

O'FAIRe: Ontology FAIRness Evaluator

in the
AgroPortal semantic artefact catalogue

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GO-GAIR Agro Brazil network seminar
October 17th, 2023

FAIR data requires FAIR ontologies, how do we do?

Clement Jonquet, PhD

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Visiting Scholar at Stanford University

RDA PII IGAD pre-meeting – Berlin, March 2018



2022: what have we done?



I2. (Meta)data use vocabularies that follow FAIR principles.

SCIENTIFIC DATA

OPEN

SUBJECT CATEGORIES

» Research data

» Publication

characteristics

Comment: The FAIR Guiding Principles for scientific data management and stewardship

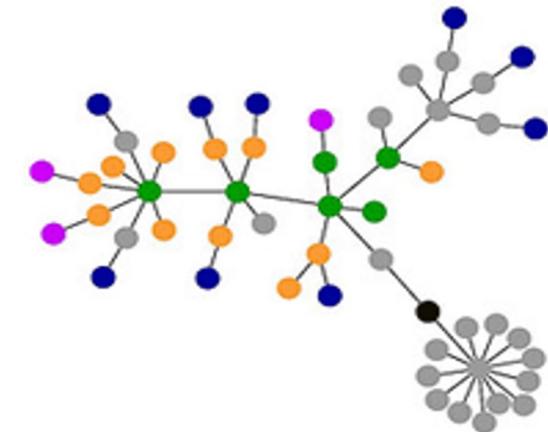
Mark D. Wilkinson *et al.*[#]

Received: 10 December 2015
Accepted: 12 February 2016
Published: 15 March 2016

There is an urgent need to improve the infrastructure supporting the reuse of scholarly data. A diverse set of stakeholders—representing academia, industry, funding agencies, and scholarly publishers—have come together to design and jointly endorse a concise and measurable set of principles that we refer to as the FAIR Data Principles. The intent is that these may act as a guideline for those wishing to enhance the reusability of their data holdings. Distinct from peer initiatives that focus on the human scholar, the FAIR Principles put specific emphasis on enhancing the ability of machines to automatically find and use the data, in addition to supporting its reuse by individuals. This Comment is the first formal publication of the FAIR Principles, and includes the rationale behind them, and some exemplar implementations in the community.

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How to go
from "principles" to
specialized criteria to
measure to which
level ontologies
respect the FAIR
Principles?



From I1, I2 and I3,
ontologies/vocabularie
s are a key element to
achieve the FAIR
Principles

The key feature in FAIRness assessment

SCIENTIFIC DATA 

OPEN

Comment: A design framework and exemplar metrics for FAIRness

Mark D. Wilkinson¹, Susanna-Assunta Sansone², Erik Schultes³, Peter Doorn⁴, Luiz Olavo Bonino da Silva Santos^{5,6} & Michel Dumontier⁷

Received: 28 November 2017

Accepted: 9 May 2018

Published: 26 June 2018

The FAIR Principles¹ (<https://doi.org/10.25504/FAIRsharing.WWH10U>) provide guidelines for the publication of digital resources such as datasets, code, workflows, and research objects, in a manner that makes them Findable, Accessible, Interoperable, and Reusable (FAIR). The Principles have rapidly been adopted by publishers, funders, and pan-disciplinary infrastructure programmes and societies. The Principles are aspirational, in that they do not strictly define how to achieve a state of "FAIRness", but rather they describe a continuum of features, attributes, and behaviors that will move a digital resource closer to that goal. This ambiguity has led to a wide range of interpretations of FAIRness, with some resources even claiming to already "be FAIR"! The increasing number of such statements, the emergence of subjective and self-assessments of FAIRness^{2,3}, and the need of data and service providers, journals, funding agencies, and regulatory bodies to qualitatively or quantitatively evaluate such claims, led us to self-assemble and establish a FAIR Metrics group (<http://fairmetrics.org>) to pursue the goal of defining ways to measure FAIRness.

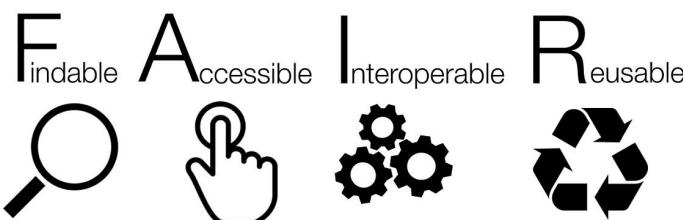
As co-authors of the FAIR Principles and its associated manuscript, founding this small focus group



Designing FAIRness assessment
methods for the community

FAIR metric: objective,
measurable, and
reproducible

«If you can't measure it, you can't improve it.» - Lord Kelvin



Agenda

- Quick introduction to **AgroPortal** (an OntoPortal-based semantic artefact catalogue)
- **Ontology FAIRness Evaluator** (O'FAIRe): a method (almost fully implemented as a tool in AgroPortal)

Introduction to AgroPortal

Welcome to AgroPortal, a vocabulary and ontology repository for agronomy and related domains

Search for a class

Find an ontology

Ontology Visits (December 2020)

Ontology	Visits
ANAEETHES	~80
ONTOBIOPOE	~60
DEMETER-AIM	~40
AGROVOC	~30
GACS	~20

AgroPortal Statistics

Category	Count
Ontologies	131
Classes	2,648,090
Individuals	2,194,309
Projects	47
Users	246

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PRODUCTS

- OntoPortal
- NCBO Web Widgets
- NCBO API

SUPPORT

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- About Us
- D2KAB project

CONNECT

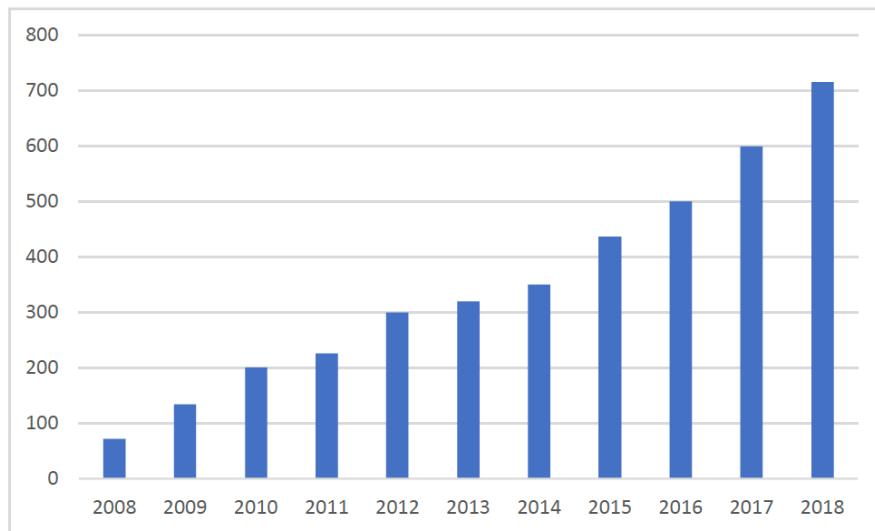
- [Twitter](#)
- [GitHub](#)
- [LinkedIn](#)

AgroPortal is currently being developed within French ANR D2KAB project (ANR-18-CE23-0017). It also receives or received support from ANR SIFR project (ANR-12-JS02-0010), European Union H2020-MSCA SIFRm project (No 701771), the NUMEV Labex (ANR-10-LABX-0020), the IBC of Montpellier project (ANR-11-BINFO002), the Agro Labex (ANR-10-LABX-0001) as well as from University of Montpellier, CNRS and INRAE.

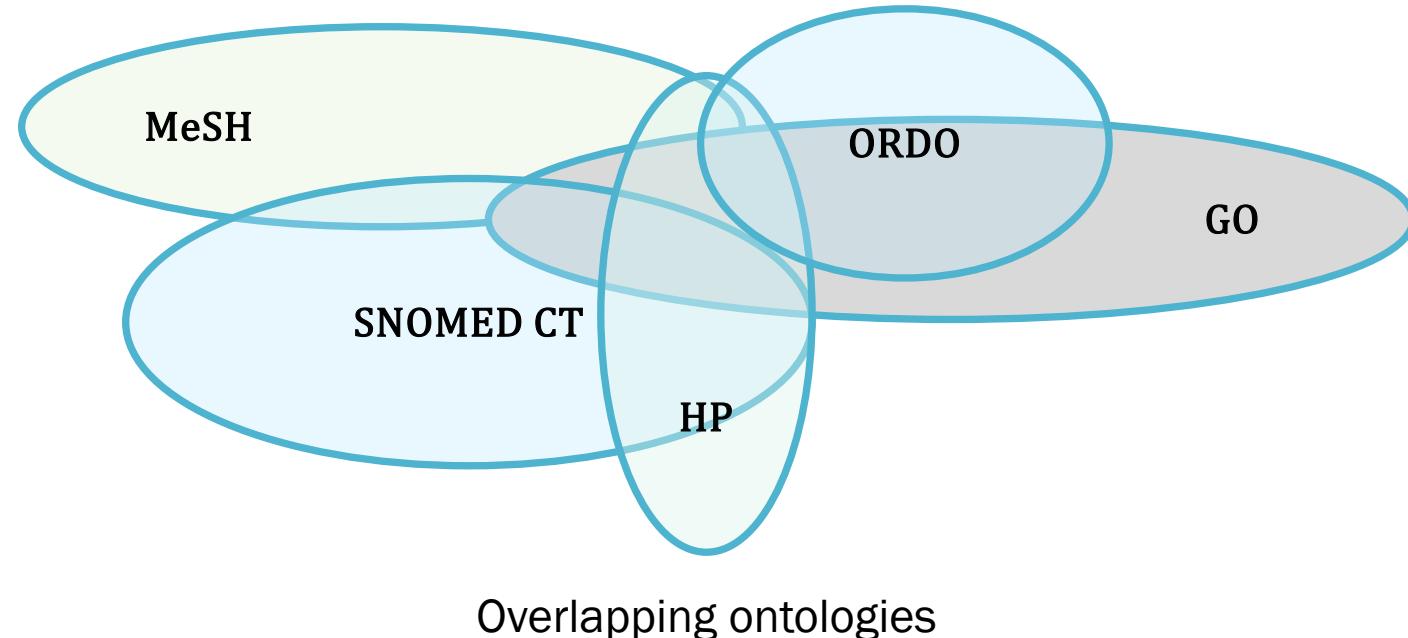
[CITE US](#)

Issues with ontologies...

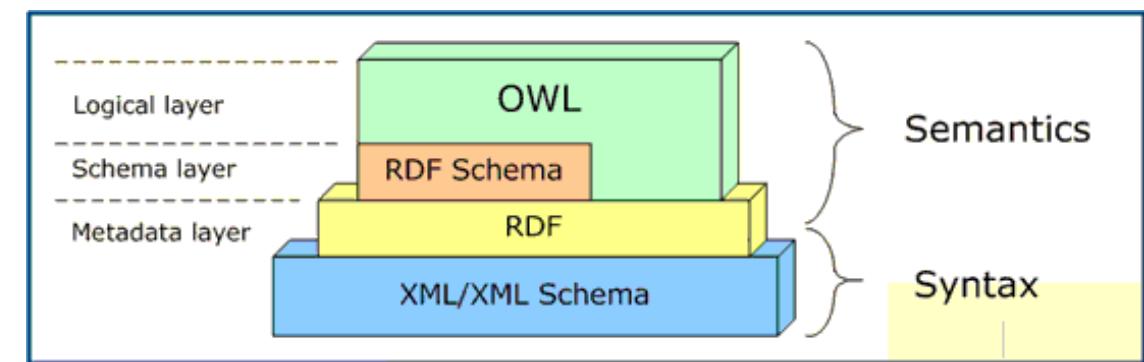
spread out, in different formats, of different size, with different structures



Number of ontologies in the NCBO BioPortal



Overlapping ontologies

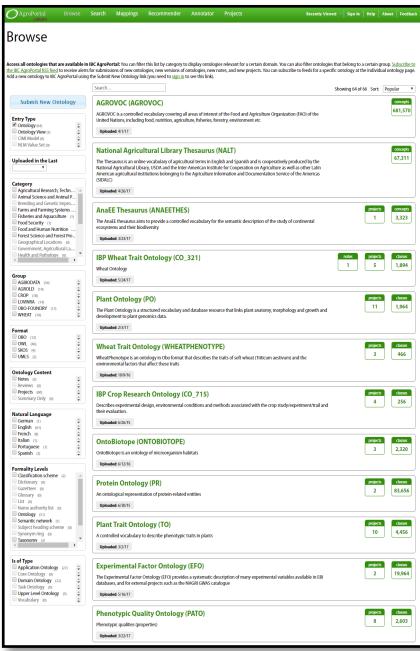


Variety of representation languages

Ontology repositories help to make ontologies FAIR

F_{indable} A_{ccessible} I_{nteroperable} R_{e-usablen}

Findable

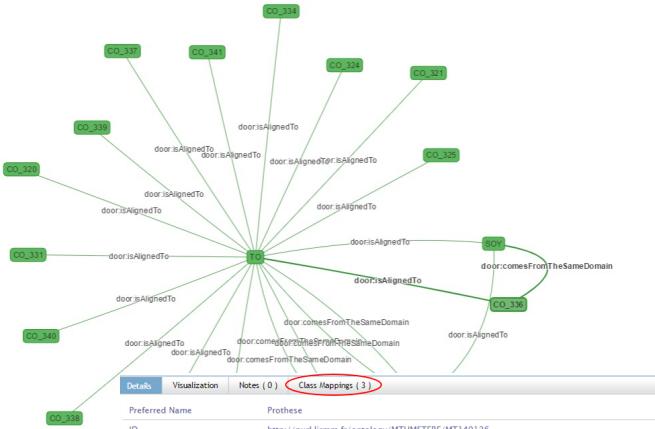


SPARQL httpd server v1.1.5-122-g



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I nteroperable



AgroPortal

an ontology repository
for agronomy, food, plant sciences & biodiversity

- ▶ Publish, search, download
- ▶ Browse, visualize
- ▶ Peer review
- ▶ Versioning
- ▶ Annotation
- ▶ Recommendation
- ▶ Mapping
- ▶ Notes
- ▶ Projects

<http://agroportal.lirmm.fr>

Browse

Browse the library of ontologies

Search... Showing 131 of 137 Sort: Popular

Entry Type	Uploaded in the Last	Category	Group	Format	Ontology Content
<input checked="" type="checkbox"/> Ontology (131)		AnaEE Thesaurus (ANAEETHES) The AnaEE thesaurus aims to provide a controlled vocabulary for the semantic description of the study of continental ecosystems and their biodiversity Uploaded: 12/12/20			
<input type="checkbox"/> Ontology View (6)		OntoBiotope (ONTOBIOTOPE) OntoBiotope is an ontology of microorganism habitats Uploaded: 9/25/19			
		DEMERTER Agriculture Information Model (DEMERTER-AIM) The DEMETER Agri Profile is a master profile importing focused specific profiles/modules of DEMETER AIM. Uploaded: 10/30/20			
		AGROVOC (AGROVOC) AGROVOC is a controlled vocabulary covering all areas of interest of the Food and Agriculture Organization (FAO) of the United Nations, including food, nutrition, agriculture, fisheries, forestry, environment etc Uploaded: 12/30/20			
		Global Agricultural Concept Scheme (GACS) The Global Agricultural Concept Scheme (GACS) is a hub for concepts related to agriculture, in multiple languages, for use in Linked Data Uploaded: 6/4/18			
		Animal Disease Ontology (ANDO) L'ontologie des maladies animales est un référentiel de maladies touchant des animaux de rente et d'agents pathogènes ainsi que des relations qu'ils entretiennent Uploaded: 11/14/18			
		Agri-Food Experiment Ontology (AFEO) The Agri-Food Experiment Ontology (AFEO), a new ontology network was developed based on two existing ontology resources, i.e. Uploaded: 8/5/20			

Welcome to AgroPortal, a vocabulary and ontology repository for agronomy and related domains

Search for a class
Enter a class, e.g. Melanoma

Advanced Search

Ontology Visits (December 2020)

More

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CITE US

- ▶ 149 ontologies, 110 candidates
- ▶ 5 original driving use cases
- ▶ ~330 registered users



AgroPortal: a vocabulary and ontology repository for agronomy

<http://agroportal.lirmm.fr>



- Develop and support a reference ontology repository
 - *Primary focus on the agronomy & close related domains (plant sciences, food and biodiversity)*
- Reusing the NCBO BioPortal technology
 - *Avoid to re-implement what has been done, facilitate interoperability*
 - *Reusing the scientific outcomes, experience & methods of the biomedical domain*
- Enable straightforward use of agronomic related ontologies
 - *Respect the requirements & specificities of the agronomic community*
 - *Fully semantic web compliant infrastructure*
 - *Enable new science*

Browse and select ontologies

- Allows to search, order and select ontologies using a faceted search approach, based on the metadata

AgroPortal Browse Search Mappings Recommender Annotator Projects Landscape Login Support ▾

Browse

Browse the library of ontologies ?

