

# Drexel Team Update: DataNet Federation Consortium

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# DFC – Drexel University updates

- Materials science ontology work
- iRODS potential for core facility
- Format registry progress

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# HIVE and Material Science Ontologies

- Mine online literature to get metal terms and related semantic relationships
- Build ontology for metal concepts and convert skos/rdf format
- Import ontology into HIVE for concept browsing and automatic indexing

The screenshot shows the HIVE Vocabulary Server interface. At the top, there is a logo for HIVE (Helping with Interdisciplinary Vocabulary Engineering) and navigation buttons for Home, Concept Browser, and Indexing. Below the logo, it says 'Opened vocabularies: XMETAL +Add'. A search bar is present with a 'Search' button. The main content area displays a hierarchical ontology for 'Metal'. The 'Metal' category is expanded, showing sub-categories: Alloy, Base metal, Ferrous metal, and Non-ferrous metal. Under 'Alloy', there are sub-items: Brass, Iron alloy, Copper, Iron, Lead, Nickel, and Zinc. Under 'Base metal', there are sub-items: Steel, Wrought iron, and Noble metal. Under 'Ferrous metal', there are sub-items: Aluminium and Beryllium. A red circle highlights the 'Alloy' sub-category and its items. A blue arrow points from the 'Alloy' sub-category towards the right-hand side of the interface. On the right-hand side, there is a table for 'METAL->Alloy' with the following data:

Preferred Label	Alloy
URI	<a href="http://en.wikipedia.org/wiki/metal#c_43">http://en.wikipedia.org/wiki/metal#c_43</a>
Alternative Label	This concept does not have alternative labels.
Broader Concepts	<a href="#">Metal</a>
Narrower Concepts	<a href="#">Brass</a> <a href="#">Iron alloy</a>
Related Concepts	This concept does not have related concepts.
Scope Notes	An alloy is a material composed of two or more metals or a metal nonmetal.;

Ontologies of Metal (partial)



# HIVE and Material Science Ontologies

- Work in Progress
  - ▣ Training HIVE in the materials areas with scientific literatures indexing by experts
- Goal
  - ▣ Adding ontologies from other sub-domains of Material Science

The screenshot shows the HIVE Vocabulary Server interface. At the top, it says "Helping with Interdisciplinary Vocabulary Engineering". The main header includes the HIVE logo (a beehive) and the text "Vocabulary Server". Navigation buttons for "Home", "Concept Browser", and "Indexing" are visible. Below the navigation, a message states: "You can select multiple concepts from the cloud and view in the following formats: SKOS RDF/XML, SKOS N triples, Dublin Core, MARC/XML, and MODS/XML." A blue button labeled "Select Concepts to" and a grey button labeled "Start Over" are present. The "Extracted Concepts Cloud" section shows a list of concepts under the heading "METAL". The concepts are: Lithium, Gallium, Ruthenium, Iridium, Iron alloy, Bismuth, Rhodium, Osmium, Ferrous metal, and Non-ferrous metal. A red oval highlights this list of concepts.

Sample indexing in materials  
generated by HIVE





# Core Facilities

- ❑ SEM, FIB-SEM, E-SEM/OIM, elemental analysis: X-ray fluorescence & energy dispersive spectroscopy
- ❑ TEM/EDS, including *in situ* heating, bias, mechanical loading, fluid, sample prep.
- ❑ X-ray Diffraction (SAXS, WAXS, Rigaku SmartLab)
- ❑ UHV X-ray Photoelectron Spectroscopy - Auger Spectroscopy
- ❑ Raman (UV & visible wavelengths, mapping, variable temperature) and FTIR Spectroscopy
- ❑ Terahertz Spectroscopy, Transient Absorption Spectroscopy
- ❑ Nanoindentation
- ❑ Microfabrication (vacuum thin-film dep., deep inductively coupled plasma etching, photo-, laser and 3D stereolithography for rapid prototyping)



# Format registry work w/Harvard

- **Phase 1: Format Analysis** - define a broad set of candidate 2D and 3D formats and relevant properties.
- **Phase 2: Metadata Analysis** - identify the metadata elements
- **Phase 3: Content Modeling** – Format registry and DRS-Digital repository Service
- **Phase 4: Tool Analysis** – work with Harvard's File Information Tool Set (FITS), and explore the ability to identify, validate, and extract metadata from the selected 2D and 3D formats.

Legend: D: develop & test; F: feedback & improve; H: help users; T: Theory & prototype; S: demonstrate

Milestones: Engineering		Quarter							
		Year 4				Year 5			
1	Build interface to enable users to edit the format registry ontology			D	D	D	F	F	
2	Expand format registry to include more scientific domains and extend metadata ontology where appropriate	D	D	D	DF	DF	DF	F	F
3	Leverage more file format metadata in the Format Registry identifier to improve accuracy	D	D	D	F	F			
4	Integrate identification indexer with chained indexing support within iRODS, and explore link with HIVE ontology server	T	T	D	D	D	D	FH	FH
5	Provide continued production support for CIBER-U, RodsWiki, Format Registry, Format Converter	FH	FH	FH	FH	H	H	H	H
6	Modifications to RodsWiki as needed based on feedback and requests from user community	F	F	H	H	H	H	H	H
7	Develop materials science ontologies for HIVE, integrate into DFC prototype	T	TD	D	D	D	FH	FH	FH
8	Demonstrations				S				S