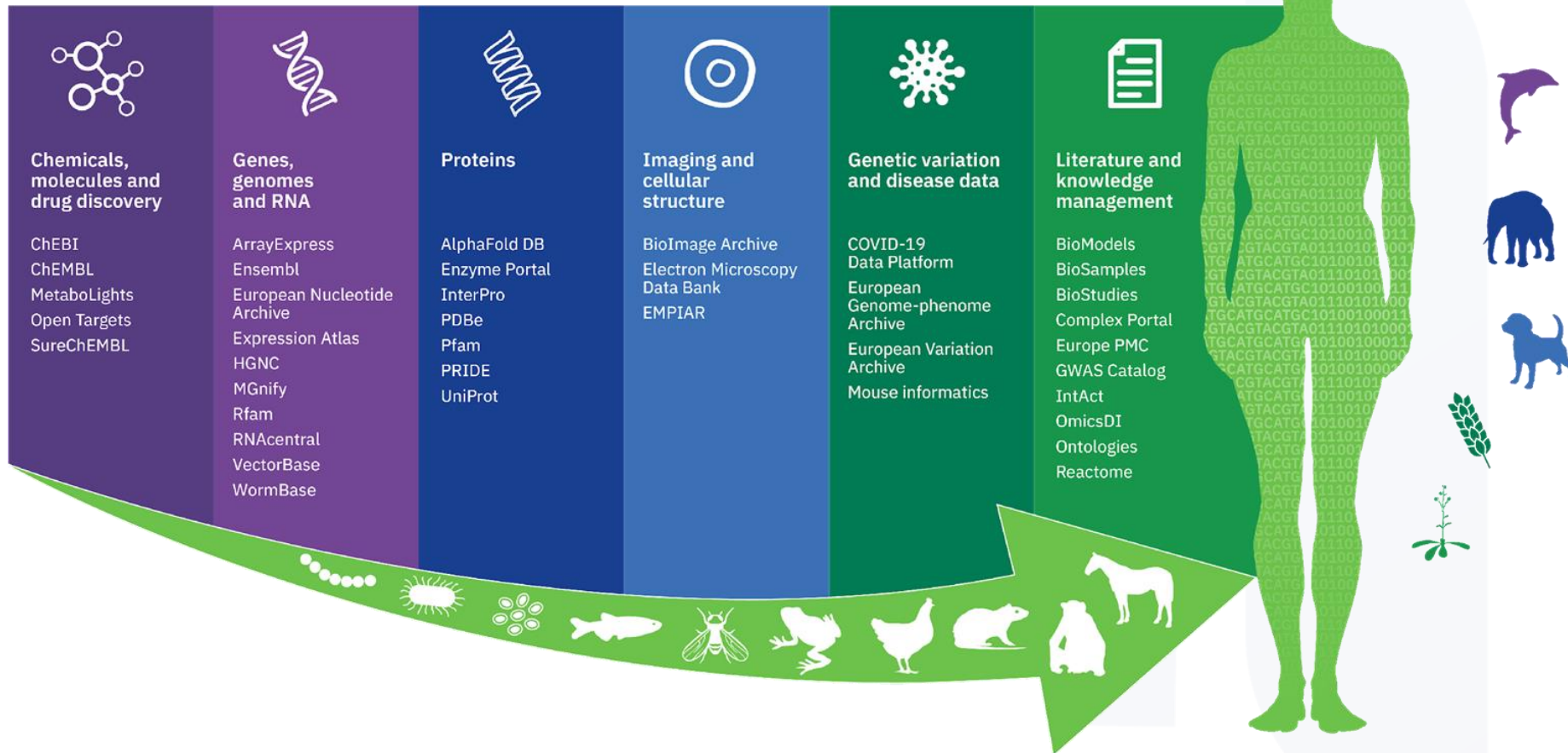
7) Bioinformatic

“Ontology governance at EMBL-EBI”

