Collaborating with the National Center for Biomedical Ontology

Mark Musen and the NCBO Team
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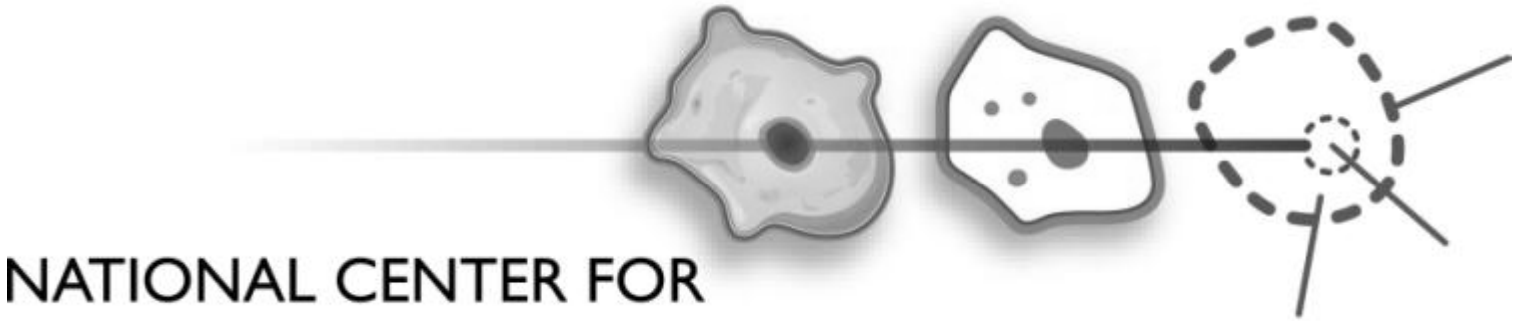


NIH Roadmap

ACCELERATING MEDICAL DISCOVERY TO IMPROVE HEALTH

- Overview
- NIH Roadmap Initiatives
- Funding Opportunities
- Funded Research
- Roadmap Related Activities
- Public Meetings and Workshops
- Frequently Asked Questions
- News and Information
- NIH Roadmap Institute and Center Liaisons
- Subscribe to the NIH Roadmap E-mail list

New Pathways to Discovery

- Building Blocks, Biological Pathways, and Networks
- Molecular Libraries and Imaging
- Structural Biology
- Bioinformatics and Computational Biology
- Nanomedicine

Research Teams of the Future

- High-Risk Research
  - NIH Director's Pioneer Award
- Interdisciplinary Research
- Public-Private Partnerships

Re-engineering the Clinical Research Enterprise

- Re-engineering the Clinical Research Enterprise Initiatives
  - Clinical Research Networks and NECTAR
  - Clinical Outcomes Assessment
  - Clinical Research Training
  - Clinical Research Policy Analysis and Coordination
  - Translational Research

What's New

- **Press Release:** NIH Launches Major Program to Transform Clinical and Translational Science
- **RFA:** Planning Grants for Institutional Clinical and Translational Science Awards
- **RFA:** Institutional Clinical and Translational Science Award
- **Program:** Institutional Clinical and Translational Science Award Program Information
- **Meeting:** Interdisciplinary Research Centers Workshop
- **Press Release:** 2005 NIH Director's Pioneer Award Recipients Announced
- **Press Release:** NIH Roadmap Continues to Move Forward on All Fronts
- **Meeting Summary:** BAA Roadmap Steering Committee, May 2005
- What's New – Archives

NIH Roadmap

National Centers for Biomedical Computing

Home | NCBC Summary | SDIWG | Tools and Applications | Ontology Working Group | DBP Interactions

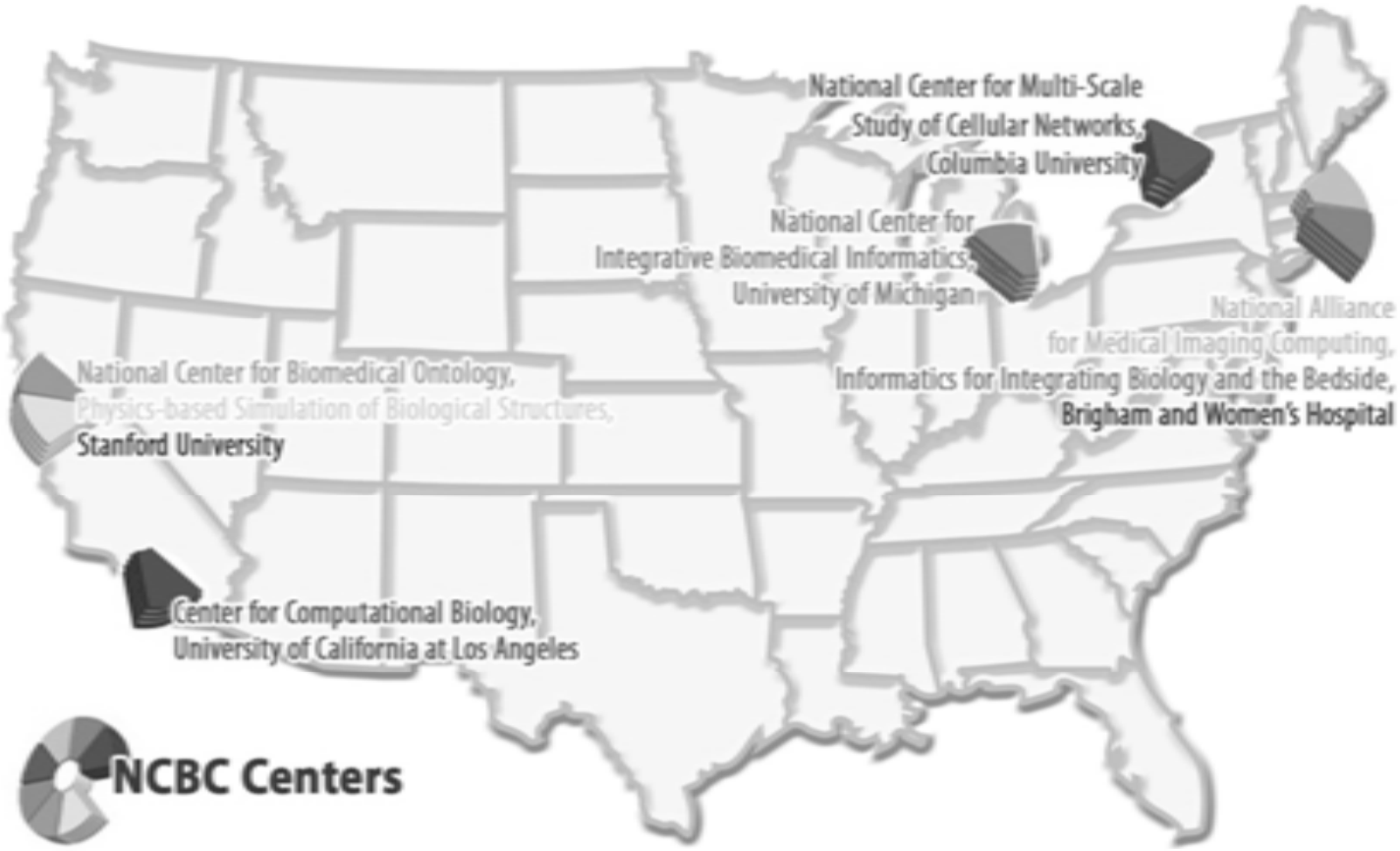
ATTENTION: Final Report from National Centers for Biomedical Computing 2006 All Hands Meeting

MAGNet

i2b2

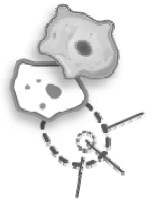
NCBI

simbios

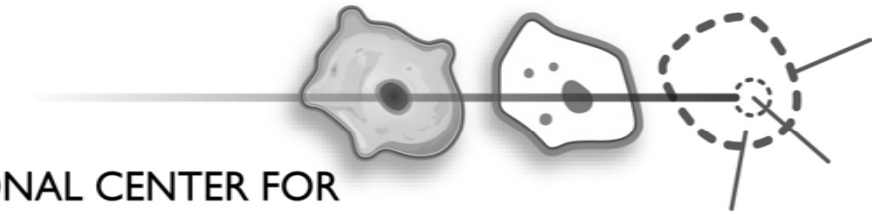


http://www.ncbcs.org

The National Center for Biomedical Ontology



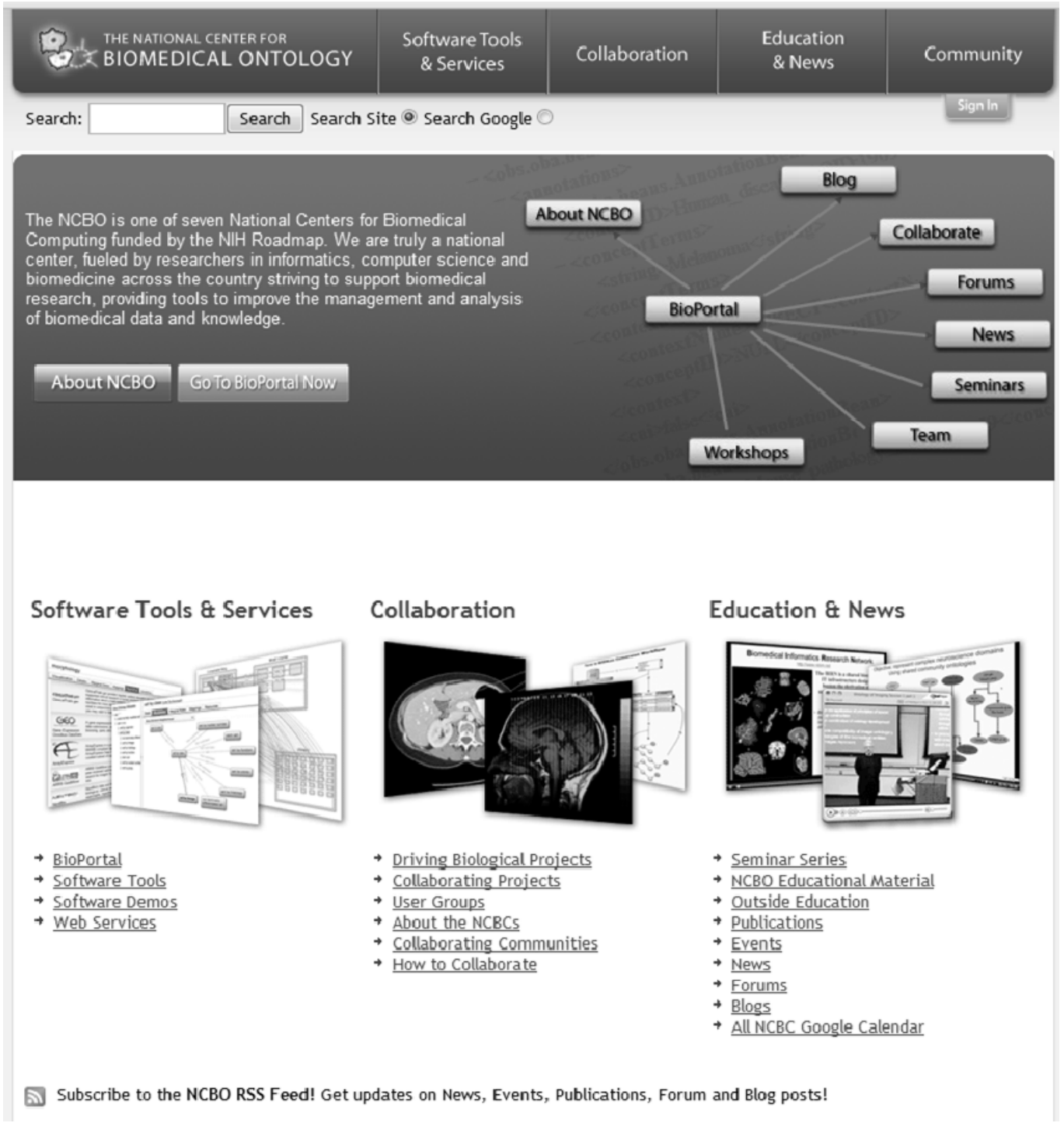
- One of three National Centers for Biomedical Computing launched by NIH in 2005
- Collaboration of Stanford, Mayo, Buffalo, Washington University, Johns Hopkins, and the Medical College of Wisconsin
- Primary goal is to make ontologies accessible and usable
- Research will develop technologies for ontology dissemination, use, indexing, alignment, and peer review

