SWAD–Europe Deliverable 8.4: Inter–Thesaurus Mapping

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Abstract:

This document is an introduction and guide to the RDF thesaurus vocabulary extension for defining inter-thesaurus mappings and equivalence relationships. It gives recommendations and examples for defining mappings between concepts from different thesa uri, and using these mappings to enable inter-thesaurus interoperability.
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    Completed report
Comments on this document are welcome and should be sent to ☞Alistair Miles or to the ☞public-esw-thes@w3.org list. An archive of this list is available at ☞http://lists.w3.org/Archives/Public/public-esw-thes/

Contents

1. Introduction [☞back to contents]

This document is an introduction to the SKOS-Mapping RDF schema [☞3]. SKOS-Mapping is a schema designed to support inter-thesaurus mappings within an RDF framework.

Every *mapping* has a *source* and a *target*. The *source* will be a single concept from the source thesaurus. The *target* may be a single concept, or some combination of concepts from the target thesaurus.

The SKOS-Mapping schema consists of a set of mapping properties (exact, inexact, major, minor, partial, broad, narrow). It also contains a set of constructs for creating mapping targets from combinations of concepts (AND, OR, NOT).

2. Using SKOS–Mapping [☞back to contents]

The examples below involve mappings between the HPMulti Thesaurus for Health Promotion [☞6] and the UK

Government Category List (GCL) thesaurus of subject headings [☞8].

The following class definitions are assumed (see ☞SWAD-Europe deliverable 8.1 for more on how to define thesaurus concepts in RDF [☞2]):

HPMulti and GCL class definitions

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">

        <rdfs:Class rdf:about="http://www.govtalk.gov.uk/gcl/Concept">
                <rdfs:label>GCL Thesaurus Concept</rdfs:label>
                <rdfs:subClassOf rdf:resource="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#Concept"/>
        </rdfs:Class>

        <rdfs:Class rdf:about="http://www.hpmulti.net/Concept">
                <rdfs:label>HPMulti Thesaurus Concept</rdfs:label>
                <rdfs:subClassOf rdf:resource="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#Concept"/>
        </rdfs:Class>

</rdf:RDF>
```

a. Exact - Exact mapping property hierarchy

```
skos-map:semanticMapping
   |
   +--skos-map:exactMapping
```

Usage: Use this property when the intension of the source concept is identical to the intension of the target.

Example of exact mapping

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
        xmlns="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#">

        <hpm:Concept>
                <prefLabel>Health care</prefLabel>
                <map:exactMatch>
                        <gcl:Concept>
                                <prefLabel>Health care</prefLabel>
                        </gcl:Concept>
                </map:exactMatch>
        </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Family planning</prefLabel>
                <map:exactMatch>
                        <gcl:Concept>
                                <prefLabel>Family planning</prefLabel>
                        </gcl:Concept>
                </map:exactMatch>
        </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Crime</prefLabel>
                <map:exactMatch>
                        <gcl:Concept>
                                <prefLabel>Crime</prefLabel>
                        </gcl:Concept>
                </map:exactMatch>
        </hpm:Concept>

</rdf:RDF>
```

N.B. an exact mapping can be made between two concepts whose preferred labels are not identical, as long as the intended meaning is the same.

b. Inexact - Inexact mapping property hierarchy

```
skos-map:semanticMapping
   |
   +--skos-map:inexactMapping
```

Usage: Use this property when there is some overlap in the intended meaning of source and target concepts.

NB. This property is provided for backwards compatibility with mappings conforming to ISO 1985:5964 [☞7]. It is recommended to use major or minor mappings instead, wherever possible.

c. Major - Major mapping property hierarchy

```
skos-map:semanticMapping
   |
   +--skos-map:inexactMapping
          |
          +--skos-map:majorMapping
```

Usage: Use this property when there is significant overlap in the intended meaning of source and target concepts.

