

SKOS Core Tutorial DC-2005 Madrid

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Tutorial 5: SKOS
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- **SKOS**
 - <http://www.w3.org/2004/02/skos/>
 - Simple Knowledge Organisation System(s)
- **SKOS Core**
 - <http://www.w3.org/2004/02/skos/core/>
 - Goal: Simple, flexible, extensible, machine-understandable representation for...
 - Thesauri
 - Classification Schemes
 - Taxonomies
 - Subject Headings
 - Other types of 'controlled vocabulary'...



- Development and status
- SKOS Features
- Extending SKOS Core

- Other topics:
 - SKOS Core and DCMI metadata terms
 - SKOS Core and OWL
 - HTTP



- SKOS Core is maintained by W3C SWBPD-WG
- Public, consensus-driven, design by open community
- All discussion in public, via public-esw-thes@w3.org
- Review proposals for change every 2-3 months
<http://www.w3.org/2004/02/skos/core/proposals>
- Publish revised working drafts
<http://www.w3.org/TR/swbp-skos-core-guide>
<http://www.w3.org/TR/swbp-skos-core-spec>



- Completed second review
- Plan 3rd review November 2005
- Change management policy
<http://www.w3.org/TR/swbp-skos-core-spec/#secChange>
- *unstable, testing, stable*
- Most at *testing*, some at *unstable*
- Feedback on all aspects of work presented here welcome!
public-esw-thes@w3.org
- Translations most welcome!
<http://www.w3.org/2004/02/skos/core/translations>



- SKOS Core is an application of the *Resource Description Framework*
 - *RDFS Classes and RDF Properties*
- ...This tutorial will be demonstrating how to use the classes and properties of the SKOS Core Vocabulary to express the basic structure and content of a concept scheme as an RDF graph



- ‘Concept scheme’ is a blanket term for...
 - Thesauri
 - Classification Schemes
 - Taxonomies
 - Subject Headings
 - Terminologies
 - Other types of controlled vocabularies...
- Defined as...
 - *‘A set of concepts, optionally including statements about semantic relationships between those concepts.’*



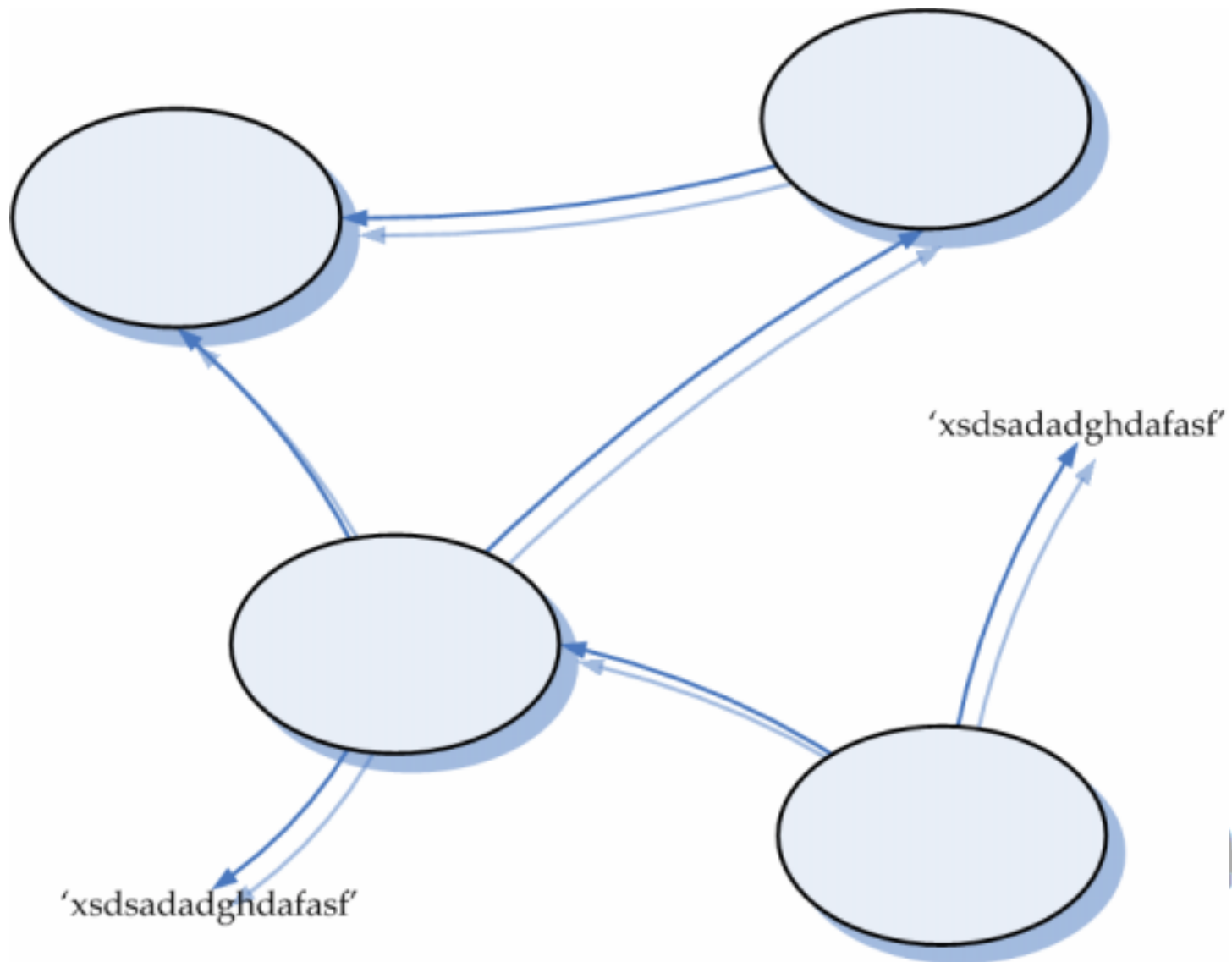
- Why choose RDF as the basis for a standard?

Most compelling reasons...

1. Ease of combination with other meta-information standards
 - (KOS data is re-used in a great variety of contexts, in combination with DCMI terms and many others)
2. Flexibility and ease of extension, to cope with variations in structure and style
 - Variations between KOS types (e.g. 'thesaurus' vs. 'classification scheme') and within KOS types (compare e.g. the AAT or GEMET with ISO2788)

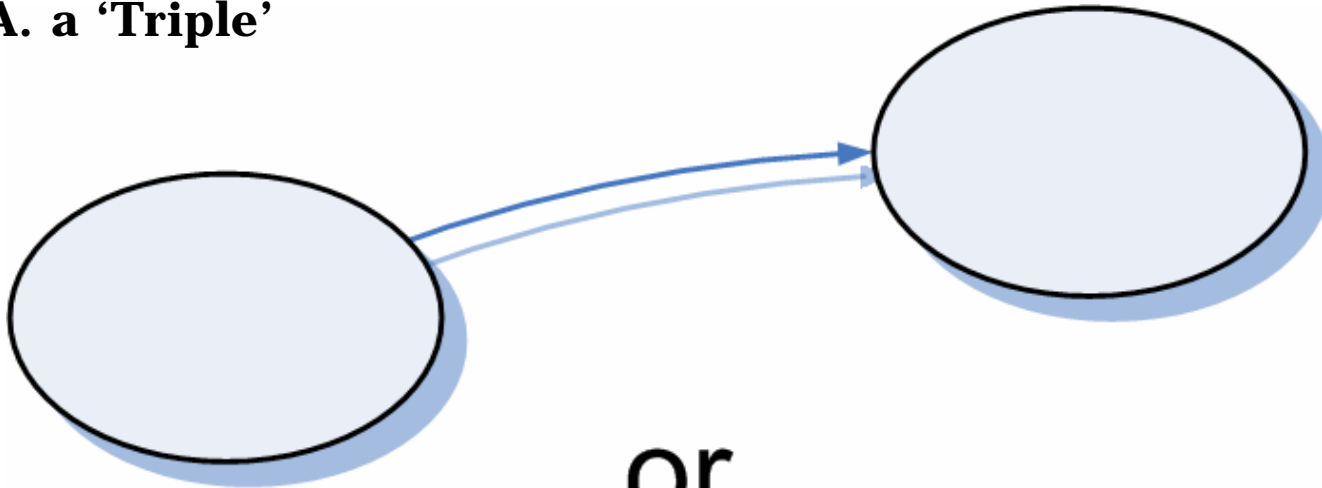


Quick RDF: a 'Graph'

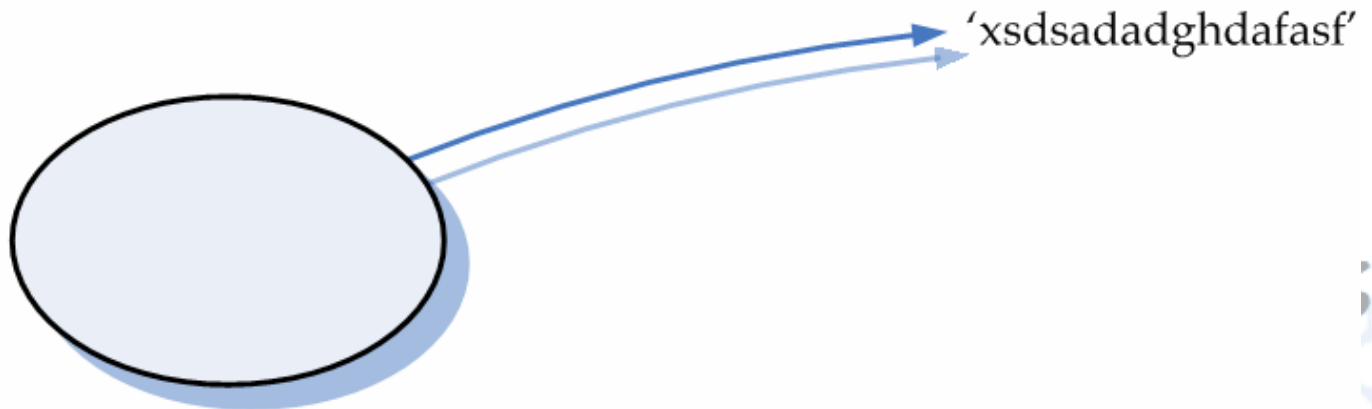


Quick RDF: a 'Statement'

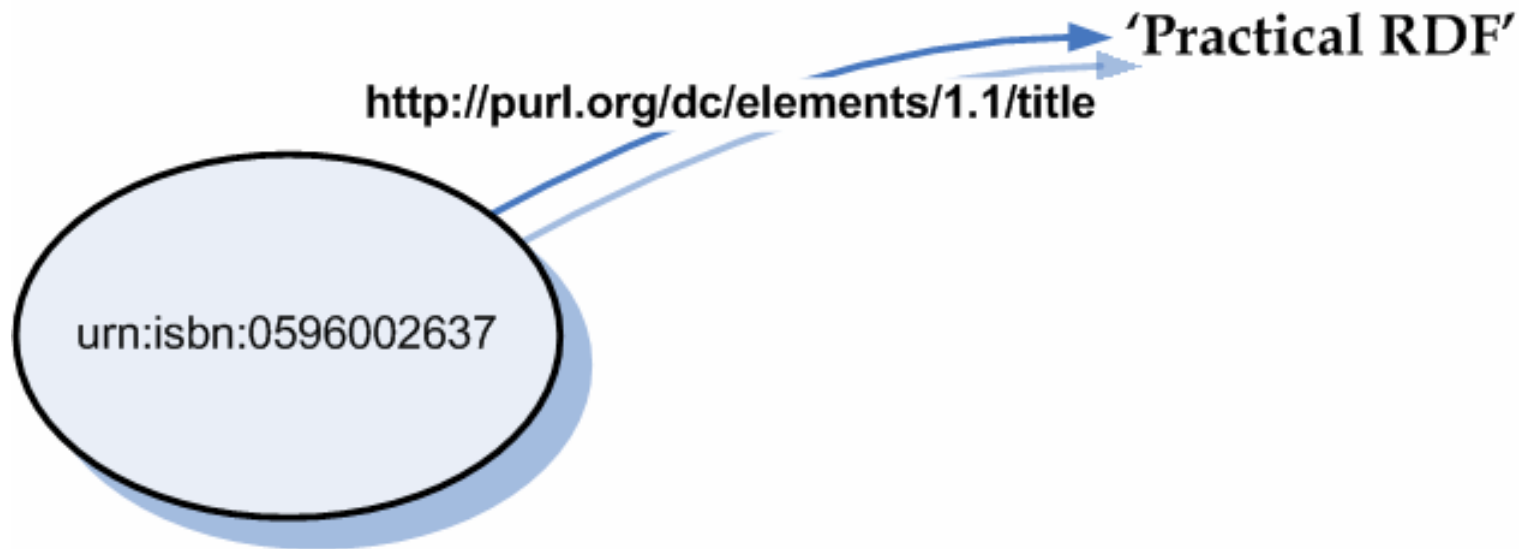
A.K.A. a 'Triple'



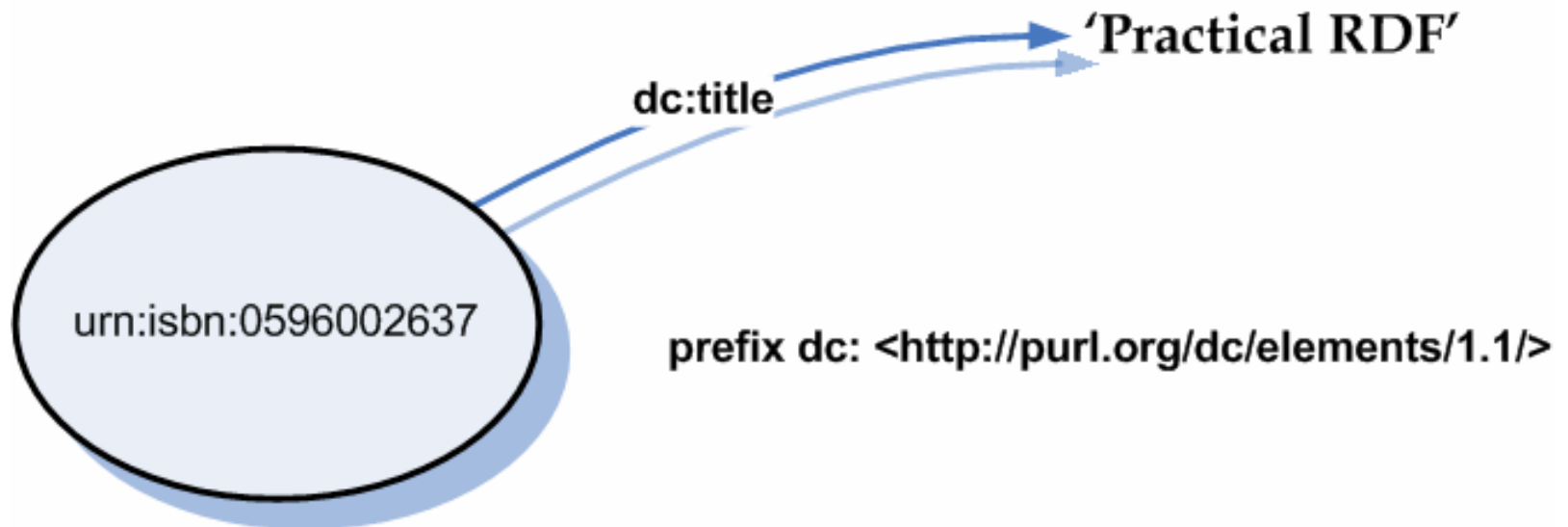
or...



