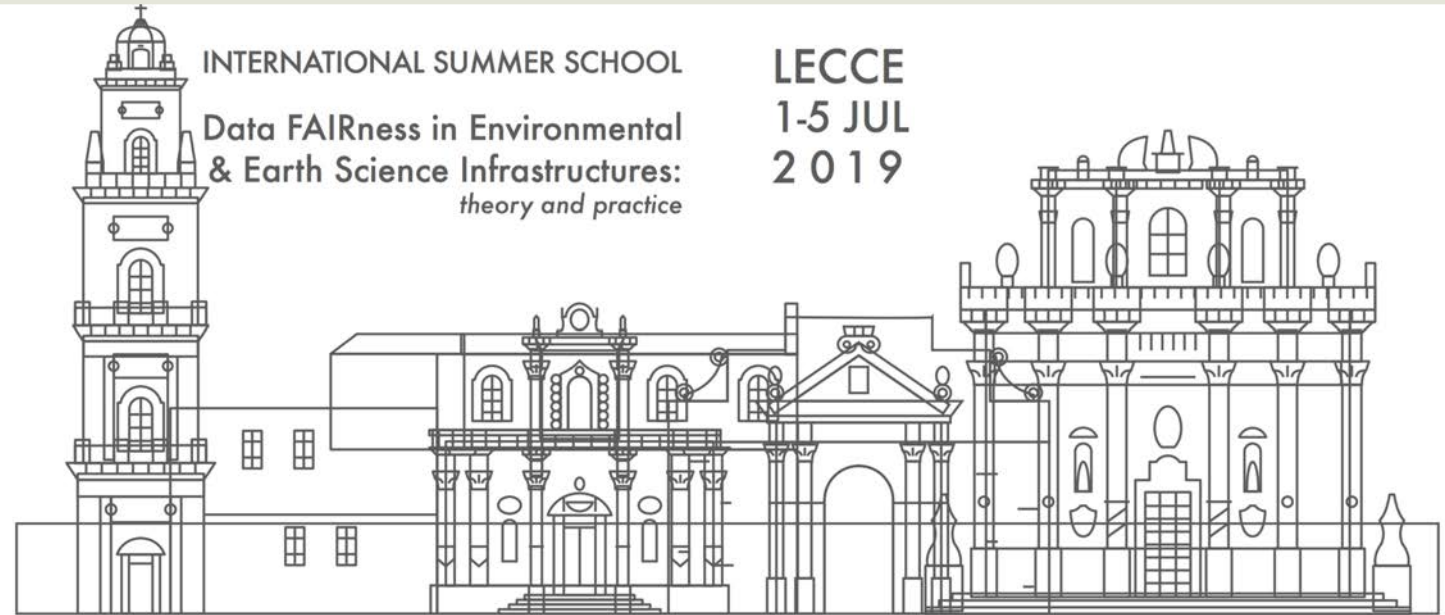




Tutorial: “How to use ontology repositories and ontology-based services”

DATA FAIRness International Summer School
Lecce, July 3rd 2019





Tutorial presentation

Who am I?



Clement Jonquet

Associate Professor,
University of Montpellier,
PI of AgroPortal, SIFR &
D2KAB projects



- « Disclaimer »
 - Despite the availability of concrete platforms, this remains a research activity (in progress)
 - Excuse bugs, inconsistencies, misunderstanding, limits
 - We will not have an answer to everything

With support of:

- ANR D2KAB
- H2020 SIFRm



Tutorial objectives

Work with Bio/Agro/EcoPortal platform

Describe your ontology using standard vocabularies

Interconnect your ontology to the rest of the world

Annotate text with ontologies

Manipulate APIs (REST or SPARQL) to automate tasks

Ontology repository technology developed for the NCBO BioPortal project

Welcome to BioPortal, the world's most comprehensive repository of biomedical ontologies

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

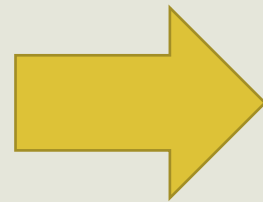
Find an ontology: Start entering ontology name, e.g. Cancer, then choose from list

Ontology Visits (July 2017)

Ontology	Visits
CPT	~1000
RINCHM	~1000
MEDDGA	~1000
SINAMEDCT	~1000
NDCP	~1000

BioPortal Statistics

Category	Count
Ontologies	596
Classes	8,173,420
Resources Indexed	48
Indexed Records	35,537,360
Direct Annotations	95,468,433,792
Direct Plus Expanded Annotations	144,789,542,812



EcoPortal

Search for a class: Enter a class, e.g. Shape, Trait, etc.

Find a semantic resource (ontology, thesaurus, etc.): Start entering ontology name, e.g. PhytoTraits, then choose from list

Ontology Visits (June 2019)

Ecoportal Statistics

Category	Count
Ontologies	6
Classes	137

Medical Subject Headings, version française

细胞系本体 (中文简化版)

AgriPortal

Search all ontologies: Enter ontology name, e.g. Melanoma

Find an ontology: Enter ontology name, e.g. MCF7

Ontology Visits (April 2017)

Ontology	Visits
AGRINOV_LAKONOVQ	112
Agri4L Therapeutics (ANALITHE)	95
National Agricultural Library (NAL)	47

Tutorial plan

Ontology selection

metadata
search
recommender

Drop & use an ontology

browsing
visualization
API

Semantic annotation of text

annotator

Ontology alignments management

create
retrieve
API

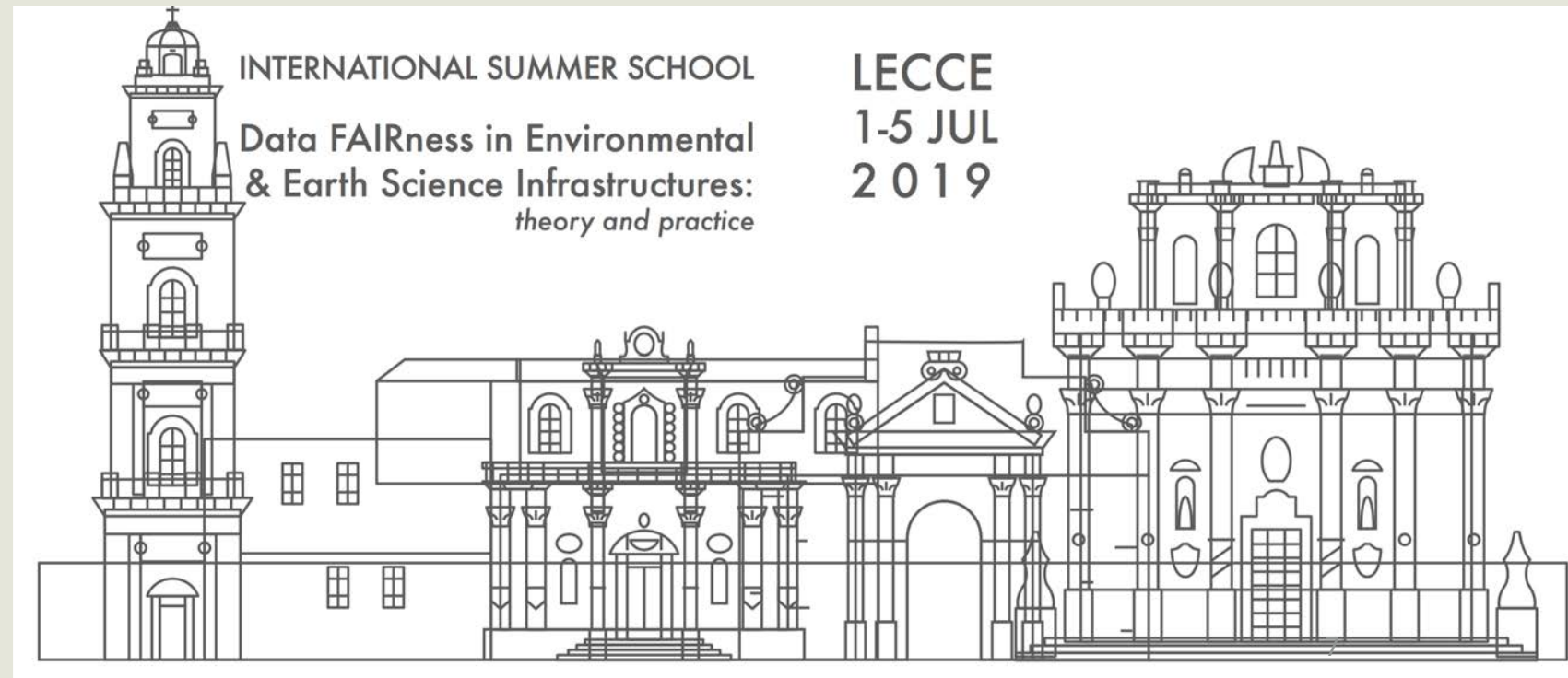
Automatize access with API

REST
SPARQL

Who are you?

- Have you ever used ontologies (or terminologies in general)? BioPortal?
 - For which task?
 - Much interested in your feedback

- Your background?
- Why are you here today?
 - Super quickly
- Check: Access to slides?





General introduction

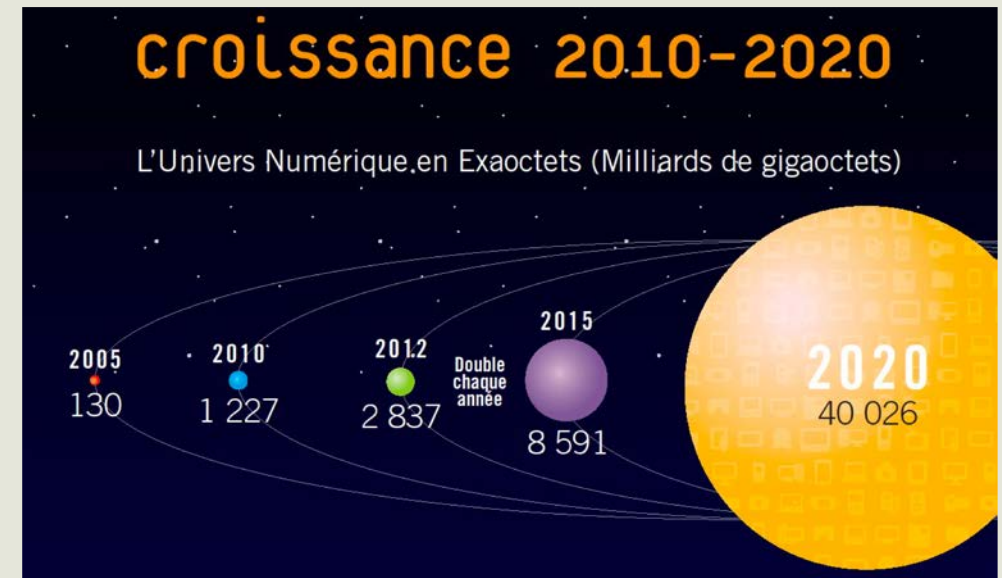
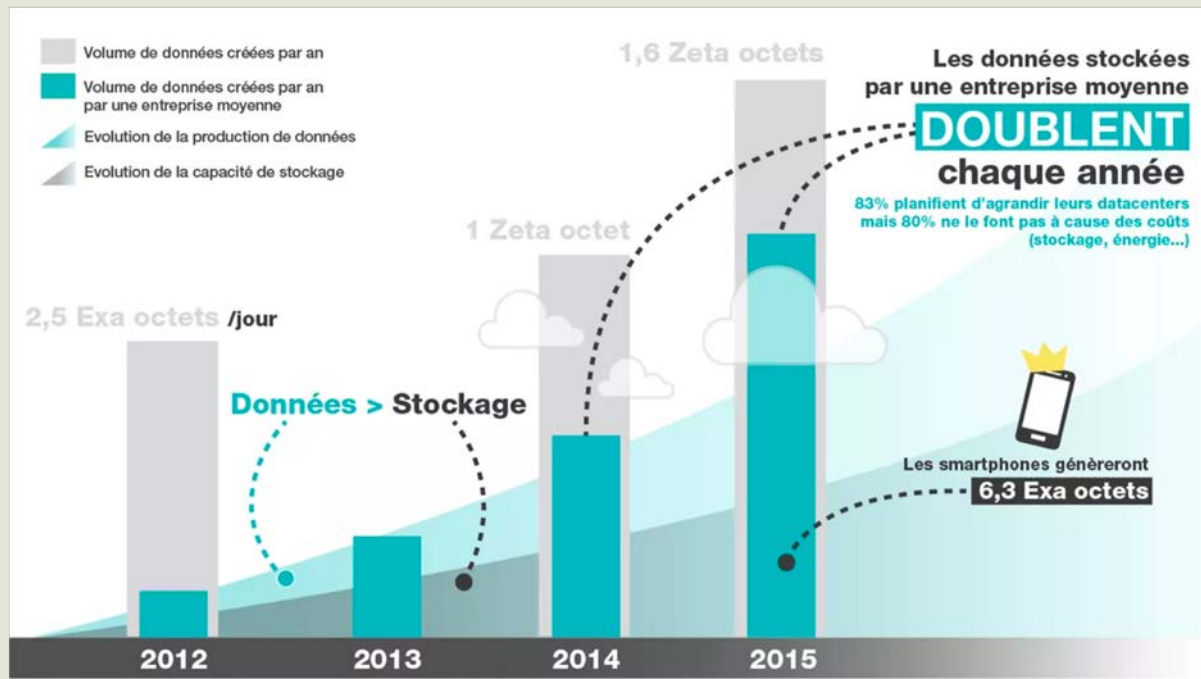
Data explosion



N°SECU	NOM	VILLE
1234567890123	MARTIN	NICE
2345678901234	SIMON	LYON
1357924680123	BERNARD	PARIS

Diagram showing relationships: sponsor -> Joueur -> Pays, Joueur -> club -> Pays, tournoi -> club -> Pays.

Icons: TXT document, Earth globe, and data tunnel.

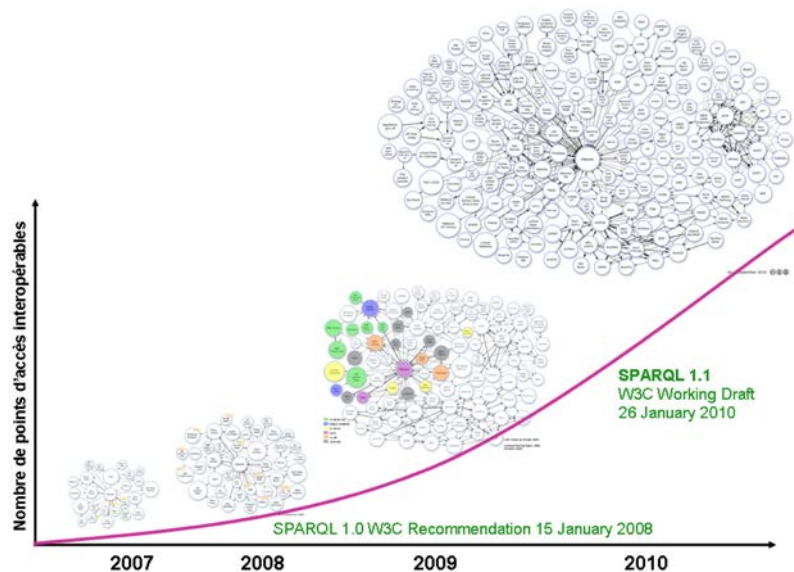
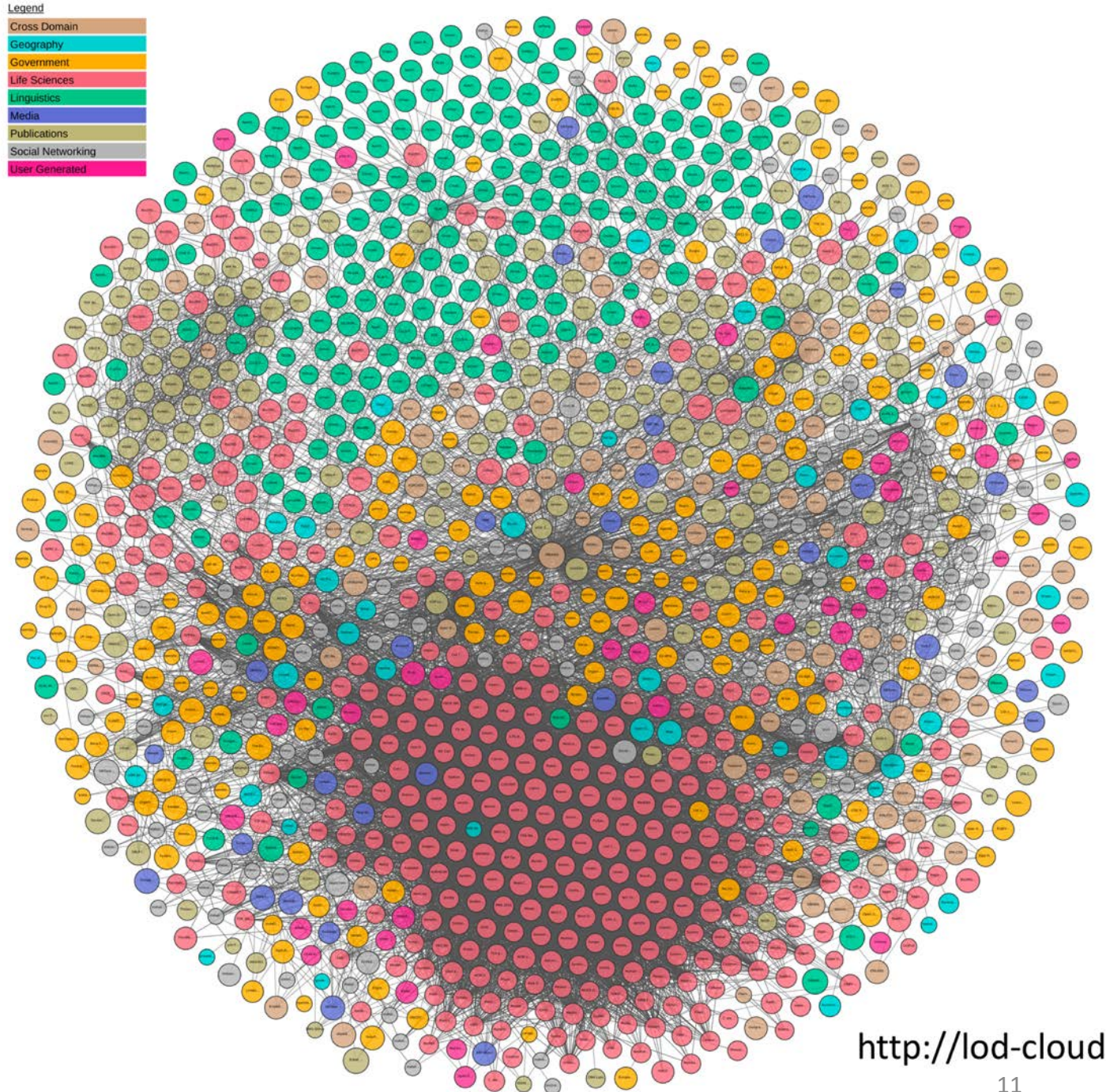




Big
Open
Linked

Our job is to structure these data

Linked Open Data create a « **Web of data** »

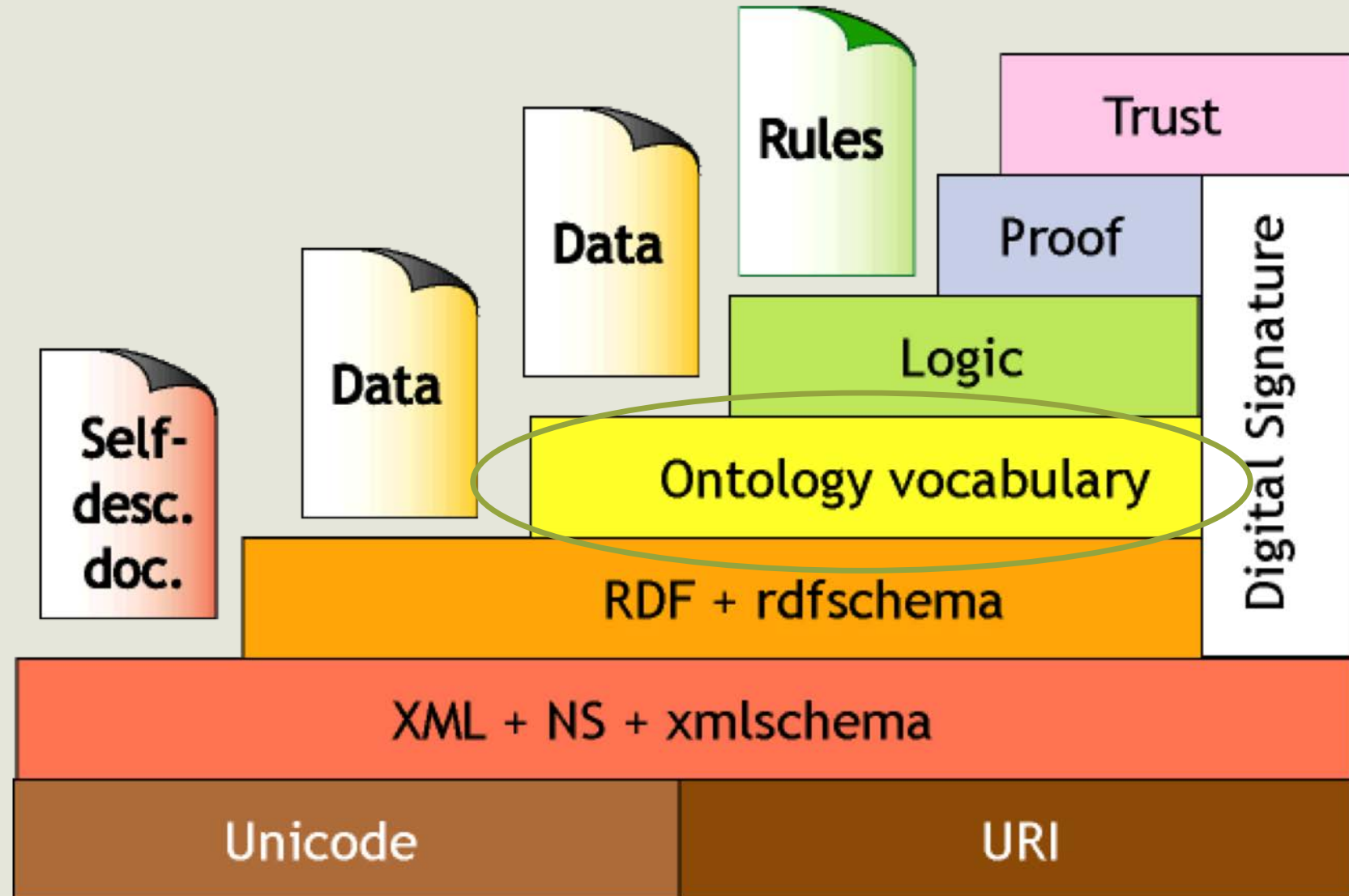


<http://lod-cloud.net>

The Semantic Web offers the technologies

The FAIR principles have established the importance of using standards vocabularies or **ontologies to describe FAIR data** and to facilitate interoperability and reuse:

12. (meta)data use vocabularies that follow FAIR principles



URL

identify what exists on the web.

