



Challenges with creating PID ontologies

FAIR Facilities and Instruments

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High Field Magnetic Laboratory

Florida State University

*Presented by Annie Glerum, Alma
Librarian, FSU Libraries*



FSU

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Introduction

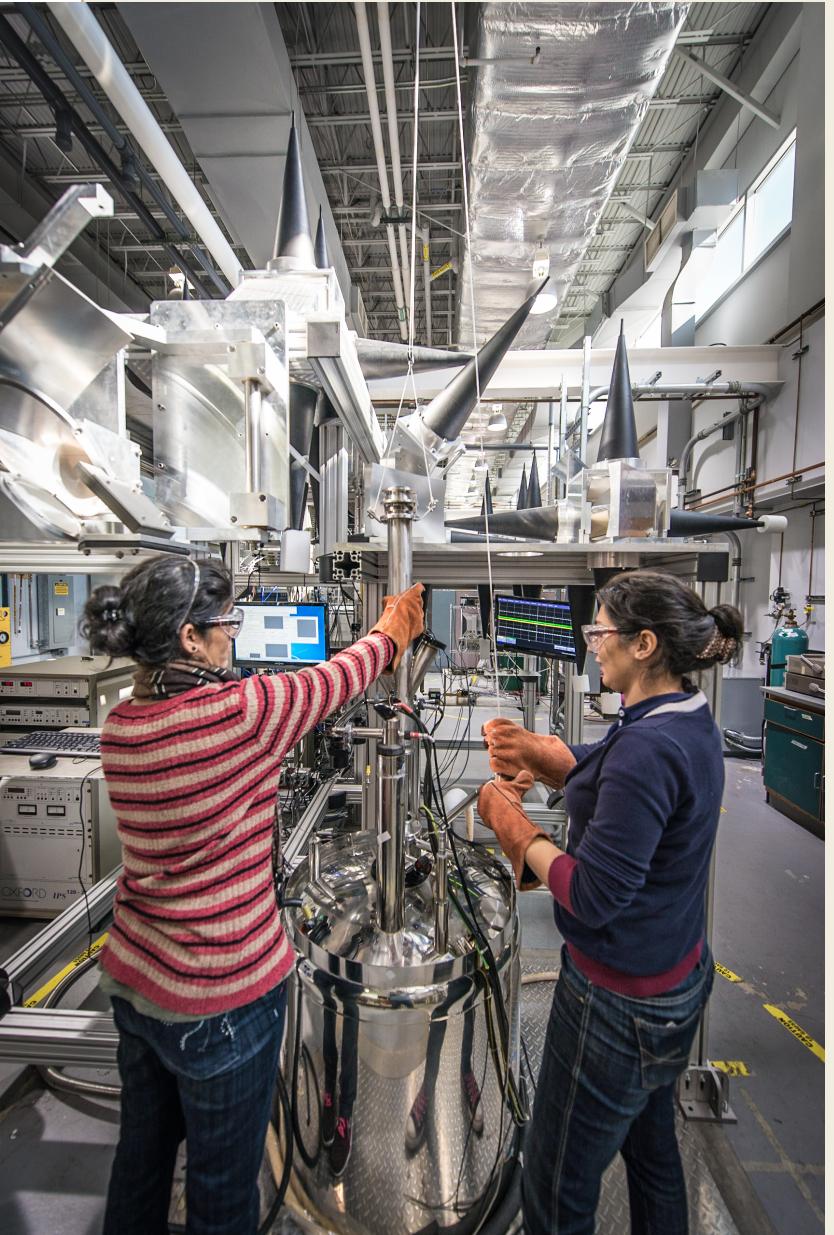


An Accidental Ontologist

- Was Head of Discovery Data Services
 - Department for catalog data quality control and management
- Tech-savvy catalog and metadata librarian
- Familiar with:
 - Information Organization
 - XML Schema
 - Web technologies



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USEDit Team

Universal Scientific Equipment Discovery Tool

Member of USEDit 2018-2022

- *Founding members:* Claudio Mundoma, Michael Meth, Renaine Julian*
- *Later joined by:* Nicholas Ruhs, Leah Booher (also worked for SciCrunch), Mark Lopez, David Rodriguez*
- Initially formed to replace **FSU Asset Management** website (<https://apps.its.fsu.edu/AssetManagement/app/>)

* See Slide 31 for where former USEDit members are now



Universal Scientific Equipment Discovery Tool

Metadata/Ontology Tasks

- Create metadata profile/schema
 - Physical and holdings descriptions
- Create scientific equipment ontology
 - Include institutional relationships
- Create a prototype discovery tool
 - USEdit Website (<https://dev-usedit-prototype.pantheonsite.io/>)