Quick RDF: URIs for Naming

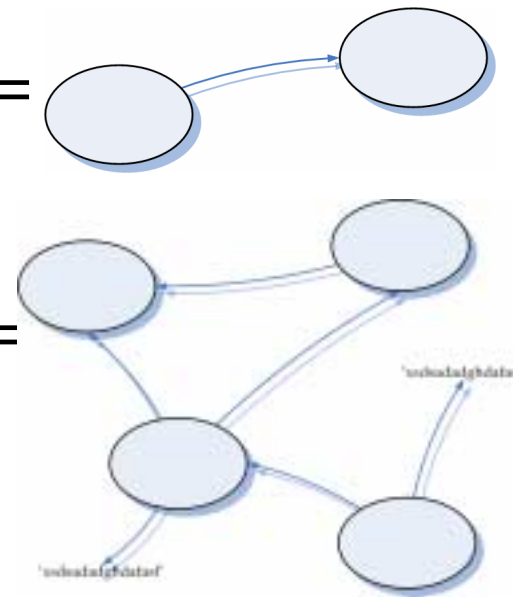


Quick RDF: QNames

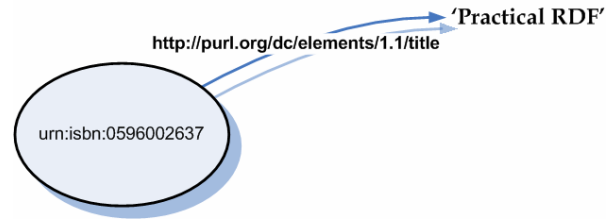


Quick RDF: Lingo

- *Resource* = thing
- *Literal* = string of characters
(?lang, ?datatype)
- *Statement* = *Triple* = (s, p, o) =
- *Property* = (... , **p** , ...)
- *Graph* = a set of *Statements* =
- *RDF Description* (of some thing) = a set of *Statements* (about that thing)



Quick RDF: Serialisation



N-Triples

```
<urn:isbn:0596002637> <http://purl.org/dc/elements/1.1/> 'Practical RDF' .
```

Turtle

```
@prefix dc: <http://purl.org/dc/elements/1.1> .  
<urn:isbn:0596002637> dc:title 'Practical RDF' .
```

RDF/XML

```
<rdf:RDF  
  xmlns:rdf='http://www.w3.org/1999/02/22-rdf-syntax-ns#' '  
  xmlns:dc='http://purl.org/dc/elements/1.1/'>  
  <rdf:Description rdf:about='urn:isbn:0596002637'>  
    <dc:title>Practical RDF</dc:title>  
  </rdf:Description>  
</rdf:RDF>
```

XHTML 2.0

```
<head xmlns:dc='http://purl.org/dc/elements/1.1/'>  
  <meta about='urn:isbn:0596002637' property='dc:title'>Practical RDF</meta>  
</head>
```

Aah...

Story So Far (1)...

- Goal
 - To express the content and structure of concept schemes in a machine-understandable way
- Development
 - Open, collaborative, consensus-driven
- Status
 - May evolve within defined change management policy
- Technology
 - Resource Description Framework (RDF)
- RDF
 - Graphs, statements (triples), resources, properties, literals...



Features...



Love

Strong feelings of attraction towards, and affection for, another adult, or great affection for a friend or family member.

Awe

A feeling of great respect sometimes mixed with fear or surprise.

Joy

A feeling of bliss and great happiness.

1. Identify
2. Describe
3. Publish

- Step 1: Identify concepts...

<http://www.example.com/concepts#love>

<http://www.example.com/concepts#awe>

<http://www.example.com/concepts#joy>

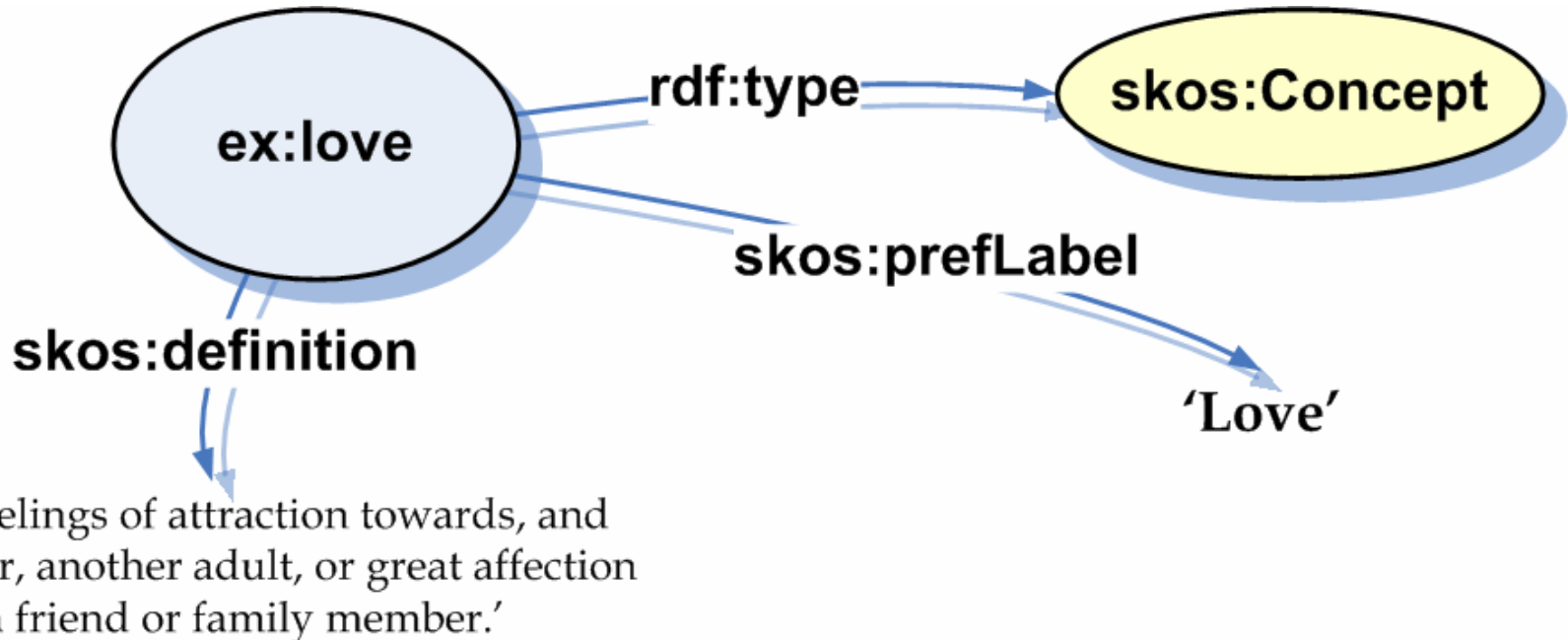
- N.B. Could just as well be

<http://foo.bar.org/1234/5678>

urn:

info:

- Step 2: Describe...



```
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .  
@prefix ex: <http://www.example.com/concepts#> .  
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
```

- Step 3: Publish...

- One way is to:

- Create an RDF/XML serialisation (concepts.rdf)
 - Put this file on an HTTP server
(<http://www.example.com/concepts>)

- Another way is to:

- Load statements into a dedicated RDF server (Joseki, Sesame, Kowari ...)

- N.B. SKOS Core is oriented towards the identification and description of concepts.

