Metadata for Terminology / KOS Resources

Marcia Lei Zeng

Registry Types

- Metadata Schemas Registries
  - Elements and refinements, application profiles, schemas in different bindings …
    - e,g., UKOLN CORES Registry
- Terminology Registries / Repositories
  - Registries for schemes (metadata) only
  - Registries of the entries of vocabularies (usually accompanied by scheme's metadata)
    - e.g., OCLC Terminologies Service; BioPortal ontology repository
- Service Registries
  - Terminology services may be listed in a terminology registry or separately hosted in a service registry
- Data Standards Registries (integrated)
  - Registries/repositories of data standards (e.g., data dictionaries, data models, schemas, and code sets)

1. Why do we need metadata for terminology resources?
2. What do we need to know about a terminology resource?
3. Is there a standardized set of metadata elements for terminology resources?

1. Why do we need metadata for terminology resources?

Basically, metadata for terminology resources will …

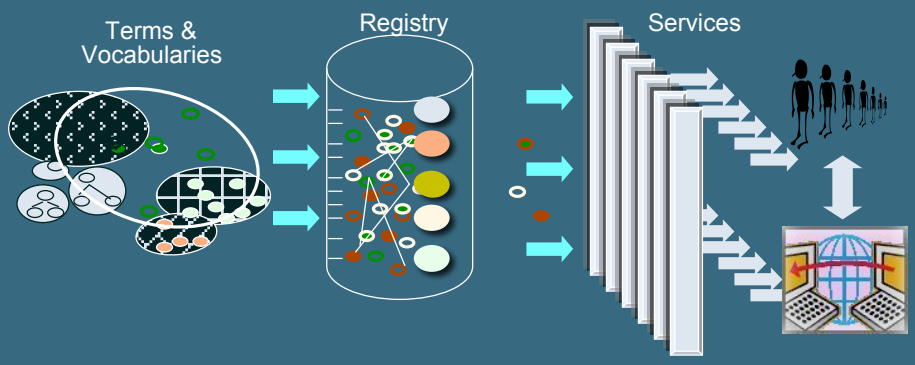
- record specific characteristics of terminology resources
- facilitate the discovery of terminology resources
- facilitate the evaluation of the terminology resource for a particular application or use
- facilitate sharing, reusing, and collaboration

Types of terminology registries

1) Registries providing metadata for each vocabulary and linking to vocabulary owner/provider
2) Registries providing metadata on (and linking to) any available terminology services
3) Registries providing access to the vocabulary content
   - by downloading the complete vocabulary
   - via access to a vocabulary's concepts, terms and relationships

- Golub & Tudhope, TRSS Report, 2008

A simplified illustration of Terminology registries and services



- registering machine accessible terminology resources
- mapping among concepts/terms
- making KOS content available in different kinds of tools via terminology (web) services

Terminology-based Services

- Related to the terminology registries are services, which may also be listed in a terminology registry or separately hosted in a *service registry*.
- These services, based on terminology, are used for automatic classification, term expansion, disambiguation, translation, and semantic reasoning.

The need of metadata (1)
-- terminology registries

Terminology registries need to provide information about:

- sources used
- creation and revision dates
- provenance
- trustworthiness of sources
- quality assessment metrics for the vocabulary & source materials
- licensing, IP limitations
- flexibility for integration with other KOS
- specific requirements such as
  - performance
  - security
  - maintainability

-- based on Elisa Kendall, 2008

The need of metadata (2)
-- service registries

- **Service registries need to understand and provide information on:**
  - Data models
  - Tool interoperability
  - Protocol
  - Querying and accessibility
  - Affectivity – at what time, location, and/or use is the content applicable or valid
  - Available formats