Search... Showing 15 of 162 Sort: Popular

Submit New Ontology

Entry Type
 Ontology (15) Ontology View (2)

Uploaded in the Last

Category

- Breeding and Genetics (11)
- Farms and Farming... (10)
- Fisheries and Aquaculture (9)
- Food Security (4)
- Food and Human Nutrition (15)
- Forest Science and... (2)
- Geographical Locatio... (2)
- Government, Agricu... (1)
- Health and Patholo... (2)

Group

- AGBIODATA (0)
- AGROLG (0)
- CROP (0)
- INRAE (6)
- OBO-FOUNDRY (3)
- RICE (0)
- SEMANDIV (0)
- WHEAT (0)

Format

FoodOn (FOODON)
FoodOn is a consortium-driven project to build a comprehensive and easily accessible global farm-to-fork ontology about food, that accurately and consistently describes foods commonly known in cultures from around the world
Uploaded: 7/1/23 Categories: Food Security, Animal Science and Animal Products, Plant Science and Plant Products, Food and Human Nutrition

Meat Thesaurus (MEAT-T)
The meat thesaurus describes different facets of the meat production chain, such as the meat market, breed, slaughtering, culinary preparations, etc
Uploaded: 2/13/22 Categories: Animal Science and Animal Products, Food and Human Nutrition

Food Classification and Description System (FOODEX2)
FoodEx2 is a comprehensive food classification and description system aimed at covering the need to describe food in data collections across different food safety domains
Uploaded: 4/24/20 Categories: Food Security, Food and Human Nutrition

Agri-Food Experiment Ontology (AFEO)
The Agri-Food Experiment Ontology (AFEO), a new ontology network was developed based on two existing ontology resources, i.e
Uploaded: 6/9/22 Categories: Agricultural Research, Technology and Engineering, Food and Human Nutrition

Ontology for Food Processing Experiment (OFPE)
OFPE is a generic ontology specialized for food processing experiments, where raw materials are transformed into final products
Uploaded: 6/26/18 Categories: Food and Human Nutrition

Showing 15 of 162 Sort: Popular

classes 34,368 FAIR score 336
projects 2 instances 435

concepts 1,505 FAIR score 272

concepts 75,222 FAIR score 248
projects 1

classes 145 FAIR score 299
projects 2 instances 28
notes 1

classes 69 FAIR score 275
projects 2 instances 58

Class Search

leaf area index

Enter a class, e.g. Melanoma

help

Show advanced options

Search

Matches in 29 ontologies

leaf area index - AGROVOC (AGROVOC)

http://aims.fao.org/aos/agrovoc/c_35196

http://aims.fao.org/aos/agrovoc/xDef_012441f5

[details](#) - [visualize](#) - [2 more from this ontology](#)

leaf area index - AnaeEE Thesaurus (ANAEETHES)

http://opendata.inra.fr/anaeethes/c3_2317

leaf area index. http://opendata.inra.fr/anaeethes/c1_def_en_34ee941a. http://opendata.inra.fr/anaeethes/c1_def_en_34ee941a

[details](#) - [visualize](#) - [8 more from this ontology](#)

Leaf area index - Wheat Ontology (CO_321)

https://cropontology.org/rdf/CO_321:0000184

It is a dimensionless quantity that characterizes plant canopies and defined as the leaf area per unit ground surface area.

[details](#) - [visualize](#) - [5 more from this ontology](#)

leaf area index - Plant Trait Ontology (TO)

http://purl.obolibrary.org/obo/TO_0012001

Leaf Area Index (LAI) is the ratio of total upper leaf surface of vegetation divided by the surface area of the land on which the vegetation grows.

[used to predict photosynthetic primary production and ...](#)

[details](#) - [visualize](#) - [7 more from this ontology](#)

Tree Widget

Display a class tree with a search field for TO

Get code

leaf are

leaf area index

leaf area trait

leaf area to spikelet number ratio

leaf area duration

specific leaf area

relative leaf area

large vascular bundle number to leaf area ratio

flag leaf area

Reuses in other ontologies

leaf area index - Agronomy Ontology (AGRO)

http://purl.obolibrary.org/obo/TO_0012001

Leaf Area Index (LAI) is the ratio of total upper leaf surface of vegetation divided by the surface area of the land on which the vegetation grows.

[details](#) - [visualize](#) - [2 more from this ontology](#)

Green Area Index - Wheat Trait and Phenotype Ontology (WHEATPHENOTYPE)

http://purl.obolibrary.org/obo/WTO_0000061

[details](#) - [visualize](#) - [1 more from this ontology](#)

Agronomy Ontology

Last uploaded: November 5, 2021



Summary Classes Properties Instances Notes Mappings Widgets

Jump to:



Details Instances (0) Visualization Notes (0) Class Mappings (32) Access Class JSON

Preferred Name leaf area index

Definitions Leaf Area Index (LAI) is the ratio of total upper leaf surface of vegetation divided by the surface area of the land on which the vegetation grows.

ID http://purl.obolibrary.org/obo/TO_0012001

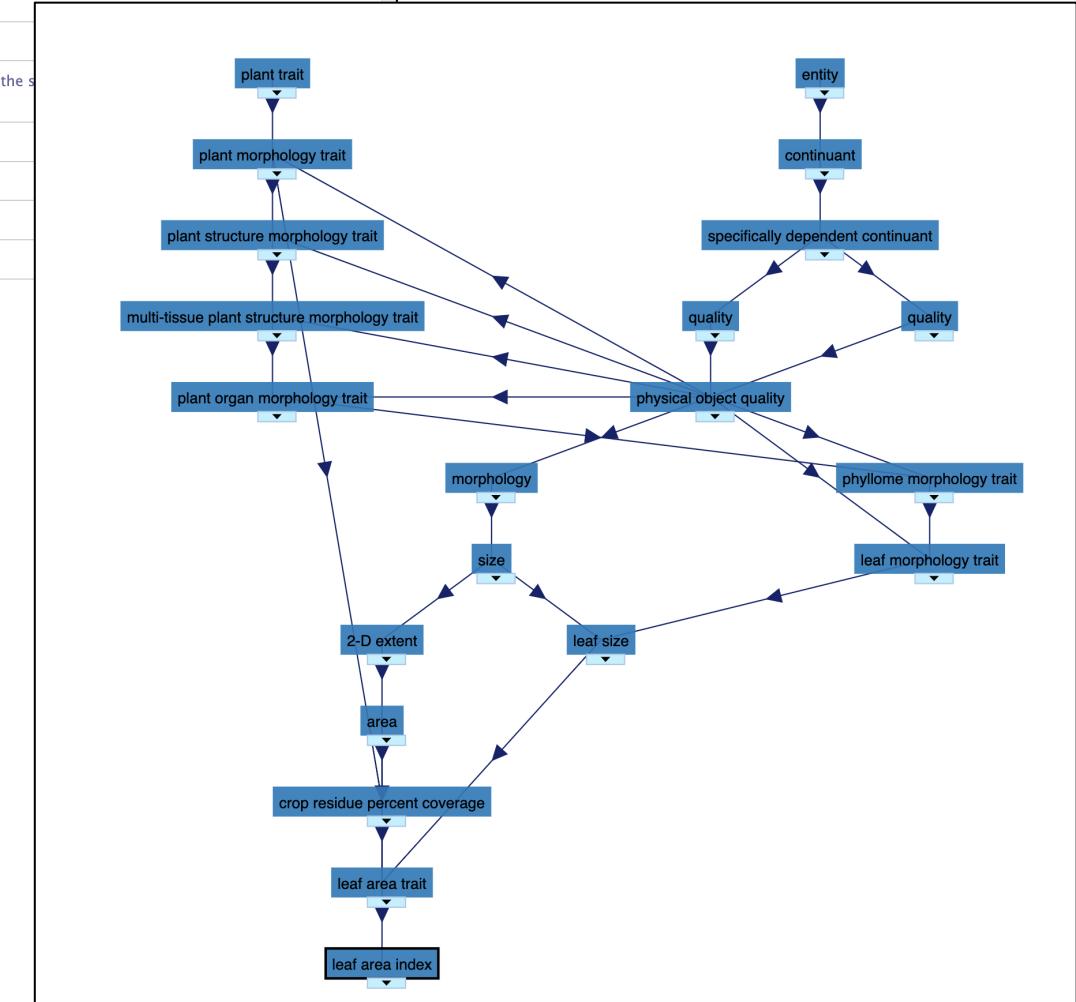
definition Leaf Area Index (LAI) is the ratio of total upper leaf surface of vegetation divided by the s vegetation grows.

label leaf area index

prefixIRI obo1:TO_0012001

prefLabel leaf area index

subClassOf leaf area trait



Community based functionalities

Latest Mappings

[tissue \(BT\) <=> tissue \(CL\)](#)
REST Mapping 06/24/2015 by jonquet

[tissue \(CL\) <=> tissue \(BT\)](#)
REST Mapping 06/24/2015 by jonquet

Latest Notes

[object quality \(Phenotypic Quality Ontology\)](#)
about 19 hours ago by emonet
What is the difference with object quality or process quality? To which object those this quality...

[quality vs trait \(Phenotypic Quality Ontology\)](#)
about 20 hours ago by jonquet
Is this ok in PATO to have 'trait' as a synonym of quality?

Animal Health Ontology for Livestock
Last uploaded: November 8, 2019  

More Permissions	https://www.etalab.gouv.fr/wp-content/uploads/2018/11/open-licence.pdf	Projects using AHOL 
Natural Language		Agrisemantics Map of Data Standards
Ontology Related To	 	Sicpa Sanitaire Web
Publisher	INRA (http://www.inra.fr/)	Vocabulaires Ouverts @INRAE

Meat Thesaurus

Last uploaded: February 13, 2022



Summary

Concepts

Properties

Notes

Mappings

Schemes

Collections

Widgets

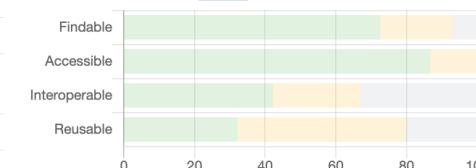
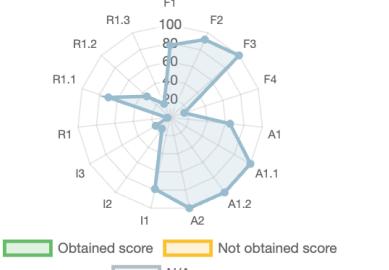
Details

Acronym	MEAT-T
Visibility	Public
Description	The meat thesaurus describes different facets of the meat production chain, such as the meat market, breed, slaughtering, culinary preparations, etc. It contains terms and definitions in French and English. It was derived and adapted from the Dictionnaire de la viande, Académie de la viande (France). Publisher, Autres voix, 2012. ISBN, 2918237086, 9782918237082
Status	Alpha
Format	SKOS
Contact	Vocabulaires Ouverts, vocabulaires-ouverts@inrae.fr
Categories	Animal Science and Animal Products, Food and Human Nutrition

Additional Metadata

URI	http://opendata.inrae.fr/ThViande/MeatThesaurus
Alternative Name	Thésaurus de la Viande
Audience	scientists and professionals of the meat sector
Deprecated	false
Designed For Ontology Task	http://omv.ontoware.org/2005/05/ontology#IndexingTask
Example Identifier	http://opendata.inrae.fr/ThViande/C707
Creators	Moïse Kombolo, Jean-François Hocquette (ORCID: 0000-0003-2409-3881), François Landrieu, Brigitte Richon, Sophie Aubin (ORCID: 0000-0003-4805-8220), Jérémie Yon (ORCID: 0000-0002-4169-5780)
Has Formality Level	http://w3id.org/nkos/nkostype#thesaurus
Has License	
Ontology Syntax	http://www.w3.org/ns/formats/RDF_XML
Identifier	https://doi.org/10.15454/PB5QXC
Is Of Type	http://omv.ontoware.org/2005/05/ontology#DomainOntology
Keywords	meat, dishes, meat cuts, butchery, butchery animals
Natural Language	

Links

[Go to the REST API JSON entry](#)[Get my metadata back](#)[N-Triple](#) [Json-LD](#) [RDF/XML](#)FAIR Scores beta Total score : 272.0 (56.0%) [details](#)

Metrics

Classes	2
Individuals	1,505
Properties	0
Maximum Depth	0
Maximum Number Of Children	2

Describe the ontologies with many metadata

Annotator

The IBC AgroPortal Annotator processes text submitted by users, recognizes relevant ontology terms in the text and returns the annotations to the user. Use the interface below to submit sample text to get ontology-based annotations. Hover the mouse pointer on any button to see what it does. Click on the (?) to see a detailed help panel.

Subscribe to the [NCBO Annotator Users Google group](#) to learn more about who and how the Annotator is being used in different projects.

Plant height is a whole plant morphology trait which is the height of a whole plant. Plant height is sometime measured as height from ground level to the top of canopy at harvest.