<http://my-site.fr>



<http://animals.org/zebra#this>



<http://الحيوانات.tn/斑馬#this>



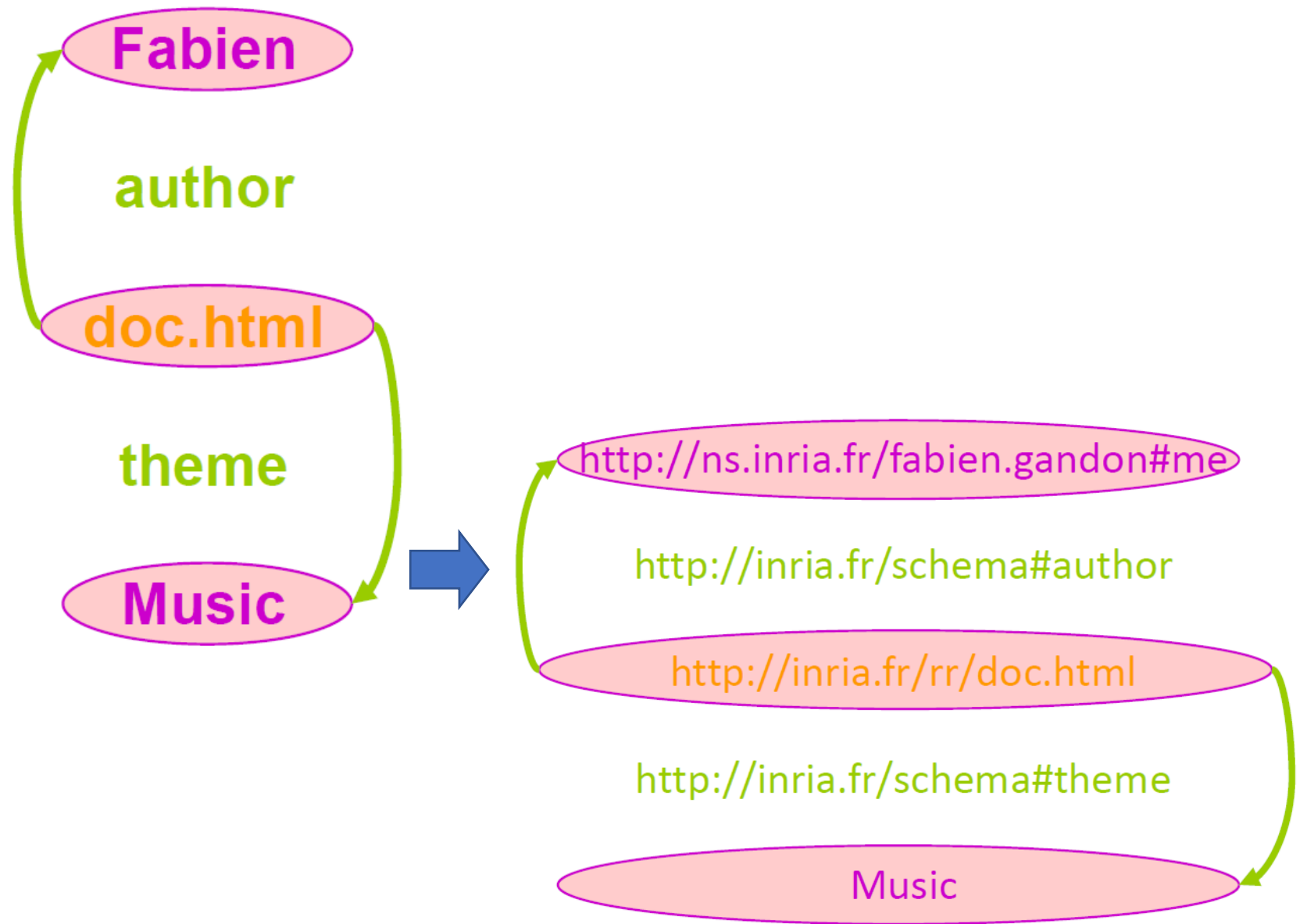
URI

identify, on the web, what exists.

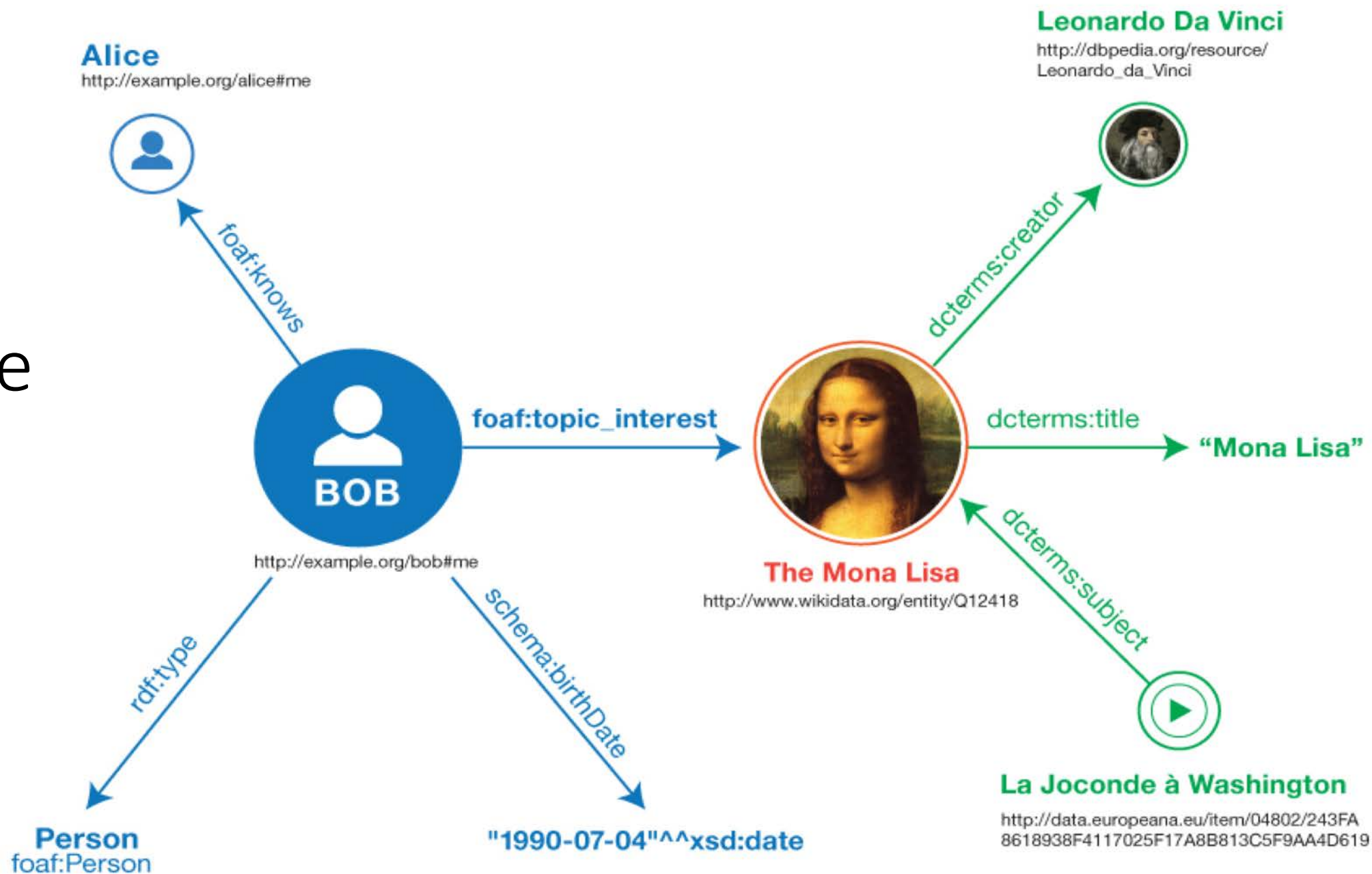
IRI

identify, on the web, in any language, what exists.

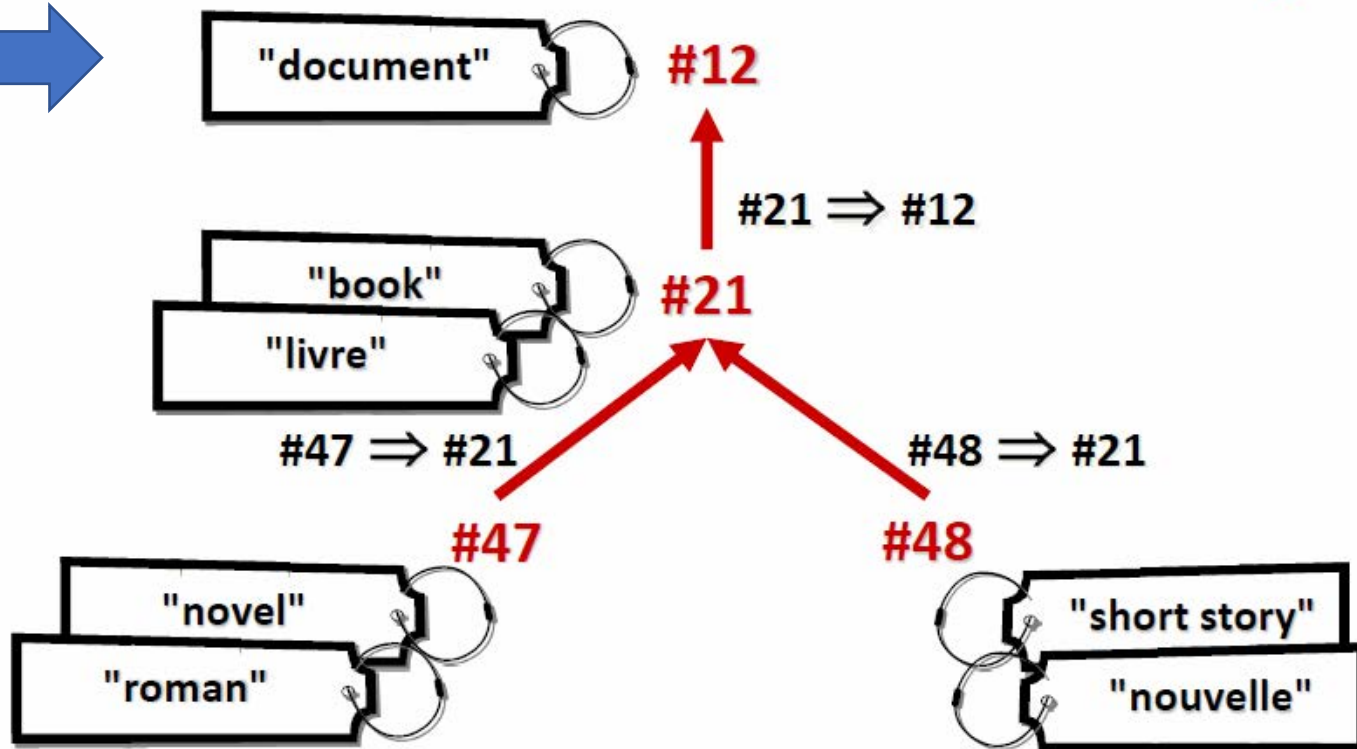
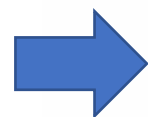
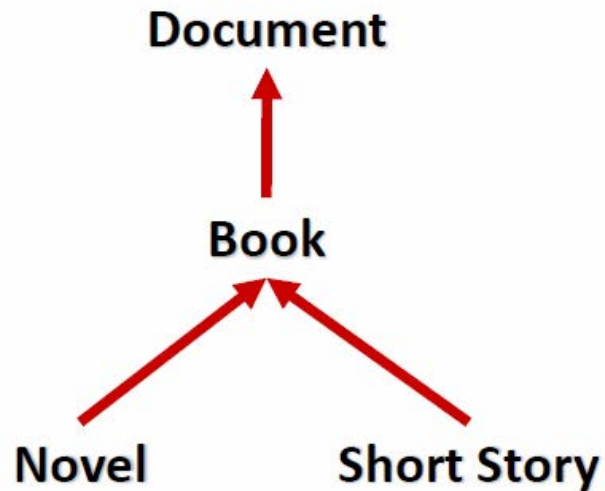
The Semantic Web relies on RDF



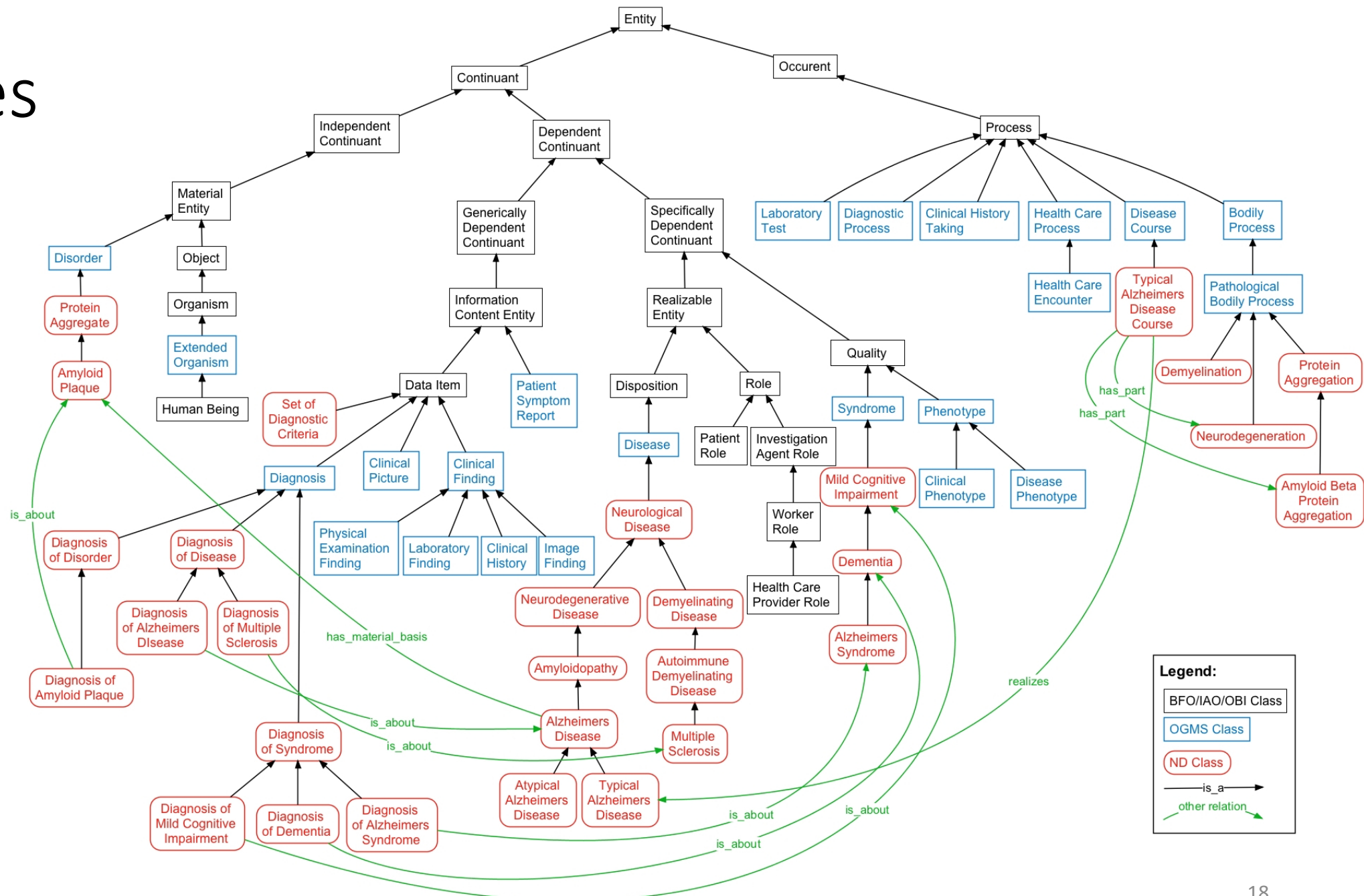
Knowledge graphs



Ontologies (small)



Ontologies (big)



Sustainable Development Goals Interface Ontology

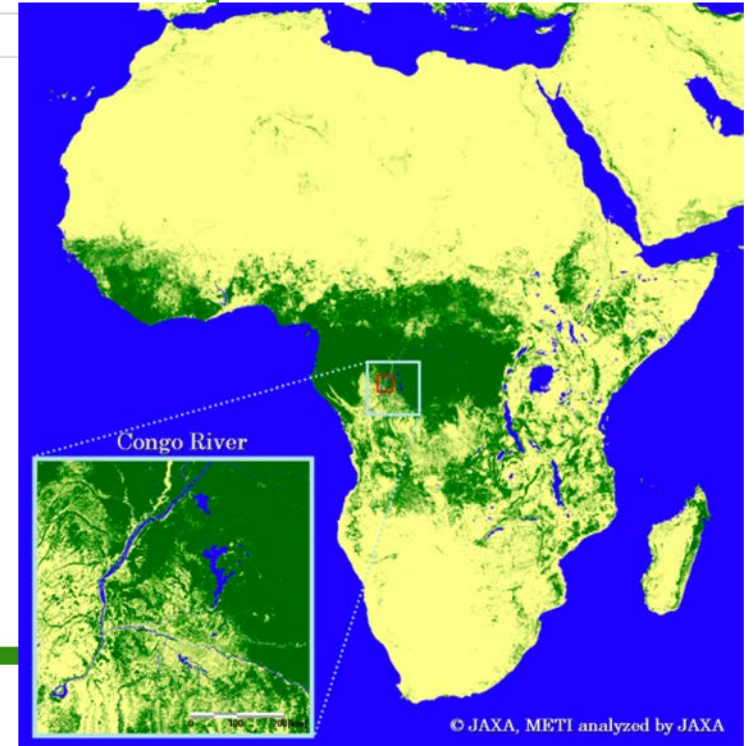
Summary Classes Properties Notes Mappings Widgets

Jump To:

- entity
 - continuant
 - generically dependent continuant
 - information content entity
 - conclusion based on data
 - data item
 - data about an ontology part
 - data set
 - direct material input
 - energy intensity
 - material footprint
 - material footprint per capita
 - material input per capita
 - material intensity
 - material trade balance
 - material trade balance per capita
 - measurement datum
 - net permanent forest loss
 - resource consumption
 - sustainable development goal indicator value
 - Agricultural export subsidies
 - Aid for Trade commitments and disbursements
 - Amount of water- and sanitation-related official development assistance
 - Average marine acidity (pH) measured at agreed suite of sites
 - Change in the extent of water-related ecosystems over time
 - Change in water-use efficiency over time
 - CO2 emission per unit of value added
 - Coverage by protected areas of important sites for mount
 - Death rate due to road traffic injuries
 - Debt service as a proportion of exports of goods and services
 - Developing countries' and least developed countries' share of global income
 - Dollar value of financial and technical assistance (including grants)
 - Extent of use of country-owned results frameworks and plans
 - Extent to which (i) global citizenship education and (ii) education
 - Financial Soundness Indicators
 - Forest area as a proportion of total land area**
 - Global food loss index

Details	Visualization	Notes (0)	Class Mappings (0)	Access Class JSON
Preferred Name				Forest area as a proportion of total land area
ID				http://purl.unep.org/sdg/SDGIO_00020174
label				Forest area as a proportion of total land area
prefixIRI				sdg:SDGIO_00020174
prefLabel				Forest area as a proportion of total land area
UN SDG Indicator ID				15.1.1
UNSD SDG indicator code				C150101
subClassOf				sustainable development goal indicator value

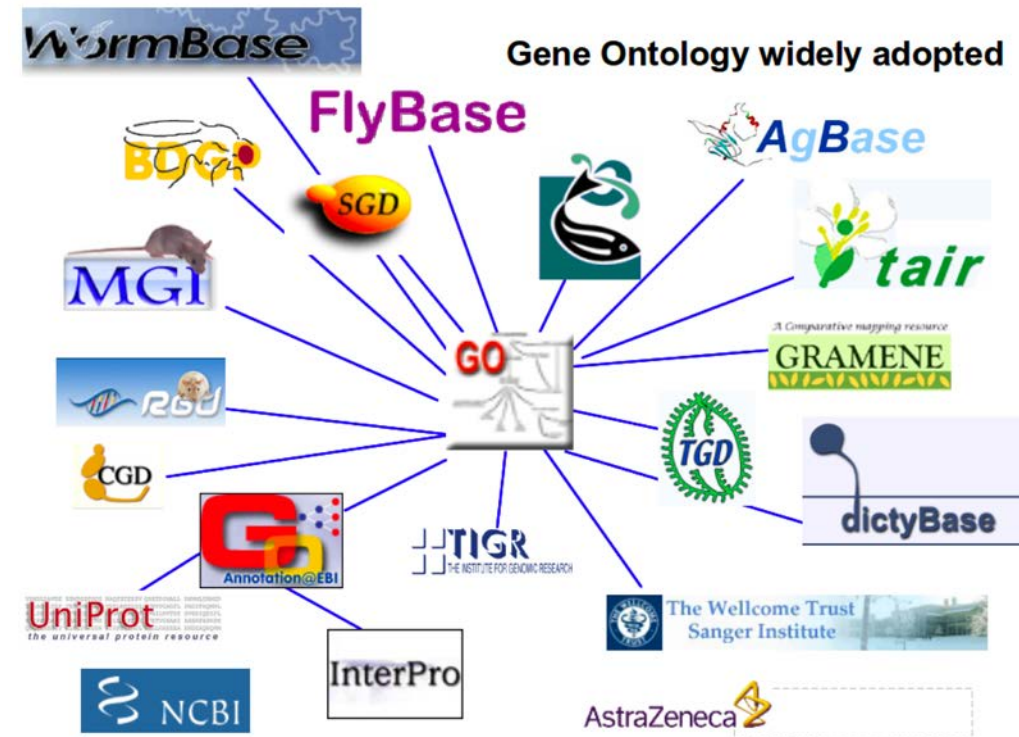
Describe data



Why ontologies are important in science?