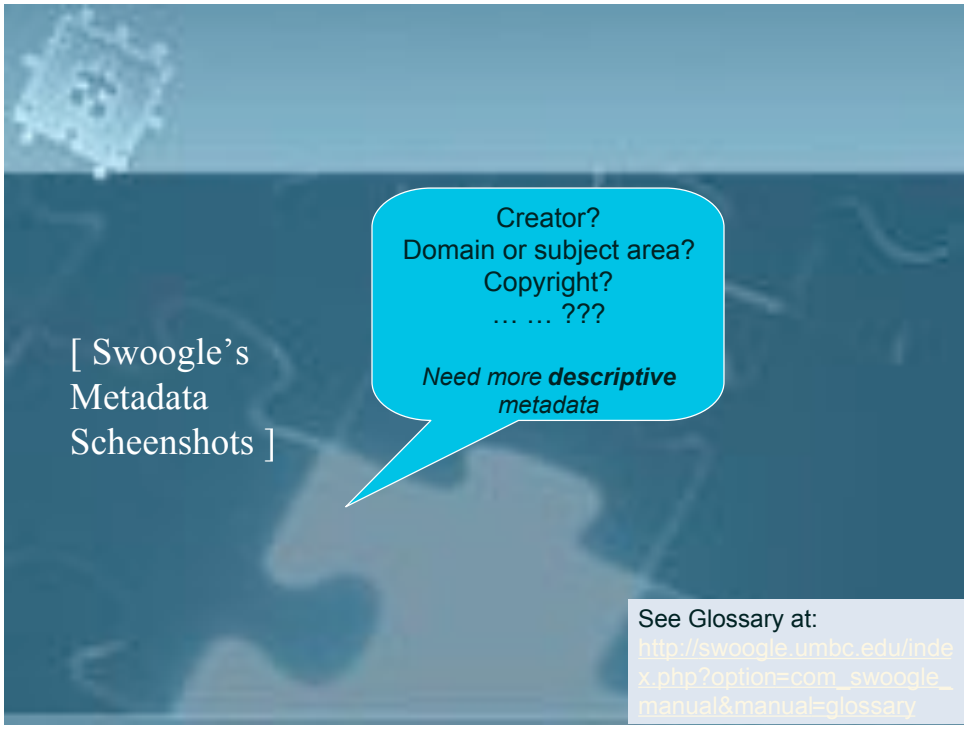
The need of metadata (3) -- vocabulary users

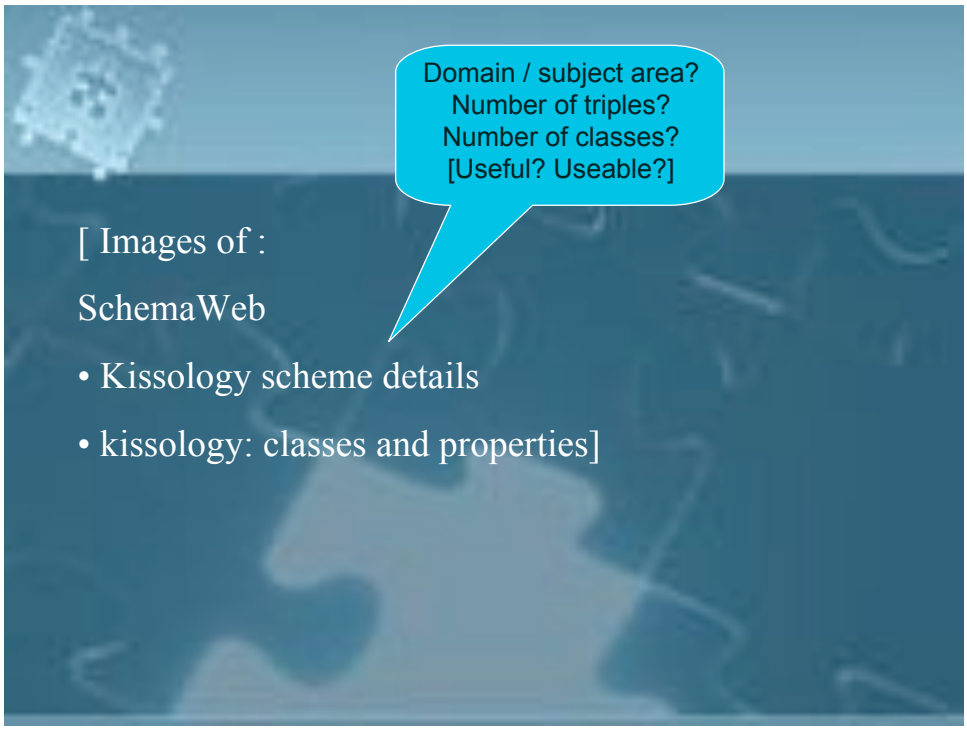
Different agents, services, and applications need to *communicate* about KOS data in the form of:

- transferring
- exchange
- transformation
- mediation
- migration
- integration

2. What do we need to know about a terminology resource?

- Descriptive metadata
- Administrative metadata
- Structural metadata


[Swoogle's Metadata Scheenshots]
Creator?
Domain or subject area?
Copyright?
… … ???
*Need more **descriptive** metadata*
See Glossary at:
http://swoogle.umbc.edu/index.php?option=com_swoogle_manual&manual=glossary


[Images of :
SchemaWeb
• Kissology scheme details
• kissology: classes and properties]
Domain / subject area?
Number of triples?
Number of classes?
[Useful? Useable?]

