SWAD-Europe Thesaurus Activity
Deliverable 8.6

OWL Ontology for Thesaurus Data

A description of the OWL features used in the SKOS-Core RDF vocabulary for thesauri

Abstract:

This report describes the features of OWL that are used in the SKOS-Core RDF vocabulary for thesaurus data to express additional semantics and constraints that may not be expressed with RDF Schema alone.

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1. Introduction [back to contents]

This report describes the features of OWL [OWL] that are used in the SKOS-Core RDF vocabulary [SKOS GUIDE] [SKOS SCHEMA] as it stands at 02/06/2004, to express additional semantics and constraints on the SKOS data model.

The SKOS model is an abstract data model defining the structure of a thesaurus. The SKOS-Core vocabulary is an encoding of this model using RDF Schema [RDFS]. Some semantics and constraints present in the data model cannot be expressed by RDF Schema alone, but require features of OWL. These are described here. Also, some semantics and constraints cannot be expressed by either RDFS or OWL, and these are also described.

2. OWL Features of SKOS-Core [back to contents]

The following properties are declared to be of type `owl:TransitiveProperty`:

- `skos:broader`
- `skos:narrower`
- `skos:broaderGeneric`
- `skos:narrowerGeneric`
- `skos:broaderPartitive`
- `skos:narrowerPartitive`
- `skos:relatedPartOf`
- `skos:relatedHasPart`

The following property pairs are declared to be each other's inverse, via a statement using the `owl:inverseOf` predicate:

- `skos:broader / skos:narrower`
- `skos:broaderInstantive / skos:narrowerInstantive`
- `skos:broaderGeneric / skos:narrowerGeneric`
- `skos:broaderPartitive / skos:narrowerPartitive`
- `skos:relatedPartOf / skos:relatedHasPart`

The following properties are declared to be of type `owl:SymmetricProperty`:

- `skos:related`

3. Constraints and Semantics Not Expressable With RDFS or OWL [back to contents]

- Each resource of type `skos:Concept` may have no more than one value of the `skos:prefLabel` property FOR EACH LANGUAGE.
- Two resources are identical (can be declared to be `owl:sameAs`) iff they both have the same value for the property `skos:prefLabel` AND the same value for the property `skos:inScheme`.
- Two resources are identical (can be declared to be `owl:sameAs`) iff they both have the same value for the property `skos:externalID` AND the same value for the property `skos:inScheme`.

References

[SKOS GUIDE]
SKOS-Core 1.0 Guide. Miles, A.J., Rogers, R., Beckett, D. SWAD-Europe Thesaurus Activity.
http://www.w3.org/2001/sw/Europe/reports/thes/1.0/guide/
[SKOS SCHEMA]
SKOS-Core 1.0 RDF Schema. Miles, A.J., Rogers, R., Beckett, D. SWAD-Europe Thesaurus Activity.
http://www.w3.org/2004/02/skos/core.rdf
[OWL]
OWL Web Ontology Language Guide. Smith, M.K., Welty, C., McGuiness, D.L. Eds. W3C Recommendation.
http://www.w3.org/TR/owl-guide/
[RDFS]
RDF Vocabulary Description Language 1.0: RDF Schema. Brickley, D., Guha, R.V. Eds. W3C Recommendation.
http://www.w3.org/TR/rdf-schema/

Appendix: SKOS-Core Schema (02/06/2004)

