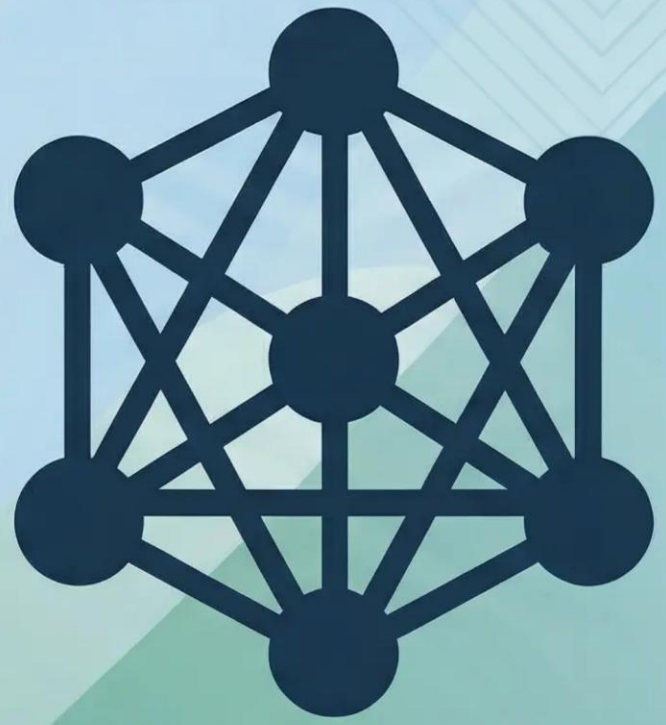
SKOS for Terminological Modeling

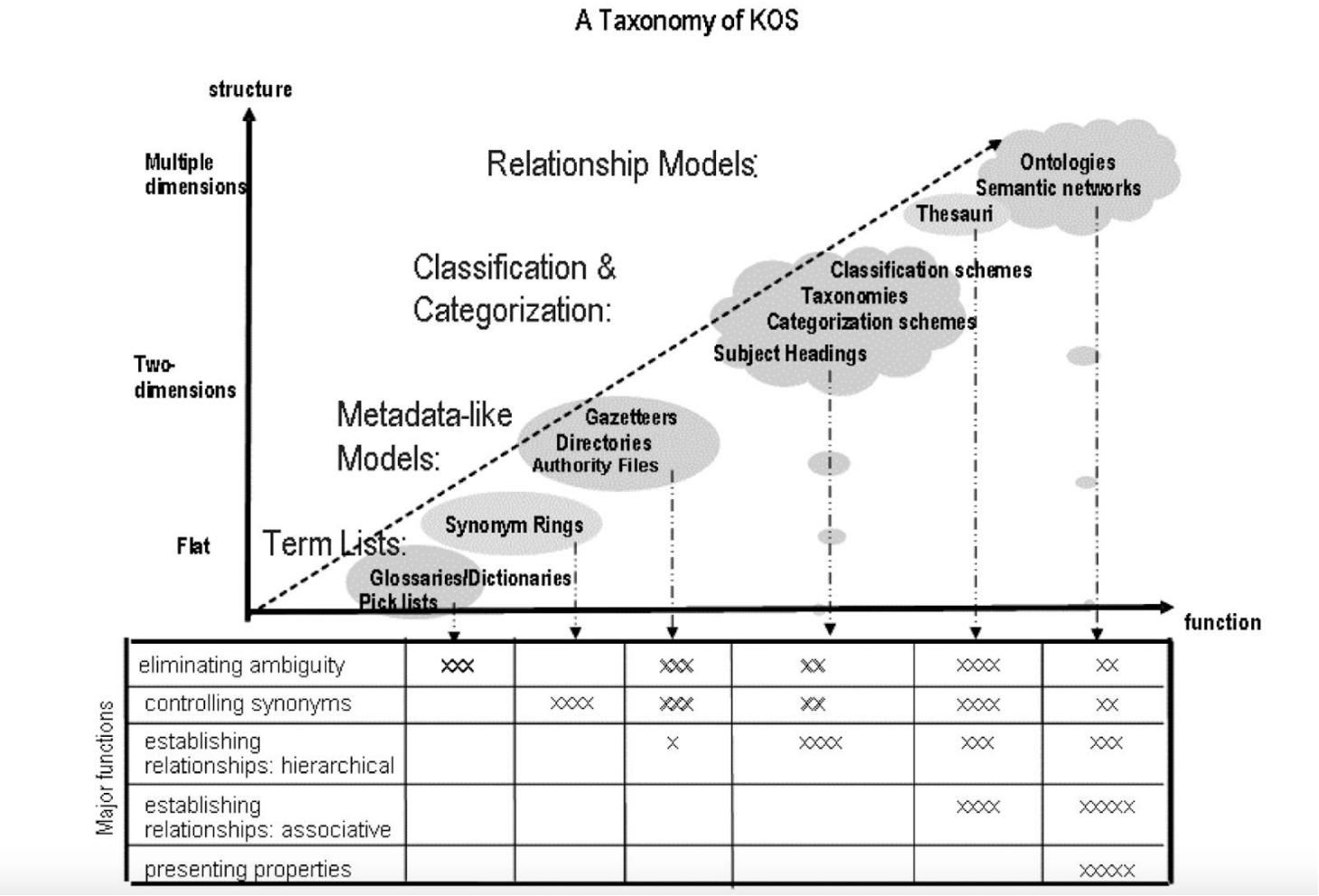
Concept Structure, Semantic Relations, and Interoperability