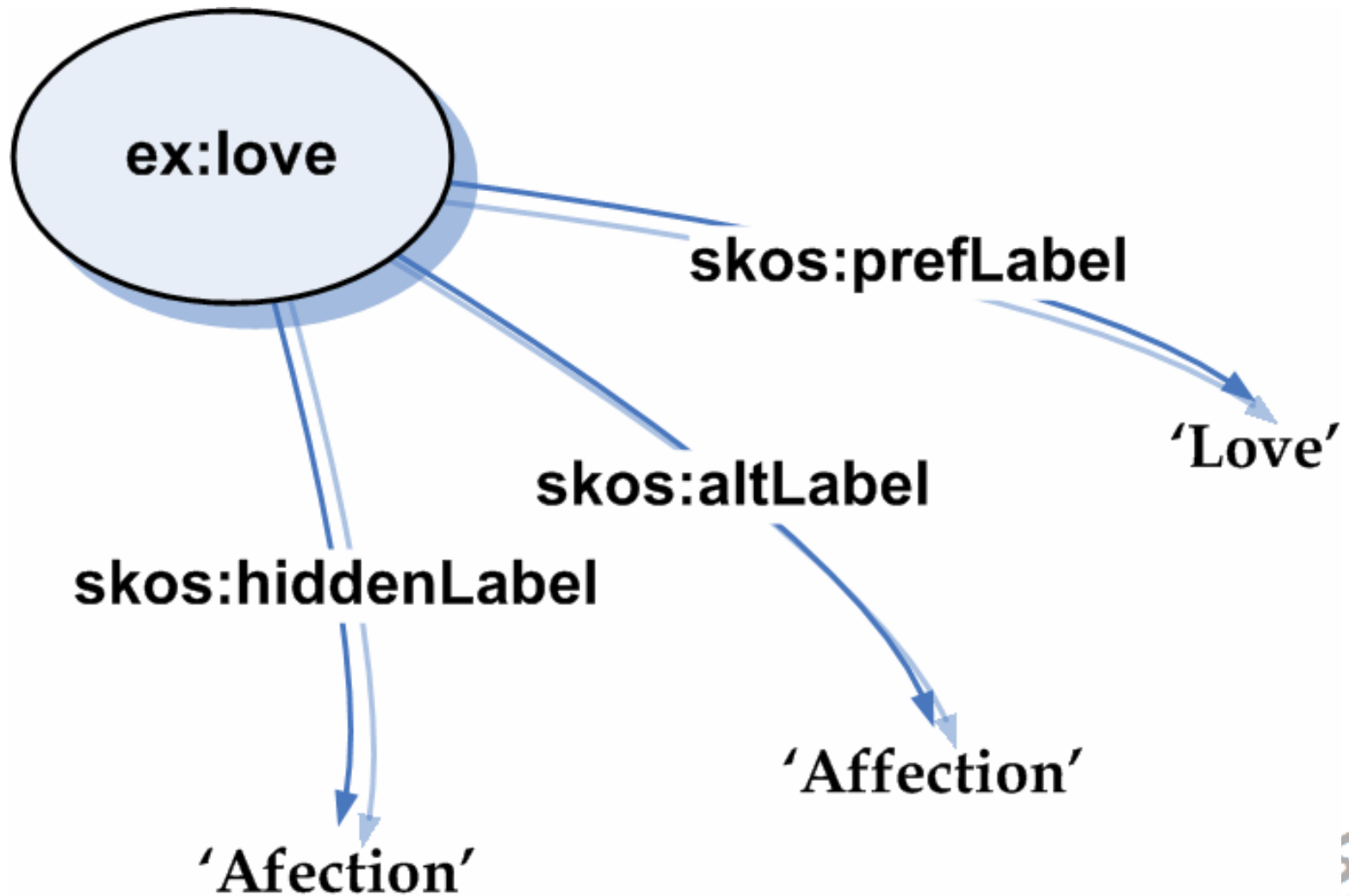
Love

UF Affection

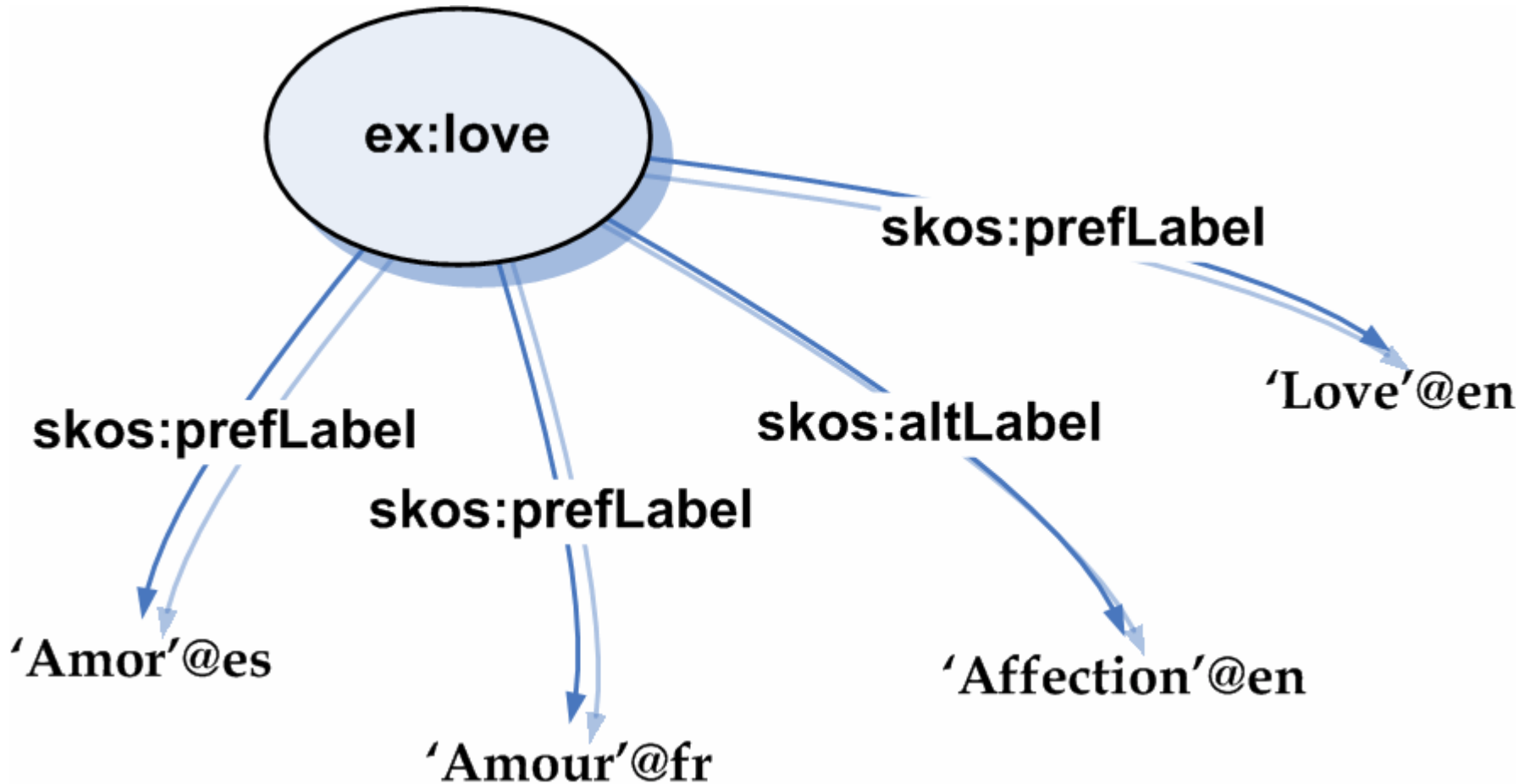
Affection

USE Love

Lexical Labels



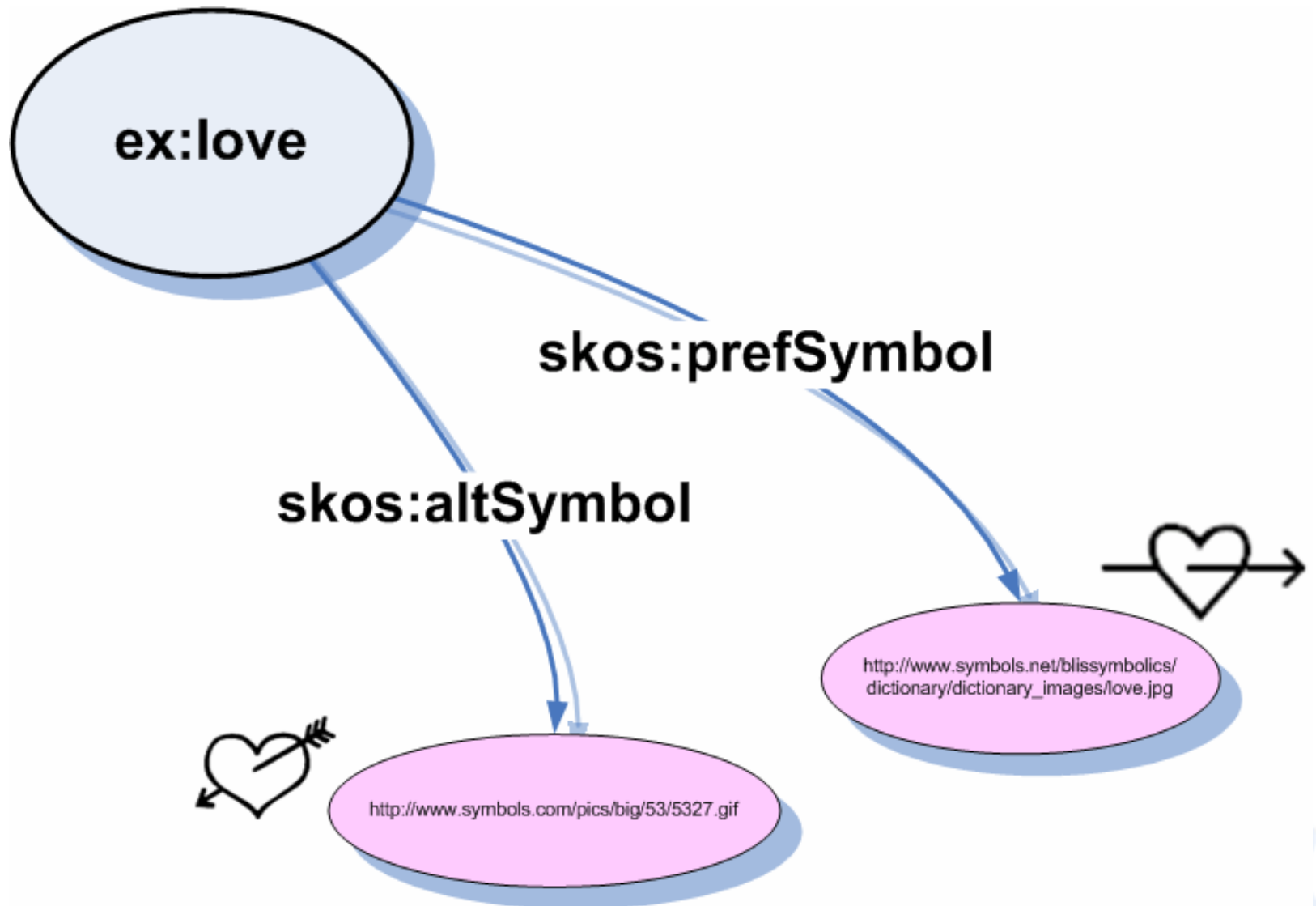
Multilingual Labels



N.B. No more than one **skos:prefLabel** per language



Symbolic Labels



Love

BT Emotion

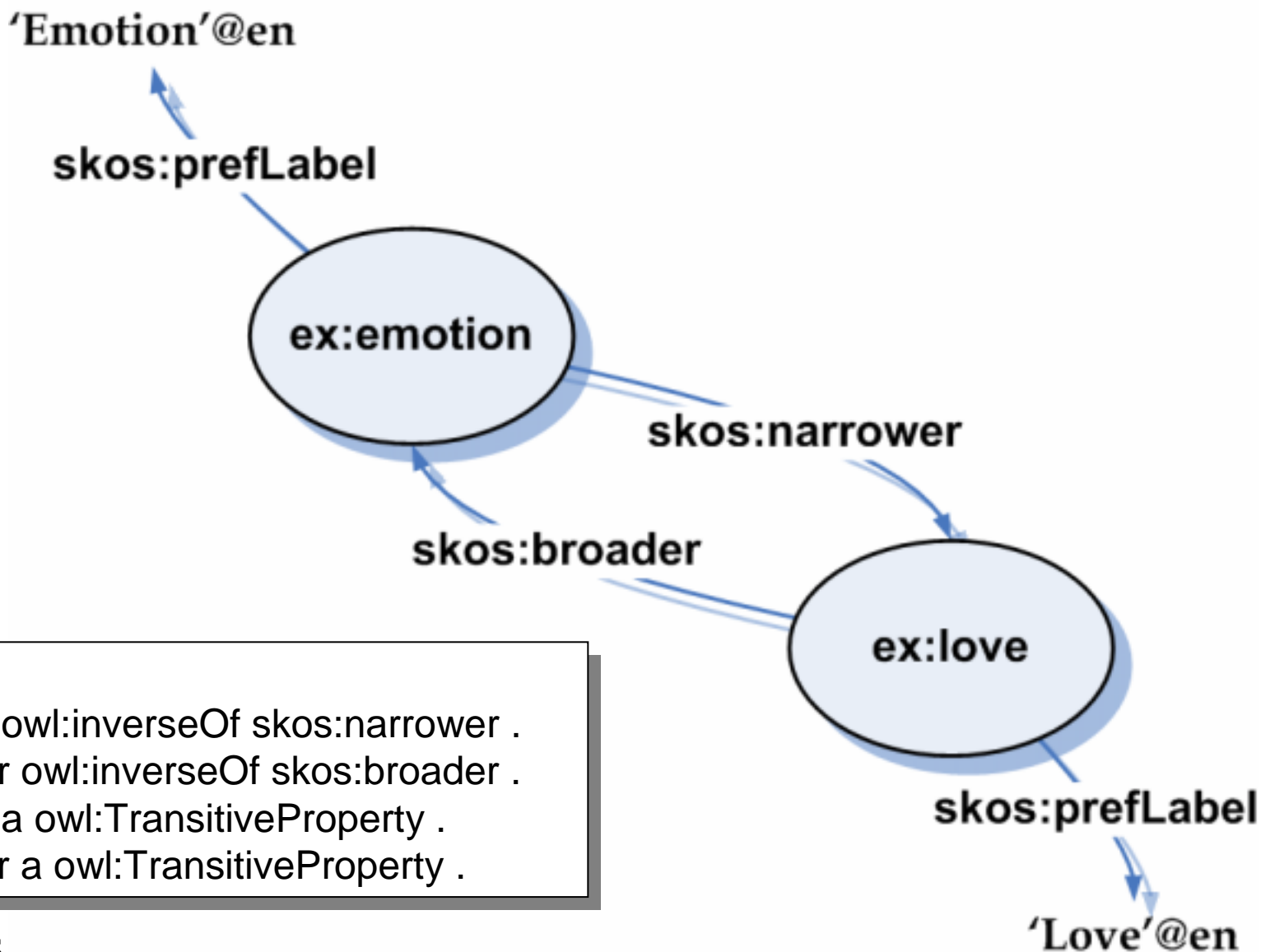
Emotion

NT Love

NT Awe

NT Joy

Broader/Narrower



N.B.

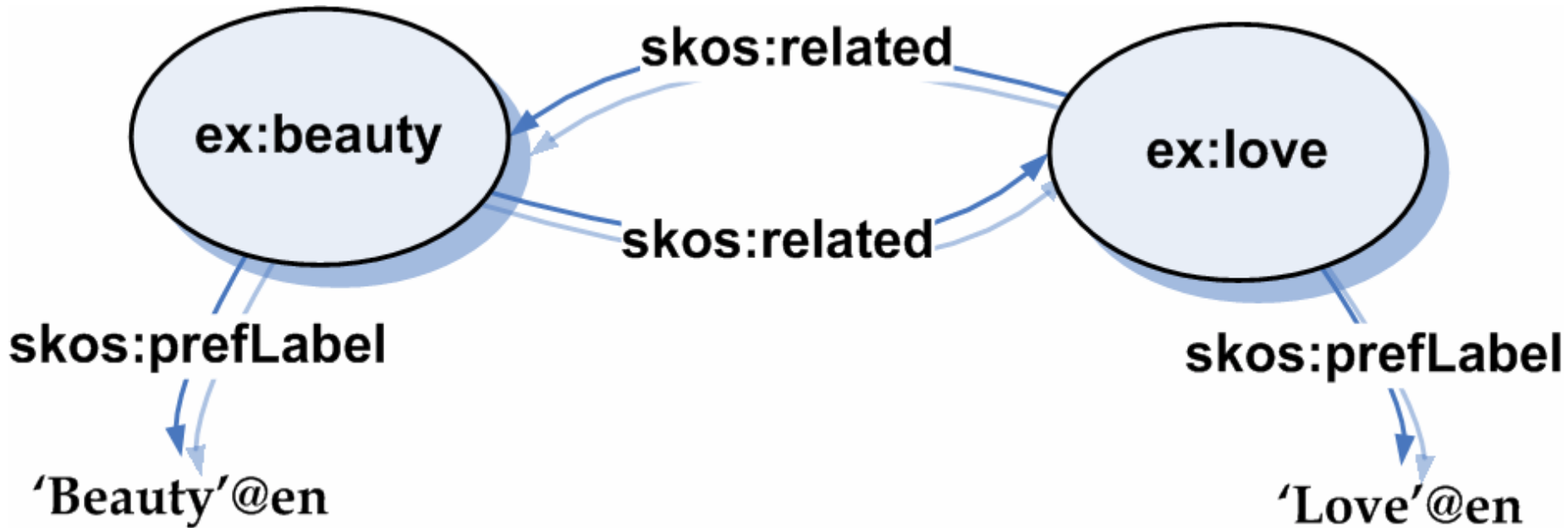
skos:broader owl:inverseOf skos:narrower .
skos:narrower owl:inverseOf skos:broader .
skos:broader a owl:TransitiveProperty .
skos:narrower a owl:TransitiveProperty .

