

# BioPortal to OntoPortal to OntoPortal Alliance: Meeting Needs

Presentation for NKOS 2023

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BioPortal



OntoPortal

- BioPortal
- OntoPortal
- OntoPortal Alliance

[bit.ly/bp-op-opa](http://bit.ly/bp-op-opa)



# The Principals

Mark Musen, M.D., Ph.D.

Stanford University School of Medicine

Stanford Center for Biomedical  
Informatics Research (BMIR) (Director)

Principal Investigator of BioPortal

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# The Principals

Clement Jonquet, Ph.D.

Senior Researcher, INRAE &

Associate Researcher, University of  
Montpellier

Principal Investigator, AgroPortal

<https://jonquet.mystrikingly.com/>



Need: Common biomedical concepts repo

Result: National Center for Biomedical Ontology (2004)

- Funded development of repository for biomedical ontologies
- BioPortal launched in 2006
  - Educating community about the repository and its importance
  - Accumulated an average of 50 or so ontologies per year
  - Allowed anyone to submit an ontology for public or private use
  - Shared backend service software with providers like Marine Metadata Interoperability Ontology Registry & Repository
- Significant funding until about 2016

# BioPortal Project today

- Parent Project: Stanford Center for Biomedical Informatics Research
- Portal Purpose: Biomedical and other community ontologies
- Users: >16,750
  - Ontologies >>

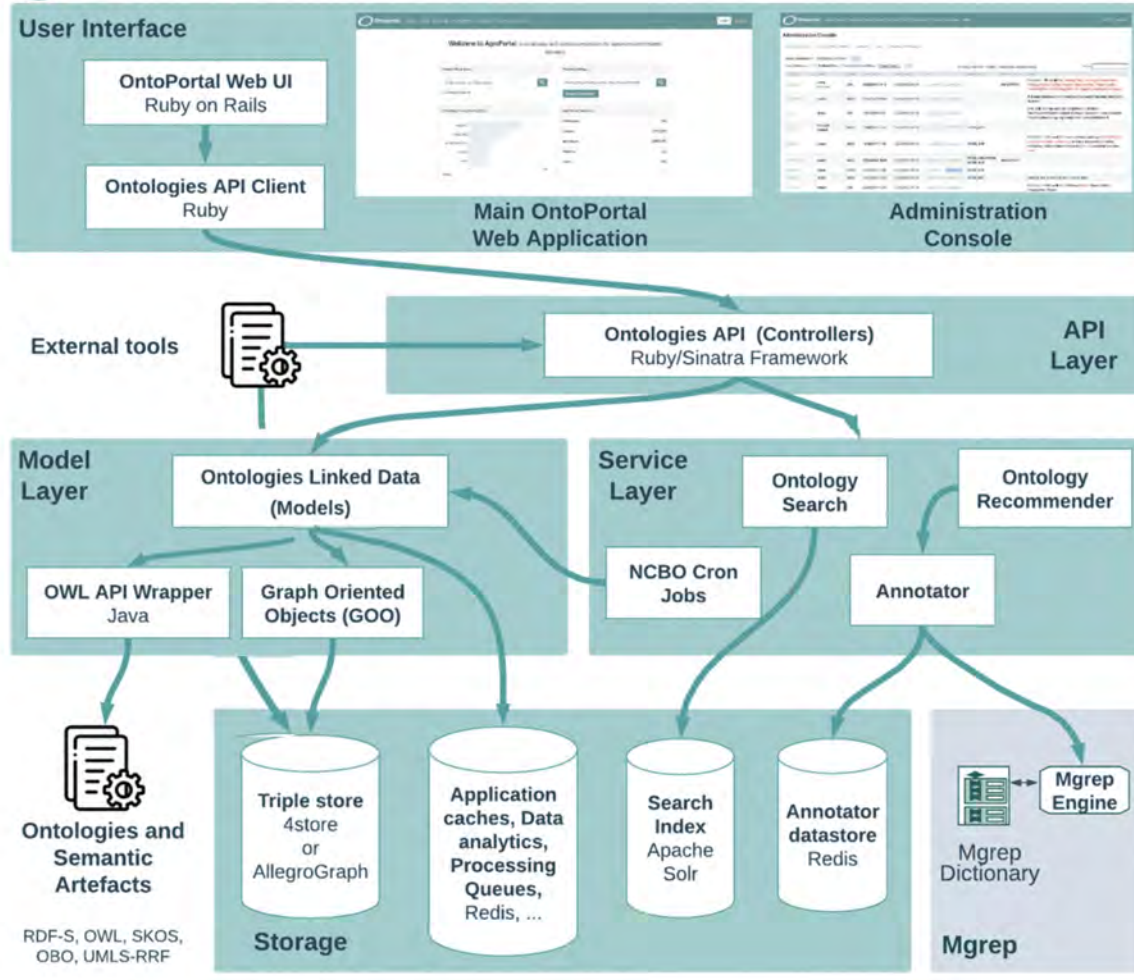
# Ontologies	Public	Private	TOTAL
Complete	1082	337	1419
Partial Views	183	22	205
<b>TOTAL</b>	<b>1265</b>	<b>359</b>	<b>1624</b>