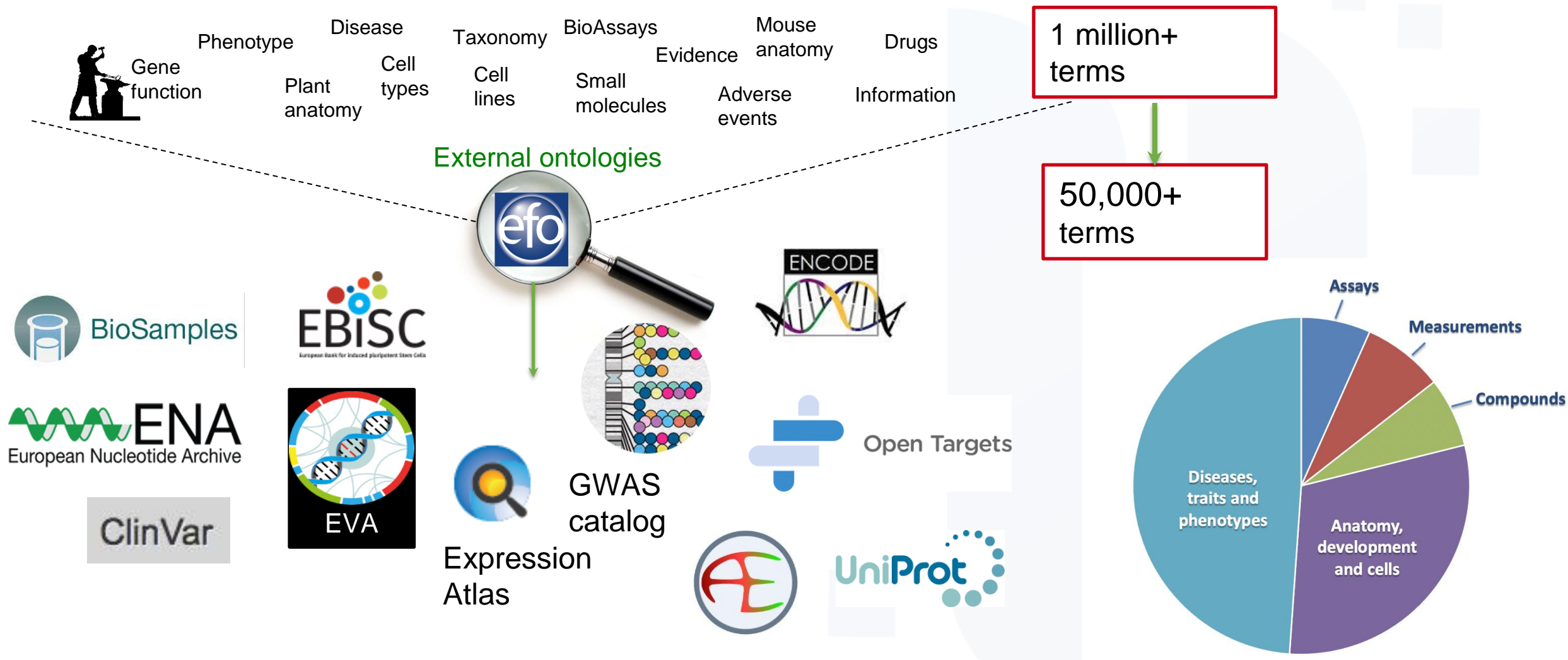
Zoe Pendlington & Henriette Harmse
(EMBL-EBI)

7) “Ontology governance at EMBL-EBI” by EMBL-EBI

a-Context / Principles



7) "Ontology governance at EMBL-EBI" by EMBL-EBI



7) “Ontology governance at EMBL-EBI” by EMBL-EBI


b- Metadata



- All ontologies in OLS are OWL 2 RDF ontologies, OWL 2 and RDF are W3C standards.
- For each ontology we require at a minimum to have:
 - a purl where the ontology can be downloaded from.
 - a unique abbreviation or prefix for the ontology to be used in searches or pipelines
- Ontologies are encouraged to have
 - license information
 - a title for the ontology
 - a description of the ontology
- For mapping between ontologies we are in the process of rewriting OxO to make use of SSSOM, a standard for defining mappings between ontologies.

7) “Ontology governance at EMBL-EBI” by EMBL-EBI

c- Quality

Quality assurance	Good Practices	Reuse and import	Feedback
<ul style="list-style-type: none"> ● Continuous integration on  GitHub ● Using pull requests rather than merging straight into master branch ● Many tests run locally at each release via ODK 	<ul style="list-style-type: none"> ● Follow OBO Foundry principles (where possible) ● Importing from domain ontologies ● Encouraged to add synonyms and x-refs ● Giving back to domain ontologies to enrich the domain as a whole 	<ul style="list-style-type: none"> ● Dynamic imports 	<ul style="list-style-type: none"> ● Efo-users mailing list ● GitHub issues

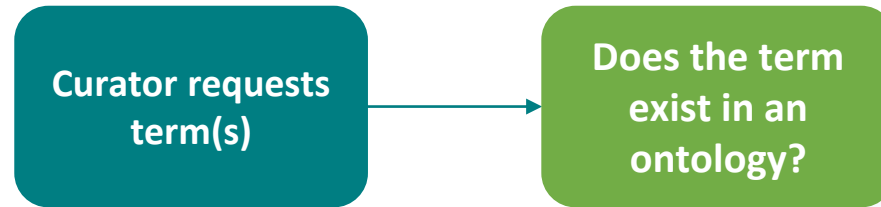
7) “Ontology governance at EMBL-EBI” by EMBL-EBI

d- Access

- EFO, OLS and OxO provided under Apache 2.0 license.
- EFO, OLS and OxO extensively used by nonprofit and for-profit organizations.
- Community wide communication mainly happens via mailing lists and occasionally user days.
- Funding is mostly from external sources, but occasionally also from internal funds due to EBI services being heavily dependent on EFO, OLS and OxO.