Example of major mapping

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
        xmlns="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#">
```

```
                        <prefLabel>Access to information</prefLabel>
                        <map:majorMatch>
                                <gcl:Concept>
                                        <prefLabel>Freedom of information</prefLabel>
                                </gcl:Concept>
                        </map:majorMatch>
                </hpm:Concept>

                <hpm:Concept>
                        <prefLabel>Mass media</prefLabel>
                        <map:majorMatch>
                                <gcl:Concept>
                                        <prefLabel>Media and the press</prefLabel>
                                </gcl:Concept>
                        </map:majorMatch>
                </hpm:Concept>

                <hpm:Concept>
                        <prefLabel>Nursery schools</prefLabel>
                        <map:majorMatch>
                                <gcl:Concept>
                                        <prefLabel>Pre-school learning</prefLabel>
                                </gcl:Concept>
                        </map:majorMatch>
                </hpm:Concept>

                <hpm:Concept>
                        <prefLabel>Alcoholism</prefLabel>
                        <map:exactMatch>
                                <gcl:Concept>
                                        <prefLabel>Alcohol use and abuse</prefLabel>
                                </gcl:Concept>
                        </map:exactMatch>
                </hpm:Concept>

                <hpm:Concept>
                        <prefLabel>Drug dependency</prefLabel>
                        <map:exactMatch>
                                <gcl:Concept>
                                        <prefLabel>Drug use and abuse</prefLabel>
                                </gcl:Concept>
                        </map:exactMatch>
                </hpm:Concept>

</rdf:RDF>
```

d. Minor - Minor mapping property hierarchy

```
skos-map:semanticMapping
   |
   +--skos-map:inexactMapping
            |
            +--skos-map:minorMapping
```

Usage: Use this property when there is some small overlap in the intended meaning of source and target concepts.

Example of minor mapping

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
        xmlns="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#">

                <hpm:Concept>
                        <prefLabel>Accidents</prefLabel>
                        <map:minorMatch>
                                <gcl:Concept>
                                        <prefLabel>Occupational health and safety</prefLabel>
                                </gcl:Concept>
                        </map:minorMatch>
                </hpm:Concept>

                <hpm:Concept>
                        <prefLabel>Access to information</prefLabel>
                        <map:minorMatch>
                                <gcl:Concept>
                                        <prefLabel>Libraries and archives</prefLabel>
                                </gcl:Concept>
                        </map:minorMatch>
                </hpm:Concept>

                <hpm:Concept>
                        <prefLabel>Sexuality</prefLabel>
                        <map:minorMatch>
                                <gcl:Concept>
                                        <prefLabel>Equal opportunities and diversity</prefLabel>
                                </gcl:Concept>
                        </map:minorMatch>
                </hpm:Concept>

</rdf:RDF>
```

e. Partial - Partial mapping property hierarchy

```
skos-map:semanticMapping
   |
   +--skos-map:partialMapping
```

Usage: Use this property when the intended meaning of source concept either subsumes, or is subsumed by the intended meaning of the target concept.

N.B. This property is provided for backwards compatibility with mappings conforming to ISO 1985:5964 [☞7]. It is recommended that either broad or narrow mappings are used instead, wherever possible.

f. Broad - Broad mapping property hierarchy

```
skos-map:semanticMapping
   |
   +--skos-map:partialMapping
         |
         +--skos-map:broadMapping
```

Usage: Use this property when the intended meaning of the source concept is subsumed by the intended meaning of the target concept.

Example of broad mapping

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
        xmlns="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#">

        <hpm:Concept>
                <prefLabel>Access to information</prefLabel>
                <map:broadMatch>
                        <gcl:Concept>
                                <prefLabel>Information and communication</prefLabel>
                        </gcl:Concept>
                </map:broadMatch>
        </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Accident prevention</prefLabel>
                <map:broadMatch>
                        <gcl:Concept>
                                <prefLabel>Safety</prefLabel>
                        </gcl:Concept>
                </map:broadMatch>
        </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Adult education</prefLabel>
                <map:broadMatch>
                        <gcl:Concept>
                                <prefLabel>Adult education and training</prefLabel>
                        </gcl:Concept>
                </map:broadMatch>
        </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Acupuncture</prefLabel>
                <map:broadMatch>
                        <gcl:Concept>
                                <prefLabel>Alternative medicine</prefLabel>
                        </gcl:Concept>
                </map:broadMatch>
        </hpm:Concept>

</rdf:RDF>
```

g. Narrow - Narrow mapping property hierarchy

```
skos-map:semanticMapping
   |
   +--skos-map:partialMapping
         |
         +--skos-map:narrowMapping
```

Usage: Use this property when the intended meaning of the source concept subsumes the intended meaning of the target concept.

Example of narrow mapping

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
        xmlns="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#">

        <hpm:Concept>
                <prefLabel>Health services</prefLabel>
                <map:narrowMatch>
                        <gcl:Concept>
                                <prefLabel>National Health Service (NHS)</prefLabel>
                        </gcl:Concept>
                </map:narrowMatch>
        </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Education</prefLabel>
                <map:narrowMatch>
                        <gcl:Concept>
                                <prefLabel>Pre-school learning</prefLabel>
                        </gcl:Concept>
```

```
                </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Access</prefLabel>
                <map:narrowMatch>
                        <gcl:Concept>
                                <prefLabel>Access to countryside</prefLabel>
                        </gcl:Concept>
                </map:narrowMatch>
        </hpm:Concept>

</rdf:RDF>
```

i. AND - Usage: Use the AND construct to create a mapping target that represents the common intension of two or more concepts.