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE rdfs [
        <!ENTITY rdf "http://www.w3.org/1999/02/22-rdf-syntax-ns#">
        <!ENTITY rdfs "http://www.w3.org/2000/01/rdf-schema#">
        <!ENTITY dc "http://purl.org/dc/elements/1.1/">
        <!ENTITY dct "http://purl.org/dc/terms/">
        <!ENTITY foaf "http://xmlns.com/foaf/0.1/">
        <!ENTITY owl "http://www.w3.org/2002/07/owl#">
]>
<rdf:RDF xml:base="http://www.w3.org/2004/02/skos/core" xmlns:rdf="&rdf;" xmlns:rdfs="&rdfs;" xmlns:dc="&dc;" xmlns:dct="&dct;" xmlns:owl
        <!-- This schema is described by the SKOS-Core 1.0 Guide, which can be found at http://www.w3.org/2001/sw/Europe/reports/thes/1.0
        <!-- Description of this schema -->
        <rdf:Description rdf:about="">
                <dc:title>SKOS-Core 1.0</dc:title>
                <dc:description>An RDF schema for encoding simple concept schemes such as thesauri and subject heading schemes.</dc:descr
                <dc:creator>Alistair Miles</dc:creator>
                <dc:creator>Nikki Rogers</dc:creator>
                <dc:creator>Dave Beckett</dc:creator>
                <dct:modified>2004-03-26</dct:modified>
        </rdf:Description>
        <!-- Fundamental classes -->
        <rdfs:Class rdf:ID="ConceptScheme">
                <rdfs:label>Concept Scheme</rdfs:label>
                <rdfs:comment>A concept scheme is a collection of concepts.</rdfs:comment>
        </rdfs:Class>
        <rdfs:Class rdf:ID="Concept">
                <rdfs:label>Concept</rdfs:label>
                <rdfs:comment>A concept is any unit of thought that can be defined or described.</rdfs:comment>
        </rdfs:Class>
        <rdfs:Class rdf:ID="TopConcept">
                <rdfs:label>Top Concept</rdfs:label>
                <rdfs:comment>A concept that sits at the top of the concept hierarchy.</rdfs:comment>
    <rdfs:subClassOf rdf:resource="#Concept"/>
        </rdfs:Class>
        <!-- Basic properties of concepts -->
        <rdf:Property rdf:ID="inScheme">
                <rdfs:label>in scheme</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="&rdfs;isDefinedBy"/>
                <rdfs:domain rdf:resource="#Concept"/>
                <rdfs:range rdf:resource="#ConceptScheme"/>
                <rdfs:comment>Use this property to state that a concept is a part of some concept scheme.  A concept may be a part of mor
        </rdf:Property>
        <rdf:Property rdf:ID="prefLabel">
                <rdfs:label>preferred label</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="&rdfs;label"/>
                <rdfs:comment>Use this property to indicate a preferred label for a resource.  If the resource is a concept in some conce
        </rdf:Property>
        <rdf:Property rdf:ID="altLabel">
                <rdfs:label>alternative label</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="&rdfs;label"/>
                <rdfs:comment>Use this property to indicate an alternative (non-preferred) label for a resource.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="prefSymbol">
                <rdfs:label>preferred symbol</rdfs:label>
                <rdfs:domain rdf:resource="&rdf;Resource"/>
                <rdfs:range rdf:resource="&foaf;Image"/>
                <rdfs:comment>Use this property to indicate a preferred symbolic representation for a resource.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="altSymbol">
```