KOS type?
Data model?

Relation with other vocabularies?

From the website:
- Disease Ontology (v2.1) is based almost entirely on ICD9CM (International Classification of Diseases, 9th Revision, Clinical Modification);
- It contains 19136 concept nodes.
- Disease Ontology 3 (revision 21) is based on UMLS vocabularies (including ICD9) and is currently under development.

[Images of:

BioPortal 2.0 browse interface

Ontology Metadata of Human Diseases

3. Is there a standardized set of metadata elements for terminology resources?

International Standard -- ISO 11179

ISO 11179-2 Information Technology -- **Metadata registries (MDR)**

- Part 2 Classification*

(*CLASSIFICATION schemes include: key words, thesauri, taxonomies, and ontologies.)

http://metadata-standards.org/11179/

Regions of the MDR metamodel containing classification scheme attributes

Figure A.1 — Classification metamodel region.

Attributes of a classification system that may be recorded in an MDR (slide 1)

ISO 11179

Designation
- *name*
- *preferred designation*
- ***language identifier***

Definition
- *definition text*
- *preferred definition*
- ***source reference***
- ***language identifier***

Context
- ***administration record***
- *description*
- ***description language identifier***

Classification Scheme
- *type name*

Classification Scheme Item
- *value*
- *type name*

Classification Scheme Item Relationship
- *type description*

(**boldface**: datatypes containing multiple attribute components)

Attributes of a classification system that may be recorded in an MDR (slide 2)

ISO 11179

Administration Record
- ***item identifier***
- *registration status*
- *administrative status*
- *creation date*
- *last change date*
- *effective date*
- *until date*
- *change description*
- *administrative note*
- *explanatory comment*
- *unresolved issue*
- *origin*

Reference Document
- *identifier*
- *type description*
- ***language identifier***
- *title*
- *organization name*
- *organization mail address*

Attributes of a classification system that may be recorded in an MDR (slide 3)

ISO 11179

Submission
- *organization name*
- *organization mail address*
- ***contact***

Stewardship
- *organization name*
- *organization mail address*
- ***contact***

Registration Authority
- *organization name*
- *organization mail address*
- ***registration authority identifier***
- ***documentation language identifier***