Love

RT Beauty

Beauty

RT Love



N.B.

`skos:related` is an `owl:SymmetricProperty`.



Story So Far (2)...

- Basic Structure
 - `skos:Concept`
- Lexical Labelling
 - `skos:prefLabel`, `skos:altLabel`, `skos:hiddenLabel`
- Symbolic Labelling
 - `skos:prefSymbol`, `skos:altSymbol`
- Documentation
 - `skos:definition`
- Semantic Relations
 - `skos:broader`, `skos:narrower`, `skos:related`



Features...



Documentation Properties

- **skos:note**
e.g. 'Anything goes.'
- **skos:definition**
e.g. 'A long curved fruit with a yellow skin and soft, sweet white flesh inside.'
- **skos:example**
e.g. 'A bunch of bananas.'
- **skos:scopeNote**
e.g. 'Historically members of a sheriff's retinue armed with pikes who escorted judges at assizes.'
- **skos:historyNote**
e.g. 'Deleted 1986. See now Detention, Institutionalization (Persons), or Hospitalization.'
- **skos:editorialNote**
e.g. 'Confer with Mr. X. re deletion.'
- **skos:changeNote**
e.g. 'Promoted "love" to preferred label, demoted "affection" to alternative label, Joe Bloggs, 2005-08-09.'

Allowed patterns:

1. Documentation as an **RDF Literal**
2. Documentation as a **Related Resource Description**
3. Documentation as a **Document Reference**

...RDF Literal

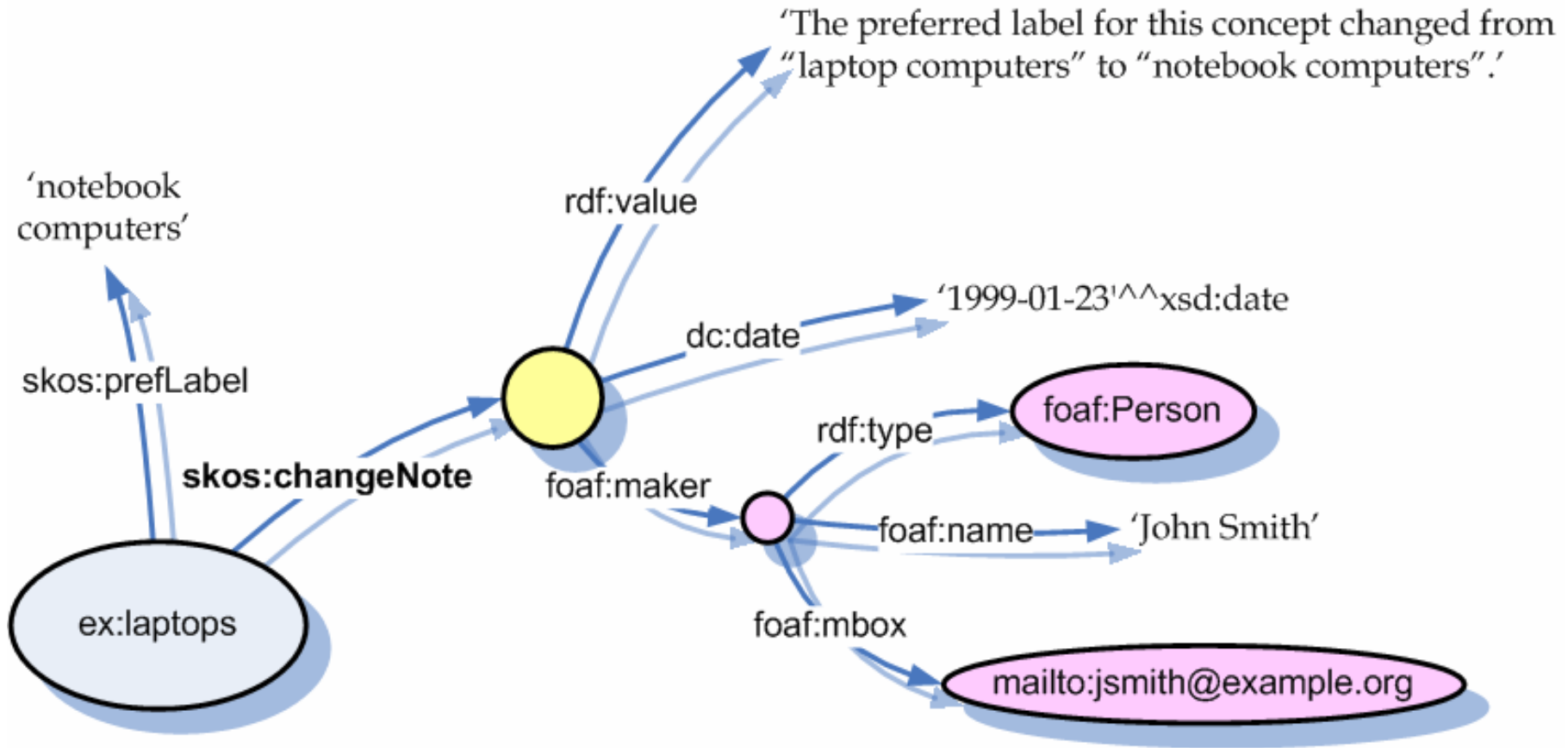


skos:definition

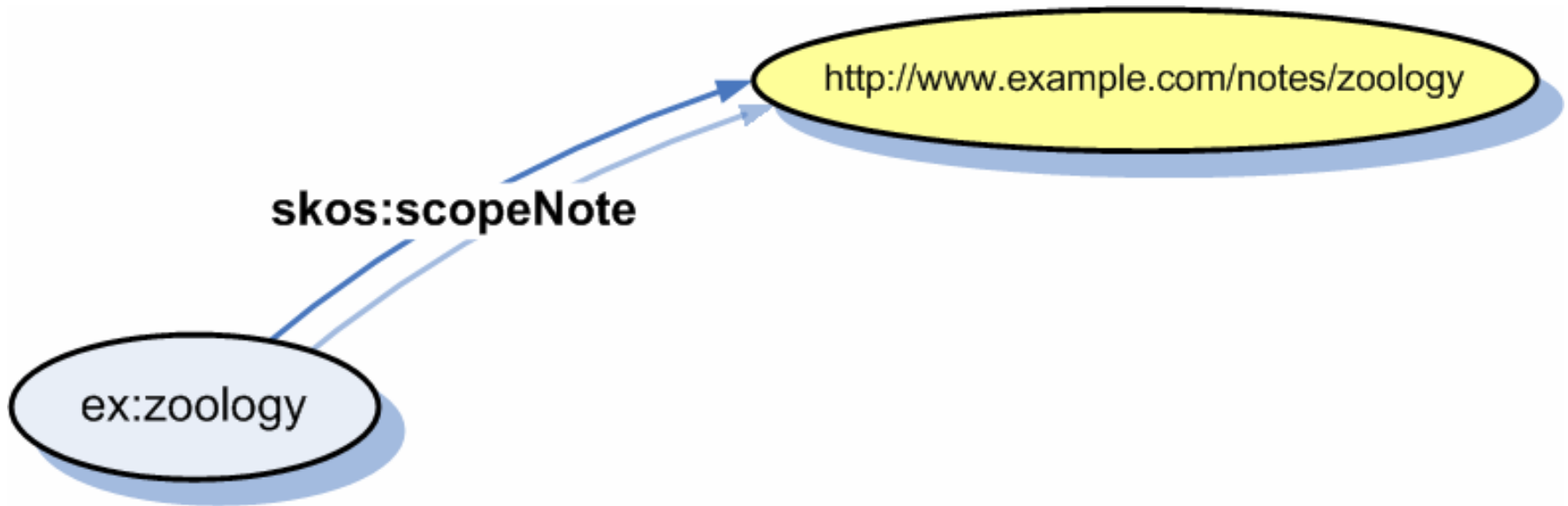
'Strong feelings of attraction towards, and affection for, another adult, or great affection for a friend or family member.'



...Related Resource Description



...Document Reference



Allowed patterns:

1. Documentation as an **RDF Literal**
2. Documentation as a **Related Resource Description**
3. Documentation as a **Document Reference**

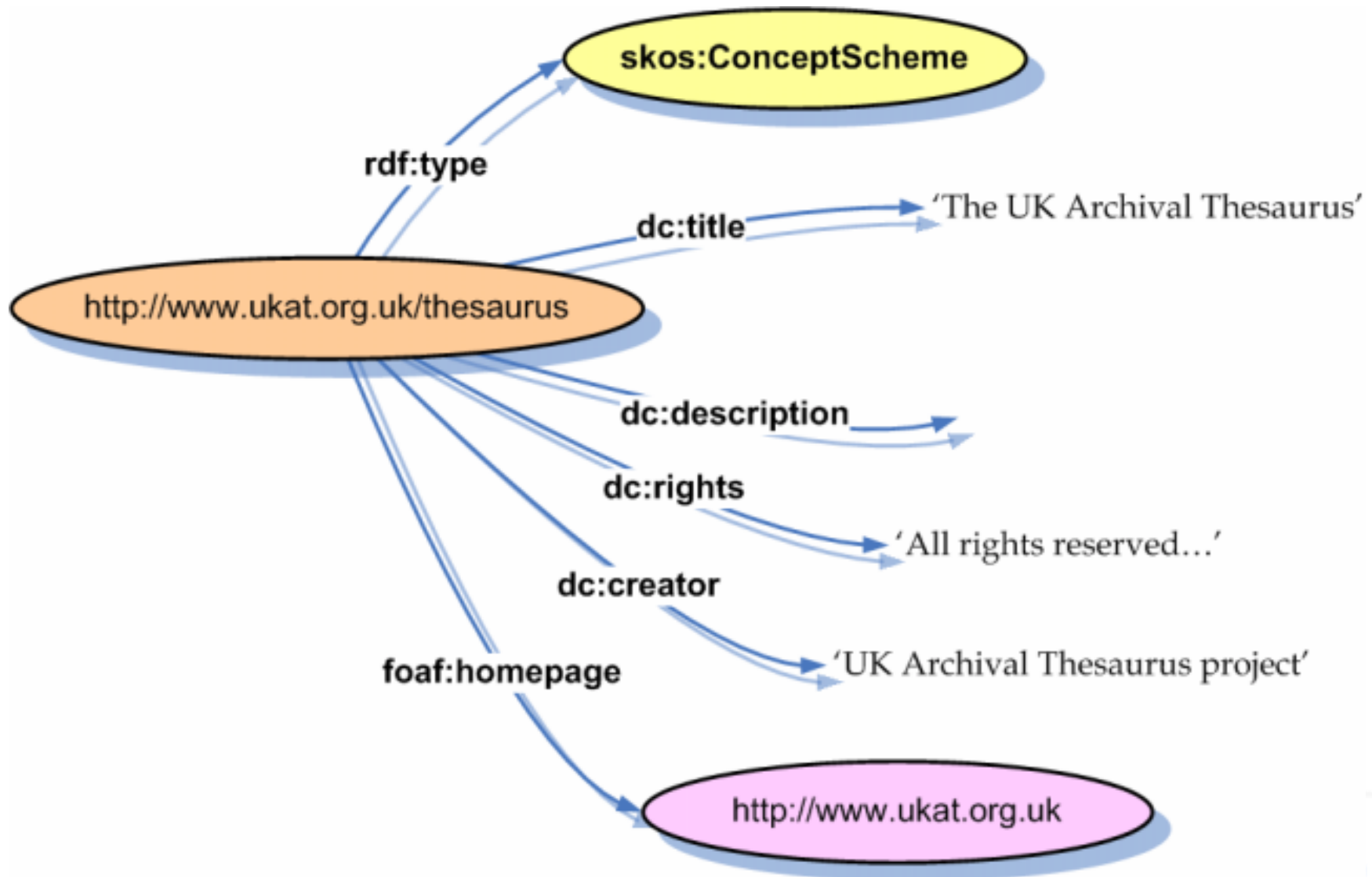
... N.B. this takes SKOS Core outside OWL DL ...