Insert sample text

Ontology filters

Select Ontologies

PO TO [clear selection](#) [select from list](#)

Select UMLS Semantic Types [?](#)

Type here to select UMLS semantic types

Select UMLS Semantic Groups [?](#)

Type here to select UMLS semantic groups

Include Ancestors Up To Level:

None

Include Score:

cvalue



Matching parameters

 Match Longest Only
 Match Partial Words
 Include Mappings
 Exclude Numbers
 Exclude Synonyms

NegEx / ConText

 Detect negation [?](#)
 Detect temporality [?](#)

Annotations

total results 7 (direct 7 / ancestor 0 / mapping 0)

CLASS filter	ONTOLOGY filter	TYPE filter	CONTEXT	MATCHED CLASS filter	MATCHED ONTOLOGY filter	SCORE
whole plant	Plant Trait Ontology	direct	... of a whole plant . Plant height is ...	whole plant	Plant Trait Ontology	10.000
plant height	Plant Trait Ontology	direct	Plant height is a whole ...	plant height	Plant Trait Ontology	8.644
plant height	Plant Trait Ontology	direct	... whole plant. Plant height is sometime measured ...	plant height	Plant Trait Ontology	8.644
whole plant morphology trait	Plant Trait Ontology	direct	... is a whole plant morphology trait which is the ...	whole plant morphology trait	Plant Trait Ontology	6.644
whole plant	Plant Ontology	direct	... of a whole plant . Plant height is ...	whole plant	Plant Ontology	6.644
height	Plant Trait Ontology	direct	... is the height of a whole ...	height	Plant Trait Ontology	4.322
height	Plant Trait Ontology	direct	... measured as height from ground level ...	height	Plant Trait Ontology	4.322

Format Results As:

AgroPortal Annotator

identifies ontology concepts within plain text for semantic indexing

Sprouting
Initial Vigor

Color of unexpanded apical root

leaves

Color of first fully expanded leaf

Leaf vein color

Apical Pubescence

Length of stipules

Number of leaf lobes

Leaf lobe position

Angle of petiole insertion

Petiole length

Petiole color

Anthocyanin pigmentation

Growth habit of young stem

Pubescence of young stem

Stem color

Leaf scar prominence

Apical branching

Branching levels

Branching Angle

Height of first apical branch

Height of plant

Total fresh weight foliage and stems

Total fresh weight foliage and stems

Number harvested

Root number

Fresh weight of storage

Color of unexpanded apical root

Fresh root yield

leaves

Dry yield

Harvest index

Proportion of lodged plants

Leaf retention

Plant architecture

Flowers (50%)

Sepal Color

Disc Color

Sigma color

Ovary color

Anther color

Female stamenoids

Male Sterile

Days to Flower

Fruit set

Fruit Exocarp

Ploidy

Seed oclor



Annotator

The IBC AgroPortal Annotator processes text submitted by user on any button to see what it does. Click on the (?) to see a detail

Subscribe to the NCBO Annotator Users Google group to learn i

Plant architecture

Flowers (50%)

Sepal Color

Disc Color

Cassava Trait Ontology

Ontology filters

Select Ontologies

CO_334 x

clear selection select from list

```
- {  
  - annotatedClass: {  
    @id: "http://www.cropontology.org/rdf/co_334:0000386",  
    @type: "http://www.w3.org/2002/07/owl#Class"  
  },  
  hierarchy: [ ],  
  annotations: [  
    - {  
      from: 11,  
      to: 23,  
      matchType: "PREF",  
      text: "INITIAL VIGOR"  
    }  
  ],  
},
```

Cassava Trait Ontology

Summary Classes Properties Notes Mappings Widgets

Jump To:

	Cassava trait
	Agronomical trait
	Anthocyanin Pigmentation
	Ease of Harvest
	Female Stamenoids
	Fresh Shoot Weight
	Fruit Exocarp Texture
	Fruit set presence
	Initial Vigor
	Leaf weight
	Male Sterile
	Marketable root number

Preferred Name Initial Vigor

Synonyms Initial plant vigor

Definitions Initial plant vigor at one month after planting

Ontology Recommender

Get recommendations for the most relevant ontologies based on an excerpt from a biomedical text or a list of keywords [?](#)

Input
 Text Keywords (separated by commas)

Output
 Ontologies Ontology sets

[insert sample input](#)

Some useful technical specifications for timber purchase. For example, the following criteria can be used in the technical specifications of a contract that is sustainable in environmental terms:
- the assurance that the rate of harvesting of timber does not exceed levels that can be permanently sustained;
- use of environment-friendly non-chemical methods of pest control, and the avoidance of use of chemical pesticides.

[advanced options](#)
[Get Recommendations](#)

AgroPortal Recommender

get the most relevant ontologies for your data

Ontology Recommender

Get recommendations for the most relevant ontologies based on an excerpt from a biomedical text or a list of keywords [?](#)

Input
 Text Keywords (separated by commas)

Output
 Ontologies Ontology sets

[insert sample input](#)

Some useful technical specifications for timber purchase. For example, the following criteria can be used in the technical specifications of a contract that is sustainable in environmental terms: - the assurance that the rate of harvesting of timber does not exceed levels that can be permanently sustained; - use of environment-friendly non-chemical methods of pest control, and the avoidance of use of chemical pesticides

[advanced options](#)
[Edit Input](#)
Recommended ontologies

POS.	ONTOLOGY	FINAL SCORE	COVERAGE SCORE	ACCEPTANCE SCORE	DETAIL SCORE	SPECIALIZATION SCORE	ANNOTATIONS	HIGHLIGHT ANNOTATIONS	
1	ANAEETHES	29.5	26.3	0.0	0.0	100.0	3	<input checked="" type="checkbox"/>	
2	WHEATPHENOTYPE	22.8	31.6	0.0	13.7	22.6	3	<input type="checkbox"/>	
3	TO	17.1	15.8	0.0	45.1	11.9	2	<input type="checkbox"/>	
4	EFO	16.0	21.1	0.0	20.6	9.0	2	<input type="checkbox"/>	
5	ENVO	15.6	15.8	0.0	35.9	10.4	2	<input type="checkbox"/>	
6	STY	15.5	21.1	0.0	7.8	18.3	2	<input type="checkbox"/>	
7	NCBITAXON	13.7	21.1	0.0	7.8	6.5	2	<input type="checkbox"/>	
8	SIO	8.1	10.5	0.0	13.7	6.8	1	<input type="checkbox"/>	
9	PATO	8.1	10.5	0.0	7.8	9.5	1	<input type="checkbox"/>	
10	AEO	7.8	10.5	0.0	5.9	8.3	1	<input type="checkbox"/>	
11	AFEO	7.8	10.5	0.0	5.9	6.6	1	<input type="checkbox"/>	
12	PCO	7.8	10.5	0.0	7.8	5.3	1	<input type="checkbox"/>	

Align ontologies one another

AgroPortal LIRMM

Browse Search Mappings Recommender Annotator Projects Admin Recently Viewed antool

AnaEE Thesaurus

Summary Classes Properties Notes Mappings Widgets Edit ontology information Add submission Edit submission information (1.0)

Jump To:

Details Visualization Notes (0) Class Mappings (4) Class Mappings (4)

Create New Mapping Create New External Mapping

Internal mappings

MAPPING TO	ONTOLOGY	SOURCE	RELATION
carbon dioxide	Environment Ontology	LOOM	
carbon dioxide	Experimental Factor Ontology	LOOM	
CarbonDioxide	XEML Environment Ontology	LOOM	
Carbon dioxide	Biorefinery	LOOM	

Interportal mappings

MAPPING TO	ONTOLOGY	SOURCE	RELATION
There are currently no interportal mappings for this class.			

External mappings

MAPPING TO	ONTOLOGY	SOURCE	RELATION
There are currently no external mappings for this class.			

concept by concept

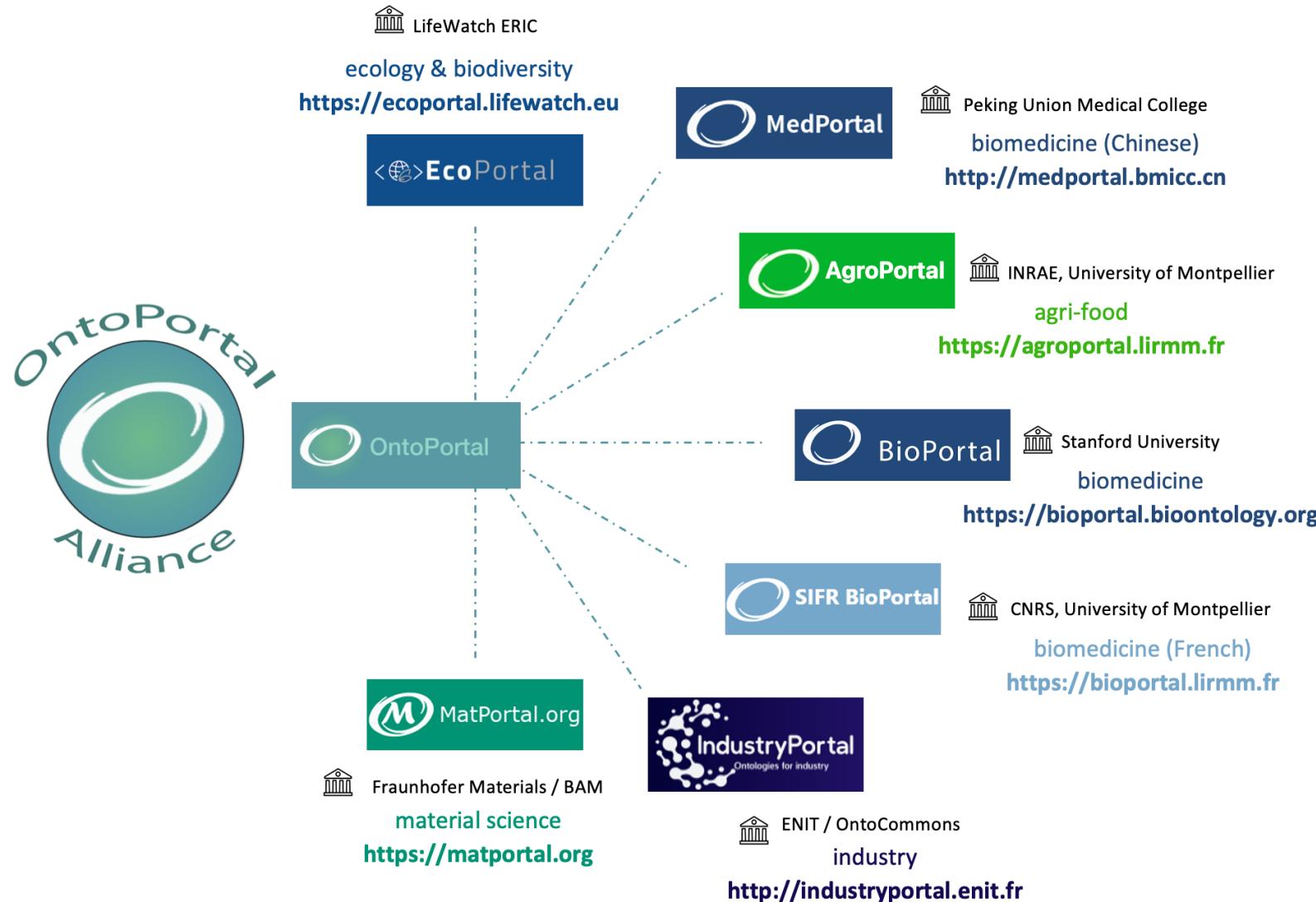
- + abiotic environment
- + AnaEE-France service identification and partners
- + biotic environment
- + chemical compound
 - + carbon forms
 - + carbon dioxide
 - carbonate
 - Dissolved organic carbon
 - inorganic carbon
 - insoluble organic carbon
 - organic carbon
 - Particulate organic carbon
 - total carbon
 - total organic carbon
 - chemical elements
 - chloride
 - ions
 - metals
 - molecule
 - nitrogen forms
 - organic matter
 - organic molecules
 - oxygen forms
 - pesticide
 - phosphorus forms
 - pollutant
 - reactive oxygen species
 - sulfur forms

Mappings

ONTOLOGY	MAPPINGS
Agri-Food Experiment Ontology	1
Agricultural Experiments Ontology	5
Banana Anatomy	2
Basic Formal Ontology	1
Biorefinery	13
Cell Ontology	4
Chickpea Ontology	14
Comparative Data Analysis Ontology	3
Durum Wheat	2
EDAM bioinformatics operations, data types, formats, identifiers and topics	25
Environment Ontology	72
Environment Ontology for Livestock	10
Experimental Factor Ontology	93
Gene Ontology	5
GENO Ontology	5
Genomic Feature and Variation Ontology	5
Gramene Taxonomy Ontology	3
Groundnut Ontology	16
IBP Cassava Trait Ontology	23
IBP Cowpea Trait Ontology	25
IBP Crop Research Ontology	22

Mappings visualization

OntoPortal Alliance: Synchronizing and mutualizing research and development efforts



Representing OntoPortal adopters and end users

- to maximize OntoPortal value (state-of-the-art service portfolio)
- to improve OntoPortal software while managing several parallel and different installations
- to increase semantic uptake in science communities and facilitate adoption of the FAIR principles
- to increase the ecosystem's long term operational and financial health

Always in-line with the OntoPortal technology but with many added features...

- Customization of group, categories, look-and-feel
- Change default language
- Slices fix, sync of group and slices
- New metadata model
- New metadata user interfaces (browse, summary, landscape)
- Annotator enhancements (French ConText, formats, scoring, etc.)
- NCBO Annotator+
- Internal/external mappings + multiple mapping properties
- User admin page
- Support instances
- FAIRness assessment O'FAIRe
- Repair notifications and subscriptions
- Better multilingual support
- Large file processing
- Enhanced SKOS support
- SSSOM mappings import
- Metadata edition in batch

REST Service API:

<http://data.agroportal.lirmm.fr/documentation>

The screenshot shows a web browser displaying the API Documentation. The left sidebar contains a navigation menu with links like Home, General Usage, Search, Annotator, Recommender, Resource Index, Batch, Ontology Analytics, Resources, Media Types and Hypermedia Links, Category, Class, Group, Mapping, Metric, Note, Reply, Ontology, OntologySubmission, Project, ProvisionalClass, Review, Slice, User, and Content Types. The main content area has a title "API Documentation" and a "General Usage" section. Below it is a "Common Parameters" table.

Parameter	Possible Values	Description
apikey	{your api key}	An API Key is required to access any API call. It can be provided in three ways: <ol style="list-style-type: none">Using the <code>apikey</code> query string parameterProviding an <code>Authorization</code> header: <code>Authorization: apikey token=your_apikey</code> (replace 'your_apikey' with your actual key)When using a web browser to explore the API, if you provide your API Key once using method 1, it will be stored in a cookie for subsequent requests. You can override this by providing a different API Key in a new call.
include	all {comma-separated list of attributes, EX: attr1,attr2}	By default, the API will show a subset of the available attributes for a given media type. This behavior can be overridden by providing <code>include=all</code> to show all attributes or <code>include=attribute1,attribute2</code> to include a specific list. The API is optimized to return the default values, so overriding this can impact the performance of your request. The <code>include=all</code> option is most useful for testing in the browser. Use it to identify the set of attributes required and use only those by passing them as a comma separated list, e.g. <code>include=prefLabel,cui</code> . The <code>include</code> parameter is currently unsupported on Annotator and Recommender endpoints.
format	json jsonp xml	The API returns JSON as the default content type. This can be overridden by using the <code>format</code> query string parameter. The API also respects <code>Accept</code> header entries, with precedence given to the <code>format</code> parameter.