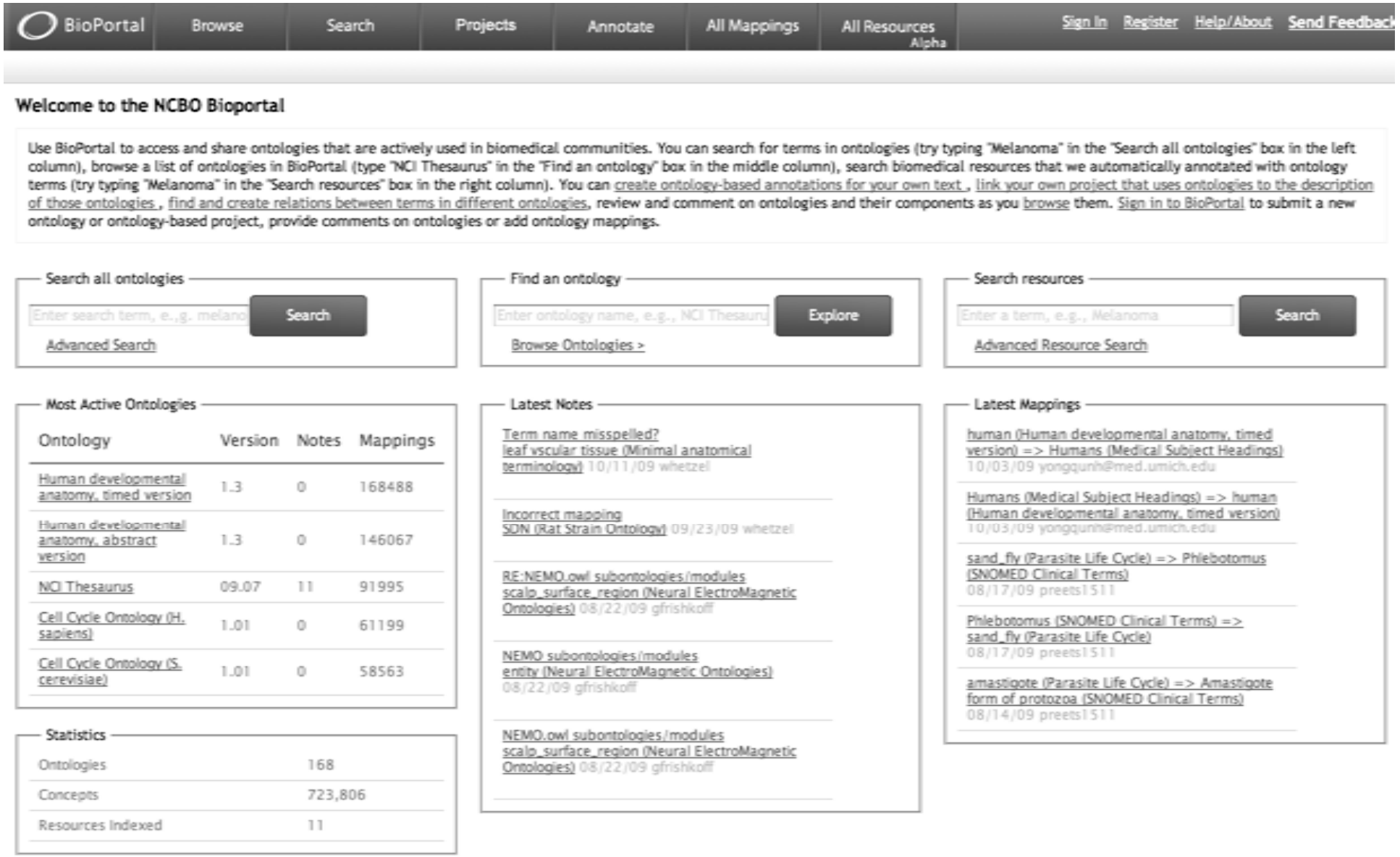


NCBO: Key activities

- We **create and maintain a library** of biomedical ontologies.
- We **build tools and Web services** to enable the use of ontologies.
- We **collaborate with scientific communities** that develop and use ontologies.

www.bioontology.org





http://bioportal.bioontology.org

BioPortal allows us to experiment with new models for

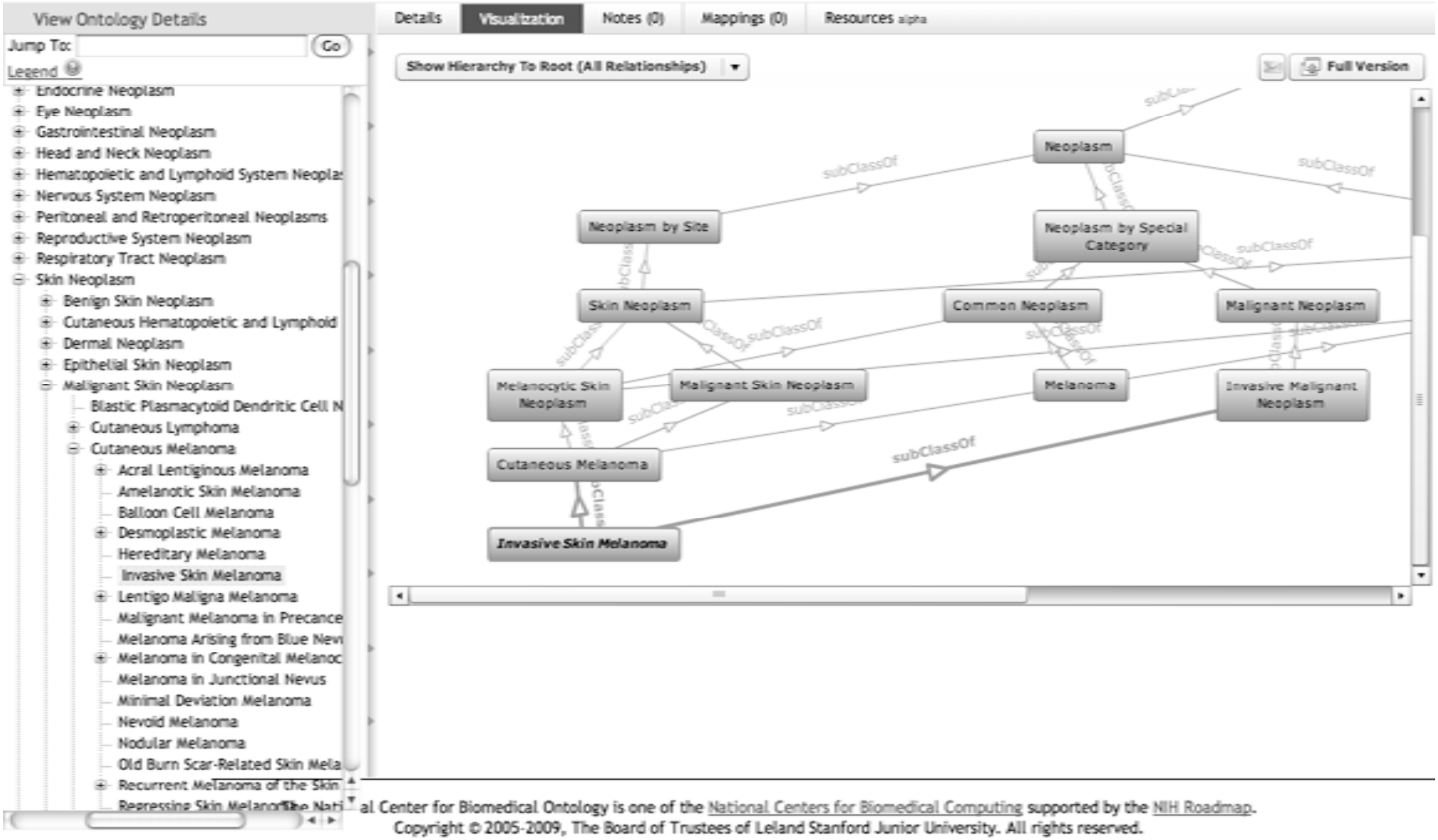
- Dissemination of knowledge on the Web
- Integration and alignment of online content
- Knowledge visualization and cognitive support
- Peer review of online content

Access all ontologies that are available in BioPortal: You can filter this list by category to display ontologies relevant for a certain domain (try selecting "Anatomy or Experimental Conditions" in the "Filter by category" menu below). You can also filter ontologies that belong to a certain group such as ontologies from the OBO Foundry, or ontologies from the Cancer Biomedical Informatics Grid (caBIG). Subscribe to the 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 biomedical ontology to BioPortal using the Submit New Ontology link (you need to sign in to see this link).

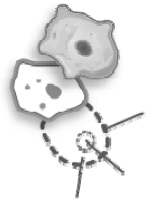
SUBMIT ONTOLOGY	Submit New Ontology
FILTER BY CATEGORY	All Categories
FILTER BY GROUP	All Groups — Link To This Filter
FILTER BY TEXT	

Subscribe to all updates

ONTOLOGY NAME	FORMAT	VERSION	AUTHOR	UPLOADED ON	GROUP	STATUS
ABA Adult Mouse Brain (ABA)	OWL	1.0	Allen Institute for Brain Science	08/08/2009		Explore
African Traditional Medicine (ATMO)	OBO Format	1.101	Ghislain Atemezing	06/28/2009		Explore
Amino Acid (amino-acid)	OWL	1.2	Nick Drummond, Georgina Moulton, Robert Stevens, Phil Lord	04/25/2009		Explore
Amphibian gross anatomy (AAO)	OBO Format	1.8	AmphiAnat list	07/30/2008	OBO Foundry	Explore
Amphibian taxonomy (ATO)	OBO Format	See Remote Site	AmphiAnat list	08/14/2009		
Animal natural history and life history (ADW)	PROTEGE	See Remote Site	Http://animaldiversity Administrators	04/27/2009		
Ascomycete phenotype ontology (APO)	OBO Format	1.6	Fungal_anatomy Administrators	09/01/2009		Explore
Basic Formal Ontology (BFO)	OWL	1.1		07/24/2009		Explore
Basic Vertebrate Anatomy (basic-vertebrate-gross-anatomy)	OWL	1.1		01/16/2007		Explore
Bilateria anatomy (BILA)	OBO Format	See Remote Site	Thorsten Heinrich	04/13/2009		
Biological imaging methods (FBbi)	OBO Format	1.1	Image Administrators	07/30/2008		Explore



Users can view and create mappings



BioPortal | Browse | Search | Projects | Annotate | All Mappings | All Resources Alpha | Sign In

Human developmental anatomy, timed version | Cell Line Ontology | Cell Cycle Ontology (H. sapiens)

Cell Cycle Ontology (H. sapiens) **Version 1.01**

protein | Link Here | Subscribe

View Ontology Details

Jump To: Go

Legend

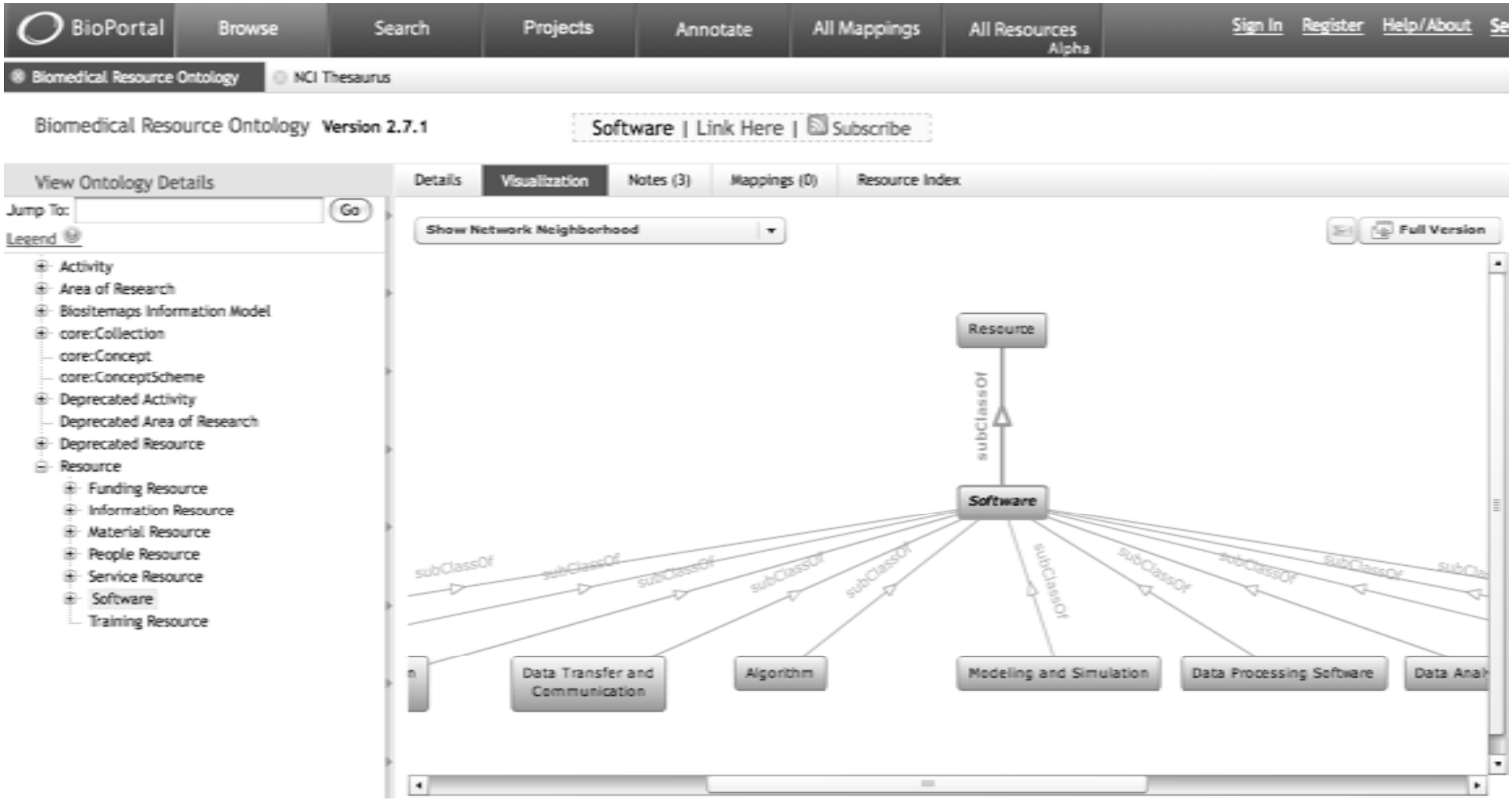
- biological entity
  - biological continuant
    - biological reference
    - cell cycle continuant
    - cellular_component
    - gene
      - cell cycle gene
    - gene product
      - protein
        - cell cycle protein
        - modified protein
    - molecular_function
    - organism
    - small molecule
  - biological process