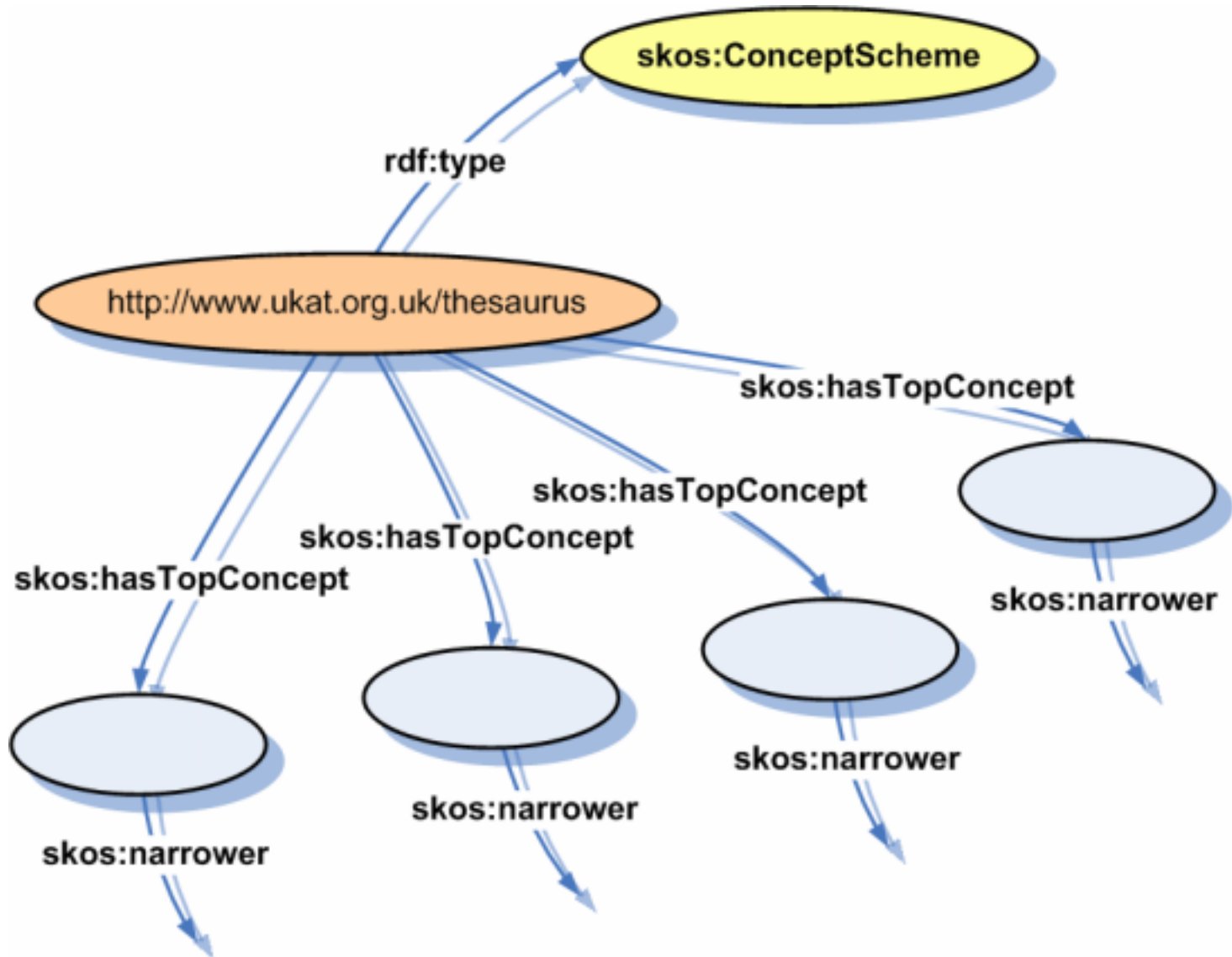
Concept Schemes

- Organise a set of concepts into a **concept scheme**

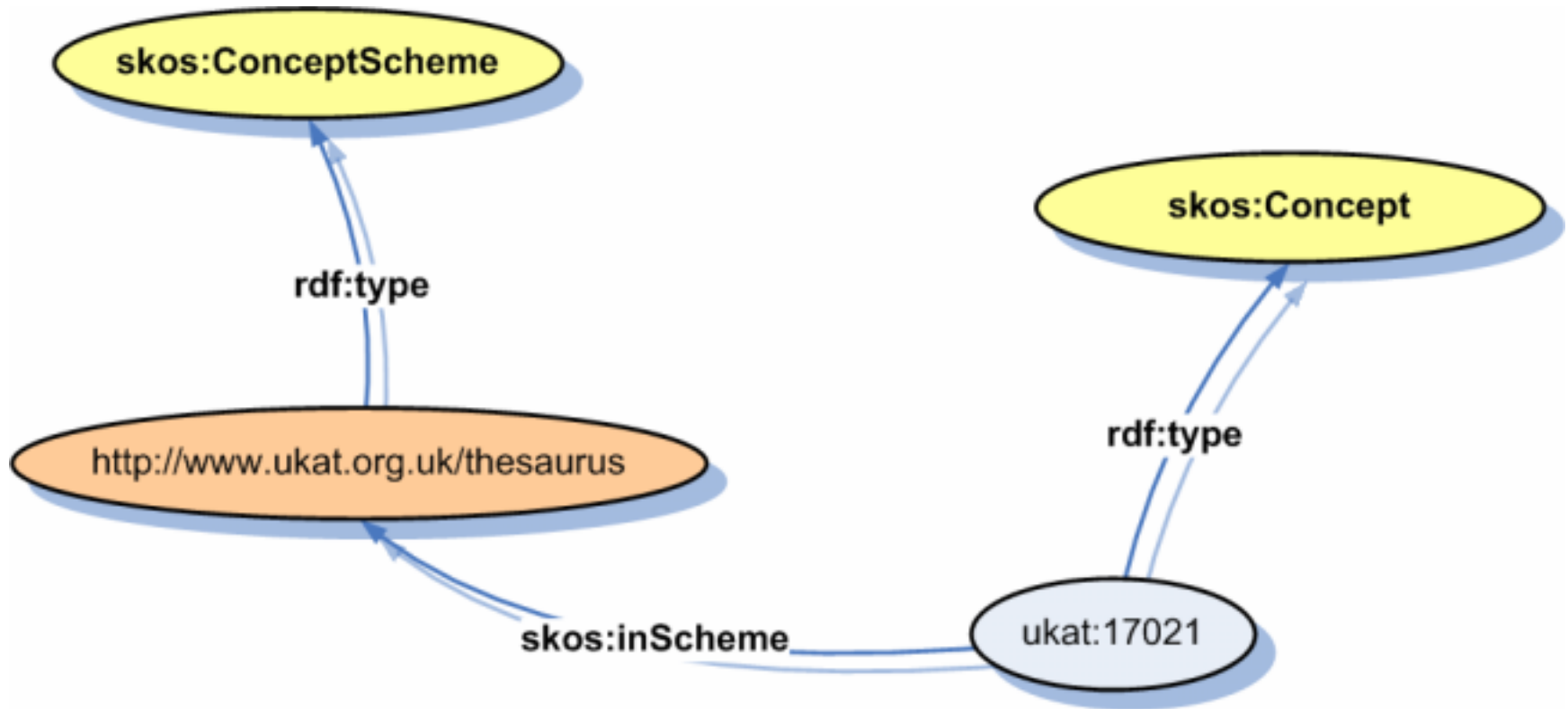
Concept Scheme



Top Concepts



Concepts in Scheme



```
@prefix ukat: <http://www.ukat.org.uk/thesaurus/concept/> .
```

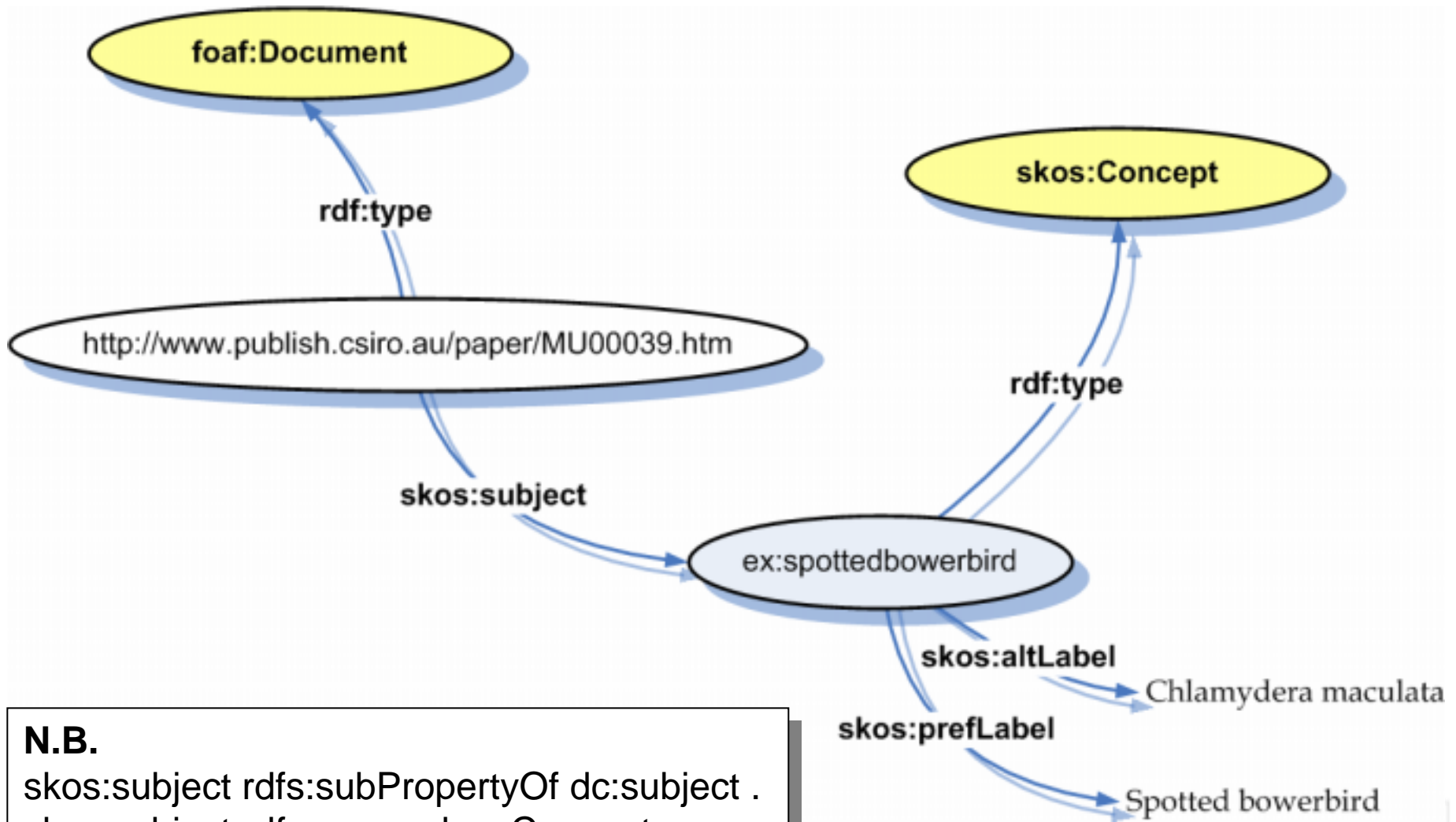


Subject Indexing

- Simple functionality based on dc:subject

Spotted Bowerbird

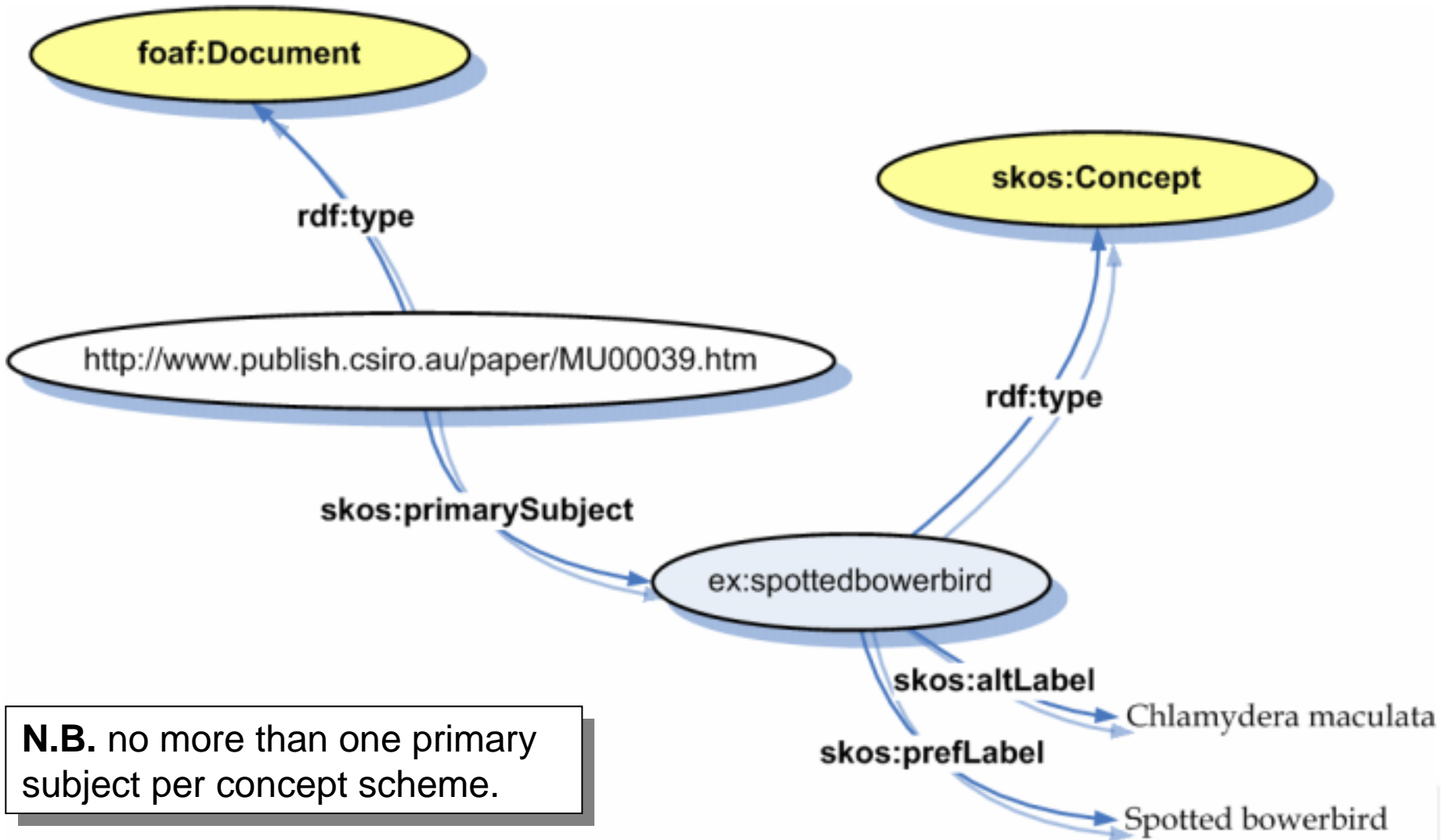




N.B.
skos:subject rdfs:subPropertyOf dc:subject .
skos:subject rdfs:range skos:Concept .