SPARQL endpoint:

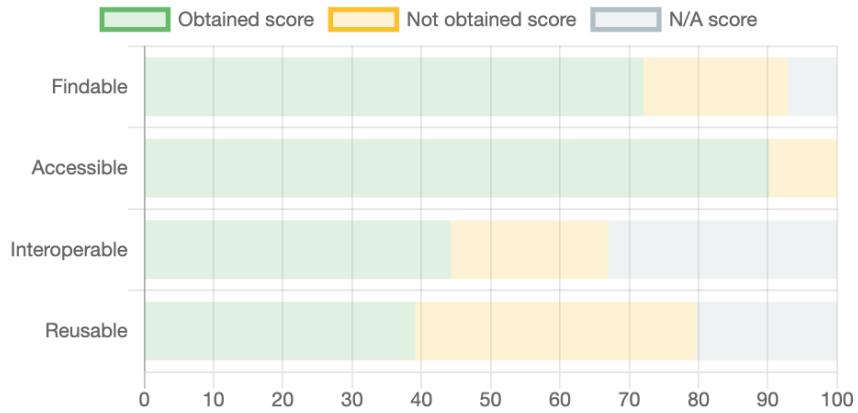
<http://sparql.agroportal.lirmm.fr>

The screenshot shows a web browser displaying a SPARQL endpoint. The address bar shows `sparql.agroportal.lirmm.fr/test/`. The main content area has a title "SPARQL httpd server v1.1.5-122-g1788d29 test query" and a "KB ontologies_api" section. Below it is a code editor containing a SPARQL query.