# Need: Community repository services

## Result: NCBO Virtual Appliance (2012)

- Always access the source code in [GitHub ncbo repo](#)
- Easily [deploy your own copy](#) of BioPortal repository software
- No cost to deploy privately, publicly, or commercially
- BioPortal team support: [support@bioontology.org](mailto:support@bioontology.org)
- Includes most BioPortal services
- Released cloud-based version in 2016(?) as [OntoPortal Appliance Amazon Machine Instance](#)

# OntoPortal Appliance: Architecture Today





Need: Store non-biomedical ontologies too

Result: BioPortal supports any domain content (~2016)

- Noble reasons
    - Science often requires terms from many domains
    - Difficult to draw precise lines
    - Provide more services to more communities
  - Practical reasons
    - BioPortal doesn't actively curate ontologies
    - More general-purpose tools like CEDAR used
- BioPortal

# Need: Support like-minded communities

## Result: Created the OntoPortal Alliance (2018)



- Noble reasons
  - Provide support for each other's work
  - Advance our common code base faster
  - Present a unified 'community of interest'
- Practical reasons
  - Identify and understand shared requirements
  - Increase 'market share' in semantic community
  - Increase the level of code sharing (not just adoption)
  - Get to reuse other people's work

*ontoportal.org*

ALLIANCE BLOG DOCUMENTATION GITHUB

# OntoPortal, a generic technology to build ontology repositories or semantic artefact catalogues

The most advanced and rich technology for ontology services!

Get your own OntoPortal

See a demo of OntoPortal

OntoPortal [Home](#) [About](#) [Features](#) [Documentation](#) [Help](#) [Login](#) [Support](#)

## Welcome to OntoPortal Appliance, your ontology repository for your ontologies

Search for a class

[Advanced Search](#)

Find an ontology

[Browse Ontologies](#)

Ontology Visits (April 2023)

[More](#)

OntoPortal Appliance Statistics

Ontologies	2
Classes	100
Properties	36,286
Mappings	2

OntoPortal Appliance 3.1.1 | Powered by OntoPortal | [Privacy](#)

# Be part of a **community**



## BioPortal

The world's most comprehensive repository of biomedical ontologies



## SIFR BioPortal

A repository for French biomedical terminologies and ontologies



## AgroPortal

A vocabulary and ontology repository for agronomy and related domains



## EcoPortal

The LifeWatch ERIC repository of semantic resources for ecology and related domains



## MedPortal

A repository for Chinese biomedical terminologies and ontologies



## MatPortal

The ontology repository for materials science



## IndustryPortal

A common ontology portal for industry and related domains



## EarthPortal

A semantic artefact repository dedicated to Earth sciences



## BiodivPortal

A semantic artefact repository for biodiversity

# Repos and Workshops

2020



2022



2023

- AgroPortal**  
Member of the AgroPortal and SIFR BioPortal team mostly at LIRMM and MISTEA

- BiodivPortal**  
NFDI4biodiv team working on a dedicated OntoPortal

- BioPortal**  
Members of the BioPortal team mostly at Stanford BMIR.

- CogniZone**  
Member of the Cogni.zone SME team.

