

MIREOT

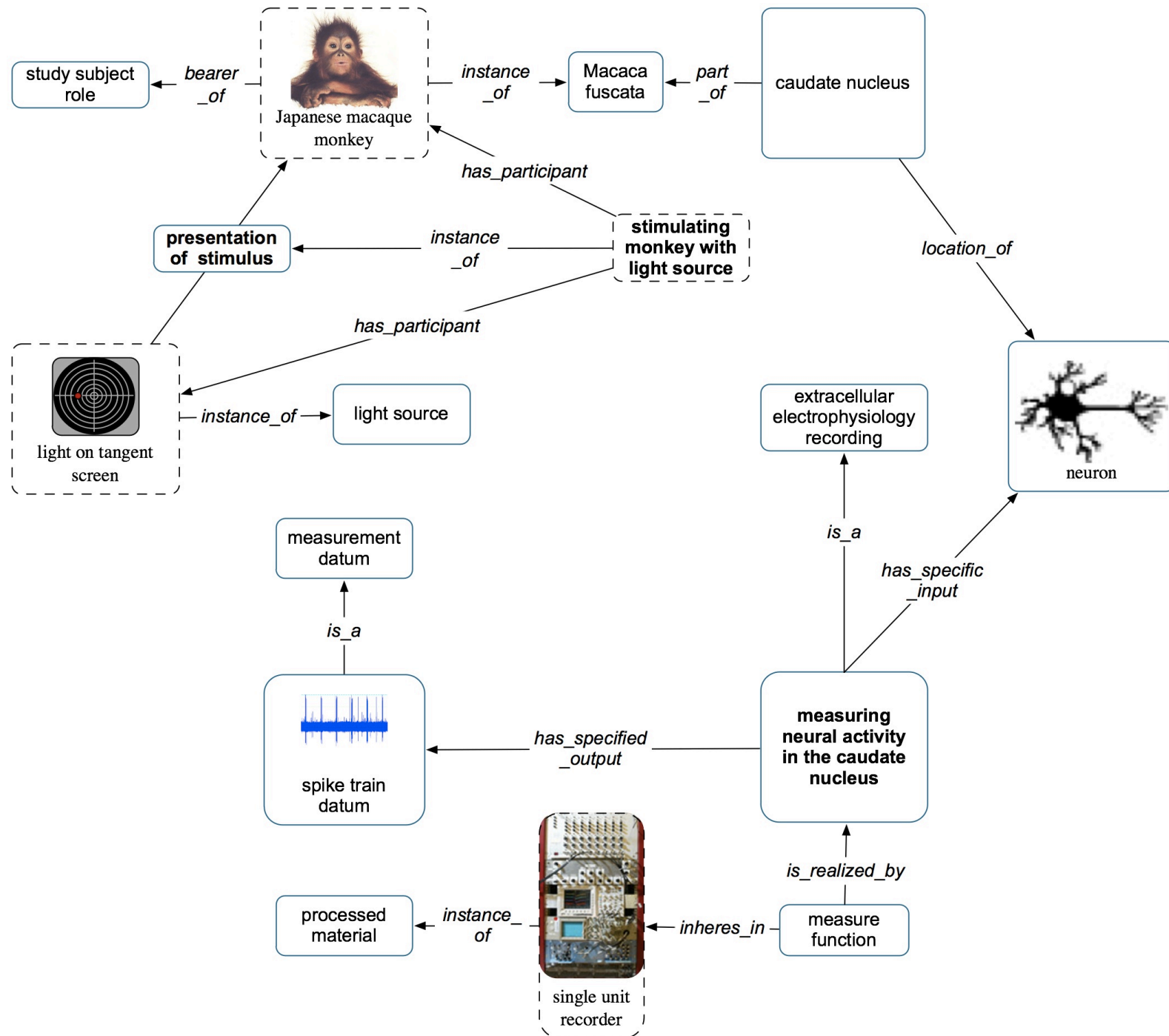
Minimum information to reference external ontology terms

