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► **To cite this version:**

Emmanuel Castanier, Clement Jonquet, Soumia Melzi, Pierre Larmande, Manuel Ruiz, et al.. Semantic Annotation Workflow using Bio-Ontologies. Workshop on Crop Ontology and Phenotyping Data Interoperability, Mar 2014, Montpellier, France. , 1 p., 2014. lirmm-01052546

**HAL Id: lirmm-01052546**

**<https://hal-lirmm.ccsd.cnrs.fr/lirmm-01052546>**

Submitted on 28 Jul 2014

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# Semantic Annotation Workflow using Bio-Ontologies

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## Introduction

Biologists have adopted ontologies:

- To provide canonical representation of scientific knowledge
- To annotate experimental data to enable interpretation, comparison, and discovery across databases
- To facilitate knowledge-based applications for decision-support, natural language processing, and data integration

But **off-the-shelf solutions for the biologist** to use ontologies are rare (versions, format, availability, license, overlap, etc.)

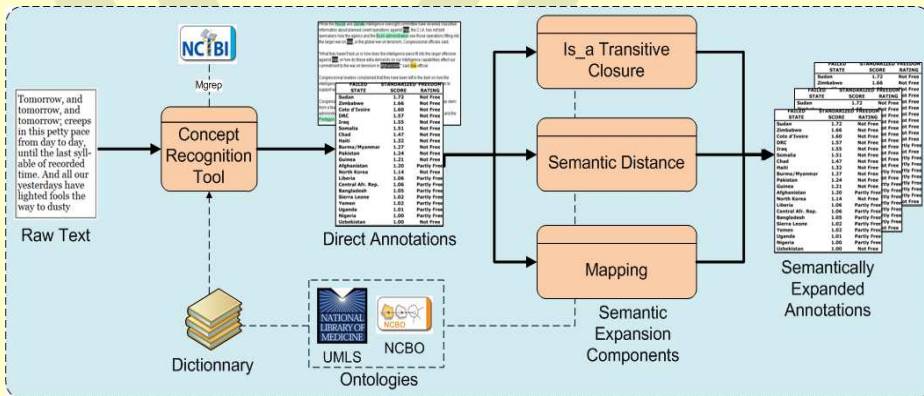
## The challenge

Automatically process complex biological resources text content and generate annotations :

- Large-scale – to scale up to many resources and ontologies
- Automatic – to keep precision and accuracy
- Easy to use and to access – web service approach
- Customizable – to fit very specific needs
- Smart – to leverage the knowledge contained in ontologies

There have been **success stories to reproduce**: GO annotations, PubMed indexing, etc.

## NCBO Annotator: 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 **aggregated and scored** according to the context in which they have been created.

## Customized IBC Annotator for database schemas

### BioSemantic

Rich internet application



Convert SQL database to RDF/RDFS  
Upload it to NCBO Platform for annotation



### WebSmatch

Use WebSmatch matching techniques to find mapping for Entries/Instances

Web service calls



NCBO platform

Ontologies stored and indexed by NCBO platform



Ontologies database

- Convert **SQL database schemas to RDF/RDFS** with BioSemantic
- Annotate with NCBO Annotator and WebSmatch using customized NCBO services
- **Annotator relies on WebSmatch** to create mappings between elements of schemas and ontological concepts
- **Indexing IBC related data** with the workflow to enhance semantic search and mining of data

R. Coletta, E. Castanier, P. Valduriez, C. Frisch, D-H. Ngo, Z. Bellahsene: Public data integration with WebSmatch. *Workshop on Open Data*. 2012, pp. 5-12.

C. Jonquet, N. H. Shah, M. A. Musen. *The Open Biomedical Annotator*. In *AMIA Symposium on Translational Bioinformatics*. 2009. pp. 56-60.

C. Jonquet, P. LePendou, S. Falconer, A. Coulet, N. F. Noy, M. A. Musen, N. H. Shah. *NCBO Resource Index: Ontology-Based Search and Mining of Biomedical Resources*, *Web Semantics*. 2011. Vol. 9 (3), pp. 316-324.

J. Wollbrecht, P. Larmande, F. De Lamotte, M. Ruiz. *Clever generation of rich SPARQL queries from annotated relational schema: application to Semantic Web Service creation for biological databases*. *BMC Bioinformatics*. 2013; 14:126.

In collaboration with

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