Why Terminologists Need SKOS

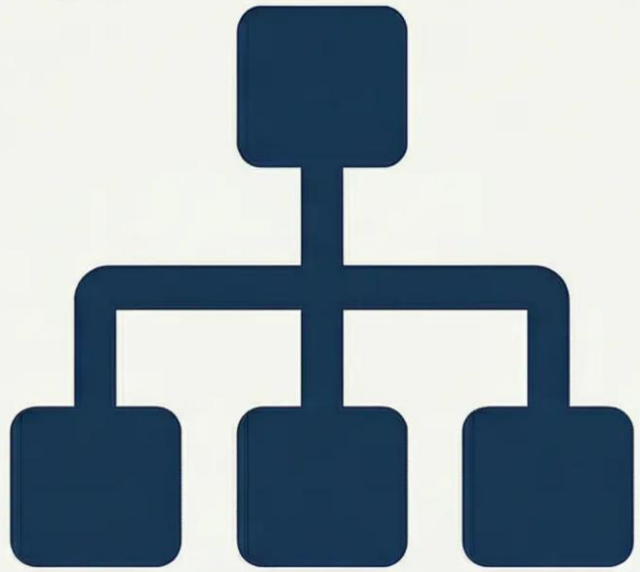
- Terminology = concept systems
- Digital scholarship requires machine-readable vocabularies
- Interoperability across repositories
- Linked Data publishing
- Key question: How do we formalize a terminological system without building a full ontology?

What is NOS


A Taxonomy of KOS
structure
Multiple dimensions
Two-dimensions
Flat
Relationship Models:
Ontologies
Semantic networks
Thesauri
Classification & Categorization:
Classification schemes
Taxonomies
Categorization schemes
Subject Headings
Metadata-like Models:
Gazetteers
Directories
Authority Files
Synonym Rings
Term Lists:
Glossaries/Dictionaries
Pick lists
function
Major functions
eliminating ambiguity
controlling synonyms
establishing relationships: hierarchical
establishing relationships: associative
presenting properties

What is SKOS?

- SKOS (Simple Knowledge Organization System) — W3C standard (2004, updated 2009)
- Built on RDF — encodes information as triples (subject-predicate-object)
- Represents: thesauri, taxonomies, controlled vocabularies, subject heading systems
- Does NOT model: logical axioms, necessary/sufficient conditions, class restrictions



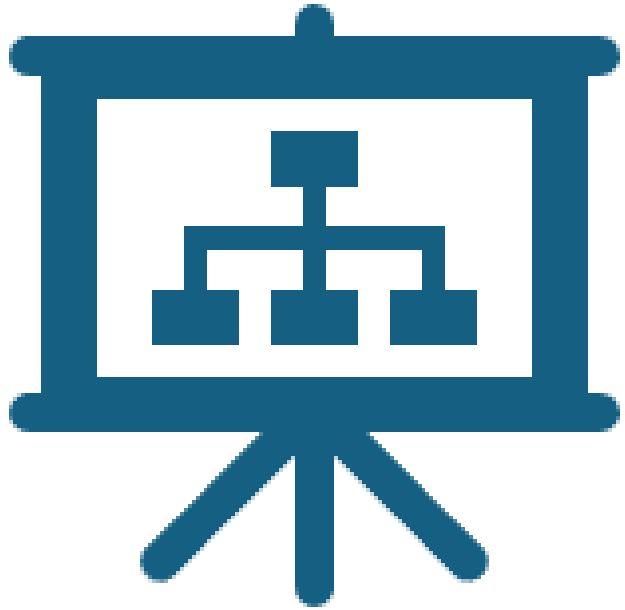
What is SKOS?