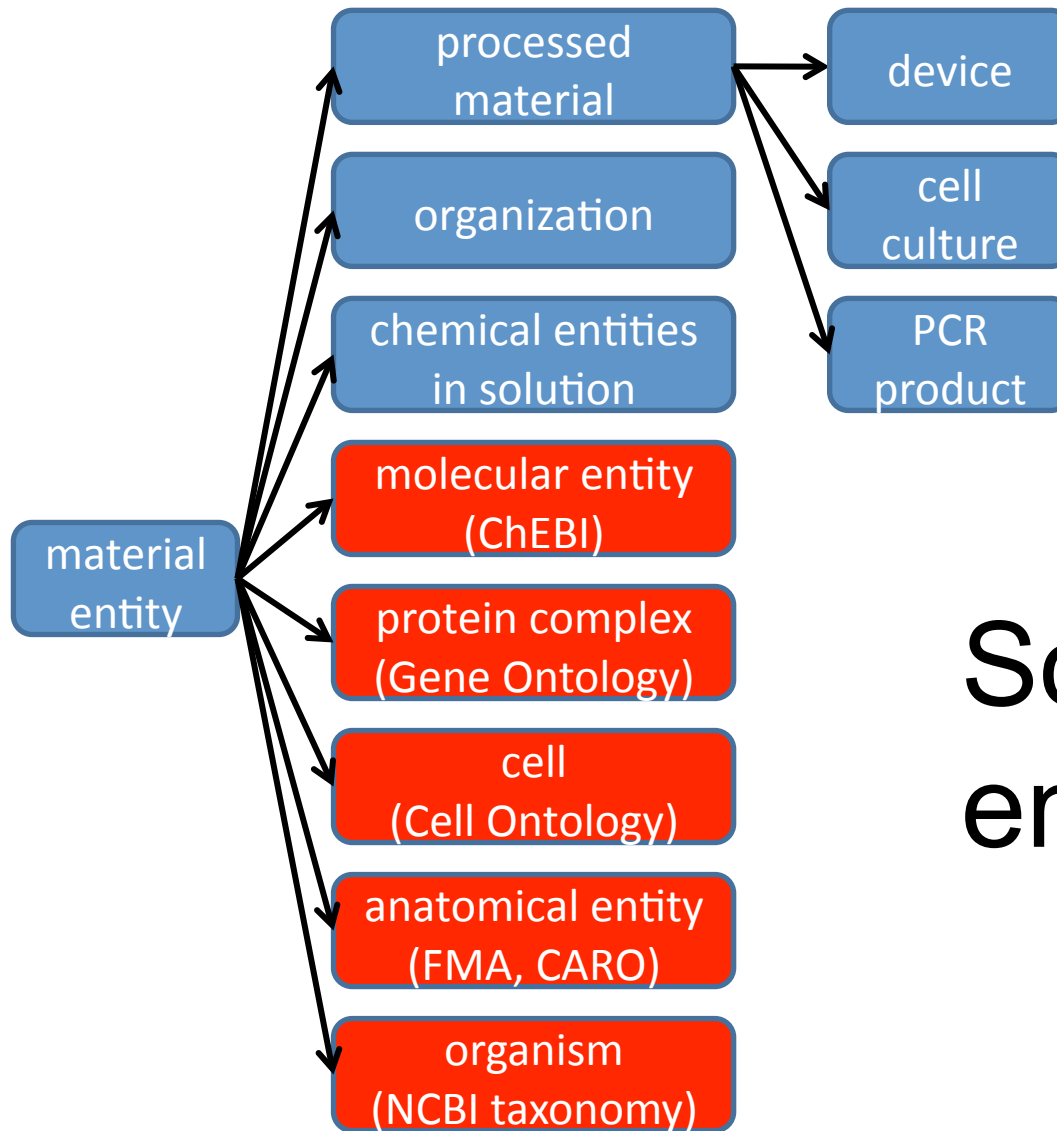
**Mélanie Courtot, Frank Gibson, Allyson L. Lister, James Malone,
Daniel Schober, Ryan R. Brinkman and Alan Ruttenberg**