- EarthPortal**  
Members of the EarthPortal team mostly at CNRS and DataTerra

- EcoPortal**  
Members of the EcoPortal team mostly at LifeWatch ERIC

- IndustryPortal**  
Members of IndustryPortal team mostly at ENIT

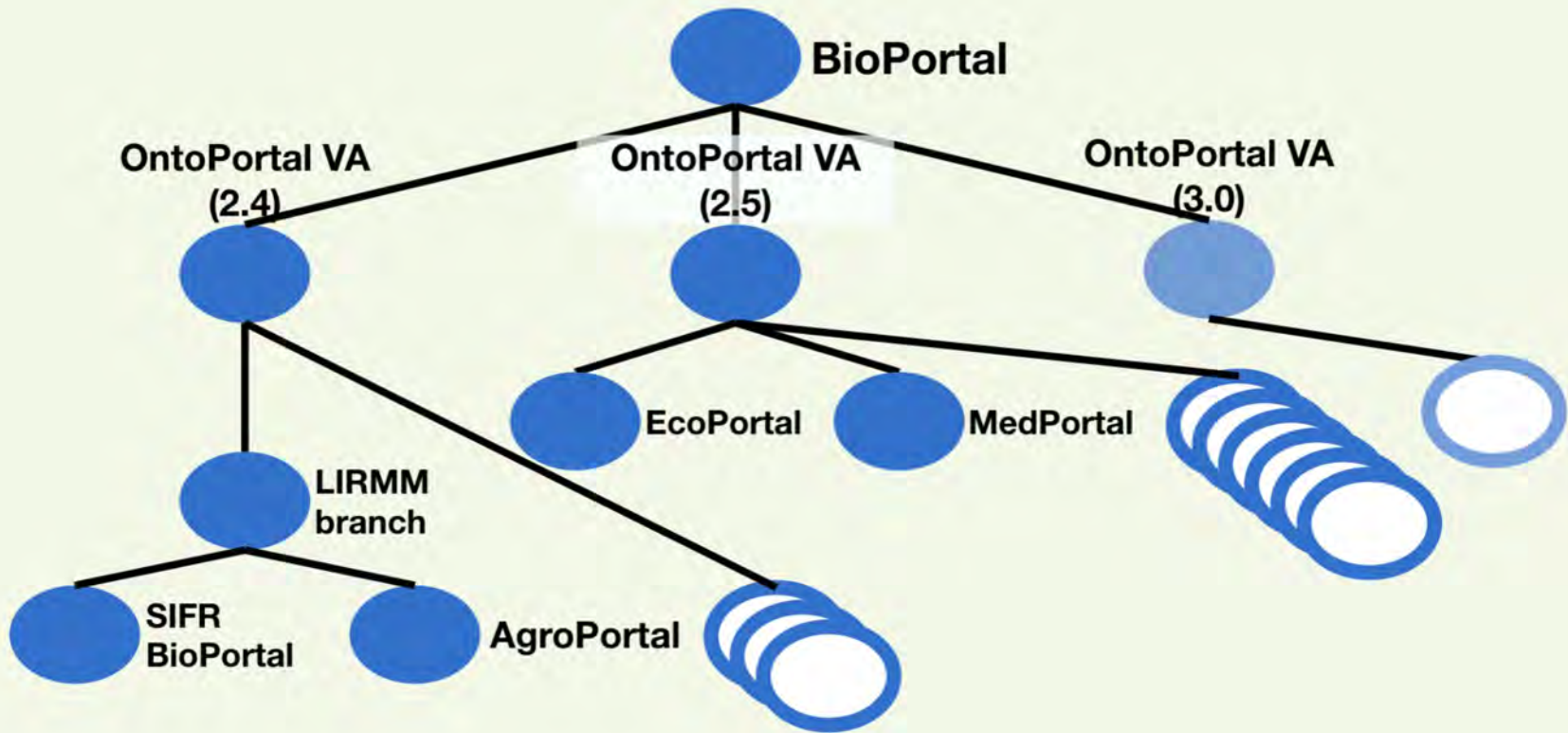
- MatPortal**  
Members of the MatPortal team mostly at Fraunhofer

- MedPortal**  
Members of the MedPortal team mostly at BMICC.

