Ontology Engineering
Lecture 8: Bottom-up Ontology Development – SKOS

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Slides by Jos de Bruijn, who based it on slides by Mark van Assem,
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- SKOS
  - "Simple Knowledge Organisation System(s)"
  - Simple, extensible, machine-understandable representation for "concept schemes"
    - Thesauri
    - Classification Schemes
    - Taxonomies
    - Subject Headings
    - Other types of 'controlled vocabulary'...

SKOS
RDF

SKOS Development

- Developed by W3C's Semantic Web Best Practices-WG

- Draft for Working Group Note

- Design: public, consensus-driven, open community, email

- Input from actual vocabulary maintainers

Semantic Web technology can help improve search facilities and reuse:

1. Concept-based search instead of text-based search

2. Reuse each other's concept definitions

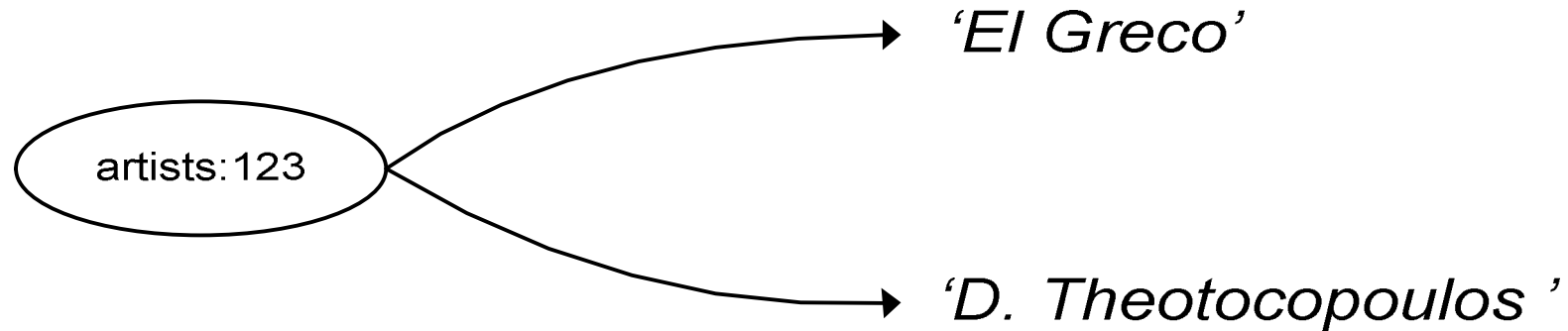3. Search across (institution) boundaries

4. Standard software

1. Concept Search

- Painter Domenikos Theotocopoulos = "El Greco" (nickname)

- Some indexers use "El Greco", others "D. Theotocopoulos"

- Searching for "El Greco" does not give all results

- Solution: one *concept* with different *lexical labels*.