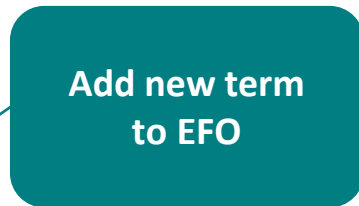
7) "Ontology governance at EMBL-EBI" by EMBL-EBI

e- Lifecycle



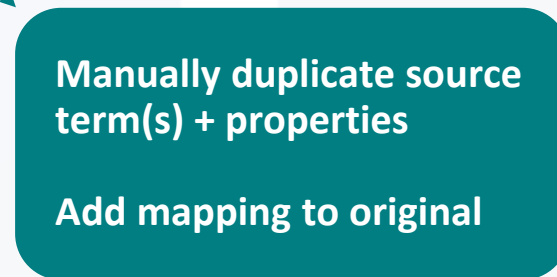
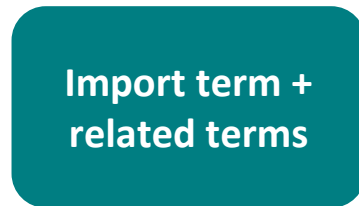
no

yes



yes

no



Minimum information:
Term label
Term parent

Requested information:
Term definition
Term x-refs
Term synonyms



UBERON Anatomy Ontology*

Cell Ontology*

Mondo*

Human Phenotype Ontology*

Human Ancestry Ontology



7) “Ontology governance at EMBL-EBI” by EMBL-EBI

f- Stakeholders and decisions

- Curators and domain experts mostly drive changes to EFO
- Developers mostly drive changes to OLS and OxO, but we have input from curators and domain experts as well.
- Prioritisation mostly driven by funders but input from the larger community is also considered, i.e. dealing with some regression and tickets opened by larger community.
- Occasionally the PI may direct decisions.

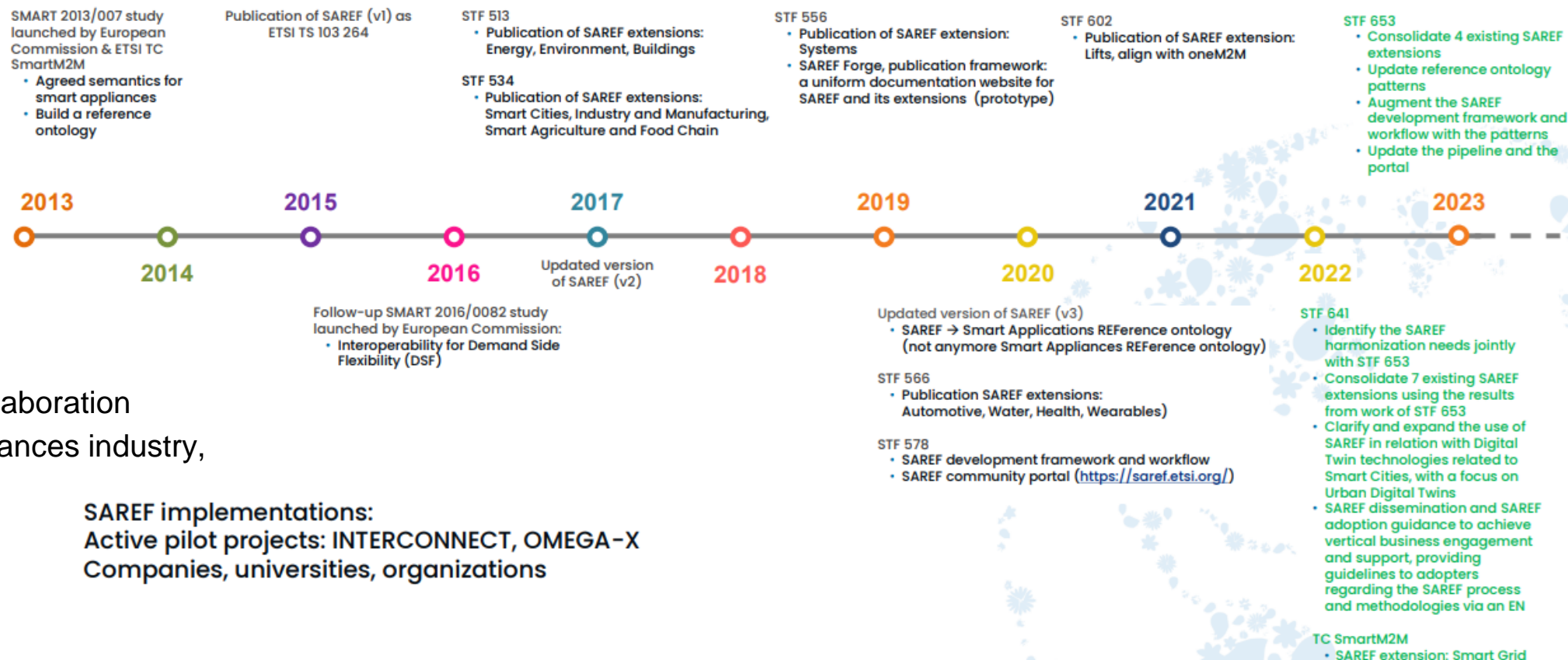
8) Industry

“Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead”

Maxime Lefrancois
(SAREF)

8) “Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead” by SAREF

Smart Appliances Applications REFerence ontology (SAREF).