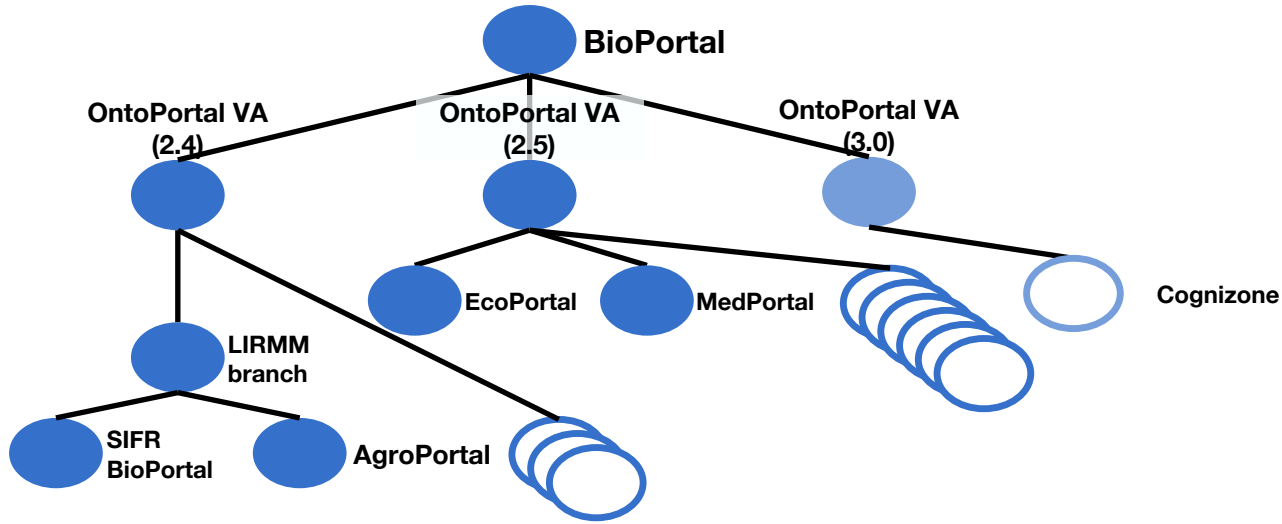


# How do we keep deployments aligned?

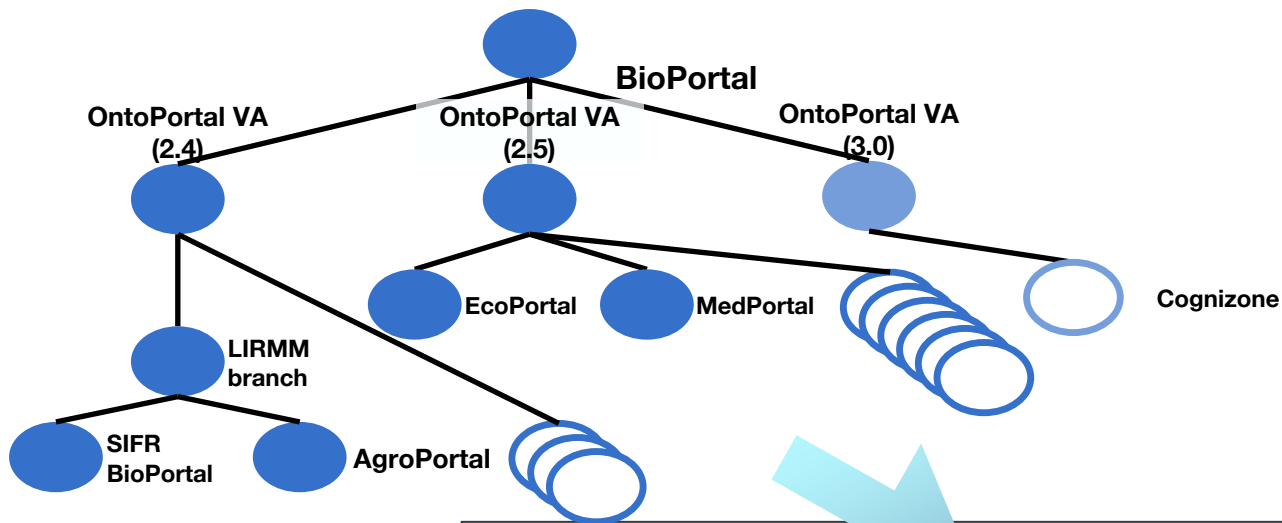
*(Our starting point, years ago...)*



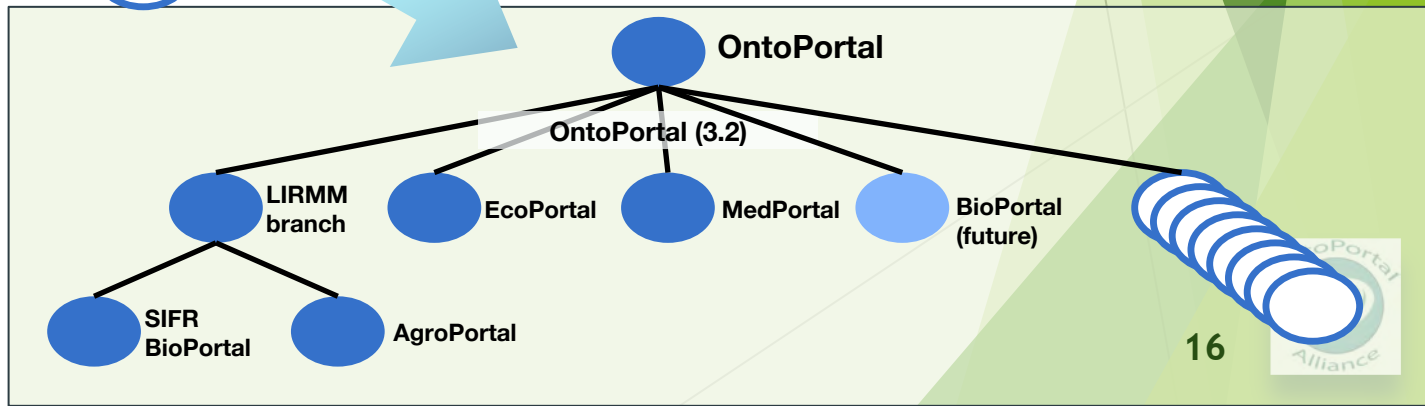
# How do we keep deployments aligned?



# How to transition to what we really want?



**Many steps needed  
with mutual  
Patience and support**





Need: Common code distribution model

Result: New GitHub distribution model (mostly)

- “Who’s on top?” in this diagram matters, some. And:
  - Where are most changes originating?
  - How many changes are there?
  - Who has time to evaluate and integrate changes?
- Behind the scenes best practices are essential
  - Good shared coding practices
  - Good separation of concerns/modularization
  - Really crisp regression testing
- Once all in place, sharing code will be much easier

# Need: Federation agreement for ontology sharing

The image shows a screenshot of the AgroPortal website's 'Environment Ontology' page. The page header includes 'AgroPortal' and navigation links: 'Browse', 'Search', 'Mappings', 'Recommender', 'Annotator', 'Projects', and 'Landscape'. The main content area is titled 'Environment Ontology' and notes it was last updated on February 14, 2023. Below this are tabs for 'Summary', 'Classes', 'Properties', 'Notes', 'Mappings', and 'Instances'. A 'Details' section is visible, with the acronym 'ENVO' highlighted in pink. To the right of the screenshot is a grid of nine other ontology portals, each with a logo, name, and brief description. Pink arrows originate from the 'ENVO' label and point to the logos of BioPortal, SIFR BioPortal, AgroPortal, EcoPortal, MedPortal, MatPortal.org, IndustryPortal, EarthPortal, and BiodivPortal.