```
                <rdfs:label>alternative symbol</rdfs:label>
                <rdfs:domain rdf:resource="&rdf;Resource"/>
                <rdfs:range rdf:resource="&foaf;Image"/>
                <rdfs:comment>Use this property to indicate an alternative (non-preferred) symbolic representation for a resource.</rdfs:
        </rdf:Property>
        <rdf:Property rdf:ID="externalID">
                <rdfs:label>identifier</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="&rdf;value"/>
                <rdfs:domain rdf:resource="#Concept"/>
                <rdfs:comment>Use or extend this property to indicate any non-URI code that is used to uniquely identify a concept within
        </rdf:Property>
        <rdf:Property rdf:ID="semanticRelation">
                <rdfs:label>semantic relation</rdfs:label>
                <rdfs:domain rdf:resource="#Concept"/>
                <rdfs:range rdf:resource="#Concept"/>
                <rdfs:comment>This is the super-property of all properties used to make statements about how concepts within the same con
        </rdf:Property>
        <!-- Basic semantic relation properties -->
        <rdf:Property rdf:ID="broader">
                <rdfs:label>has broader</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#semanticRelation"/>
                <rdfs:comment>This property carries weak semantics.  It may be used to state that the object is in some way more general
        </rdf:Property>
        <rdf:Property rdf:ID="narrower">
                <rdfs:label>has narrower</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#semanticRelation"/>
                <owl:inverseOf rdf:resource="#broader"/>
                <rdfs:comment>This property is the inverse of the 'broader' property.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="related">
                <rdfs:label>related to</rdfs:label>
                <rdf:type rdf:resource="&owl;SymmetricProperty"/>
                <rdfs:subPropertyOf rdf:resource="#semanticRelation"/>
                <rdfs:subPropertyOf rdf:resource="&rdfs;seeAlso"/>
                <rdfs:comment>This property carries weak semantics.  It may be used to state that that the object is in some way related
        </rdf:Property>
        <!-- Semantic relation property extensions -->
        <rdf:Property rdf:ID="broaderInstantive">
                <rdfs:label>instance of</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="#broader"/>
                <rdfs:subPropertyOf rdf:resource="&rdf;type"/>
                <rdfs:comment>An extension of the 'broader' property to specify the instantiation (instance of) relationship between two
        </rdf:Property>
        <rdf:Property rdf:ID="narrowerInstantive">
                <rdfs:label>has instance</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="#narrower"/>
                <owl:inverseOf rdf:resource="#broaderInstantive"/>
                <rdfs:comment>This property is the inverse of the 'broaderInstantive' property.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="broaderGeneric">
                <rdfs:label>sub-class of</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#broader"/>
                <rdfs:subPropertyOf rdf:resource="&rdfs;subClassOf"/>
                <rdfs:comment>An extension of the 'broader' property to specify the class subsumption (sub-class/super-class) relationshi
        </rdf:Property>
        <rdf:Property rdf:ID="narrowerGeneric">
                <rdfs:label>super-class of</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#narrower"/>
                <owl:inverseOf rdf:resource="#broaderGeneric"/>
                <rdfs:comment>This property is the inverse of the 'broaderGeneric' property.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="broaderPartitive">
                <rdfs:label>part of</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#broader"/>
                <rdfs:subPropertyOf rdf:resource="&dct;isPartOf"/>
                <rdfs:comment>An extension of the 'broader' property to specify a partitive (part of) relationship between two concepts.<
        </rdf:Property>
        <rdf:Property rdf:ID="narrowerPartitive">
                <rdfs:label>has part</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#narrower"/>
                <rdfs:subPropertyOf rdf:resource="&dct;hasPart"/>
                <owl:inverseOf rdf:resource="#broaderPartitive"/>
                <rdfs:comment>This property is the inverse of the 'broaderPartitive' property.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="relatedPartOf">
                <rdfs:label>part of</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#related"/>
                <rdfs:subPropertyOf rdf:resource="&dct;isPartOf"/>
                <rdfs:comment>An extension of the 'related' property.  Use this property to express a partitive relationship between conc
        </rdf:Property>
        <rdf:Property rdf:ID="relatedHasPart">
                <rdfs:label>has part</rdfs:label>
                <rdf:type rdf:resource="&owl;TransitiveProperty"/>
                <rdfs:subPropertyOf rdf:resource="#related"/>
                <rdfs:subPropertyOf rdf:resource="&dct;hasPart"/>
                <owl:inverseOf rdf:resource="#relatedPartOf"/>
                <rdfs:comment>This property is the inverse of the 'relatedPartOf' property.</rdfs:comment>
        </rdf:Property>
        <!-- Scope notes, definitions and examples -->
        <rdf:Property rdf:ID="scopeNote">
                <rdfs:label>scope note</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="&rdfs;comment"/>
                <rdfs:comment>A scope note is a piece of text that in some way helps to elucidate the intended meaning of a concept.</rdf
                <rdfs:domain rdf:resource="#Concept"/>
        </rdf:Property>
        <rdf:Property rdf:ID="definition">
                <rdfs:label>definition</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="&rdfs;comment"/>
                <rdfs:comment>A formal (dictionary style) definition of the intended meaning of a concept.</rdfs:comment>
                <rdfs:domain rdf:resource="#Concept"/>
        </rdf:Property>
        <rdf:Property rdf:ID="example">
                <rdfs:label>example</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="&rdfs;comment"/>
                <rdfs:comment>A contextual example of the use of a concept, that helps to elucidate its intended meaning.</rdfs:comment>
                <rdfs:domain rdf:resource="#Concept"/>
        </rdf:Property>
        <!-- N.B. use the foaf:depiction property to attach an image depicting a concept. -->
</rdf:RDF>
```