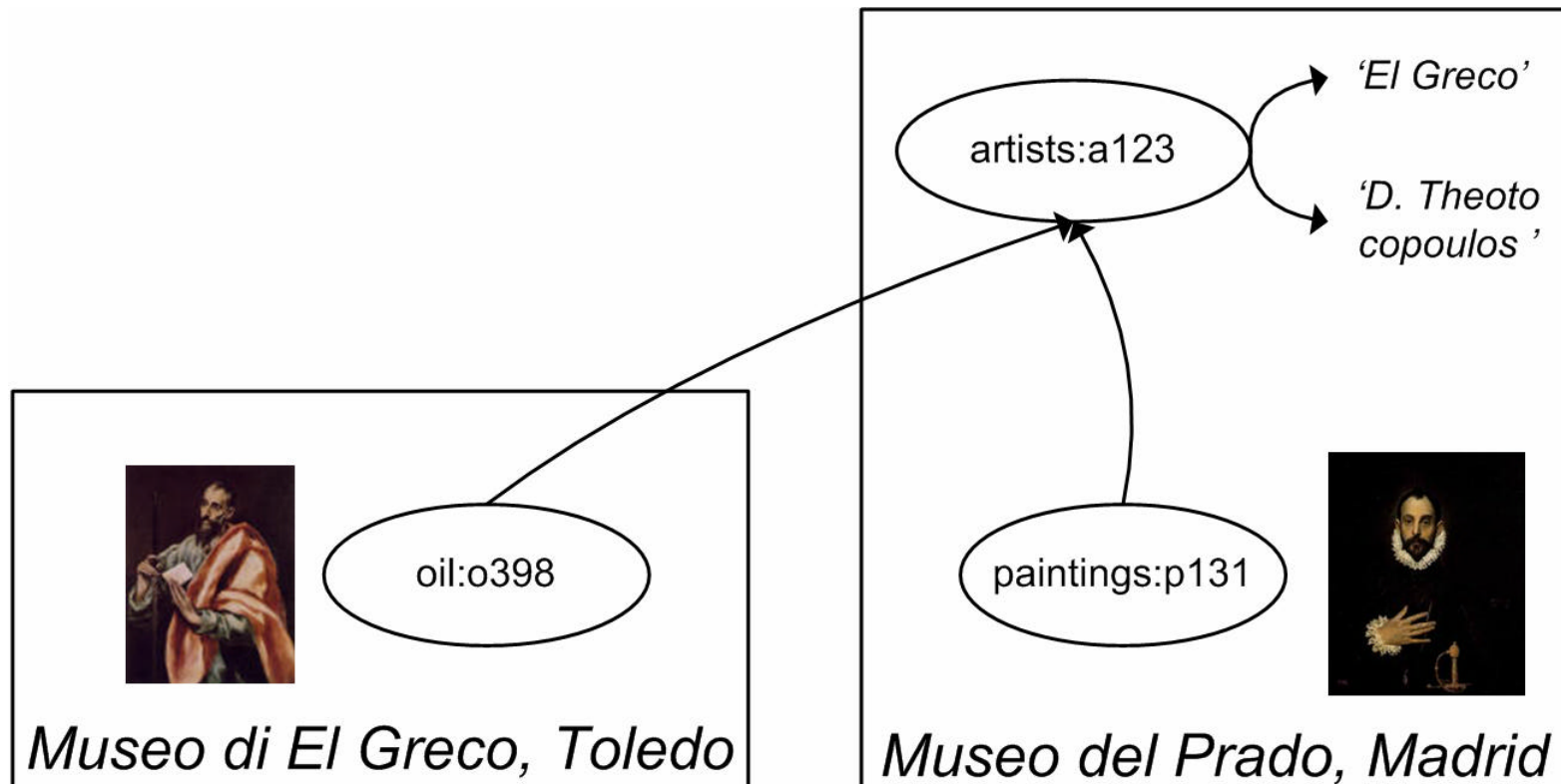# Example

- N.B.: vocabulary with *identifiers* for preferred terms and indexing with *identifiers* accomplishes this
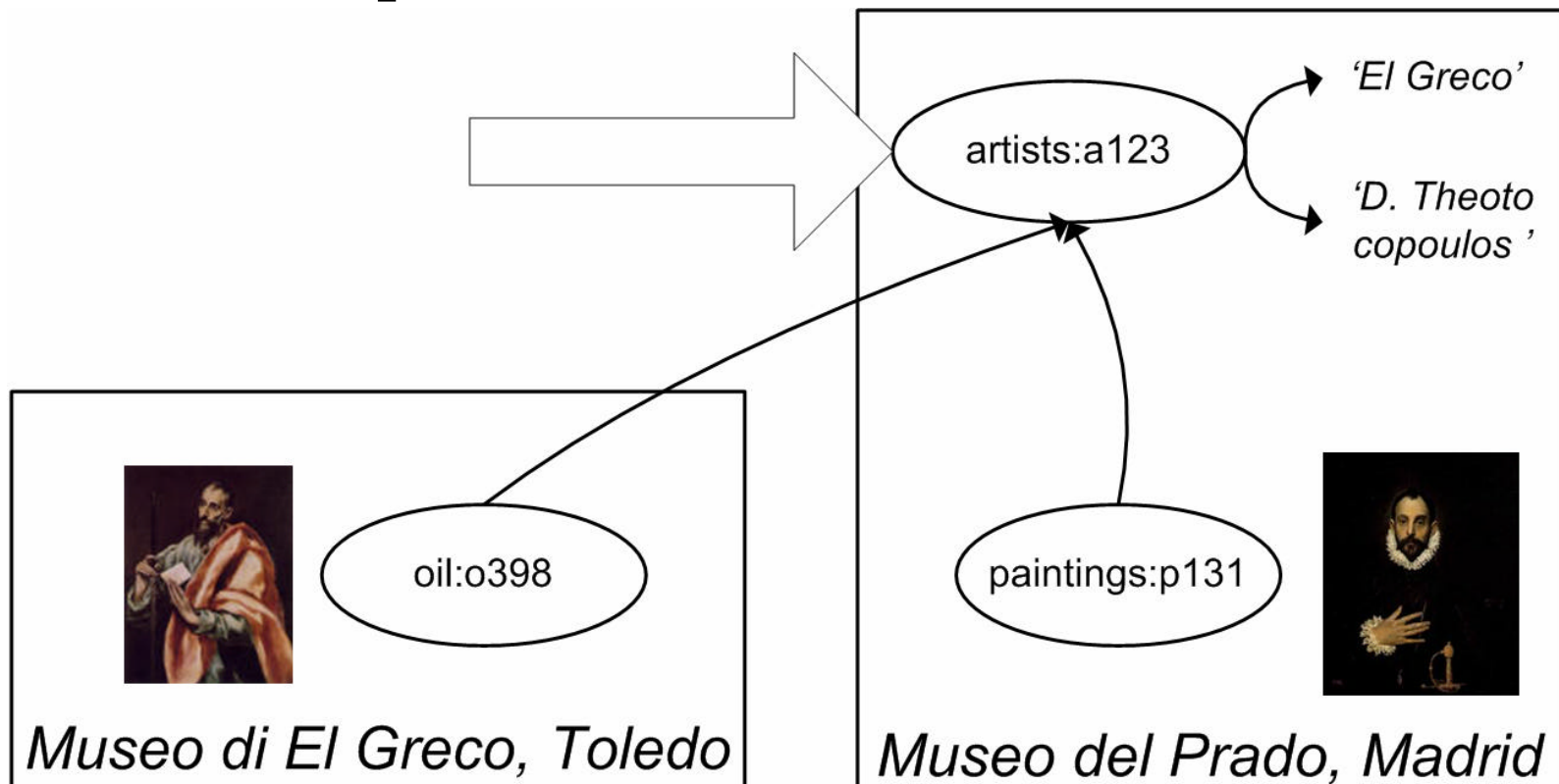
- Reuse existing concept "El Greco"
- ✍ Req. 1: one "exchange syntax"
- ✍ Req. 2: "point" at other concepts

3. Search Across Boundaries

- Search for *concept* "El Greco" returns paintings from both institutions
  - ✍ Same requirements

4. Standard Software

- If all concept schemes use same "exchange syntax" and "structure", standardized software can be built to:
  - Display/browse concept scheme
  - Annotate with concept scheme
  - Integrate data from 2 institutions using standard concept schemes ("search across boundaries")

✍ Req. 3: Similar *structures* (graphs) in exchange syntax

SKOS
RDF

Why SKOS helps

SKOS uses RDF

–   sharing "graphs" in distributed environment (intranet/internet)
–   Uses URIs for "pointing" (identifying)
–   Easy to extend by anyone for specific purposes

✍   "exchange syntax"

✍   "Point at concept"

SKOS: set of *classes* and *properties* to describe
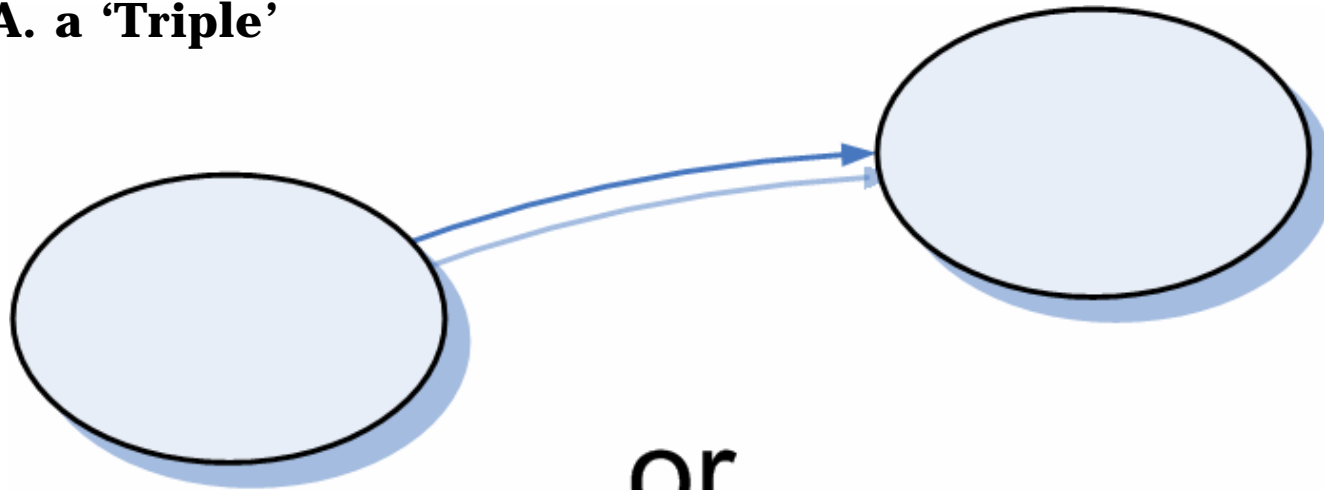concept schemes