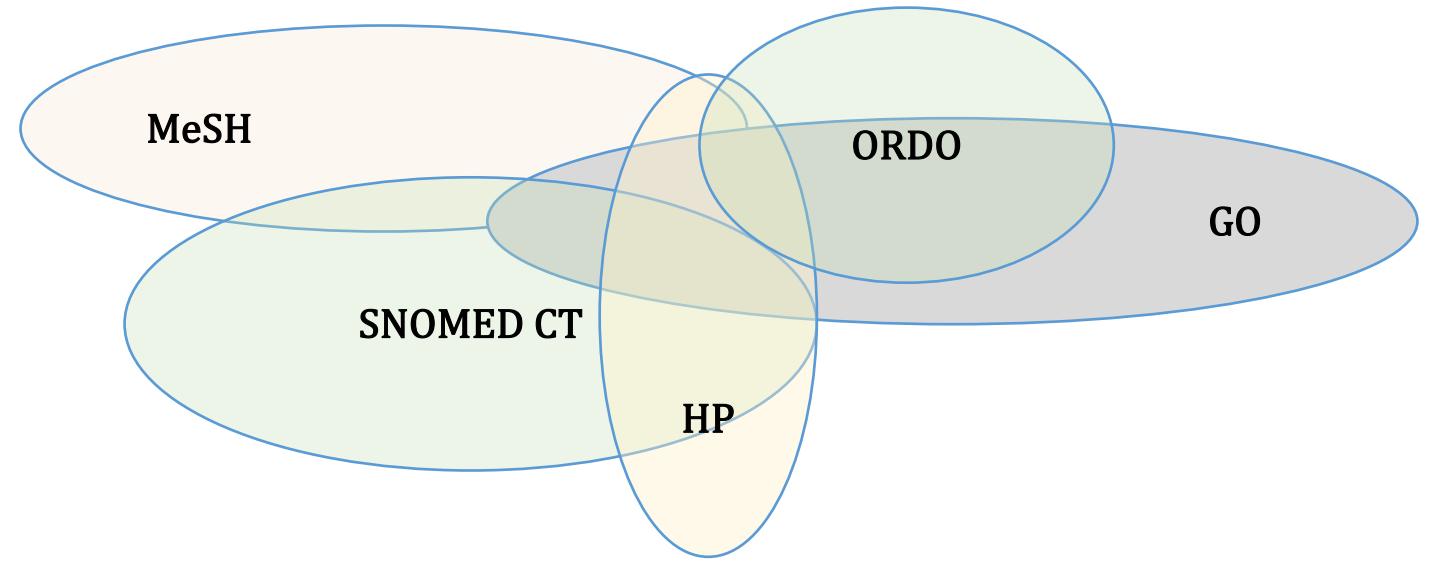


- To provide canonical **representation** and sharing of scientific knowledge
- To **annotate** experimental data to enable interpretation, comparison, and discovery across databases
- To facilitate **knowledge-based applications** for
 - Decision support, reasoning
 - Natural language-processing
 - Data integration

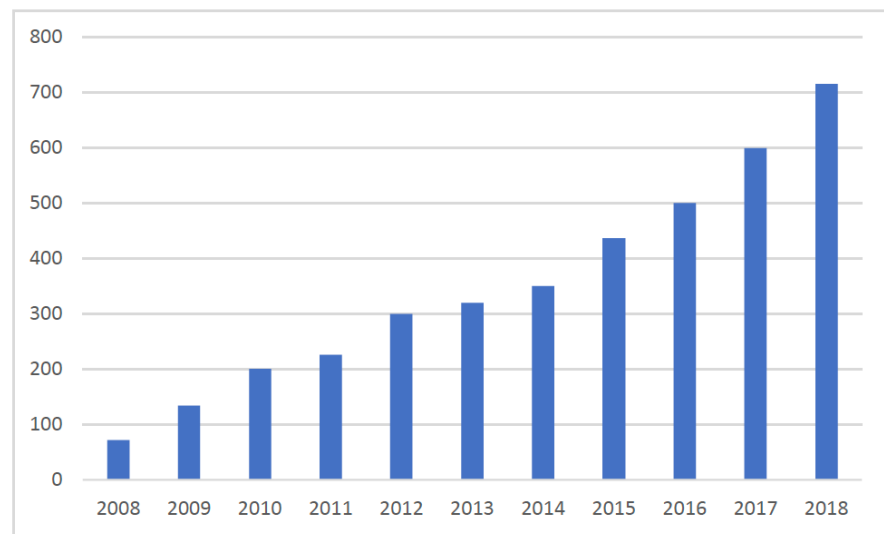


- But ontologies are: **spread out, in different formats, of different size, with different structures**

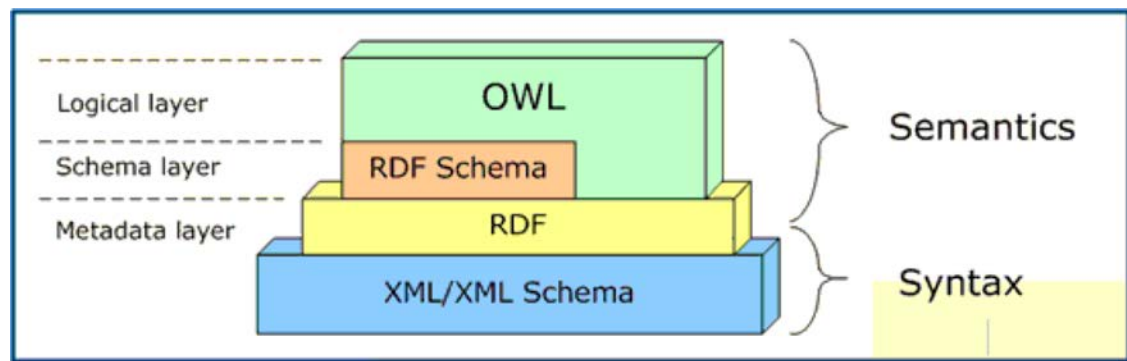
Other issues with ontologies



Overlapping ontologies



Number of ontologies in the NCBO BioPortal



Variety of representation languages

Ontology libraries, registries, repositories



- Ontology **libraries** defined as
 - *“a library system that offers various functions for **managing, adapting and standardizing groups of ontologies**. It should fulfill the needs for re-use of ontologies. In this sense, an ontology library system should be easily accessible and offer efficient **support for re-using** existing relevant ontologies and standardizing them based on upper-level ontologies and ontology representation languages.” [Ding & Fensel, 2001]*

Ontology repositories... a subject of study




- Defined by [Hartmann, Palma, Gomez-Perez, 2009] as:
 - *“a structured **collection** of ontologies (...) by using an Ontology **Metadata Vocabulary**. References and **relations between ontologies** and their modules build the semantic model of an ontology repository. Access to resources is realized through **semantically-enabled interfaces** applicable for humans and machines. Therefore a repository provides a formal query language”*
- Open Ontology Repository initiative (late 2000s)
- 2010 ORES workshop
- Review of ontology repositories
 - [Where to publish and find ontologies? D’Aquin & Noy, 2012]
 - New platform in 2015 Aber-OWL
 - OLS 3.0, AgroPortal release

Why ontology repositories are important?

- You've built an ontology, how do you let the world **know**?
- You need an ontology, **where** do you go to get it?
- How do you know whether an ontology is any **good**?
- How do you find **data** resources that are relevant to the domain of the ontology?
- How could you leverage your ontology to enable new **science**?
- How could you use ontologies without **managing** them ?

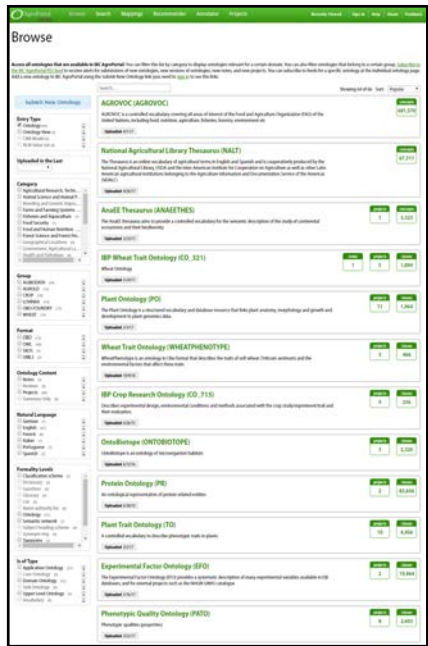
Ontology repositories help to make ontologies FAIR

Findable 

Accessible 

Interoperable 

Re-usable 



Browse

AGRICULTURE (AGRICULTURE)

National Agricultural Library Thesaurus (NALT)

Amul Thesaurus (AMETHES)

BP Wheat Trait Ontology (EO_321)

Plant Trait Ontology (PTO)

Wheat Trait Ontology (WHEATPHENOTYPE)

Wheat Trait Ontology (WHEATPHENOTYPE)

BP Crop Research Ontology (EO_715)

OntoBiotope (ONTOBIOTOPE)

Protein Ontology (PRO)

Plant Trait Ontology (PTO)

Experimental Factor Ontology (EFO)

Phenotypic Quality Ontology (PNO)

API Documentation

General Usage

This API is comprised of a set of resources (Ontologies, Classes, etc) and related endpoints (Search, Annotator, Recommender) that are connected together via links, much like webpages. We recommend that you try browsing the API using a web browser (Chrome and Firefox work very well) as IE does not work before you start writing code. For more information, please see the documentation on Media Types and Hypermedia Links or view our sample code, available in Java, Python, Ruby and other languages (please email help@ontobiotope.org if you would like examples in another language).

Common Parameters

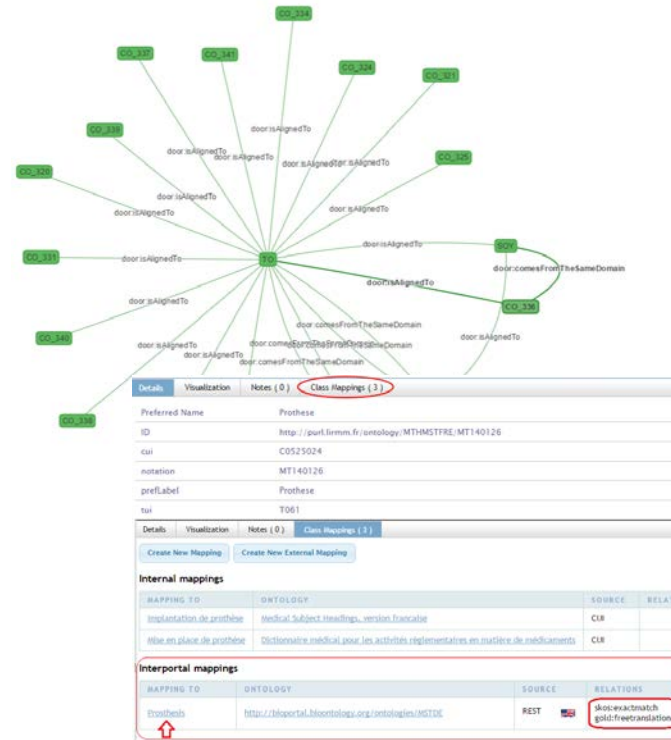
Parameter	Possible Values	Description
apikey	(your api key)	An API Key is required to access any API call. It can be provided in three ways: 1. Using the <code>apikey</code> query string parameter 2. Providing an <code>Authorization</code> header: <code>Authorization: apikey token=your_apikey</code> (replace your <code>apikey</code> with your actual key) 3. When using a web browser to explore the API, if you provide your API Key once using method 1, it will be retained in a cookie for subsequent requests. You can

SPARQL httpd server v1.1.5-122-;

KB ontologies_api

```
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
```



Details Visualization Notes (0) Class Mappings (3)

MAPPING TO	ONTOLOGY	SOURCE	RELATION
implantation de prothese	Medical Subject Headings - version française	CLR	
file en place de prothese	Dictionnaire médical pour les activités réglementées en matière de médicaments	CLR	

MAPPING TO	ONTOLOGY	SOURCE	RELATIONS
↑	http://topolaportal.ontobiotope.org/ontologies/IGTIDE	REST	skos-exactmatch gold:freetranslation



Details

Ontology: Prothese

URI: <http://purl.fr/ontologies/MTM5T5RE:MT140126>

Preferred Name: Prothese

ID: http://purl.fr/ontologies/MTM5T5RE:MT140126

CUI: COS25024

notation: MT140126

prefLabel: Prothese

tui: TO61

Additional Metadata

Metrics

Additional Information

Internal mappings

MAPPING TO	ONTOLOGY	SOURCE	RELATION
implantation de prothese	Medical Subject Headings - version française	CLR	
file en place de prothese	Dictionnaire médical pour les activités réglementées en matière de médicaments	CLR	

Interportal mappings

MAPPING TO	ONTOLOGY	SOURCE	RELATIONS
↑	http://topolaportal.ontobiotope.org/ontologies/IGTIDE	REST	skos-exactmatch gold:freetranslation

Focus on NCBO BioPortal : a “one stop shop” for biomedical ontologies

- Web repository for biomedical ontologies
 - Make ontologies accessible and usable – abstraction on format, locations, structure, etc.
- Users can publish, download, browse, search, comment, align ontologies and use them for annotations both online and via a web services API.

A screenshot of the BioPortal website interface. The header includes the BioPortal logo and navigation links for Login, Tools, and Support. The main content area features a search bar for classes, a search bar for ontologies, and a bar chart showing ontology visits for July 2017. A statistics table is also present, listing various metrics such as the number of ontologies, classes, and annotations. The footer contains links for products, support, about, and connect, along with copyright information and social media icons.

Welcome to BioPortal, the world's most comprehensive repository of biomedical ontologies

Search for a class

Enter a class, e.g. Melanoma

Advanced Search

Find an ontology

Start entering ontology name, e.g. Cancer, then choose from list

Browse Ontologies

Ontology Visits (July 2017)

Ontology	Visits
CPT	85,000
RXNORM	25,000
MEDDRA	20,000
SNOMEDCT	15,000
NDDF	5,000

More

BioPortal Statistics

Ontologies	596
Classes	8,173,420
Resources Indexed	48
Indexed Records	39,537,360
Direct Annotations	95,468,433,792
Direct Plus Expanded Annotations	144,789,582,932

PRODUCTS

- BioPortal
- BioPortal REST API
- BioPortal Virtual Appliance
- NCBO Web Widgets

SUPPORT

- Contact Us
- Documentation
- NCBO Wiki

ABOUT

- About Us
- Mission & Vision
- Team
- Projects

CONNECT

[f](#) [t](#) [o](#)

The National Center for Biomedical Ontology was founded as one of the National Centers for Biomedical Computing, supported by the NHGRI, the NHLBI, and the NIH Common Fund under grant U54-HG004028.

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CITE US | PRIVACY POLICY | TERMS

- Online support for ontology
 - Peer review & notes
 - Versioning
 - Mapping
 - Search
 - Resources
 - Annotation

- Open source technology
 - Packaged in a “virtual appliance”
 - Set up your own “bioportal” in a few days

Welcome to BioPortal, the world's most comprehensive repository of biomedical ontologies

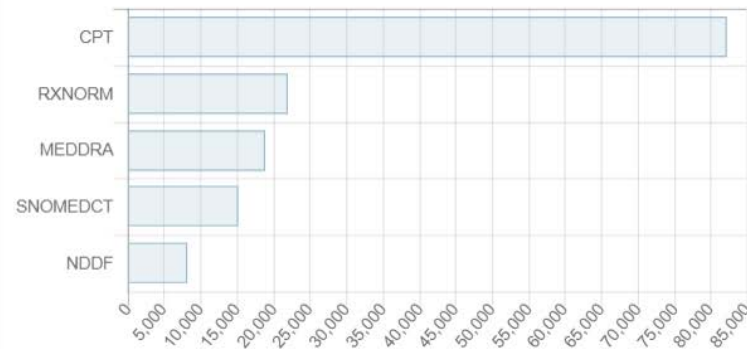
Search for a class


[Advanced Search](#)

Find an ontology


[Browse Ontologies](#)

Ontology Visits (July 2017)


[More](#)

BioPortal Statistics

Ontologies	596
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 Noy, N. F., Shah, N. H., Whetzel, P. L., ..., Jonquet C., ... & Musen, M. A. (2009). BioPortal: ontologies and integrated data resources at the click of a mouse. *Nucleic acids research*, 37(suppl_2), W170-W173. **+800 citations.**

The **National Center for Biomedical Ontology** was founded as one of the National Centers for Biomedical Computing, supported by the NHGRI, the NHLBI, and the NIH Common Fund under grant U54-HG004028.

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[CITE US](#) [PRIVACY POLICY](#) [TERMS](#)

<http://data.bioontology.org>

Ontology Services →

- Search
- Traverse
- Comment
- Download

Mapping Services →

- Create
- Upload
- Download

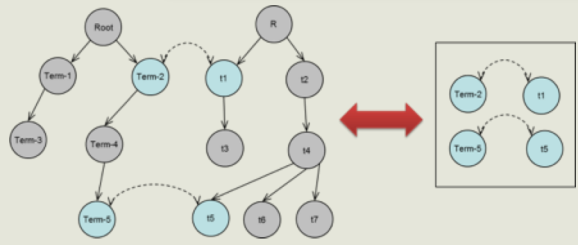
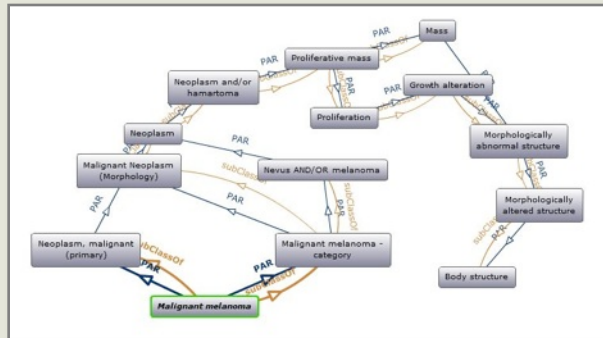
Widgets →

- Tree-view
- Auto-complete
- Graph-view

Annotation → Term recognition

Data Access → Search “data” annotated with a given term

<http://bioportal.bioontology.org>

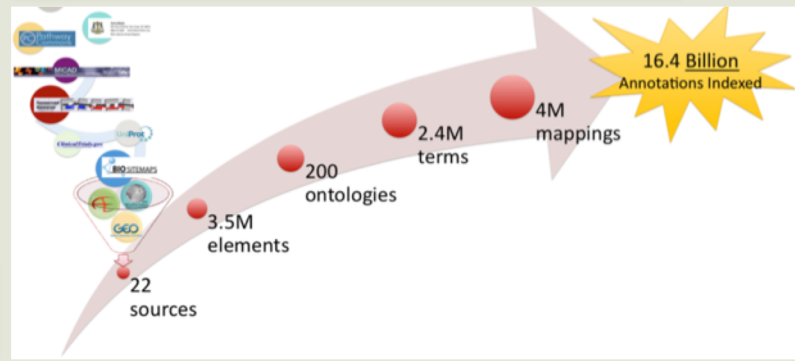


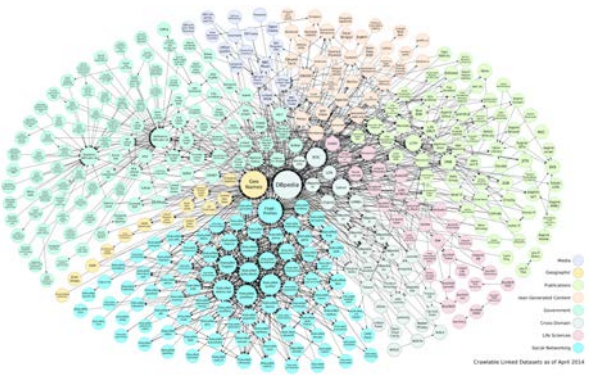
Jump To:

Legend

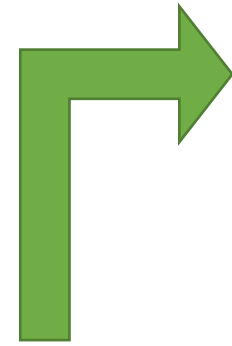
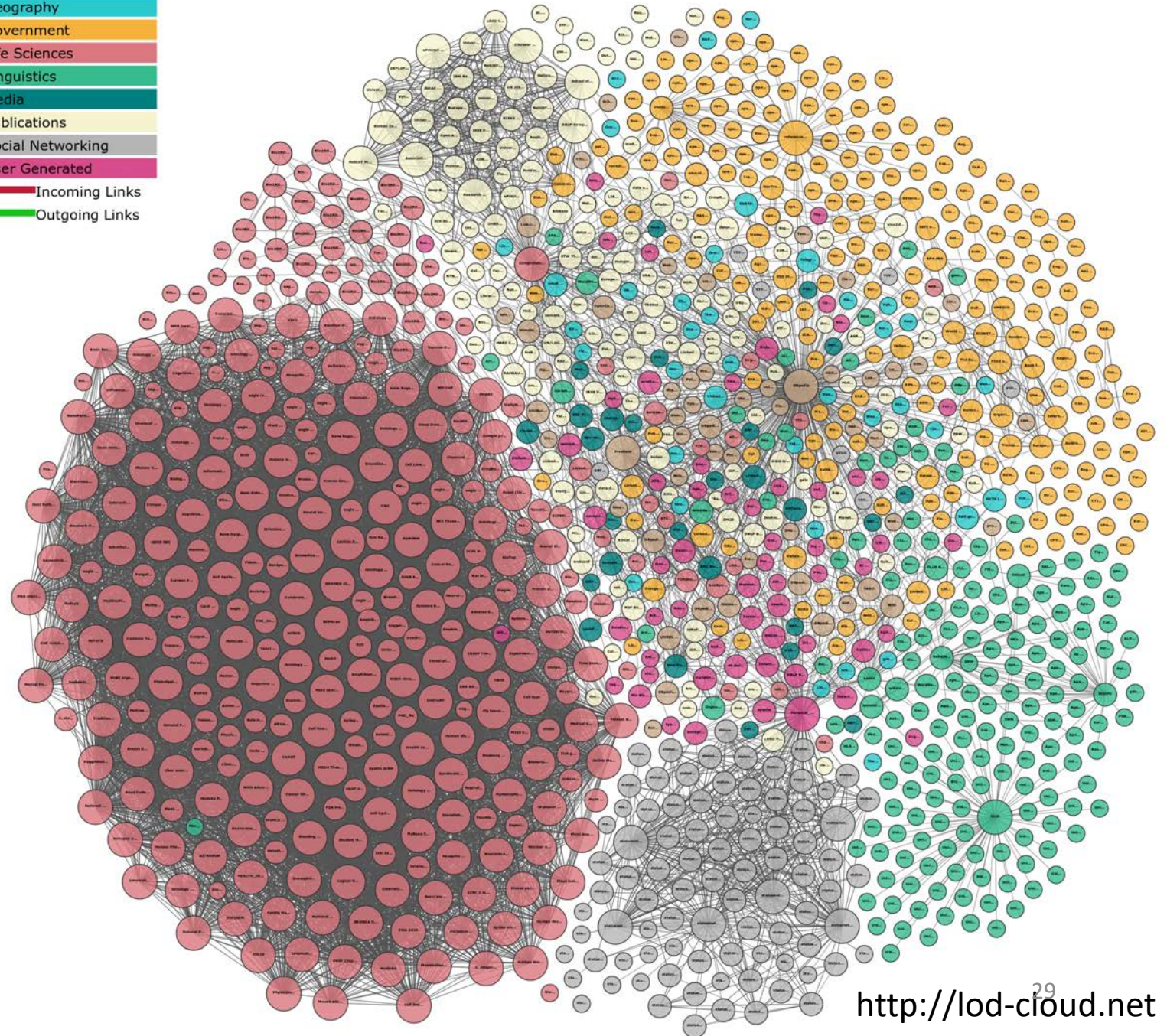
- Malignant **melanoma** (synonym)
- Amelanotic **melanoma** (preferred name)
- Excision of **melanoma** (preferred name)
- Melanoma** in situ (preferred name)
- Melanoma** vaccine (preferred name)

Expression, Expression of bladder, bladder, smooth, bladder muscle, muscle, smooth muscle, cells, mechanical, mechanical stimulation, stimulation, Chronic, results, bladder overdistension, associated, associated with, with, loss, genes, altered





- Legend**
- Cross Domain
 - Geography
 - Government
 - Life Sciences
 - Linguistics
 - Media
 - Publications
 - Social Networking
 - User Generated
 - Incoming Links
 - Outgoing Links



NCBO BioPortal
data as of 2013

Who has been reusing NCBO technology so far?