Portal Name	Description
BioPortal	The world's most comprehensive repository of biomedical ontologies
SIFR BioPortal	A repository for French biomedical terminologies and ontologies
AgroPortal	A vocabulary and ontology repository for agronomy and related domains
EcoPortal	The LifeWatch ERIC repository of semantic resources for ecology and related domains
MedPortal	A repository for Chinese biomedical terminologies and ontologies
MatPortal.org	The ontology repository for materials science
IndustryPortal	A common ontology portal for industry and related domains
EarthPortal	A semantic artefact repository dedicated to Earth sciences
BiodivPortal	A semantic artefact repository for biodiversity

**ENVO** Details:

- Acronym: ENVO
- Visibility: Public
- Description: ENVO is an ontology which represents knowledge about environments, entities, ENVO is an ontology which represents knowledge about environment related entities
- Status: Production
- Format: OWL
- Contact: Pier Luigi Buttigieg (ORCID: orcid.org/0000-0002-4366-3088), pier.buttigieg@univ-lorraine.fr
- Categories: Biodiversity and Ecology, Natural Resources, Earth and Environment
- Groups: GDR SemanDiv, OBO Foundry, Rice Data Interoperability working group, V

# Need: Federation agreement for ontology sharing

## Result: Agreed 'ontology federation' practices

- Is one of these primary?
- How are copied kept current?
- What if a repo needs a different version?