<div align="right">Example of AND mapping target</div>

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
        xmlns="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#">

        <hpm:Concept>
                <prefLabel>Dental health care</prefLabel>
                <map:exactMatch>
                        <map:AND>
                                <map:memberList rdf:parseType="Collection">
                                        <gcl:Concept>
                                                <prefLabel>Dental health</prefLabel>
                                        </gcl:Concept>
                                        <gcl:Concept>
                                                <prefLabel>Health care</prefLabel>
                                        </gcl:Concept>
                                </map:memberList>
                        </map:AND>
                </map:exactMatch>
        </hpm:Concept>

        <hpm:Concept>
                <prefLabel>Child health care</prefLabel>
                <map:broadMatch>
                        <map:AND>
                                <map:memberList rdf:parseType="Collection">
                                        <gcl:Concept>
                                                <prefLabel>Health care</prefLabel>
                                        </gcl:Concept>
                                        <gcl:Concept>
                                                <prefLabel>Families and children</prefLabel>
                                        </gcl:Concept>
                                </map:memberList>
                        </map:AND>
                </map:broadMatch>
        </hpm:Concept>

</rdf:RDF>
```

j. OR - Usage: Use the OR construct to create a mapping target that represents the combined intension of two or more concepts.

<div align="right">Example of OR mapping target</div>

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
        xmlns="http://www.w3c.rl.ac.uk/2003/11/21-skos-core#">

        <gcl:Concept>
                <prefLabel>Antisocial behaviour and disorder</prefLabel>
                <map:broadMatch>
                        <map:OR>
                                <map:memberList rdf:parseType="Collection">
                                        <hpm:Concept>
                                                <prefLabel>Antisocial behaviour</prefLabel>
                                        </hpm:Concept>
                                        <hpm:Concept>
                                                <prefLabel>Behavioural disorders</prefLabel>
                                        </hpm:Concept>
                                </map:memberList>
                        </map:OR>
                </map:broadMatch>
        </gcl:Concept>

</rdf:RDF>
```

k. NOT - Usage: Use the NOT construct to create a mapping target from which some element of intended meaning is excluded.

<div align="right">Example of NOT mapping target</div>

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:hpm="http://www.hpmulti.net/"
        xmlns:gcl="http://www.govtalk.gov.uk/gcl/"
        xmlns:map="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping#"
```

```
<gcl:Concept>
        <prefLabel>Schools</prefLabel>
        <map:majorMatch>
                <map:AND>
                        <map:memberList rdf:parseType="Collection">
                                <hpm:Concept>
                                        <prefLabel>Education</prefLabel>
                                </hpm:Concept>
                                <map:NOT>
                                        <map:memberList rdf:parseType="Collection">
                                                <hpm:Concept>
                                                        <prefLabel>Adult education</prefLabel>
                                                </hpm:Concept>
                                        </map:memberList>
                                </map:NOT>
                        </map:memberList>
                </map:AND>
        </map:majorMatch>
</gcl:Concept>