-   Produce "similar graphs"

✍ "Same structures"/ clear what graph means

Disadvantage: unusual concept schemes don't fit into
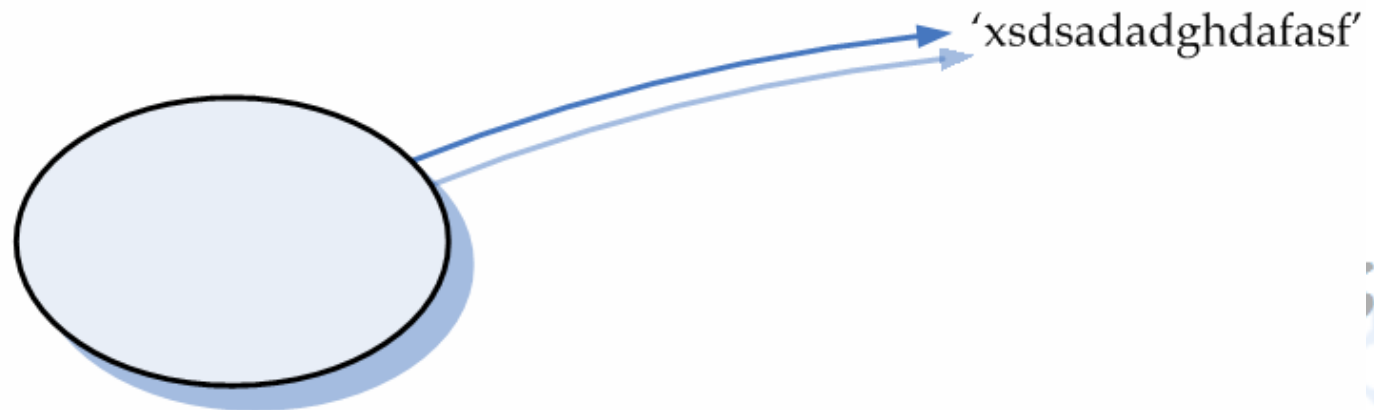SKOS (original structure too complex)

Quick RDF: a 'Statement'

A.K.A. a 'Triple'

or...

'xsdsadadghdafasf'

RDF

Quick RDF: a 'Graph'

'xsdsadadghdafasf'

'xsdsadadghdafasf'

Quick RDF: exchange syntax

- RDF Graphs can be exchanged in XML (and other formats)

- Alternative ways to represent & exchange the *same* graph

- Here we only discuss RDF graphs, exchange syntax is "lower-level" technical issue

Controlled Vocabulary

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.

SKOS
RDF

Converting into SKOS graph

1. Identify
2. Describe
3. Publish

Identify

- Step 1: Identify concepts...

  http://www.example.com/concepts#love
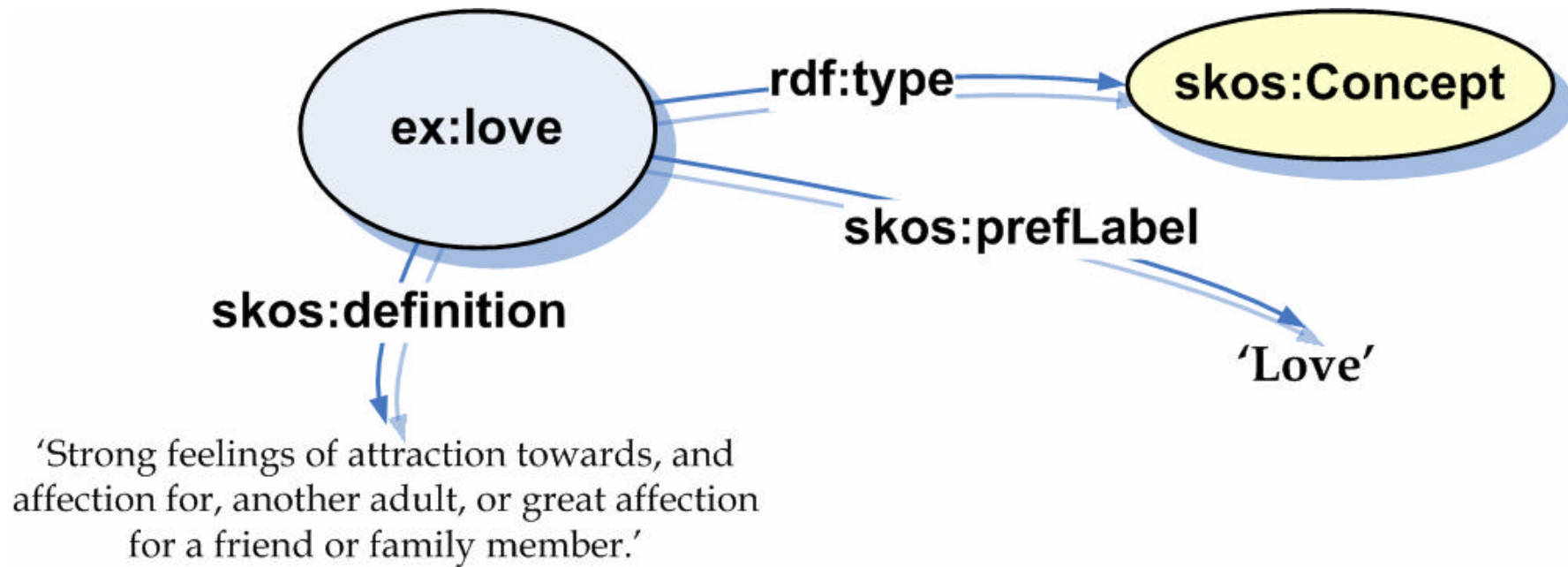 http://www.example.com/concepts#awe
  http://www.example.com/concepts#joy

- Step 2: Describe...