ENVO



We have agreement in principle on how to manage this kind of shared resource across all the Members of the Alliance.

# Need: Diverse features for different projects

BioPortal: A lot of infrastructure work improving these...

- Submission/Ingest
  - Format Conversions
  - Versioning
  - Differencing
  - Metrics re Vocab.
  - Interpretation/  
Property Mapping
- Search
  - Ontology Name
  - Terms
  - Best Terms
  - Attribute/Value
  - Metadata
  - Triples
- Subselection
  - Views (partial voc.)
  - Slices (partial repo)
  - Preferred Vocab

- Terms
  - Browsing
  - Create ID
  - Resolve ID
  - Term Pages
  - Mappings
    - Auto-syntax
    - Auto-identifiers
    - Manual-user
- Vocab. Recommend
  - Keyword-based
  - Text-based
  - Multi-vocabulary
  - Controllable criteria
  - Selectable vocabs
- Annotation
  - Keyword/text based
  - Selectable vocabs

## Widgets

- Term completion
- Term browsing
- Visualization

## Social

- Reviews
- Notes/Comments
  - Ontology
  - Term

## Usage Tracking

## Visualization

## Licensing

- # API requests

## API Features

## Resource Index

## Visualization

# Need: Diverse features for different projects

## Result: Agile methods to share/test features

**AgroPortal major features:** multilingual ontologies support; complete SKOS capabilities; in-app FAIR evaluation of ontologies

**AgroPortal other features:** new administrations tools (metadata, groups and categories); some new UIs; some UI internationalization; consolidated metadata model

**BiodivPortal major features:** diff and versioning support; SSSOM (mapping) support; iADOPT integration

**MedPortal major features:** replace Google page tracking; Chinese internationalization; CSV imports

**EcoPortal major features:** VocBench and ShowVoc integration; assigning DOIs; Keycloak-based Single Sign-On (SSO)

# Need: Federation of features (e.g., search)

The screenshot shows the BioPortal search interface. The browser address bar contains the URL: `bioportal.bioontology.org/search?q=environment&ontologies=&include_properties=false&include_views=false&includeObs...`. The page title is "Class Search". A search input field contains the text "environment". Below the input field, there are options to "Show advanced options" and a "Search" button. A section titled "Include results from other portals:" shows two checked checkboxes: "EcoPortal" and "AgroPortal". The search results are listed below, showing matches in 46 ontologies. The first result is "Environment - Medical Subject Headings (MESH)" from BioPortal, with a description: "The external elements and conditions which surround, influence, and affect the life and development of an organism or population." The second result is "Environment - Logical Observation Identifier Names and Codes (LOINC)" from BioPortal. The third result is "environment - Environmental Thesaurus (ENVTHES)" from EcoPortal, with a description: "[ONTOAD] The external elements and conditions which surround, influence, and affect the life and development of an organism or population. (source: MSH)". The fourth result is "environment - AGROVOC (AGROVOC)" from AgroPortal, with a description: "[ONTOAD] The external elements and conditions which surround, influence, and affect the life and development of an organism or population. (source: MSH)".

Search | NCBO BioPortal

bioportal.bioontology.org/search?q=environment&ontologies=&include\_properties=false&include\_views=false&includeObs...

BioPortal Ontologies Search Annotator Recommender Mappings Admin mdorf Support

## Class Search

environment

Enter a class, e.g. Melanoma [help](#)

Show advanced options

Include results from other portals:

EcoPortal  AgroPortal

Search

Matches in 46 ontologies

Environment - Medical Subject Headings (MESH) <http://uri.bioontology.org/ontology/MESH/D004777>  
The external elements and conditions which surround, influence, and affect the life and development of an organism or population.  
[details](#) - [visualize](#)