- NCI term browser (BioPortal first, then LexEVS) (<https://nciterms.nci.nih.gov>)
- Open Ontology Repository (OOR) Initiative (<http://www.oor.net>)
- Marine Metadata Interoperability Ontology Registry and Repository (<http://mmisw.org>)
- Earth Science Information Partners ESIPPortal (then ORR) (<http://semanticportal.esipfed.org>)
- AgroPortal (<http://agroportal.lirmm.fr>)
- SIFR/French BioPortal (<http://bioportal.lirmm.fr>)
- Stanford libraries (<https://biblio.ontportal.org>)
- LifeWatch ERIC EcoPortal (<http://ecoportal.lifewatchitaly.eu/>)
- Chinese Academy of Medical Sciences (<http://medportal.bmicc.cn>)
- And a many hospitals, research labs, with private data and specific needs (often in-house annotation)



What are the ontology libraries out there?

- Ontology repositories / portal

- [NCBO BioPortal](#)

- [Ontobee](#)

- [AberOWL](#)

- [EBI Ontology Lookup Service](#)

- [OKFN Linked Open Vocabularies](#)

- [ONKI Ontology Library Service](#)

- [MMI Ontology Registry and Repository](#)

- [ESIPportal](#)

- [AgroPortal](#)

- [SIFR BioPortal](#)

- [MedPortal](#)

- [EcoPortal](#)

- [CISMEF HeTOP](#)

- [OntoHub](#)

- [Ontoserver](#)

- Web indexes

- [Watson](#), [Swoogle](#),
[Sindice](#), [Falcons](#)

- Ontology libraries / listings (more or less updated)

- [OBO Foundry](#)

- [WebProtégé](#)

- [Romulus](#)

- [DAML ontology library](#)

- [Colore](#)

- [FAO VEST Registry](#)

- [FAIRsharing](#)

- [DERI Vocabularies](#), [OntologyDesignPatterns](#),
[Semanticweb.org](#), [W3C Good ontologies](#)

- [BARTOC](#)

- Platform technology, Terminology Services

- [Mondeca ITM](#), [LexEVS](#), [ANDS](#), [SKOSMOS](#), [NERC-VS](#)

- Abandoned projects

- [Cubboard](#), [Knoodl](#), [Schemapedia](#), [SchemaWeb](#),
[OntoSelect](#), [OntoSearch](#), [TONES](#)



28 ontologies/terminologies

- From the UMLS or CISMef's HeTOP or uploaded by users
- Cleaned and checked for annotation

The screenshot shows the SIFR BioPortal interface. At the top, there is a navigation bar with links for Browse, Search, Mappings, Recommender, Annotator, NCBO Annotator+, Projects, Landscape, Recently Viewed, Sign In, Help, About, and Feeds. The main heading is "Browse". Below it, a search bar and a "Showing 28 of 29" indicator are visible. The list of ontologies includes:

- Dictionnaire médical pour les activités réglementaires en matière de médicaments (MDRFRE) - 1 project, 68,980 classes
- Classification Internationale des Maladies - 10ème révision (CIM-10) - 1 project, 27,879 classes
- Medical Subject Headings, version française (MSHFRE) - 1 project, 27,879 classes
- Systematized Nomenclature of Medicine, version française (SNMIFRE) - 1 project, 106,291 classes
- Ontologie des urgences (ONTOLURGENCES) - 1 project, 10,031 classes
- Classification Internationale des Soins Primaires, deuxième édition (CISP-2) - 745 classes
- Classification ATC (anatomique, thérapeutique et chimique) (ATCFRE) - 5,768 classes
- Biologie Hors Nomenclature (BHN) - 1 project, 13,539 classes
- Ontologie des maladies rares humaines (HRDO) - 1 project, 13,539 classes

The screenshot shows the AgroPortal interface. At the top, there is a navigation bar with links for Browse, Search, Mappings, Recommender, Annotator, Projects, Recently Viewed, Sign In, Help, About, and Feedback. The main heading is "Browse". Below it, a search bar and a "Showing 63 of 65" indicator are visible. The list of ontologies includes:

- AGROVOC (AGROVOC) - 681,570 concepts
- AnaEE Thesaurus (ANAETHES) - 1 project, 3,323 concepts
- National Agricultural Library Thesaurus (NALT) - 67,311 concepts
- OntoBiotope (ONTOBIOTOPE) - 3 projects, 2,320 classes
- Protein Ontology (PR) - 1 project, 83,656 classes
- IBP Crop Research Ontology (CO_715) - 3 projects, 256 classes
- Process and Observation Ontology (PO2) - 2 projects, 4,449 classes
- IBP Wheat Trait Ontology (CO_321) - 1 note, 5 projects, 1,023 classes

▶ 107 ontologies, 80 candidates

▶ 5 driving use cases, ~90 registered users



C. Jonquet, A. Annane, K. Bouarech, V. Emonet & S. Melzi. **SIFR BioPortal: French biomedical ontologies and terminologies available for semantic annotation**, In *16th Journées Francophones d'Informatique Médicale, JFIM'16*. Genève, Suisse, July 2016.



C. Jonquet, A. Toulet, (...) P. Larmande. **AgroPortal: an ontology repository for agronomy**, *Computers and Electronics in Agriculture*. Jan 2018. 144, pp.126-143. Elsevier.

Medical Subject Headings, version française

Summary Classes Properties Notes Mappings Widgets

Details

ACRONYM	MSHFRE
VISIBILITY	Public
DESCRIPTION	Le MeSH (Medical Subject Headings) est le thésaurus de référence dans le domaine biomédical. La NLM (U.S. National Library of Medicine), qui l'a construit et le met à jour chaque année, l'utilise pour indexer et permettre d'interroger ses bases de données, notamment MEDLINE/PubMed. L'Inserm, qui est le partenaire français de la NLM depuis 1969, a traduit le MeSH en 1986, et met à jour la version française chaque année depuis lors. Dans le cadre d'un accord de coopération avec l'Inserm, l'Inist-CNRS (Institut de l'information scientifique et technique du CNRS) contribue à la mise à jour de la version française depuis 2004.
STATUS	Production
FORMAT	UMLS
CONTACT	Yannick Pilatte, yannick.pilatte@inserm.fr Claudie Hasenfuss, hasenfus@vjf.inserm.fr
HOME PAGE	http://mesh.inserm.fr/mesh/
PUBLICATIONS PAGE	https://www.nlm.nih.gov/
DOCUMENTATION PAGE	http://mesh.inserm.fr/mesh/
CATEGORIES	Traduction français
GROUPS	French Unified Medical L

Go to the REST API JSON entry

Get my metadata back

N-Triple Json-LD RDF/XML

Metrics

NUMBER OF CLASSES:	27879
NUMBER OF INDIVIDUALS:	0
NUMBER OF PROPERTIES:	6
MAXIMUM DEPTH:	15
MAXIMUM NUMBER OF CHILDREN:	164
AVERAGE NUMBER OF CHILDREN:	4

Additional Metadata

NATURAL LANGUAGE	
VERSION	2016AB
RELEASE DATE	2016-12-11T00:00:00+00
KNOWN USAGE	La version bilingue est so bases de données en fran
FUNDED BY	Institut national de la sant
TRANSLATOR	INSERM
HAS DOMAIN	http://data.bioportal.lirmm
HAS FORMALITY LEVEL	http://w3id.org/nkos/nkos
HAS LICENSE	Contactez l'INSERM
ONTOLOGY SYNTAX	http://www.w3.org/ns/for
IS OF TYPE	http://omv.ontoware.org/2
HAS PRIOR VERSION	MSHFRE/submissions/
DEPRECATED	false
PUBLISHER	INSERM
IDENTIFIER	
IS FORMAT OF	https://www.nlm.nih.gov/
ENDPOINT	

Browse

Access all ontologies that are available in SIFR BioPortal: You can filter this list by category to display ontologies relevant for a certain domain. You can also filter ontologies that belong to a certain group. Subscribe to the SIFR BioPortal RSS feed to receive alerts for submissions of new ontologies, new versions of ontologies, new notes, and new projects. You can subscribe to feeds for a specific ontology at the individual ontology page. Add a new ontology to SIFR BioPortal using the Submit New Ontology link (you need to log in to see this link).

Search: _____ Showing 28 of 29 Sort: Popular

[Submit New Ontology](#)

Entry Type

- Ontology (28)
- Ontology View (1)
- OWL Model (2)
- NLM Value Set (2)

Uploaded in the Last

Category

- Traduction français (11)
- Uniquement français (8)
- Vue française (2)

Group

- CISEF (11)
- LMICS (2)
- LOTESBE (2)
- NCBOSP (1)
- UMLS (11)

Format

- OWL (21)
- SKOS (3)
- UMLS (4)

Ontology Content

- Notes (4)
- Releases (2)
- Projects (16)
- Summary Only (2)

Natural Language

- German (1)
- English (7)
- French (28)
- Italian (1)
- Portuguese (1)
- Spanish (1)

Formality Levels

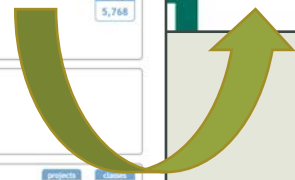
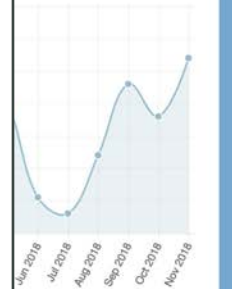
- Classification scheme (1)
- Dictionary (2)
- Gazetteer (2)
- Glossary (2)
- LMI (2)
- Name authority list (2)
- Ontology (8)
- Semantic network (2)
- Subject heading scheme (2)
- Synonym ring (2)
- Taxonomy (1)
- Terminology (2)
- Thesaurus (4)

Is of Type

- Application Ontology (1)
- Core Ontology (2)
- Domain Ontology (1)
- Task Ontology (2)

Ontologies listed:

- Dictionnaire médical pour les activités réglementaires en matière de médicaments (MDRFRE)**
Traduction française de Medical Dictionary for Regulatory Activities Terminology (MedDRA)
Uploaded: 3/4/17
Projects: 1, Classes: 68,980
- Classification Internationale des Maladies - 10ème révision (CIM-10)**
La CIM-10 permet le codage des maladies, des traumatismes et de l'ensemble des motifs de recours aux services de santé.
Uploaded: 3/9/17
- Medical Subject Headings, version française (MSHFRE)**
Le MeSH (Medical Subject Headings) est le thésaurus de référence dans le domaine biomédical.
Uploaded: 3/4/17
Projects: 1, Classes: 27,879
- Systematized Nomenclature of MEDICINE, version française (SNMIFRE)**
La SNOMED Internationale (Systematized Nomenclature of Medicine) est une nomenclature pluri-axiale couvrant tous les champs de la médecine et de la dentisterie humaine, ainsi que la médecine animale.
Uploaded: 3/16/17
Projects: 1, Classes: 106,291
- Ontologie des urgences (ONTOLURGENCES)**
Ontologie des urgences médicales créée durant le projet LERUDI.
Uploaded: 10/27/15
Projects: 1, Classes: 10,031
- Classification Internationale des Soins Primaires, deuxième édition (CISP-2)**
La CISP-2 permet de classer et coder trois éléments de la consultation de médecine générale, ou plus généralement de soins primaires.
Uploaded: 3/20/17
Classes: 745
- Classification ATC (anatomique, thérapeutique et chimique) (ATCFRE)**
(from Wikipedia) La classification ATC (anatomique, thérapeutique et chimique) est utilisée pour classer les médicaments.
Uploaded: 3/20/17
Classes: 5,768
- Biologie Hors Nomenclature (BHN)**
L'activité innovante de biologie et d'anatomo-pathologie réalisée notamment dans les Centres Hospitalo-Universitaires est habituellement appelée activité hors nomenclature (BHN pour la biologie hors nomenclature et PHN pour l'anatomo-pathologie hors nomenclature).
Uploaded: 11/24/13
- Ontologie des maladies rares humaines (HRDO)**
Ontologie des maladies rares établie par lors du projet de recherche OrphaOnto (2010-2012, LImics, INSERM UMRS872) à partir des données d'Orphanet, INSERM US14.
Uploaded: 11/24/13
Projects: 1, Classes: 13,539



A dedicated version of BioPortal for French ontologies

<http://bioportal.lirmm.fr>

28 monolingual ontologies/terminologies

- From the UMLS or HeTOP or uploaded by users
- Cleaned and checked for annotation



C. Jonquet, A. Annane, K. Bouarech, V. Emonet & S. Melzi. **SIFR BioPortal: French biomedical ontologies and terminologies available for semantic annotation**, In *16th Journées Francophones d'Informatique Médicale JFIM'16*. Genève, Suisse, July 2016.

Annotator

The SIFR BioPortal 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 get ontology-based annotations. Hover the mouse pointer on any button to see what it does.

Le mélanome est un cancer de la peau ou des muqueuses, développé aux dépens des mélanocytes (tumeur mélanocytaire).

Son siège initial est la peau dans l'immense majorité des cas. Il existe toutefois des mélanomes de l'œil (mélanome choroidien), des muqueuses (bouche, canal anal, vagin), et plus rarement encore des organes internes.

French/SIFR Annotator

<http://bioportal.lirmm.fr/annotator>

Insert sample text

Ontology filters

Select Ontologies

MDRFRE x MSHFRE x

clear selection select from list

Select UMLS Semantic Types ?

Type here to select UMLS semantic types

Select UMLS Semantic Groups ?

Maladies (DISO) x Anatomie (ANAT) x

Matching parameters

Match Longest Only

Match Partial Words

Include Mappings

Exclude Numbers

Exclude Synonyms

Lemmatize (beta)

Ancestors Level: None ? **Include Score:** cvalue ? **Score threshold:** 0

Get Annotations

Annotations
Only results from ontologies with semantic types available are displayed. total results 28 (direct 13 / ancestor 15 / mapping 0)

CLASS	filter	ONTOLOGY	filter	TYPE	filter	UMLS SEM TYPE	CONTEXT	MATCHED CLASS	filter	MATCHED ONTOLOGY	filter	SCORE
Cancer de la peau		Dictionnaire médical pour les activités réglementaires en matière de médicaments		direct			... est un cancer de la peau ou des muqueuses, ...	Cancer de la peau		Dictionnaire médical pour les activités réglementaires en matière de médicaments		19.932
Cancer de la peau		Dictionnaire médical pour les activités réglementaires en matière de médicaments		direct			... est un cancer de la peau ou des muqueuses, ...	Cancer de la peau		Dictionnaire médical pour les activités réglementaires en matière de médicaments		19.932
Maladies de la peau		Medical Subject Headings, version française		ancestor			... est un cancer de la peau ou des muqueuses, ...	Tumeurs cutanées		Medical Subject Headings, version française		19.198
Tumeurs par siège		Medical Subject Headings, version française		ancestor			... est un cancer de la peau ou des muqueuses, ...	Tumeurs cutanées		Medical Subject Headings, version française		19.198
Tumeurs malignes et non précisées de la peau (excl mélanomes)		Dictionnaire médical pour les activités réglementaires en matière de médicaments		ancestor			... est un cancer de la peau ou des muqueuses, ...	Cancer de la peau		Dictionnaire médical pour les activités réglementaires en matière de médicaments		19.198
Tumeurs cutanées		Medical Subject Headings, version française		direct			... est un cancer de la peau ou des muqueuses, ...	Tumeurs cutanées		Medical Subject Headings, version française		18.000
Mélanome		Dictionnaire médical pour les activités réglementaires en matière de médicaments		direct			Le mélanome est un cancer ...	Mélanome		Dictionnaire médical pour les activités réglementaires en matière de médicaments		4.322
Mélanome		Dictionnaire médical pour les activités réglementaires en matière de médicaments		direct			Le mélanome est un cancer de la peau ou des muqueuses, développé aux dépens des mélanocytes (tumeur mélanocytaire). ... de l'œil (mélanome choroidien), des muqueuses ...	Mélanome		Dictionnaire médical pour les activités réglementaires en matière de médicaments		4.322
Mélanome		Medical Subject Headings, version française		direct			Le mélanome est un cancer ...	Mélanome		Medical Subject Headings, version française		4.322
Mélanome		Medical Subject Headings, version française		direct			Le mélanome est un cancer de la peau ou des muqueuses, développé aux dépens des mélanocytes (tumeur mélanocytaire). ... de l'œil (mélanome choroidien), des muqueuses ...	Mélanome		Medical Subject Headings, version française		4.322
Tumeurs neuroendocrines		Medical Subject Headings, version française		ancestor			Le mélanome est un cancer ...	Mélanome		Medical Subject Headings, version française		4.200
Naevus et mélanomes		Medical Subject Headings, version française		ancestor			Le mélanome est un cancer ...	Mélanome		Medical Subject Headings, version française		4.200
Tumeurs neuroendocrines		Medical Subject Headings, version française		ancestor			Le mélanome est un cancer de la peau ou des muqueuses, développé aux dépens des mélanocytes (tumeur mélanocytaire). ... de l'œil (mélanome choroidien), des muqueuses ...	Mélanome		Medical Subject Headings, version française		4.200
Naevus et mélanomes		Medical Subject Headings, version française		ancestor			Le mélanome est un cancer de la peau ou des muqueuses, développé aux dépens des mélanocytes (tumeur mélanocytaire). ... de l'œil (mélanome choroidien), des muqueuses ...	Mélanome		Medical Subject Headings, version française		4.200
Mélanocytes		Medical Subject Headings, version française		direct			... dépens des mélanocytes (tumeur mélanocytaire). Son siège ...	Mélanocytes		Medical Subject Headings, version française		3.322
Tumeur		Dictionnaire médical pour les activités réglementaires en matière de médicaments		direct			... des mélanocytes (tumeur mélanocytaire). Son siège initial ...	Tumeur		Dictionnaire médical pour les activités réglementaires en matière de médicaments		3.322
Peau		Medical Subject Headings, version française		direct			Le mélanome est un cancer de la peau ou des muqueuses, développé aux dépens des mélanocytes (tumeur mélanocytaire). ... est la peau dans l'immense majorité ...	Peau		Medical Subject Headings, version française		3.322
Bouche		Medical Subject Headings, version française		direct			Le mélanome est un cancer de la peau ou des muqueuses, développé aux dépens des mélanocytes (tumeur mélanocytaire). ... des muqueuses (bouche , canal anal, vagin), ...	Bouche		Medical Subject Headings, version française		3.322

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**



AgroPortal a vocabulary and 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>

- ▶ 107 ontologies, 80 candidates
- ▶ 5 driving use cases
- ▶ ~90 registered users

Use AgroPortal to access and share ontologies. You can [create ontology-based annotations for your own text](#), [link your own project that uses ontologies to the description of those ontologies](#), [find and create relations between terms in different ontologies](#), review and comment on ontologies and their components as you [browse](#) them. [Sign in to AgroPortal](#) to submit a new ontology or ontology-based project, provide comments on ontologies or add ontology mappings.

