



# Meaningful Concept Displays for KOS Mapping

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# KOS Mapping

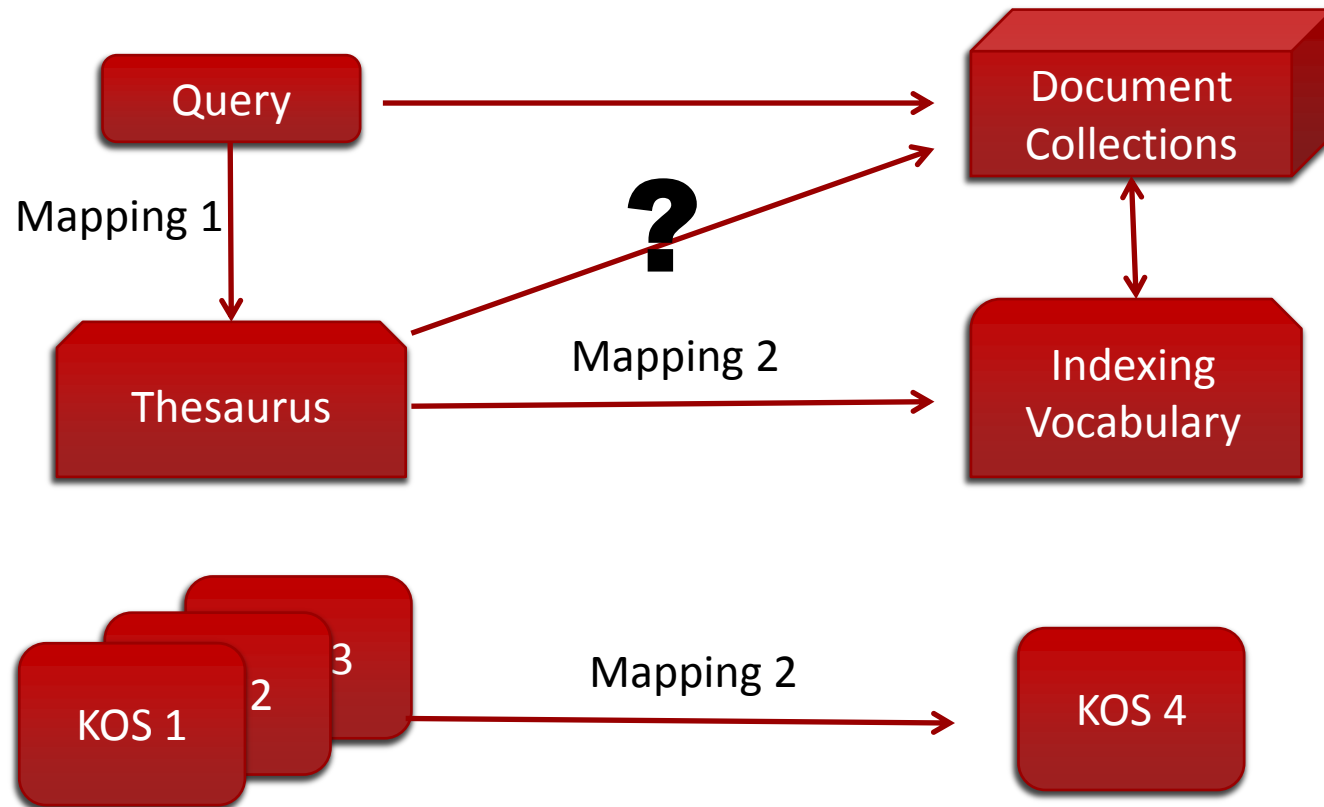
- ◆ There are increasing numbers of KOS available through Linked Data
  - They are all described in RDF or OWL.
  - They may be aggregated in one single endpoint and searchable through SPARQL queries
  - Are they linkable at the concept level?
    - Some are controlled vocabularies, some are not
    - Some are elemental and some are compound concepts
    - Many concepts will have different scopes
  
- ◆ Linked data provide only a syntactical solution to KOS mapping. Much more work need to be done at the semantic level.

