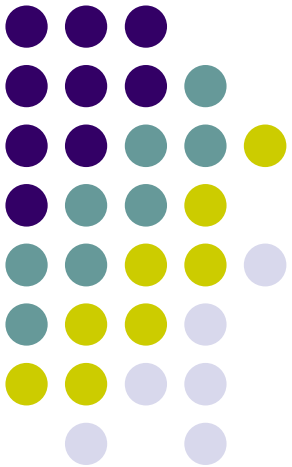
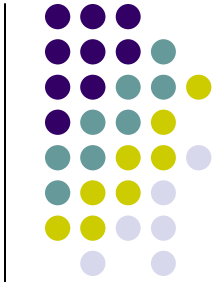
SparQL and Non-FMA Ontologies

Is the FMA's Compatibility with SparQL a Fluke?

Todd Detwiler
UW - SIG

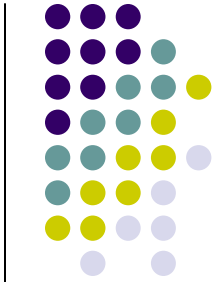


Reference Ontologies



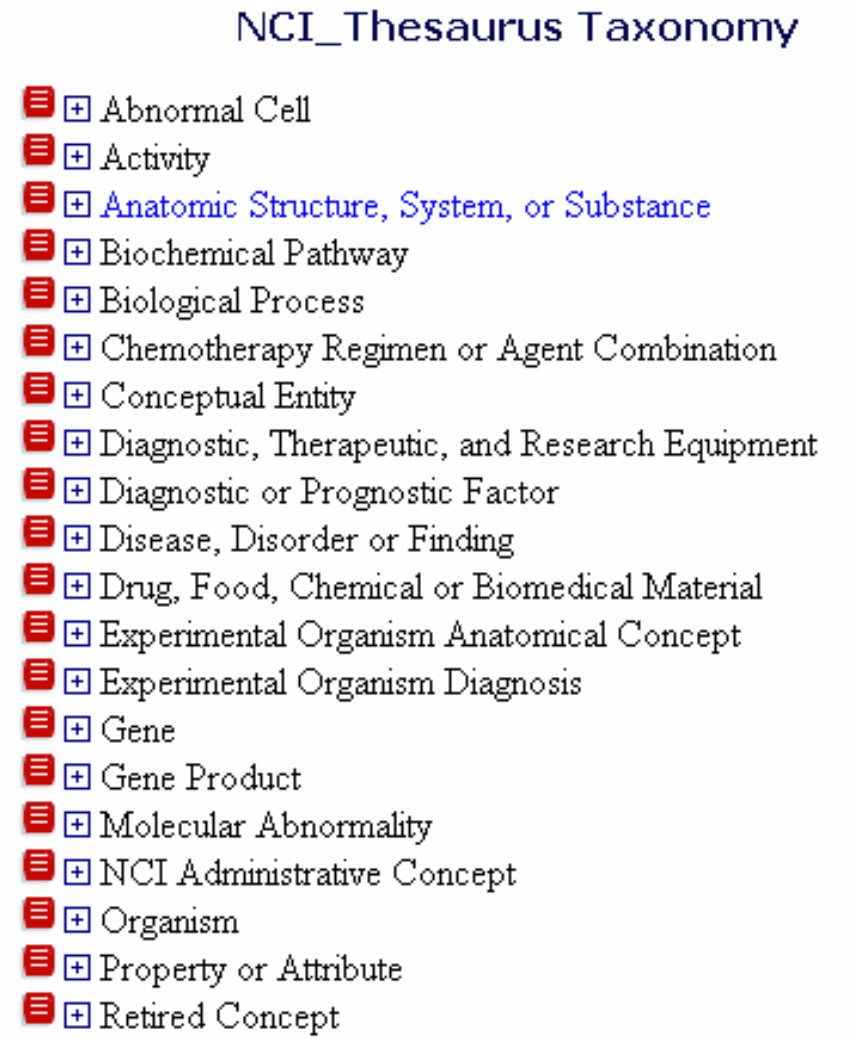
- Typically express relationships between classes of entities
- Useful view queries will surely need to select for specific inter-class paths
- Inter-class relations disallowed in OWL-DL
- Many ontologies currently implemented in DL

NCI Thesaurus (1)

