

NKOS Consolidated Workshop

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Faceted classifications as linked data
A logical analysis

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ILC research project

Faceted classifications

- Semantically rich KOSs
Many relationships, like in ontologies
- Many structural elements:
basic classes, facet indicators, foci, phase relation's...
+ rules: citation order, restrictions on foci...
- Representing them as linked data
is then a demanding task

Integrative Levels Classification (ILC)

- A faceted classification based on **phenomena**
- Developed since 2004 by an international team
- ILC1 (7,052 classes+facets) published in 2011
- ILC2 (10,845 classes+facets) published in 2019
- ILC2 converted from MySQL to SKOS in 2019

Facets as linked data

- A facet expresses a **relationship**:

x**f** 29 **f**
painting, in *country*: Italy

- In the logic of linked data, this is a property in a triple:

Subject	property	Object
BasicClass	facetIndicator	Focus

Facets as linked data

- A facet can belong to a **fundamental category**
e.g. ILC facet 29 “*in country*”
belongs to category 2 “*in place*”
- In RDF terms,
`<29> rdfs:subPropertyOf <2>`

Multi-faceted classes

- $\text{painting} \cap \text{baroque} \cap \text{in Italy}$

are equivalent to several RDF triples
connected by intersection:

$\text{painting} \cap \text{baroque}$

“painting, baroque”

“painting, in Italy”

RDF properties

- have a **domain** and a **range**:

```
<29> a rdf:Property;  
      skos:notation "29"^^xsd:string;  
      skos:prefLabel "in country"@en;  
      rdfs:label "in country"@en;  
      rdfs:domain skos:Concept;  
      rdfs:range <tt>;  
      rdfs:subPropertyOf <2>.
```

What are the domain and range of a facet?

- ...It depends on what is meant by “facet”!
- In literature there is ambiguity between
 - facet as a semantic category (nature)
 - facet as a syntactic role (function)

[Maniez 1999; Hudon 2019]

4 (+2) possibilities

- unrestricted domain / restricted range (to itself/other class)
- unrestricted domain / unrestricted range
- restricted domain / restricted range (to itself/other class)
- restricted domain / unrestricted range

Let us use DDC examples

Common facets

- **x** 09 **45**

"any subject, in: **Italy**"

unrestricted domain

restricted range

Special facets 1

- 786.2 1 83

"piano, musical form: sonata"

restricted domain, restricted range

- Case 1: range is restricted to music itself (**bound s.f.**)
- Occur only in few DDC classes, such as music

Special facets 2

- 782 3 45
"vocal music for service, of religion: Hinduism"
restricted domain, restricted range
- Case 2: range is restricted to another class
(parallel special facets)

Special facets 3

- 78 00 61
"music, in relation with: medicine"
- 02 6 34
"libraries, specializing in: law"
restricted domain, unrestricted range (free special f.)

Free facets

- **x 015 x**
"any subject, principles: any science"
- **620.0 015 3**
"engineering, principles: physical"
unrestricted range, unrestricted domain
- Only available with sciences (015) in DDC
- but could easily be extended to any class
e.g. using 00 + 001/999 !

Facet types

- **Common facets**
 - **Bound:** d. unrestricted, r. restricted to domain
 - **Parallel:** d. unrestricted, r. restricted to other class
 - **Free:** d. unrestricted, r. unrestricted
- **Special facets**
 - **Bound:** d. restricted, r. restricted to domain
 - **Parallel:** d. restricted, r. restricted to other class
 - **Free:** d. restricted, r. unrestricted

Facet types

- ILC has ways to distinguish them in notation
...just trust me ;-)
- These are reflected in SKOS version of ILC
by definitions of domains and ranges

Conclusions

- Facets can be expressed in RDF as properties
- They can be subproperties of fundamental categories
- Multi-faceted compounds = Intersections of triples
- The need to express ILC in SKOS stimulated a more formal distinction of facet types
- Other classifications can benefit of such analysis and introduce more facet types, e.g. free facets by –00– in DDC

...Thanks!

- iskoi.org/ilc
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```
<http://www.iskoi.org/ilc/2/class/d93> a rdf:Property;  
    rdfs:domain <http://www.iskoi.org/ilc/2/class/d>;  
    rdfs:label "attracted by fundamental  
interaction"@en;  
    rdfs:range <http://www.iskoi.org/ilc/2/class/daf>;  
    rdfs:seeAlso  
<http://www.iskoi.org/ilc/2/details.php?no=d93>;  
    rdfs:subPropertyOf  
<http://www.iskoi.org/ilc/2/class/d9>;  
    <http://www.w3.org/2004/02/skos/core#altLabel>  
    "attracted by force"@en;  
    <http://www.w3.org/2004/02/skos/core#notation>  
    "d93"^^xsd:string;  
    <http://www.w3.org/2004/02/skos/core#prefLabel>  
    "attracted by fundamental interaction"@en.
```