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





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

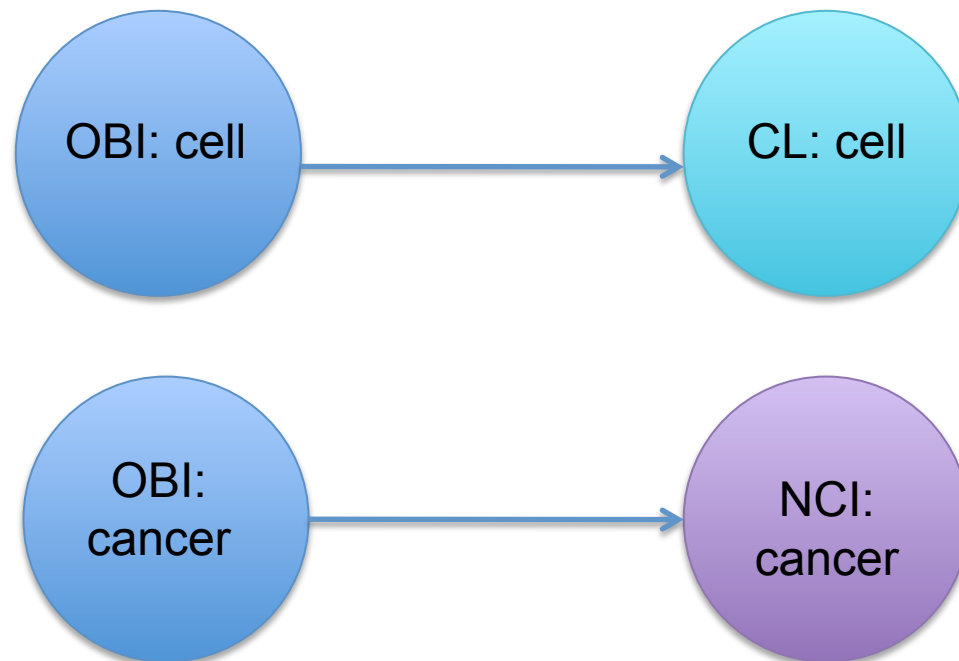
Possible Solutions

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

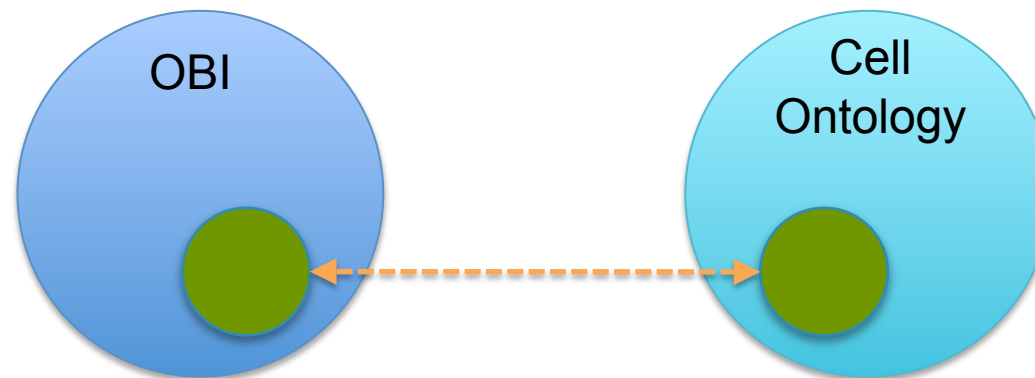
We can create our own terms and reference others

