science commons

MIREOT
Minimum information to reference external ontology terms

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Session 4: Creating ontologies that work together

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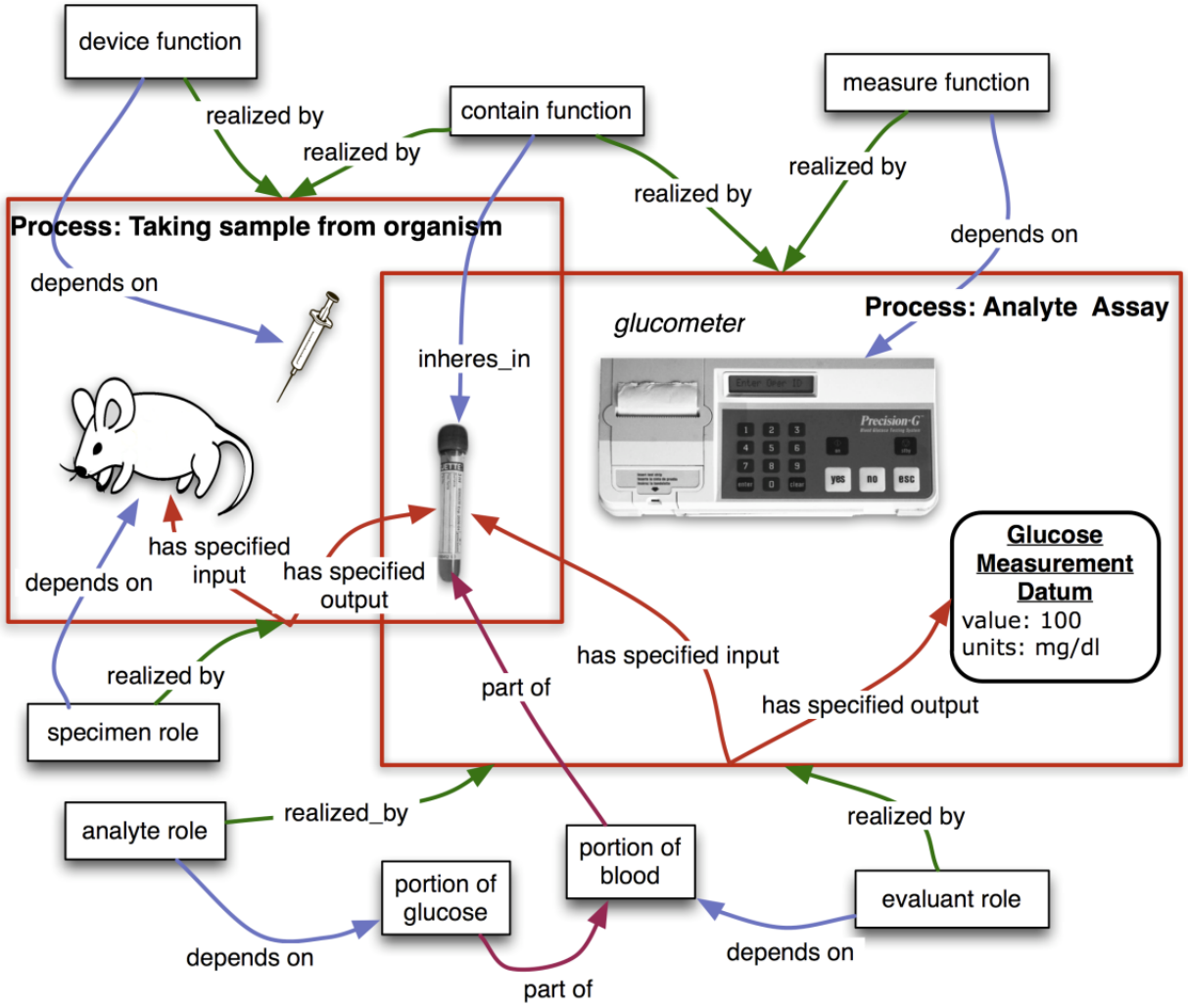
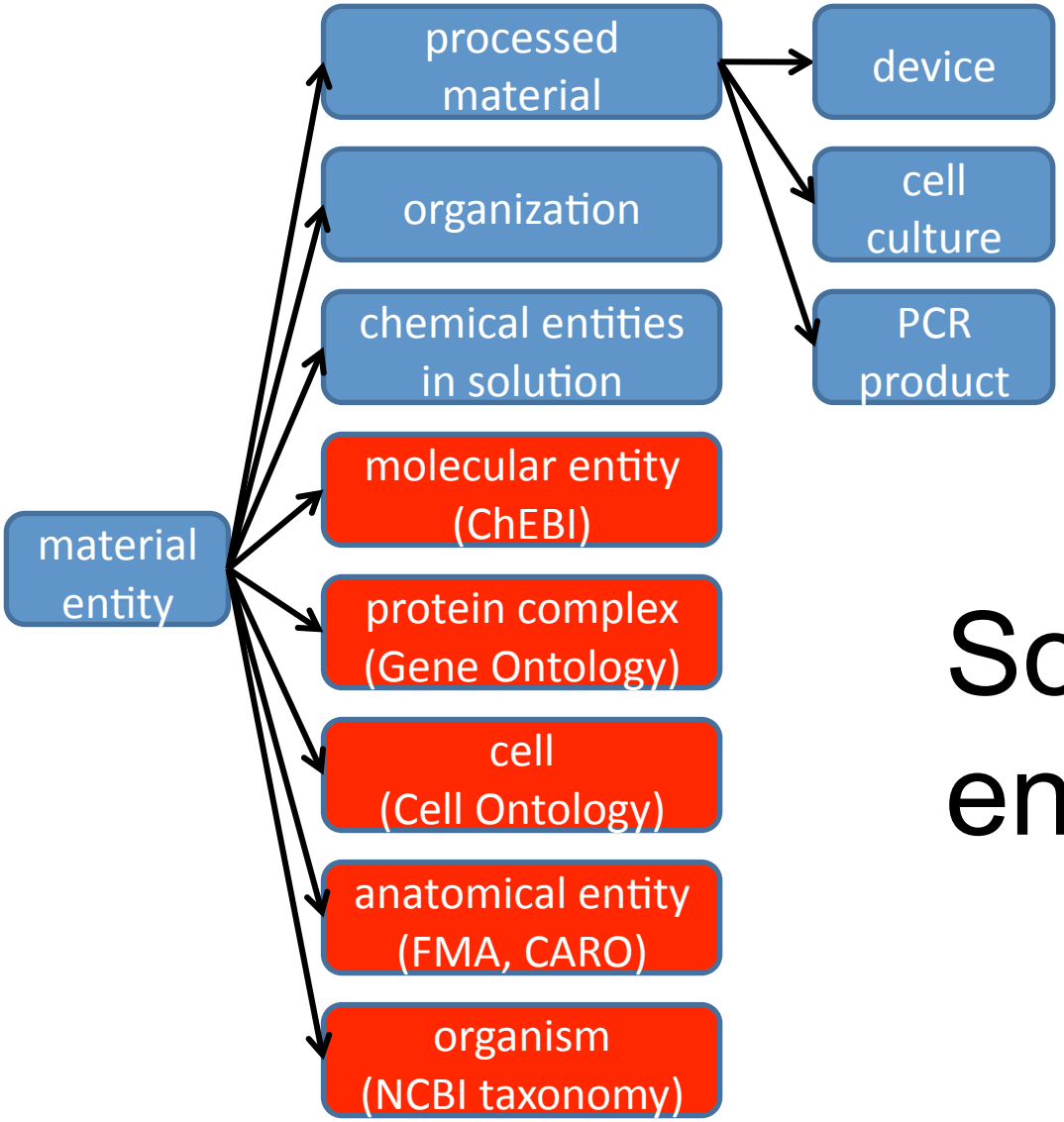
Background – the OBI project