Details | Visualization | Notes (0) | Mappings (27) | Resource Index

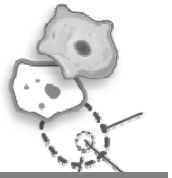
"New Point-to-Point Mapping"

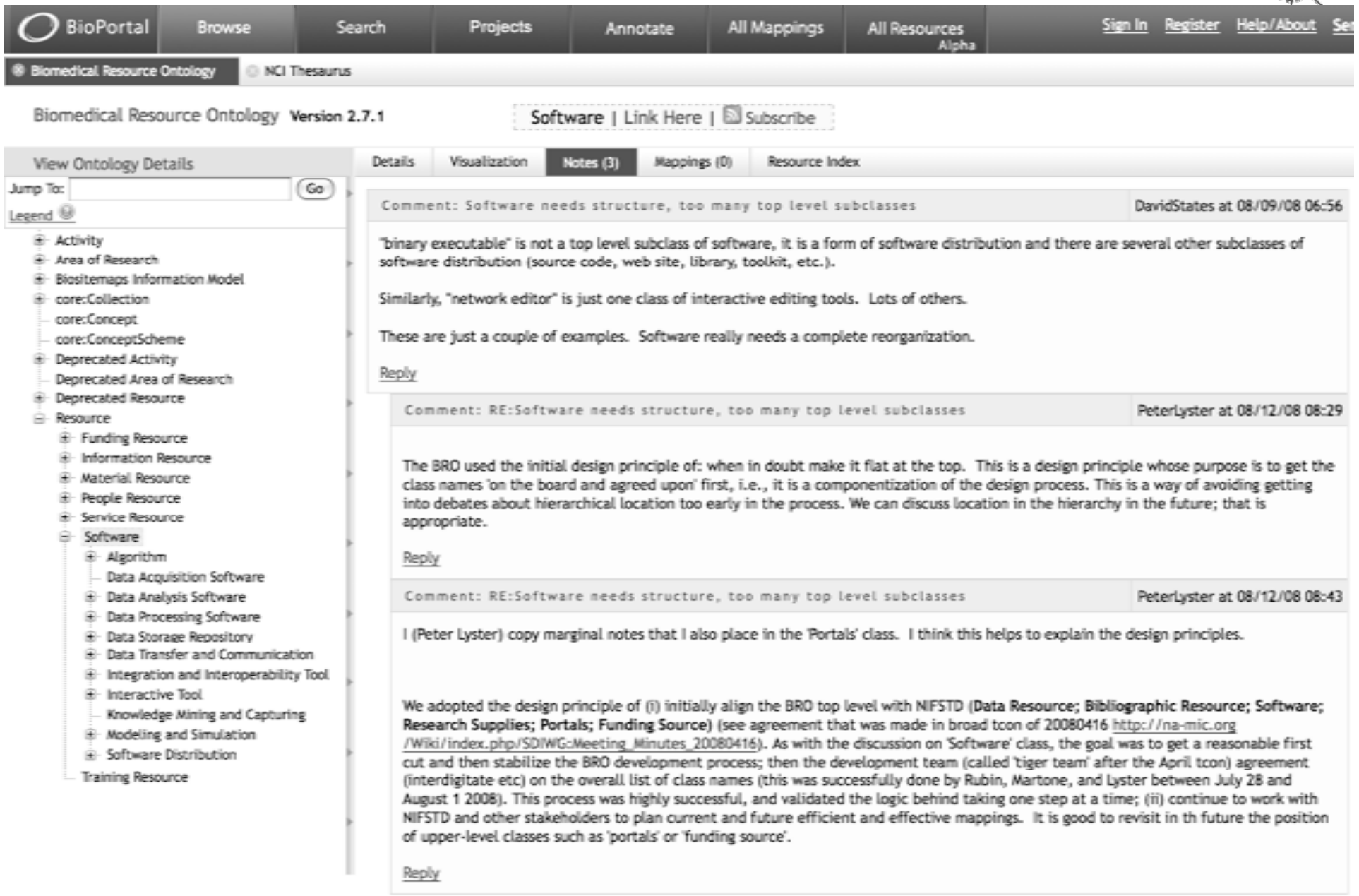
MAPPING TO	SOURCE	MAPPED BY	MAPPED ON	NOTES
Protein (Cardiac Electrophysiology Ontology)	LOOM	amirg	08/13/09	View Notes
Protein (Galen)	LOOM	amirg	08/13/09	View Notes
protein (SNP-Ontology)	LOOM	amirg	08/13/09	View Notes
protein (Cell Cycle Ontology (S. pombe))	LOOM	amirg	08/13/09	View Notes
protein (Sequence Ontology)	LOOM	amirg	08/13/09	View Notes
protein (Cell Cycle Ontology (S. cerevisiae))	LOOM	amirg	08/13/09	View Notes
protein (Cell Cycle Ontology (A. thaliana))	LOOM	amirg	08/13/09	View Notes
Protein (Foundational Model of Anatomy)	LOOM	amirg	08/13/09	View Notes

Biomedical Resource Ontology in BioPortal

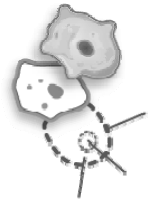


“Notes” in BioPortal





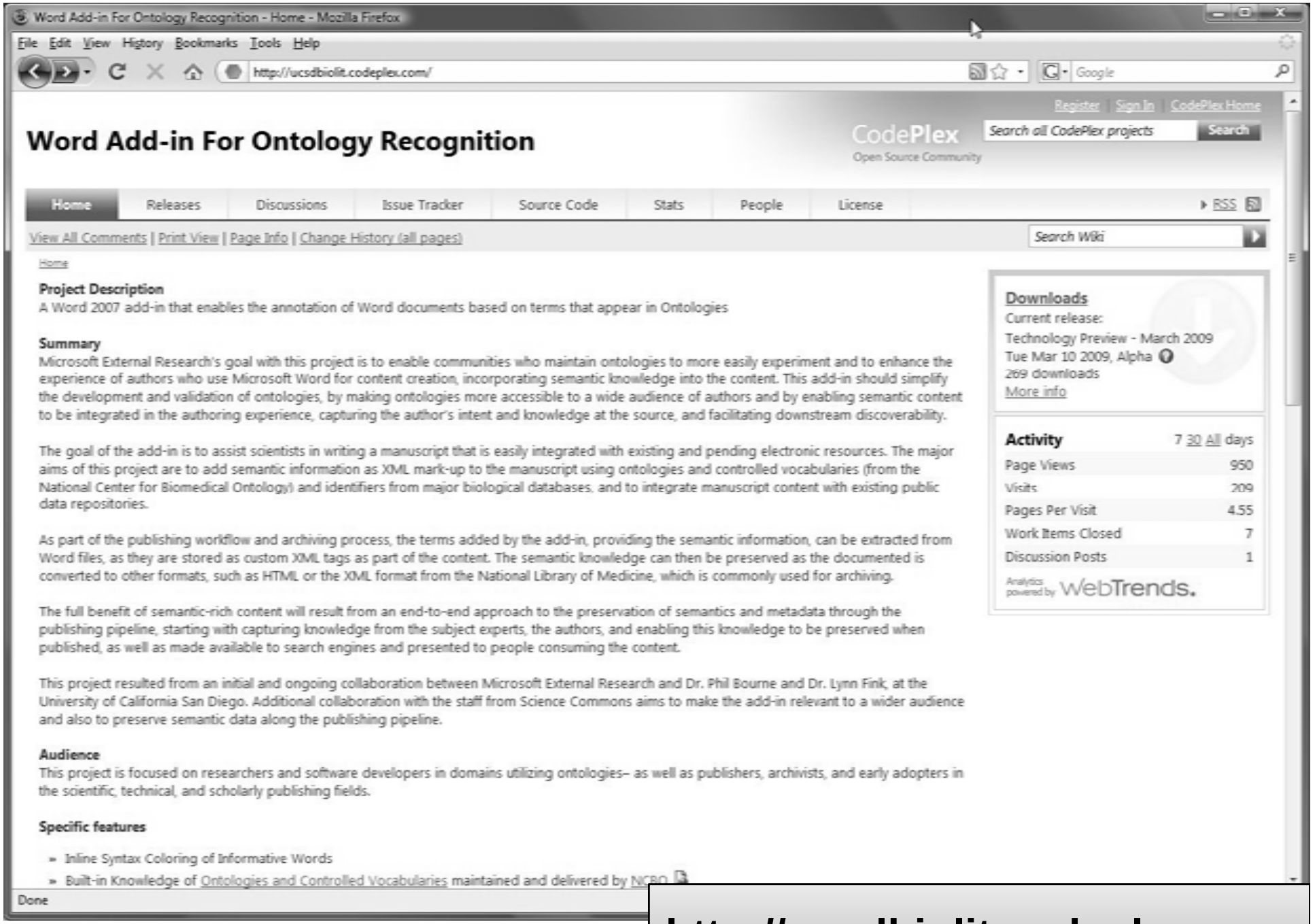
Community-Based Annotation as Peer Review



- Makes ontology evaluation a democratic process
- Assumes users' application of ontologies will lead to insights not achievable by inspection alone
- Assumes end-users will be motivated to comment on and engage in dialog about ontologies in the repository

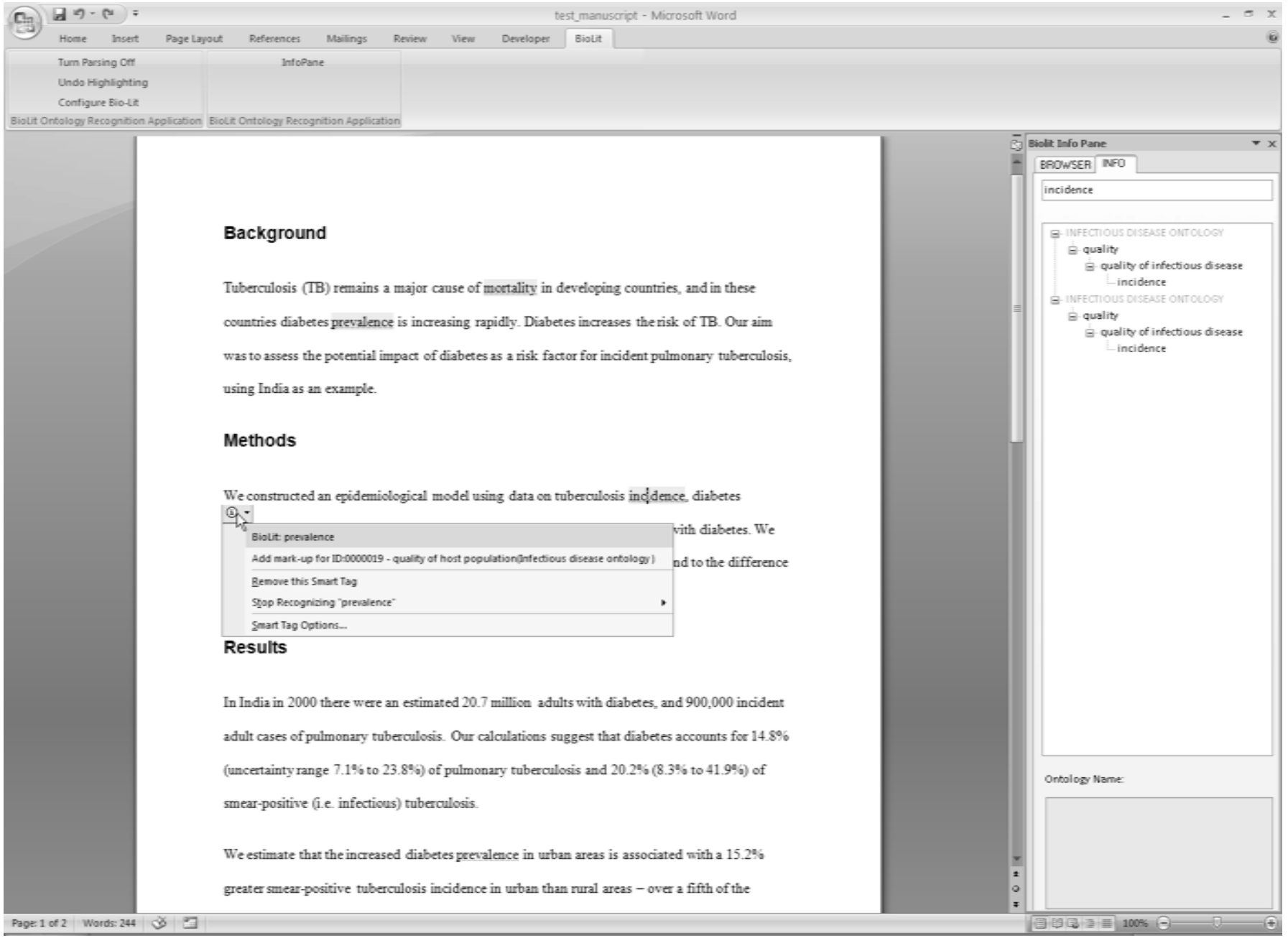
BioPortal is building an online community of users who