- 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

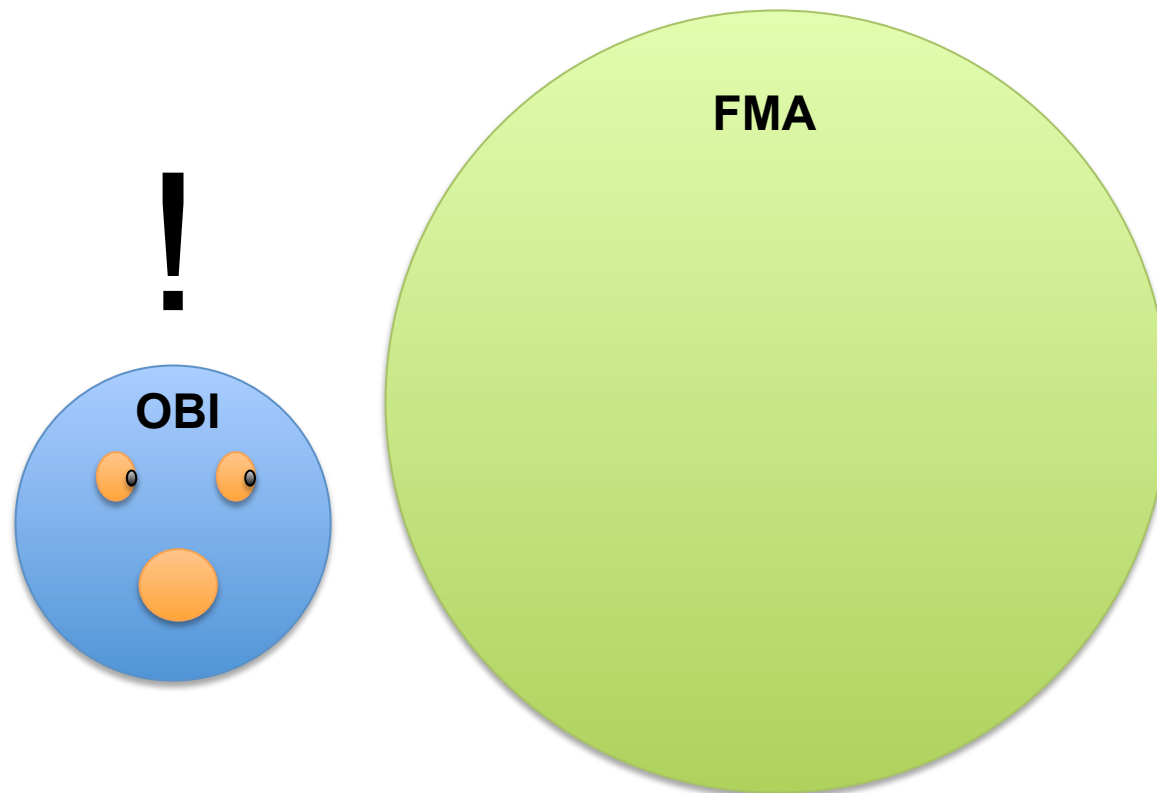
- A module is a subset of the external ontology, containing classes and axioms, allowing “original” reasoning
- **But** problem to get the modules



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

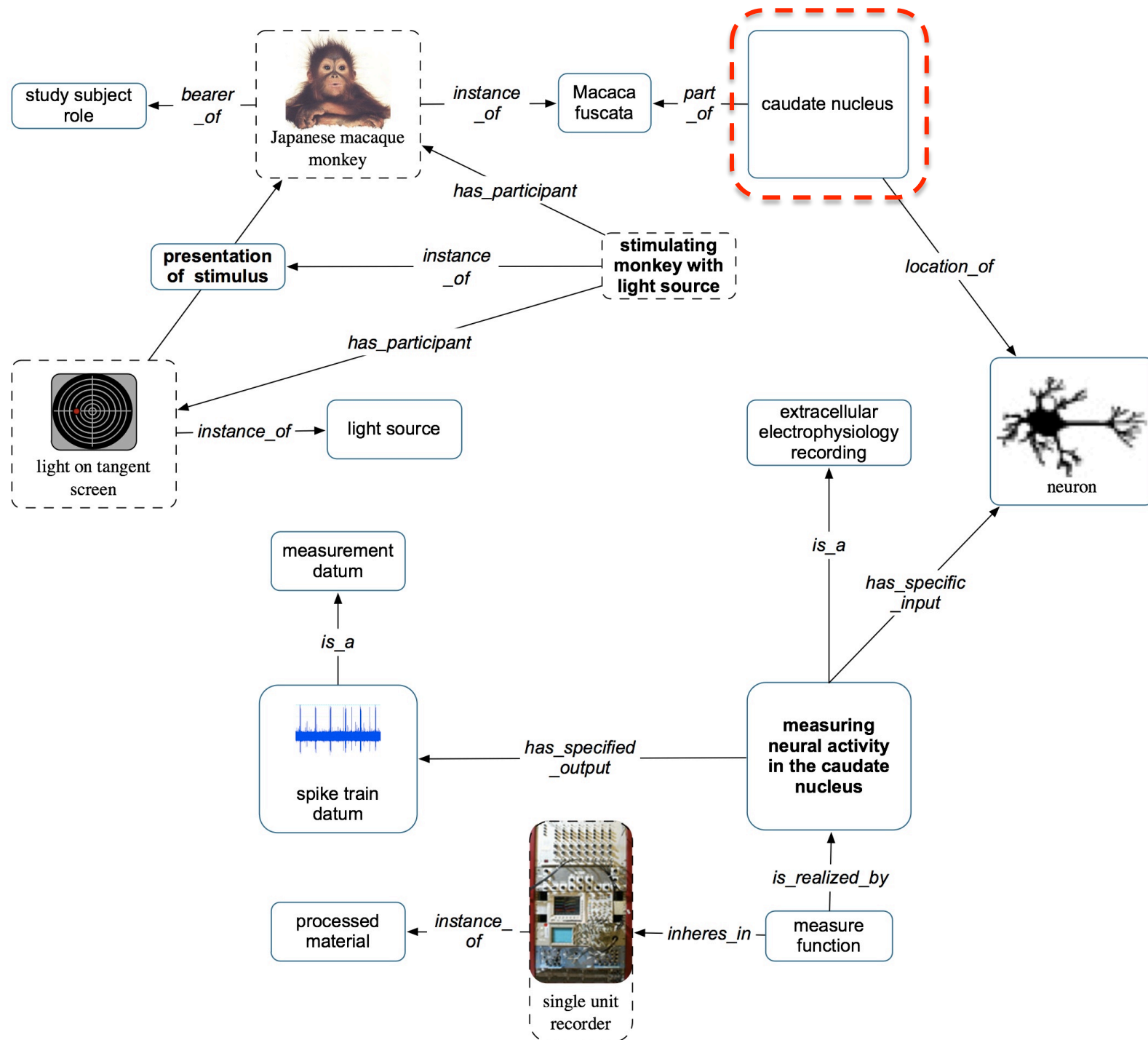
=> they can be seen as ***individual units*** of meaning

