

Harnessing the Power of the Community in a Library of Biomedical Ontologies

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What are we trying to do

- 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 resources that are relevant to the domain of the ontology (or to specific terms)?

BioPortal: A Community-Based Ontology Repository

BioPortal | Browse | Search | Projects | Annotate | All Mappings | All Resources Alpha | Sign In | Register | Help/About | Send Feedback

human phenotype ontology

Search all ontologies — Advanced Search

Find an ontology — Browse Ontologies >

Search resources — Advanced Resource Search

Most Active Ontologies

Ontology	Version	Notes	Mappings
Human disease	1.36	0	17732
Mouse adult gross anatomy	1.194	0	3905
NCI Thesaurus	08.12d	9	3798
Foundational Model of Anatomy	3.0	0	1997
Zebrafish anatomy and development	1.21	0	791

Latest Notes —

[change namespace from IAO to OBI material entity \(Ontology for Biomedical Investigations\)](#) 06/10/09 whetzel

[RE:Add mapping to Unit ontology? unit \(Experimental Factor Ontology\)](#) 06/01/09 jamesmalone

[Add mapping to Unit ontology? unit \(Experimental Factor Ontology\)](#) 04/12/09 whetzel

[Release notes for version 2009-04-02 entity \(NanoParticle Ontology\)](#) 04/02/09 sobolevnmr

[Missing preferred term field OBI 0000577 \(Ontology for Biomedical Investigations\)](#) 04/01/09 whetzel

Latest Mappings —

[cellular component \(Biological process\) => Cell component \(Foundational Model of Anatomy\)](#) 04/27/09 matthiassamwald

[Cell component \(Foundational Model of Anatomy\) => cellular component \(Biological process\)](#) 04/27/09 matthiassamwald

[Cell \(Foundational Model of Anatomy\) => Cell \(NCI Thesaurus\)](#) 04/16/09 lechatpito

[Cell \(NCI Thesaurus\) => Cell \(Foundational Model of Anatomy\)](#) 04/16/09 lechatpito

[tbio:Cell \(Basic Vertebrate Anatomy\) => Cell \(NCI Thesaurus\)](#) 04/16/09 lechatpito

Statistics

Ontologies	143
Concepts	723,806
Resources Indexed	11

<http://bioportal.bioontology.org>

BioPortal Today

- ~170 ontologies and terminologies in OWL, RDFS, OBO format, RRF
- Well over 1,000,000 concepts
- ~1,000,000 mappings

Community Features in BioPortal

- Publication of ontologies
- Notes and discussions
- Ontology evaluation
- Mappings between concepts
- Ontology views

Publishing Ontologies

- Any ontology in biomedical domain can be published in BioPortal.
- When publishing the ontology, the authors provide the metadata describing salient features of their ontology.
- With publication, ontology authors get:
 - on-line browsing and search for their ontology
 - REST service access
 - version maintenance
 - RSS feeds for new comments, mappings, new versions

Notes and Discussion

- Users create notes to
 - discuss class definitions
 - suggest changes and corrections
 - request new items
 - provide additional information about a class (e.g., references, images, supporting documentation)

The screenshot shows the 'View Ontology Details' page for the Biomedical Resource Ontology (BRO) Version 2.7. The left sidebar displays a tree view of ontology classes, including 'activity:Activity', 'area:Area_of_Research', 'BRO:Deprecated_Resource', 'BRO:Resource' (which is expanded to show 'BRO:Funding_Resource', 'BRO:Information_Resource', 'BRO:Material_Resource', 'BRO:People_Resource', 'BRO:Service_Resource', 'BRO:Software', and 'BRO:Training_Resource'), 'desc:Biositemaps_Information_Model', 'area:Deprecated_Area_of_Research', and 'activity:Deprecated_Activity'. The right side of the interface features a navigation bar with 'Details', 'Visualization', 'Notes' (which is the active tab), 'Mappings', and 'Resources alpha'. Below the navigation bar, a 'Comment' section is visible, showing a comment from 'DavidStates' at 08/09/08 06:56: "Software needs structure, too many top level subclasses". The comment discusses the structure of the ontology, noting that 'binary executable' is not a top level subclass of software and that 'network editor' is just one class of interactive editing tools. It also mentions that software really needs a complete reorganization. A 'Reply' button is present below the comment. Another comment from 'PeterLyster' at 08/12/08 08:29: "RE:Software needs structure, too many top level subclasses" is also shown, along with a reply from 'PeterLyster' at 08/12/08 08:43: "I (Peter Lyster) copy marginal notes that I also place in the 'Portals' class. I think this helps to explain the design principles." A note at the bottom states: "We adopted the design principle of (i) initially align the BRO top level with NIFSTD (Data Resource; Bibliographic".