# Old problems? New Problems?

- ◆ We have had many years research on
  - Mapping free text queries to terms in controlled vocabularies
  - Mapping from controlled vocabulary A to controlled vocabulary B ?
  - Mapping of controlled vocabularies A and B through C
  - Integrate multiple vocabulary resources to one (i.e., UMLS)
- ◆ What's new?
  - Networked environment -- Instant connection through URI
  - Interactive environment – Users make selections during the mapping process
  - Integrated environment – vocabularies are linked to their primary resources.

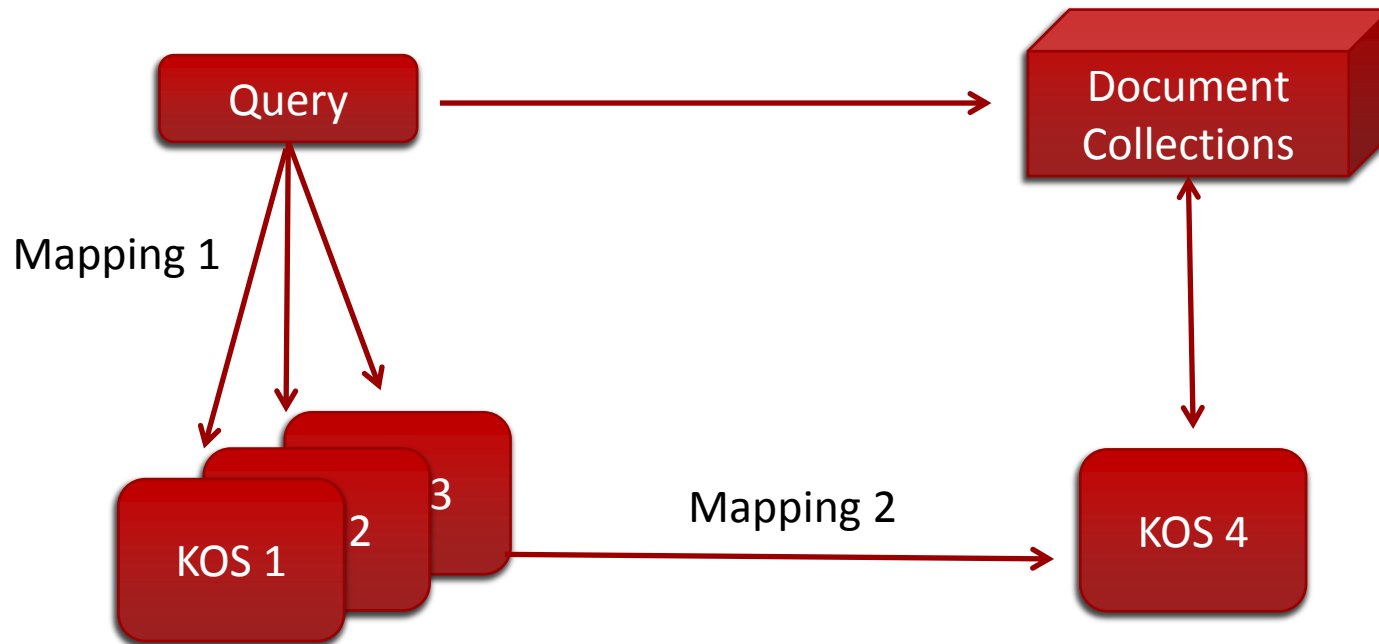
# Old Problems? New Problems?

- ◆ Testing KOS mapping as “query expansion”



# New Challenges

- ◆ KOS mapping as “query expansion”



# Real World Problems

- ◆ Desire: Use Getty's AAT to search ARTstor collections
- ◆ Problems: ARTstor collections are NOT indexed by AAT
  - Some are indexed by their own controlled vocabularies
  - Some are indexed by just a list of keywords
- ◆ Previous approach:
  - Search the collections directly by AAT terms
  - Ontology annotation – attempt to automatically assign AAT terms to ARTstor collections
- ◆ Our approach:
  - Map the queries to AAT terms and AAT terms to indexing terms