Our Proposal: Import only classes that are needed

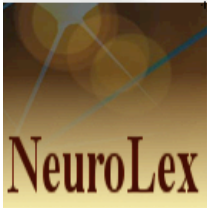
- Pro: We get around the problems with the other methods
- Con: Lose complete inference
- **But** because the imported ontology might not be commensurate with OBI, we are not sure the inference would be correct

Implementation

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



http://ontology.neuinfo.org/NIF/BiomaterialEntities/NIF-GrossAnatomy.owl#birnlex_1373



NeuroLex

navigation

- [Main Page](#)
- [Community portal](#)
- [New categories](#)
- [Recent changes](#)
- [Random page](#)
- [Help](#)

search

toolbox

- [What links here](#)
- [Related changes](#)
- [Special pages](#)
- [Printable version](#)
- [Permanent link](#)
- [Browse properties](#)

[category](#) [discussion](#) [annotate](#) [edit](#) [edit source](#) [history](#)


Category:Caudate nucleus

[Basic](#) [Advanced](#)


Name:	Caudate nucleus
Definition:	Subcortical nucleus of telencephalic origin consisting of an elongated gray mass lying lateral to and bordering the lateral ventricle. It is divided into a head, body and tail in some species.
Is part of :	Striatum
Super-category:	Regional part of neostriatum
ID:	birnlex_1373

Parts of Caudate nucleus

Click the + next to "Caudate nucleus" to see its parts

 [+ Caudate nucleus](#)