Registrar
- ***identifier***
- ***contact***

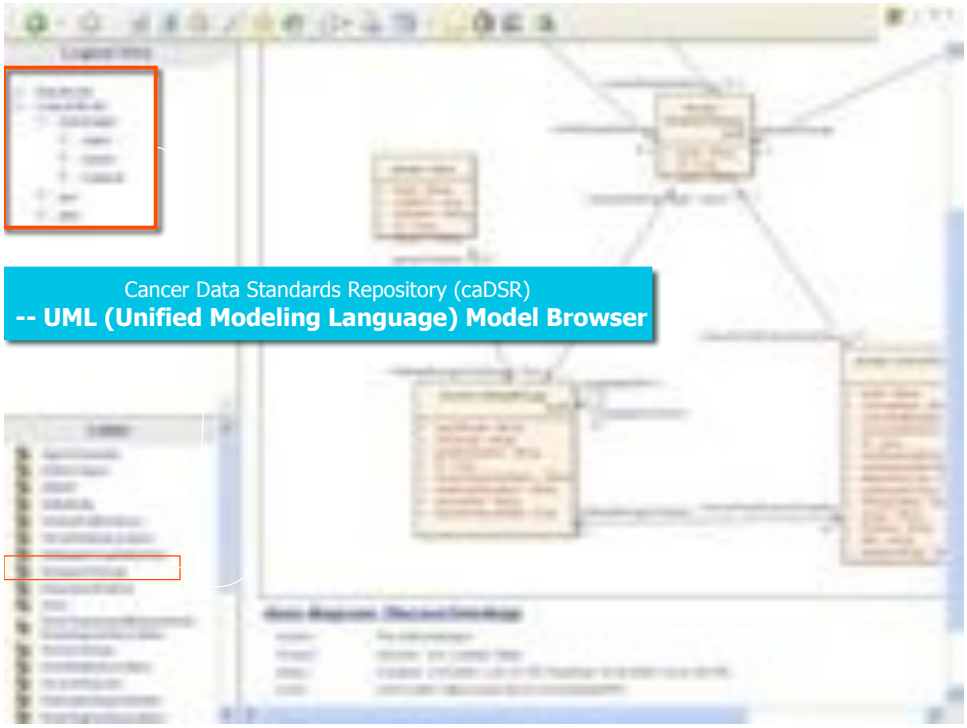
11179 Data Element Registries

- US National Cancer Institute - Cancer Data Standards Repository (caDSR)
- Australian Institute of Health and Welfare - Metadata Online Registry (METeOR)
- US Department of Justice - Global Justice XML Data Model GJXDM
- US Environmental Protection Agency - Environmental Data Registry
- US Health Information Knowledgebase (USHIK)
- US National Information Exchange Model NIEM
- Minnesota Department of Education Metadata Registry (K-12 Data)
- Minnesota Department of Revenue Property Taxation (Real Estate Transactions)

Cancer Data Standards Repository (caDSR)
-- CDE (Common Data Element) Browser

- Important additional items (in addition to "Classification" of ISO 11179)
  - **Form** -- a collection of CDEs (Common Data Elements)
  - **Protocol** -- a collection of Forms.
  - For clinical trials applications,
    - Forms correspond to Case Report Forms (CRFs)
    - Protocols correspond to a clinical trial protocol

http://umlmodelbrowser.nci.nih.gov/umlmodelbrowser/



Cancer Data Standards Repository (caDSR)
-- UML (Unified Modeling Language) Model Browser

NKOS Group's Efforts (1)

***NKOS Registry - Draft Set of Thesaurus Attributes*, 1999**

(based on Controlled Vocabulary Registry developed by Linda L. Hill and Interconnect Technologies in 1996, with some modification)

http://nkos.slis.kent.edu/Thesaurus_Registry.html

Terminology Registry Scoping Study (TRSS)*, *2008

(PIs: Kora Golub, Doug Tudhope, Trss Final Report to JISC, UK.)

http://www.ukoln.ac.uk/projects/trss/

TRSS survey report 2008 (draft)

K. Golub, D. Tudhope, Aug, 7, 2008

Product Information	A	B	C	D	E	F	G	H	I	J	K	L
Product Name/Title	+	+	+	+	+	+	+	+	+	+	+	+
Variant Product Name/Title /Acronym	+	+	+	+		+						
Type of Product	+	+	+		+	+		+		+	+	
Product Description	+	+	+*			+	+		+	+	+	+
Auxiliary Lists	+											
Author/Editor	+	+			+	+			+	+		
Current Version/Edition	+						+					+
Date of Current Version	+	+	+							+	+	
Product Update Frequency	+		+								+	
Available Format(s) and Size	+	+	+			+					+	
Online Availability	+		+		+	+	+**	+	+	+	+	
Notes	+											

A – NKOS Registry 1998
B – NKOS Registry 2001
C – CENDI
D – Ecoterm (Environmental Terminology and KOS)
E – Food and Agriculture Organization (FAO) of UN
F – Hodge et al. 2007 (10th OFMR)
G – National Science Digital Library Registry
H – ISO 11179 (Information Technology– Metadata registries (MDR))
I – OCLC Terminology Services
J – SPECTRUM Terminology Bank
K – Taxonomy Warehouse
L– Vocman (Becta Vocabulary Bank)

NKOS Registry – Metadata Element Set (slide 1)

Draft Set of Thesaurus Attributes, 1999

I. Product Information

- Product Name/Title *
  Variant Product Name/Title
  Type of Product *
  Product Description *
  Auxiliary Lists
  Author/Editor
  Current Version/Edition *
  Date of Current Version *
  Product Update Frequency *
  Available Format(s) and Size *
  Online Availability
  Notes
  URL for Examples

TRSS Study, 2008

Added:

- *Vocabulary type*
- Available terminology services
- Vocabulary identifier

* required

NKOS Registry – Metadata Element Set (slide 2)