- The Ontology for Biomedical Investigations (OBI) project is developing an ontology for the description of biological and clinical investigations
- The domain of OBI includes
  - materials made and produced for investigations
  - research objectives
  - experimental protocols
  - roles of people in investigations
  - processing and publication of data gathered in investigations

Modeling experimental processes



See the OBI poster for more information



Some material entities in OBI

Ontologies that OBI uses

- Chemical Entities of Biological Interest (ChEBI)
- The Phenotypic Quality Ontology (PATO)
- The Foundational Model of Anatomy ontology (FMA)
- The Cell Type Ontology (CL)
- The NCBI taxonomy (NCBITaxon)
- The Information Artifact Ontology (IAO)
- The Relation Ontology (RO)
- The Environment Ontology (ENVO)
- The Sequence Ontology (SO)
- …

Challenges of imports

- ***Large overhead -*** using large ontologies, such as NCBI Taxonomy or Foundational Model of Anatomy (FMA)
- ***True Alignment*** - Ontologies constructed using a different design, or not using BFO as upper-level ontology prevents full integration
- ***Fluid development*** - Resources under development

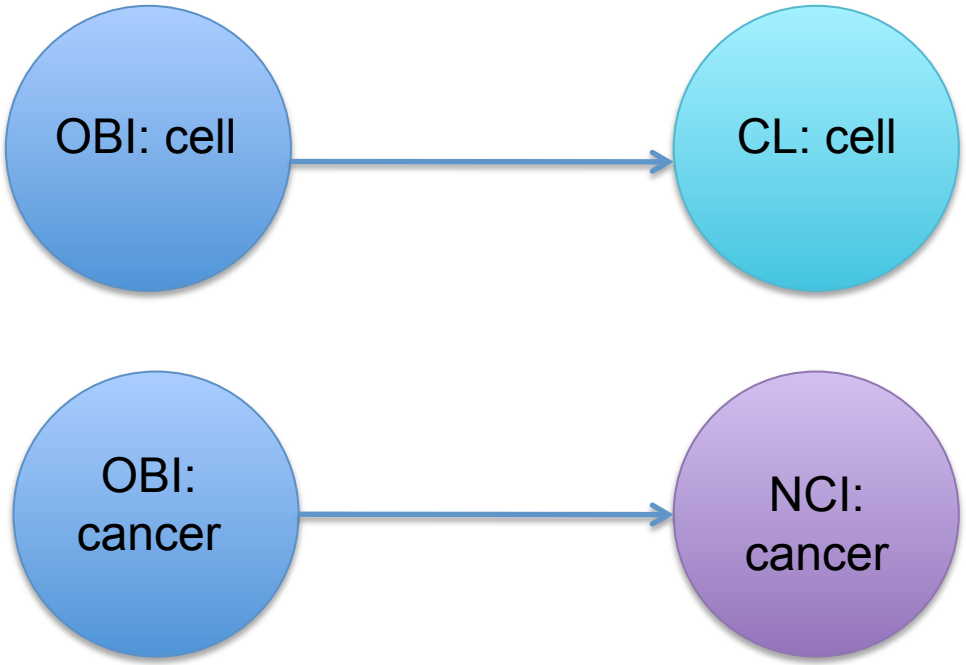
Possible Solutions

1. We can create our own terms and reference others
2. We can generate and import modules
3. We can import whole resources

1. Create our own terms

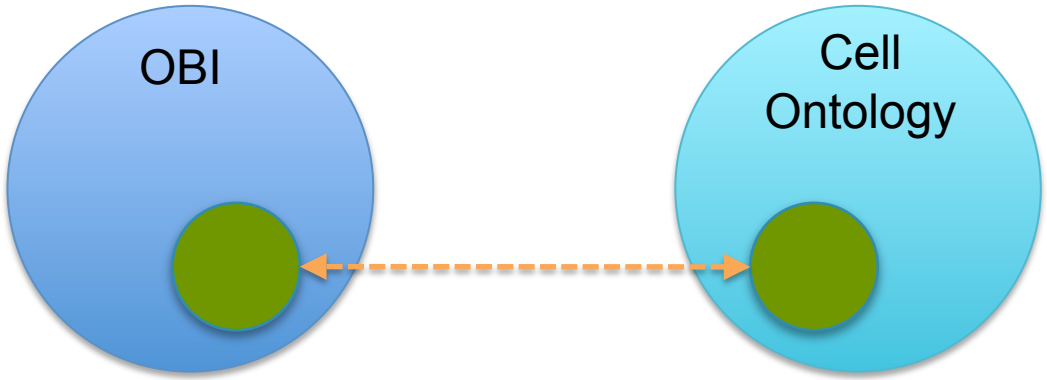
We can create our own terms and reference others