Information Organization



Information Organization

From simple to complex

- List
- Ordered list
- Dictionary
- Controlled vocabulary
- Taxonomy
- Ontology

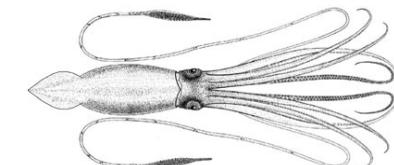
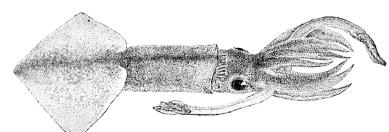
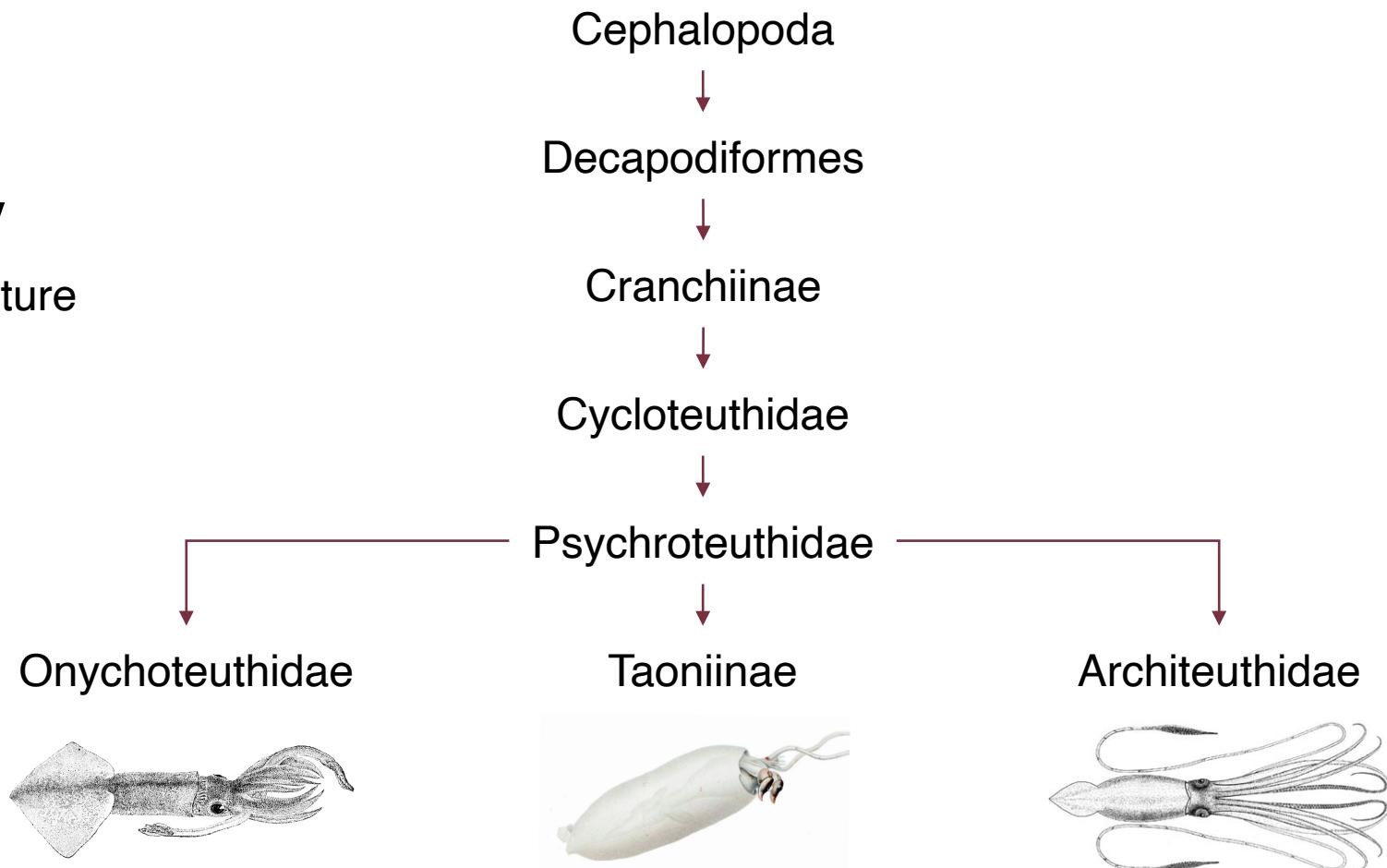
Information Organization

List	Ordered List	Dictionary	Controlled Vocabulary
oysters	ammonites	<i>SQUID</i> . In physics, a superconducting quantum interference device.	<i>Cephalopoda</i>
snails	clams		Use For: Cephalopods
squids	octopuses		Use For: Coleoidea
clams	oysters		Use For: Dibranchiata
scallops	scallops		Broader Term: Mollusks
octopuses	snails		Narrower Term: Architeuthidae
ammonites	squids	<i>Squid</i> . In zoology, a marine cephalopod with eight arms and two tentacles.	Narrower Term: Nautilida
			Narrower Term: Octopoda
			Narrower Term: Ommastrephidae
			Narrower Term: Sepiida
			Narrower Term: Squids