Query for more information

Click [here](#)  to search more about Caudate nucleus

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

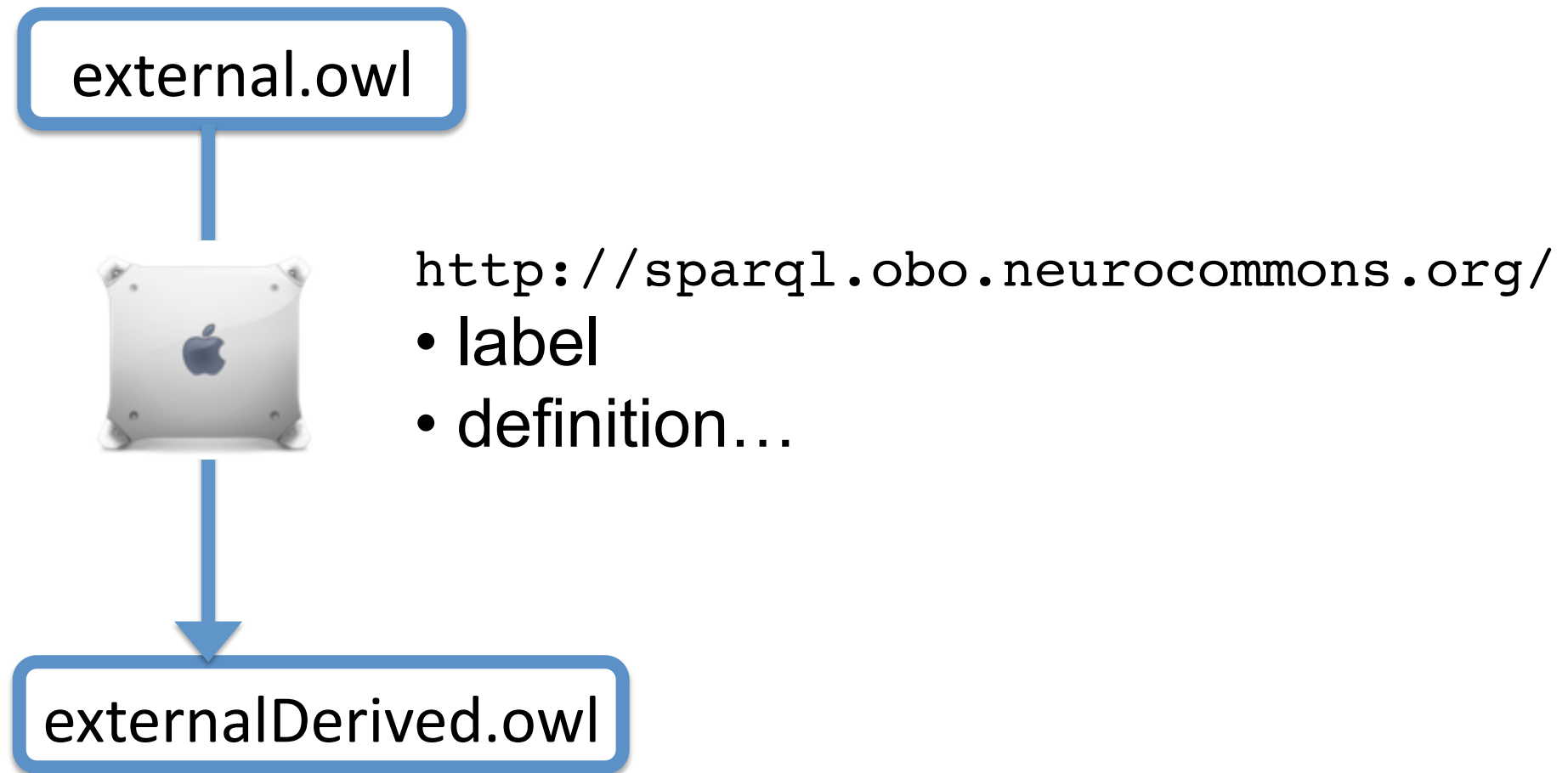
Perl script



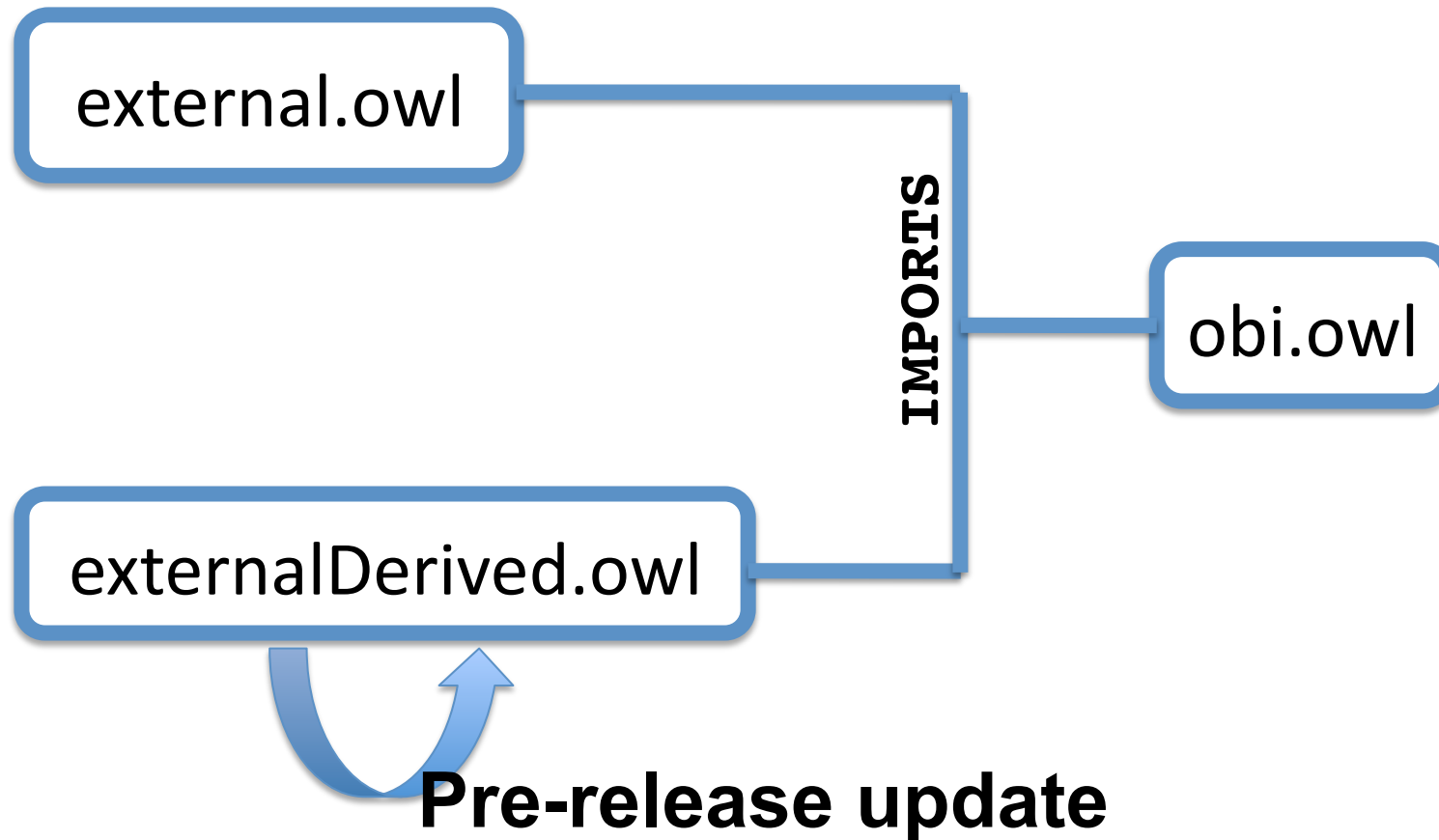
external.owl

Step 2: add information

Use external.owl to generate SPARQL queries



Step 3: Plug it in



Summary

- This process works very well for OBI, 1447 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

The screenshot shows the OntoFox web interface. At the top is the OntoFox logo and a navigation bar with links: Home, Introduction, Tutorial, FAQs, References, Links, Contact, and Acknowledge. Below the navigation bar is a brief description of OntoFox: 'A web server that facilitates ontology development by automatically fetching ontology terms and their annotations from existing ontologies and saving the results in an importable RDF/OWL format. OntoFox is developed based on the MIREOT principle. OntoFox is implemented using one of the following two methods, based on how data is input.'

1. Data input using web forms:
Examples: [Example 1](#), [example 2](#), [example 3](#), [example 4](#), [example 5](#)

(1) Select one or more source ontologies:
Chemical Entities of Biological Interest (CHEBI) [v]