Triple Representation

- ***Subject:*** uepi:GraffitiInscription
- ***Predicate:*** skos:broader
- ***Object:*** uepi:WallInscription

So the RDF triple is:

uepi:GraffitiInscription **skos:broader** **uepi:WallInscription**



Core Unit: skos:Concept

- **skos:Concept is the fundamental unit**
- **Properties: skos:prefLabel (one per language), skos:altLabel, skos:definition, skos:note**

```
uepi:GraffitiInscription skos:prefLabel "напис-графіті"@uk
uepi:GraffitiInscription skos:altLabel "graffiti inscription"@en
uepi:GraffitiInscription skos:definition "An informal inscription scratched or painted on a surface"@en
```

skos:ConceptScheme

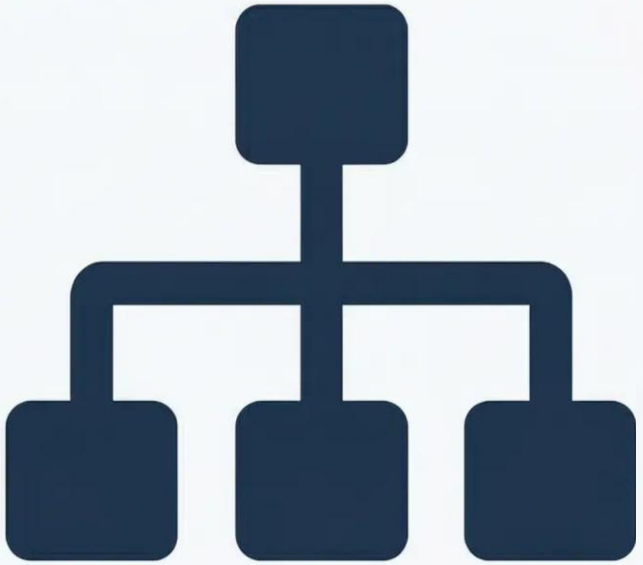
- **All concepts belong to a skos:ConceptScheme**
- Represents the entire terminological system (e.g., Epigraphic Vocabulary, Legal Terminology System)
- Properties: **skos:hasTopConcept**, **skos:inScheme**

```
uepi:EpigraphicVocabulary a skos:ConceptScheme
uepi:GraffitiInscription skos:inScheme uepi:EpigraphicVocabulary
```

Hierarchical Relations

- skos:broader — concept is more general
- skos:narrower — concept is more specific
- skos:broaderTransitive / skos:narrowerTransitive — inferred transitive closure

```
uepi:GraffitiInscription skos:broader uepi:WallInscription
uepi:WallInscription skos:broader uepi:Inscription
```



Associative Relations

- **skos:related — symmetric, non-hierarchical link**
- Used when concepts are intellectually connected but not in a genus-species or whole-part relationship

```
uepi:AlphabetInscription skos:related "Literacy practice"@en
```

⚠️ Do not use skos:related between concepts already in a broader/narrower relationship

Mapping Properties (Cross-system Interoperability)

- **skos:exactMatch** — same concept in another vocabulary
- **skos:closeMatch** — similar but not identical
- **skos:broadMatch** — broader concept in another vocabulary
- **skos:narrowMatch** — narrower concept in another vocabulary
- **skos:relatedMatch** — associatively related concept in another vocabulary

Use case: linking your terminological system to Getty AAT, LCSH, or other LOD vocabularies

SKOS Labels: Standard vs SKOS-XL

Standard SKOS

- prefLabel
- altLabel
- hiddenLabel
- (plain literals)

SKOS-XL

- Reifies labels as objects
- Allows adding metadata to labels (e.g., label creation date, source, morphological form)

When to use SKOS-XL: When label provenance or linguistic metadata is required

Practical Demonstration: SKOS Play!

Tool: SKOS Play! (https://skos-play.sparna.fr)

Features

- Convert Excel/CSV to SKOS RDF
- Visualize thesaurus hierarchy
- Export in Turtle, RDF/XML, N-Triples

Options available

- Generate SKOS-XL labels
- Compute skos:broaderTransitive
- Output as zip file
- Generate Virtuoso-compatible graph files

Step-by-step

1. Prepare Excel with columns: URI, prefLabel@en, altLabel@en, broader, definition.
2. Upload to SKOS Play!
3. Select output format (Turtle recommended)
4. Download and validate

Summary and Key Takeaways

- SKOS is the standard for formalizing terminological systems in the Semantic Web
- Core components: Concept, ConceptScheme, labels, hierarchical/associative/mapping relations
- SKOS-XL extends labeling for linguistic metadata
- SKOS Play! enables practical conversion from spreadsheets to RDF

Next steps: Try building your own SKOS vocabulary from your thesis terminology