Community-Based Evaluation



*Which ontology from the library
is appropriate for my task?*

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- The people who know the answer to these questions are
 - (maybe) ontology authors
 - other users of the ontology

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 - other users of the ontology
- Our solution: Allow users to provide ratings for ontologies

Reviewers Provide

- General review and rating
- Usage information
 - Which applications have successfully used the ontology?
 - What problems were encountered?
- Coverage
 - Does it cover the domain properly?
 - Are there major gaps?
 - Are some parts developed better than others?

Projects in BioPortal

- Users can describe their **ontology-based projects** in BioPortal
- Projects are linked to ontologies they are using
- Ontology reviews can be done in the context of projects

Ontology Mappings

- BioPortal ontologies overlap in content
 - The same is true for almost any ontology library
 - A **mapping** between two terms in different ontologies indicates a relationship between them
 - Usually a **similarity** relationship
 - For example, *nostril* in NCI Thesaurus is similar to *naris* in Mouse Anatomy Ontology

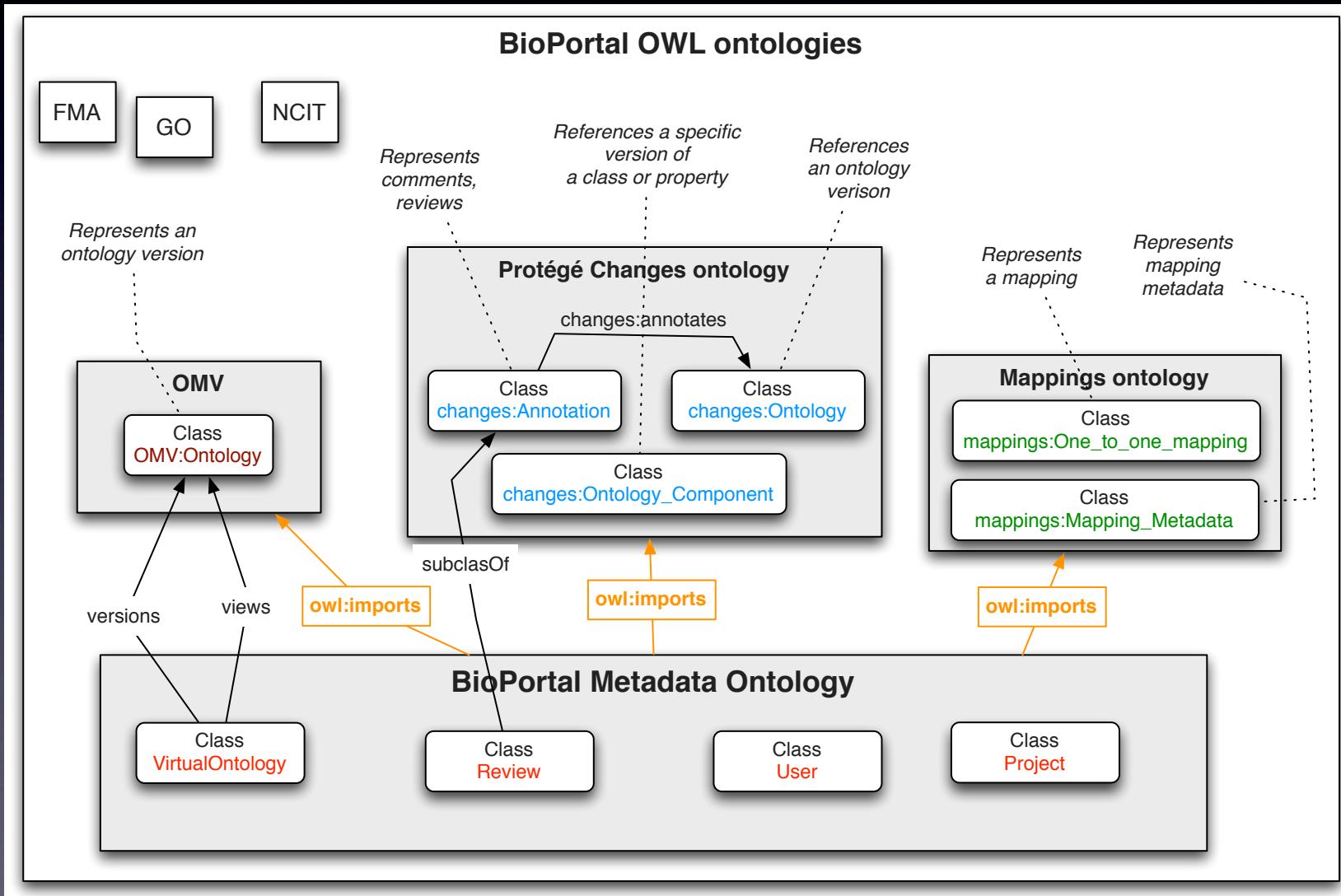
Mappings in BioPortal

- Mappings in BioPortal are **concept-to-concept** mappings
- Mappings are created by users or uploaded in bulk
- Bulk uploads are usually the results of automatic or semi-automatic mapping
- There is detailed **metadata** for provenance of mappings
- Users can comment on and discuss the mappings
- ~1,000,000 mappings in BioPortal now