Draft Set of Thesaurus Attributes, 1999

II. Scope and Usage

- *Type of NKOS*
- Major Subjects
- Minor Subjects
- Description of User Community and Applications

Added by TRSS Study, 2008

- *Purpose as given by author/publisher*
- *Used by*
- Description of collections where used
- Usage case study
- Use in application profiles
- Rating
- URL to vocabulary users' discussion board
- Change notification details
- Related vocabularies
- Overlap with related vocabularies
- Mappings to other vocabularies
- URL to tutorial for applying vocabulary

NKOS Registry – Metadata Element Set (slide 3)

III Detailed Characteristics

Language(s) *
Type of Terms (e.g. concept terms, geographic names, corporate names, etc.) *
Description of Overall Structure *
Source of New Terminology *
Number of Preferred Terms or Nodes *
Number of Non-preferred Terms
Types of Relationships *

Arrangement of Displays (e.g., alphabetical, hierarchical, graphical)
Depth of Hierarchy (maximum number of levels)

Added in TRSS, 2008

- Total number of terms**
- Total number of classes**

- **update automatically

NKOS Registry – Metadata Element Set (slide 5)

VII. Terms and Conditions

- Subscription Price by Format
  Licensing Availability Restrictions (or no-restrictions statement) *

Added in TRSS, 2008

- Import/download instructions

NKOS Registry – Metadata Element Set (slide 6)

VIII. Vendor/Provider Information

… … [14 elements]

IX. Contact Information

… … [5 elements]

X. Additional Information

- General Note
- Comments to Registry Maintainer

Simplified in TRSS, 2008

6 Vocabulary provider

- Vocabulary provider name
- Vocabulary provider URL
- Vocabulary provider contact details

NKOS Registry – Metadata Element Set (slide 7)

NEW -- Added in TRSS, 2008:

4 Terminology services

- Available terminology services and their APIs
- Type of terminology service
- If a mappings service, the granularity of the mappings
- If a mappings service, whether mappings derived automatically or manually
- Technical specifications (ways of access etc.)

NKOS Group's Efforts (2)

Registry, Version 3 with Reference Document for Data Elements - Draft

For use with Dublin Core

- core elements only
- consistent with Dublin Core elements and attributes for each element

Draft developed by Diane Vizine-Goetz
Last updated: June 21, 2001

http://nkos.slis.kent.edu/registry3.htm

for facilitating the discovery of KOS resources, (DC-based) :

- KOS Title (R)
- Alternative Title (O)
- Creator (O)
- KOS Subject (R)
- Description (O)
- Publisher (O)
- Date (R)
- KOS Type (R)
- Format (R)
- Identifier (O)
- Language (R)
- KOS Relation (R)
- Rights (O)

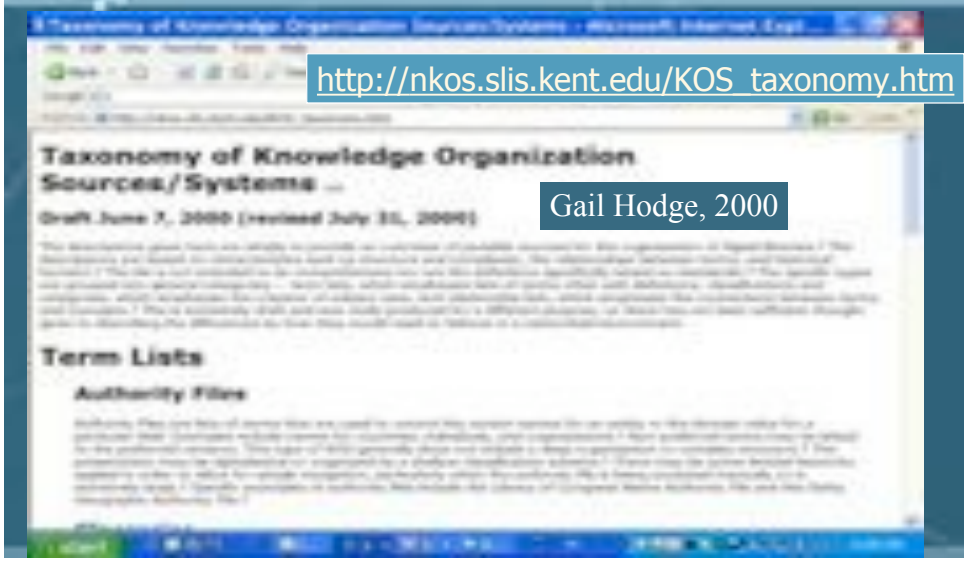
for recording specific characteristics, to facilitate the evaluation of the resource for a particular application or use:

