NATIONAL CENTER FOR
BIOMEDICAL ONTOLOGY

The National Center for Biomedical Ontology

Mark A. Musen,[1*] Daniel L. Rubin,[1] Natalya Noy,[1] Nigam Shah,[1] Clement Jonquet,[1] Benjamin Dai,[1] Michael Montegut,[1]
Ida Sim,[2] Christopher G. Chute,[3] Margaret-Anne Storey,[4] Barry Smith[5]

[1]Stanford University, [2]University of California, San Francisco, [3]Mayo Clinic, [4]University of Victoria, [5]University at Buffalo; *musen@stanford.edu, **http://www.bioontology.org**

GOALS OF THE CENTER

1. To **help *unify the divergent and isolated efforts*** in ontology development by promoting high quality, open-source, standards-based tools to create, manage, and use ontologies
2. To ***create new software tools*** that aid scientists in using ontologies to annotate and analyze biomedical data
3. To ***provide a national resource*** for the ongoing evaluation, integration, and evolution of biomedical ontologies, and their associated tools and theories, in the context of driving biomedical projects (DBPs)
4. To ***disseminate the tools and resources*** of the Center through workshops, the World Wide Web, and any other necessary means.
5. To identify, evaluate, and communicate the ***best practices of ontology development*** to the biomedical community

OVERVIEW OF THE CENTER

1. **Tools** to develop ontologies and to annotate experimental data
2. **Resources** to integrate and relate existing ontologies as well as by creating repositories of biomedical data that are annotated using those ontologies
3. **Collaborations** with DBPs to stimulate technology development
4. **Training workshops** in ontology design, development, and usage, and is also pursuing research in ontology evaluation, quality, and use of ontologies to promote scientific discovery

ENABLING LARGE-SCALE SCIENCE

Ontologies are currently at the center of two major activities in biomedical research:

1. **Structured representation of biomedicine:** Communities of researchers are creating and maintaining biomedical ontologies representing entities and relations to describe biomedicine in a structured way (ontology content curation).
2. **Annotation:** Biomedical experimentalists use ontologies to summarize and describe their results in a structured manner, enabling
   - Integration of their data with other researchers' results
   - Cross-species analyses

MISSION

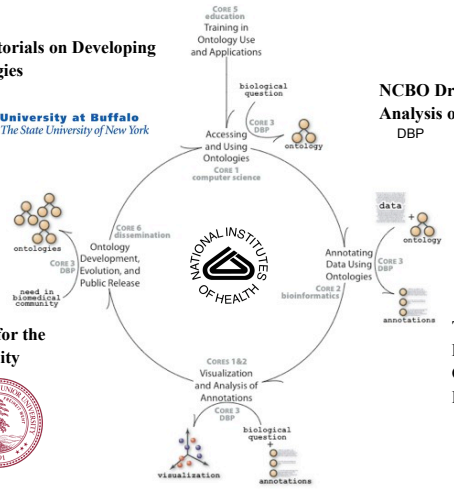
The National Center for Biomedical Ontology is a consortium of leading biologists, clinicians, informaticians, and ontologists who develop innovative technology and methods allowing scientists to create, disseminate, and manage biomedical information and knowledge in machine-processable form.

Workshops and Tutorials on Developing Biomedical Ontologies
CORE 6

University at Buffalo
The State University of New York

NCBO Driving Biological Project: Analysis of HIV Trials
DBP

UCSF



Ontology Resources for the Biomedical Community
CORE 1

Tools for Storage & Annotation of Biomedical Data using Ontologies: Open Biomedical Resources (OBR) and Biomedical Annotations Repository (BAR)
CORE 2

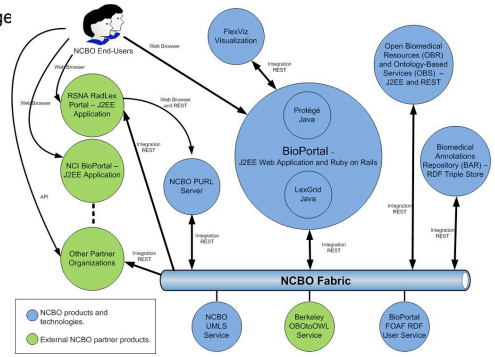
LexBIO—Shared Vocabulary Resources for the NCBO
CORE 1

MAYO CLINIC College of Medicine

Interactive Views for Navigating Ontologies and Data Annotations
CORES 1 & 2

University of Victoria | British Columbia Canada

NCBO PRODUCTS AND TECHNOLOGIES



- **BioPortal** – A web application for accessing, visualizing, analyzing, uploading, and searching a large repository of biomedical ontologies, terminologies, & annotations.
- **Ontology-Based Services (OBS)** – A set of inter-related, Java-based, REST /SOAP services that use BioPortal ontologies to perform concept recognition, ontology traversal, concept expansion, and concept similarity determination.
- **Open Biomedical Resources (OBR)** – A set of annotations generated automatically and presented in the BioPortal user interface, enabling researchers to search for biomedical resources associated (or annotated) with specific ontology terms.
- **Open Biomedical Annotator (OBA) Web Service** – A Java-based REST/SOAP web service that, given a set of search terms, uses ontology services from OBS and annotations from OBR to return biomedical resources relevant to the search terms & related concepts using Ontology-based services for concept recognition and ontology traversal.
- **Biomedical Annotations Repository (BAR)** - A database of manually generated biomedical annotations (starting with phenotype annotations) summarizing key attributes such as anatomy, phenotype, and genetic features. The manually created annotations are currently loaded directly from a Phenote file.