Current Release: **4.24 (February 2016)**
 Issue tracking on [GitHub](#)

Search all ontologies

[Advanced Search](#)

Find an ontology

[Browse Ontologies >](#)

Links



Ontology Visits (July 2017)

AnaEE Thesaurus (ANAEETHES)	95
AGROVOC (AGROVOC)	94
National Agricultural Library Thesaurus (NALT)	41
OntoBiotope (ONTOBIOTOPE)	36
Wheat Trait Ontology (WHEATPHENOTYPE)	27

[More](#)

Latest Notes

[Terms in double \(IBP Wheat Trait Ontology\)](#)

5 months ago by jonquet
 A bunch of the terms in this branch are in double. Is this normal ?

[Un peu d'histoire \(Banana Anatomy\)](#)

over 1 year ago by antoulet
 Inflorescence est un mot d'origine latine qui signifie "fleurir". Il est le même en français et e...

[Can measure by mapped to another ontology ? \(Biorefinery\)](#)

over 1 year ago by jonquet
 Such as Unit of Measurement ?

[Is spadice a kind of inflorescence for banana? \(Banana Anatomy\)](#)

over 1 year ago by jonquet
 Can we consider spadice an appropriate inflorescence for banana?

Latest Mappings

[zooplankton \(ANAEETHES\) <=> OMIT_0015869](#)

(<http://purl.obolibrary.org/obo/omit.owl>)
 External Mapping 04/25/2017 by jonquet

[QTL \(SO\) <=> QTL \(<http://www.southgreen.fr/agrold/resource>\)](#)

External Mapping 04/06/2017 by larmande

Slices

[Crop Ontology Curation Tool \(crop\)](#)

[INRA Linked Open Vocabularies \(lovinra\)](#)

[OBO Foundry \(obo-foundry\)](#)

[The Agronomic Linked Data \(AgroLD\) \(agrold\)](#)

[Consortium of Agricultural Biological Databases \(agbiodata\)](#)

[RDA Wheat Data Interoperability working group \(wheat\)](#)

[Exclusive AgroPortal ontologies \(exclu\)](#)

Statistics

Ontologies	64
Classes	1,199,915
Individuals	1,377,548
Projects	32
Users	77

Supported by



With the collaboration of



5 Driving Agronomic Use Cases

- IBC **Rice** Genomics & AgroLD project
 - Data integration and knowledge management related to rice (P. Larmande)
- RDA **Wheat** Data Interoperability working group
 - Common framework for publishing wheat data (E. Dzalé-Yeumo)
- **LovInra** : INRA Linked Open Vocabularies
 - Vocabularies produced by INRA scientists (S. Aubin)
- **Crop** Ontology project
 - Ontologies for describing crop germplasm & traits (E. Arnaud)
- GODAN global map of **agri-food** data standards
 - VEST/AgroPortal MAP of standards (V. Pesce)



Examples of ontologies uploaded in AgroPortal

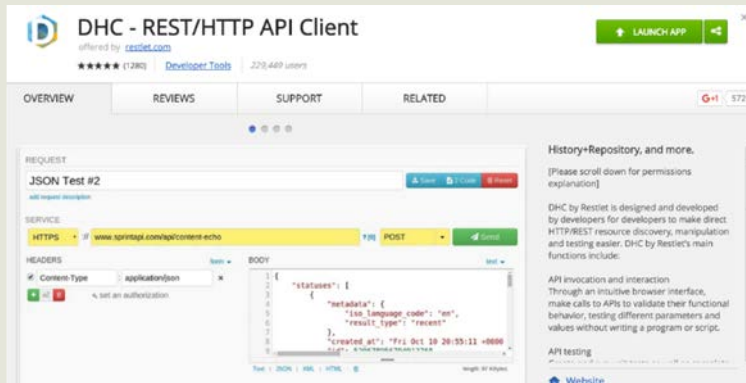
Title	Format	Groups	Size
IBP Rice Trait Ontology (CO_320)	OWL	CROP, RICE	~2K
IBP Wheat Trait Ontology (CO_321)	OWL	CROP, WHEAT	~1K
IBP Wheat Anatomy Ontology (CO_121)	OBO	CROP, WHEAT	~80
IBP Crop Research (CO_715)	OBO	CROP	~250
Multi-Crop Passport Ontology (CO_020)	OBO	CROP	~90
Biorefinery (BIOREFINERY)	OWL	LOVINRA	~300
Matter Transfer (TRANSMAT)	OWL	LOVINRA	~1.1K
Plant Ontology (PO)	OWL	WHEAT, RICE, OBOF	~2K
Plant Trait Ontology (TO)	OWL	WHEAT, RICE, OBOF	~4.4K
Durum Wheat (DURUM_WHEAT)	OWL	LOVINRA	~130
Agricultural Experiments (AEO)	OWL	LOVINRA	~60
Environment Ontology (ENVO)	OWL	WHEAT, OBOF	~6.3K
NCBI Organismal Classification (NCBITAXON)	RRF	WHEAT	~900K
AnaEE Thesaurus (ANAEE)	SKOS	LOVINRA	~3.3K
French Crop Usage (CROPUSAGE)	SKOS	none	~300
Agrovoc (AGROVOC)	SKOS	none	~32K
Food Ontology (FOODON)	OWL	OBOF	~10K
National Agriculture Library Thesaurus (NALT)	SKOS	none	~67K
Global Agricultural Concept Scheme (GACS)	SKOS	none	40 ~585K



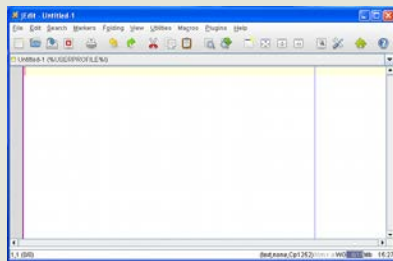
Tutorial material



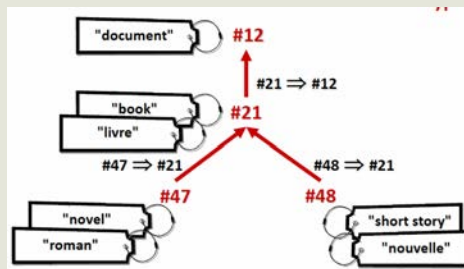
→ A web browser to use the web application



→ A REST client for advanced REST web service calls (DHC, cURL, etc.)



→ A text editor

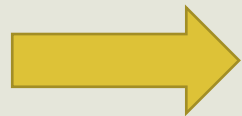


→ One ontology (preferably in OWL or SKOS)

During the tutorial



Demo



Exercise

Ressources

- Examples will be given with AgroPortal but (most of the time) equivalent action or queries can be done on one of the other portal.
- For API, by changing the base URL
 - <http://data.agroportal.lirmm.fr/>
 - <http://data.bioontology.org/>
 - <http://193.204.79.110:8080> (for EcoPortal)
- Documentation
 - AgroPortal: <https://github.com/agroportal/documentation/wiki/>
 - NCBO BioPortal: NCBO wiki

Create an account and get an APIkey

- Sign in > Create account
- Copy/paste your APIKey somewhere

that uses ontologies to the description of those ontologies, find and create relations between terms in different ontologies, review
y-based project, provide comments on ontologies or add ontology mappings.

Current Release: 4.24 (February 2016)
Issue tracking on [GitHub](#)

Sign In | Help | Feedback

Explore

Search resources

Enter a concept, e.g. Melanoma Search

Advanced Resource Search

Latest Mappings

Season (CO_715) <=> Season (<http://dbpedia.org>)
External Mapping 01/08/2016 by jonquet

Season (CO_715) <=> ccon#Season (<http://data.bioontology.org/ontologies/CCON>)
Interportal Mapping ncbo 01/08/2016 by jonquet

plant organ (PO) <=> Plant_organ (<http://dbpedia.org/ontology/>)
External Mapping 11/30/2015 by jonquet

Plant (STY) <=> Plant (<http://dbpedia.org/ontology/>)
External Mapping 11/06/2015 by jonquet

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

Slices

[Crop Ontology Curation Tool \(crop\)](#)

[INRA Linked Open Vocabularies \(lovinra\)](#)

[The Agronomic Linked Data \(AgroLD\) \(agrold\)](#)

[RDA Wheat Data Interoperability working group \(wheat\)](#)

[Exclusive AgroPortal ontologies \(exclu\)](#)

ported by

INRA Institut de Biologie
computationnelle

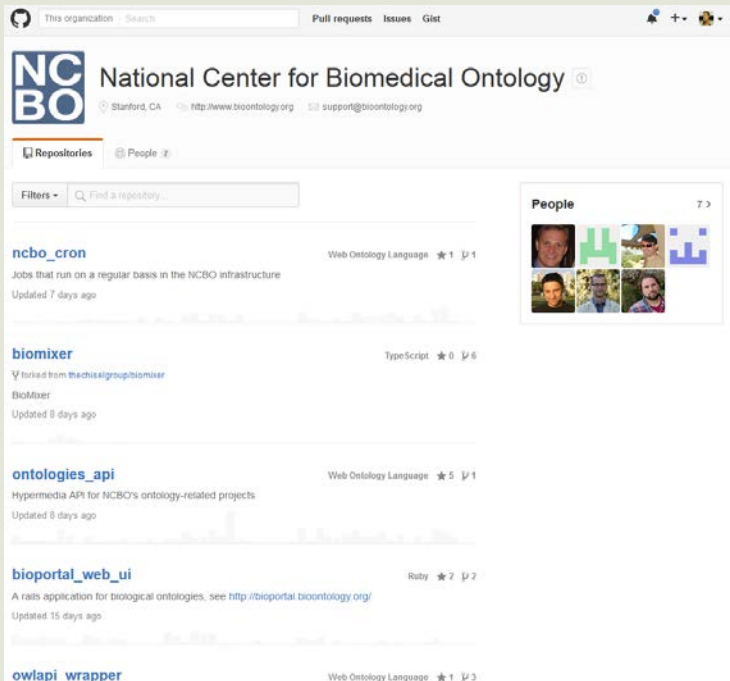
collaboration of

rs Bioversity
International

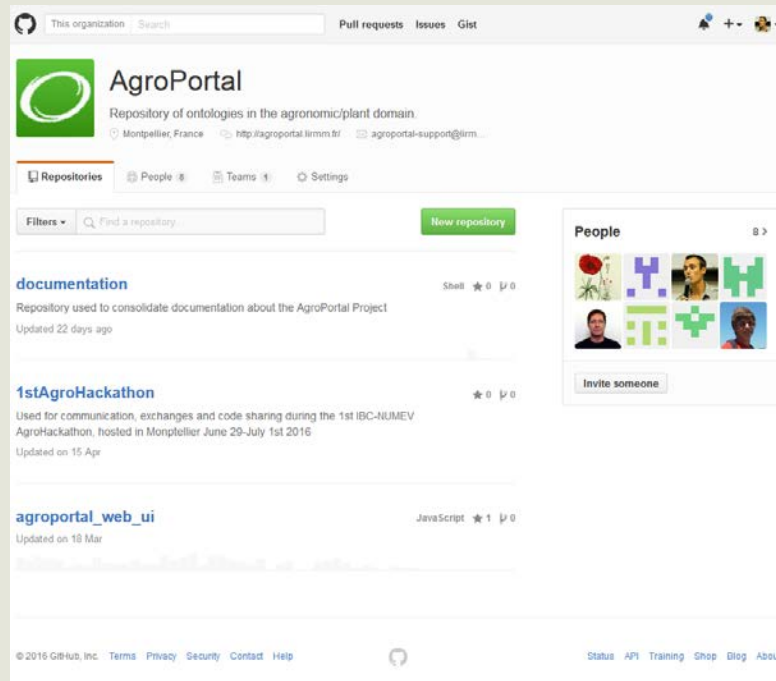
INRA IRD Institut de recherche
pour le développement

cirad

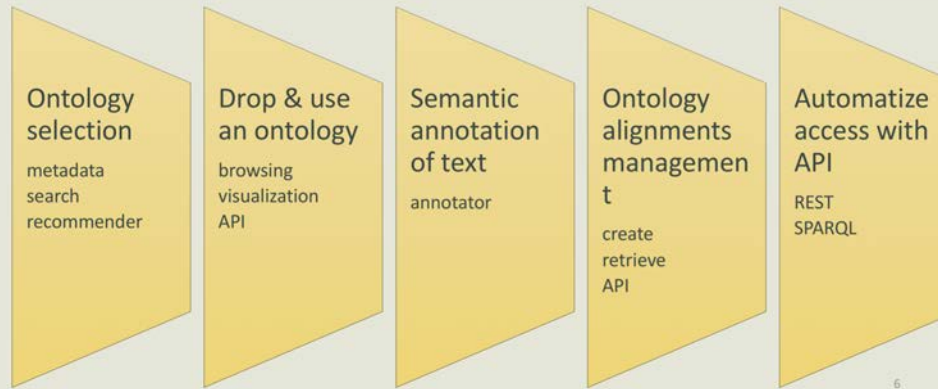
For those who would like to see the code a little closer



<https://github.com/ncbo>



<https://github.com/agroportal>



1. Ontology selection

- Use metadata
- Search within an ontology
- Use the Recommender
- Define metadata for your ontology

Why ontology selection and evaluation is hard?

- Large **number and variety** of ontologies (versions, platforms, formats, etc.), different **complexity level** (from terminology to ontologies)
- **Automation** of the selection process?
- Diversity of **user requirements** and expectations
 - Pick up an ontology for reuse in a knowledge based system
 - Ontology extension
 - Automatic substitution of an ontology by another one
- What's the **risk of a bad choice**?
 - Miss a relevant ontology
 - Miss connection/integration with other data that use the right ontologies
 - Miss possible reuse and start a new ontology

Browse

Access all ontologies that are available in IBC AgroPortal: You can filter this list by category to display ontologies relevant for a certain domain. You can also filter ontologies that belong to a certain group. [Subscribe to the IBC AgroPortal RSS feed](#) to receive alerts for submissions of new ontologies, new versions of ontologies, new notes, and new projects. You can subscribe to feeds for a specific ontology at the individual ontology page. Add a new ontology to IBC AgroPortal using the Submit New Ontology link (you need to [sign in](#) to see this link).

Search... Showing 37 of 37 Sort: Popular ▾

[Submit New Ontology](#)

- Entry Type**
- Ontology (37)
 - Ontology View (0)
 - CIMI Model (0)
 - NLM Value Set (0)

Uploaded in the Last

▾

- Category**
- 010-089 General Germplasm (1)
 - 100-299 Plant Anatomy and De...
 - 300-499 Phenotype and Trait (3)
 - 500-699 Structural and Functio...
 - 700-799 Location and Environ...
 - Crop Ontology (7)
 - Reference ontologies for plant...

- Group**
- CROP (4)
 - LOVINRA (2)
 - RICE (8)
 - WHEAT (22)

- Format**
- OBO (22)
 - OWL (13)
 - UMLS (2)

Biorefinery (BIOREFINERY) notes: 1 projects: 1 classes: 284

This vocabulary describes characteristics of biomass relevant for bio-refinery and unitary operations to transform a biomass in glucose.

Uploaded: 10/24/15

Plant Trait Ontology (PTO) projects: 1 classes: 1,337

A controlled vocabulary to describe phenotypic traits in plants

Uploaded: 6/23/15

IBP Rice Trait Ontology (CO_320) classes: 488

CGIAR rice trait ontology version 3

Uploaded: 6/26/15

Wheat Trait Ontology (WHEATPHENOTYPE) classes: 466

WheatPhenotype is an ontology of wheat traits and environmental factors that affect these traits

Uploaded: 7/1/15

Banana Anatomy (CO_125) notes: 2 classes: 150

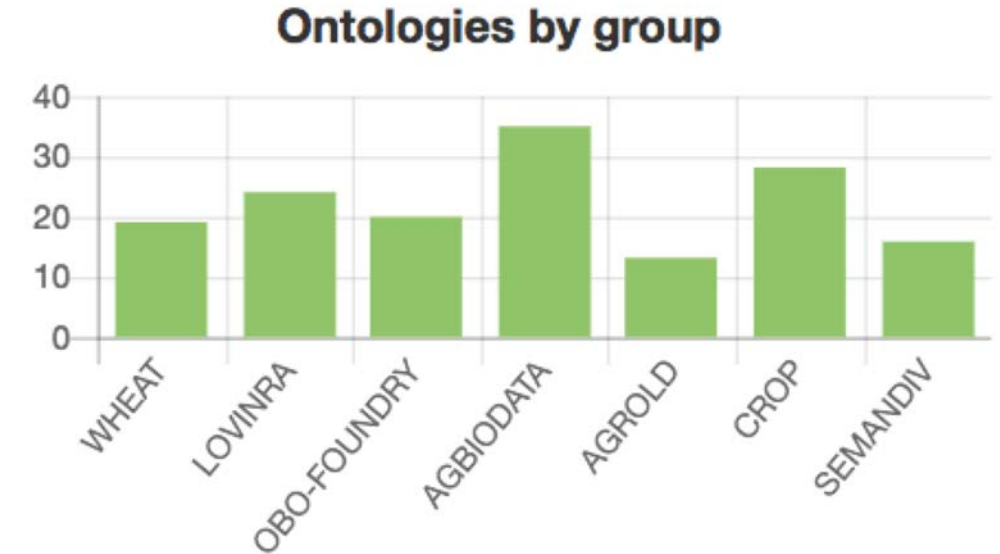
Ontology of the Banana Anatomy

Uploaded: 6/24/15



Ontology groups and categories

Category	Number
Plant Phenotypes and Traits	31
Plant Anatomy and Development	4
Natural Resources, Earth and Environment	12
Animal Science and Animal Products	6
Agricultural Research, Technology and Engineering	15
Breeding and Genetic Improvement	1
Plant Science and Plant Products	7
Plant Genetic Resources	2
Food and Human Nutrition	7
Food Security	2
Taxonomic Classifications of Organisms	6
Farms and Farming Systems	5
Fisheries and Aquaculture	2
Forest Science and Forest Products	2
Biodiversity and Ecology	14



Specific slices display to use only the ontologies of a group

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

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

Your turn!



Select an
ontology by
browsing or
searching

Details

ACRONYM	ONTOBIOTOPE
VISIBILITY	Public
DESCRIPTION	<p>OntoBiotope is an ontology of microorganism habitats. Its modeling principle and its lexicon reflect the biotope classification used by biologists to describe microorganism isolation sites (e.g. GenBank, GOLD, ATCC). OntoBiotope is developed and maintained by the Meta-omics of Microbial Ecosystems (MEM) network in which 30 microbiologists from INRA (French National Institute for Agricultural Research) from all fields of applied microbiology participate. The relevance of OntoBiotope terms is evaluated through the PubMedBiotope semantic search engine. It identifies and categorizes microbial biotopes in all PubMed abstracts by applying the ToMap method (Text to Ontology Mapping) to the OntoBiotope ontology. It also indexes 3,35 millions relations between taxa and their habitats.</p>
STATUS	Production
FORMAT	OBO
CONTACT	Claire Nédellec, claire.nedellec@inra.fr
HOME PAGE	http://lovinra.inra.fr/
PUBLICATIONS PAGE	https://doi.org/10.1186/1471-2105-16-S10-S1
DOCUMENTATION PAGE	http://lovinra.inra.fr/
CATEGORIES	Biodiversity and Ecology, Natural Resources, Earth and Environment
GROUPS	GDR SemanDiv, INRA Linked Open Vocabularies

Additional Metadata

URI	http://purl.obolibrary.org/obo/TEMP
NATURAL LANGUAGE	
VERSION	1.2
RELEASE DATE	2018-07-24T18:02:31+02:00

[Go to the REST API JSON entry](#)

Get my metadata back

[N-Triple](#)

[Json-LD](#)

[RDF/XML](#)

Metrics ?

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

Visits [Download as CSV](#)

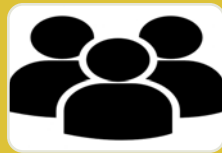


So much things to say about an ontology



Intrinsic

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



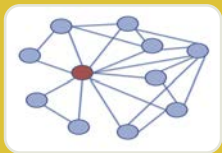
People

- 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

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

The screenshot displays the OntoBiotope web interface. The main content area is divided into several sections:

- Details:** A table with the following information:

ACRONYM	ONTOBIOTOPE
VISIBILITY	Public
DESCRIPTION	OntoBiotope is an ontology of microorganism habitats. Its modeling principle and its lexicon reflect the biotope classification used by biologists to describe microorganism isolation sites (e.g. GenBank, GOLD, ATCC). OntoBiotope is developed and maintained by the Meta-omics of Microbial Ecosystems (MEM) network in which 30 microbiologists from INRA (French National Institute for Agricultural Research) from all fields of applied microbiology participate. The relevance of OntoBiotope terms is evaluated through the PubMedBiotope semantic search engine. It identifies and categorizes microbial biotopes in all PubMed abstracts by applying the TolMap method (Text to Ontology Mapping) to the OntoBiotope ontology. It also indexes 3.35 millions relations between taxa and their habitats.
STATUS	Production
FORMAT	OBO
CONTACT	Claire Nédélec, claire.nedelec@jouy.inra.fr
HOME PAGE	http://ovl.inra.fr/
PUBLICATION PAGE	https://doi.org/10.1100/1471-2105-16-S10-S1
DOCUMENTATION PAGE	http://ovl.inra.fr/
CATEGORIES	Natural Resources, Earth and Environment
GROUPS	INRA Linked Open Vocabularies
- Additional Metadata:** A table with the following information:

NATURAL LANGUAGE	
VERSION	1.2
RELEASE DATE	2015-06-29T00:00:00+00:00
KEYWORDS	information extraction, corpus annotation, natural language processing, ontology building, biology, genetics
KNOWN USAGE	Used by the BioNLP Shared task (Bacteria Biotope task) in 2011, 2013 and 2016
NOTES	OntoBiotope is developed and maintained by the Meta-omics of Microbial Ecosystems (MEM) network in which 30 microbiologists from INRA (French National Institute for Agricultural Research) from all fields of applied microbiology participate.
CREATORS	Claire Nédélec
DESIGNED FOR ONTOLOGY TASK	http://omv.ontoware.org/2005/05/ontology#AnnotationTask
ENDORSED BY	INRA (http://www.inra.fr/)
FUNDED BY	INRA (http://www.inra.fr/)
HAS FORALLITY LEVEL	http://3d.org/inks/hk/ostype#ontology
HAS LICENSE	
ONTOLOGY SYNTAX	http://purl.obolibrary.org/obo/oboformat#iges.html
IS OF TYPE	http://omv.ontoware.org/2005/05/ontology#DomainOntology
PUBLISHER	INRA (http://www.inra.fr/)
IDENTIFIER	doi.org/10.15454/1.4382640528105164E12
COPYRIGHT HOLDER	INRA (http://www.inra.fr/)
- Metrics:** A table showing various statistics:

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:	240
CLASSES WITH MORE THAN 25 CHILDREN:	3
CLASSES WITH NO DEFINITION:	2320
- Visits:** A line graph showing the number of visits over time from February 2016 to May 2017. The y-axis represents the number of visits, ranging from 0 to 150. The x-axis shows monthly intervals. The graph shows a significant peak in visits around April 2017, reaching approximately 140 visits.
- Buttons:** A red box highlights a "Go to the REST API JSON entry" button and a "Get my metadata back" section containing "N-Triples", "JSON-LD", and "RDF/XML" buttons.
- Footer:** Includes an "included in DataCatalog" section with a button for <http://www.inra.fr/2015/07/30/ontobiotope/> and a "V.E.S.T. Registry" button, along with the INRA logo and "SCIENCE & IMPACT" text.