- Develop, upload, and apply ontologies
- Map ontologies to one another
- Comment on ontologies via “notes” to give feedback
  - To the ontology developers
  - To one another
- Make proposals for specific changes to ontologies
- Stay informed about ontology changes and proposed changes via “push” technology
- Incorporate BioPortal services into their own technologies

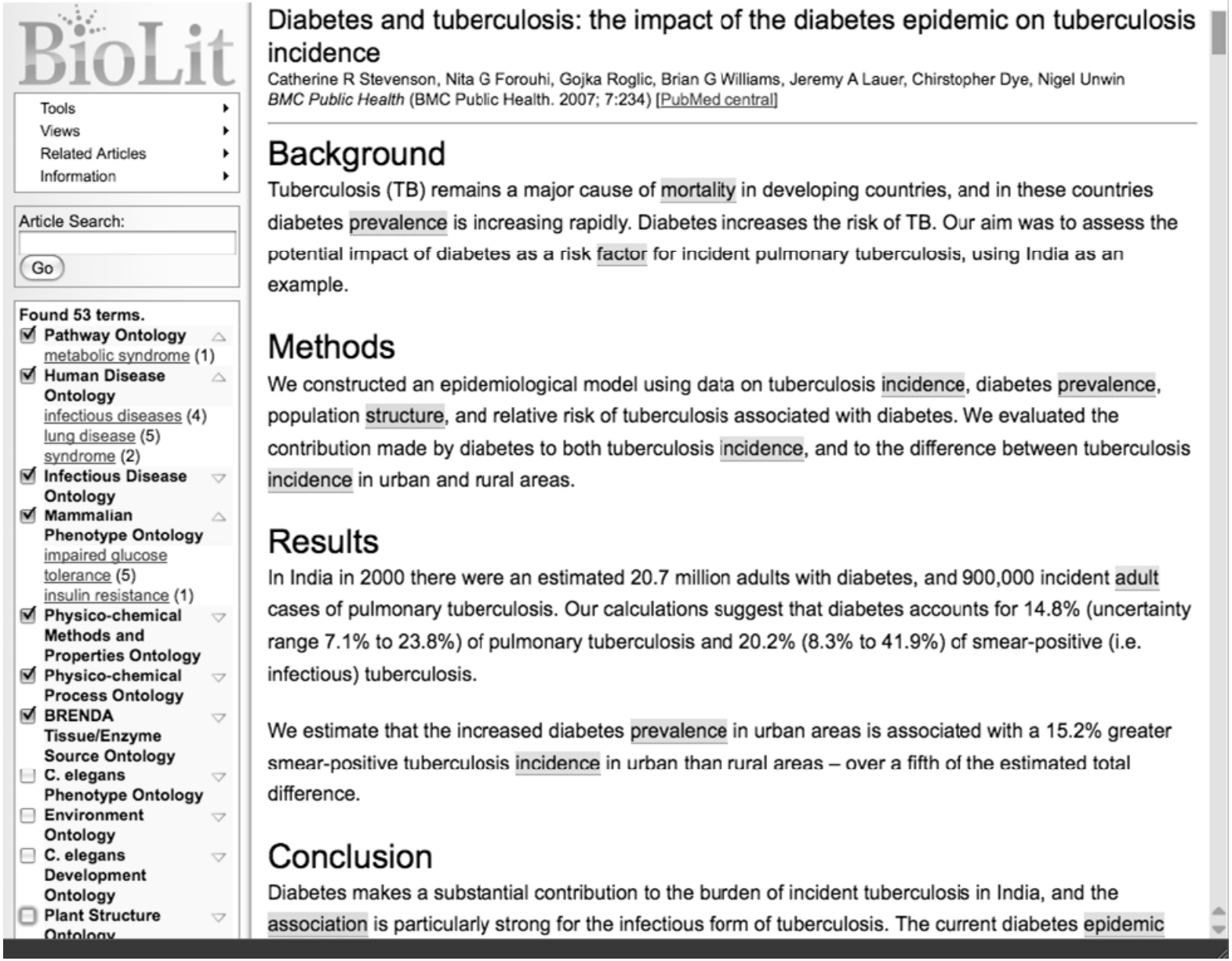


http://ucsdbiolit.codeplex.com

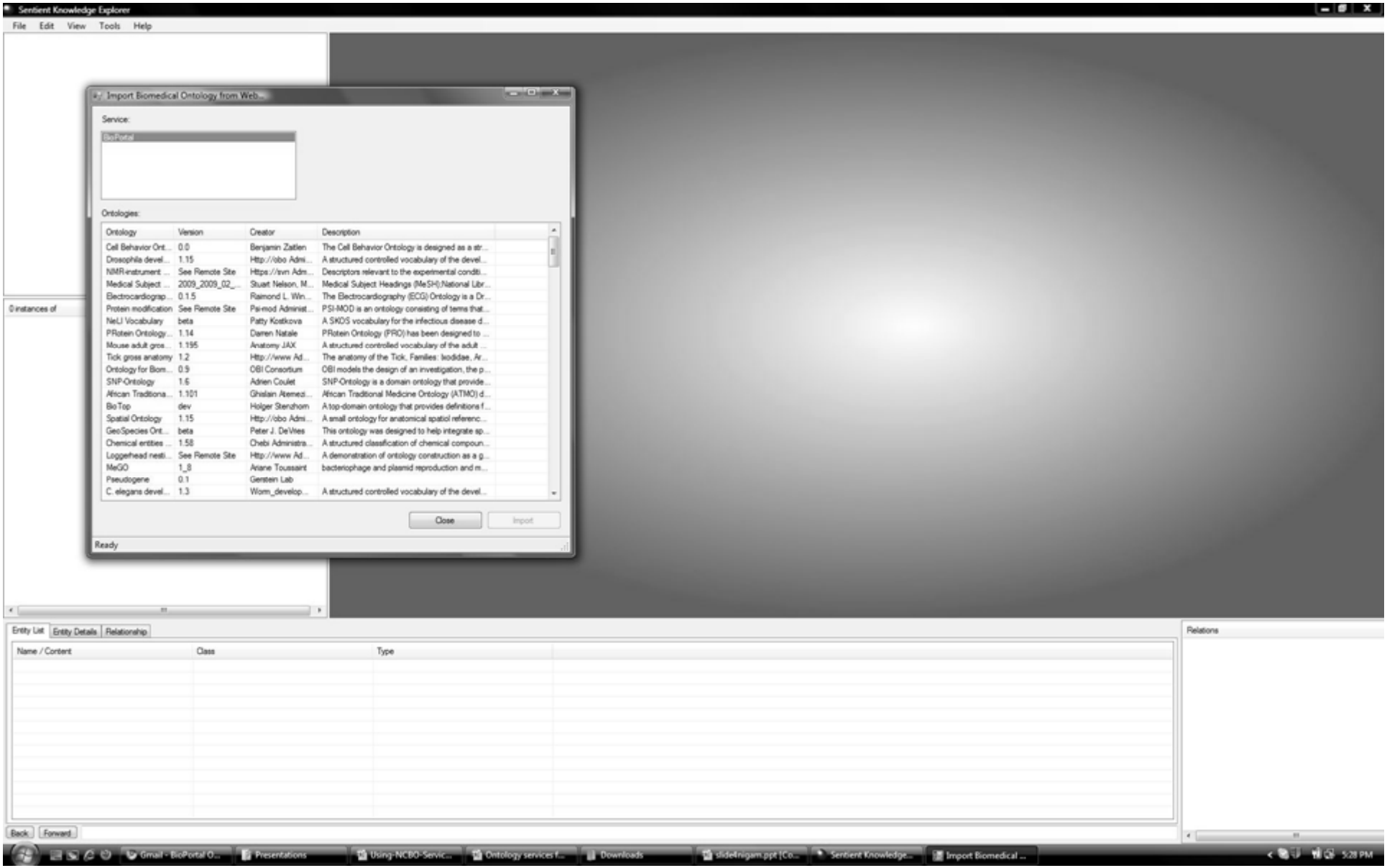
Automated recognition of ontology terms *before* publication



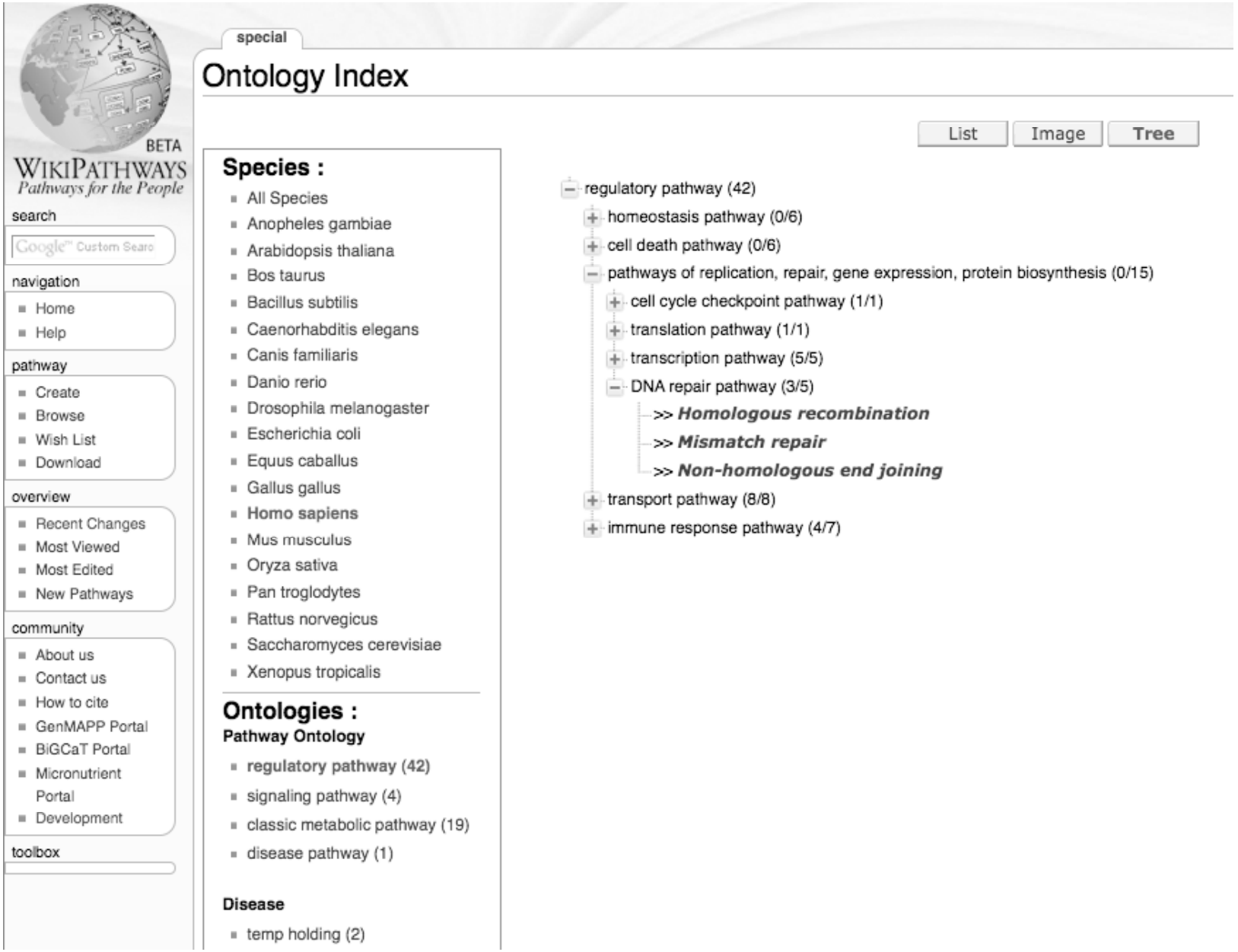
BioLit Web resource: automated recognition of ontology terms and database IDs *after* publication



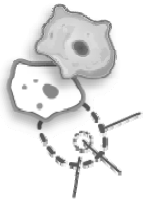
IO informatics uses Ontology Services



Wikipathways uses Ontology Services



Ontology Tags



Pathway Ontology : cell adhesion signaling pathway, immune response pathway, inflammatory response pathway
Disease : Signal Transduction Pathway Deregulation, disease of response to stimulus
Cell Type : lymph gland plasmatocyte

dna repair

altered DNA repair pathway
Pathway ontology

DNA repair pathway
Pathway ontology

Abnormal DNA Repair
Human disease

DNA Repair Deficiency
Human disease

To add a tag, either select from the available ontology trees below or type a search term in the search box.