- Step 3: Publish...

  – Put the file on a web server for programs to download & process

  – Put the file on special RDF server on which you can query with SQL-like language:

    - Select * from ... Where ...

Thesaurus (USE/UF)

Love   (*preferred term*)
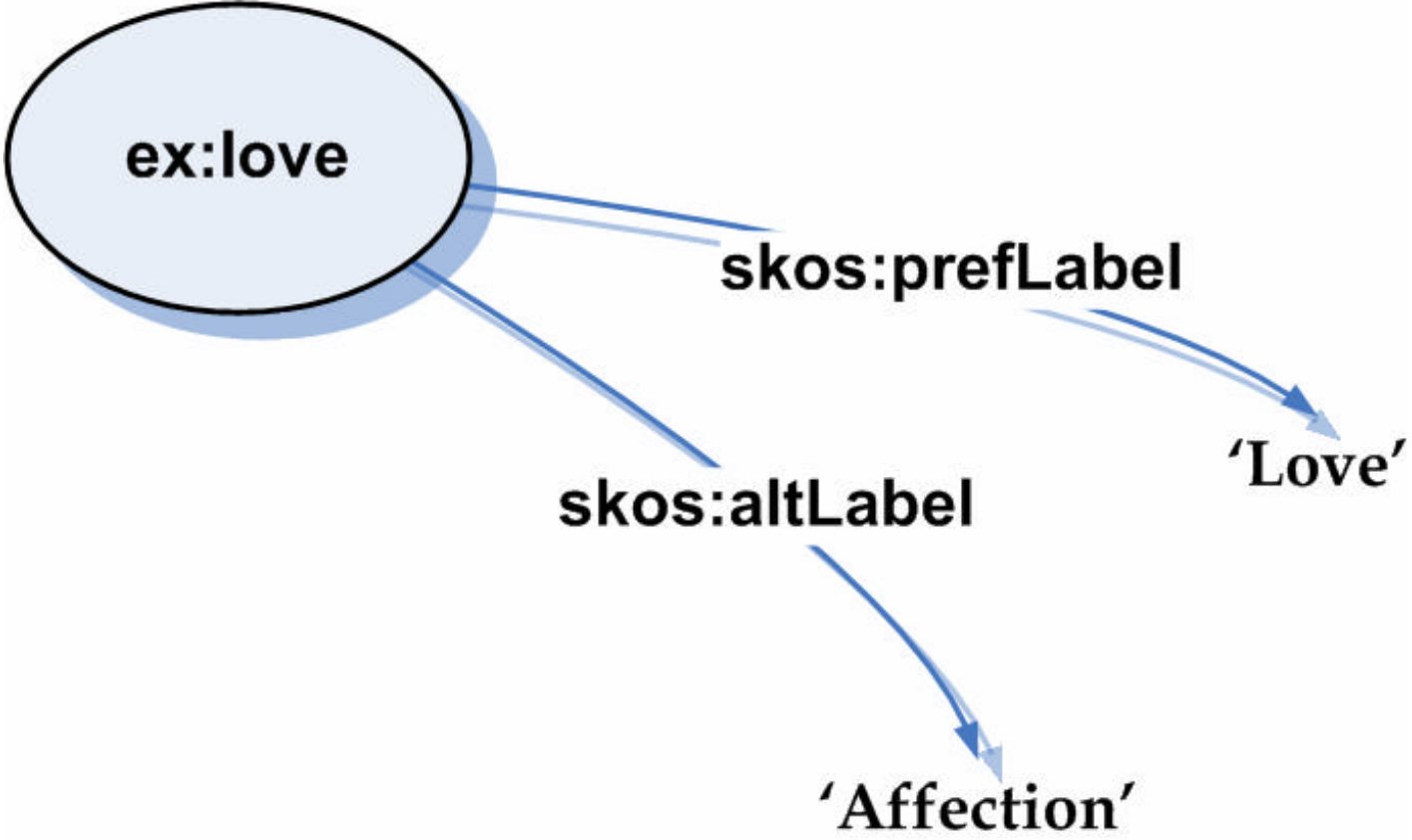
   UF Affection

Affection   (*non-preferred term*)

   USE Love

("USE" directs user from non-pref term to pref-term that should be used in indexing and search)

SKOS
RDF

Lexical Labels

Thesaurus (BT/NT)

Love

    BT Emotion   ("*BT*" = *Broader Term)*

Emotion

    NT Love   ("*NT*" = *Narrower Term*)

    NT Awe

    NT Joy

    (BT/NT only between preferred terms)