- Adding an annotation referencing the external ontology
- **But** duplicates efforts, creates redundancy, doesn't comply with orthogonality principle from OBO Foundry and makes data integration more difficult



2. Import modules

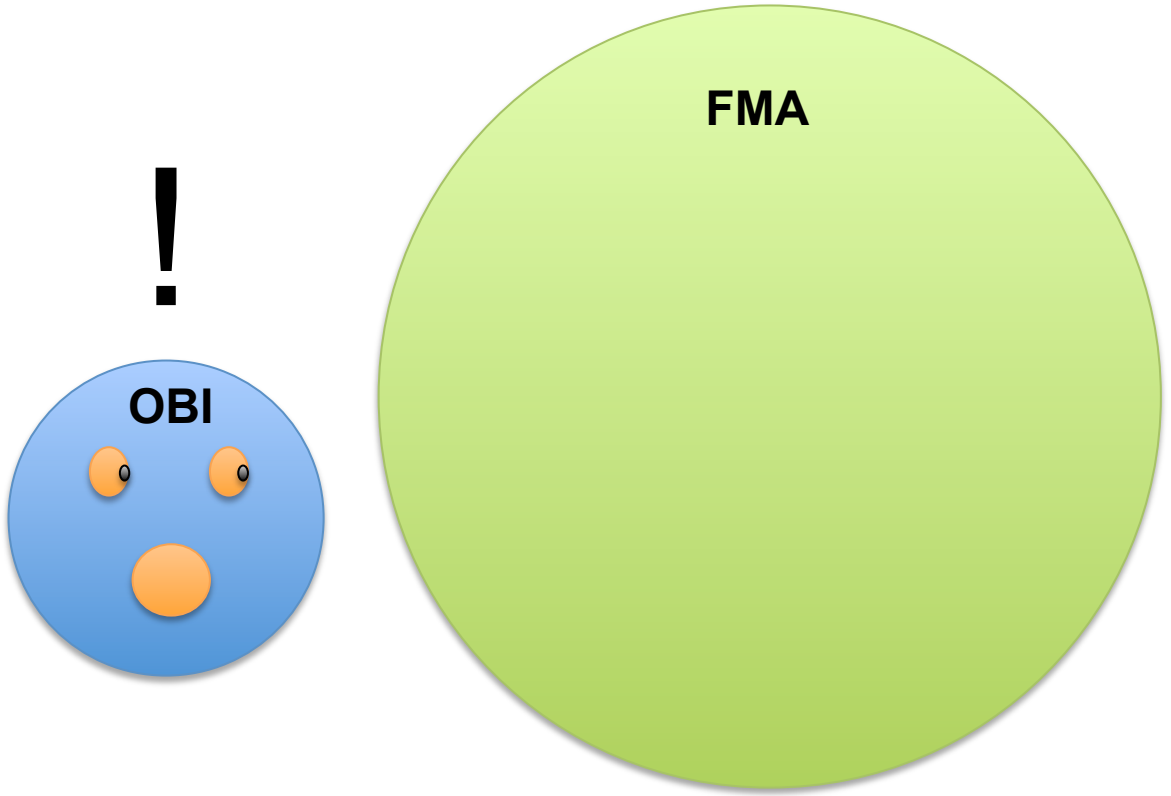
- A module is a subset of the external ontology, containing classes and axioms, allowing "original" reasoning
- **But** problem to get the modules