Information Organization

Taxonomy

Hierarchal structure



Information Organization

Ontology

Controlled vocabulary

**Hierarchal-like
structures**

Relationships

Gene Ontology

Biological process

Metabolic process

Primary metabolic process

Carbohydrate metabolic process

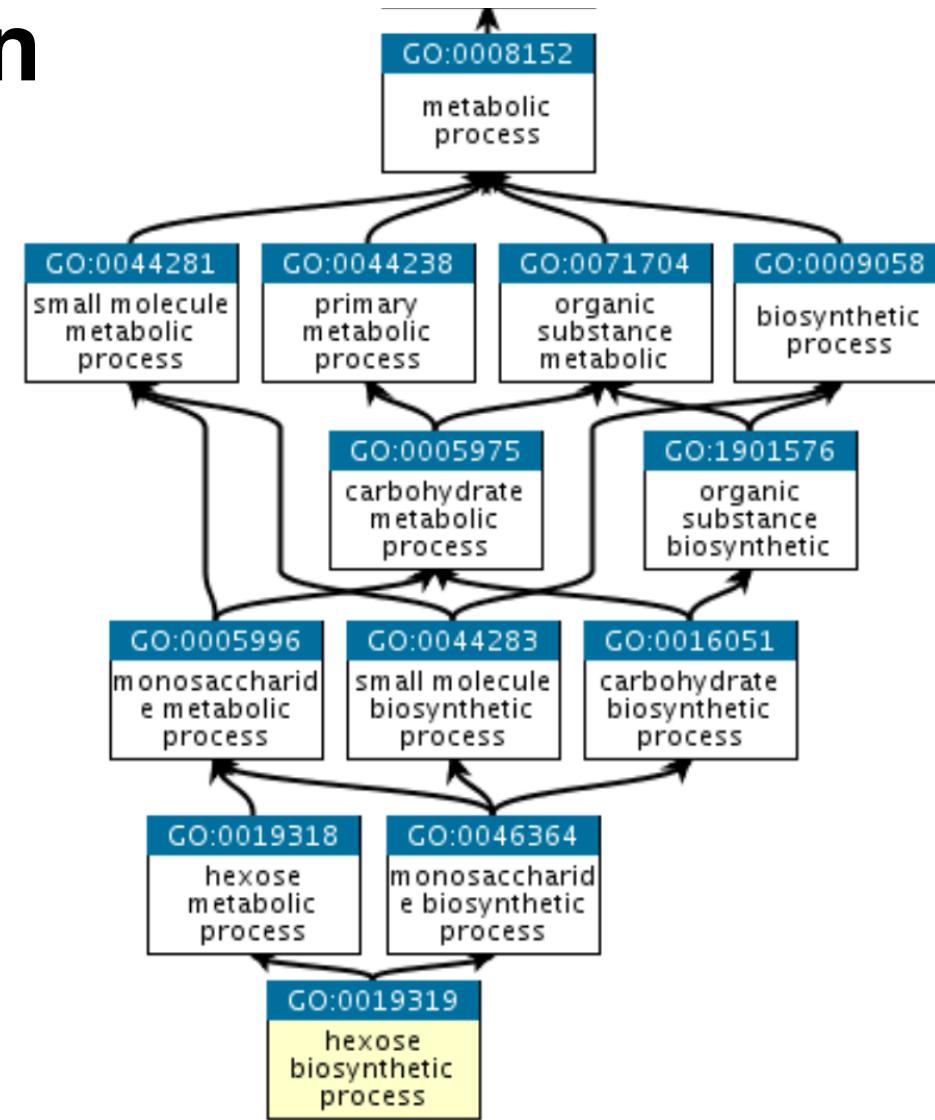
Glucose metabolic process

Information Organization

Ontology

Controlled vocabulary
Hierarchical-like structures

Relationships



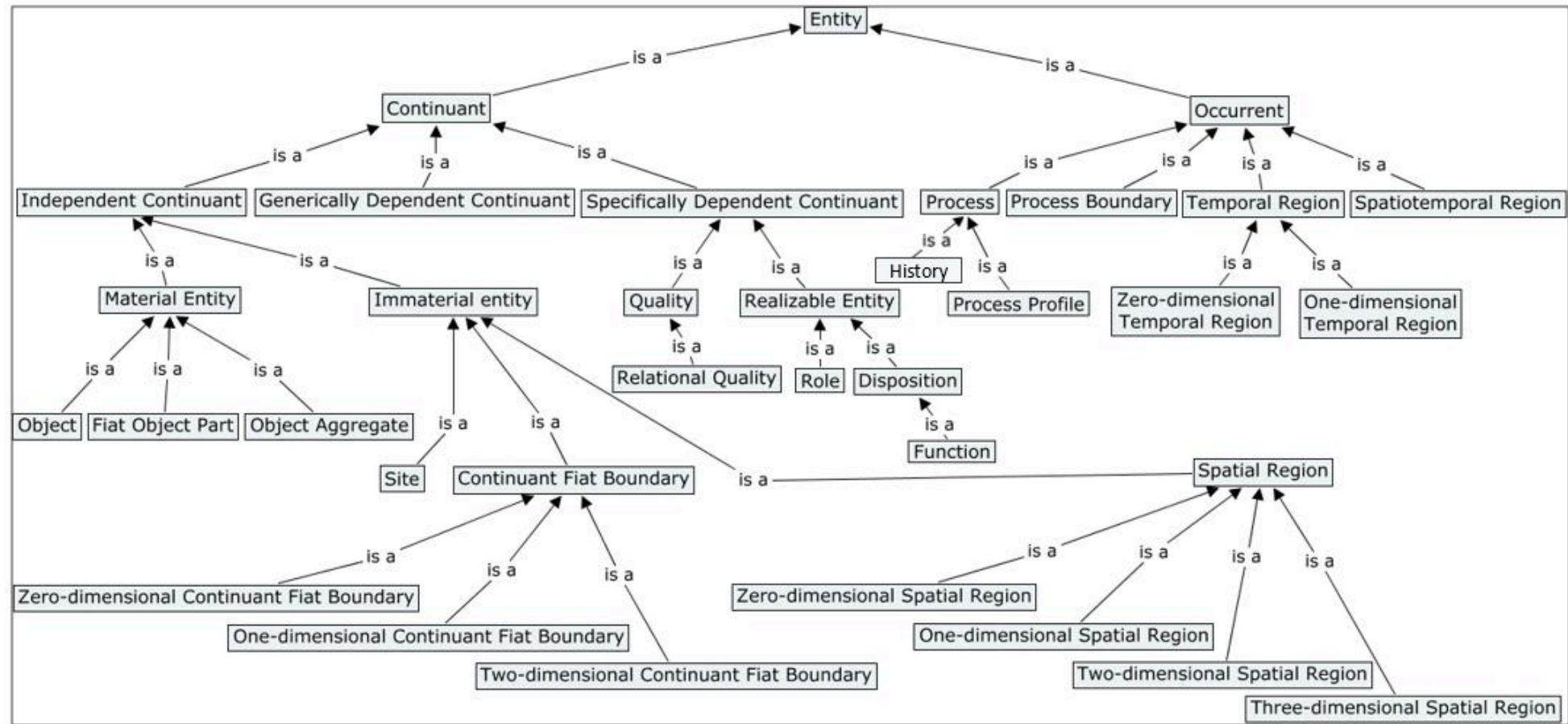




Equipment Ontology

Equipment Ontologies