Disease Cell Type

Ontology Tags

Pathway Ontology : cell adhesion signaling pathway, immune response pathway, inflammatory response pathway
Disease : Signal Transduction Pathway Deregulation, disease of response to stimulus
Cell Type : lymph gland plasmatocyte

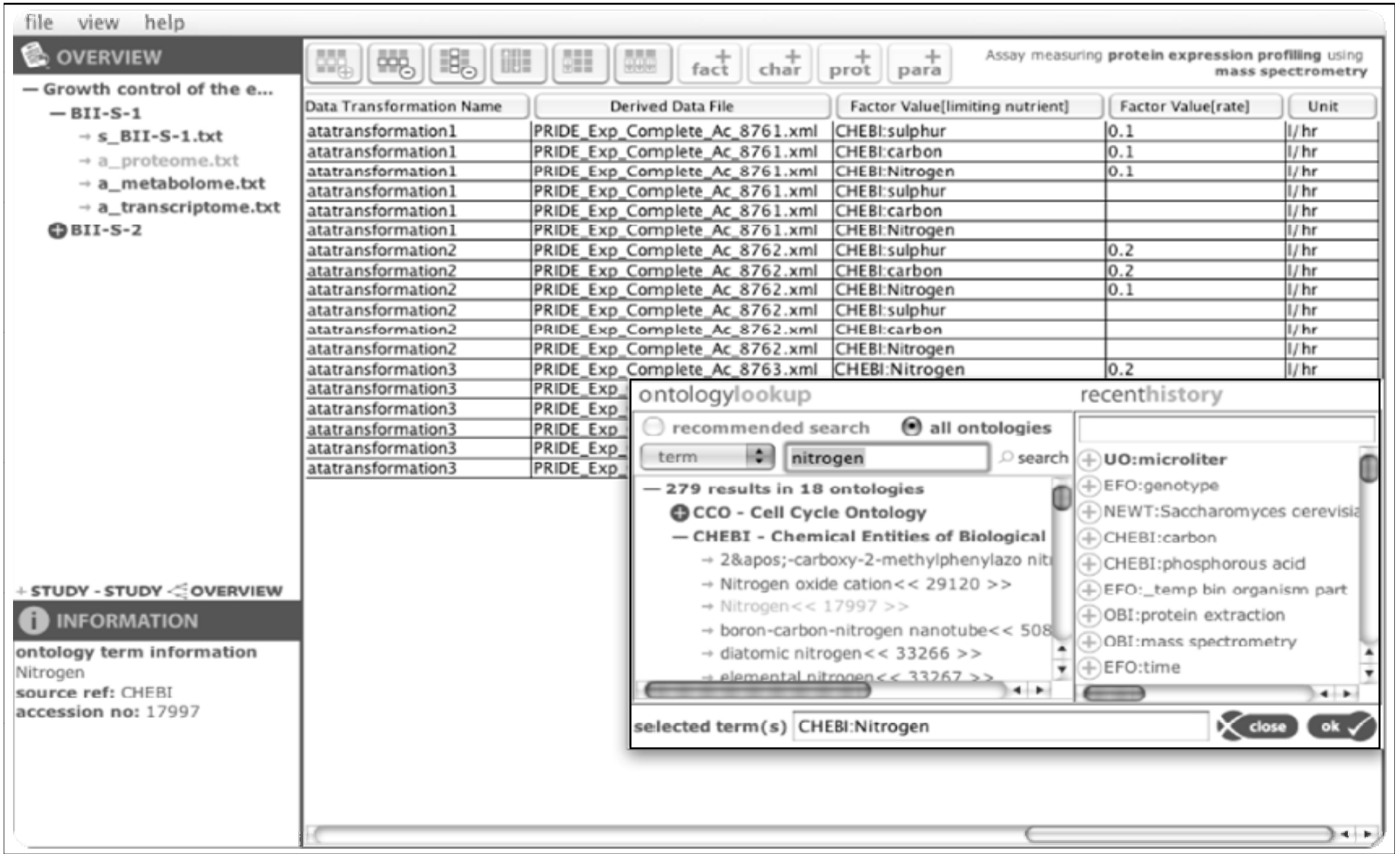
Term : altered DNA repair pathway
ID : PW:0000292

altered DNA repair pathway

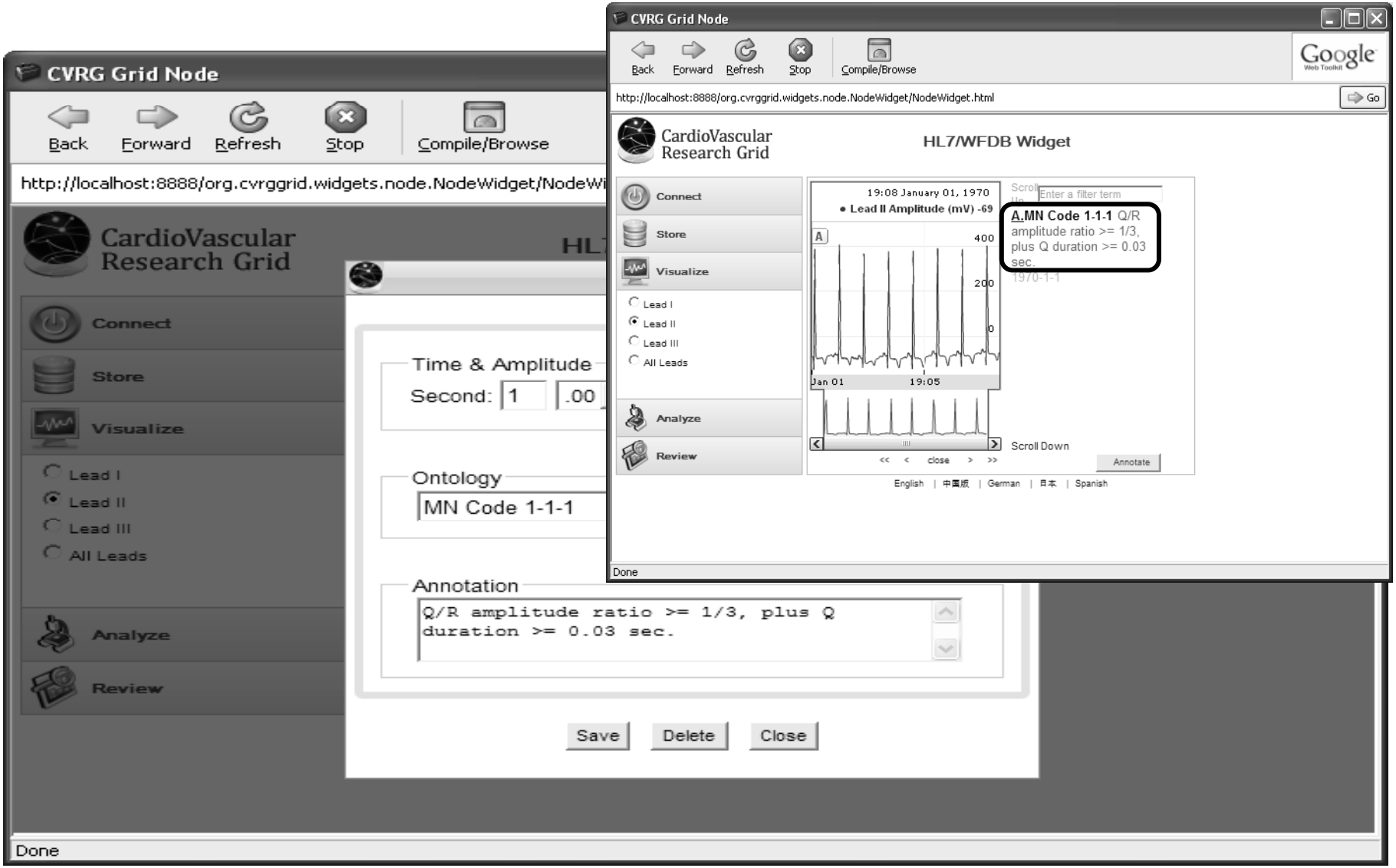
To add a tag, either select from the available ontology trees below or type a search term in the search box.

Pathway Ontology Disease Cell Type

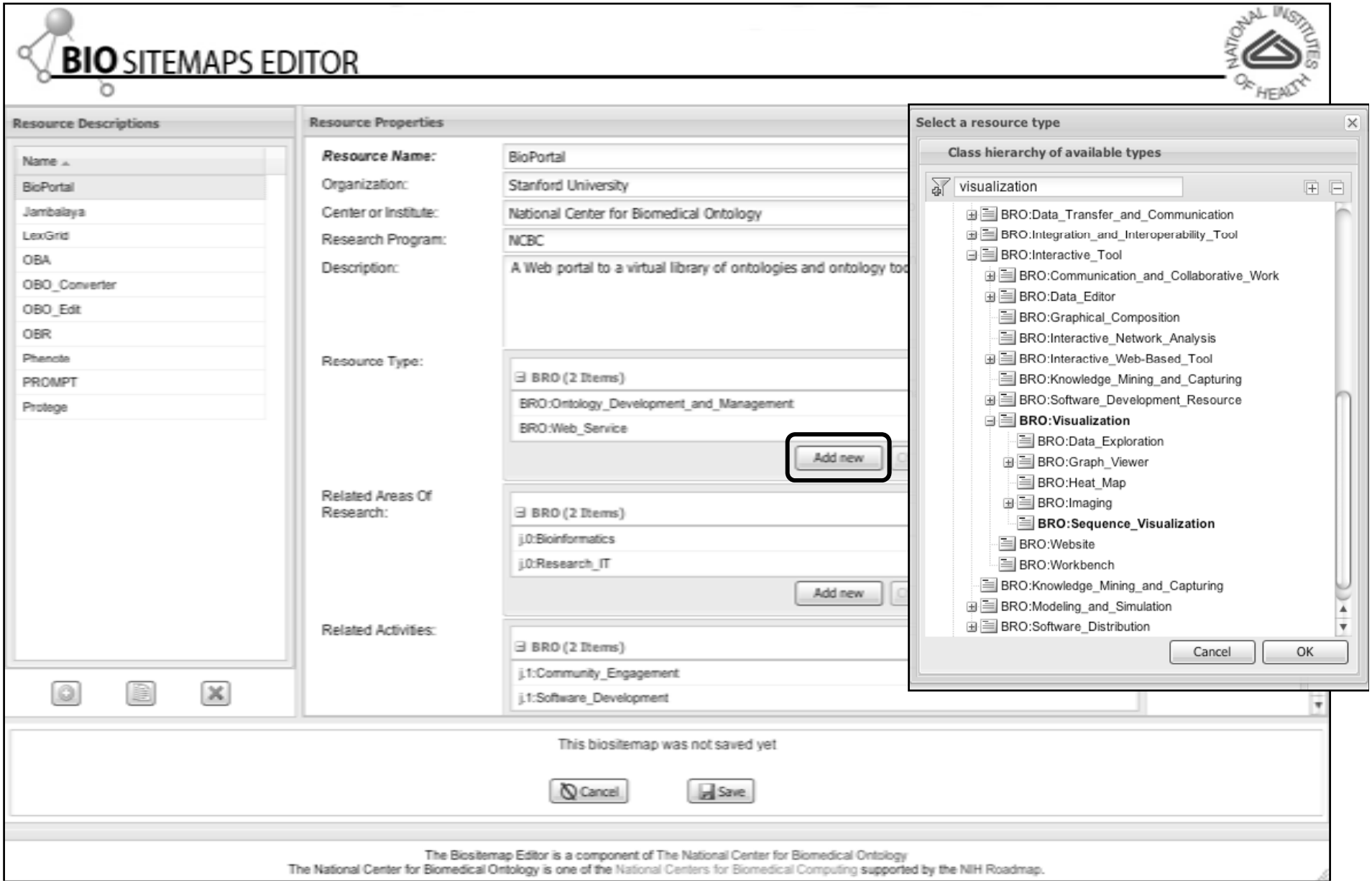
ISAcreator uses Ontology Services



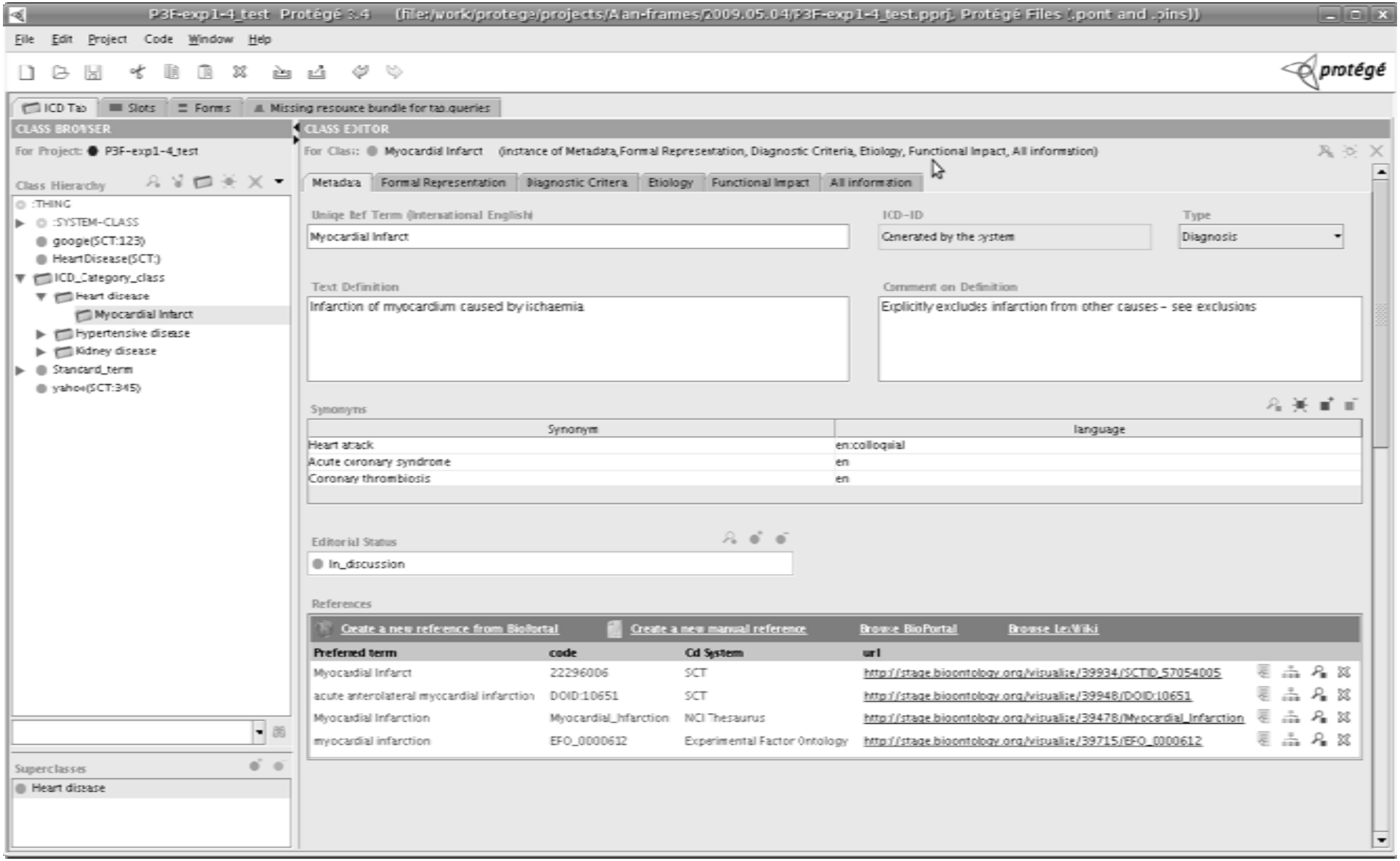
ECG Gadget uses Ontology Services



Biositemaps Editor



Protégé BioPortal-reference plug-in



Simbios uses NCBO Ontology Web Widgets

7. Classify your project **(required)**

a) Choose one or more terms from the Biological Resource Ontology that most closely describe your project. These will be used in searches so others can more easily find your work.