Browse and select ontologies

- Allows to search, order and select ontologies using a **faceted search** approach, based on the metadata
- 4 additional ways to filter ontologies in the list
- 2 new options to sort this list (name, released date).

The screenshot displays the AgroPortal ontology browser interface. The top navigation bar includes 'Browse', 'Search', 'Mappings', 'Recommender', 'Annotator', and 'Projects'. The main content area is titled 'Browse' and features a search bar and a 'Submit New Ontology' button. The left sidebar contains several filter sections: 'Entry Type' (Ontology, CIMI Model, NLM Value Set), 'Uploaded in the Last', 'Category' (Agricultural Research, Techn..., Animal Science and Animal P..., Breeding and Genetics, etc.), 'Group' (AGRODATA, AGROLD, CROP, LOVINRA, OBO-FOUNDRY, WHEAT), 'Format' (OBO, OWL, SKOS, UMLS), 'Ontology Content' (Notes, Reviews, Projects, Summary Only), 'Natural Language' (German, English, French, Italian, Portuguese, Spanish), 'Formality Levels' (Classification scheme, Dictionary, Gazetteer, Glossary, Lbl, Name authority list, Ontology, Semantic network, Subject heading scheme, Synonym ring, Taxonomy), and 'Is of Type' (Application Ontology, Core Ontology, Domain Ontology, Task Ontology, Upper Level Ontology, Vocabulary). The main list of ontologies includes AGROVOC (AGROVOC), National Agricultural Library Thesaurus (NALT), AnaEE Thesaurus (ANAETHES), IBP Wheat Trait Ontology (CO_321), Plant Ontology (PO), Wheat Trait Ontology (WHEATPHENOTYPE), IBP Crop Research Ontology (CO_715), OntoBiotope (ONTOBIOTOPE), Protein Ontology (PR), Plant Trait Ontology (TO), Experimental Factor Ontology (EFO), and Phenotypic Quality Ontology (PATO). Each ontology entry shows its name, description, upload date, and statistics for projects and classes. A red box highlights the 'Natural Language' filter section, and another red box highlights the 'Showing 64 of 66' and 'Sort: Popular' options.

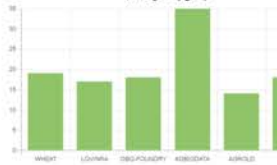
AgroPortal landscape page

AgroPortal Landscape

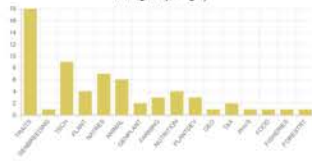
Visualize data retrieved from the ontologies stored in the portal.

Groups and categories

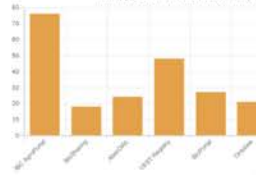
Ontologies by group



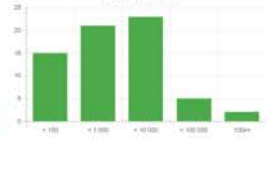
Ontologies by category



Ontologies count in each data catalog



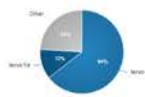
Ontologies by size



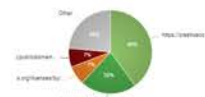
Properties use

The proportion of properties usage among stored ontologies

Ontologies natural languages



Licenses used by the ontologies

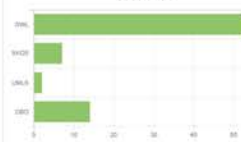


Most used tools to build ontologies

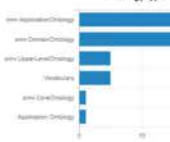


Ontologies types

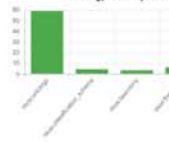
Format used



Ontology types



Ontology formality levels



Contributors to ontologies development

Most active people

Most mentioned people as contact, creator, contributor, curator



Most active organizations

Organizations that fund and endorse the greatest number of ontologies



► Display “per property”

- Explore the agronomical ontology landscape by automatically aggregating the metadata fields of each ontologies in explicit visualizations

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

Name Space	Name
rdfs	RDF Schema
omv	Ontology Metadata Vocabulary
owl	OWL 2 Web Ontology Language
dc	Dublin Core Metadata Element Set
dct	DC qualified
foaf	Friend of a Friend Vocabulary
void	Vocabulary of Interlinked Datasets
door	Descriptive Ontology of Ontology Relations
vann	Vocabulary for annotating vocabulary descriptions
adms	Asset Description Metadata Schema
voaf	Vocabulary of a Friend
dcat	Data Catalog Vocabulary
prov	Provenance Ontology
cc	Creative Commons Rights Expression Language
schema	Schema.org
skos	Simple Knowledge Organization System

- <https://github.com/agroportal/documentation/tree/master/metadata>

One example: 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:preferredNamespacePrefix>
  <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.org email:
  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/].</dct:rights>
  <protege:defaultLanguage> en</protege:defaultLanguage>
  <dct:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://orcid.org/0000-0003-4727-9435</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>
```

Your turn!



Take your ontology and add 3 metadata fields



Tell us what you want to say about your ontology we'll tell you which property to use



Check out Dublin Core, DCAT, Schema.org ...

A scoring algorithm for recommending ontologies

- (1) *coverage*, or the extent to which the ontology covers the input data;
- (2) the *acceptance* of the ontology in the community;
- (3) the level of *detail* of the ontology classes that cover the input data;
- (4) the *specialization* of the ontology to the domain of the input data.

$$\begin{aligned} \text{score}(o, t) = & w_c * \text{coverage}(o, t) + w_a * \text{acceptance}(o) \\ & + w_d * \text{detail}(o, t) + w_s * \text{specialization}(o, t) \end{aligned}$$

Ontology Recommender

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

Input **Output**

Text Keywords (separated by commas) Ontologies Ontology sets

insert sample input

Trait description. **Increased** plant **size**. **Normal** to **stout** stems, normally or semi-openly **distributed** tillers, **wide** and **long** leaves, from **yellow green** to **dark green color** or **normal** to **light green** **erect** leaves due to **late** flowering state, **big** **long** spikelets, **long** and/or **wide** panicle, with or without panicles incompletely **exserted** (temporarily). **Decreased** plant **size** with or without **dark green**, rolled to semi-rolled leaves, **normal** to **twisted** leaves, **normal** to **narrow** and **small** leaves (shorter leaves than **average size** leaves), **normal** to **erect** leaves, **low** tillering **late** flowering, **normal** to **small** spikelets, **normal** to panicles incompletely **exserted** (temporarily), with or without sterility (empty seed). **Decreased number of** tillers, **normal** to **stout** stems or **increased width** in culm **increased number of** tillers Upper leaf base rolled, the first leaf **long** and **weak** Upper leaf emerging by sheath site of lower leaf **Size** of leaves varied. **Short** and/or **long** and/or **wide** and/or **narrow** and/or **small** and/or **big** flag leaf Plants show lodging **Brittle** culm, plant shatter after moderate winds **Twisted** stem. Many tillers with fine culms.

advanced options

Edit Input

Recommended ontologies

POS.	ONTOLOGY	FINAL SCORE	COVERAGE SCORE	ACCEPTANCE SCORE	DETAIL SCORE	SPECIALIZATION SCORE	ANNOTATIONS	HIGHLIGHT ANNOTATIONS
1	PATO	61.0	66.0	0.0	64.6	100.0	55	<input checked="" type="checkbox"/>
2	PO	24.6	15.8	0.0	87.5	18.6	11	<input type="checkbox"/>
3	EFO	23.4	26.2	0.0	39.0	20.9	20	<input type="checkbox"/>
4	SIO	20.3	26.0	0.0	12.0	28.1	22	<input type="checkbox"/>
5	CO_125	12.2	7.1	0.0	47.1	7.9	6	<input type="checkbox"/>
6	ENVO	12.2	0.6	0.0	77.8	1.0	1	<input type="checkbox"/>
7	PTO	12.1	7.6	0.0	47.1	5.8	2	<input type="checkbox"/>
8	VARIO	11.3	5.9	0.0	47.1	6.7	5	<input type="checkbox"/>
9	GO	10.7	1.2	0.0	66.0	1.2	2	<input type="checkbox"/>
10	CL	10.5	4.7	0.0	49.0	3.8	4	<input type="checkbox"/>
11	CO_321	7.3	2.4	0.0	37.9	1.8	2	<input type="checkbox"/>
12	EDAM	7.2	2.4	0.0	37.3	2.0	2	<input type="checkbox"/>
13	PCO	6.0	2.4	0.0	34.3	2.4	2	<input type="checkbox"/>

Recommender



M. Martinez-Romero, C. Jonquet, M. J. O'Connor, J. Graybeal, A. Pazos & M. A. Musen. **NCBO Ontology Recommender 2.0: An Enhanced Approach for Biomedical Ontology Recommendation**, *Biomedical Semantics*. June 2017. Vol. 8 (21).

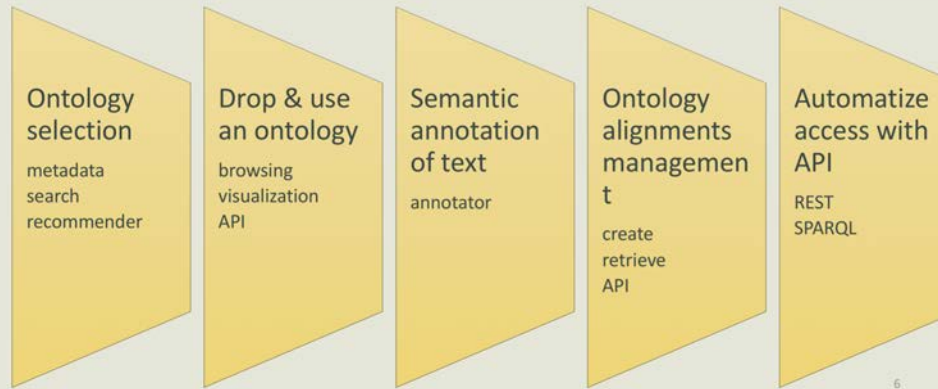
Your turn!



Take the summary of your last article and get a recommendation for that content



Enter a list of terms that you would like to find in an ontology to identify the one that offers the best coverage



Drop and use an ontology

- Submit an ontology in the repository
- Browse and visualize an ontology
- Access the API for an ontology

Upload an ontology in AgroPortal (1/2)

- 1. Creation of the skeleton

The screenshot shows the 'Submit New Ontology' form in the AgroPortal interface. The browser address bar shows 'agroportal.lirmm.fr/ontologies/new'. The page has a green header with the AgroPortal logo and navigation links: Browse, Search, Mappings, Recommender, Annotator, Projects, and Admin. The form title is 'Submit New Ontology' with a red asterisk indicating that some fields are required. The form fields are:

- NAME:** * (text input)
- ACRONYM:** * (text input)
- ADMINISTRATORS:** * (text input with placeholder 'Select administrators')
- VIEWING RESTRICTIONS:** (dropdown menu with 'Public' selected)
- CATEGORIES:** (text input with placeholder 'Select category (domain)')
- VIEW:** (checkbox 'This ontology is a view of:' followed by a dropdown menu 'Select an ontology to create a view on')

At the bottom of the form, there is a checkbox for 'Subscribe to email notifications for new notes' and two buttons: 'Cancel' and 'Create ontology'. The footer of the page includes 'Powered by NCBO BioPortal Release Notes' and 'NCBO Appliance 2.4'.

Upload an ontology in AgroPortal (2/2)

- 2. Submission description

The screenshot shows the 'Add New Submission' form for the OWL format. The form includes fields for Description, Format (set to OWL), Version, Status (set to alpha), Release Date, Location (with options for Metadata Only, Load from URL, and Upload Local File), Contact (Name and Email), Home Page, Documentation Page, and Publications Page. A red asterisk indicates that certain fields are required. The footer of the page reads 'Powered by NCBO BioPortal Release Notes' and 'NCBO Appliance 2.4'.

Format OWL

The screenshot shows the 'Add New Submission' form for the SKOS format. The form includes fields for Description, Format (set to SKOS), Version, Status (set to alpha), Release Date, Location (with options for Metadata Only, Load from URL, and Upload Local File), Contact (Name and Email), Home Page, Documentation Page, and Publications Page. A red asterisk indicates that certain fields are required. The footer of the page reads 'Powered by NCBO BioPortal Release Notes' and 'NCBO Appliance 2.4'.

Format SKOS

Biorefinery

Summary Classes Properties Notes Mappings Widgets

Jump To:

- Concept
- Conversion
- Dimension
- Measure
- Prefix
- Quantity
 - + Activité enzymatique
 - Arabinose rate
 - Biomass quantity**
 - Buffer concentration
 - Cellulose rate
 - Default quantity result
 - Energie totale du pré-traitement
 - Experience number
 - Glucose rate
 - Humidity Rate
 - Lignin rate
 - + Liquid constituent quantity
 - + Measured characteristic
 - Numéro d'étape dans le procédé
 - Numéro du cocktail enzymatique
 - + Output solid constituent quantity
 - + Paramètre de contrôle du procédé
 - Porosité d'une biomasse
 - Quantité de constituant gazeux
 - Quantité de liquide tampon
 - Specific surface
 - Taux d'hémicellulose
 - Taux de Xylose
- + Relation
- Scale
- Singular_Unit
- + Symbolic_Concept
- Unit_Division_Or_Multiplication
- Unit_Exponentiation
- Unit_Multiple_Or_Submultiple

Details Visualization Notes (0) Class Mappings (0)

Preferred Name	Biomass quantity
ID	http://opendata.inra.fr/resources/BIORAF#biomass_quantity
prefixIRI	onto:biomass_quantity
prefLabel	Quantité de biomasse Biomass quantity
subClassOf	Quantity

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?

agroportal.lirmm.fr/projects

AgroPortal LIRMM

Browse Search Mappings Recommender Annotator **Projects** Recently Viewed test Help Feedback

Projects

Browse the ontology-based projects in the community: Each project description is linked to IBC AgroPortal ontologies that the project uses. Use the 'Add Project' link to add your ontology-based project to this list and to link it to IBC AgroPortal ontologies. Your project will then appear on the pages that list the details for the ontologies that you selected. We also invite you to review ontologies that you used in your project.

Create New Project

PROJECT	DESCRIPTION	CONTACTS	INSTITUTIONS	ONTOLOGIES
Computational Biology Institute Home Page	Modeling, processing and analysis of large scale data in biology, health, agronomy and environment.	Pierre Larmande	University of Montpellier, CNRS, CIRAD, INRIA, IRD, INRA, SupAgro, INSERM	0
Labex Numev Home Page	The Numev Labex was created within the greater construct of rallying the MIPS community (Mathematics, Computer Science, Physics, Systems) around the objective of tackling organic life, health and environmental issues.	Clément Jonquet	University of Montpellier, CNRS, INRIA, INRA, SupAgro	0
Semantic Indexing of French Biomedical Data Resources Home Page	The SIFR project proposes to investigate the scientific and technical challenges in building ontology-based services to leverage biomedical ontologies and terminologies in indexing, mining and retrieval of French biomedical data.	Clément Jonquet	LIRMM (University of Montpellier & CNRS)	0

Powered by NCBO BioPortal [Release Notes](#)



Use an ontology via the API

- Ontology metadata
 - http://data.agroportal.lirmm.fr/ontologies/ONTO/?apikey=**
- Ontology classes
 - http://data.agroportal.lirmm.fr/ontologies/ONTO/classes/?apikey=**