Basic Formal Ontology



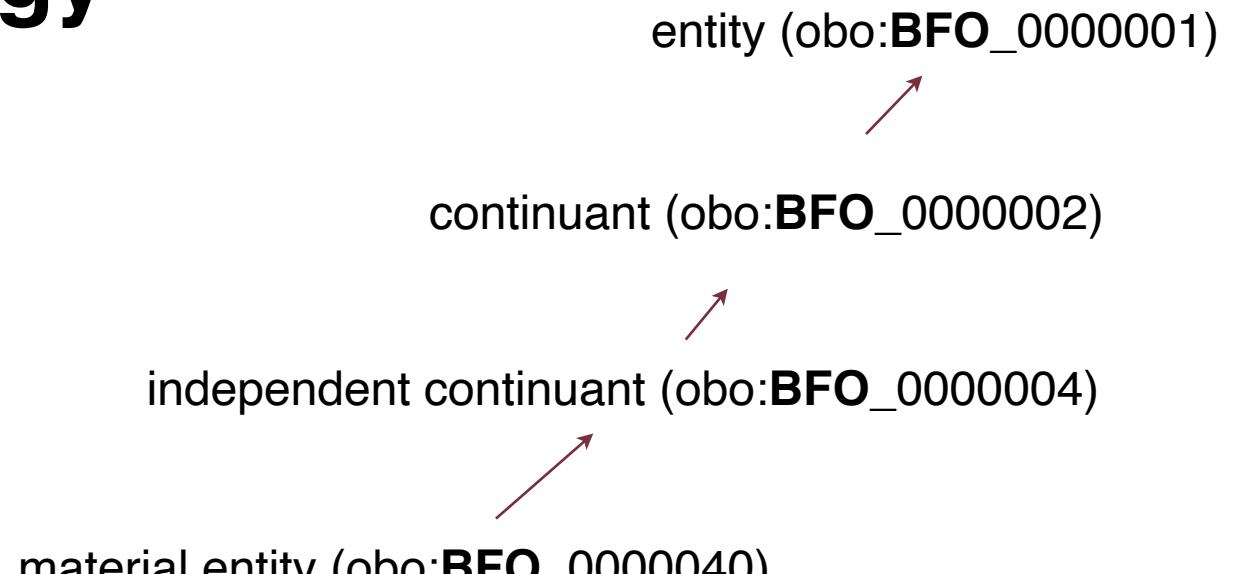
Equipment Ontology

Basic Formal Ontology

Foundation for USEDit

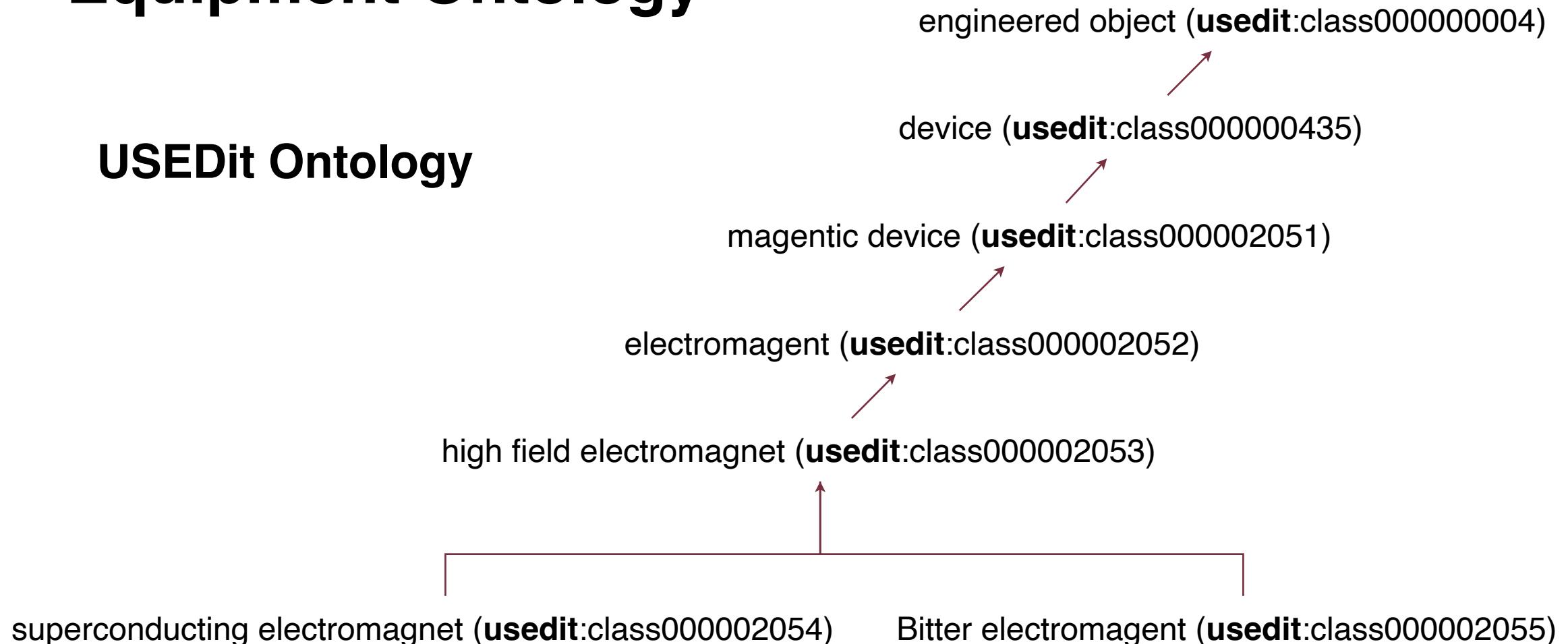
natural object (**usedit: class000000003**)

engineered object (**usedit: class000000004**)