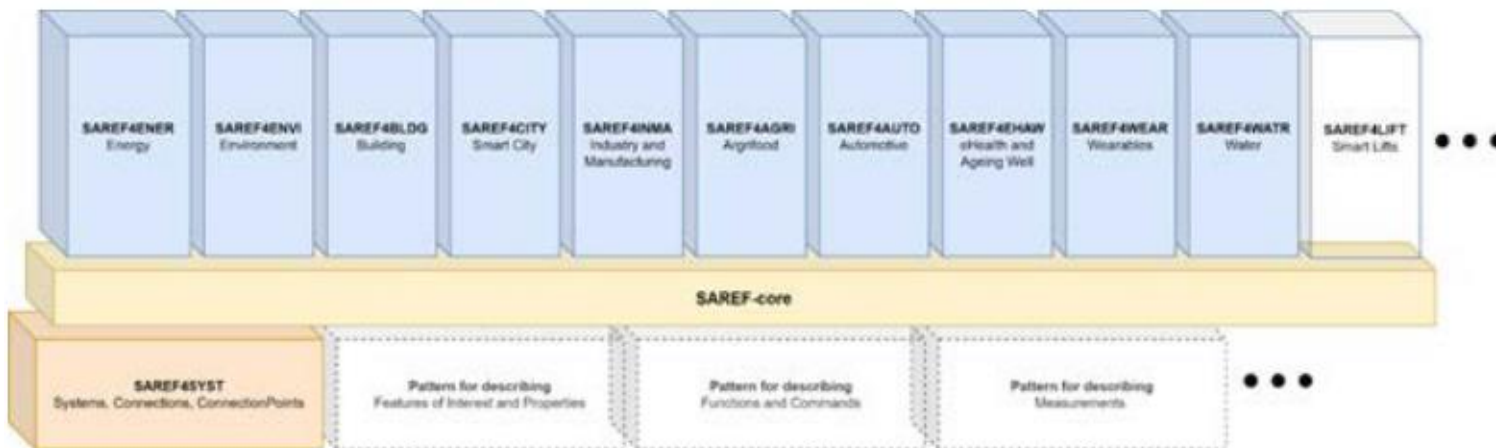


Created in close collaboration with the Smart Appliances industry,

SAREF implementations:
Active pilot projects: INTERCONNECT, OMEGA-X
Companies, universities, organizations

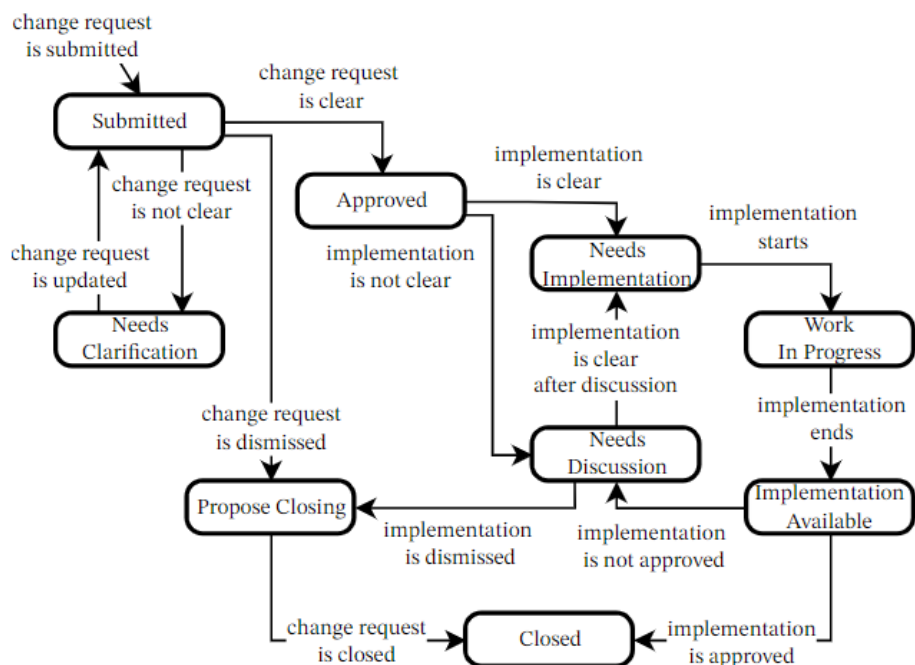
8) “Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead” by SAREF

- A set of versioned ontologies, published in ETSI Technical Specification documents
 - a set of domain-independent reference ontology patterns
 - a core ontology
 - extensions for verticals
- Documentation published at <https://saref.etsi.org/>
- Referred to by different catalogues, not part of our publication process



8) “Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead” by SAREF

- ETSI TS 103 673 "SAREF Development Framework and Workflow" specifies the actors, the workflows, the structure of the repository, the required metadata
- metadata on the ontology: owl, dcterms, vann
- metadata on the terms: rdfs