1) Search for a term by starting to enter it in the box below - all terms that contain what you entered will be shown below the box. Select one of these, *or*. . .

2) Alternatively, you can try browsing the Biological Resource Ontology. Only terms under BRO:Resource are allowed. You are most likely to find suitable terms under BRO:Resource → BRO:Software → BRO:Modeling_and_Simulation. Enter the term or any part of it in the box below *without* the BRO prefix and continue as in 1).

Restriction: only terms from the BRO:Resource branch of the Biological Resource Ontology allowed.

Samples: *Neuromuscular_Model, Molecular_Dynamics*

Ontology terms:

Computational_Model	Remove
Protein_Model	Remove
Standalone_Application	Remove
Structure-Based_Protein_Classification	Remove

Add (click after choosing a term)

b) Please also choose one or more keywords for your project. These will also be used in searches so others can more easily find your project.

Keywords: (required)

allosteric communication	Remove
allostery	Remove

Add (one at a time)

To save changes, click Save Project Info **here or at the bottom of the page.**

8. Short Purpose/Synopsis **(required)**

Please provide a synopsis of your project. This will be displayed in the search results.

Restriction: 255 characters

Samples:

1) Provide an easy-to-use application for manipulating RNA structures

2) Provides the code base for creating, simulating, and visualizing three-dimensional finite-element models of skeletal muscle.

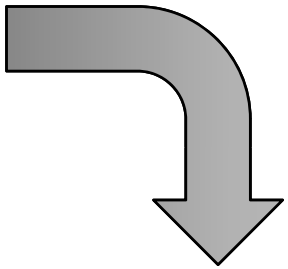
3) Geometric models in VTK/XML PolyData format for download, for use in cardiovascular applications.

NCBO Annotator: The Basic Idea

Process textual metadata to tag text automatically with as many ontology terms as possible.

GDS Summary

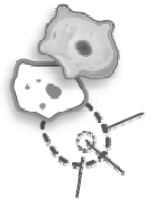
Accession:	GDS906 ☞ View Expression (GEO profiles)		
Title:	Bladder smooth muscle cell response to mechanical stretch		
Data Set type:	gene expression array-based (RNA / in situ oligonucleotide)		
Summary:	Expression profiling of cultured bladder smooth muscle cells subjected to repetitive mechanical stimulation for 4 hours. Chronic overdistension results in bladder wall thickening, associated with loss of muscle contractility. Results identify genes whose expression is altered by mechanical stimuli.		
Platform:	GPL96: Affymetrix GeneChip Human Genome U133 Array Set HG-U133A		
Citations:	Adam RM, Eaton SH, Estrada C, Nimgaonkar A et al. Mechanical stretch is a highly selective regulator of gene expression in human bladder smooth muscle cells. *Physiol Genomics* 2004 Dec 15;20(1):36-44. PMID: 15467014		
Sample organism:	Homo sapiens	**Platform organism:**	Homo sapiens
Feature count:	22283	**Value type:**	count
Series:	GSE1595	**Series published:**	07/25/2004
Last GDS update:	12/20/2004		



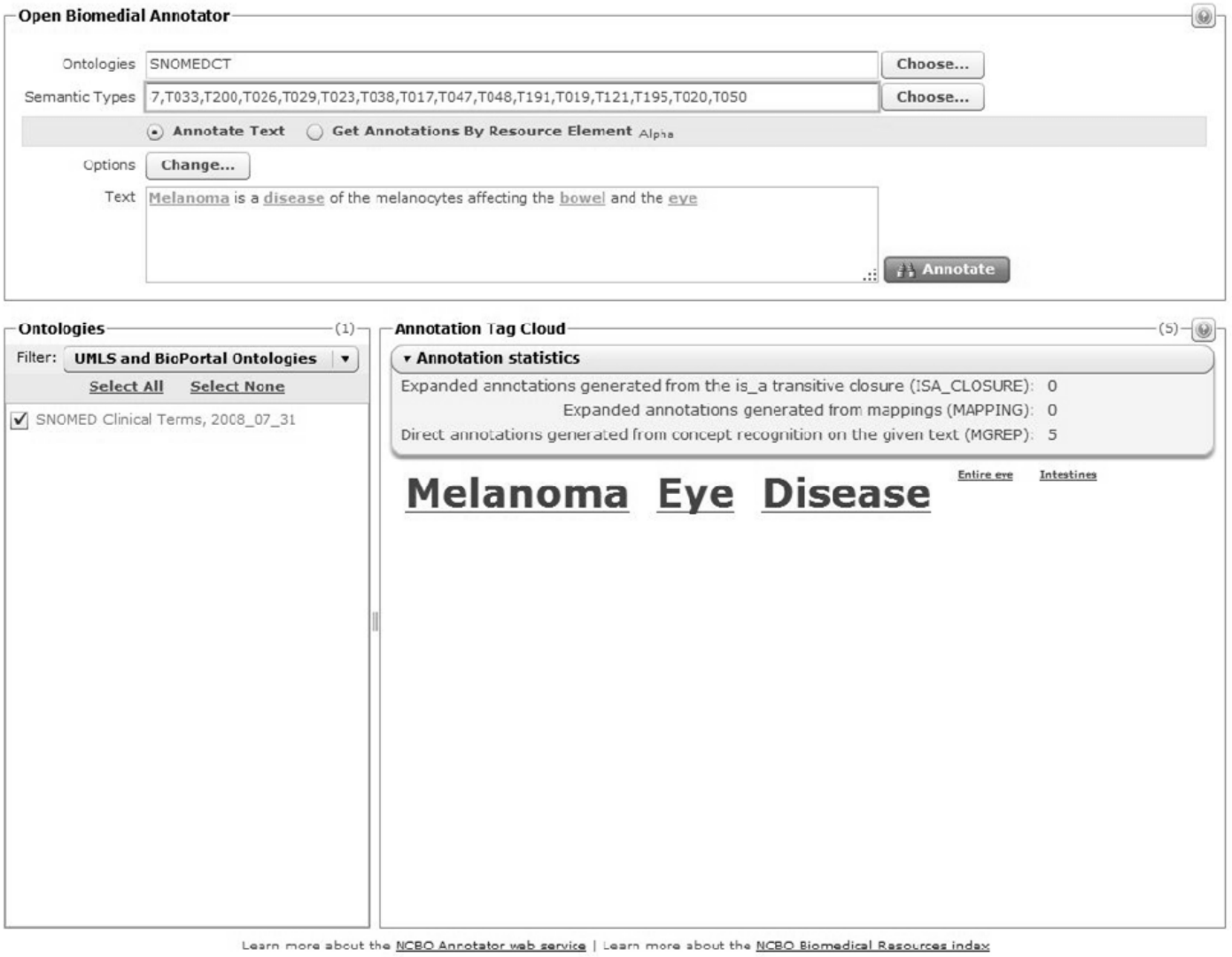
Expression, Expression of bladder, bladder, smooth, bladder muscle, muscle, smooth muscle, cells, mechanical, mechanical stimulation, stimulation, Chronic, results, bladder overdistension, associated, associated with, with, loss, genes, altered

NCBO Annotator

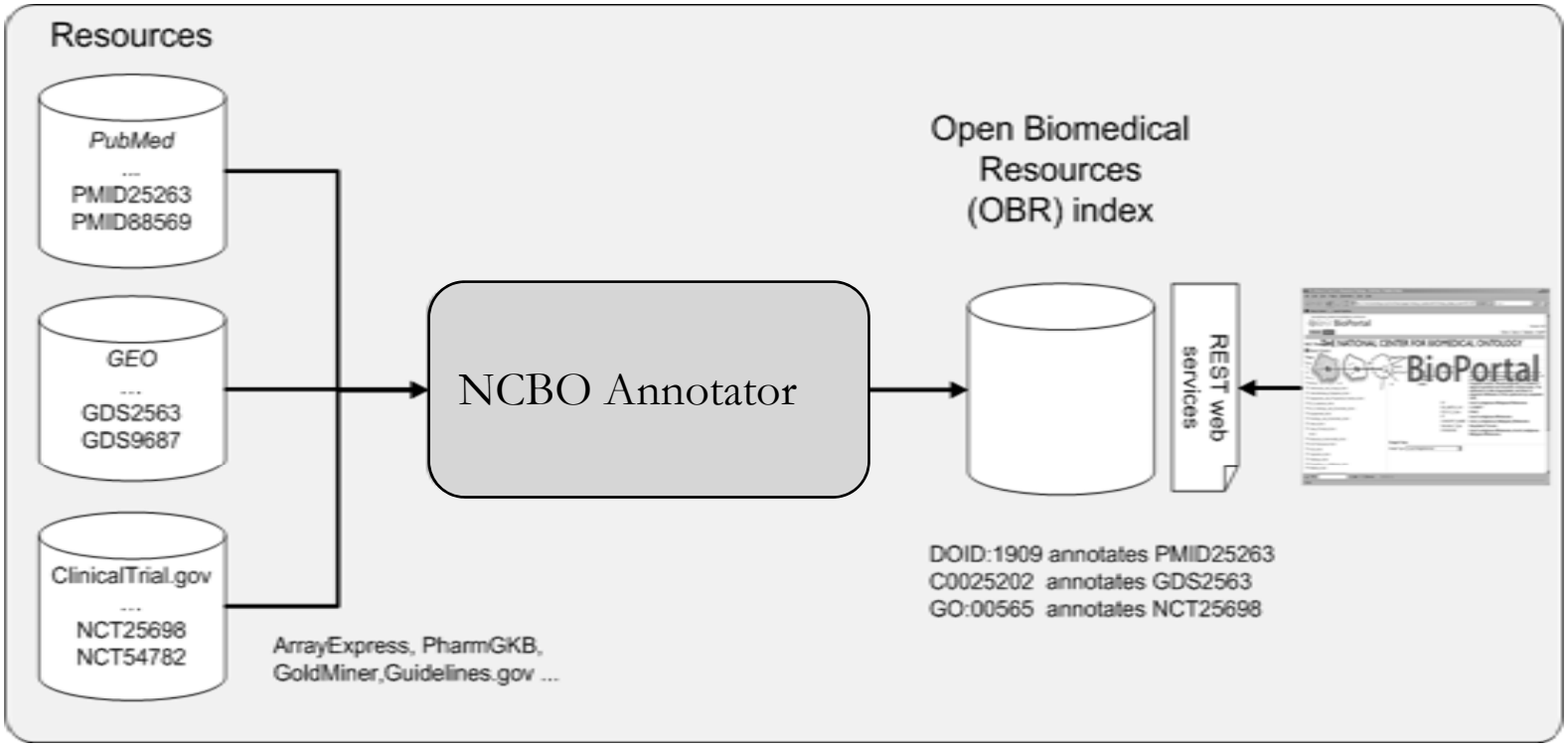
http://bioportal.bioontology.org/annotate



- Give your text as input
- Select your parameters
- Get your results … in text or XML