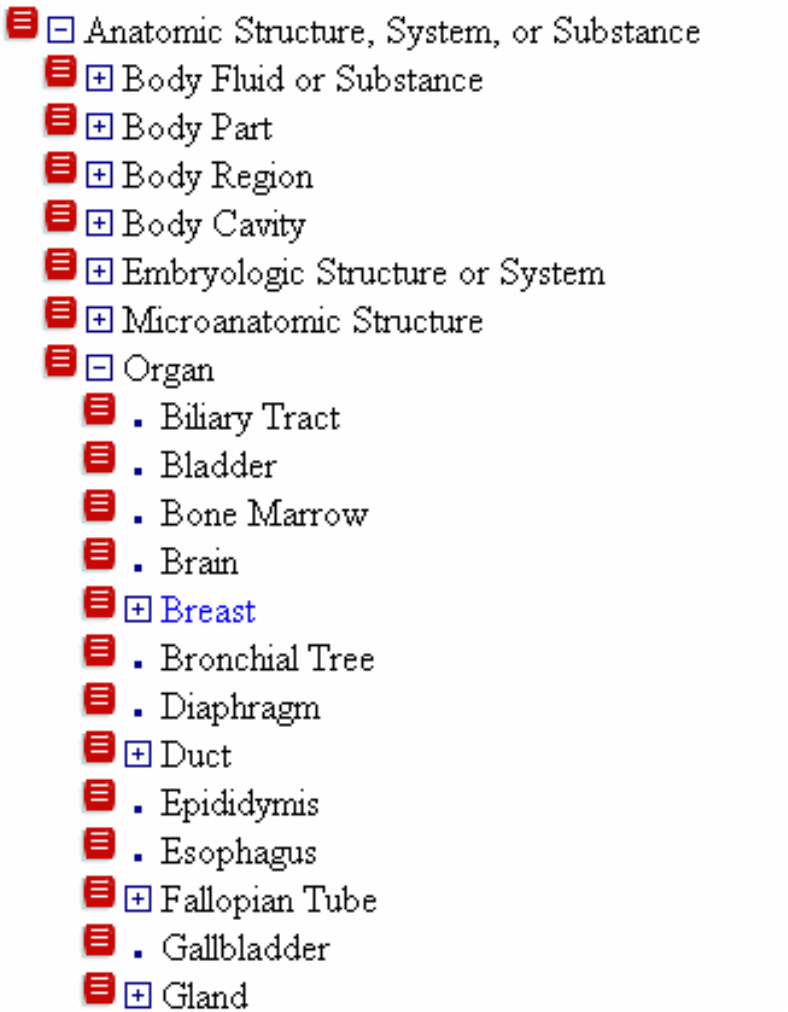


- “Reference terminology and biomedical ontology”
- Published monthly by multidisciplinary team of editors (~900 new entries monthly)
- Vocabularies for clinical care, translational and basic research, and public information and administrative activities
- ~10,000 cancers and related diseases
- ~8000 single agents and combination therapies
- Wide range of other topics related to cancer and biomedical research

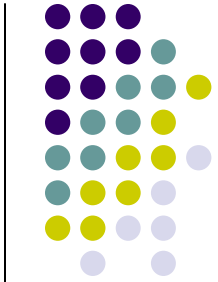
NCI Thesaurus (2)



NCI Thesaurus (3)



Heart (FMA)



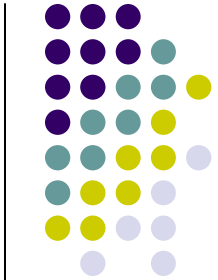
1 Attributes:

Name	Value
rdf:about	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Heart

113 Subtags:

Tag name/Text	rdf:resource
dl:location	
dl:constitutional_part	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Cardiac_vein
dl:part	
dl:regional_part_of	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Cardiovascular_system
dl:constitutional_part	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Systemic_capillary_bed_of_heart
dl:location	
dl:attributed_part	
dl:constitutional_part	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Fibrous_skeleton_of_heart
dl:regional_part	
dl:surrounded_by	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Pericardial_sac_proper
dl:part	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Left_coronary_artery
dl:attributed_part	
dl:location	
dl:part	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Cavity_of_left_atrium
dl:constitutional_part	http://bioontology.org/projects/ontologies/fma/fmaOwlDlComponent_1_4_0#Mitral_valve
dl:attributed_part	

Heart (NCI)



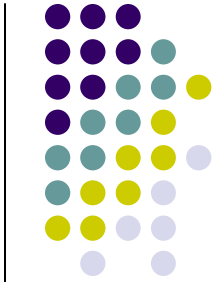
1 Attributes:

Name	Value
rdf:ID	Heart

17 Subtags:

Tag name/Text	Text	rdf:resource	owl:Restriction
rdfs:label	Heart		
code	C12727		
rdfs:subClassOf		#Organ	
rdfs:subClassOf			owl:Restriction
rdfs:subClassOf			owl:Restriction
Preferred_Name	Heart		
Semantic_Type	Body Part, Organ, or Organ Compone...		
Synonym	Cardiac		
Synonym	Heart		
FULL_SYN	<![CDATA[<term-name>Cardiac</ter...		
FULL_SYN	<![CDATA[<term-name>Heart</term-...		
FULL_SYN	<![CDATA[<term-name>Heart</term-...		
FULL_SYN	<![CDATA[<term-name>Heart</term-...		
DEFINITION	<![CDATA[<def-source>NCI</def-sou...		
Display_Name	Heart		
Mitelman_Code	1202		
UMLS_CUI	C0018787		

Heart (NCI)