```
..  
  acronym: "FORM",  
  name: "Formation",  
  summaryOnly: null,  
  ontologyType: http://data.agroportal.lirmm.fr/ontology\_types/ONTOLOGY,  
  @id: http://data.agroportal.lirmm.fr/ontologies/FORM,  
  @type: http://data.bioontology.org/metadata/Ontology,  
  - links: {  
    submissions: http://data.agroportal.lirmm.fr/ontologies/FORM/submissions,  
    properties: http://data.agroportal.lirmm.fr/ontologies/FORM/properties,  
    classes: http://data.agroportal.lirmm.fr/ontologies/FORM/classes,  
    single_class: http://data.agroportal.lirmm.fr/ontologies/FORM/classes/{class\_id},  
    roots: http://data.agroportal.lirmm.fr/ontologies/FORM/classes/roots,  
    instances: http://data.agroportal.lirmm.fr/ontologies/FORM/instances,
```

- More calls: <http://data.agroportal.lirmm.fr/documentation>

Your turn!



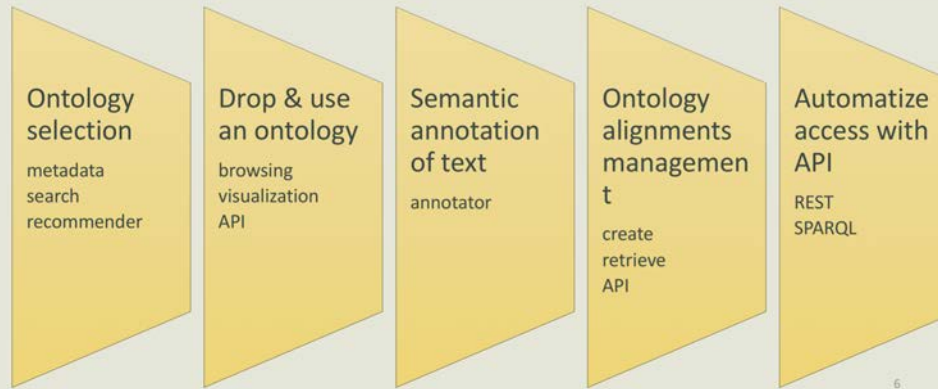
Eventually submit an ontology (if it is not already done) but it is not mandatory



For the ontology of your choice, navigate, visualize, leave some comments



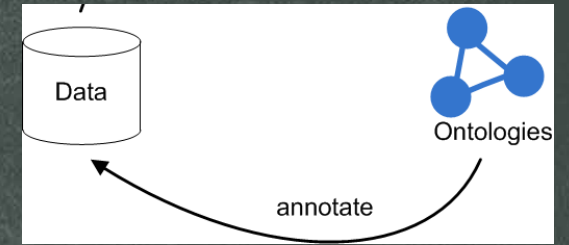
Enter a project that uses one or more ontology (s)



Semantic annotation of text

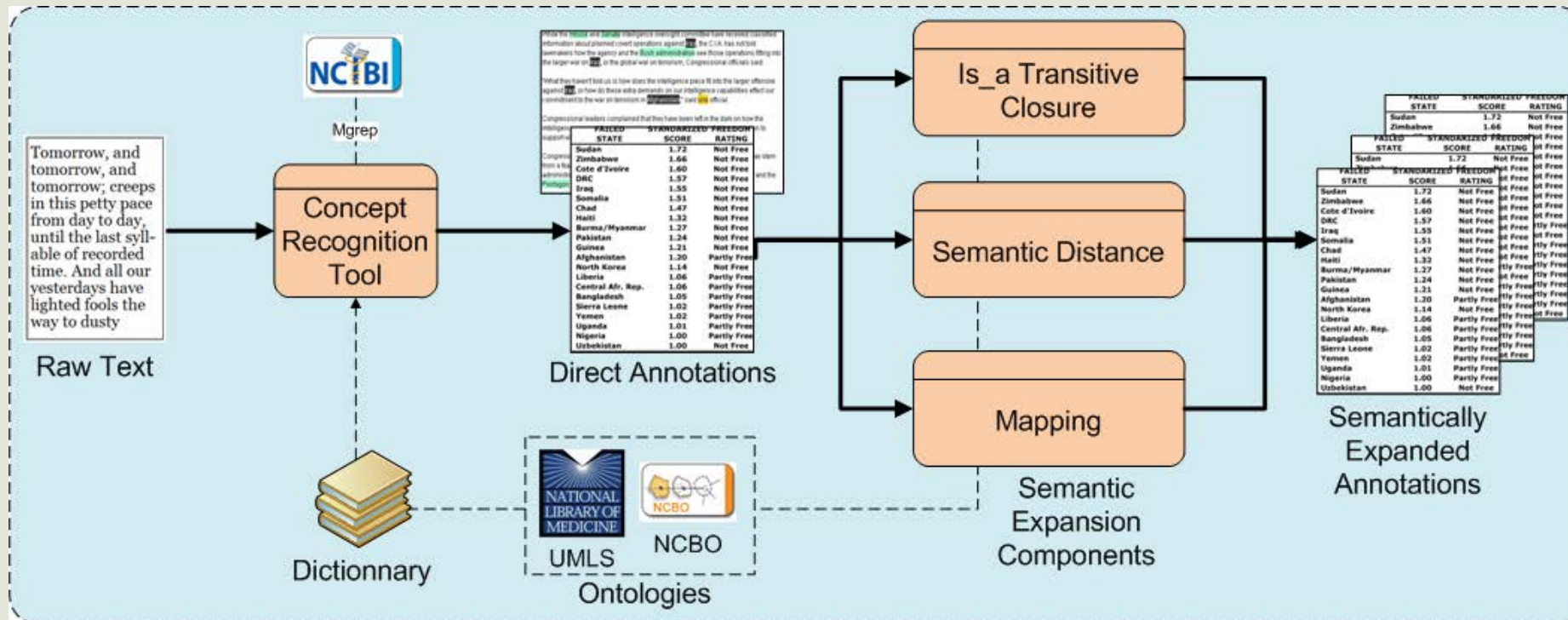
- Identify ontology concepts in text

Why semantic annotation is hard?



- Annotation is not an easy task
 - **Lack of annotation tools** (convenient, simple to use and easily integrated into automatic processes)
 - Boring additional task without immediate reward for the user
- Automatically process a piece of raw text to annotate it with relevant ontologies
 - **Large scale** – to scale up for many resources and ontologies
 - **Automatic** – to offer good precision and recall
 - **Easy to use and to access** – to enlarge the possible use cases
 - **Customizable** – to fit very specific needs
 - **Smart** – to leverage the knowledge contained in ontologies
 - **Evolutive** – both ontologies and data change everyday

Ontology-based annotation workflow



- First, direct annotations are created by recognizing concepts in raw text,
- Second, annotations are semantically expanded using knowledge of the ontologies,
- Third, all annotations are scored according to the context in which they have been created.

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
 Fresh root yield
 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



AgroPortal LIRMM

Browse Search Mappings

Annotator

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

Subscribe to the [NCBO Annotator Users Google group](#) to learn more.

- 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

agroportal.lirmm.fr/annotator

AgroPortal LIRMM

Browse Search Mappings Recommender **Annotator** Projects

Recently Viewed Sign In Help Feedback

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

insert sample text

BACKGROUND: Plant phenotype datasets include many different types of data, formats, and terms from specialized vocabularies. Because these datasets were designed for different audiences, they frequently contain language and details tailored to investigators with different research objectives and backgrounds. Although phenotype comparisons across datasets have long been possible on a small scale, comprehensive queries and analyses that span a broad set of reference species, research disciplines, and knowledge domains continue to be severely limited by the absence of a common semantic framework.

Select Ontologies

Type here to select ontologies or leave blank to use all

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

Select UMLS Semantic Types

Type here to select UMLS semantic types

Match Longest Only Include Mappings

Exclude Numbers Match Partial Words

Exclude Synonyms

Include Ancestors Up To Level: None

Include Score: cvalue

[Get Annotations](#)

Annotator

Annotations total results 14 (direct 14 / ancestor 0 / mapping 0)

CLASS filter	ONTOLOGY filter	TYPE filter	CONTEXT	MATCHED CLASS filter	MATCHED ONTOLOGY filter	SCORE
phenotype	Semanticscience Integrated Ontology	direct	BACKGROUND: Plant phenotype datasets include many ...	phenotype	Semanticscience Integrated Ontology	4.322
phenotype	Semanticscience Integrated Ontology	direct	... backgrounds. Although phenotype comparisons across datasets ...	phenotype	Semanticscience Integrated Ontology	4.322
phenotype	Experimental Factor Ontology	direct	BACKGROUND: Plant phenotype datasets include many ...	phenotype	Experimental Factor Ontology	4.322
phenotype	Experimental Factor Ontology	direct	... backgrounds. Although phenotype comparisons across datasets ...	phenotype	Experimental Factor Ontology	4.322
Plant	National Center for Biotechnology Information (NCBI) Organismal Classification	direct	BACKGROUND: Plant phenotype datasets include ...	Plant	National Center for Biotechnology Information (NCBI) Organismal Classification	3.322
Data	National Center for Biotechnology Information (NCBI) Organismal Classification	direct	... types of data , formats, and terms ...	Data	National Center for Biotechnology Information (NCBI) Organismal Classification	3.322
Language	National Center for Biotechnology Information (NCBI) Organismal Classification	direct	... frequently contain language and details tailored ...	Language	National Center for Biotechnology Information (NCBI) Organismal Classification	3.322
language	Semanticscience Integrated Ontology	direct	... frequently contain language and details tailored ...	language	Semanticscience Integrated Ontology	3.322
Scale	Biorefinery	direct	... a small scale , comprehensive queries and ...	Scale	Biorefinery	3.322
scale	Experimental Factor Ontology	direct	... a small scale , comprehensive queries and ...	scale	Experimental Factor Ontology	3.322
set	Semanticscience Integrated Ontology	direct	... a broad set of reference species, ...	set	Semanticscience Integrated Ontology	3.322
reference	Semanticscience Integrated Ontology	direct	... set of reference species, research disciplines, ...	reference	Semanticscience Integrated Ontology	3.322
bract	Plant Ontology	direct	... a small scale , comprehensive queries and ...	bract	Plant Ontology	3.000
trichome	Plant Ontology	direct	... a small scale , comprehensive queries and ...	trichome	Plant Ontology	3.000

Format Results As: [JSON](#)



Retrieve the annotations

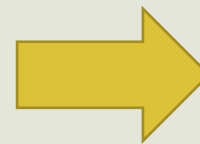
			these ...
population	Agriculture and Forestry Ontology	direct	... rapidly growing human population , there is a ...
population	Agriculture and Forestry Ontology	direct	... growing human population , there is a ...

Format Results As:

To reproduce these results:

[Corresponding REST web service call](#)

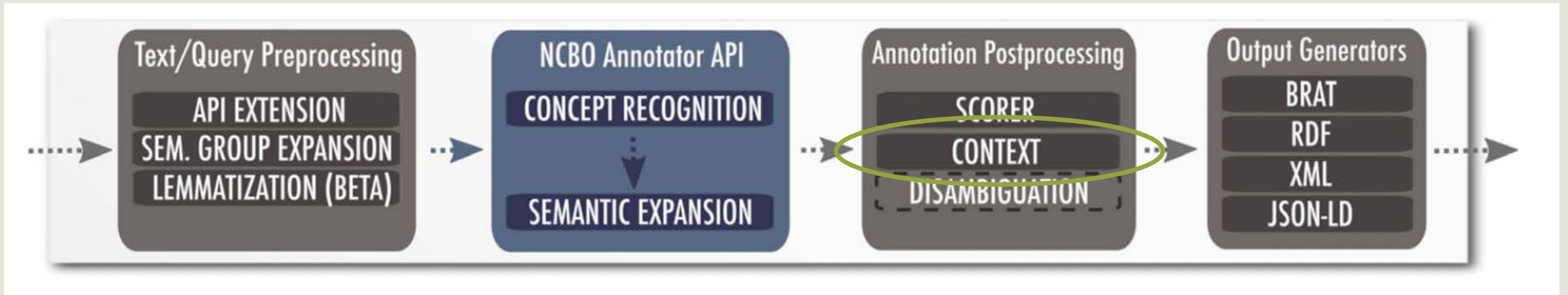
Additional parameters are documented at [Annotator Web Service](#)



```
- {
  - annotatedClass: {
    @id: "http://www.yso.fi/onto/yso/p6881",
    @type: "http://www.w3.org/2002/07/owl#Class"
  },
  hierarchy: [ ],
  - annotations: [
    - {
      from: 11,
      to: 18,
      matchType: "SYN",
      text: "INCREASE",
      negationContext: "AFFIRMED"
    }
  ],
  mappings: [ ],
  score: 3
},
- {
  - annotatedClass: {
    @id: "http://lod.nal.usda.gov/nalt/45764",
    @type: "http://www.w3.org/2002/07/owl#Class"
  },
  hierarchy: [ ],
  - annotations: [
    - {
      from: 122,
      to: 126,
      matchType: "SYN",
      text: "HUMAN",
      negationContext: "AFFIRMED"
    }
  ],
  mappings: [ ],
  score: 3
},
- {
  - annotatedClass: {
    @id: "http://purl.obolibrary.org/obo/NCBITaxon_9606",
    @type: "http://www.w3.org/2002/07/owl#Class"
  },
  hierarchy: [ ],
  - annotations: [
    - {
      from: 122,
      to: 126,
      matchType: "SYN",
      text: "HUMAN",
      negationContext: "AFFIRMED"
    }
  ]
}
```



But we did not just “translate” the Annotator



- Most of our new features are developed within a proxy
 - E.g., we can call either the AgroPortal, SIFR BioPortal or even the NCBO BioPortal Annotator and use the same code to score annotations

Improve the workflow to handle clinical text narrative

- Project SIFR & PractiKPharma
- Detecting Negation, Temporality and Experiencer
- Implementation using NegEx/ConText
 - Inclusion in the French/SIFR Annotator
 - Proxy architecture to plug this the NCBO Annotator
- Very good performance results
 - e.g., negation F1 between 0.8 and 0.9

**PractiK
Pharma**

AGENCE NATIONALE DE LA RECHERCHE
ANR



A. Abdaoui, A. Tchechmedjiev, W. Digan, S. Bringay, C. Jonquet., French **ConText: a Publicly Accessible System for Detecting Negation, Temporality and Experiencer in French Clinical Notes** *Biomedical Informatics*. Under review – 3rd round.

Annotating and contextualizing clinical text

Le patient ne montre aucun signe de fièvre. Son père a déjà eu de l'arthrose. Il a des antécédents de dépression.

Select Ontologies

MSHFRE x

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

Select UMLS Semantic Groups ?

Maladies (DISO) x

Detect negation ?

Detect experiencer ?

Detect temporality ?

CLASS <small>filter</small>	ONTOLOGY <small>filter</small>	TYPE <small>filter</small>	UMLS SEM TYPE	CONTEXT	MATCHED CLASS <small>filter</small>	MATCHED ONTOLOGY <small>filter</small>	NEGATION	EXPERIENCER	TEMPORALITY
Fièvre	Medical Subject Headings, version française	direct		... signe de fièvre . Son père a ...	Fièvre	Medical Subject Headings, version française	NEGATED	PATIENT	RECENT
Arthrose	Medical Subject Headings, version française	direct		... eu de l' arthrose . Il a des ...	Arthrose	Medical Subject Headings, version française	AFFIRMED	OTHER	RECENT
Dépression	Medical Subject Headings, version française	direct		... antécédents de dépression .	Dépression	Medical Subject Headings, version française	AFFIRMED	PATIENT	HISTORICAL

Your turn!



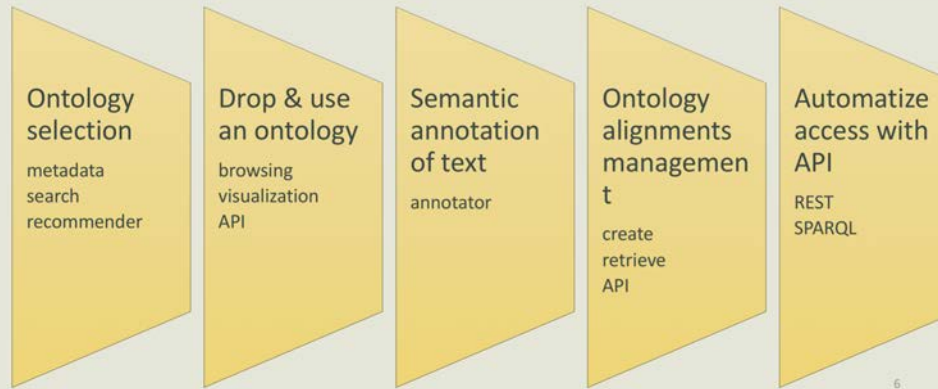
Take a summary of your last article and get annotations



Test the score and other advance parameters



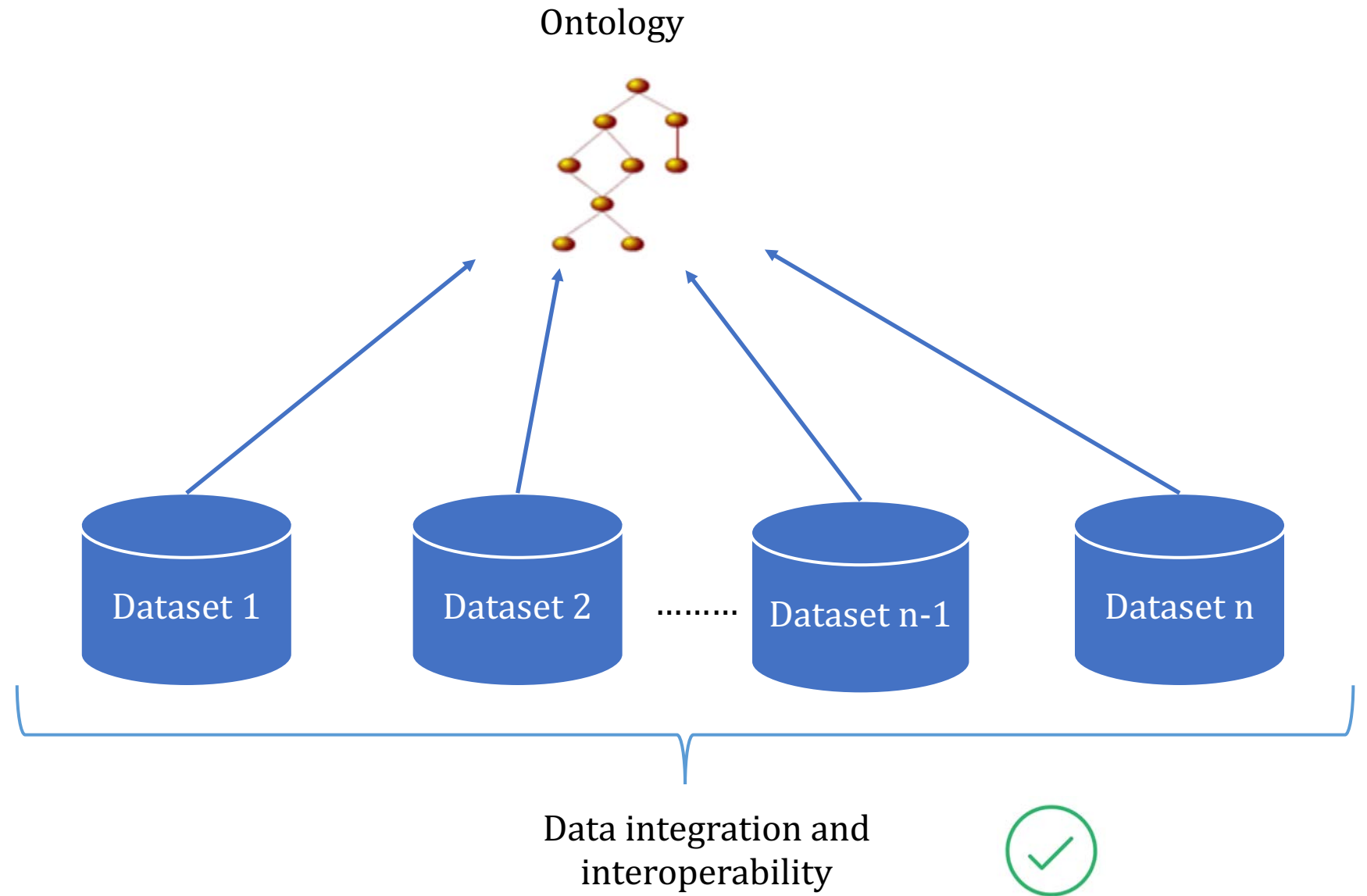
Get same results with the API



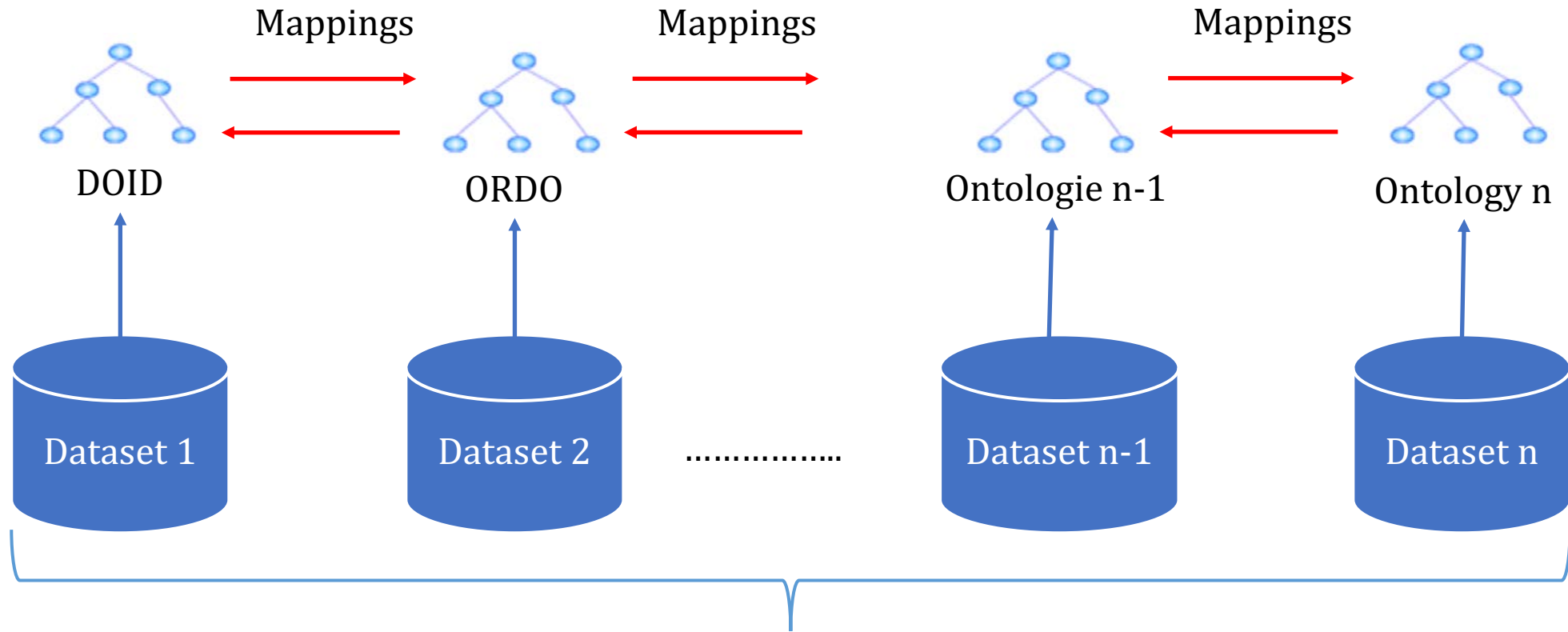
Ontology alignments management

- Retrieve or enter alignments
- Format of alignments
- Import alignments generated with external tools

Differences
between
theory...



... and reality.



Data integration and interoperability



Ontology alignment

- Ontologies, vocabularies, and terminologies inevitably **overlap** in coverage
- Mappings do not always belong to an ontology
 - The community needs a place to **store** and **retrieve** them
 - That's the role of the ontology repository
- Dealing with mappings is a technical, data and scientific challenge
 - Capture the **whole mapping lifecycle**
 - Semantically described with plenty of **provenance information**



All aspects of ontology alignments

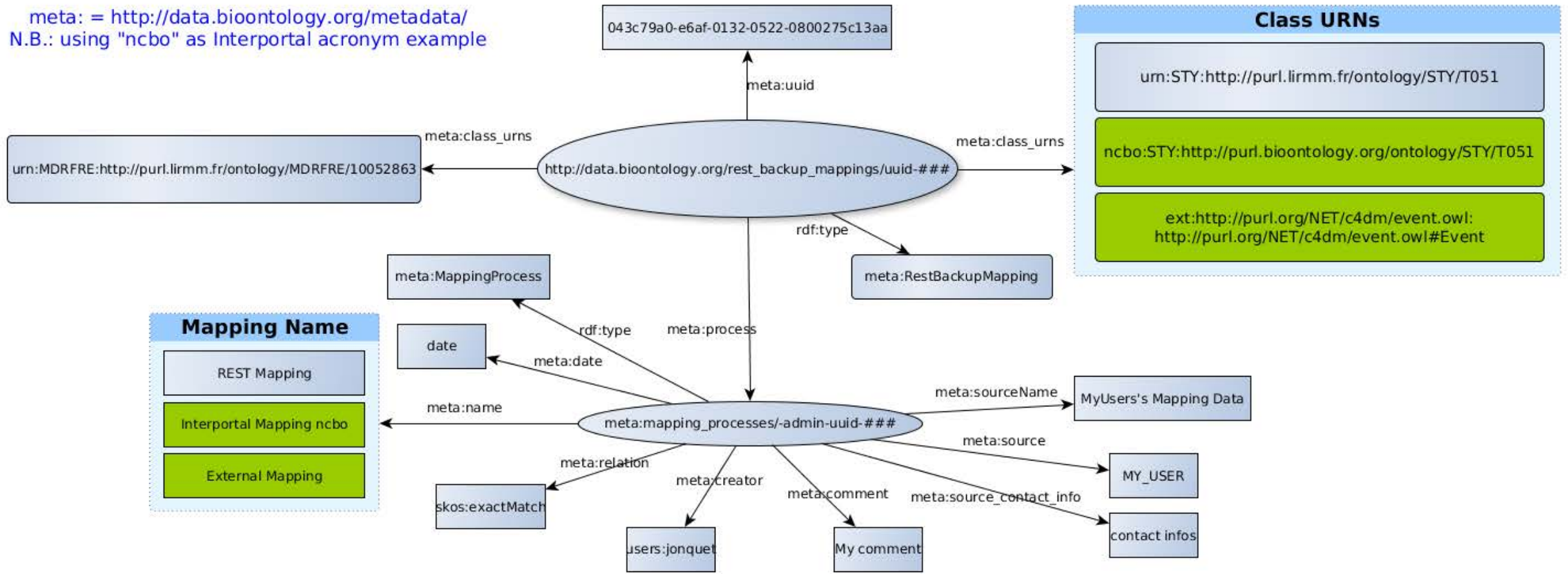


Different types of mappings

- Mappings uploaded (and stored within the portal)
 - *RestBackupMapping* - A mapping added by a user using the REST API (or the UI).
 - Materialized into the triple-store.
- Mappings created (automatically by the portal)
 - *SameURI* - Created between 2 concepts with the same URI.
 - *LOOM* - Lexical mappings created between 2 concepts with equivalent labels (preferred name): removing accents, spaces and special characters.
 - *CUI* - Created between 2 concepts that have the same CUI (Concept Unique Identifiers). The CUI is an unique identifier used by UMLS.
 - Not materialized in the triple-store, generated on-the-fly.

Representation of mappings inside AgroPortal

meta: = <http://data.bioontology.org/metadata/>
 N.B.: using "ncbo" as Interportal acronym example



Example with translation mappings

- Mappings between 2 ontologies hosted in different « bioportal » instances
- Tagged with different mapping properties