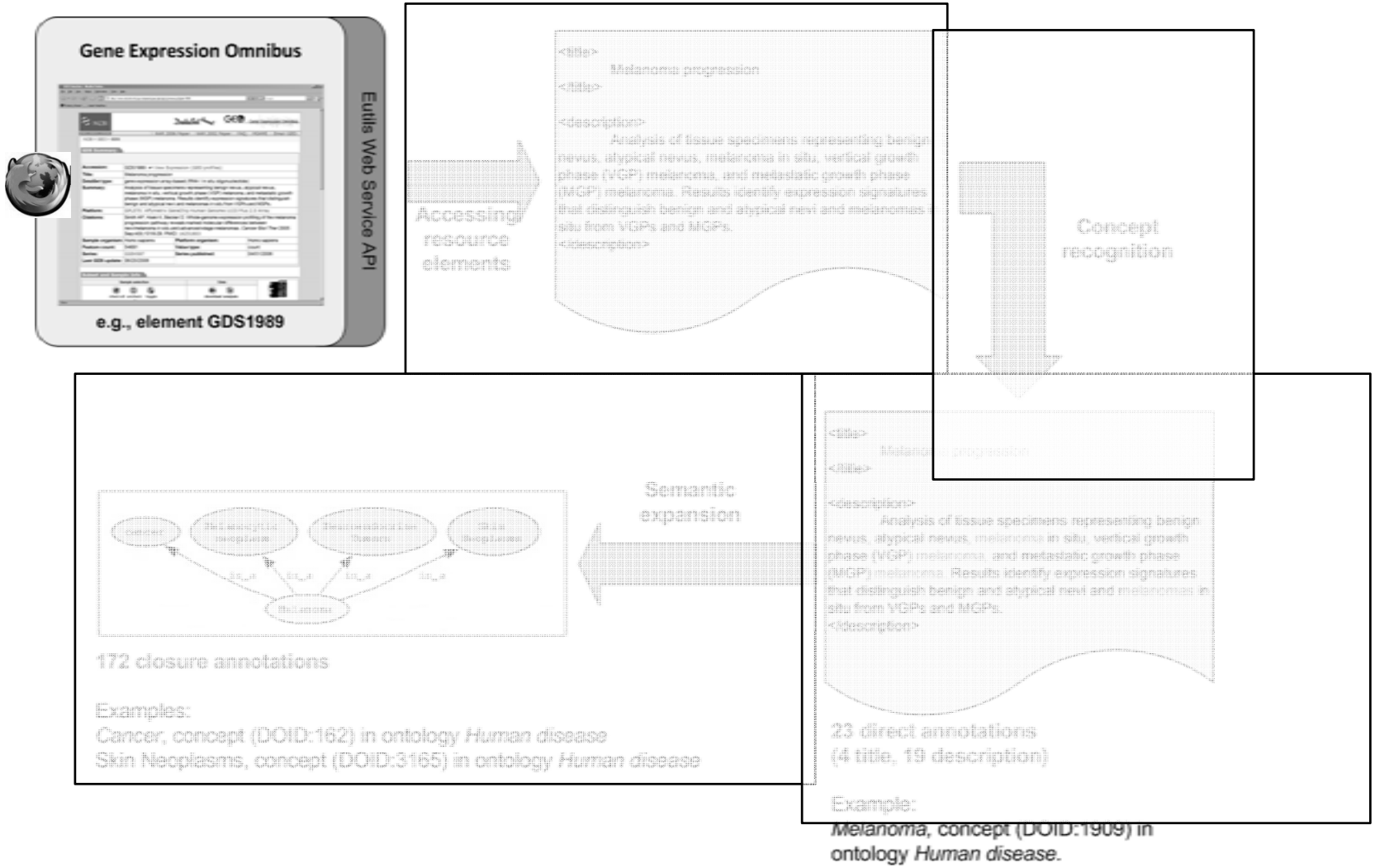


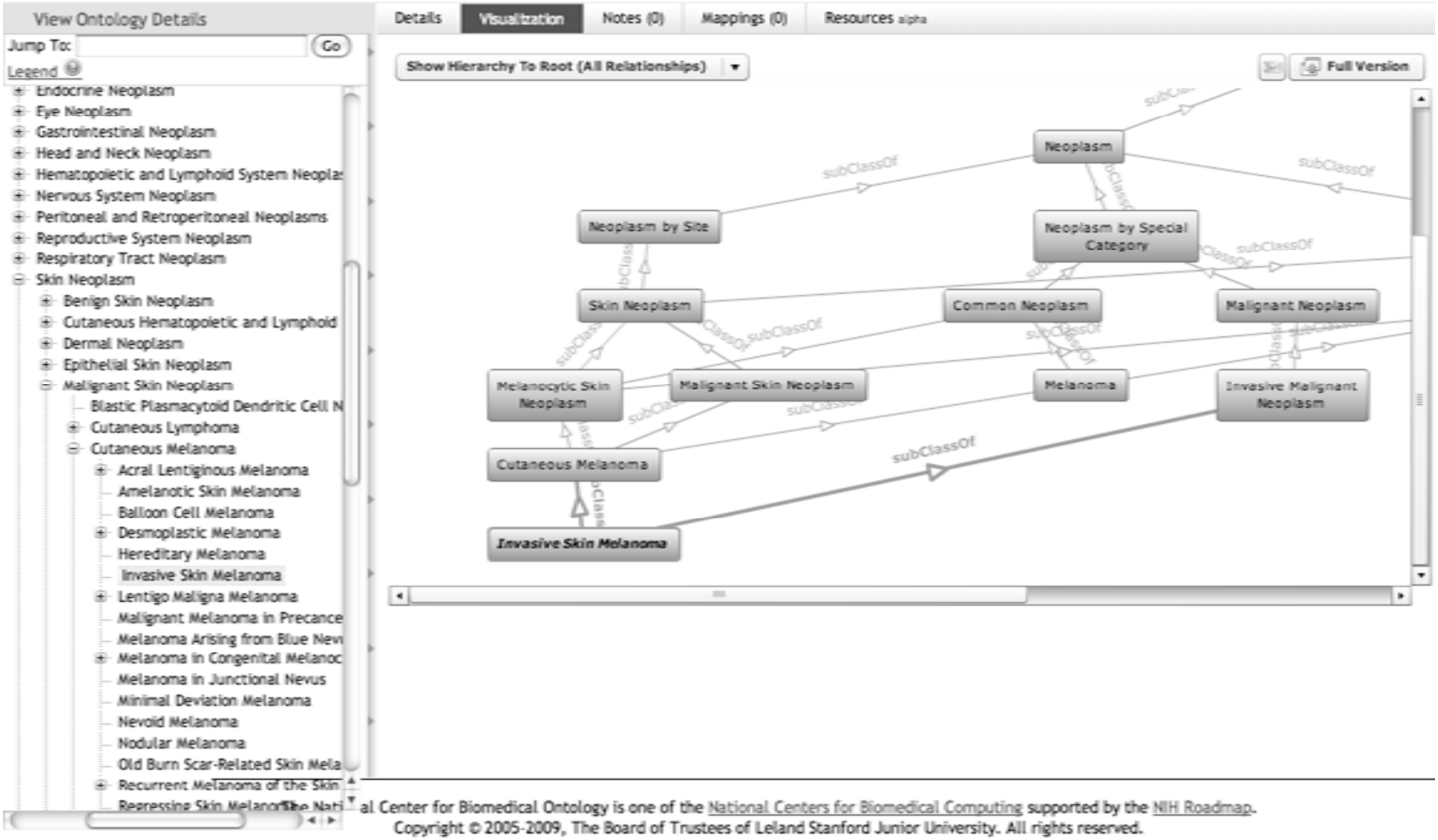
Resources Index: The Basic Idea



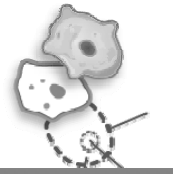
- The index can be used for:
  - Search
  - Data mining