1 Attributes:

Name	Value
rdf:ID	Heart

17 Subtags:

Tag name/Text	Text	rdf:resource	owl:Restriction
rdfs:label	Heart		
code	C12727		
rdfs:subClassOf		#Organ	
rdfs:subClassOf			owl:Restriction
rdfs:subClassOf			owl:Restriction
Preferred_Name	Heart		
Semantic_Type	Body Part, Organ, or Organ Compone...		
Synonym	Cardiac		
Synonym	Heart		
FULL_SYN	<![CDATA[<term-name>Cardiac</ter...		
FULL_SYN	<![CDATA[<term-name>Heart</term-...		
FULL_SYN	<![CDATA[<term-name>Heart</term-...		
FULL_SYN	<![CDATA[<term-name>Heart</term-...		
DEFINITION	<![CDATA[<def-source>NCI</def-sou...		
Display_Name	Heart		
Mitelman_Code	1202		
UMLS_CUI	C0018787		

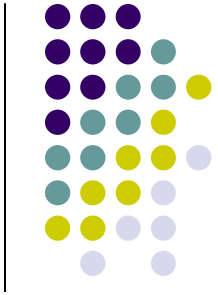
owl:Restriction

(This tag has no attibutes.)

2 Subtags:

Tag name/Text	rdf:resource
owl:onProperty	#Anatomic_Structure_Has_Location
owl:someValuesFrom	#Thoracic_Cavity

Heart (NCI)



```
<owl:Class rdf:ID="Heart">
<rdfs:label>Heart</rdfs:label>
<code>C12727</code>
<rdfs:subClassOf rdf:resource="#Organ"/>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:onProperty rdf:resource="#Anatomic_Structure_Has_Location"/>
    <owl:someValuesFrom rdf:resource="#Thoracic_Cavity"/>
  </owl:Restriction>
</rdfs:subClassOf>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:onProperty rdf:resource="#Anatomic_Structure_Is_Physical_Part_Of"/>
    <owl:someValuesFrom rdf:resource="#Cardiovascular_System"/>
  </owl:Restriction>
</rdfs:subClassOf>
<Preferred_Name>Heart</Preferred_Name>
<Semantic_Type>Body Part, Organ, or Organ Component</Semantic_Type>
<Synonym>Cardiac</Synonym>
<Synonym>Heart</Synonym>
<FULL_SYN><![CDATA[<term-name>Cardiac</term-name><term-group>AD</term-group><term-source>NCI</term-source>]]>
<FULL_SYN><![CDATA[<term-name>Heart</term-name><term-group>DN</term-group><term-source>CTRM</term-source>]]>
<FULL_SYN><![CDATA[<term-name>Heart</term-name><term-group>PT</term-group><term-source>CTRM</term-source>]]>
<FULL_SYN><![CDATA[<term-name>Heart</term-name><term-group>PT</term-group><term-source>NCI</term-source>]]></FU
<DEFINITION><![CDATA[<def-source>NCI</def-source><def-definition>A hollow muscular organ which receives the blood from t
<Display_Name>Heart</Display_Name>
<Mitelman_Code>1202</Mitelman_Code>
<UMLS_CUI>C0018787</UMLS_CUI>
```

NCI Thesaurus SparQL Query

Enter SparQL query:

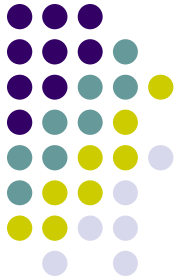
```
PREFIX nci: <http://ncicb.nci.nih.gov/xml/owl/EVS/Thesaurus.owl#>
PREFIX rdfs:<http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl:<http://www.w3.org/2002/07/owl#>

SELECT ?a ?prop ?c
WHERE
{
 ?a nci:Preferred_Name "Heart" .
 ?a rdfs:subClassOf ?b .
 ?b owl:onProperty ?prop .
 ?b owl:someValuesFrom ?c .
}
```

Submit Query

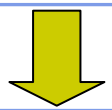
NCI Thesaurus SparQL Results

a	prop	c
nci:Heart	nci:Anatomic_Structure_Is_Physical_Part_Of	nci:Cardiovascular_System
nci:Heart	nci:Anatomic_Structure_Has_Location	nci:Thoracic_Cavity

FMA vs. NCI Example

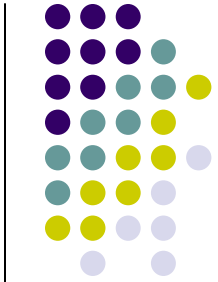


```
SELECT ?a ?prop ?c
WHERE
{
 ?a fma:Preferred_Name "Heart" .
 ?a ?prop ?c .
}
```



```
SELECT ?a ?prop ?c
WHERE
{
 ?a nci:Preferred_Name "Heart" .
 ?a rdfs:subClassOf ?b .
 ?b owl:onProperty ?prop .
 ?b owl:someValuesFrom ?c .
}
```

Not the Complete Story



- Only illustrates case where property restrictions are asserted in bNode superclass
- Similar transformation needed for allValuesFrom?