SKOS
RDF

Broader/Narrower
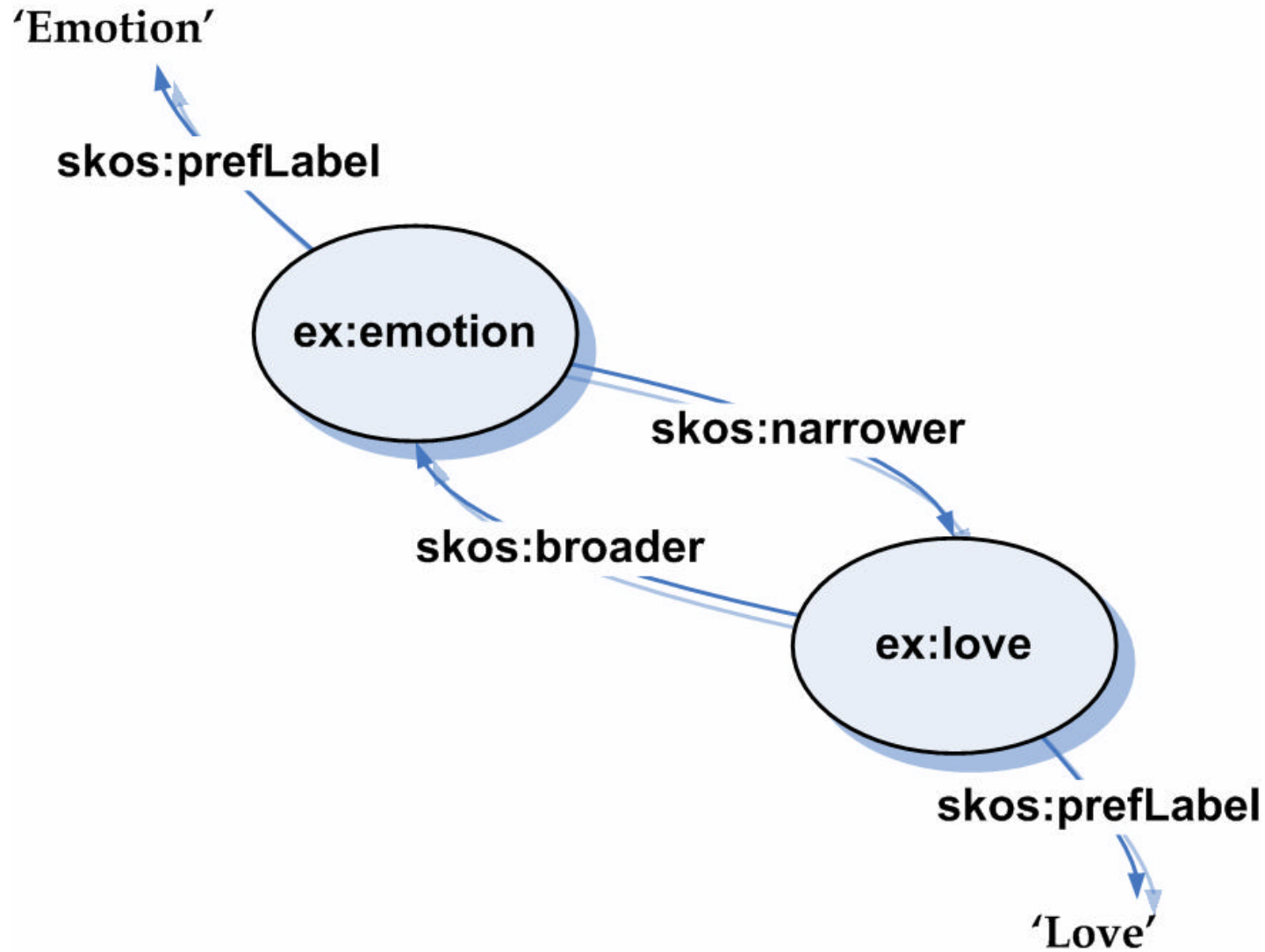
Thesaurus (RT)

Love

    RT Beauty   *("RT" = Related Term)*
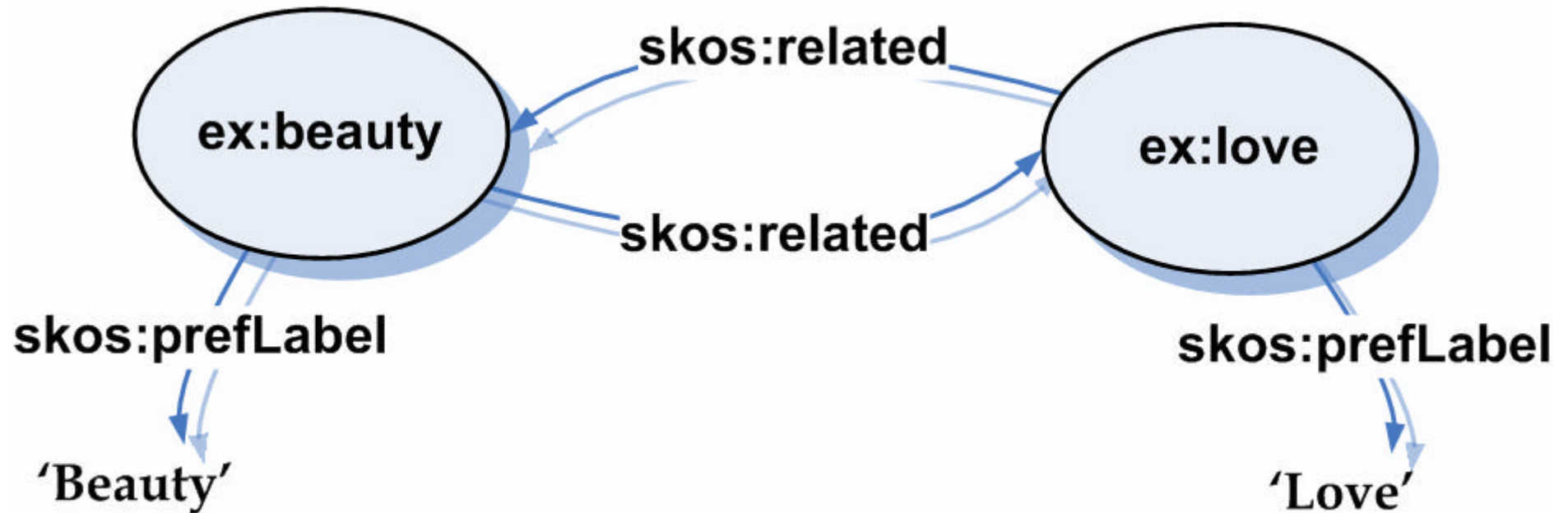
Beauty

    RT Love

(RT only between preferred terms)

SKOS
RDF

Story So Far...

- <u>Basic Structure</u>
  - skos:Concept
- <u>Lexical Labelling</u>
  - skos:prefLabel, skos:altLabel
- <u>Documentation</u>
  - skos:definition
- <u>Semantic Relations</u>
  - skos:broader, skos:narrower, skos:related

More Documentation Properties

- ## skos:note

  e.g. 'I'm going bananas'