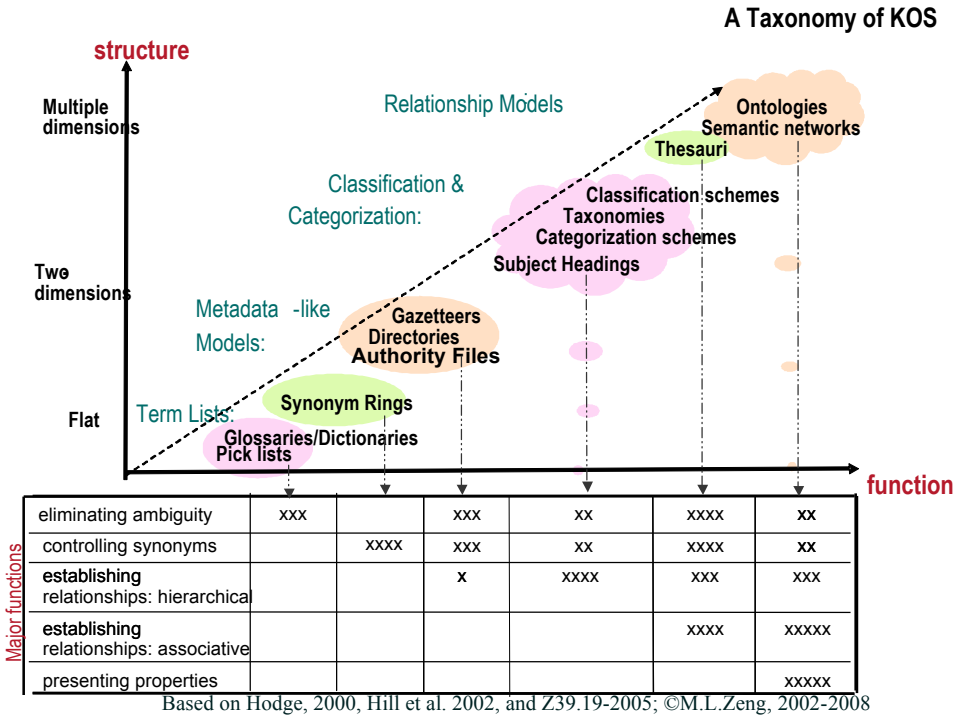
- Entity Type (R)
- Entity Value (O)
- Relationships (R)
- Information Given (O)
- Arrangement (R)
- Application (O)

- Minor Subject (O)
  [Should this be a qualifier of KOS Subject?]

http://nkos.slis.kent.edu/registry3.htm

NKOS Group's Efforts (3)
KOS Types





Based on Hodge, 2000, Hill et al. 2002, and Z39.19-2005; ©M.L.Zeng, 2002-2008

Factors governing types of KOS -- Template

Entities
Concepts, terms, strings,
Atomic - Composite (attributes)
Enumerative - Synthetic
Low – medium - high degree precombination (coordination in KOS itself)
Size: small – large
Depth: small – medium - large

Relationships (internal)
Types / expressivity of relationships:
low (core set) – medium – high (definable)
concept -concept, concept -term, term -term
monohierarchies - polyhierarchies
Formality: low – medium – high

Typical application to objects in domain of interest
Metadata element: subject, various elements, general
Granularity of application objects: unstructured - complex
Relationship applying concepts to objects in domain
about (fuzzy), instance
Exhaustivity : low - high
Specificity: low - high
Coordination: low - high
expressivity and formality of relationships in coordinatio n (synthesis rules)

Tudhope,05,NKOS, ECDL2005

http://www.ukoln.ac.uk/nkos/nkos2006/presentations/tudhope.ppt

Factors governing types of KOS -- Thesaurus

Entities
Concepts, terms, strings,
Atomic - Composite (attributes)
Enumerative - Synthetic
Low – medium - high degree precombination (coordination in KOS itself)
Size: small – large
Depth: small – medium - large

Relationships (internal)
Types / expressivity of relationships:
low (core set) – medium – high (definable)
concept-concept, concept-term, term-term
monohierarchies - polyhierarchies
Formality: low – medium – high