3. Full import

We can import whole resources

- only if full axiomatic interoperability
- Large ontologies are huge overhead: current limitations in editing tools and reasoners



Observation

- Terms in OBO Foundry ontologies stand on their own
- If their meaning changes, they are deprecated

=> *denotation* of individual terms remain stable

=> they can be seen as ***individual units*** of meaning

Our Proposal: Import only classes that are needed

- Pro: We get around the problems with the other methods
- Con: Lose complete inference
- **But** because the imported ontology might not be commensurate with OBI, we are not sure the inference would be correct

Implementation

- Strategy: Figure out how to automate as much as possible
- How to make it as easy as possible to enter, and maintain.

Define the minimal information we need

- URI of the class
- URI of the source ontology
- Position in the target ontology

=> this ***minimal set*** allows to unambiguously identify a term

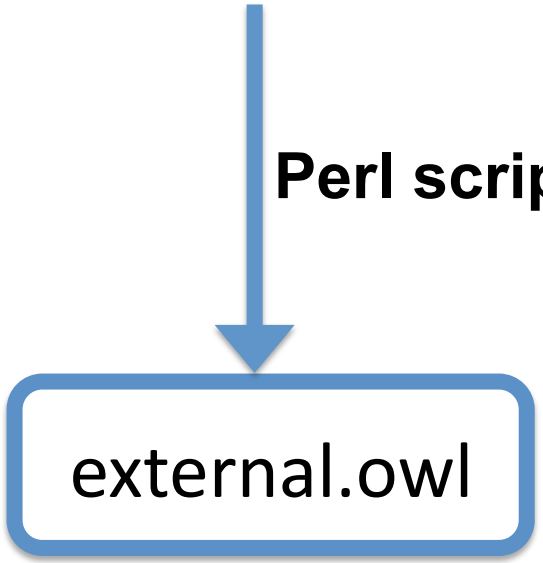
Additional information

- We may want to capture:
  - Label,
  - Definition,
  - Other annotations: adding “human-readable” information
  - Superclasses: for example, NCBI taxonomy
  - …