Environment - Logical Observation Identifier Names and Codes (LOINC) <http://uri.bioontology.org/ontology/NCIT/P102337-5>  
[details](#) - [visualize](#) - 1 more from this ontology

environment - Environmental Thesaurus (ENVTHES) <http://vocabs.lter-europe.net/EnvThes/20521>  
[ONTOAD] The external elements and conditions which surround, influence, and affect the life and development of an organism or population. (source: MSH)  
[details](#) - [visualize](#) - 6 more from this ontology

environment - AGROVOC (AGROVOC) [http://aims.fao.org/aos/agrovoc/c\\_2693](http://aims.fao.org/aos/agrovoc/c_2693)  
[http://aims.fao.org/aos/agrovoc/xDef\\_4f7254f7](http://aims.fao.org/aos/agrovoc/xDef_4f7254f7)  
[details](#) - [visualize](#) - 14 more from this ontology

<https://bioportal.bioontology.org/ontologies/BIN?p=classes&conceptid=http%3A%2F%2Furi.bioontology.org%2Fontology%2FMESH%2FD004777>

# Need: Federation of features (e.g., search)

## Result: Initial strategies for federating search

- Agreement that search is first feature to federate
- Agreement on what federated search is:
  - While searching on a term, user can choose to extend search to other OntoPortal instances
- Agreement on what is found:
  - Matching entities, sorted in some way
  - Further analysis needed of best sorting approach
- Ideas matured in other areas
  - How to best display results
  - Best architecture for responsiveness & reliability



# Need: A publication

## Result: A publication!

- Clement Jonquet, John Graybeal, Syphax Bouazzouni, Michael Dorf, Nicola Fiore, et al.. **Ontology Repositories and Semantic Artefact Catalogues with the OntoPortal Technology**. ISWC 2023 - 22nd International Semantic Web Conference, Nov 2023, Athens, Greece.

[https://doi.org/10.1007/978-3-031-47243-5\\_3](https://doi.org/10.1007/978-3-031-47243-5_3)



**Ontology Repositories and Semantic Artefact Catalogues with the OntoPortal Technology**

Clement Jonquet<sup>1,2</sup>, John Graybeal<sup>3</sup>, Syphax Bouazzouni<sup>1</sup>, Michael Dorf<sup>2</sup>, Nicola Fiore<sup>2</sup>, Xeni Kechagioglou<sup>1</sup>, Timothy Redmond<sup>1</sup>, Ilaria Rosati<sup>5,6</sup>, Alex Skrenchuk<sup>3</sup>, Jennifer L. Vendetti<sup>3</sup>, Mark Musen<sup>3</sup> and members of the OntoPortal Alliance

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<sup>5</sup> CNR-IRET, National Research Council, Institute of Research on Terrestrial Ecosystems, Lecce, Italy

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**Abstract.** There is an explosion in the number of ontologies and semantic artefacts being produced in science. This paper discusses the need for common platforms to receive, host, serve, align, and enable their reuse. Ontology repositories and semantic artefact catalogues are necessary to address this need and to make ontologies FAIR (Findable, Accessible, Interoperable, and Reusable). The OntoPortal Alliance (<https://ontoportals.org>) is a consortium of research and infrastructure teams dedicated to promoting the development of such repositories based on the open, collaboratively developed OntoPortal software. We present the OntoPortal technology as a generic resource to build ontology repositories and semantic artefact catalogues that can support resources ranging from SKOS thesauri to OBO, RDF-S, and OWL ontologies. The paper reviews the features of OntoPortal and presents the current and forthcoming public and open repositories built with the technology maintained by the Alliance.

**Keywords:** ontologies · semantic artefacts · ontology repository · ontology services · vocabulary server · terminology service · ontology registry · semantic artefact catalogue