Primary Subject



N.B. no more than one primary subject per concept scheme.



Subject Inverses

- **skos:isSubjectOf**
 - inverse of **skos:subject**
- **skos:isPrimarySubjectOf**
 - inverse of **skos:primarySubject**

Subject Generality

- Subject generality rule:

```
{
  ?d skos:subject ?x .
  ?x skos:broader ?y .
}
=>
{
  ?d skos:subject ?y .
}
```

I.e. if a document is about 'bowerbirds' and 'birds' is broader than 'bowerbirds', then the document is about 'birds' too.

Use to implement simple query expansion.



<milk by source animal>

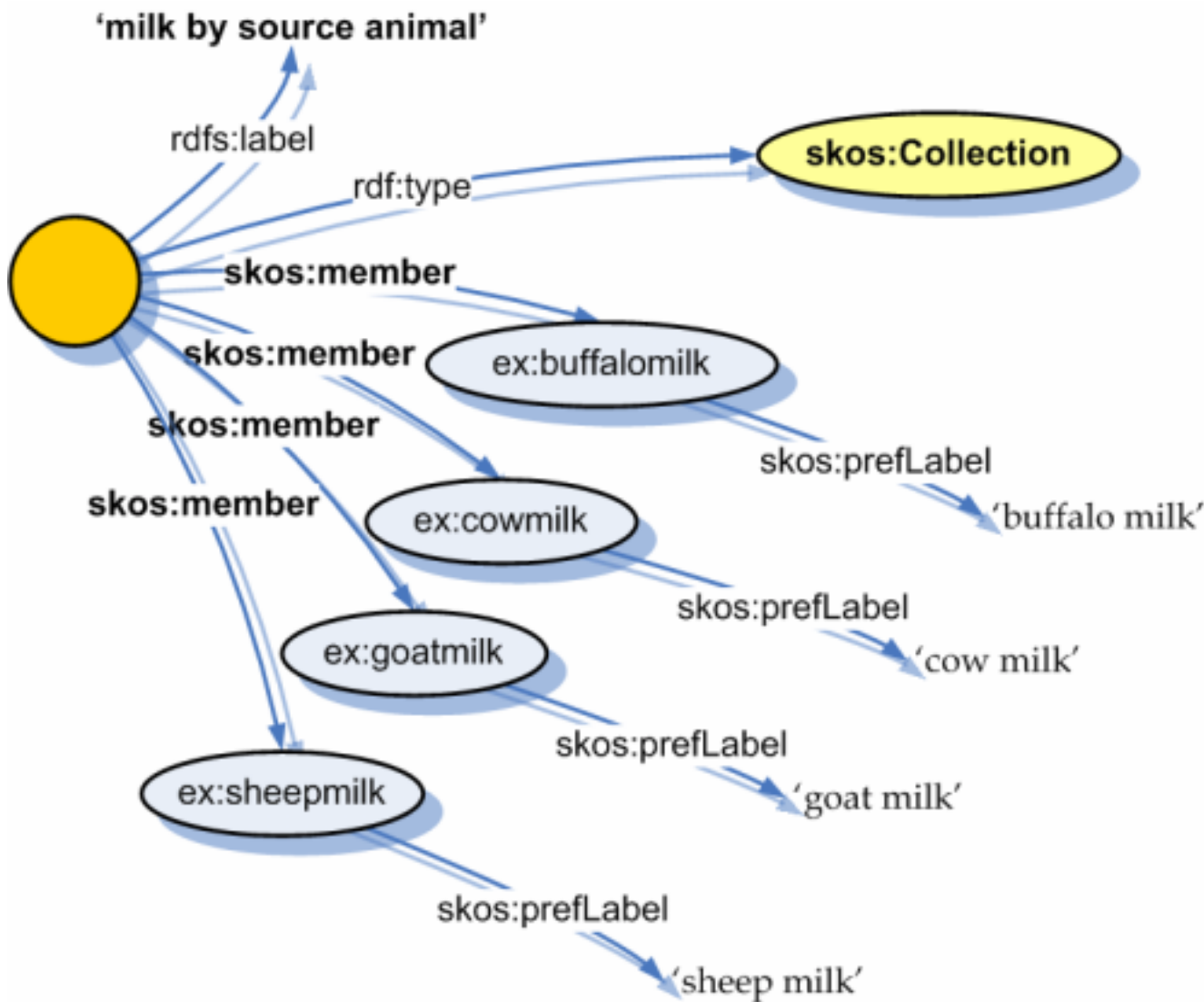
buffalo milk

cow milk

goat milk

sheep milk

Meaningful Collections



Node Labels in Hierarchy

milk

<milk by source animal>

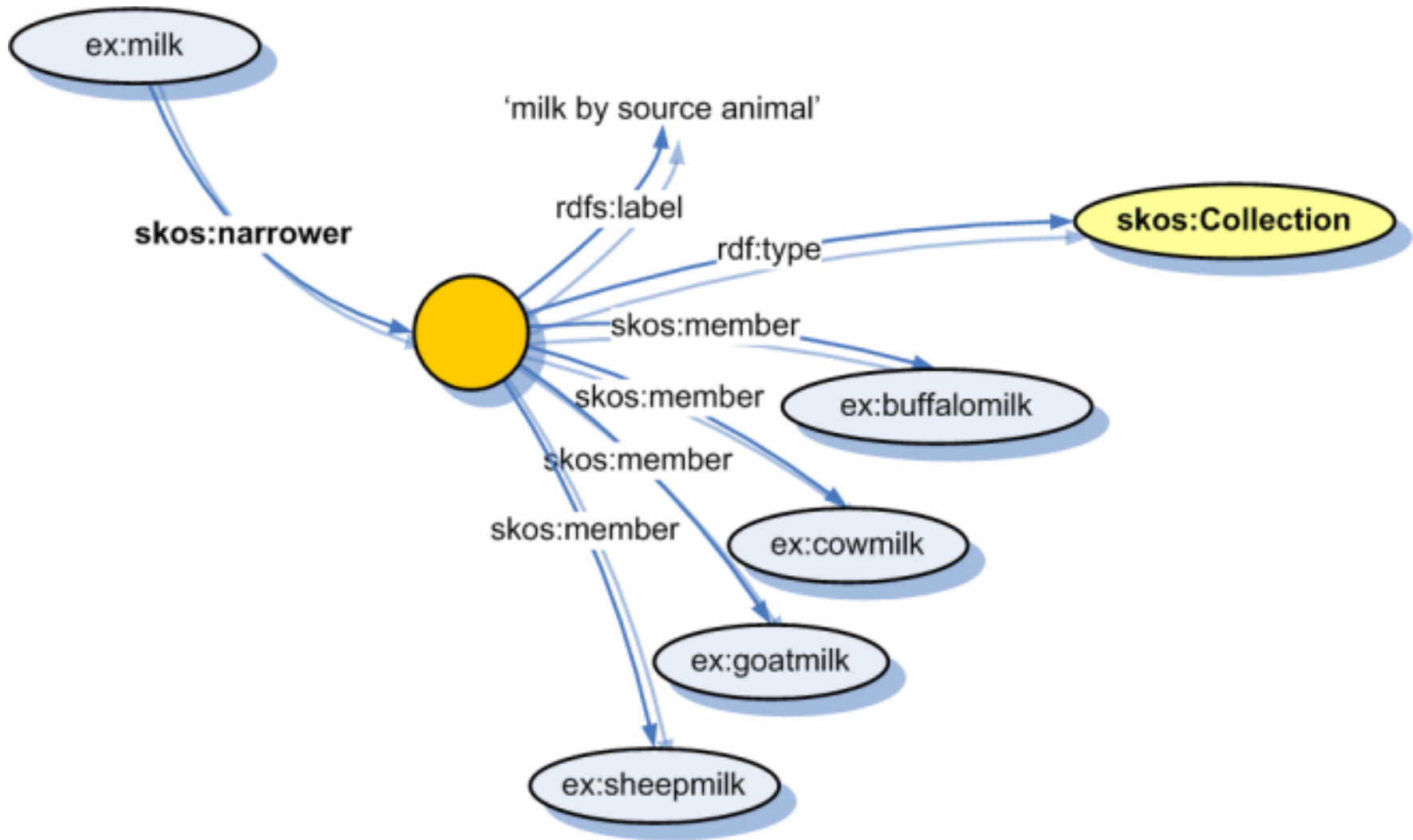
buffalo milk

cow milk

goat milk

sheep milk

Collectable Properties



Nested Node Labels

chairs

<chairs by form>

armchairs

easy chairs

<chairs by form: back form>

heart-back chairs

oval-back chairs

N.B.

A member of a collection may be a concept or another collection.

More on Collections...

- See SKOS Core Guide for...
 - Meaningfully ordered collections
 - Nested ordered/unordered collections
 - Rules for collections
 - Rules for collectable properties

Aah...

Story So Far (3)...

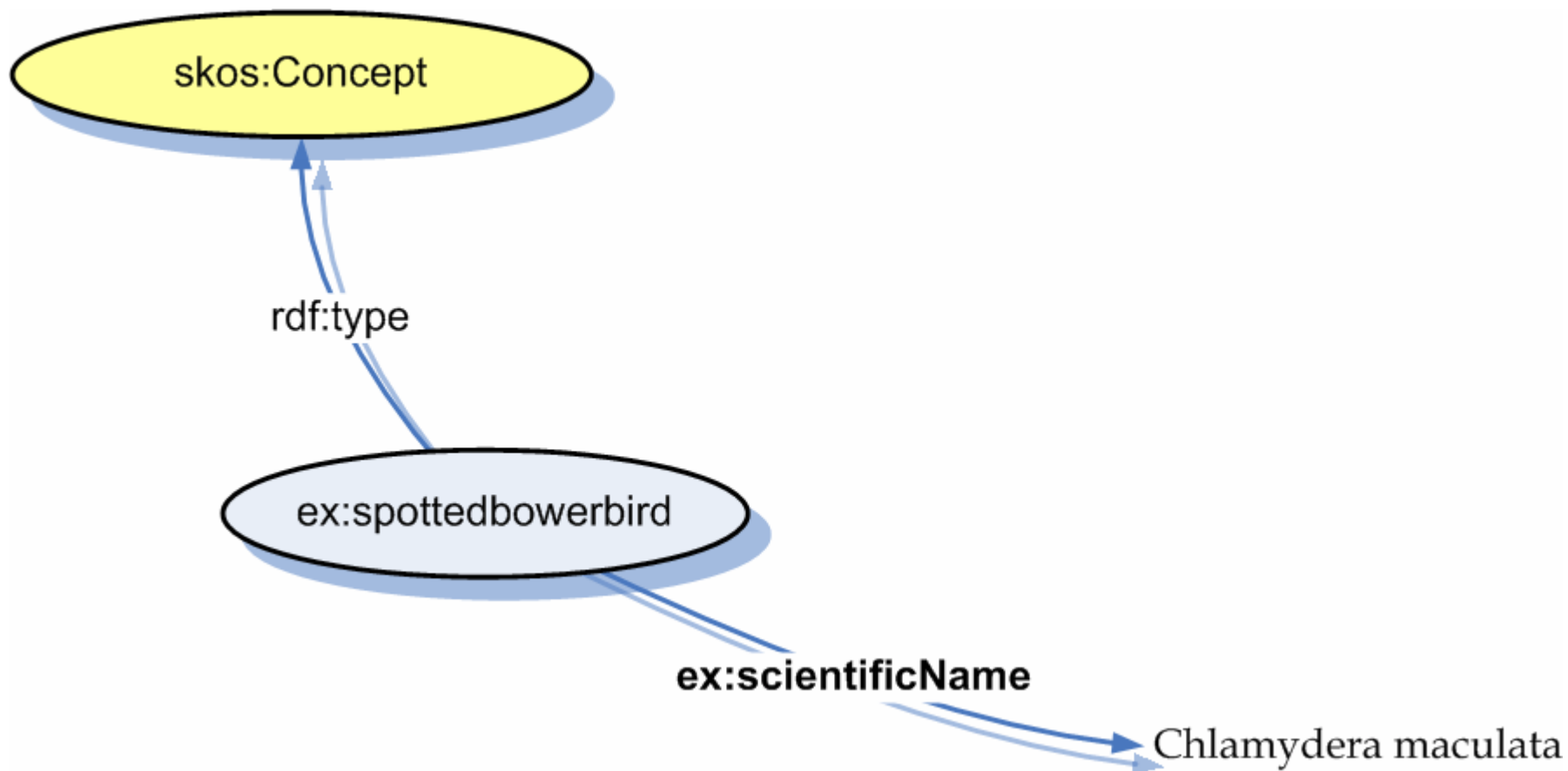
- Documentation Properties
 - `skos:note`, `skos:definition`, `skos:example`, `skos:scopeNote`, `skos:historyNote`, `skos:editorialNote`, `skos:changeNote`
- Documentation Patterns
 - ...as RDF Literal, as Related Resource Description, as Document Reference
- Concept Schemes
 - `skos:ConceptScheme`, `skos:hasTopConcept`, `skos:inScheme`
- Subject Indexing
 - `skos:subject`, `skos:isSubjectOf`, `skos:primarySubject`, `skos:isPrimarySubjectOf`
- Node Labels and Guide Terms
 - `skos:Collection`, `skos:OrderedCollection`, `skos:member`, `skos:memberList`