- ## 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. 'Only use for the western family of bananas'
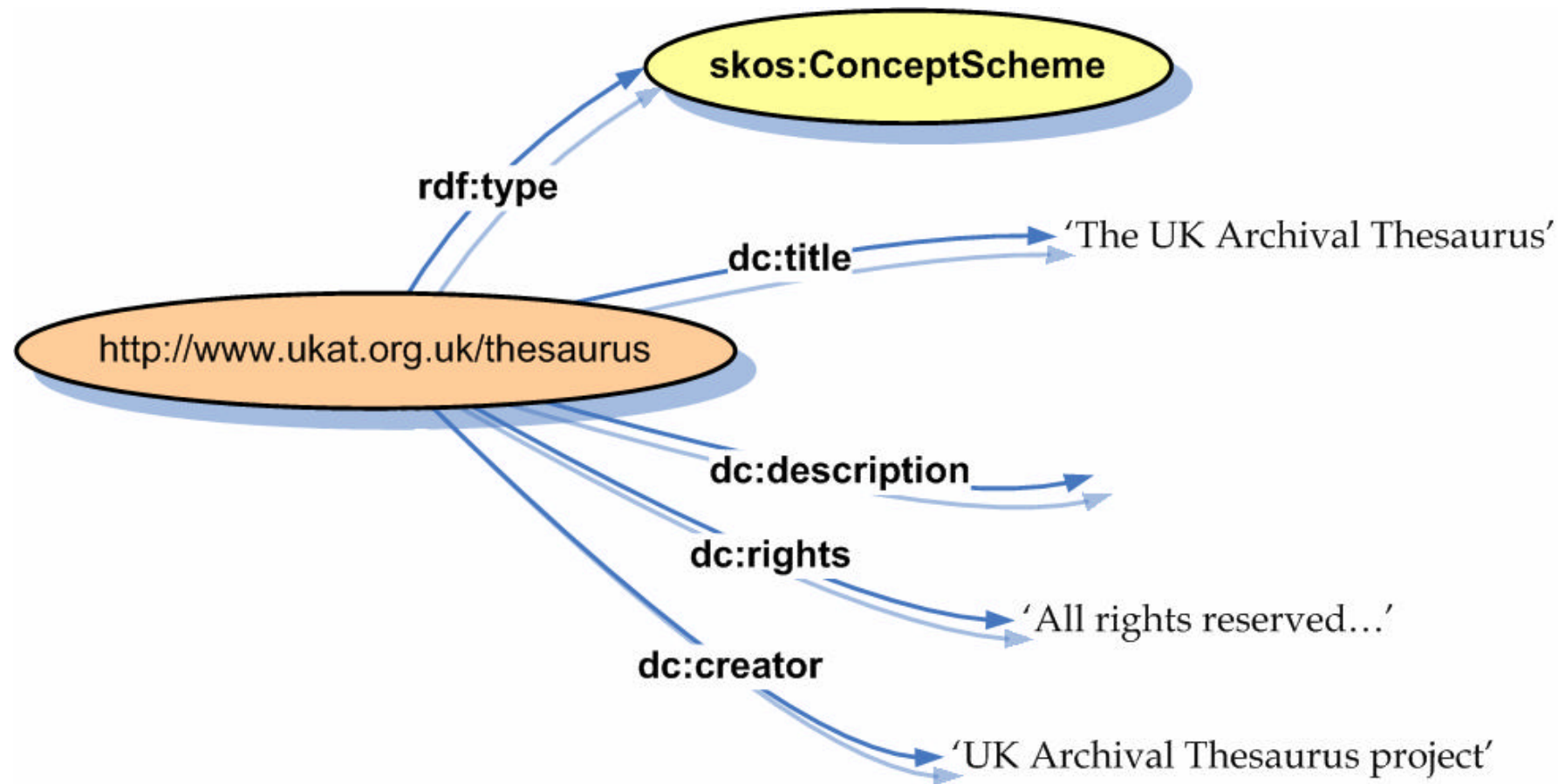
- ## skos:historyNote
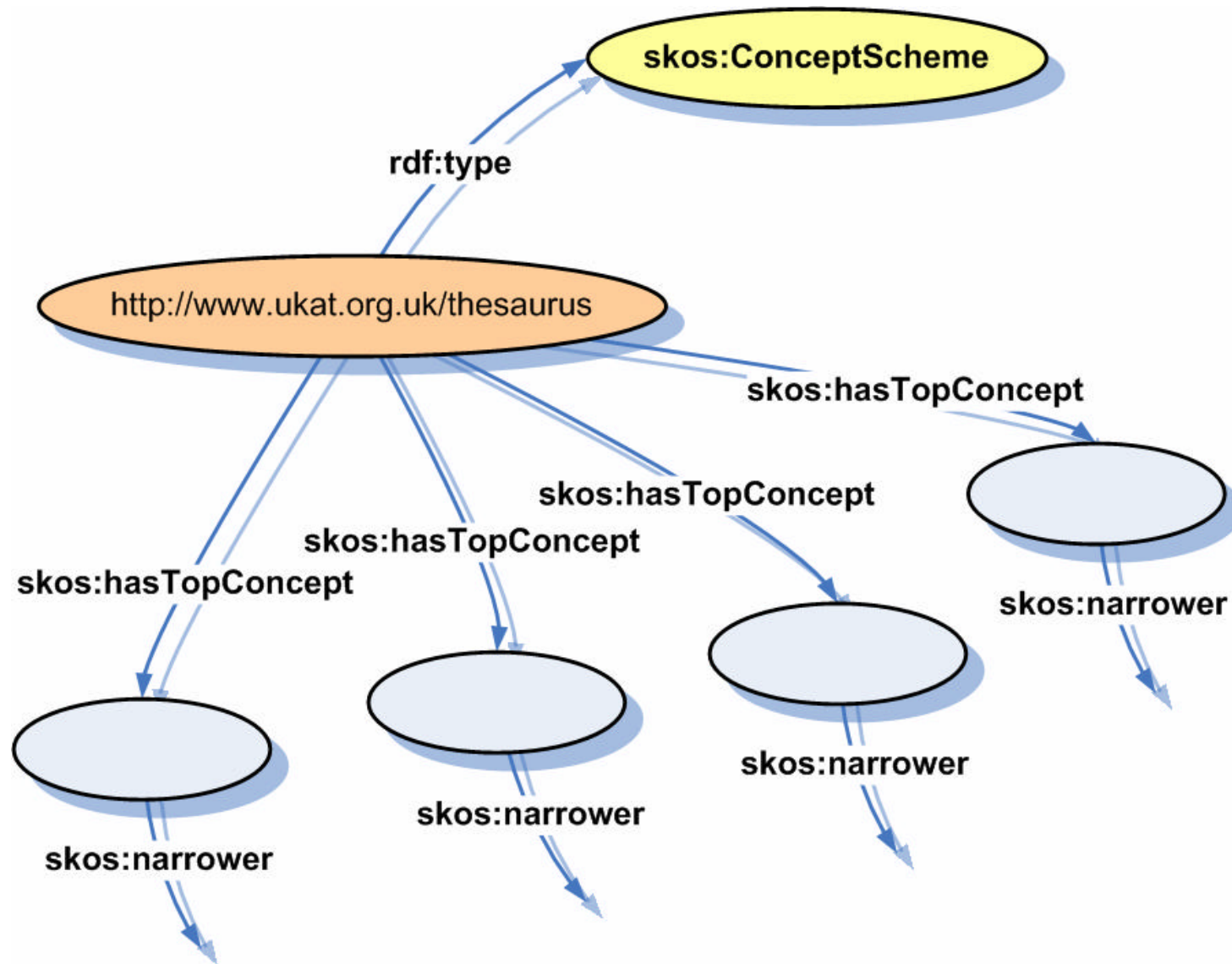
  e.g. 'Introduced 1986.'