Step 1: “import” the term

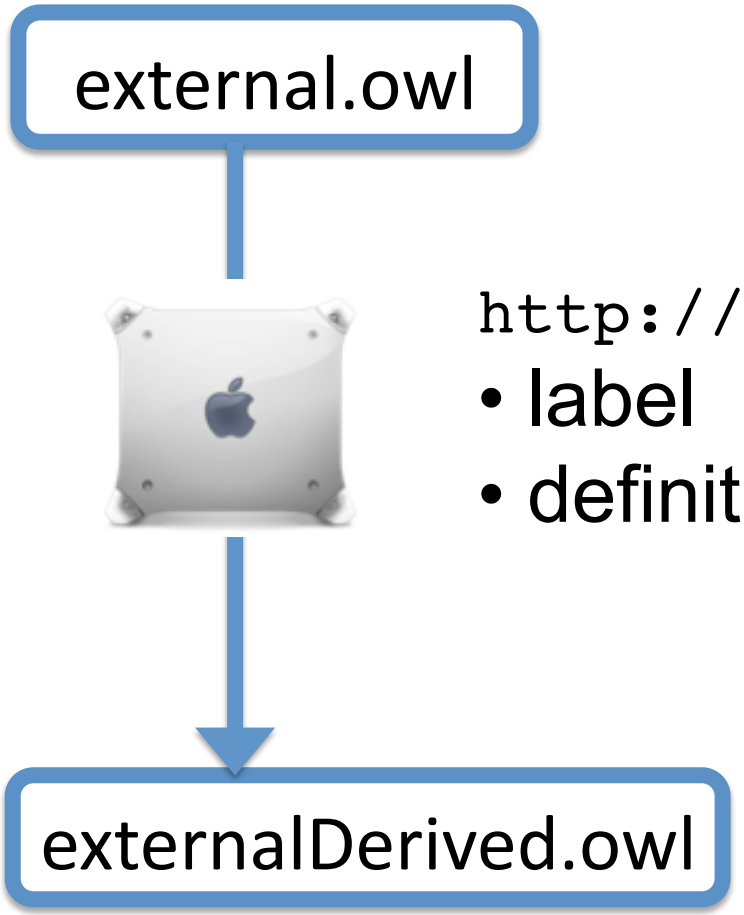
Minimal information

- URI of the term
- URI of the source ontology
- Superclass in target ontology



Step 2: add information

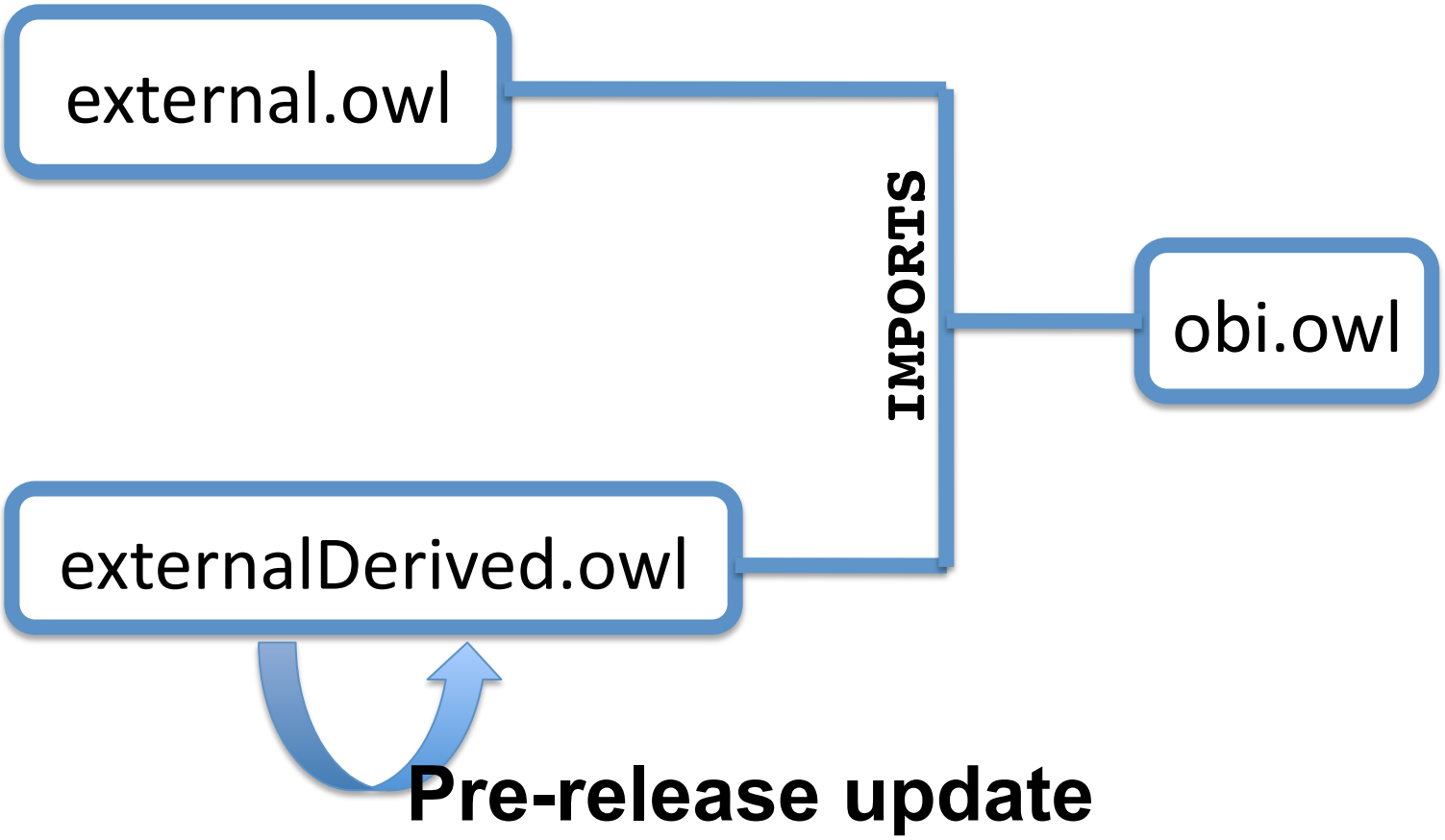
Use external.owl to generate SPARQL queries