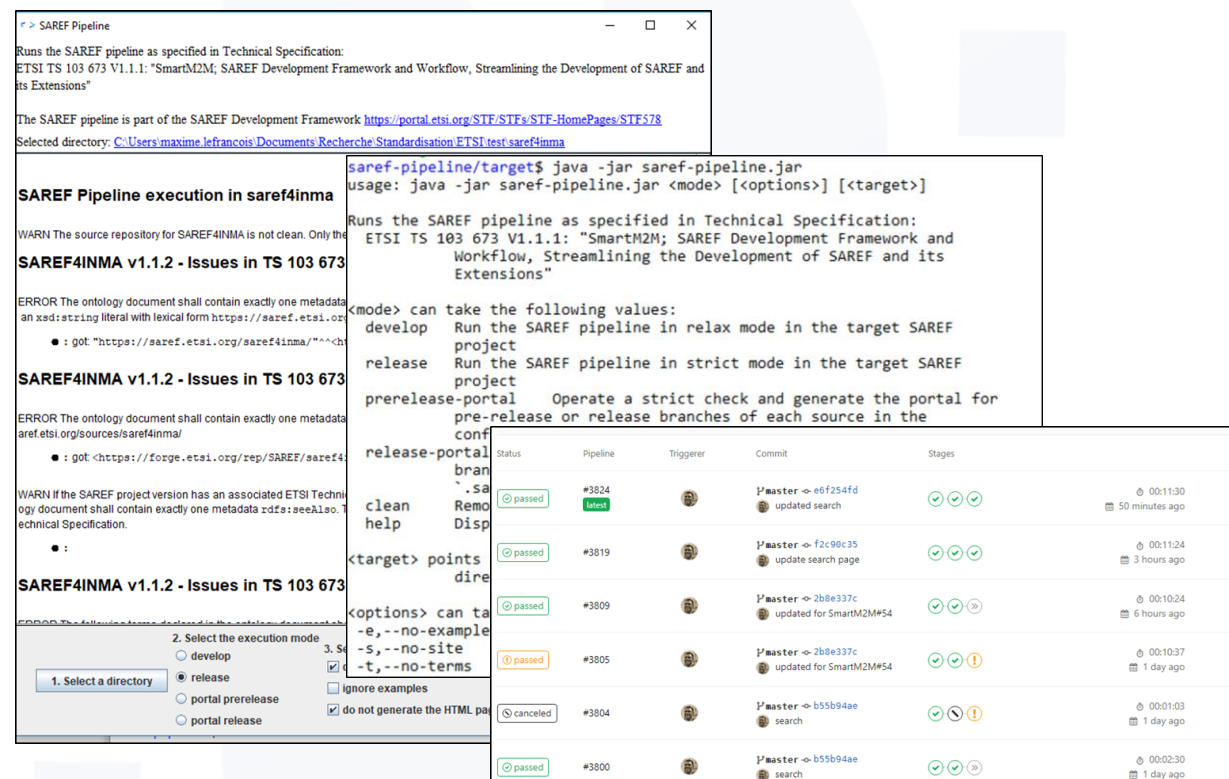
```

1  @prefix : <https://saref.etsi.org/core/> .
2  @prefix owl: <http://www.w3.org/2002/07/owl#> .
3  @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
4  @prefix xml: <http://www.w3.org/XML/1998/namespace> .
5  @prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
6  @prefix foaf: <http://xmlns.com/foaf/0.1/> .
7  @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
8  @prefix saref: <https://saref.etsi.org/core/> .
9  @prefix dcterms: <http://purl.org/dc/terms/> .
10 @prefix vann: <http://purl.org/vocab/vann/> .
11 @base <https://saref.etsi.org/core/> .
12
13 <https://saref.etsi.org/core/> rdf:type owl:Ontology ;
14   owl:versionInfo "v3.1.1" ;
15   owl:versionIRI <https://saref.etsi.org/core/v3.1.1/> ;
16   dcterms:issued "2020-02-11"^^xsd:date ;
17   dcterms:modified "2020-05-29"^^xsd:date ;
18   dcterms:title "SAREF: the Smart Applications REFERENCE ontology"@en ;
19   dcterms:publisher <https://www.etsi.org/> ;
20   dcterms:license <https://forge.etsi.org/etsi-software-license> ;
21   dcterms:creator <https://www.linkedin.com/in/lauradaniele> ;
22   dcterms:creator <http://www.garcia-castro.com/foaf.rdf#me> ;
23   dcterms:creator <https://w3id.org/people/mpoveda/> ;
24   dcterms:creator <http://maxime-lefrancois.info/me#> ;
25   dcterms:source <https://saref.etsi.org/sources/saref-core/> ;
26   rdfs:seeAlso <https://www.etsi.org/deliver/etsi_ts/103200_103299/103264/03.01.01_60/ts_103264v030101p.pdf> ;
27   vann:preferredNamespacePrefix "saref" ;
28   vann:preferredNamespaceUri "https://saref.etsi.org/core/" ;
29   dcterms:description "The Smart Applications REFERENCE ontology (SAREF) is intended to enable interoperable
30     solutions from different providers and among various activity sectors in the Internet of Things (IoT),
31     contributing to the development of the global digital market."@en ;
32   rdfs:comment ""Information about changes compared to version 2.1.1:
33     - Added the saref:FeatureOfInterest class and the properties used to relate it to saref:Measurement (saref:hasMeasurement and saref:isMeasurementOf) and to saref:Property (saref:hasProperty and saref:isPropertyOf).
  