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

SELECT * WHERE {
?s ?p ?o
} LIMIT 10
```

At the bottom, there are buttons for "Soft limit", "xml", "Execute", and "Effacer".



O'FAIRe: Ontology FAIRness Evaluator in the AgroPortal semantic resource repository

Work with Emna Amdouni, Syphax Bouazzouni

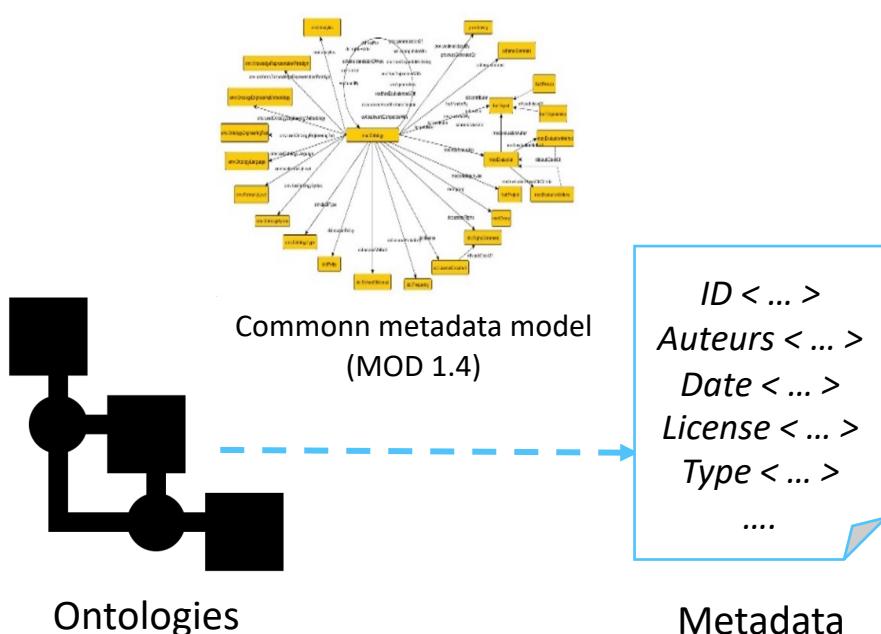


FooSIN

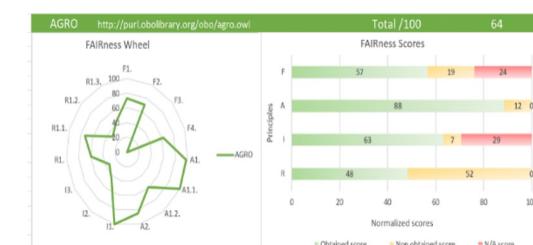


 **eosc** | **FAIR-IMPACT**
Expanding FAIR solutions across EOSC
GO-GAIR Agro Brazil network seminar - C. Jonquet

Our objective: a **methodology** and a **tool** to automatically assess the level of FAIRness of a semantic resource



Metadata curation



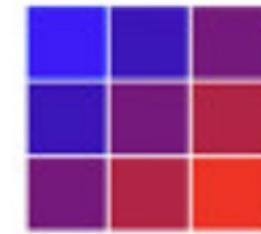
This screenshot shows the OntoBiotope tool interface at the URL <http://agroportal.lirmm.fr/>. The interface includes a navigation bar with links like "AgroPortal", "Onto", "Search", "Mappings", "Recommender", "Annotations", "Projects", and "Language". The main area is titled "OntoBiotope" and contains sections for "Details", "Metrics", "Additional Metadata", "Reviews", "Submissions", and "Projects Using This Ontology". The "Metrics" section provides detailed statistics such as the number of classes (2328), individuals (6), and publications (42). The "Reviews" section states "No reviews available." The "Submissions" section shows a table with one entry. The "Projects Using This Ontology" section lists several projects, with a red box highlighting the INRA logo. A large green arrow points from the "Metadata curation" section above to this interface, indicating the tool's role in managing and assessing semantic resources.

Background: 50 shades of FAIR!

- Generic (any type of data): SHARC, FDMM, FAIR Metrics, FAIR-Aware, FAIRshake, FAIR dat, FAIR checker
- Specific to semantic resources
 - *H2020 FAIRsFAIR deliverable*,
 - *Poveda et al., (2 papers then FOOPS)*
 - *10 simple rules paper*
 - *DBpedia Archivo*
- Specific to semantic resources but pre-existing FAIR
 - *MIRO guidelines* (*Minimum Information for Reporting an Ontology*)
 - *MOD* (*Metadata for Ontology Description and Publication Ontology*)
 - *5-stars for vocabularies*



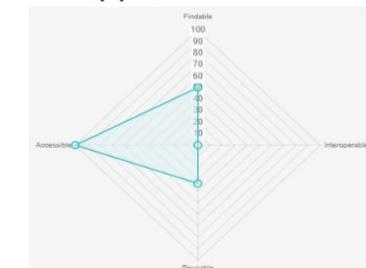
(c) FAIRshake



(d) FAIR-Aware



(e) FAIR checker



Recent work on FAIRness or alike...



- [SHARC] R. David et al., “Fairness literacy: The achilles’ heel of applying fair principles,” *Data Science Journal*, vol. 19, no. 1, pp. 1–11, Aug. 2020, doi: [10.5334/DSJ-2020-032](https://doi.org/10.5334/DSJ-2020-032).
- [FDMM] C. Bahim et al., “The FAIR data maturity model: An approach to harmonise FAIR assessments,” *Data Science Journal*, vol. 19, no. 1, pp. 1–7, Oct. 2020, doi: [10.5334/DSJ-2020-041](https://doi.org/10.5334/DSJ-2020-041).
- [5-star] A. Hasnain and D. Rebolz-Schuhmann, “Assessing FAIR data principles against the 5-star open data principles,” in *ESWC 2018 Satellite Events*, Jun. 2018, vol. 11155 LNCS, pp. 469–477. doi: [10.1007/978-3-319-98192-5_60](https://doi.org/10.1007/978-3-319-98192-5_60).
- [MIRO] N. Matentzoglu, J. Malone, C. Mungall, and R. Stevens, “MIRO: guidelines for minimum information for the reporting of an ontology.,” *J Biomed Semantics*, vol. 9, no. 1, p. 6, Jan. 2018, doi: [10.1186/s13326-017-0172-7](https://doi.org/10.1186/s13326-017-0172-7).
- [Povedal et al.] D. Garijo and M. Poveda-Villalón, “Best Practices for Implementing FAIR Vocabularies and Ontologies on the Web,” in *Applications and Practices in Ontology Design, Extraction, and Reasoning*,. IOS Press, 2020. doi: [10.3233/SSW200034](https://doi.org/10.3233/SSW200034). + M. Poveda-Villalón, P. Espinoza-Arias, D. Garijo, and O. Corcho, “Coming to Terms with FAIR Ontologies,” in *22nd International Conference on Knowledge Engineering and Knowledge Management, EKAW’20*, Sep. 2020, vol. 12387 LNAI, pp. 255–270. doi: [10.1007/978-3-030-61244-3_18](https://doi.org/10.1007/978-3-030-61244-3_18).
- [FAIRsFAIR] Y. le Franc, G. Coen, J. P. Essen, L. Bonino, H. Lehväslaiho, and C. Staiger, “D2.2 FAIR Semantics: First recommendations,” Mar. 2020. doi: [10.5281/zenodo.3707985](https://doi.org/10.5281/zenodo.3707985).
- [10-simple-rule] (not used at the time) S. J. D. Coxid, A. N. Gonzalez-Beltran, B. Magagna, and M.-C. Marinescu, “Ten simple rules for making a vocabulary FAIR,” *PLOS Comp. Biology*, June 2021, doi: [10.1371/journal.pcbi.1009041](https://doi.org/10.1371/journal.pcbi.1009041).

Generic
methodologies

SHARC

FDMM

MIRO

Poveda et
al.

FAIRsFAIR

5-star

Methodologies
specific to
ontologies

Integrated FAIRness
assessment grid

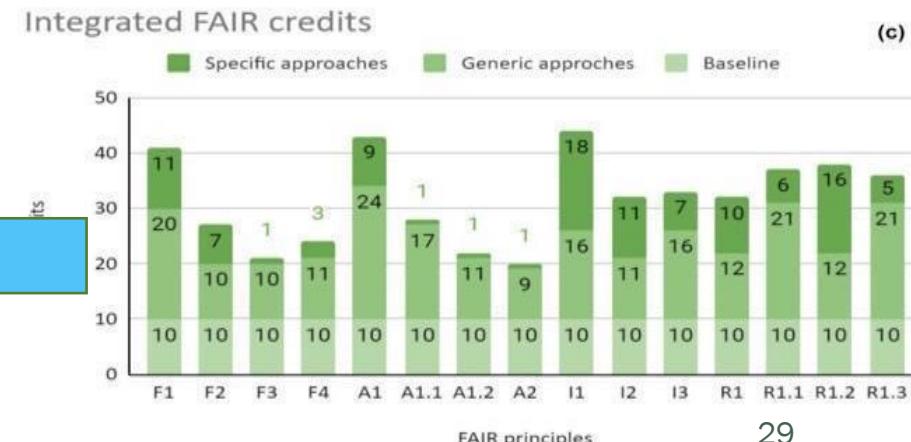
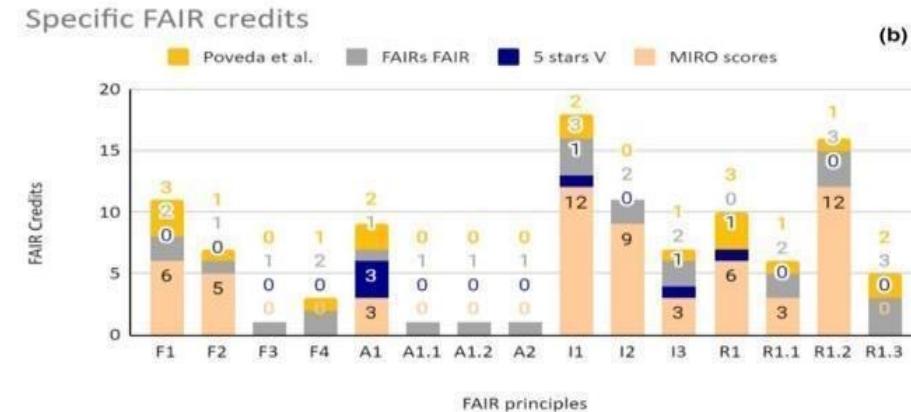
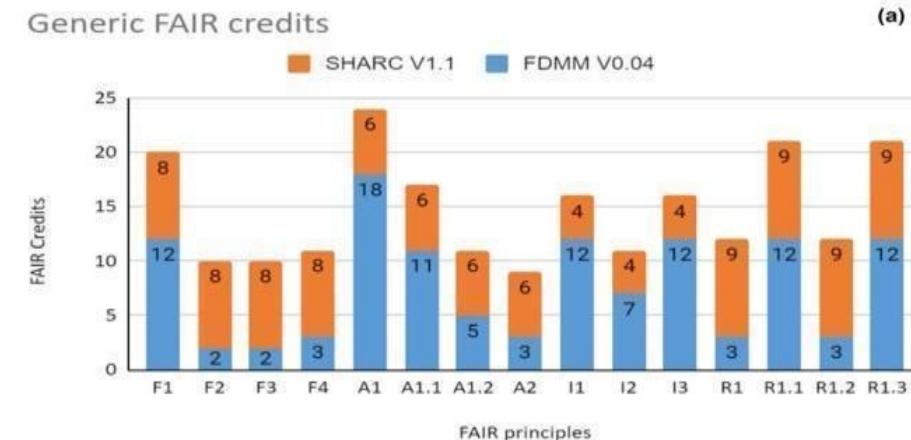
Recent work on FAIRness or alike...



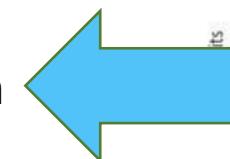
- [SHARC] R. David et al., "Fairness literacy: The achilles' heel of applying fair principles," *Data Science Journal*, vol. 19, no. 1, pp. 1–11, Aug. 2020, doi: [10.5334/DS-2020-032](https://doi.org/10.5334/DS-2020-032).
- [FDMM] C. Bahim et al., "The FAIR data maturity model: An approach to harmonise FAIR assessments," *Data Science Journal*, vol. 19, no. 1, pp. 1–7, Oct. 2020, doi: [10.5334/DSJ-2020-041](https://doi.org/10.5334/DSJ-2020-041).
- [5-star] A. Hasnain and D. Rebholz-Schuhmann, "Assessing FAIR data principles against the 5-star open data principles," in *ESWC 2018 Satellite Events*, Jun. 2018, vol. 11155 LNCS, pp. 469–477, doi: [10.1007/978-3-319-98192-5_60](https://doi.org/10.1007/978-3-319-98192-5_60).
- [MIRO] N. Matentzoglu, J. Malone, C. Mungall, and R. Stevens, "MIRO: guidelines for minimum information for the reporting of an ontology," *J Biomed Semantics*, vol. 9, no. 1, p. 6, Jan. 2018, doi: [10.1186/s13326-017-0172-7](https://doi.org/10.1186/s13326-017-0172-7).
- [Povedal et al.] D. Garijo and M. Poveda-Villalón, "Best Practices for Implementing FAIR Vocabularies and Ontologies on the Web," in *Applications and Practices in Ontology Design, Extraction, and Reasoning*, IOS Press, 2020, doi: [10.3233/SW200034](https://doi.org/10.3233/SW200034), + M. Poveda-Villalón, P. Espinoza-Arias, D. Garijo, and O. Corcho, "Coming to Terms with FAIR Ontologies," in *22nd International Conference on Knowledge Engineering and Knowledge Management, EKAW'20*, Sep. 2020, vol. 12387 LNAI, pp. 255–270, doi: [10.1007/978-3-030-61244-3_18](https://doi.org/10.1007/978-3-030-61244-3_18).
- [FAIRsFAIR] Y. le Franc, G. Coen, J. P. Essen, L. Bonino, H. Lehväslaiho, and C. Staiger, "D2.2 FAIR Semantics: First recommendations," Mar. 2020, doi: [10.5281/zenodo.3707985](https://zenodo.3707985).
- [10-simple-rule] (not used at the time) S. J. D. Coxid, A. N. Gonzalez-Beltran, B. Magagna, and M.-C. Marinescu, "Ten simple rules for making a vocabulary FAIR," *PLOS Comp. Biology*, June 2021, doi: [10.1371/journal.pcbi.1009041](https://doi.org/10.1371/journal.pcbi.1009041).

Requirement #1: a FAIRness assessment grid

- FAIR or FAIRer?
- Evaluate the importance of each principles in multiple approaches (generic & specific)
- Integrate them all in an “quantitative” grid



478 credits
dispatched on
15 principles

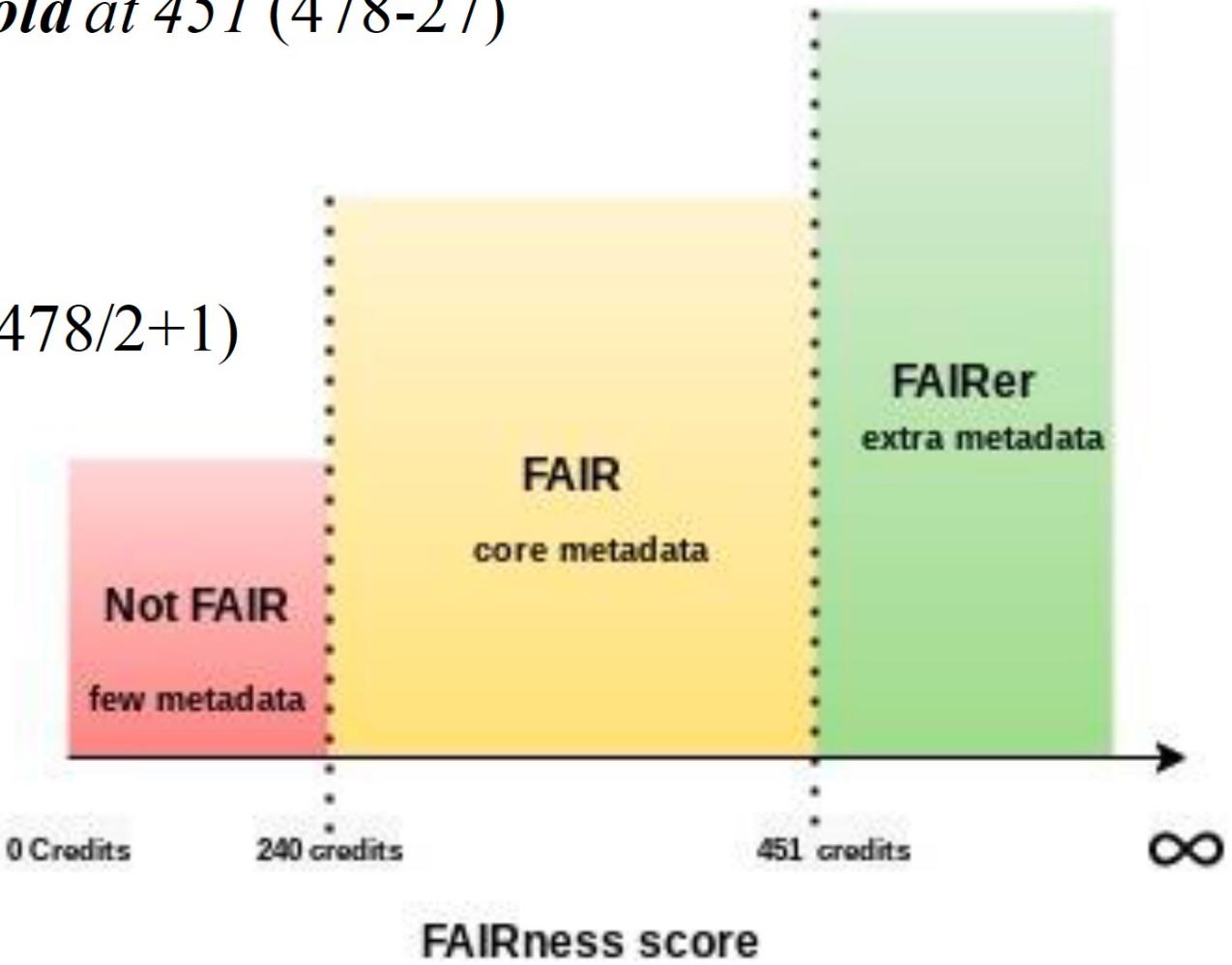


FAIR or FAIRer?



Second threshold at 451 (478-27)
Score=94%

First threshold at 240 (478/2+1)
Score=50%



So much things to say about an ontology



Intrinsic

- names, acronym, language, ids, version, status, license, syntax, type, guidelines



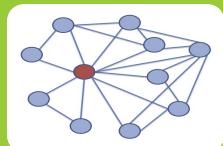
People

- creator, contributor, publisher, contact, curator



Grouping

- domain, group



Relation

- imports, versions, views, related to, aligned to, used by, translation, generalization, specialization



Content

- key classes, dumps, partitions, example, changes



Community

- endorsements, reviews, notes, projects, analytics, support, audience



Date

- creation, modification, released, validation



Metrics

- classes, properties, individuals, depth, etc.



Provenance

- Source, generated by, invalidated by



Description

- documentation, abstract, reference, notes, methods, tools, logo, property used, homepage

Requirement #2: a projection of the FAIR Principles for semantic resources

- FAIR Principles are very generic and need to be “projected” for different kind of research objects (cf. FAIR-IMPACT Horizon EU project)
- 61 questions
 - *45 are dependent on the semantic resource*
 - *16 are independent of the ontology*
- 3 examples
 - F4 Q2. Is the ontology registered in multiple open ontology 'repositories'? **10 pts**
 - A2 Q2. Are the ontology metadata of each version available? **5 pts**
 - R1.1 Q1. Is the ontology license clearly specified, with an URI that is resolvable and supports content negotiation? **15 pts**



<https://github.com/agroportal/fairness>

$$FAIRScore(sr) = \sum_{j=1}^n FAIRSubPrincipleScore_{ij}(sr) = \sum_{k=1}^m QScore_{ijk}(sr)$$

Examples

F1 assessment questions (41 credits)	Identifiers
Q1. Does the ontology have a "local" identifier, i.e., a global unique and potentially permanent identifier assigned by the developer (or developing organization)? 9 pts	
Q2. Does the ontology provide an additional "external" identifier, i.e., a guarantee globally unique and persistent identifier assigned by an accredited body? If yes, is this identifier a DOI? 11 pts	
Q3. Are the ontology metadata clearly identified with the same identifier as the ontology (if included in the ontology or with its own globally unique and persistent identifier)? 9 pts	
Q4. Does the ontology provide a version-specific URI that is resolvable? 9 pts	
Related recommendations: (i) FAIRsFAIR: P-Rec 1; (ii) Poveda et al.: Rec 1, 2, and 3.	

F4 assessment questions (24 credits)	Repository
Q1. Is the ontology registered in multiple ontology 'libraries'? 6 pts	
Q2. Is the ontology registered in multiple open ontology 'repositories'? 10 pts	
Q3. Are the ontology 'libraries' or 'repositories' properly indexed by Web search engines? 8 pts	
A1.1 assessment questions (28 credits)	Protocol
Q1. Is the ontology relying on HTTP/URIs for its identification and access mechanism? 11 pts	
Q2. Is the ontology implementable via a standard protocol? 11 pts	
Q3. If the ontology is not implementable via a standard protocol, is it implementable via another protocol? 6 pts	
Related recommendations: (i) FAIRsFAIR: P-Rec 16; (ii) Poveda et al.: Rec 6.	
R1.1 questions (37 credits)	Licensing & rights
Q1. Is the ontology license clearly specified, with an URI that is resolvable and supports content negotiation? 15 pts	
Q2. Are the ontology access rights specified and permissions documented? 7 pts	
Q3. Are the ontology usage guidelines and copyright holder documented? 15 pts	
Related recommendations: (i) FAIRsFAIR P-Rec 3 and 16; (ii) Poveda et al. Rec 6.	

Let's see the list of 61 questions

- <https://github.com/agroportal/fairness/blob/master/doc/results/FAIR-questions.md>
- E. Amdouni, S. Bouazzouni, C. Jonquet, **O'FAIRe makes you an offer: Metadata-based Automatic FAIRness Assessment for Ontologies and Semantic Resources**, Int. J. of Metadata, Semantics and Ontologies, Inderscience, 2022, TO BE PUBLISHED. <https://hal.archives-ouvertes.fr/lirmm-03630233>

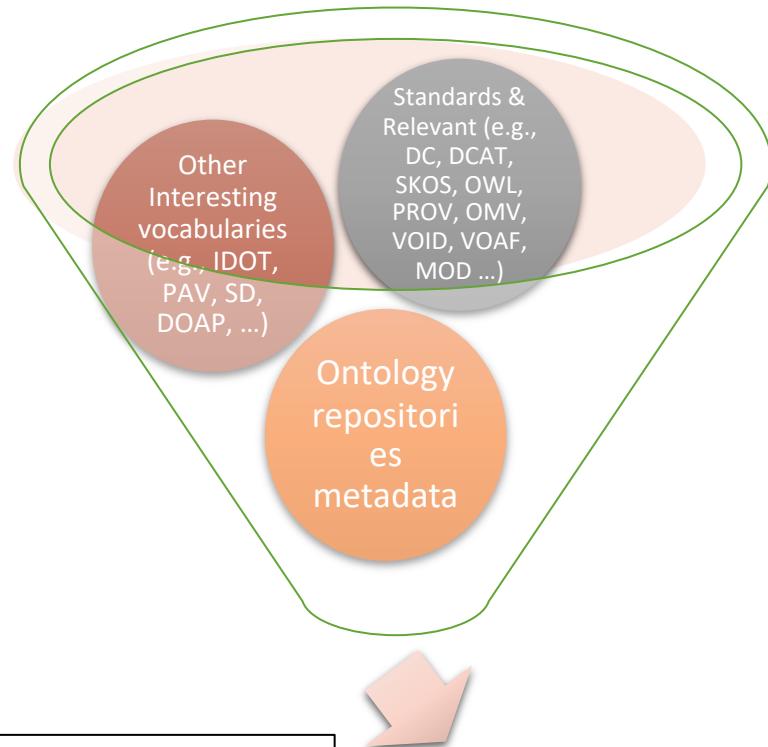
Requirement #3: a unified way to describe semantic resources (metadata)

- MOD1.4 = a set of identified properties (127) one can use to describe a semantic resource
- In O'FAIRe
 - 57 MOD properties are “core” metadata properties allowing 276/478 credits
 - 70 MOD properties are “extra” metadata properties for a FAIRer level



Dutta, B., Toulet, A., Emonet, V. and Jonquet, C. (2017). New Generation Metadata vocabulary Description and Publication. In E. Garoufaliou, S. Virkus, R. Siatri and D. Koutso Communications in Computer and Information Science (CCIS) 755, proceedings of 11th M Semantics Research Conference (MTSR 2017), November 28 – December 1, 2017, Talli Springer Nature, pp. 173-185.

GO-GAIR Agro Brazil network seminar - C. Jonquet



Stable

MOD: Metadata for Ontology Description and publication

Release August 2, 2018

This version: <http://www.isibang.ac.in/ns/mod/1.4>

Latest version: <http://www.isibang.ac.in/ns/mod/1.4>

Previous version: <http://www.isibang.ac.in/ns/mod/1.2>
<https://www.isibang.ac.in/ns/mod/1.1>
<https://www.isibang.ac.in/ns/mod/1.0>

Revision: 1.4

Authors: Biswanath Dutta, ([Indian Statistical Institute](#)) Clement Jonquet, ([University of Montpellier](#))

Contributors: Anne Toulet, ([University of Montpellier](#)) Udaya Varadarajan, ([Indian Statistical Institute](#))

Publisher: <http://www.isibang.ac.in/>

Download serialization:

Format: [JSON LD](#) Format: [RDF/XML](#) Format: [N Triples](#) Format: [TTL](#)

License: License Creative Commons Attribution 4.0

346 relevant properties that could be used to describe ontologies

127 used to build a new metadata model inside AgroPortal and available in MOD1.4

MOD 1.4 (August, 2018)

(<https://www.isibang.ac.in/ns/mod/index.html>)

MOD: Metadata for Ontology Description and publication

Release August 2, 2018

This version:

<http://www.isibang.ac.in/ns/mod/1.4>

Latest version:

<http://www.isibang.ac.in/ns/mod/1.4>

Previous version:

<http://www.isibang.ac.in/ns/mod/1.2>
<https://www.isibang.ac.in/ns/mod/1.1>
<https://www.isibang.ac.in/ns/mod/1.0>

Revision:

14

Authors:

Biswanath Dutta, ([Indian Statistical Institute](#))
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Contributors:

Anne Toulet, ([University of Montpellier](#))
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<http://www.jsibang.ac.in/>

Download serialization:

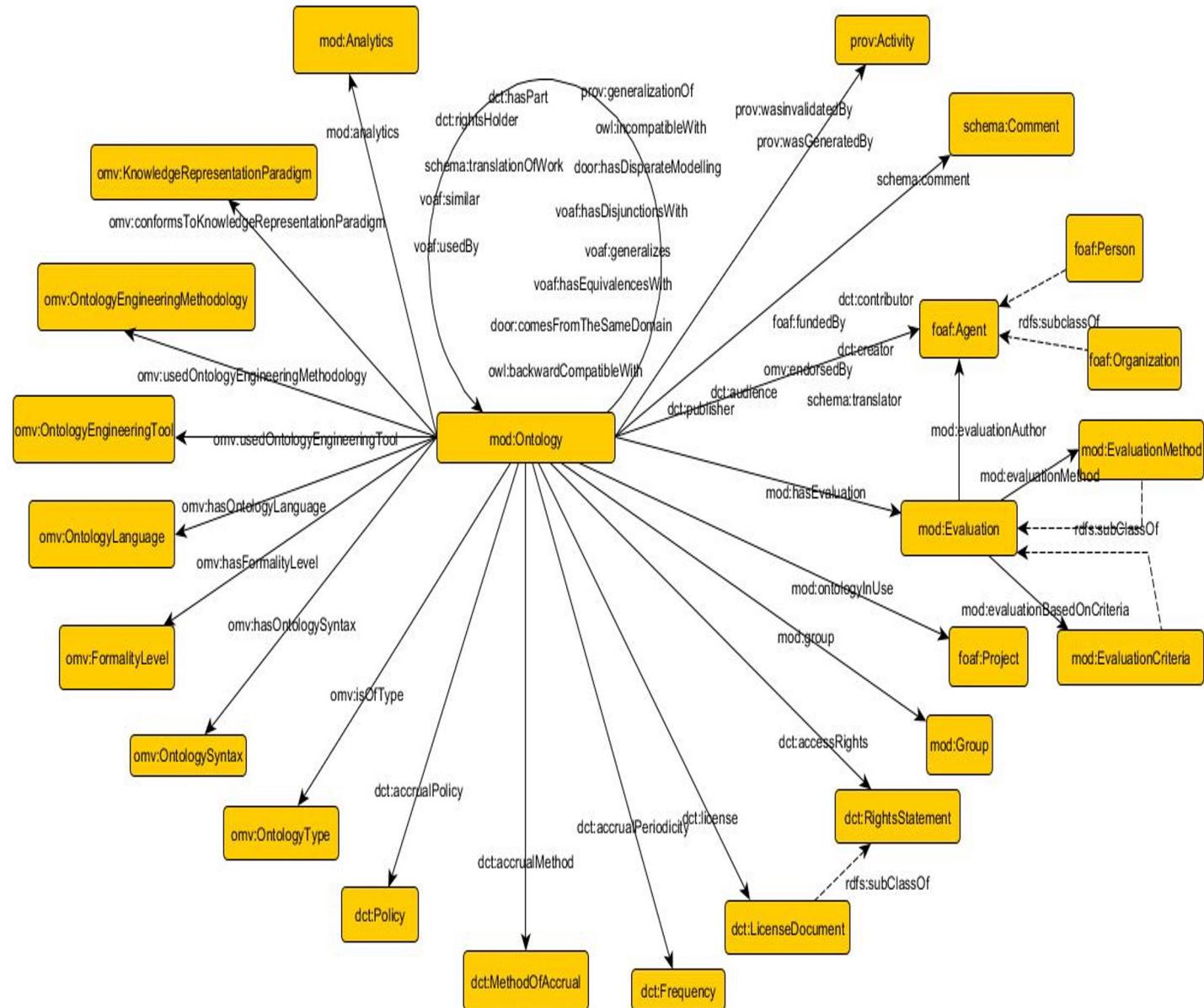
[Format](#) JSON LD [Format](#) RDF/XML [Format](#) N Triples [Format](#) TTL

License:

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Cite as:

Dutta, B., Toulet, A., Emonet, V. and Jonquet, C. (2017). New Generation Metadata vocabulary Description and Publication. In E. Garoufallou, S. Virkus, R. Siatri and D. Koutsoyiannis (Eds.), Communications in Computer and Information Science (CCIS) 755, proceedings of 11th Mediterranean Semantic Web and Semantic Technologies Research Conference (MTSR 2017), November 28 - December 1, 2017, Tallinn, Estonia. Springer Nature, pp. 173-185.



Classes: 24

Object property: 44

Data property: 96



There are many
many metadata
vocabularies to
describe your
ontology...

Name Space	Name
rdfs	RDF Schema
owl	OWL 2 Web Ontology Language
skos	Simple Knowledge Organization System
dc	Dublin Core Metadata Element Set
dct	Dublin Core Terms
omv	Ontology Metadata Vocabulary
mod	Metadata for Ontology Description and Publication
door	Descriptive Ontology of Ontology Relations
voaf	Vocabulary of a Friend
void	Vocabulary of Interlinked Datasets
idot	Identifiers.org
vann	Vocabulary for annotating vocabulary descriptions
dcat	Data Catalog Vocabulary
adms	Asset Description Metadata Schema
schema	Schema.org
foaf	Friend of a Friend Vocabulary
doap	Description of a Project
cc	Creative Commons Rights Expression Language
prov	Provenance Ontology
pav	Provenance, Authoring and Versioning
oboInOwl	ObolInOwl Mappings

One exemple: Semanticscience Integrated Ontology (SIO)