- You may use any type of HTTP URI as an identifier for a concept ...
 - ‘#’ is OK, e.g.
<http://www.example.com/concepts#love>
 - ‘/’ is OK, e.g.
<http://www.example.com/concepts/love>
- (N.B. httpRange-14 is resolved)
 - <http://lists.w3.org/Archives/Public/www-tag/2005Jun/0039>

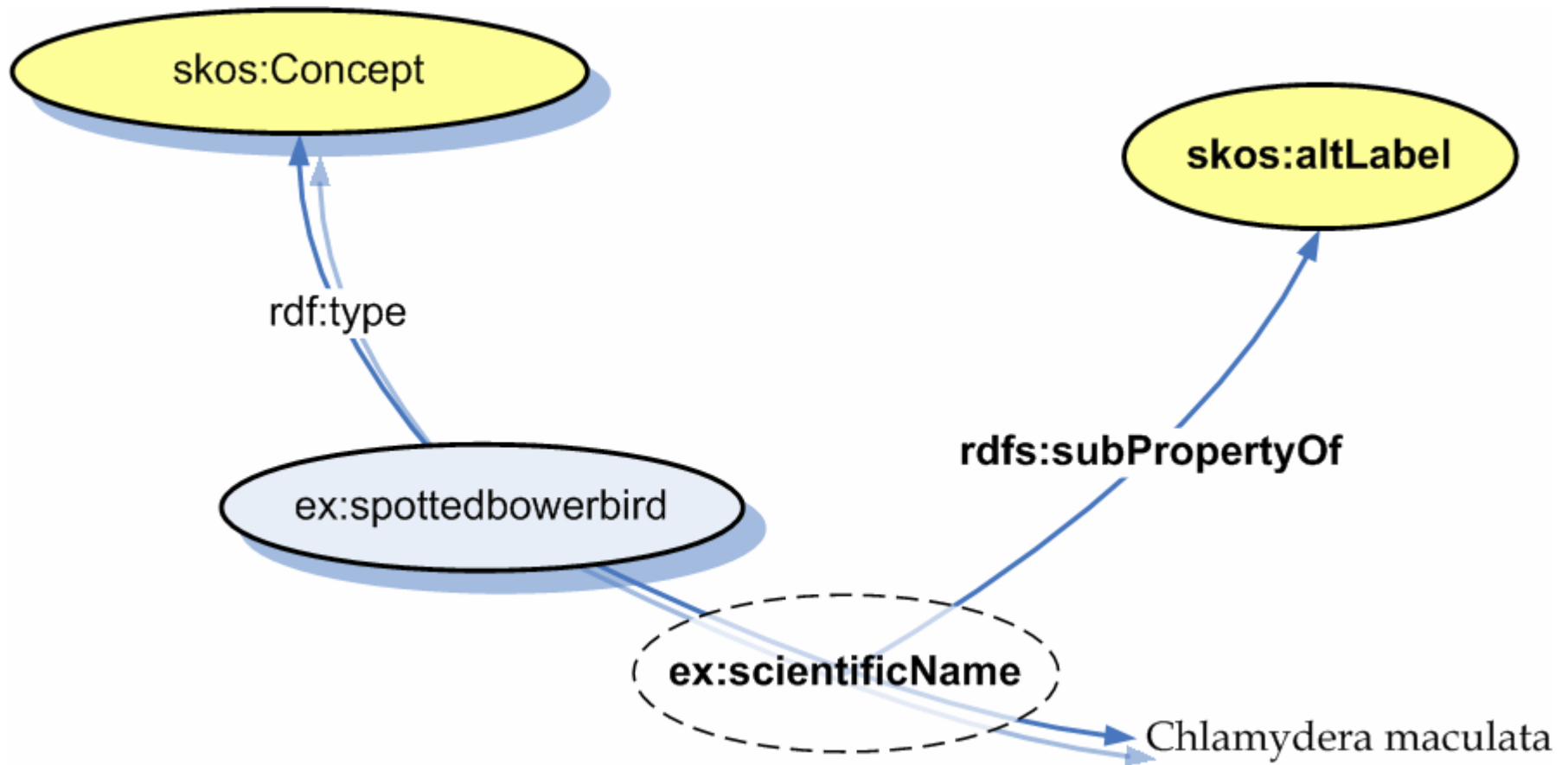
- HTTP Behaviour for ‘#’
 - N.B. you can’t actually GET <http://www.example.com/concepts#love>
 - Current practice in semantic web community: <http://www.example.com/concepts> should respond to GET with ...
 - Response code 200 (success)
 - Content-type: application/rdf+xml
 - A message that describes all concepts in the namespace

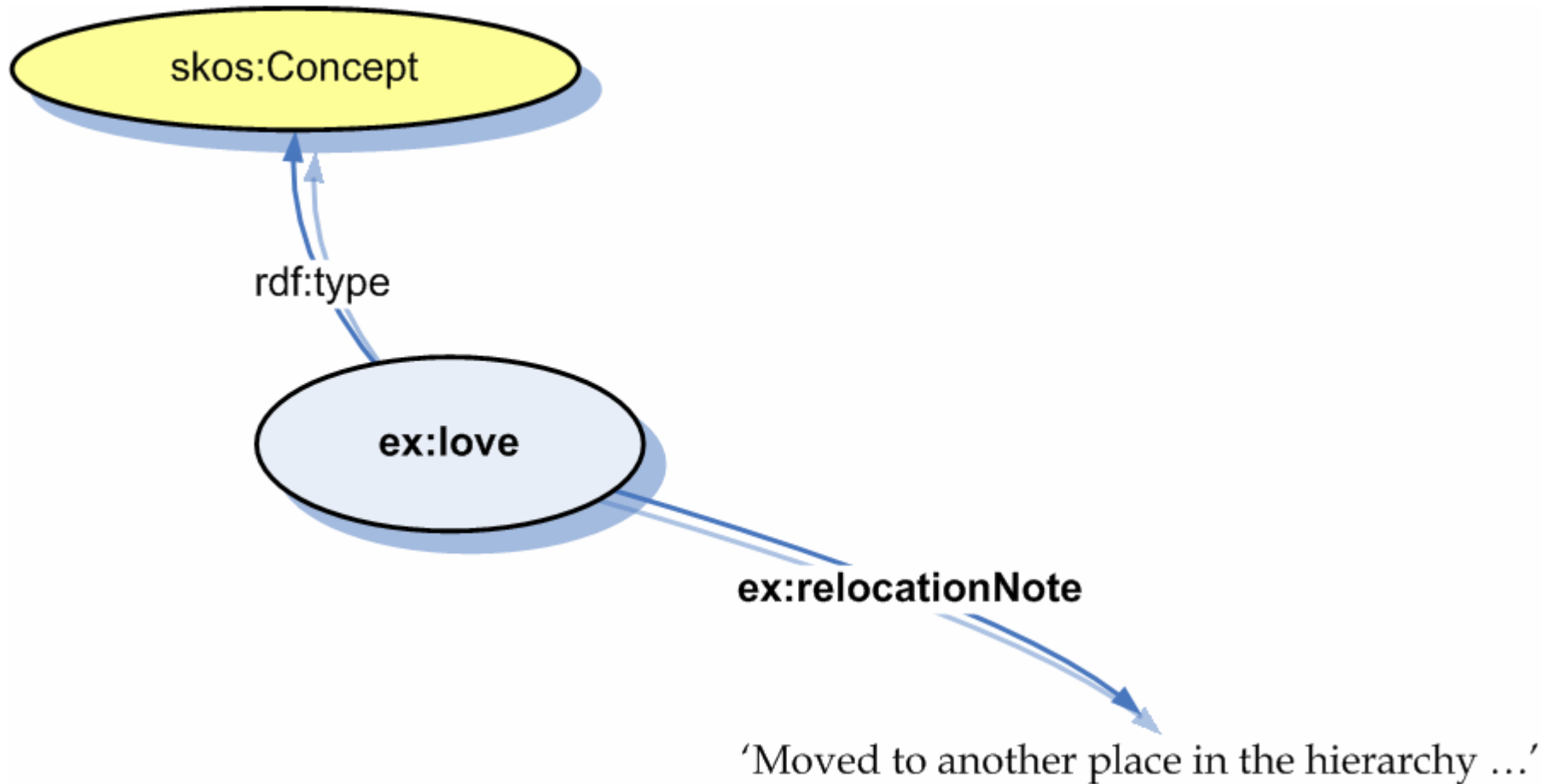
- HTTP Behaviour for ‘/’
 - <http://www.example.com/concepts/love> must respond to GET with ...
 - Response code 303 (redirect see other)
 - What you should be redirected to is an open question ...
 - HTML document?
 - RDF document?
 - XHTML 2.0 document with embedded RDF?
 - Content negotiable resource?
 - I suggest ...
 - Content negotiable resource, supporting at least application/rdf+xml and preferably also text/html, describing the concept

- SKOS Core can be **extended** by **refining** the classes and properties of the SKOS Core Vocabulary ...