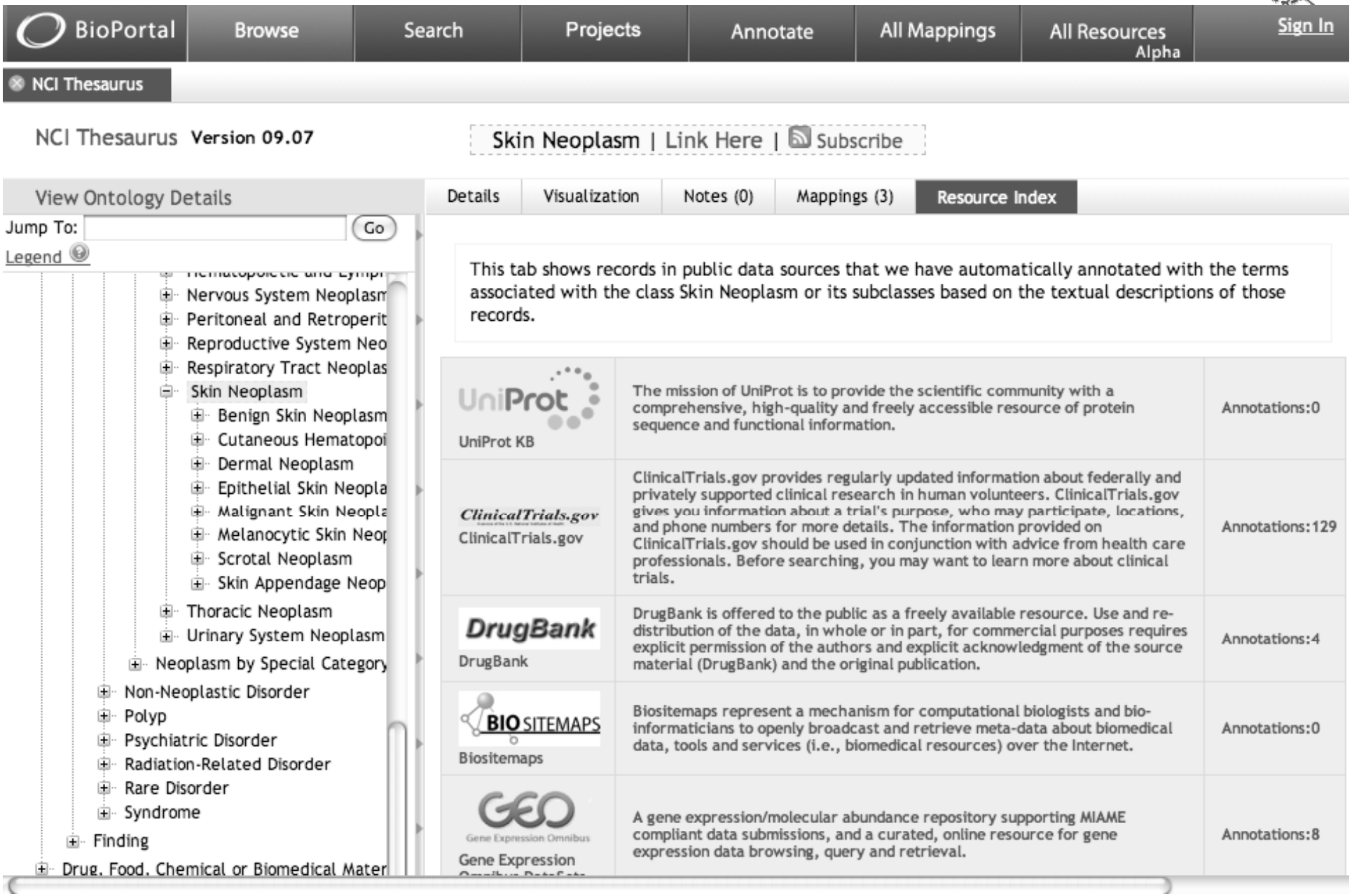
Example: Indexing GEO



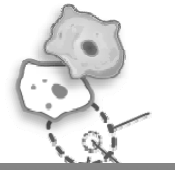


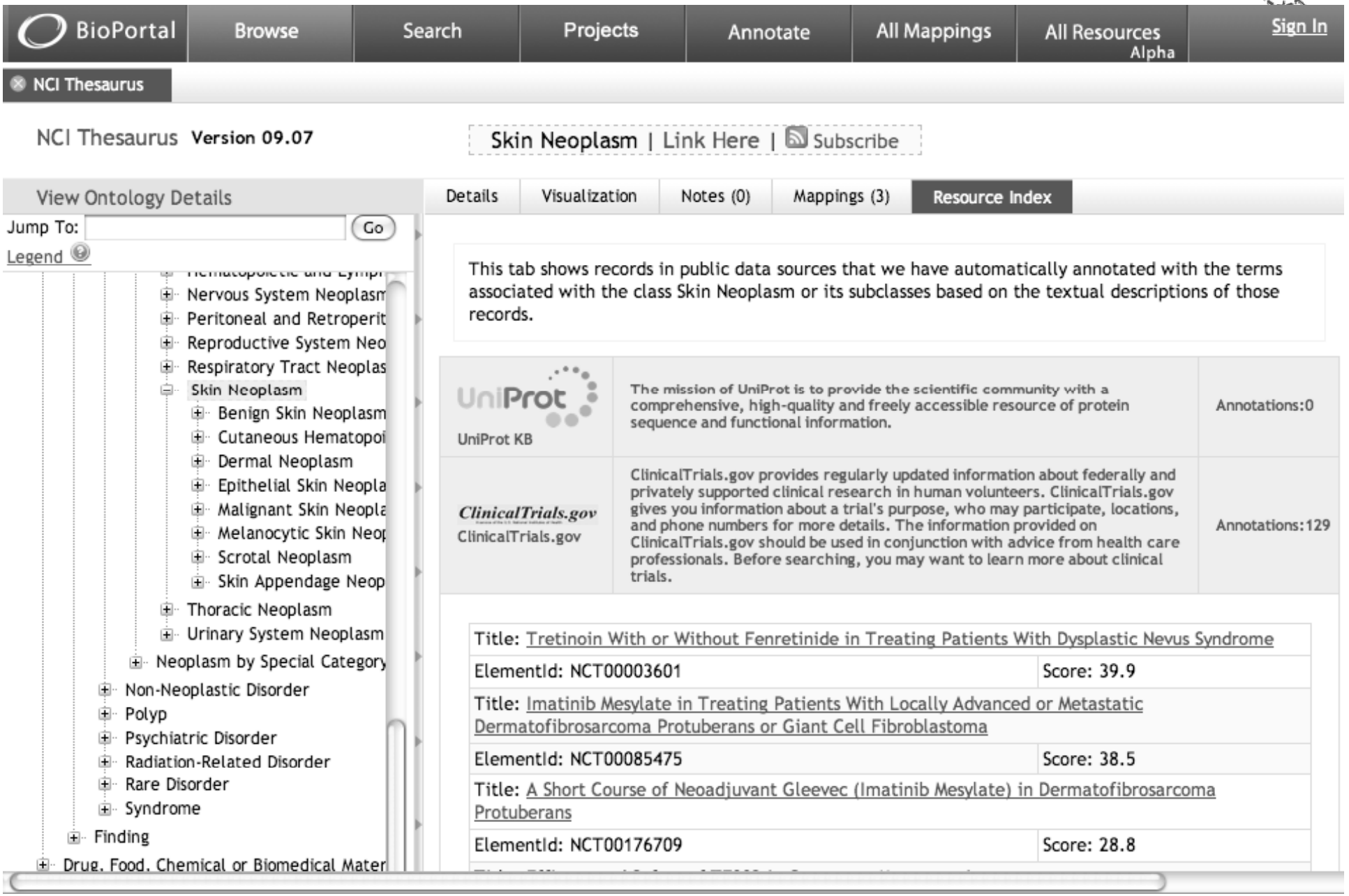
NCBO Indexed Resources



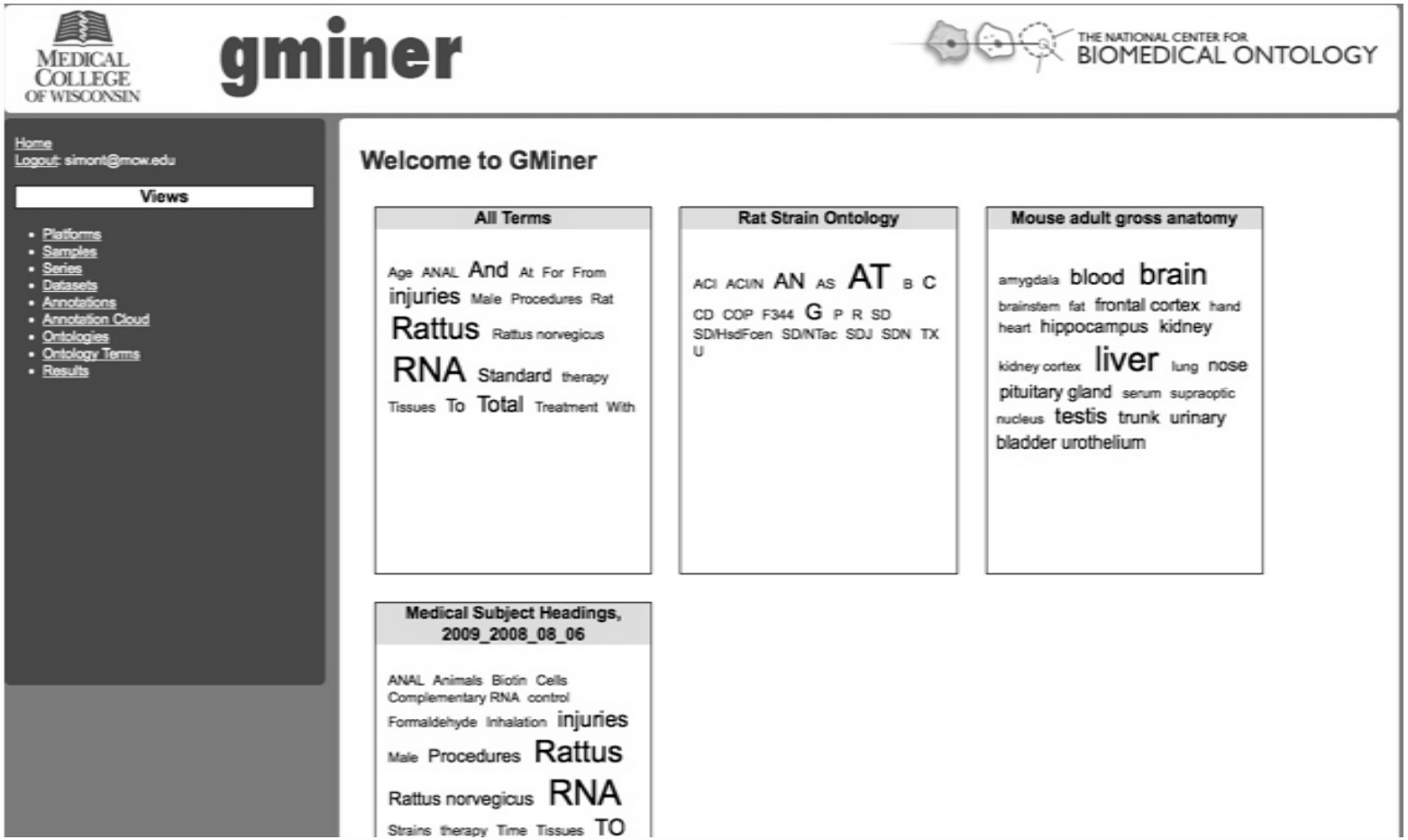


Links to specific resources

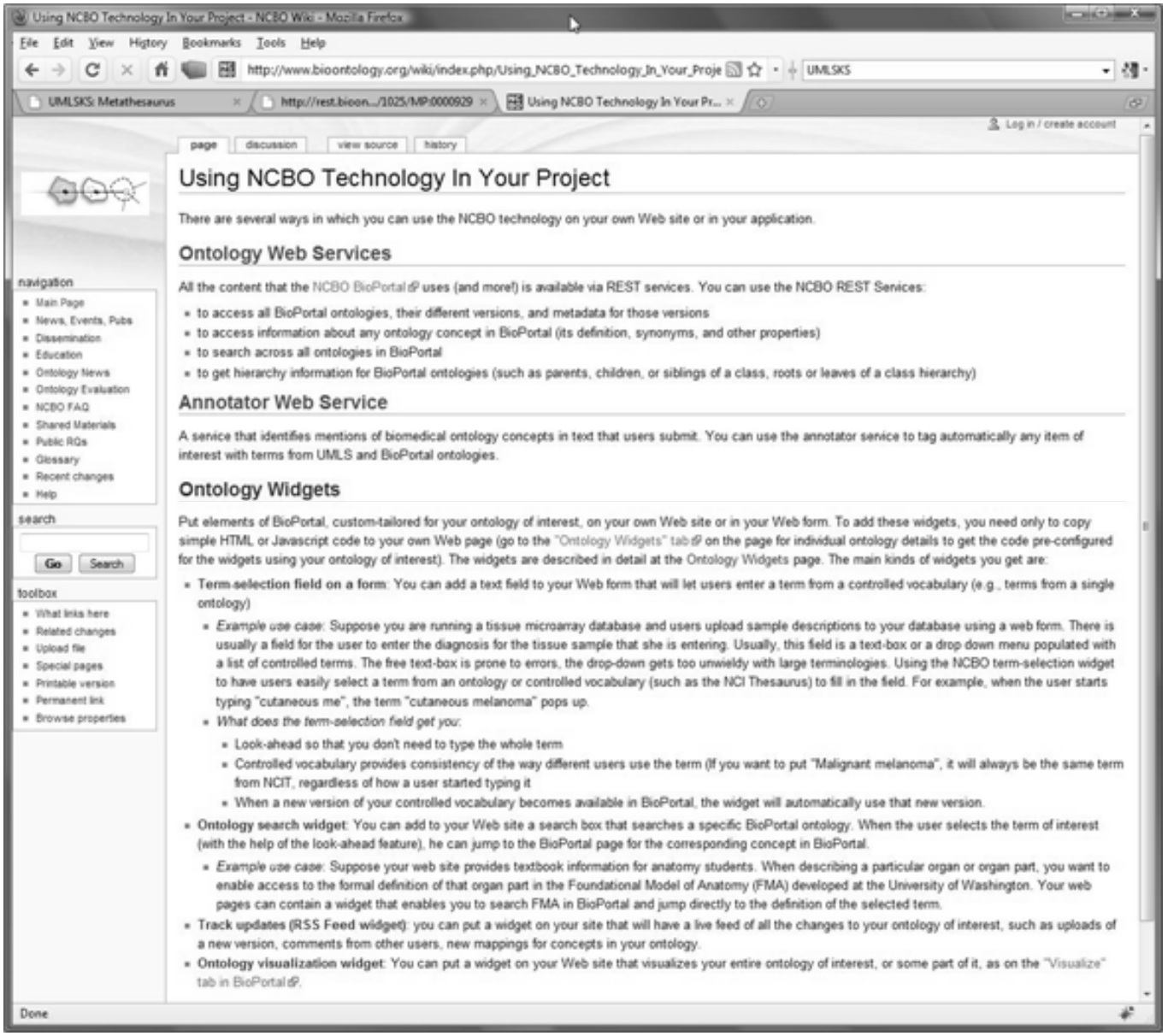




GMiner uses NCBO Annotation Services



See our wiki to learn more!



www.bioontology.org/wiki/index.php/Using_NCBO_Technology_In_Your_Project

Ways to collaborate with NCBO

- Be a user!
- Propose a Driving Biological Project (DBP)
- Get a collaborating research grant (NIH R01)
- Initiate an industrial or academic joint projects

Current Driving Biological Projects

- **caNanoLab**: Workers at Stanford and Wash U developing searchable catalog of therapeutic nanoparticles

caNanoLab

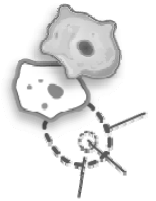
- **Cardiovascular Research Grid**: Workers at Hopkins developing ontology of ECGs and electrophysiological studies

CardioVascular Research Grid

- **Rat Genome Database**: Workers at MCW use ontologies to annotate genomic data

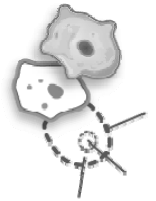
RGD

Current “Collaborating R01” grants



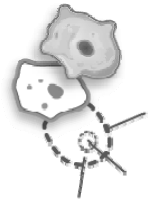
- **UW**: Creating views of ontologies
- **UCSD**: Using ontologies to annotate neuroimaging data
- **UC Denver**: Ontology enrichment through published literature
- **Pittsburgh**: Ontology enrichment through EMR data
- **Wright State**: Semantic data integration

Some other collaborative activities



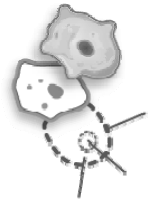
- **CollaboRx, Inc.** — Resource annotation
- **NextBio, Inc.** — Ontology-based search
- **Google, Inc.** — Web of Trust
- **University of Karlsruhe** — Use of OMV in BioPortal metadata
- **World Health Organization** — Ontology support for ICD11

Other NCBO components

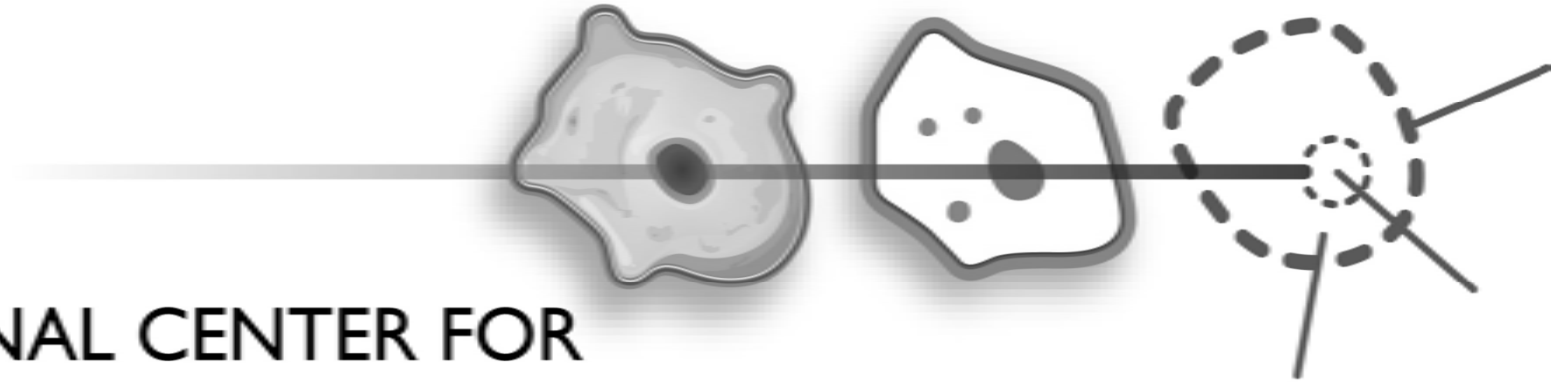


- Education and training
  - Graduate students
  - Post docs
  - Visiting researchers
- Outreach and dissemination
  - Specialized workshops
  - Support for conferences
    - ISMB Bio-ontologies SIG
    - International Conference on Biomedical Ontology

NCBO needs HCLS!



- To push on our technology
- To drive our requirements
- To help disseminate ontology-based methods in biomedicine
- To help promote W3C recommendations in biomedicine
- To help us in our mission to educate the community and to encourage best practices



NATIONAL CENTER FOR

BIOMEDICAL ONTOLOGY

http://bioontology.org