```
<rdf:Description rdf:about="http://semanticscience.org/ontology/sio.owl">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Ontology"/>
  <vann:preferredNamespacePrefix xml:lang="en">sio</vann:preferredNamespacePrefi
  <dct:license rdf:resource="http://creativecommons.org/licenses/by/4.0/" />
  <cito:citesAsAuthority
    rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://www.jbiomedsem.com/content/5/1/14</cito:citesAsAuthority>
    <owl:versionInfo rdf:datatype="http://www.w3.org/2001/XMLSchema#string">1.29.0</owl:versionInfo>
    <dct:description xml:lang="en">The semanticscience integrated ontology (SIO) provides a simple (...). website: http://semanticscience.orgemail: sio-ontology@googlegroups.com mailing list: http://groups.google.com/group/sio-ontology</dct:description>
  <dct:issued rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2010-03-29</dct:issued>
  <dc:creator xml:lang="en">Michel Dumontier</dc:creator>
  <vann:preferredNamespaceUri
    rdf:datatype="http://www.w3.org/2001/XMLSchema#string">http://semanticscience.org/resource/</vann:preferredNamespaceUri>
  <schema:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string">general class inclusion axioms:'is part of' some 'physical entity' subClassOf 'is located in' some 'physical entity'role chains:'has capability' o 'is realized in' -&gt; 'is participant in'</schema:comment>
  <dc:contributor rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Contributors are those that engage in discussions in the context of SIO (in alphabetical order):christopher baker, joachim baran, (...)</dc:contributor>
  <rdfs:seeAlso rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://sio.semanticscience.org</rdfs:seeAlso>
  <dct:rights rdf:datatype="http://www.w3.org/2001/XMLSchema#string">free to use,share,modify. modify with attribution [http://creativecommons.org/licenses/by/4.0/], see rights>
  <protege:defaultLanguage> en</protege:defaultLanguage>
  <dct:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://orcid.org/0000-0003-4727-945</dct:creator>
  <dct:title xml:lang="en">Semanticscience Integrated Ontology (SIO)</dct:title>
  <dc:identifier> sio.owl</dc:identifier>
  <rdfs:isDefinedBy rdf:resource="http://semanticscience.org/ontology/sio.owl"/>
  <owl:versionIRI rdf:resource="http://semanticscience.org/ontology/sio/v1.29.0/sio-release.owl"/>
  <dct:modified rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2016-05-18</dct:modified>
</rdf:Description>
```

O'FAIRe is 80% resource metadata-based

« Findable »



- PID
owl:ontologyIRI, dct:identifier, owl:versionIRI



- Rich metadata
omv:acronym, dct:title, dct:alternative,
skos:hiddenLabel, dct:description, foaf:page,
omv:resourceLocator, omv:keywords ...



- Metadata with PID



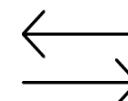
N/A

- Searchable resource
schema:includedInDataCatalog

« Accessible »



- Standardised protocol
owl:ontologyIRI, dct: identifier, sd:endpoint



- Free and open protocol
N/A



- Authentication
Schema:includedInDataCatalog



- Long term metadata access
omv:status, owl:deprecated

O'FAIRe is 80% resource metadata-based

« Interoperable »

- **Vocabularies**

Omv:hasOntologyLanguage, omv:hasFormalityLevel,
omv:hasOntologySyntax, dct:hasFormat, dct:isFormatOf



F-A-I-R

- **FAIR vocabularies**

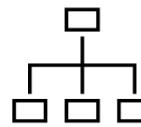
owl:imports, voaf:hasEquivalenceWith,
owl:priorVersion, voaf:similar, voaf:metadataVoc, dct:relation,
dct:isPartOf, voaf:specializes, schema:translation
OfWork, voaf:generalizes



« Reusable »

- **Métadonnées avec attributs**

mod:prefLabelProperty, mod:synonymProperty, mod:definitionProperty,
mod:authorProperty, bpm:obsoleteProperty, mod:hierarchyProperty,
mod:obsoleteParent, mod:maxDepth, mod:maxChildCount,
mod:averageChildCount, mod:classesWithOneChild,
mod:classesWithNoDefinition



- **License**

dct:license, dct:rightsHolder, dct:accessRights, cc:morePermissions,
cc:useGuidelines



- **Provenance**

dct:source, prov:wasGeneratedBy, prov:wasInvalidatedBy,
dct:accrualMethod, dct:accrualPeriodicity, dct:accrualPolicy,
omv:versionInfo, vann:changes, dct:hasVersion,
omv:usedOntologyEngineeringTool,
omv:usedOntologyEngineeringMethodology,
omv:conformsToKnowledgeRepresentationParadigm,
omv:designedForOntologyTask, mod:competencyQuestion, dct:fundedBy



- **Standards de la communauté**

mod:ontologyInUse, omv:endorsedBy, mod:group, dct:accessRights



Requirement #4: a harmonized and curated environment for ontology descriptions



- AgroPortal offers a unified metadata model for every hosted semantic resources
- Metadata is curated

 Springer Link

Original Article | [Open Access](#) | Published: 29 August 2018

Harnessing the Power of Unified Metadata in an Ontology Repository: The Case of AgroPortal

[Clement Jonquet](#) , [Anne Toulet](#), [Biswanath Dutta](#) & [Vincent Emonet](#)

Journal on Data Semantics 7, 191–221 (2018) | [Cite this article](#)

3635 Accesses | 6 Citations | 4 Altmetric | [Metrics](#)

Abstract

As any resources, ontologies, thesaurus, vocabularies and terminologies need to be described with relevant metadata to facilitate their identification, selection and reuse. For ontologies to be FAIR, there is a need for metadata authoring guidelines and for harmonization of existing metadata vocabularies—taken independently none of them can completely describe an ontology. Ontology libraries and repositories also have to play an important role. Indeed, some metadata properties are intrinsic to the ontology (name, license, description); other information, such as community feedbacks or relations to other ontologies are typically information that an ontology library shall capture, populate and consolidate to facilitate the processes of identifying and selecting the right ontology(ies) to use. We have studied ontology metadata practices by: (1) analyzing metadata annotations of 805 ontologies; (2) reviewing the most standard and relevant vocabularies (23 totals) currently available to describe metadata for ontologies (such as Dublin Core, Ontology Metadata Vocabulary, VoID, etc.); (3) comparing different metadata implementation in multiple ontology libraries or repositories. We have then built a new metadata model for our AgroPortal vocabulary and

Describe ontologies with semantic metadata

- Display “per ontology”
 - Ontology specific properties => viewable and editable within the ontology specific page
- Everything you need to know about an ontology
- URIs used in the backend to store the information
 - e.g., CC-BY =>
<https://creativecommons.org/licenses/by-nd/4.0/>
- “Get my metadata back” buttons

Screenshot of the AgroPortal interface showing the OntoBiotope entry. The page includes tabs for Summary, Classes, Properties, Notes, Mappings, and Widgets. A red box highlights the "Get my metadata back" button, which has three options: N-Triple, JSON-LD, and RDF/XML.

The "Metrics" section shows the following statistics:

Category	Value
NUMBER OF CLASSES	2320
NUMBER OF INDIVIDUALS	0
NUMBER OF PROPERTIES	0
MAXIMUM DEPTH	13
MAXIMUM NUMBER OF CHILDREN	42
AVERAGE NUMBER OF CHILDREN	3
CLASSES WITH A SINGLE CHILD	248
CLASSES WITH MORE THAN 25 CHILDREN	3
CLASSES WITH NO DEFINITION	2320

The "Visits" section includes a line chart showing traffic over time and download links for the CSV file and VEST Registry.

The "Additional Metadata" section contains detailed information about the ontology, such as its natural language (English), version (1.2), release date (2015-06-29T00:00+00:00), and various creators and funders.

The "Reviews" section indicates "No reviews available."

The "Submissions" section lists two entries:

Submission	Release Date	Upload Date	Downloads
1.2 (Parsed, Indexed, Metrics, Annotator)	06/29/2015	06/12/2016	OBO CSV RDF/XML
BioNLP-ST 2013 version (Archived)	06/29/2015	06/29/2015	OBO

The "Views" section indicates "No views available."

The "Projects Using This Ontology" section lists three projects:

Project	Description	People	Institution
LOVInra - Linked Open Vocabularies	LOVInra est un service proposé par la Délegation à...	Sophie Aubin (sophie.aubin@versailles.inra.fr)	INRA
OntoBiotope	L'ambition pour OntoBiotope est de normaliser la description...	Claire Nedellec (claire.nedellec@jouy.inra.fr)	INRA
VEST-AgroPortal Map of Standards	This VEST-AgroPortal provides a global map of existing...	Valeria Pesce (valeria.pesce@fao.org)	Food & Agriculture Organization

The bottom right corner shows the INRA logo.



Agronomy Ontology

Last uploaded: November 5, 2021

Summary Classes Properties Instances Notes Mappings Widgets

Details

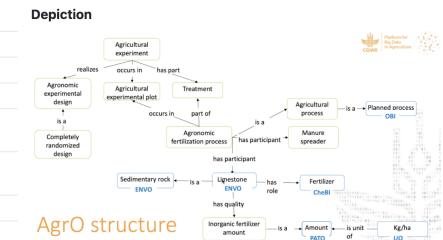
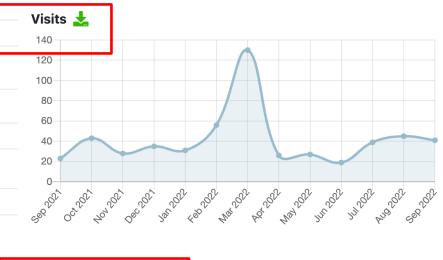
Acronym	AGRO
Visibility	Public
Description	AgrO is an ontology for representing agronomic practices, techniques, variables and related entities
Status	Alpha
Format	OWL
Contact	Céline Aubert, c.aubert@cgiar.org Marié-Angélique Laporte, m.a.laporte@cgiar.org
Categories	Agricultural Research, Technology and Engineering, Natural Resources, Earth and Environment
Groups	OBO Foundry, Rice Data Interoperability working group

Additional Metadata

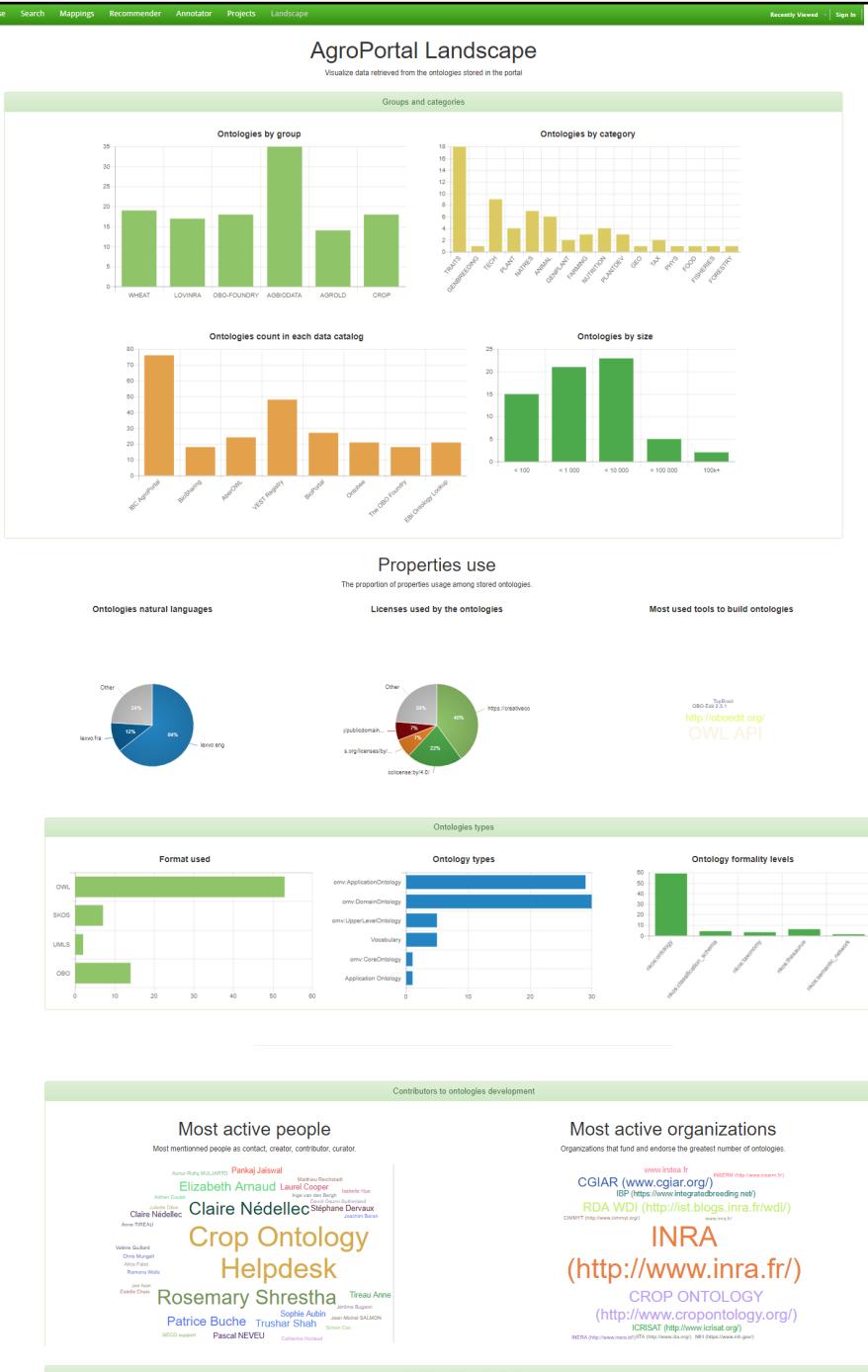
URI	http://purl.obolibrary.org/obo/agro.owl
Abstract	An ontology is a formal representation of a disciplinary domain, representing a semantic standard that can be employed to annotate data where key concepts are defined, as well as the relationships that exist between those concepts (Gruber, 2009). Ontologies provide a common language for different knowledge domains to be easily interpretable and interoperable allowing easier aggregation and analysis. The Agronomy Ontology (AgrO) provides terms from the agronomy domain that are semantically organized and can facilitate the collection, storage and use of agronomic data, enabling easy interpretation and reuse of data by humans and machines alike. To fully understand the implications of varying practices within cropping systems and derive insights, it is often necessary to pull together information from data in different disciplinary domains. For example, data on field management, soil, weather and crop growth may need to be aggregated to assess performance of particular crop under different management interventions. However, agronomic data are often collected, described, and stored in inconsistent ways, impeding data comparison, mining, interpretation reuse. The use of standards for metadata annotation play a key role in addressing these challenges. While the CG Core Metadata Schema provides a metadata standard to describe agricultural datasets, the Agronomy Ontology enables the description of agronomic data variables using standard terms.