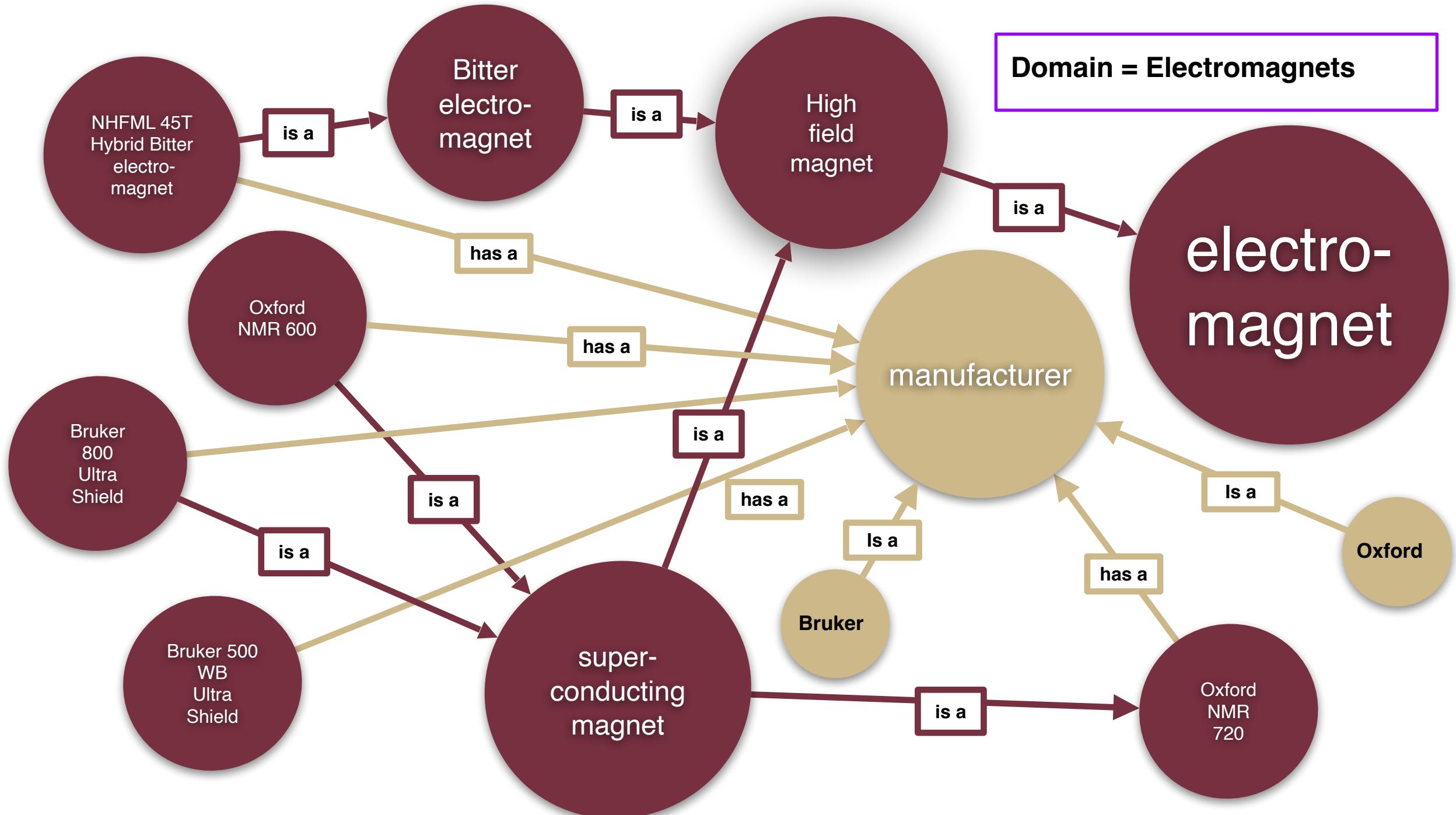


Equipment Ontology

USEDit Ontology



Domain = Electromagnets



Equipment Ontology

Basic Formal Ontology

Foundation for USEDit

acoustical property (**usedit: class000000232**)

entity (obo:BFO_0000001)

continuant (obo:BFO_0000002)

specifically dependent continuant (obo:BFO_0000020)

quality (obo:BFO_0000019)

relational quality (obo:BFO_0000145)

determinable quality (**usedit: class000000005**)

magnetic property (**usedit: class000000263**)