```

8) “Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead” by SAREF

c- Quality (1 Slide)

- The SAREF-Pipeline software assures the quality of the semantic artefacts, and generates the documentation.
- It checks conformance with ETSI TS 103 673
- It can be used through GUI, CLI, CI/CD pipeline
- We enforce reuse and imports from other semantic artefacts?
 - Imports to other SAREF extensions in specific version
 - reuse of some identified standards (SOSA/SSN, OWL-Time, GeoSPARQL)
- Feedback and issues on the ETSI Labs <https://saref.etsi.org/sources/>



The screenshot shows the SAREF Pipeline execution environment. On the left, a terminal window displays the following text:

```

SAREF Pipeline execution in saref4inma
WARN The source repository for SAREF4INMA is not clean. Only the
SAREF4INMA v1.1.2 - Issues in TS 103 673
ERROR The ontology document shall contain exactly one metadata
an xsd:string literal with lexical form https://saref.etsi.or
  • : got "https://saref.etsi.org/saref4inma/"^^ch
SAREF4INMA v1.1.2 - Issues in TS 103 673
ERROR The ontology document shall contain exactly one metadata
saref.etsi.org/sources/saref4inma/
  • : got <https://forge.etsi.org/rep/SAREF/saref4
WARN If the SAREF project version has an associated ETSI Techni
ogy document shall contain exactly one metadata zdfs:seeA1eo.
Technical Specification.
  • :
SAREF4INMA v1.1.2 - Issues in TS 103 673
  
```

On the right, a table displays the CI/CD pipeline status:

Status	Pipeline	Triggerer	Commit	Stages	Time
passed	#3824 latest	👤	P*master -> e6f254fd	🟢🟢🟢	00:11:30 50 minutes ago
passed	#3819	👤	P*master -> f2c96c35	🟢🟢🟢	00:11:24 3 hours ago
passed	#3809	👤	P*master -> 2b8e337c	🟢🟢🟢	00:10:24 6 hours ago
passed	#3805	👤	P*master -> 2b8e337c	🟢🟢🟡	00:10:37 1 day ago
cancelled	#3804	👤	P*master -> b55b94ae	🟢🟢🟡	00:01:03 1 day ago
passed	#3800	👤	P*master -> b55b94ae	🟢🟢🟢	00:02:30 1 day ago

Lefrançois, M. and Gnabasiq, D. "The SAREF Pipeline and Portal — An Ontology Verification Framework". In ISWC 2023 Resource Track

8) “Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead” by SAREF

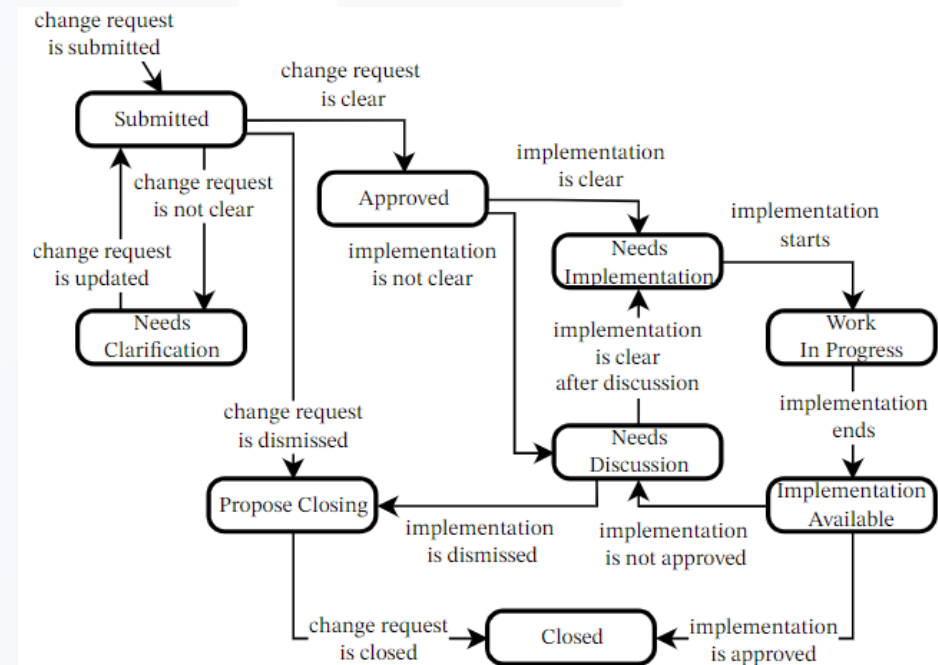
d- Access

- Terms and conditions for SAREF:
 - BSD-3 License <https://forge.etsi.org/legal-matters>
 - Currently only ETSI members can create issues and contribute
 - Ongoing discussion to allow individuals to contribute too.
- Do you have machine accessible endpoints available? Other services to share/support the ontologies?
 - Terms and ontology versions are available
 - Just a term lookup service on <https://saref.etsi.org/>
- How do you communicate with ontology users and get them notified?
 - No. It's possible to get notified through the gitlab features (for users that have an account)
- How do you ensure the sustainability of your ontologies? (financially speaking but not only)
 - Up to now, academics are mostly funded by the European Commission, through EC/ESMEA projects or ETSI Specialist Task Forces.
 - Maintenance funded by ETSI.
 - New work items funded by industrial associations (ex. European Lift Association)

8) “Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead” by SAREF

e- Lifecycle (1 Slide)

- How do you deal with the maintenance? Describe the processes to add new terms (ex: method, periodicity and policy)?
 - Usually work is led in the context of funded task forces, and lead to the publication of an ETSI TS document, or a new version
 - One rapporteur + a group of experts.
 - Work on the ETSI labs (an instance of gitlab), through issues,
 - try to get agreement by each participating institution
 - general workflow described in TS 103 673
- How do you deal with retirement or obsolescence?
 - Semantic versioning:
 - Use deprecation when incrementing Minor/patch
 - Under discussion: ok to delete when incrementing MAJOR ?
- Versioning is managed using version branches on the ETSI labs,
- Versioning is managed using redirections on the documentation portal
- At least en-tagged language tags are required.