</rdf:RDF>
```

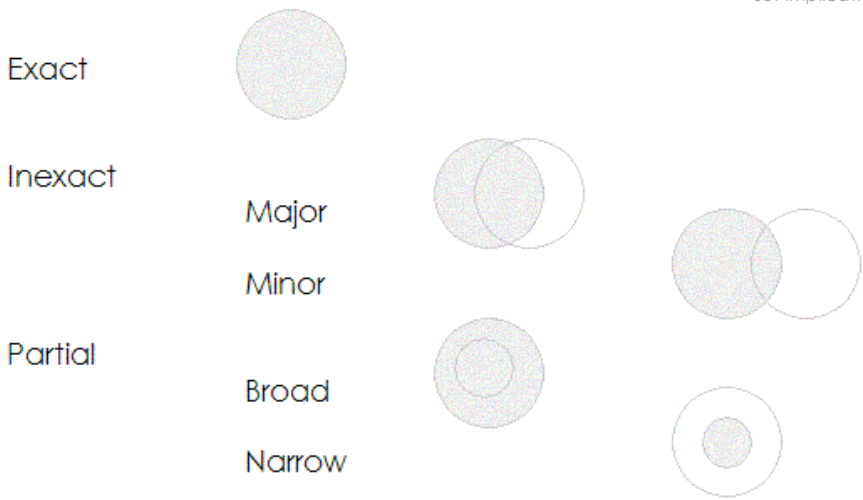# 3. Mapping and Retrieval [☞back to contents]

A thesaurus may be used as a subject scheme to support a subject-based index for a collection of documents, articles or records etc. Where different collections have been indexed against different but overlapping subject schemes, it becomes useful to have a mapping between the subject schemes, so that for example the collections may be browsed seamlessly using a single subject scheme. It is this kind of scenario that the SKOS-Mapping vocabulary is designed to support.

a. Interpretation of Mapping Statements - Mappings may be interpreted as implying relationships between the *sets of occurrences* of the source and target concepts. If a thesaurus is used as a subject scheme, then the set of occurrences of a concept is defined as the set of all resourc es for which that concept is a subject. This could be, for example, the set of all documents for which the concept is a significant theme, or the set of all images depicting the concept, or the set of all records properly indexed against that concept, de pending on the actual use of the thesaurus.

Thus every concept has a corresponding set of occurrences, which may or may not be known.

Every mapping statement should be taken to imply something about how the sets of occurrences corresponding to the source and the target are related. An exact mapping statement implies that the source and target sets are identical. An inexact mapping statement implies that the source and target sets may share some members. A major mapping statement implies that the source and target sets share greater than 50% of their members, a minor mapping implies less than 50% but greater than 0. A broad mappin g implies the target set is a superset of the source set. A narrow mapping implies the target set is a subset of the source set.

Set implications of mapping statements

Exact

Inexact

Major

Minor

Partial

Broad

Narrow

4. Summary and Conclusions [☞back to contents]

The SKOS-Mapping schema is an RDF schema designed to support inter-thesaurus mapping for the semantic web. SKOS-Mapping builds on recent work from the thesaurus community. The mapping properties of SKOS-Mapping are based on the equivalence properties described in ISO 5964:1985 [☞7], and extensions suggested in [☞4] and reviewed in [☞5].

Although SKOS-Mapping is primarily designed to support inter-thesaurus mapping, it is intended that it will be suitable for use in creating mappings between different flavours of knowledge organisation system. It should be appropriate and useful, for example, to create mappings between more loosely defined structures such as the internet topic exchange[☞9] and the open directory [☞10] using SKOS-Mapping.

References [☞back to contents]

[1] **SKOS-Core RDF Schema**
☞http://www.w3c.rl.ac.uk/2003/11/21-skos-core
[2] Miles, A.J., Matthews, B.M., Wilson, M.J., **Core RDF Vocabularies for Thesauri** (SWAD-Europe Deliverable 8.1, version 0.4)
☞http://www.w3c.rl.ac.uk/SWAD/deliverables/8.1_0_4.html
[3] **SKOS-Mapping RDF Schema**
☞http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping
[4] Doerr, M. (2001) **Semantic Problems of Thesaurus Mapping**, *Journal of Digital Information*, volume 1 issue 8.
☞http://jodi.ecs.soton.ac.uk/Articles/v01/i08/Doerr/
[5] Shiri, A. (2002) **Investigation of problems and issues in integrating and mapping thesauri and classification schemes** (HILT Project Report).
☞http://hilt.cdlr.strath.ac.uk/hilt2web/Reports/HILt_LITRev%201a.doc
[6] **HPMulti: The European multilingual thesaurus on health promotion in 12 languages**.
☞http://www.hpmulti.net/
[7] ISO (1985) ISO 5964:1985 Documentation - **Guidelines for the establishment and development of multilingual thesauri**. (61 p.)
[8] **The Government Category List - December 2002 (v1.3)**.
☞http://195.224.227.150/gcl/content/default.asp
[9] **The Internet Topic Exchange**.
☞http://topicexchange.com/
[10] **The Open Directory Project**.
☞http://dmoz.org/

Appendix. SKOS-Mapping RDF Schema [☞back to contents]

```xml
<?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/">
]>
<rdf:RDF xmlns:rdf="&rdf;"
        xmlns:rdfs="&rdfs;"
        xmlns:dc="&dc;"
        xmlns:dct="&dct;"
        xml:base="http://www.w3c.rl.ac.uk/2003/11/21-skos-mapping">