Accrual Method	Summit new terms submissions on GitHub issue tracker.
Bug Database	https://github.com/AgriculturalSemantics/agro/issues
Conforms To Knowledge Representation Paradigm	Used BFO as a foundational ontology.
Copyright Holder	CGIAR (http://www.cgiar.org/)
Curated By	Céline Aubert (CGIAR)
Deprecated	false
Endorsed By	CGIAR (http://www.cgiar.org/)
Endpoint	SPARQL
Example Of Use	local:AgrO
Example Identifier	http://purl.obolibrary.org/obo/AGRO_00000002
Funded By	CGIAR (http://www.cgiar.org/)
Contributors	Marié-Angélique Laporte, Céline Aubert, Pier Luigi Buttigieg

Creators	Marié-Angélique Laporte, Céline Aubert, Elizabeth Arnaud, Medha Devare
Has Domain	http://data.agroportal.iirmm.fr/categories/NATRES , http://data.bioontology.org/categories/TECH
Has Formality Level	http://w3id.org/nkos/nkostype#ontology
Has License	
Ontology Syntax	http://www.w3.org/ns/formats/RDF_XML
Has Prior Version	AGRO/submissions/7
Identifier	http://purl.obolibrary.org/obo/agro-edit.owl
Is Backward Compatible With	BFO
Is Of Type	http://omv.ontoware.org/2005/05/ontology#DomainOntology
Key Classes	http://purl.obolibrary.org/obo/AGRO_01000000 , http://purl.obolibrary.org/obo/AGRO_01000000
Keywords	agricultural experiment, agricultural processes, agricultural implement, fertilizers
Known Usage	AgrO is an ontology for representing agronomic practices, techniques, variables and related entities.
Mailing List	local:agronomyOntology@googlegroups.com
Metadata Vocabulary Used	http://xrnlns.com/rdf/0.1/ , http://www.w3.org/2000/01/rdf-schema# , http://www.geneontology.org/formats/obonOwl# , http://purl.org/dc/elements/1.1/ , http://www.w3.org/2002/07/owl# , http://www.w3.org/2003/11/swrl#
Natural Language	
Notes	The Agronomy Ontology by CGIAR is licensed under CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/).
Ontology Related To	GO , ENVO , https://bioportal.bioontology.org/ontologies/CHEBI , NCBITAXON , PATO , https://bioportal.bioontology.org/ontologies/UO , https://bioportal.bioontology.org/ontologies/OGMS , RO , TO , PO , https://bioportal.bioontology.org/ontologies/IAO , https://bioportal.bioontology.org/ontologies/OBI , PECO
Preferred Namespace Prefix	agro
Publisher	CGIAR (http://www.cgiar.org/)
Release Date	2021-11-05T00:00+00:00
Repository	https://github.com/AgriculturalSemantics/agro
URI Lookup Endpoint	http://data.agroportal.iirmm.fr/search?ontologies=AGRO&require_exact_match=true&q=
URI Regex Pattern	http://purl.obolibrary.org/obo/AGRO_
Use Imports	local:local
Used Ontology Engineering Methodology	Follow the OBO Principle, used Protégé and the Ontology Development Kit.
Used Ontology Engineering Tool	http://protege.stanford.edu
Version	1.0
Version IRI	http://purl.obolibrary.org/obo/agro/releases/2018-05-14/agro.owl

Submissions				
Version	Released	Modified	Uploaded	Downloads
1.0 (Parsed, Indexed, Metrics, Annotator)	11/05/2021	11/05/2021	OWL CSV RDF/XML DIFF	
1.0 (Archived)	07/01/2021	07/01/2021	OWL DIFF	
1.0 (Archived)	06/30/2021	06/30/2021	OWL DIFF	
1.0 (Archived)	04/04/2020	04/04/2020	OWL DIFF	
1.0 (Archived)	05/14/2018	12/13/2018	OWL DIFF	



- Projects using AGRO
- Agricultural Model Intercomparison and Improvement Project
 - Agrisemantics Map of Data Standards
 - Agronomy Field Information Management System
 - Collaborative Open Plant Omics
 - Data to Knowledge in Agronomy and Biodiversity



AgroPortal landscape page

- Display “per property”
 - *Global presentation of the properties*
 - *Synthesis diagrams & listing*
 - Allows to explore the agronomical ontology landscape by automatically aggregating the metadata fields of each ontologies in explicit visualizations (charts, term cloud and graphs).

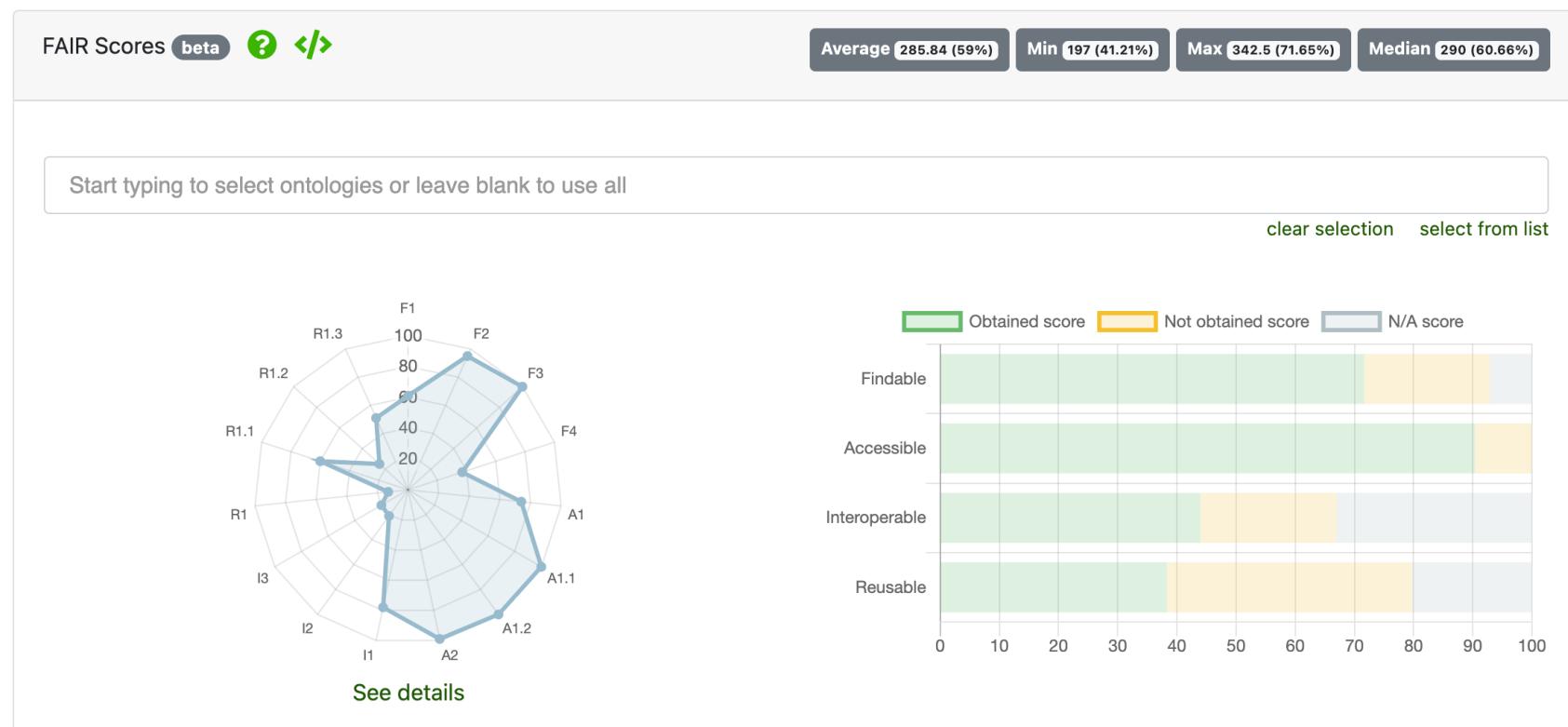


Clement Jonquet, Anne Toulet, Biswanath Dutta, Vincent Emonet. **Harnessing the power of unified metadata in an ontology repository: the case of AgroPortal**. *Journal on Data Semantics*, Springer, 2018, pp.1-31.

O'FAIRe: Ontology FAIRness Evaluator

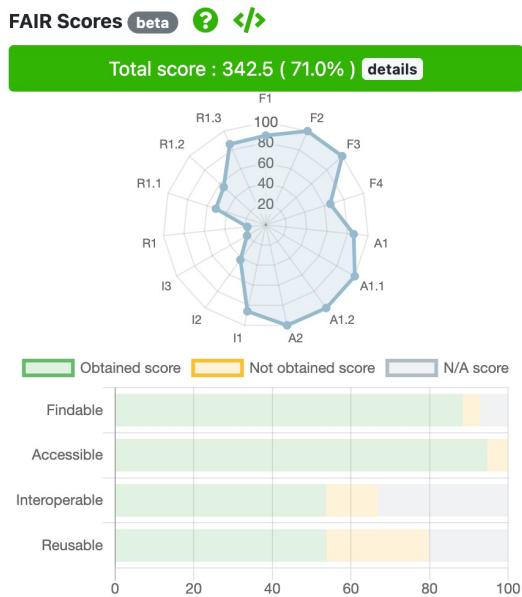
- A methodology
 - Which uses as much as possible assigned metadata values to answer a series of questions, specialized for semantic resources

- A tool
 - A web service working with any OntoPortal installations respecting the MOD1.4 metadata profile to harmonize metadata



O'FAIRe in AgroPortal: Demo

Get the FAIRness score of a given ontology



Get the explanations

FAIRness assessment questions

properties)

F1: Ontologies and ontology metadata are assigned a globally unique and persistent identifier.

36.0 (87%) 5.0 (13.0%)

F1Q1 : Does the ontology have a "local" identifier, i.e., a globally unique and potentially permanent identifier assigned by the developer (or developing organization)? 9 / 9

See possible credits See metadata used properties

owl:ontologyIRI <http://purl.oblibrary.org/obo/agro.owl>

F1Q2 : Does the ontology provide an additional "external" identifier, i.e., a guarantee globally unique and persistent identifier assigned by an accredited body? If yes, is the external identifier a DOI? 6 / 11

See possible credits See metadata used properties

F1Q3 : Are the ontology metadata clearly identified either by the same identifier than the ontology itself or by a different identifier? 1 / 1

See possible credits See metadata used properties

F1Q4 : Is the ontology metadata available in a standard format? 1 / 1

See possible credits See metadata used properties

F2: Data is presented in a machine-readable format that can be used directly and effectively by a computer program.

F2Q1 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

F2Q2 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

F2Q3 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

F3: Data is openly licensed under a permissive license that permits reuse and redistribution with an explicit permission to further distribute the modified version.

F3Q1 : Does the ontology use a permissive license? 10 / 10

See possible credits See metadata used properties

F4: Data is clearly and consistently described to enable machine processing, analysis, and re-use.

F4Q1 : Are the ontology metadata clearly identified either by the same identifier than the ontology itself or by a different identifier? 1 / 1

See possible credits See metadata used properties

F4Q2 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

F4Q3 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

A1: Data is widely accessible by its community via an open channel.

A1Q1 : Does the ontology have a public repository? 10 / 10

See possible credits See metadata used properties

A1Q2 : Does the ontology have a public repository? 10 / 10

See possible credits See metadata used properties

A1Q3 : Does the ontology have a public repository? 10 / 10

See possible credits See metadata used properties

A1.1: Data is reusable across domains.

A1.1Q1 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

A1.1Q2 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

A1.1Q3 : Does the ontology use a standard schema or vocabulary? 10 / 10

See possible credits See metadata used properties

Get the FAIRness score of a group of ontologies

FAIR Scores beta ? </>

Average 314 (65%) Min 300 (62.76%) Max 323 (67.67%) Median 319 (66.73%)

Animal Health Ontology for Livestock (AHOL) Environment Ontology for Livestock (EOL) Animal Trait Ontology for Livestock (ATOL)

clear selection select from list

This interface shows how an ontology or a group responded successfully to O'FAIRe FAIRness assessment questions. See details for each ontologies on the specific ontology summary pages

hover on a principle to see details

Obtained score Not obtained score N/A score

Principle	Score	Percentage
F1	78.04	32%
F2	85.0	100%
F3	85.0	100%
F4	21.95	9%
A1	0	0%
A1.1	0	0%

F1 : Ontologies and ontology metadata are assigned a globally unique and persistent identifier.

Obtained score: 78.04 (32%)

Not obtained score: 21.95 (9%)

N/A score: 0 (0%)

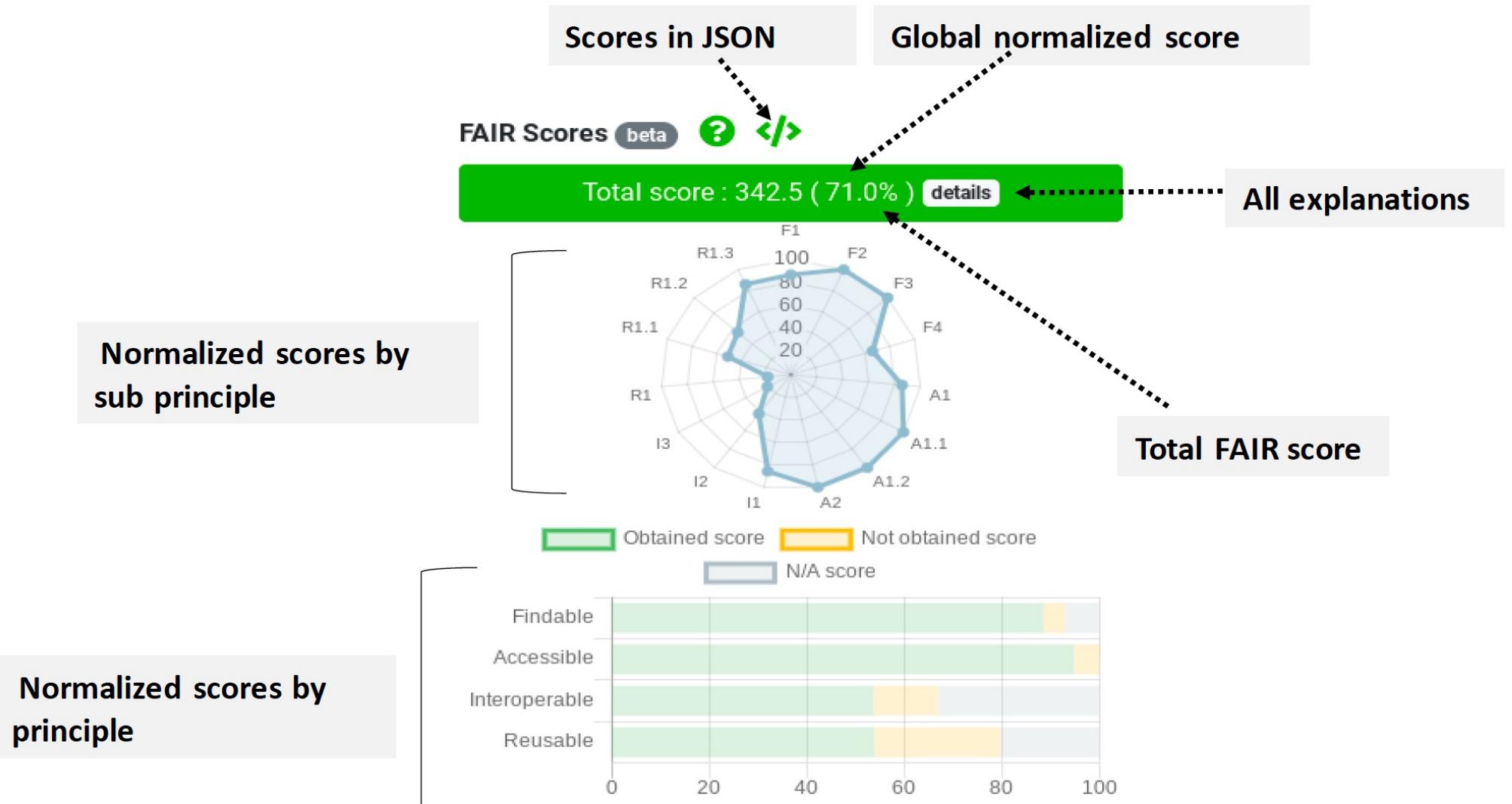
3 (100%) responded successfully to: F1Q1: "Does the ontology have a "local" identifier, i.e., a globally unique and potentially permanent identifier assigned by the developer (or developing organization)?"

3 (100%) responded successfully to: F1Q2: "Does the ontology provide an additional "external" identifier, i.e., a guarantee globally unique and persistent identifier assigned by an accredited body? If yes, is the external identifier a DOI?"

3 (100%) responded successfully to: F1Q3: "Are the ontology metadata clearly identified either by the same identifier than the ontology itself or by a different identifier?"

3 (100%) responded successfully to: F1Q4: "Is the ontology metadata available in a standard format? "

Get a FAIRness score for a given ontology



Get explanations

FAIRness assessment questions

F1

F1Q1

F1Q2

F1Q3

F1Q4

F2



Click & Check

Question

F1Q1 : Does the ontology have a "local" identifier, i.e., a globally unique and potentially permanent identifier assigned by the developer (or developing organization)?

See possible credits

See metadata used properties

Ontology URI is absent.

Ontology URI is present but invalid.

Ontology URI is present and valid.

9 / 9

0.0

3.0

9.0

Possible credits

owl:ontologyIRI <http://purl.obolibrary.org/obo/agro.owl>

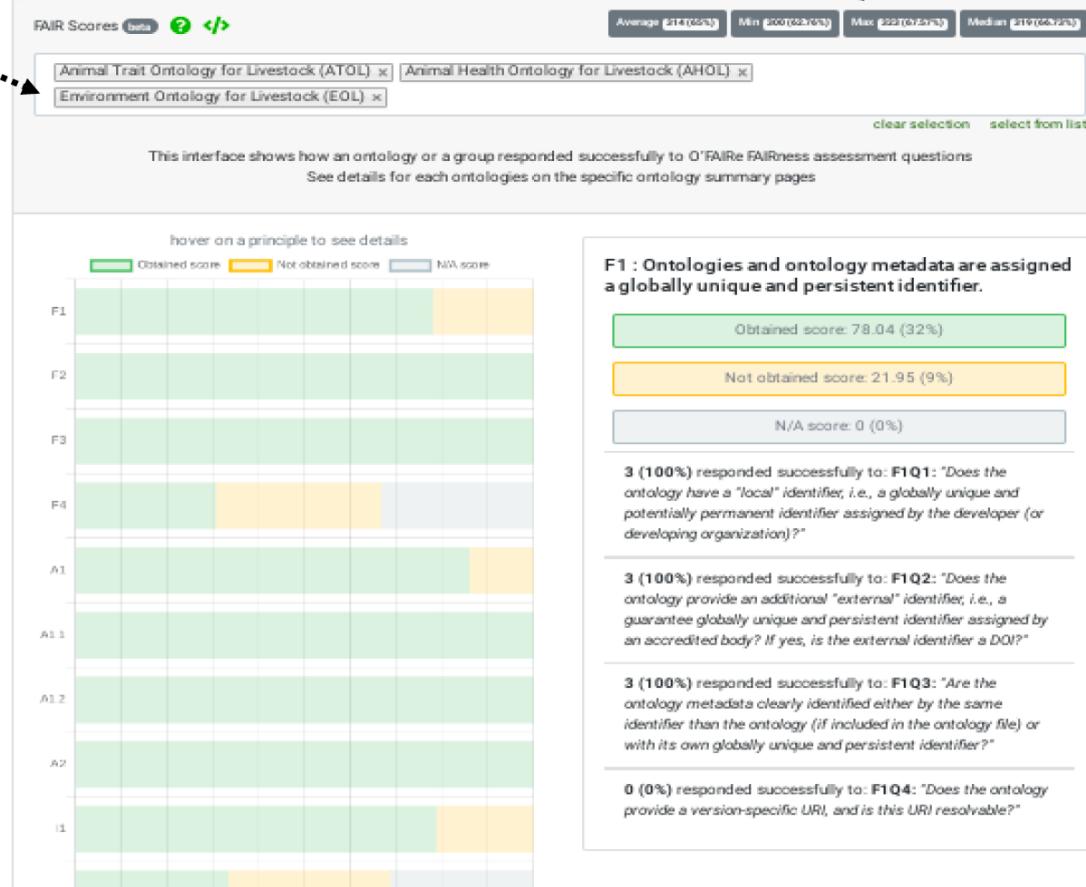
valid metadata are in green (invalid metadata are in red)



Get the FAIRness score of a group of ontologies

Listing of ontologies

Ontology FAIRness Evaluator (O'FAIRE)



[http://agroportal.lirmm.fr/
landscape](http://agroportal.lirmm.fr/landscape)

**Normalized FAIR scores statistics:
Average, Min, Max, Median**

**Normalized
scores by sub
principle**

Web service (O'FAIRe returns a JSON with the following structure)