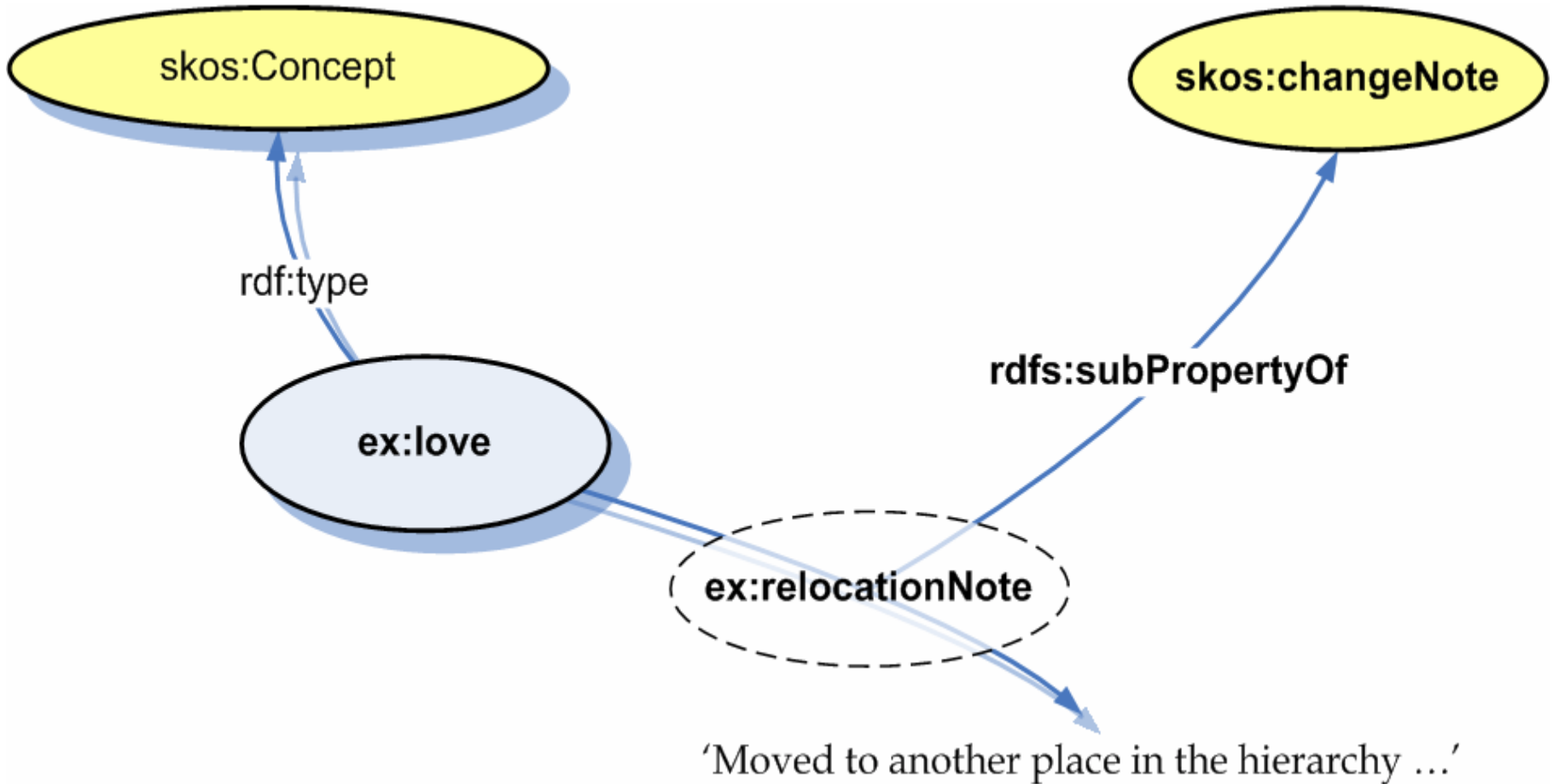


Labelling

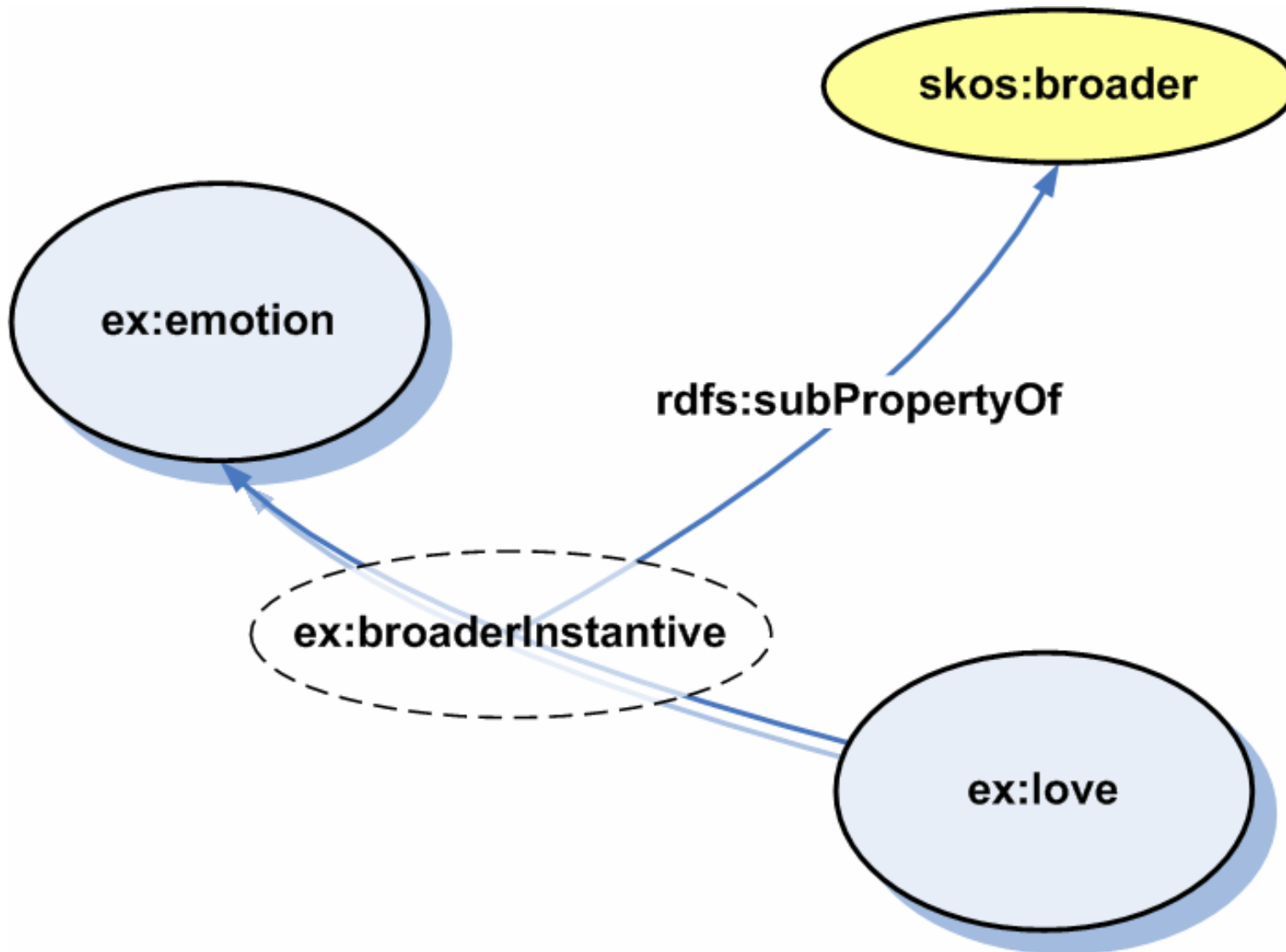




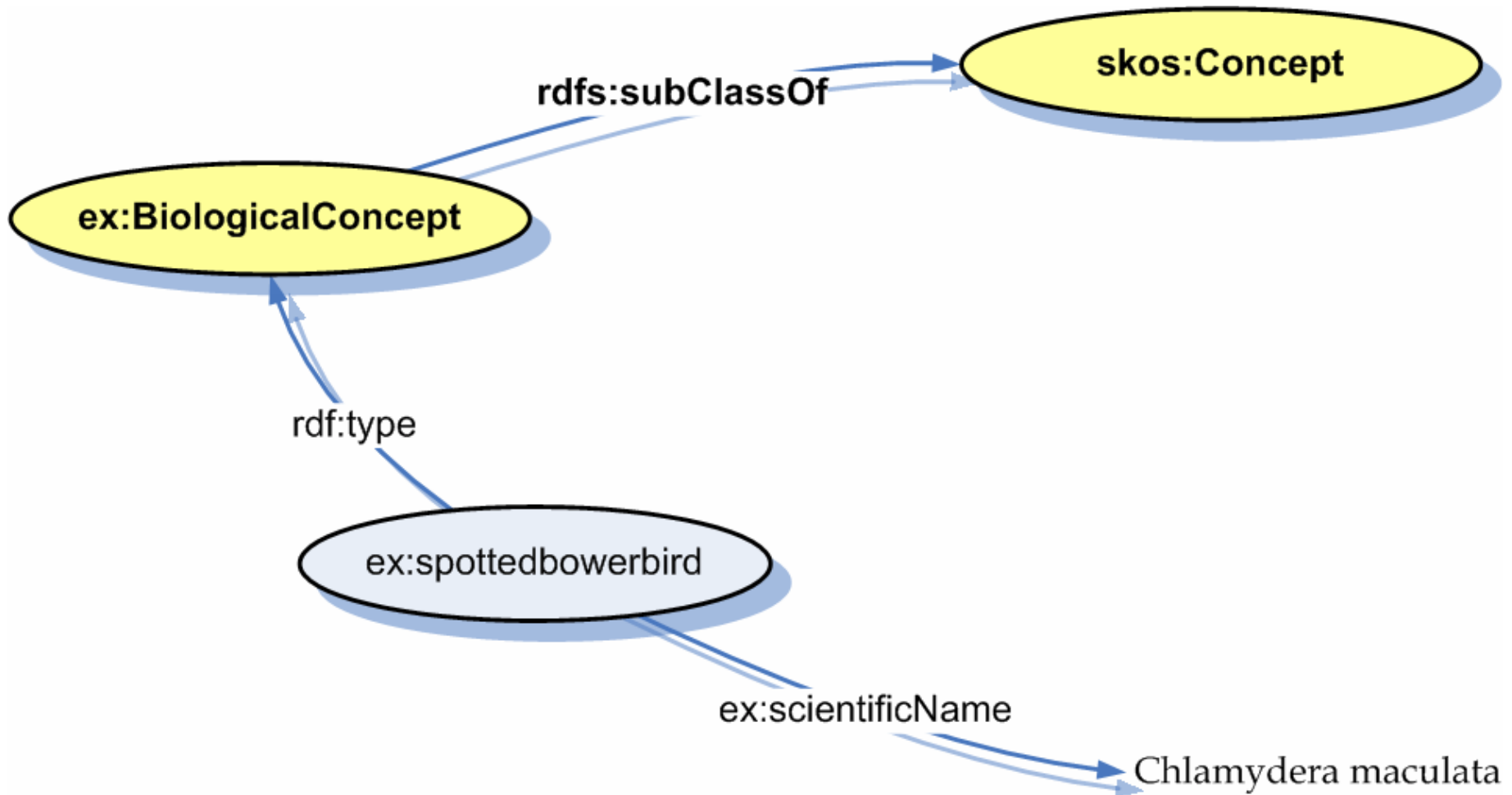
Documentation



Semantic Relations



Classes of Concept



Fundamental Facets

- E.g. AAT ...
 - Physical Attributes
 - Styles and Periods
 - Agents
 - Activities
 - Materials
 - Objects

Fundamental Facets

- Model fundamental facets as disjoint classes of concept ...

Fundamental Facets

```
# standard namespace prefixes

ex:PhysicalAttributesConcept a rdfs:Class;
  rdfs:subClassOf skos:Concept .

ex:StylesAndPeriodsConcept a rdfs:Class;
  rdfs:subClassOf skos:Concept .

ex:AgentsConcept a rdfs:Class;
  rdfs:subClassOf skos:Concept .

ex:ActivitiesConcept a rdfs:Class;
  rdfs:subClassOf skos:Concept .

ex:MaterialsConcept a rdfs:Class;
  rdfs:subClassOf skos:Concept .

ex:ObjectsConcept a rdfs:Class;
  rdfs:subClassOf skos:Concept .
```



Fundamental Facets

```
# standard namespace prefixes

# Example of using the classes ...
ex:300024978 a ex:AgentsConcept;
  skos:prefLabel 'People'.

# Declare disjointness ...

ex:PhysicalAttributesConcept
  owl:disjointWith ex:StylesAndPeriodsConcept;
  owl:disjointWith ex:AgentsConcept;
  owl:disjointWith ex:ActivitiesConcept;
  owl:disjointWith ex:MaterialsConcept;
  owl:disjointWith ex:ObjectsConcept .
```

Weighted Semantic Relations

```
# standard namespace prefixes

# Declare the bits we need ...

ex:WeightedRelation a rdfs:Class;
  rdfs:subClassOf rdf:Statement .

ex:weight a rdf:Property;
  rdfs:domain ex:WeightedRelation;
  rdfs:range xsd:integer .

# Now use them ...

[] a ex:WeightedRelation;
  rdf:subject ex:love;
  rdf:predicate skos:related;
  rdf:object ex:joy;
  ex:weight '56' .
```



Compound Concepts

- MESH ‘qualified concepts’ e.g. ...
 - Calcimycin [standards]
 - Leukemia [complications]

Compound Concepts

```
# Declare some bits ...

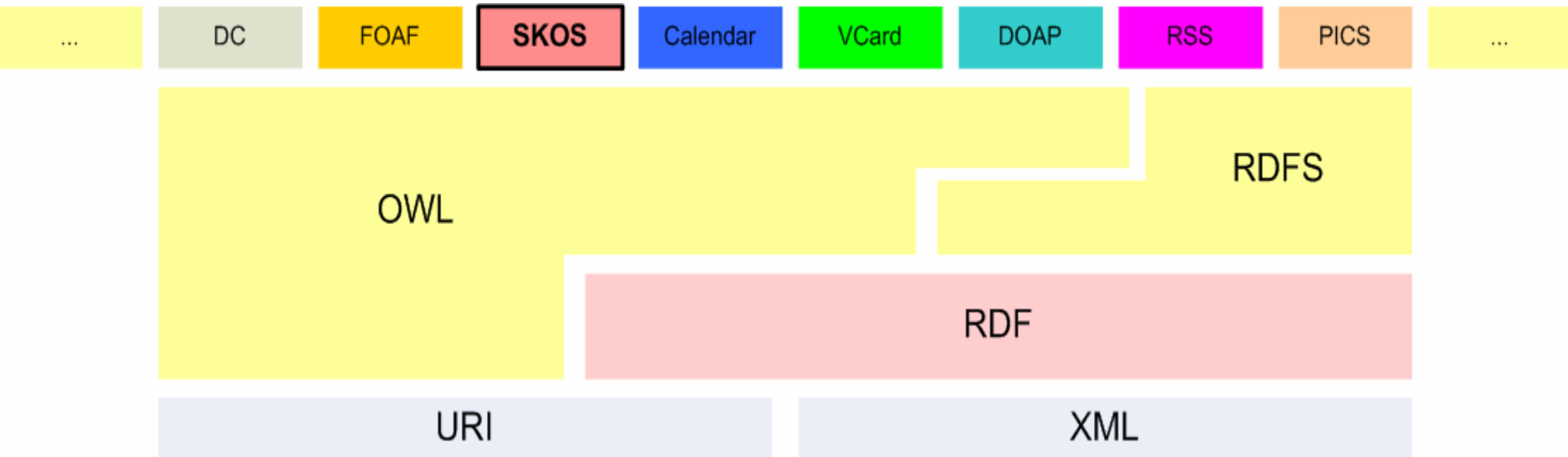
ex:CompoundConcept a rdfs:Class;
  rdfs:subClassOf skos:Concept .

ex:main a rdf:Property;
  rdfs:domain ex:CompoundConcept;
  rdfs:subPropertyOf skos:broader .

ex:qualifier a rdf:Property;
  rdfs:domain ex:CompoundConcept;
  rdfs:subPropertyOf skos:broader .

# Now use them ...

<http://www.example.com/someDocument>
  skos:subject [
    a ex:CompoundConcept;
    ex:main ex:Calcimycin;
    ex:qualifier ex:standards;
  ].
```



- Disjoint?
 - Should `skos:Concept` be disjoint with ...
 - `rdf:Property` ?
 - `rdfs:Class` ?
 - `owl:Class` ?
- DL?
 - Should SKOS Core be an OWL DL ontology?
 - Means not allowing flexibility in range of documentation props

Story So Far (4)

- HTTP Publishing
- Extension by Refinement
- SKOS Core and OWL



- Goals, development, status and nature of SKOS Core
- SKOS Core features
- HTTP, extensions & OWL

SKOS Core Homepage

<http://www.w3.org/2004/02/skos/core>

SKOS Core Guide

<http://www.w3.org/TR/swbp-skos-core-guide>

SKOS Core Vocabulary Specification

<http://www.w3.org/TR/swbp-skos-core-spec>

Mailing list

<mailto:public-esw-thes@w3.org>

<http://lists.w3.org/Archives/Public/public-esw-thes/>

This presentation

<http://isegserv.itd.rl.ac.uk/cvs-public/skos/press/dc2005/tutorial.ppt>

Diagrams used in this presentation (feel free to re-use)

<http://isegserv.itd.rl.ac.uk/cvs-public/skos/press/dc2005/img/>

Thanks for listening ☺