`http://sparql.obo.neurocommons.org/`

- label
- definition…

Step 3: Plug it in

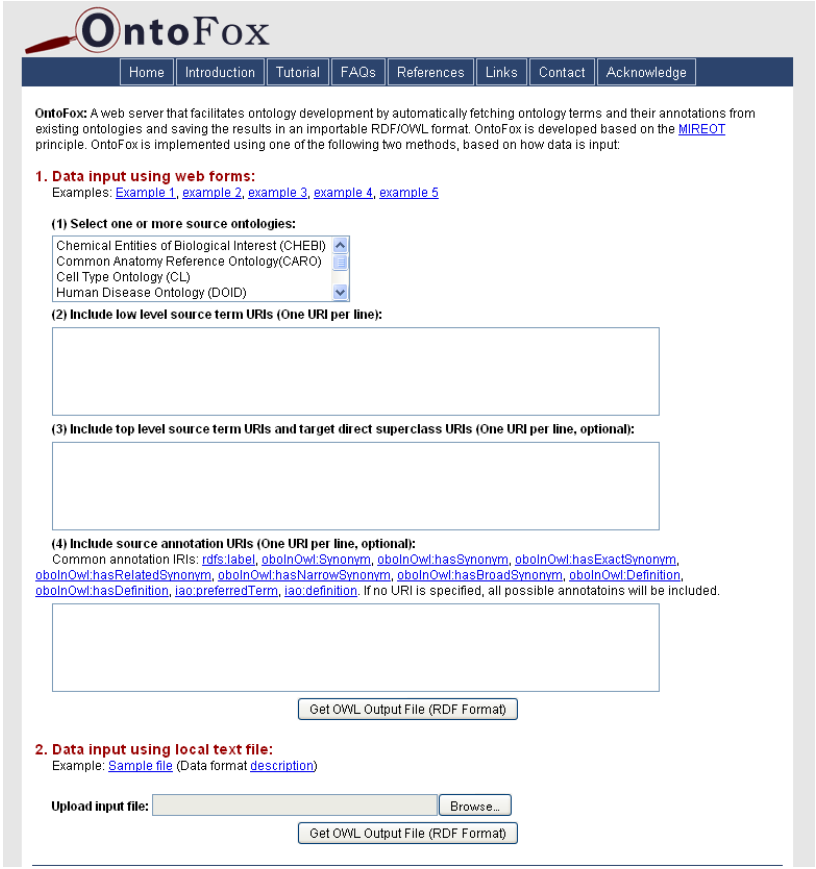


Summary

- This process works very well for us, we have 1223 external classes currently imported
- Other groups have expressed interest in using the same approach
- OntoFox has been developed to make the process easier.

OntoFox: a Web Server for MIREOTing

- ✓Based on the MIREOT principle
- ✓Web-based data input and output
- ✓Output OWL file can be directly imported in your ontology
- ✓Easy to use
- ✓No programming needed for users
- ✓**A software demo on Sunday for more information**



http://ontofox.hegroup.org

Some links

- http://obi-ontology.org/page/MIREOT

Scripts are available under our SVN repository:

- http://purl.obolibrary.org/obo/obi/repository/trunk/src/tools/
  - add-to-external.pl
- http://purl.obolibrary.org/obo/obi/repository/trunk/src/tools/build
  - create-external-derived.lisp

Thank you

- Frank Gibson
- Allyson L. Lister
- James Malone
- Daniel Schober
- Ryan R. Brinkman
- Alan Ruttenberg

The OBI Consortium

PHAC/CIHR Influenza Research Network

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