```
{  
  "ontologies": {  
    "FCU": { // ontology acronym  
      "Findable": { // FAIR principal  
        "F1": { // Subprincipal  
          "label": "Ontologies and ontology metadata are assigned a globally unique and persistent identifier  
          "results": {  
            "F1Q1": {  
              "question": "Does an ontology have a \"local\" identifier i.e., a globally unique and persistent identifier?",  
              "score": 9,  
              "explanation": "Present and valid ontology URI.", //Score explanation  
              "properties": { //List of properties used in the test with their values  
                "owl:ontologyIRI": "http://ontology.inrae.fr/frenchcropusage"  
              },  
              "maxCredits": 9,  
              "points": [ //Array of possible scores and explanation for this question  
                {  
                  "explanation": "Ontology URI is not present.",  
                  "score": 0  
                },  
                {  
                  "explanation": "Present but invalid ontology URI.",  
                  "score": 3  
                },  
                {  
                  "explanation": "Present and valid ontology URI.",  
                  "score": 9  
                }  
              ]  
            }  
          }  
        }  
      }  
    }  
  }  
}
```

<http://services.agroportal.lirmm.fr/oaire?ontologies=AGRO>

Or

<http://services.agroportal.lirmm.fr/oaire?ontologies=ATOL,EOL,AHOL&combined>

O'FAIRe in summary

- Name: Ontology FAIRness evaluator
- Base URL: <http://services.agroportal.lirmm.fr/ofaire>
- Version: V2.0
- FAIRness assessment methodology: 61 questions
- Output: FAIR score of an ontology/group of ontologies
- Code & doc: <https://github.com/agroportal/fairness>
- Reference: E. Amdouni, S. Bouazzouni, C. Jonquet. O'FAIRe makes you an offer: Metadata-based Automatic FAIRness Assessment for Ontologies and Semantic Resources. *International Journal of Metadata, Semantics and Ontologies*, 2022, 16 (1), pp.16-46. [10.1504/IJMSO.2022.131133](https://doi.org/10.1504/IJMSO.2022.131133).

- O'FAIRe deployments:

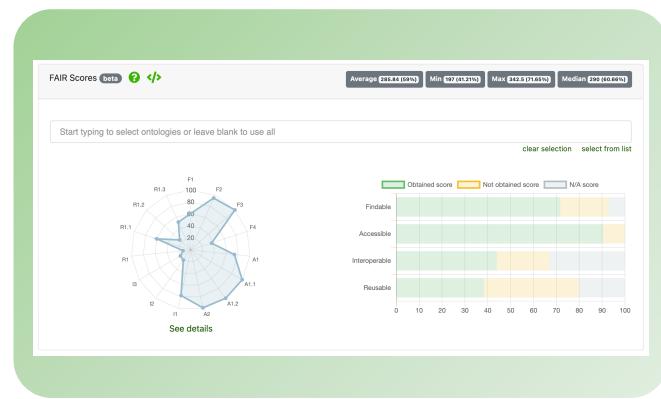
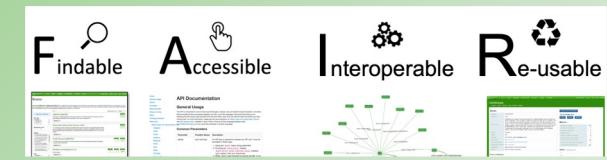


O'FAIRe in publications



- E. Amdouni, S. Bouazzouni, C. Jonquet. O'FAIRe makes you an offer: Metadata-based Automatic FAIRness Assessment for Ontologies and Semantic Resources. *International Journal of Metadata, Semantics and Ontologies*, 2022, 16 (1), pp.16-46. [⟨10.1504/IJMSO.2022.131133⟩](https://doi.org/10.1504/IJMSO.2022.131133).
- E. Amdouni, S. Bouazzouni, C. Jonquet. O'FAIRe: Ontology FAIRness Evaluator in the AgroPortal semantic resource repository. *ESWC 2022 - 19th Extended Semantic Web Conference, Poster and demonstration*, May 2022, Hersonissos, Greece. [⟨10.1007/978-3-031-11609-4_17⟩](https://doi.org/10.1007/978-3-031-11609-4_17)
- E. Amdouni, C. Jonquet. FAIR or FAIRer? An integrated quantitative FAIRness assessment grid for semantic resources and ontologies. *MTSR 2021 - 15th International Conference on Metadata and Semantics Research*, Nov 2021, Madrid, Spain. pp.67-80. [⟨10.1007/978-3-030-98876-0_6⟩](https://doi.org/10.1007/978-3-030-98876-0_6)

Summary



A screenshot of the Ontology Recommender interface, showing two main panels: 'Ontology Recommender' and 'Ontology Catalogue'. The recommender panel displays search results and a table of recommendations, while the catalogue panel shows a list of ontologies.



Questions ?