Concept Schemes

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

- Add metadata about the scheme
  - Title
  - Rights
  - creator

SKOS
R D F

Concept Scheme

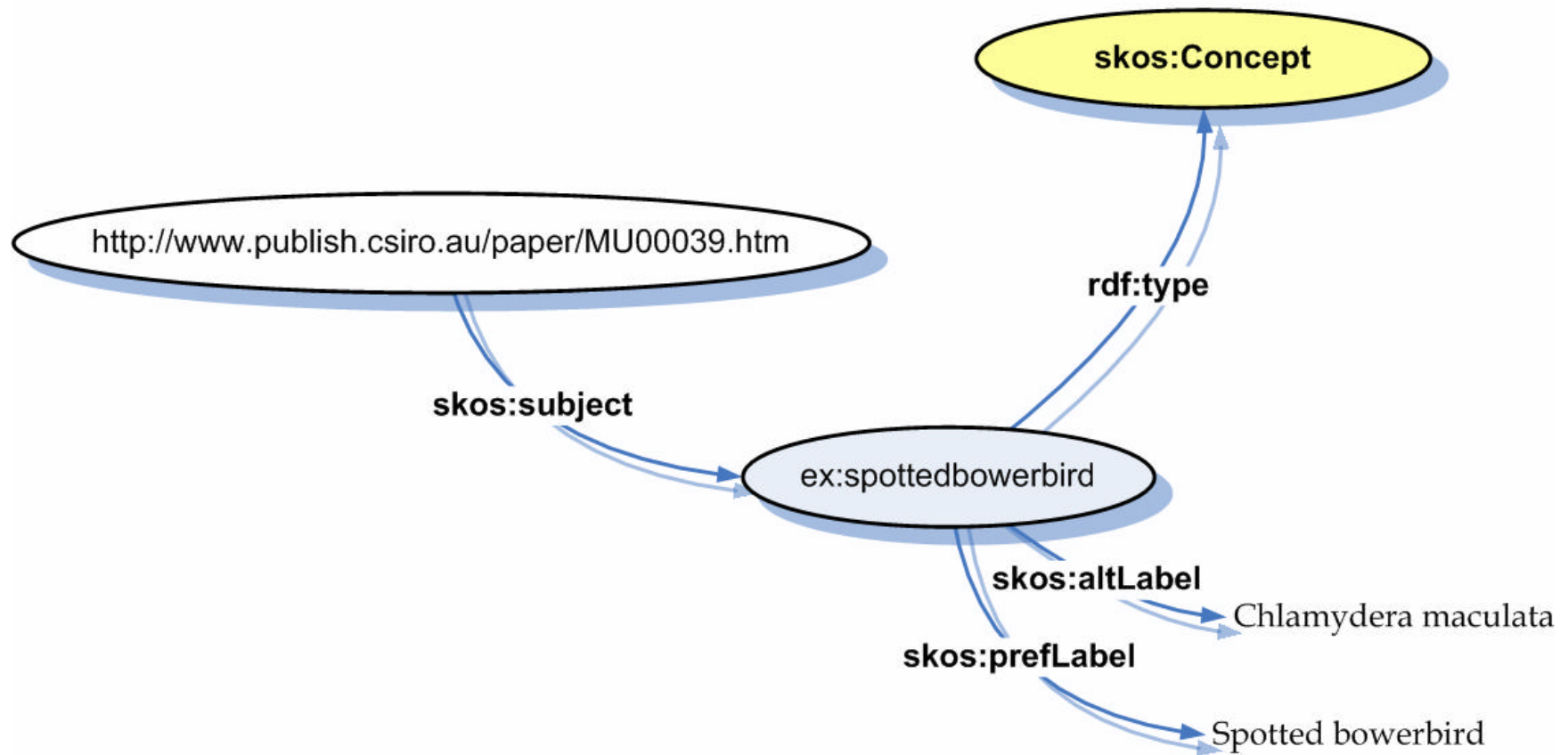# Top Concepts

Subject Indexing

- One of the main uses of concept scheme is to index documents, pictures, ...

- *skos:subject*

SKOS
R D F

Spotted Bowerbird

Subject

Node Labels in Hierarchy

milk
    \<milk by source animal\>   *(node label)*
        buffalo milk
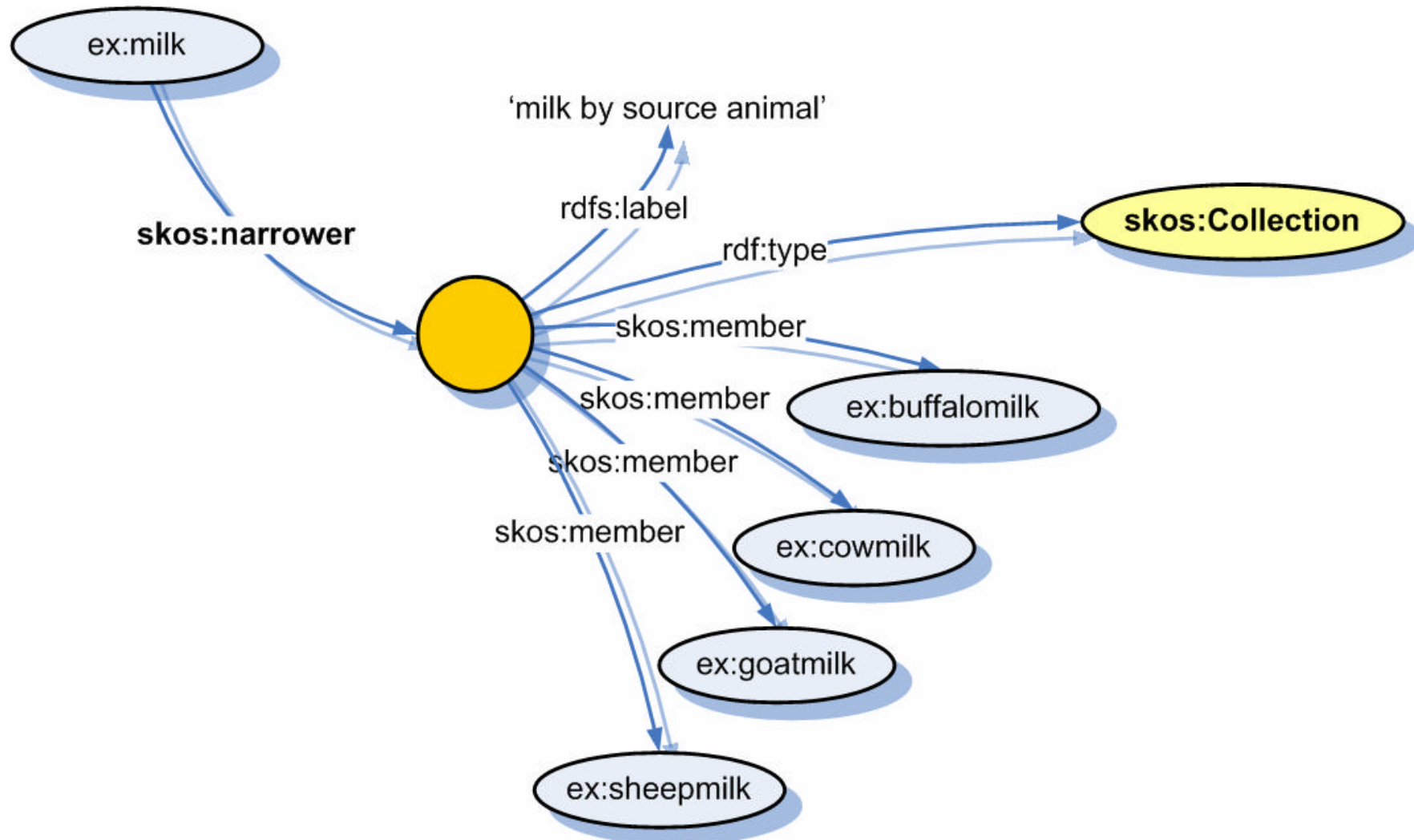   cow milk
        goat milk
        sheep milk