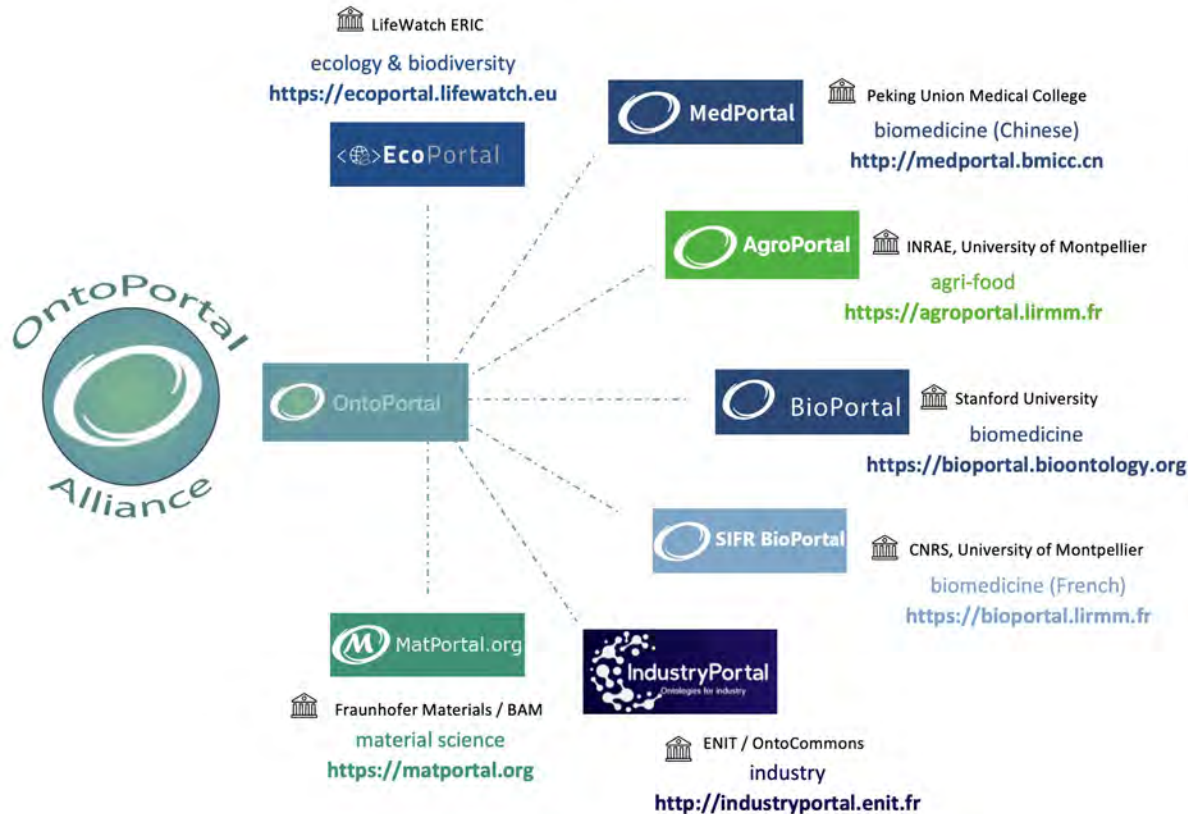
## In Conclusion

- BioPortal evolved as a feature-rich research platform
- OntoPortal provided the chance for a community to gather around the platform, all using their own funding models
- The OntoPortal Alliance is advancing on two fronts
  - Evolving the OntoPortal platform into a shared, production-level software product
  - Establishing a community capable of supporting and advancing the shared software vision
- The whole platform—code, documentation, web presence—is increasingly solid, supported, and sustained.

# Thank You to the Teams



# OntoPortal Alliance: Synchronizing and mutualizing research and development efforts



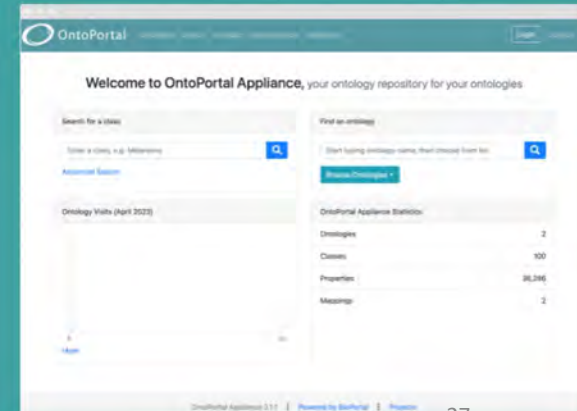
ALLIANCE BLOG DOCUMENT

## OntoPortal, a generic technology to build ontology repositories or semantic artefact catalogues

The most advanced and rich technology for ontology services!

Get your own OntoPortal

See a demo of OntoPortal



The screenshot shows the OntoPortal Appliance interface. It features a search bar for classes and ontologies, a navigation menu, and a dashboard with statistics for ontology visits and various ontology metrics.

OntoPortal Appliance Statistics:	
Ontologies	2
Classes	100
Properties	36,346
Messages	2

2025