Views, Subsets, and Value Sets

- Users can contribute their derivatives of BioPortal ontologies
 - which become first-class objects in BioPortal and can be used as all other ontologies are.
- A view can be
 - A manually extracted module
 - A module generated by a query
 - A translation of an ontology into another language (e.g., Amino-acid ontology in Chinese)
 - A transformation of an ontology into another ontology language (e.g., SKOS version of an OBO ontology)

Implementation: BioPortal Metadata Ontology



Annotator

Use ontologies to annotate *your* data

- Give your text as input
- Select your parameters
- Get your results...
 - in text, XML or OWL

The screenshot shows the Open Biomedical Annotator interface. At the top, there are fields for 'Ontologies' (set to SNOMEDCT) and 'Semantic Types' (a list of codes: 7, T033, T200, T026, T029, T023, T038, T017, T047, T048, T191, T019, T121, T195, T020, T050). Below these are two radio button options: 'Annotate Text' (selected) and 'Get Annotations By Resource Element'. A 'Change...' button is available for the text input. The 'Text' input box contains the sentence: 'Melanoma is a disease of the melanocytes affecting the bowel and the eye'. A large blue 'Annotate' button is located to the right of the text input. On the left, there is a sidebar titled 'Ontologies' with a 'Filter' dropdown set to 'UMLS and BioPortal Ontologies' and a 'Select All' button. A checkbox for 'SNOMED Clinical Terms, 2008_07_31' is checked. On the right, there is an 'Annotation Tag Cloud' section with a 'Annotation statistics' subsection. It shows: 'Expanded annotations generated from the is_a transitive closure (ISA_CLOSURE): 0', 'Expanded annotations generated from mappings (MAPPING): 0', and 'Direct annotations generated from concept recognition on the given text (MGREP): 5'. Below this, the annotated text is displayed as a tag cloud: 'Melanoma Eye Disease'. At the bottom, there are links: 'Learn more about the NCBO Annotator web service' and 'Learn more about the NCBO Biomedical Resources index'.

Discussion and Challenges

- “If we build it, will they come”?
- We must maintain community contributions as ontologies evolve
 - When is the contribution no longer relevant?
 - Who can delete notes, mappings, etc.
 - How do we prevent abuse?
- If we are successful, trust will become a major issue
 - Web of Trust
 - Privacy

Discussion and Challenges (cont'd)

- Too much of a good thing?
 - Users want their “private areas” of BioPortal where they can discuss evolving projects
 - Users want their own installation of BioPortal to keep sensitive data “in-house”
- How do we **evaluate** and measure the success of our work?

Try it out and contribute!

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ONTOLOGY NAME	FORMAT	VERSION	AUTHOR	UPLOADED ON	GROUP	STATUS
ABA Adult Mouse Brain (ABA)	OWL	1.0	Chinh Dang	06/12/2009		Explore
African Traditional Medicine (ATMO)	OBFormat	1.0.1	Ghislain Atemezing	04/23/2009		Explore
Amino Acid (amino-acid)	OWL	1.2	Nick Drummond, Georgina Moulton, Robert Stevens, Phil Lord	04/25/2009		Explore
Amino Acid with Simplified Chinese annotations (Amino Acid-zh_CN)	OWL	v1.2 zh1.1	Nick Drummond, Georgina Moulton, Robert Stevens, Phil Lord. Annotated by: Lin Zhang	04/27/2009		Explore
Amphibian gross anatomy (AAO)	OBFormat	1.8	AmphiAnat list	07/30/2008	OBOfoundry	Explore
Animal natural history and life history (ADW)	PROTEGE	See Remote Site	Http://animaldiversity Administrators	04/27/2009		
Ascomycete phenotype ontology (APO)	OBFormat	1.2	Fungal_anatomy Administrators	05/02/2009		Explore
Basic Vertebrate Anatomy (basic-vertebrate-gross-anatomy)	OWL	1.1		01/16/2007		Explore
Bilateria anatomy (BILA)	OBFormat	See Remote Site	Thorsten Heinrich	04/13/2009		

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