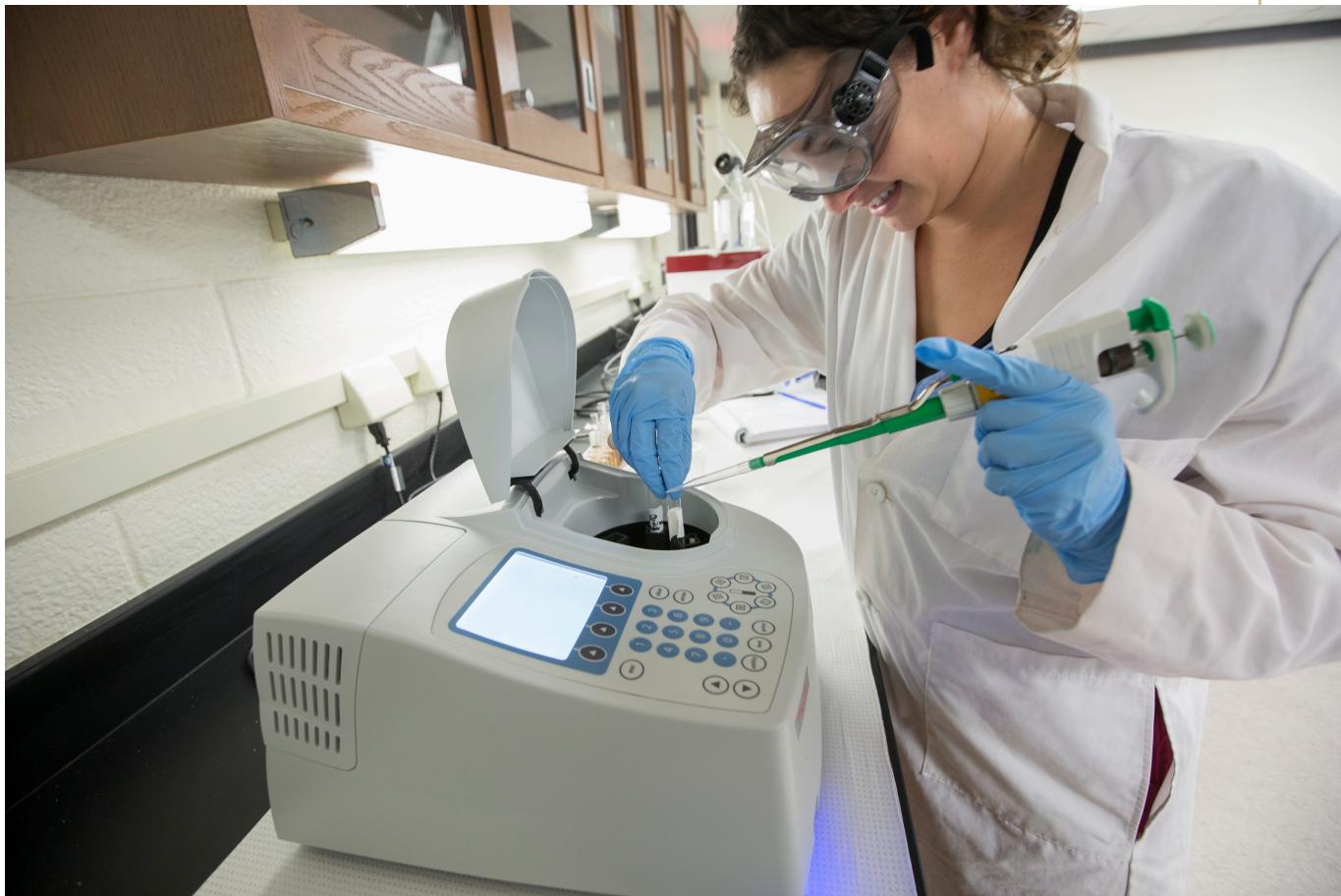
Equipment Ontology

USEdit Ontology

magnetic property
(usedit:class000000263)

- Curie temperature (**usedit:class000000264**)
- diamagnetism (**usedit:class000000265**)
- Hall coefficient (**usedit:class000000266**)
- hysteresis (**usedit:class000000267**)
- magnetostriction (**usedit:class000000268**)
- magnetocaloric coefficient (**usedit:class000000269**)
- magneto-Seebeck effect coefficient (**usedit:class000000270**)
- magnetoresistance (**usedit:class000000271**)
- permeability (**usedit:class000000272**)

Challenges



**USEDit ontology was
never completed**

Why?