8) “Governance of the ETSI SAREF suite of ontologies: past, current situation, and the road ahead” by SAREF

f- Stakeholders and decisions

- Supported and governed by EC and ETSI SmartM2M Technical Committee through funded projects and ETSI specialist task forces
- Ontology composed of a set of modules that are individually versioned, and the object of ETSI Technical Specification documents
- Inheriting governance model of ETSI on the formal side
- Development Framework and Workflow specified in ETSI Technical Specification 103673: "SmartM2M; SAREF Development Framework and Workflow, Streamlining the Development of SAREF and its Extensions"
- On the development side, mostly academics, led to modeling discrepancies.
 - -> now need try to ground the development on patterns.
- New contributions by EU projects (ex. INTERCONNECT), industrial associations (ex. European Lift Association), etc.



9.) Agri-food

“The AGROVOC Governance Model”

Imma Subirats-Coll
(Food and Agriculture Organization
of the United Nations, FAO)



**RECORDED
PRESENTATION**

9) “The AGROVOC Governance Model” by FAO




About FAO

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger.

Our goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. With 195 members - 194 countries and the European Union, FAO works in over 130 countries worldwide.

Join us in creating a world without hunger and poverty.

9) “The AGROVOC Governance Model” by FAO

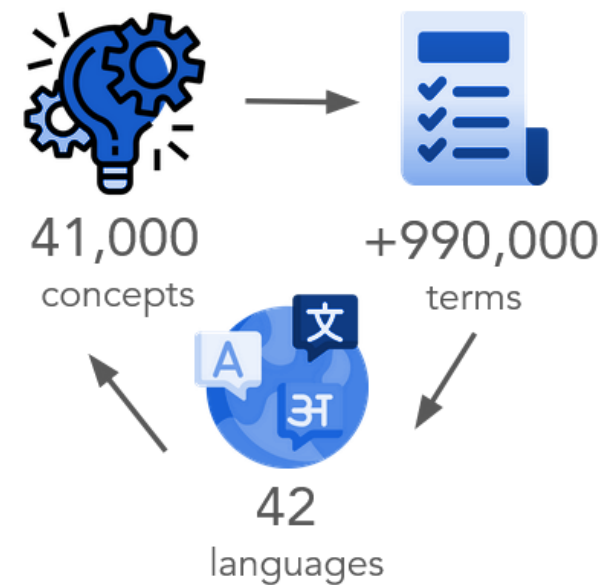
Multilingual thesaurus covering concepts and terminology under
FAO's areas of interest

Coordinated by FAO, maintained by 34 organizations from 24
countries

Released monthly, Linked Open Data Set

Hosted by the University of Tor Vergata (Italy)

Indexed by several semantic catalogues



9) “The AGROVOC Governance Model” by FAO

b- Metadata

- Which information do you require to describe your semantic artefacts?

AGROVOC [VoID](#) file provides metadata about the AGROVOC Linked Dataset: name, license, brief description, publisher, date created, date modified, and link where AGROVOC can be downloaded.

It also includes some content statistics: number of concepts, number of labels (in each language and overall), number of alignments to external datasets and links to their websites.

- Which metadata standards do you use?

DublinCore, FOAF (Friend of a friend), VoID, LIME (LInguistic MEtadata)

9) “The AGROVOC Governance Model” by FAO

c- Quality (1)

- How do you assure the quality of your semantic artefacts?
 - Quality has many facets: technical, scope, linguistic, and being up to date, while also needing to retain legacy data.
 - Continuous quality improvement work in background to improve coherence and clarity:
 - new data being added (concepts, definitions, labels, alignments)
 - existing data, some of which dates back to to 1981
 - Tools such as SPARQL are used to identify outliers or data that does not follow standards (strange characters, duplicate labels) or incorrect input.
 - Consultation with technical experts is often needed (subject matter experts in technical areas, terminology and thesaurus management).
 - Corrections are generally done manually.
 - Resolving ambiguity in a multilingual thesaurus is key: not just translation, but localization of terminology.
 - Better definition coverage in more languages is a priority (currently mainly in English).
- What are the recommended good practices? Are you following guidelines or high level principles?
 - AGROVOC has expanded coverage with a significant annual growth in the number of terms and concepts.
 - This success has required precise rules and protocols on how to edit the vocabulary in order to facilitate maintenance of AGROVOC.
 - Editorial guidelines, developed through working with editors worldwide, facilitate distributed curation of AGROVOC and shared understanding.
 - Standards and guidelines followed include “Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies” (ANSI/NISO Z39.19-2005; IFLA Guidelines for Multilingual Thesauri; ISO 25964, Thesauri and interoperability with other vocabularies.
 - Consulting primary authorities is strongly recommended, such as the International Committee on Taxonomy of Viruses (ICTV) for viruses.