        <!-- Description of this schema -->
        <rdf:Description rdf:about="">
                <dc:title>SKOS Mapping Vocabulary version 0.2</dc:title>
                <dc:description>This vocabulary allows you to express
information about how statements made
                using concepts from some conceptual scheme may be transformed into
statements with concepts
                from a different scheme.  So for example it can be used for automated
query transformation.
                Or It could be used to create a virtual subject index for a collection
in terms of an alternative
                classification system.</dc:description>
                <dc:creator>Alistair Miles</dc:creator>
                <rdfs:seeAlso rdf:resource="http://www.w3c.rl.ac.uk/SWAD/deliverables/8.4.html"/>
                <dct:modified>2003-12-04</dct:modified>
        </rdf:Description>
        <!-- Mapping relation properties -->
        <rdf:Property rdf:ID="mappingRelation">
                <rdf:label>has-match</rdf:label>
                <rdfs:comment>The super-property of all properties expressing
information about how to create mappings between concepts frmo different
conceptualschemes.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="exactMatch">
                <rdfs:label>has-exact-match</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="#mappingRelation"/>
                <rdfs:comment>If two concepts are an 'exact-match' then the set
of resources properly indexed
                against the first concept is identical to the set of resources
properly indexed against the second.
                Therefore the two concepts may be interchanged in queries and
subject-based indexes.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="broadMatch">
                <rdfs:label>has-broad-match</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="#mappingRelation"/>
                <rdfs:comment>If 'concept A has-broad-match concept B' then the
set of resources properly
                indexed against concept A is a subset of the set of resources properly
indexed against concept B.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="narrowMatch">
                <rdfs:label>has-narrow-match</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="#mappingRelation"/>
                <rdfs:comment>If 'concept A has-narrow-match concept B' then the
```

```
                        indexed against concept A is a superset of the set of resources
properly indexed against concept B.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="majorMatch">
                <rdfs:label>has-major-match</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="#mappingRelation"/>
                <rdfs:comment>If 'concept A has-major-match concept B' then the set of resources properly
                indexed against concept A shares more than 50% of its members with the
set of resources properly
                indexed against concept B.</rdfs:comment>
        </rdf:Property>
        <rdf:Property rdf:ID="minorMatch">
                <rdfs:label>has-minor-match</rdfs:label>
                <rdfs:subPropertyOf rdf:resource="#mappingRelation"/>
                <rdfs:comment>If 'concept A has-minor-match concept B' then the
set of resources properly
                indexed against concept A shares less than 50% but greater than 0 of
its members with the set of
                resources properly indexed against concept B.</rdfs:comment>
        </rdf:Property>
        <!-- Combination constructs -->
        <rdfs:Class rdf:ID="CombinationConstruct">
                <rdfs:label>Concept-combination</rdfs:label>
        </rdfs:Class>
        <rdfs:Class rdf:ID="AND">
                <rdfs:label>AND</rdfs:label>
                <rdfs:subClassOf rdf:resource="#CombinationConstruct"/>
                <rdfs:comment>This class is a shorthand for an intersection-like
construct.  So the statement
                'concept A has-exact-match AND (concept B, concept C)' implies that
the set of resources properly
                indexed against concept A is identical to the intersection of the sets
properly indexed against concepts
                B and C.   </rdfs:comment>
        </rdfs:Class>
        <rdfs:Class rdf:ID="OR">
                <rdfs:label>OR</rdfs:label>
                <rdfs:subClassOf rdf:resource="#CombinationConstruct"/>
                <rdfs:comment>This class is a shorthand for a union-like
construct.  So the statement 'concept A
                has-exact-match OR (concept B, concept C)' implies that the set of
resources properly indexed against
                concept A is identical to the union of the sets properly indexed
against concepts B and C.   </rdfs:comment>
        </rdfs:Class>
        <rdfs:Class rdf:ID="NOT">
                <rdfs:label>NOT</rdfs:label>
                <rdfs:subClassOf rdf:resource="#CombinationConstruct"/>
                <rdfs:comment>This class is a shorthand for a negation-like
construct.  So the statement 'concept A
                has-exact-match AND (concept B, NOT (concept C))' implies that the set
of resources properly indexed
                against concept A is identical to the intersection of the set properly
indexed against concept B and the
                complement of the set properly indexed against concept
C.</rdfs:comment>
        </rdfs:Class>
        <rdf:Property rdf:ID="memberList">
                <rdfs:label>has-member</rdfs:label>
                <rdfs:domain rdf:resource="#CombinationConstruct"/>
        </rdf:Property>

</rdf:RDF>
```