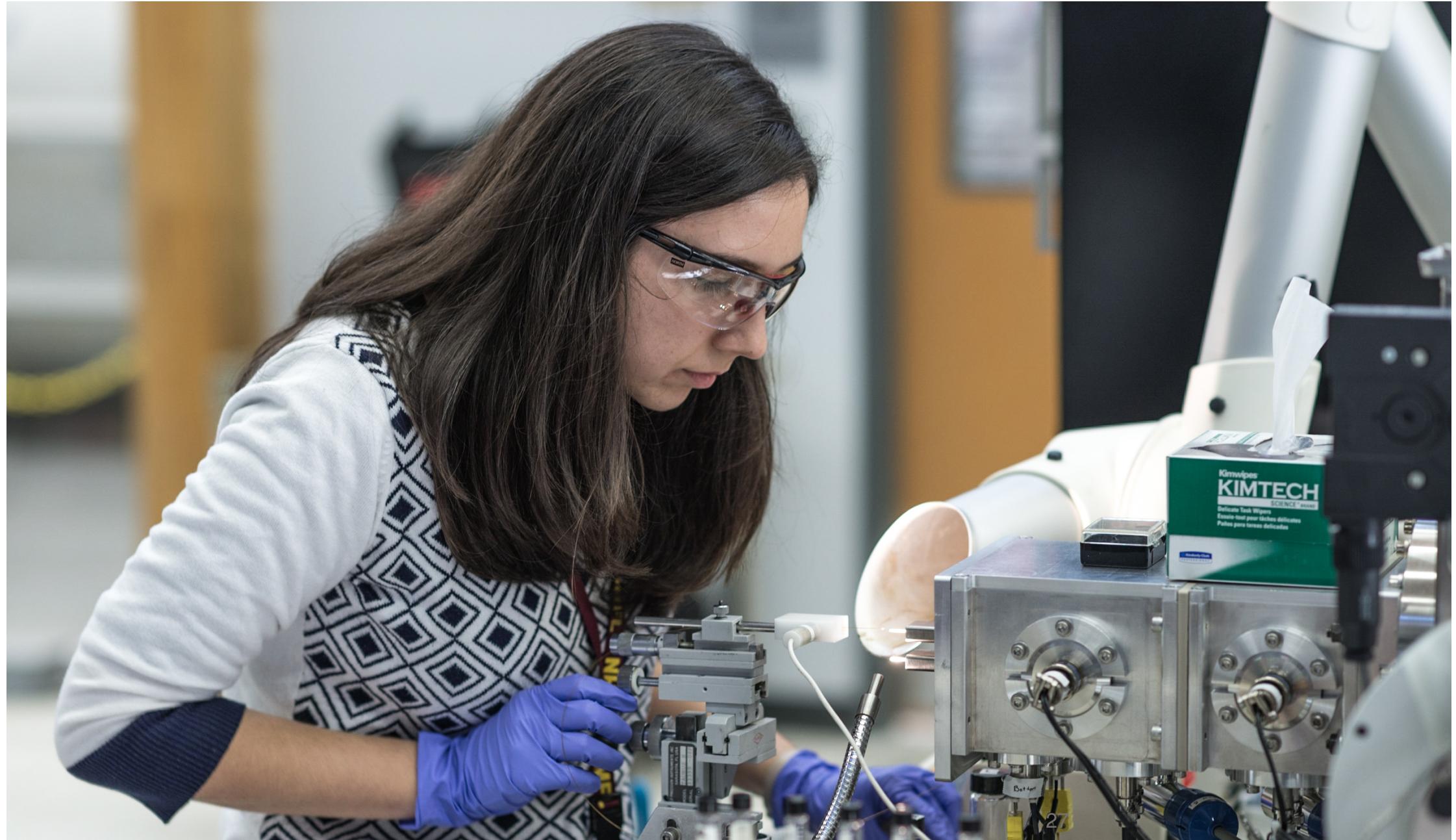
1. Complexity

- Time intensive project
 - True ontologies have complex relationships that go beyond mere classes
- Must reorient thinking from top-down hierarchy to “class is subclass of”
- Can be difficult to wrangle/visualize* multidimensional relationships

2. Comprehensiveness

- If resources (staff, funds, time) are limited, scale to local needs
 - Focus on how/why/where ontology will be used
- Develop overall ontology structure, then select one node to expand, e.g. device>>magnetic device>>electromagnet
 - Expand classes it has relationships to— an electromagnet **has a** magnetic property, so expand **subclasses of** the magnetic property class

* See Resources slide for Observable visualizations links





Sources

Resources

- **Basic Formal Ontology** (<https://github.com/bfo-ontology/BFO-2020>)
- **Basic Formal Ontology OWL Classes** (https://github.com/BFO-ontology/BFO/blob/master/bfo_classes_only.owl)
- **bfo_usedit_owl_20191015.xlsx** (https://github.com/aglerum/usedit/blob/master/ontology/bfo_usedit_owl_20191015.xlsx)
- **bfo-usedit_2020-02-29.owl** (https://github.com/aglerum/usedit/blob/master/ontology/bfo-usedit_2020-02-29.owl)
- **Taxonomic Structure for USEDit Ontology As of January 6, 2020** (<https://observablehq.com/d/3e4632b27c56668c>)
- **USEDit Agentive Taxonomy As of March 22, 2019** (<https://observablehq.com/d/aa7a4f1ec06e20c4>)

Image Citations

- **Slides 1, 2, 4, 6, 7, 10, 16, 17, 24, 26, 27.** FSU Branding assets (<https://brandfolder.com/floridastateuniversity/fsu-digital-assets>)
- **Slides 13 (left).** Onychoteuthidae (Hook Squid) (https://commons.wikimedia.org/wiki/File:Onychoteuthis_banksii2.jpg?uselang=en#Licensing)
- **Slides 13 (middle).** Taoniinae (Glass squid B). https://commons.wikimedia.org/wiki/File:Sandalops_melancholicus.jpg
- **Slides 13 (right).** Architeuthidae (Giant Squid). https://commons.wikimedia.org/wiki/File:Architeuthis_princeps_image_modified.PNG?uselang=en#Licensing)
- **Slide 15.** GO graph (<https://geneontology.org/docs/ontology-documentation/>)
- **Slide 18.** Smith, Barry. Figure 1: The BFO 2.0 is_a Hierarchy. Basic Formal Ontology 2.0 (<https://raw.githubusercontent.com/BFO-ontology/BFO/master/docs/bfo2-reference/BFO2-Reference.pdf>)

Where are they now?

- **Claudius Mundoma** - Director of Shared Instrumentation Facilities, Stanford University
- **Michael Meth** - Dean of SJSU University Library, San José State University
- **Renaine Julian** - Director of STEM Libraries, Florida State University
- **Nicholas Ruhs** - Research Data Management Librarian, Florida State University
- **Annie Glerum** - Alma Systems and Reports Librarian, Florida State University
- **Leah Booher** - Information Manager, Heron Bridge Education
- **Mark Lopez** - Digital Collections Specialist, Library of Congress
- **David Rodriguez** - Digital Services Librarian, Florida State University



Thank You!

Annie Glerum

Alma Systems and Reports Librarian

FSU Libraries

aglerum@fsu.edu