9) “The AGROVOC Governance Model” by FAO

c- Quality (2)

- **Do you enforce reuses and imports from other semantic artefacts?**
 - Concepts are not imported directly.
 - Editors are encouraged to consult other thesauri (such as NALT, CABT, UNBIS) to look at equivalence, current terminology and meaning access languages.
 - AGROVOC includes alignments (mappings) to selected thesauri.
- **How do you collect feedback and issues from the users?**
 - agrovoc@fao.org.
 - The AGROVOC editorial community is active, with annual meetings, online activities, and mailing lists both for editors.
 - There are exchanges on technical questions with some the AGROVOC editors, who both identify and resolve issues.
 - There is a mailing list for general news.
 - Recent publications mentioning AGROVOC are also monitored.
 - There has been considerable work on statistics analysis in the last year which can help trends in usage.
 - In addition, a taskforce has been working on Latin America, and feedback indicates single-language access options to AGROVOC might be useful to increase uptake.

9) “The AGROVOC Governance Model” by FAO

d- Access (1)

- Do you have terms and conditions for your semantic artefacts and who is responsible? How are they licensed?

AGROVOC has no terms and conditions. License CC-BY IGO 3.0

- Do you have machine accessible endpoints available? Other services to share/support the ontologies?

Skosmos provides a set of REST APIs to access AGROVOC vocabulary data.

There is a SPARQL endpoint for use by humans and machines.

Legacy web services are available.

For simple web/based browsing, AGROVOC users can use the Skosmos Search & browse interface.

- How do you communicate with ontology users and get them notified?

Mailing list for public AGROVOC News and AGROVOC website. @FAOAIMS on X.

9) “The AGROVOC Governance Model” by FAO

d- Access (2)

- How do you ensure the sustainability of your ontologies? (financially speaking but not only)

FAO carries mainly the responsibility for the six FAO languages (English, French, Spanish, Arabic, Chinese and Russian).
FAO facilitates the technical maintenance of AGROVOC, including its publication as a Linked Open Data resource.
FAO coordinates all editorial activities.

However

AGROVOC is a collaborative effort, with a number of institutions responsible for the different language versions and different domains.

Work done on a volunteer basis; the content needs to be useful for those contributing.

Knowledge sharing within the AGROVOC team (in and beyond FAO), so no process is too dependent on one person.

Technical collaboration is valued highly.

9) “The AGROVOC Governance Model” by FAO

e- Lifecycle

- **How do you deal with the maintenance? Describe the processes to add new terms (ex: method, periodicity and policy)?**
 - AGROVOC is updated by our editors and our team on a continuous basis.
 - Editing is done in the online collaborative tool VocBench, then reviewed and validated by the AGROVOC team.
 - Batch import of labels is also possible for AGROVOC editors, on an exceptional basis.
 - Some suggestions are also received by email.
 - Updated AGROVOC content is released once a month.
 - The release files are available for download, as well as lists of new labels by language.
 - All the related infrastructure is also updated monthly.
- **How do you deal with retirement or obsolescence?**
 - At present, concepts can be marked as deprecated: labels are removed, dct:isReplacedBy is added (pointing to concept to be used) and a history note is added. For example, c_14385 "soft corn" deprecated in 2022 as duplicate of c_7152 "soft maize".
- **How do you manage the versioning?**
 - AGROVOC does not have versioning.
 - The latest release is provided each month, and users are encouraged to use the newest data.
- **Do you manage different languages (for labels)?**
 - AGROVOC content is available in up to 42 languages. The last language to be added was Belarusian, in 2023.
 - More languages can be added if institutions volunteer to be responsible.

9) “The AGROVOC Governance Model” by FAO

f- Stakeholders and decisions

- Can you list the stakeholders involved in each of these governance aspects?
 - Developer: FAO / KTBL / Tor Vergata University
 - Curator : FAO, together with 40 experts from 34 organizations from 24 countries
 - Board: Core team FAO / KTBL
- How are you taking decisions for each of the governance workflow steps?
 - Generally, curation work follows agreed guidelines and standards.
 - Consensus is sought when needed, for example through annual meetings of the AGROVOC Editorial community.
 - External experts are consulted when there is doubt on technical terminology, for example on animal welfare, as are individual editors for each language or topic when needed.
 - Decisions on single concepts is done by the FAO/KTBL curation team, with weekly meetings.
 - Consistency and coherence is prioritized, and documented in the AGROVOC Editorial Guidelines.
 - Improving and rationalizing curation workflows is of ongoing interest.

Intervention, discussion & questions



From "What are Linked Data and Linked Open Data" [Ontotext](#)

Thank you for your attention and
participation



@fairimpact_eu /company/fair-impact-eu-project



Funded by
the European Union



[@fairimpact_eu](https://twitter.com/fairimpact_eu) /company/fair-impact-eu-project



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