Common Anatomy Reference Ontology(CARO) [v]
Cell Type Ontology (CL) [v]
Human Disease Ontology (DOID) [v]

(2) Include low level source term URIs (One URI per line):
[Text input area]

(3) Include top level source term URIs and target direct superclass URIs (One URI per line, optional):
[Text input area]

(4) Include source annotation URIs (One URI per line, optional):
Common annotation IRIs: [rdfs:label](#), [obo:owl:Synonym](#), [obo:owl:hasSynonym](#), [obo:owl:hasExactSynonym](#), [obo:owl:hasRelatedSynonym](#), [obo:owl:hasNarrowSynonym](#), [obo:owl:hasBroadSynonym](#), [obo:owl:Definition](#), [obo:owl:hasDefinition](#), [iao:preferredTerm](#), [iao:definition](#). If no URI is specified, all possible annotations will be included.
[Text input area]

[Get OWL Output File (RDF Format)]

2. Data input using local text file:
Example: [Sample file](#) (Data format [description](#))

Upload input file: [Text input area] [Browse...]
[Get OWL Output File (RDF Format)]

<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

*NIH (R01EB005034), the EC EMERALD project (LSHG-CT-2006-037686),
the BBSRC (BB/C008200/1, BB/D524283/1, BB/E025080/1),
the EU FP7 DebugIT project (ICT-2007.5.2-217139),
and the Michael Smith Foundation for Health Research.*