(*Organize terms into "subcategories" to help users find relevant term; "guide terms"; node label itself not meant for indexing*)

SKOS
RDF

Representation in SKOS

Story So Far...

- <u>Documentation Properties</u>
  - skos:note, skos:definition, skos:example, skos:scopeNote, skos:historyNote

- <u>Concept Schemes</u>
  - skos:ConceptScheme, skos:hasTopConcept,
- <u>Subject Indexing</u>
  - skos:subject
- <u>Node Labels</u>
  - skos:Collection, skos:member
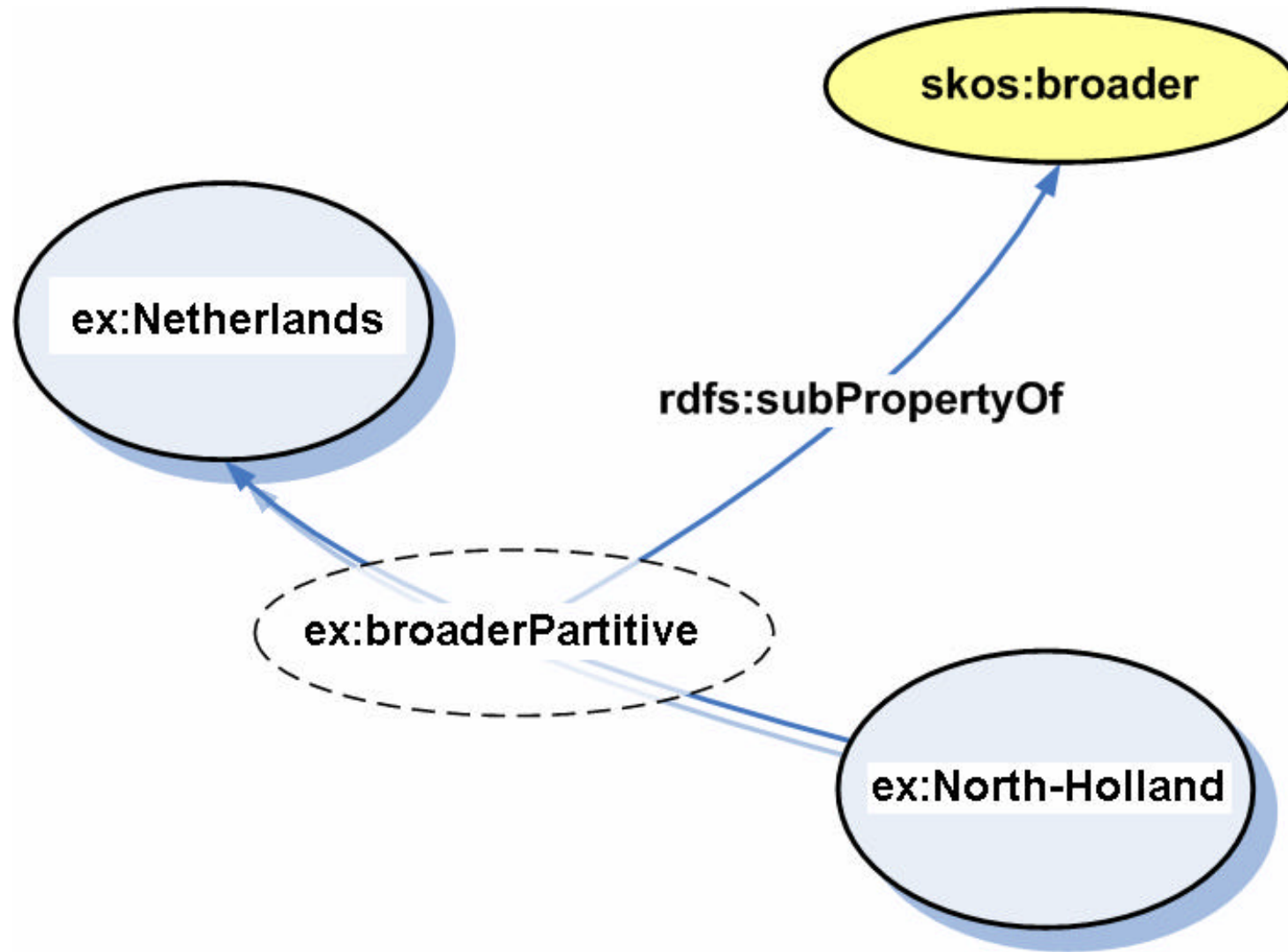

- More properties not shown here

Extensions

- SKOS Core can be **extended** by **refining** the classes and properties of the SKOS RDF Schema

- E.g. North-Holland BT Netherlands is a part-of relationship

Example

Links

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/