```
{ "creator": "http://data.stageportal.lirmm.fr/users/AAmina" ,  
  "source_contact_info": "a_annane@esi.dz",  
  "relation" : [ "http://www.w3.org/2004/02/skos/core#exactMatch" ,  
                "http://purl.org/linguistics/gold/freeTranslation" ],  
  "source": "REST",  
  "source_name": "Reconciliation of multilingual mapping",  
  "comment" : "Multilingual mapping",  
  "classes" : { "http://chu-rouen.fr/cismef/SNOMED_int.#A-01020" : "SNMIFRE",  
                "http://purl.bioontology.org/ontology/SNMI/A-01020" : "ncbo:SNMI" } }
```

agroportal.lirmm.fr/mappings

AgroPortal LIRMM Browse Search **Mappings** Recommender Annotator Projects

Mappings

Use this page to explore mappings between ontologies that you are interested in. You will also see the mappings when you browse individual ontologies.

AnaEE France Thesaurus - ANAEEF (55)

Table Visualization

ONTOLOGY	MAPPINGS
Biorefinery	6
BioTop Ontology	1
EDAM bioinformatics operations, data types, formats, identifiers and topics	3
Environment Ontology	3
Experimental Factor Ontology	9
Genomic Feature and Variation Ontology	1
National Center for Biotechnology Information (NCBI) Organismal Classification	3
Phenotypic Quality Ontology	7
Plant Trait Ontology	1
Semantic Types Ontology	1
Semanticscience Integrated Ontology	3
Sequence Types and Features Ontology	1
Single-Nucleotide Polymorphism (SNP) Ontology	1
XEML Environment Ontology	10

Powered by NCBO BioPortal | [Release Notes](#)

- When browsing an ontology, one can retrieve mappings for the whole ontology hosted in the repository
- When browsing a concept, one can retrieve mappings for this specific concept



Alignments in AgroPortal

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:

- 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
 - silicon forms

concept by concept

Details Visualization Notes (0) **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.			

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

Enable to store external mappings

i.e., mappings with only one concept in AgroPortal

Banana Anatomy

Summary Classes Properties Notes

Jump To:

- CGIAR_Musa_anatomy
 - plant part
 - corm
 - inflorescence**
 - leaf
 - pseudostem
 - root
 - sucker
- CGIAR_Musa_development

Details Visualization Notes (2) **Class Mappings (4)**

Create New Mapping

Create New External Mapping

Internal mappings

MAPPING TO	ONTOLOGY	SOURCE	RELATIONS
inflorescence	Experimental Factor Ontology	LOOM	
inflorescence	Plant Ontology	LOOM	
inflorescence	Plant Trait Ontology	LOOM	

Interportal mappings

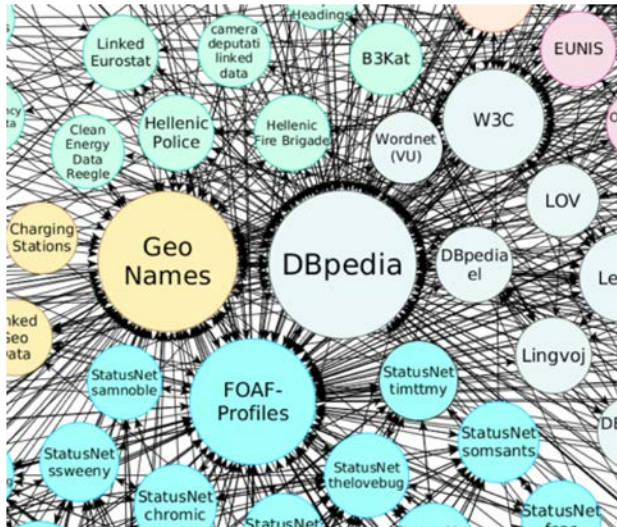
MAPPING TO	ONTOLOGY	SOURCE	RELATIONS
There are currently no interportal mappings for this class.			

External mappings

MAPPING TO	ONTOLOGY	SOURCE	RELATIONS
Spadice	http://dbpedia.org/ontology/	REST	skos:broadmatch

Mappings to external resources were also extracted

- e.g.,



What to do now: analysis and feedback to community to improve the dataset

AGROVOC - AGROVOC (84,030)

Table Visualization

ONTOLOGY	MAPPINGS
Agri-Food Experiment Ontology	1
Agricultural and Nutrition Technology Ontology	2
Agriculture and Forestry Ontology	22
AGRORDF	2
AnaEE Thesaurus	333
Animal Disease Ontology	17
Animal Trait Ontology for Livestock	3
Biodiversity Thesaurus	255
Biological Collections Ontology	1
Biorefinery	2
Brachiaria Ontology	1
Brassica Ontology	2
Cassava Trait Ontology	1
Castor Bean Ontology	1
Cell Ontology	19
Chickpea Ontology	2
Common bean Ontology	1
Cowpea Trait Ontology	1
Darwin-SW	1
EDAM bioinformatics operations, data types, formats, identifiers and topics	6
Environment Ontology	29
Experimental Factor Ontology	85
External Mappings	47,809
Flora Phenotype Ontology	5
FoodOn	192

Mappings entre ontologies: a few exemples

- <http://agroportal.lirmm.fr/ontologies/STY?p=classes&conceptid=http%3A%2F%2Fpurl.bioontology.org%2Fontology%2FSTY%2FT002#mappings>
- <http://bioportal.lirmm.fr/ontologies/MSHFRE/?p=classes&conceptid=http%3A%2F%2Fpurl.lirmm.fr%2Fontology%2FMSHFRE%2FD012959>



Your turn!



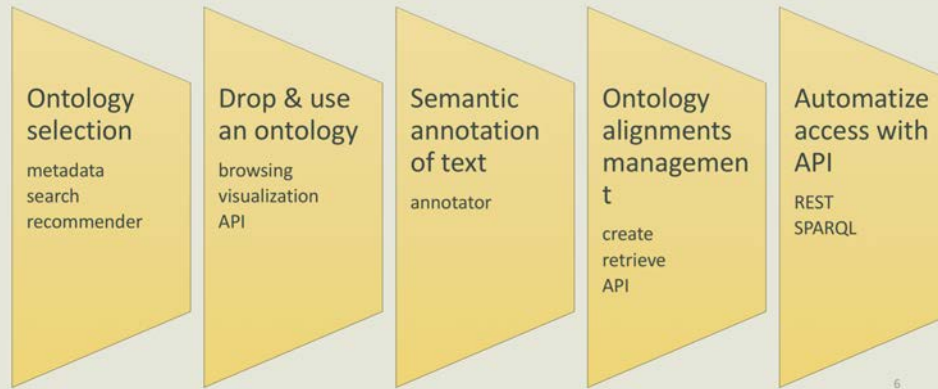
Retrieve all the alignments generated by the portal for your favorite ontology



Enter (relevant) alignments between classes of different ontologies



Enter alignments to classes that are not in portal e.g., DBPedia (AgroPortal only)

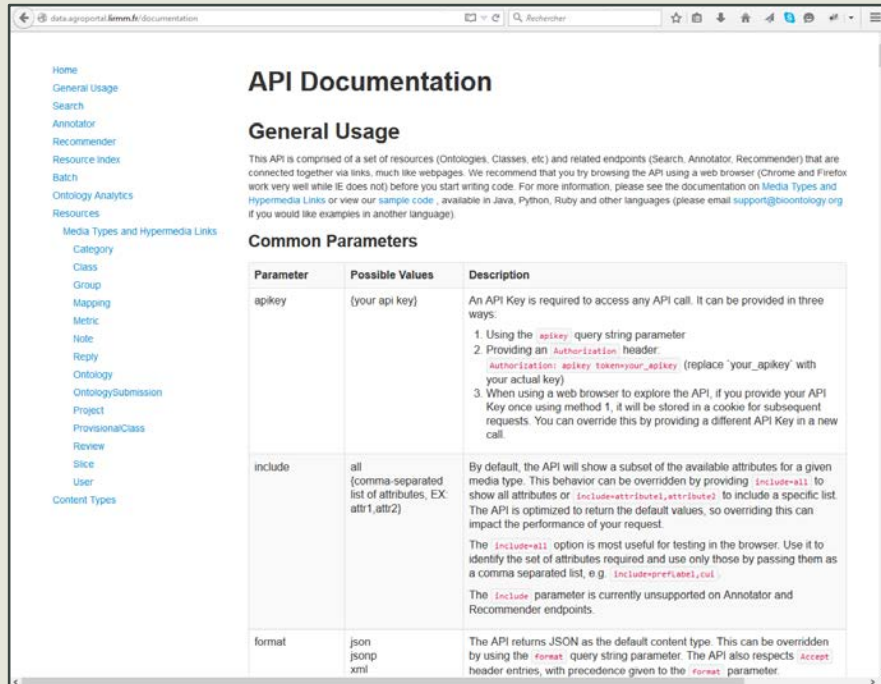


Automatize access with API

- REST
- SPARQL

REST Web Service API:

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



API Documentation

General Usage

This API is comprised of a set of resources (Ontologies, Classes, etc) and related endpoints (Search, Annotator, Recommender) that are connected together via links, much like webpages. We recommend that you try browsing the API using a web browser (Chrome and Firefox work very well while IE does not) before you start writing code. For more information, please see the documentation on [Media Types and Hypermedia Links](#) or view our [sample code](#), available in Java, Python, Ruby and other languages (please email support@bioontology.org if you would like examples in another language).

Common Parameters

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: 1. Using the <code>apikey</code> query string parameter 2. Providing an <code>Authorization</code> header. <code>Authorization: apikey token=your_apikey</code> (replace 'your_apikey' with your actual key) 3. 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>



SPARQL httpd server v1.1.5-122-g1788d29 test query

KB ontologies_api

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

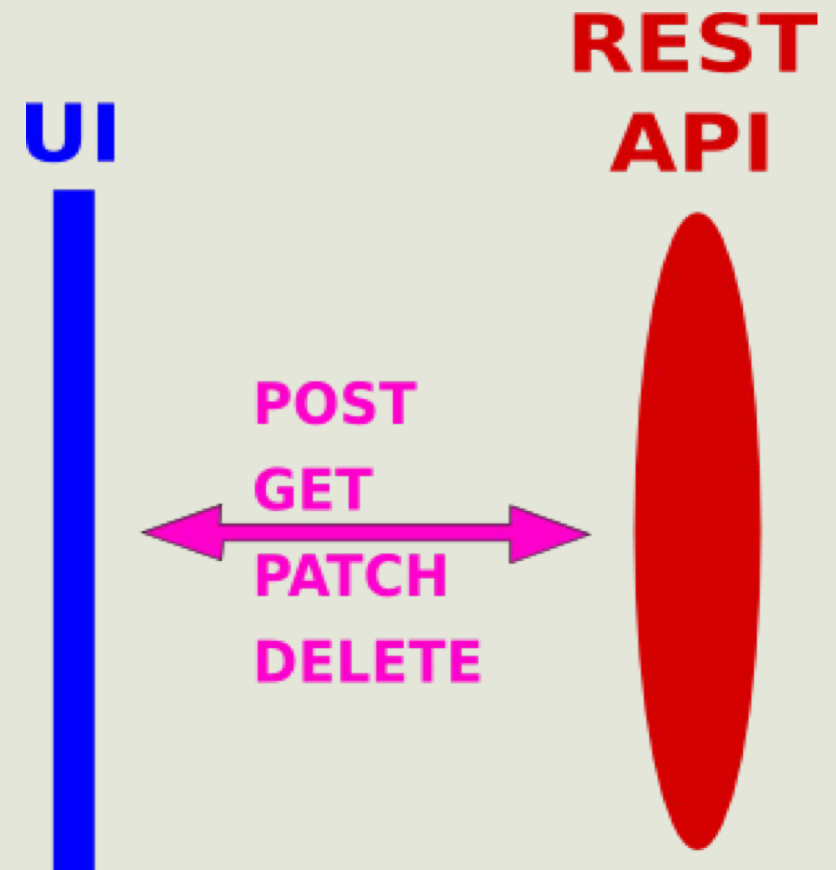
SELECT * WHERE {
  ?s ?p ?o
} LIMIT 10
```

Soft limit xml

96

What's a REST API?

- Uses HTTP protocol to access web resource
- Access to a resource via its URL
- Native HTTP operations:
 - GET (retrieve a resource)
 - POST/PUT (create)
 - PATCH (modify)
 - DELETE (delete)



BioPortal/AgroPortal/EcoPortal REST API

- Data are exposed in JSON or XML with the following base URLs:
 - <http://data.agroportal.lirmm.fr/>
 - <http://data.bioontology.org/>
 - <http://193.204.79.110:8080> (for EcoPortal)
- Operations are applied on these data with HTTP queries
 - <http://data.agroportal.lirmm.fr/documentation>
 - GET queries retrieve objects (ontologies, classes, mappings, users, project, slice, etc.)
 - PUT queries create objects
 - PATCH queries modify objects
 - DELETE queries delete objects
- Exemple: <http://data.agroportal.lirmm.fr/users?apikey=XXX&display=all>

Access to data via REST API

The screenshot shows the 'Browse' page of the agroportal.lirmm.fr/ontologies website. The page features a search bar, a 'Submit New Ontology' button, and several filters for 'Entry Type', 'Uploaded In the Last', 'Category', 'Group', and 'Format'. A list of ontologies is displayed, each with a title, description, and statistics for projects and classes.

Ontology Name	Projects	Classes
Plant Trait Ontology (TO)	1	2,258
Plant Ontology (PO)	2	1,728
Wheat Trait Ontology (WHEATPHENOTYPE)	2	466
Matter transfer ontology (TRANSMAT)	2	1,053
Biorefinery (BIOREFINERY)	1	344
National Center for Biotechnology Information (NCBI) Organismal Classification (NCBITAXON)	1	906,907
OntoBiotope (ONTOBIOTOPE)	2	1,756

agroportal.lirmm.fr/ontologies

```
data.agroportal.lirmm.fr/ontologies?apikey=*****
[
  - {
    - administeredBy: [
      http://data.agroportal.lirmm.fr/users/admin
    ],
    acronym: "SIO",
    name: "Semanticscience Integrated Ontology",
    summaryOnly: null,
    ontologyType: http://data.agroportal.lirmm.fr/ontology_types/ONTOLOGY,
    @id: http://data.agroportal.lirmm.fr/ontologies/SIO,
    @type: http://data.bioontology.org/metadata/Ontology,
    - links: {
      submissions: http://data.agroportal.lirmm.fr/ontologies/SIO/submissions,
      properties: http://data.agroportal.lirmm.fr/ontologies/SIO/properties,
      classes: http://data.agroportal.lirmm.fr/ontologies/SIO/classes,
      single_class: http://data.agroportal.lirmm.fr/ontologies/SIO/classes/{class_id},
      roots: http://data.agroportal.lirmm.fr/ontologies/SIO/classes/roots,
      instances: http://data.agroportal.lirmm.fr/ontologies/SIO/instances,
      metrics: http://data.agroportal.lirmm.fr/ontologies/SIO/metrics,
      reviews: http://data.agroportal.lirmm.fr/ontologies/SIO/reviews,
      notes: http://data.agroportal.lirmm.fr/ontologies/SIO/notes,
      groups: http://data.agroportal.lirmm.fr/ontologies/SIO/groups,
      categories: http://data.agroportal.lirmm.fr/ontologies/SIO/categories,
      latest_submission: http://data.agroportal.lirmm.fr/ontologies/SIO/latest_submission,
      projects: http://data.agroportal.lirmm.fr/ontologies/SIO/projects,
      download: http://data.agroportal.lirmm.fr/ontologies/SIO/download,
      views: http://data.agroportal.lirmm.fr/ontologies/SIO/views,
      analytics: http://data.agroportal.lirmm.fr/ontologies/SIO/analytics,
      ui: http://agroportal.lirmm.fr/ontologies/SIO,
    - @context: {
      submissions: http://data.bioontology.org/metadata/OntologySubmission,
      properties: http://data.bioontology.org/metadata/Property,
      classes: http://www.w3.org/2002/07/owl#Class,
      single_class: http://www.w3.org/2002/07/owl#Class,
      roots: http://www.w3.org/2002/07/owl#Class,
      instances: http://data.bioontology.org/metadata/Instance,
      metrics: http://data.bioontology.org/metadata/Metrics,
      reviews: http://data.bioontology.org/metadata/Review,
      notes: http://data.bioontology.org/metadata/Note,
      groups: http://data.bioontology.org/metadata/Group,
      categories: http://data.bioontology.org/metadata/Category,
      latest_submission: http://data.bioontology.org/metadata/OntologySubmission,
      projects: http://data.bioontology.org/metadata/Project,
      download: http://data.bioontology.org/metadata/Ontology,
      views: http://data.bioontology.org/metadata/Ontology,
      analytics: http://data.bioontology.org/metadata/Analytics,
      ui: http://data.bioontology.org/metadata/Ontology
    }
  }
]
```

data.agroportal.lirmm.fr/ontologies?apikey=***

Access to services via REST API

Agroportal LIRMM

Annotations

CLASS	ONTOLOGY	TYPE	CONTEXT	MATCHED CLASS	MATCHED ONTOLOGY
Banana	Banana Ontology	direct	banana	Banana	Banana Ontology
fruit	Banana Anatomy	direct	banana	fruit	Banana Anatomy

agroportal.lirmm.fr/annotator

```
{
  "annotatedClass": {
    "@id": "http://purl.obolibrary.org/obo/CO_325_ROOT",
    "@type": "http://www.w3.org/2002/07/owl#Class",
    "links": {
      "self": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT",
      "ontology": "http://data.agroportal.lirmm.fr/ontologies/CO_325",
      "children": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/children",
      "parents": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/parents",
      "descendants": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/descendants",
      "ancestors": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/ancestors",
      "instances": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/instances",
      "tree": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/tree",
      "notes": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/notes",
      "mappings": "http://data.agroportal.lirmm.fr/ontologies/CO_325/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT/mappings",
      "ui": "http://agroportal.lirmm.fr/ontologies/CO_325?p=classes&conceptid=http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FCO_325_ROOT"
    }
  },
  "@context": {
    "self": "http://www.w3.org/2002/07/owl#Class",
    "ontology": "http://data.bioontology.org/metadata/Ontology",
    "children": "http://www.w3.org/2002/07/owl#Class",
    "parents": "http://www.w3.org/2002/07/owl#Class",
    "descendants": "http://www.w3.org/2002/07/owl#Class",
    "ancestors": "http://www.w3.org/2002/07/owl#Class",
    "instances": "http://data.bioontology.org/metadata/Instance",
    "tree": "http://www.w3.org/2002/07/owl#Class",
    "notes": "http://data.bioontology.org/metadata/Note",
    "mappings": "http://data.bioontology.org/metadata/Mapping",
    "ui": "http://www.w3.org/2002/07/owl#Class"
  },
  "@vocab": "http://data.bioontology.org/metadata/"
},
  "hierarchy": [ ],
  "annotations": [
    {
      "from": 2,
      "to": 7,
      "matchType": "PREF",
      "text": "BANANA"
    }
  ],
  "mappings": [ ]
}
```

services.agroportal.lirmm.fr/annotator/?text="banana"&apikey=***

Examples of REST calls

- Get information about a user
 - <http://data.agroportal.lirmm.fr/users/jonquet>
- Get information about a group
 - <http://data.agroportal.lirmm.fr/groups/LOVINRA>
- Retrieve information about an ontology
 - http://data.agroportal.lirmm.fr/ontologies/CO_125
- Get information about a project
 - <http://data.agroportal.lirmm.fr/projects/SIFR>

Examples of REST calls for mappings

- Retrieve a specific mapping by id
 - <http://data.agroportal.lirmm.fr/mappings/fd709e40-fcab-0132-77e3-525400026749>
- Retrieve mappings btw 2 ontologies
 - <http://data.agroportal.lirmm.fr/mappings?ontologies=BT,CL>
- Get all the mappings for a given ontology
 - <http://data.agroportal.lirmm.fr/ontologies/CL/mappings>
- Get all the mappings of a given class
 - http://data.agroportal.lirmm.fr/ontologies/CL/classes/http%3A%2F%2Fpurl.obolibrary.org%2Fobo%2FUBERON_0000479/mappings

Examples of SPARQL queries (1/2)

```
// all triples about ontologies
```

```
SELECT ?s ?p ?o WHERE {  
  GRAPH  
  <http://data.bioontology.org/ontologies/ANAEETHES/submissions/3>{  
    ?s ?p ?o .  
  }  
} LIMIT 30
```

```
//liste des graphes dans 4stores
```

```
SELECT DISTINCT ?g WHERE {  
  GRAPH ?g {  
    ?s a ?p .  
  }  
}
```

```
// list of all username
```

```
PREFIX meta: <http://data.bioontology.org/metadata/>  
  
SELECT DISTINCT ?user WHERE {  
  GRAPH <http://data.bioontology.org/metadata/User> {  
    ?user meta:username ?o .  
  }  
}
```

Examples of SPARQL queries (2/2)

```
//Get 20 first concept labels from the ANAETHES thesaurus.  
  
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>  
  
SELECT DISTINCT ?s ?label WHERE {  
  GRAPH  
  <http://data.bioontology.org/ontologies/ANAEETHES/submissions/3> {  
    ?s a skos:Concept .  
    ?s skos:prefLabel ?label .  
  }  
}  
  
ORDER BY DESC(?label)  
LIMIT 20
```

Your turn!



Fire a few REST calls



... and SPARQL queries

Voilà, it's the end

- Questions & remarks
- Feedback
- Exchanges

The background is a dark grey chalkboard with various white chalk sketches. On the left, there's a large sketch of a microscope. Above it, a globe of the Earth is drawn. In the bottom left, there's a stack of books. In the bottom center, an open book with some illegible text is shown. To the right of the open book, there are sketches of a percentage sign, an exclamation mark, and a right-pointing arrow. The overall theme is education and science.

Thank you!