Typical application to objects in domain of interest
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Specificity: low - high
Coordination: low - high
expressivity and formality of relationships in coordination (synthesis rules)

Tudhope,05,NKOS, ECDL2005

Factors governing types of KOS – [AI] Ontology

Entities
Concepts, terms, strings,
Atomic - Composite (attributes)
Enumerative - Synthetic
Low – medium - high degree precombination (coordination in KOS itself)
Size: small – large
Depth: small – medium - large

Relationships (internal)
Types / expressivity of relationships:
low (core set) – medium – high (definable)
concept-concept, concept-term, term-term
monohierarchies - polyhierarchies
Formality: low – medium – high

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Metadata element: subject, various elements, general
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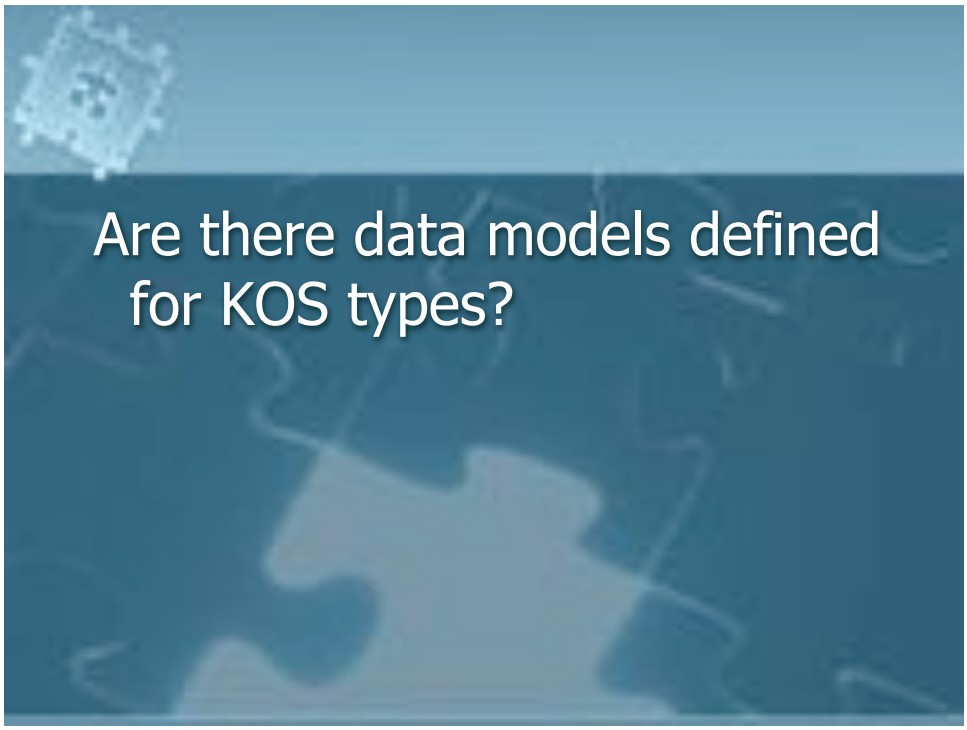
Tudhope,05,NKOS, ECDL2005



Summary

- Metadata for KOS resources are important to
  - Terminology registries
  - Service registries
  - Vocabulary users
- Currently there are no standardized metadata element sets
- A KOS typology needs to be implemented
- KOS data models need to be developed and tested

References

- Hodge, G.; Salokhe, G.; Zolly, L.; Anderson, N. (2007). Terminology Resource Registry: Descriptions for Humans and Computers. Presentation at Integrating Standards in Practice, 10th Open Forum on Metadata Registries, New York City, NY USA, July 9-11, 2007. http://www.metadataopenforum.org/index.php?id=21,74,0,0,1,0
- ISO/IEC 11179, Information Technology -- Metadata registries (MDR) http://metadata-standards.org/11179/
- Kendall. E. Metadata Support for OMG's Emerging Ontology & Vocabulary Management Initiative. Joint OOR-OntologySummit2008 Panel Discussion: "Developing an Ontology of Ontologies for OOR" http://ontolog.cim3.net/cgi-bin/wiki.pl?ConferenceCall_2008_04_10
- Golub, K.; Tudhope, D. TRSS survey report 2008 (draft) Aug, 7, 2008