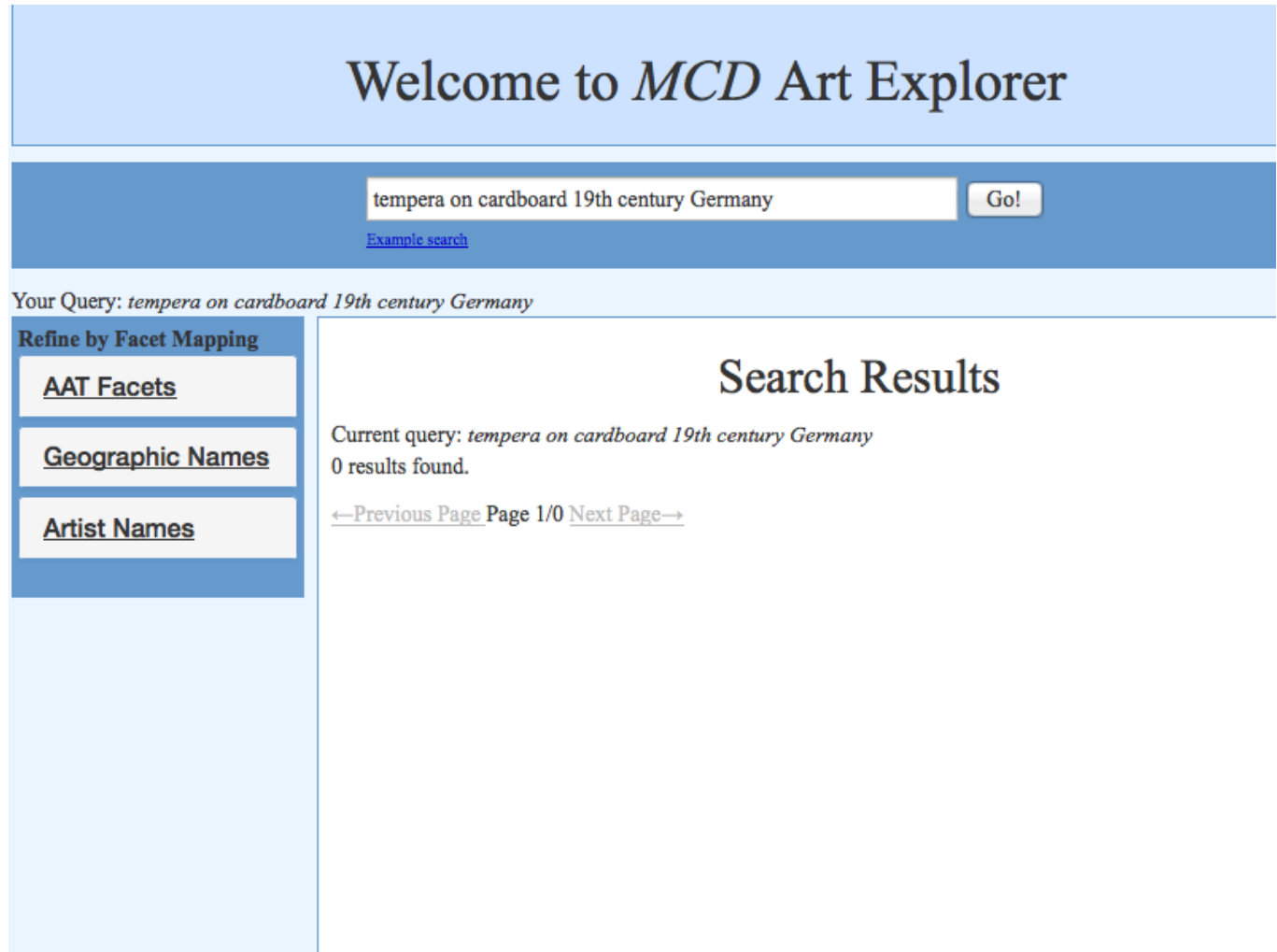
# Mapping Strategies

- ◆ Decompose queries (or terms) to elementary concepts whatever possible
- ◆ Identify facets of the elementary concepts
- ◆ Map the elementary concepts to CV terms
- ◆ Map CV terms to indexing terms
- ◆ Let the users select indexing terms that match their needs
- ◆ Use the facets to narrow down search results

# DEMO: Mapping and Search

Query:  
“Tempera on  
Cardboard 19<sup>th</sup>  
century Germany”

Direct search get no  
results.



Welcome to *MCD* Art Explorer

tempera on cardboard 19th century Germany

[Example search](#)

Your Query: *tempera on cardboard 19th century Germany*

**Refine by Facet Mapping**

- [AAT Facets](#)
- [Geographic Names](#)
- [Artist Names](#)

## Search Results

Current query: *tempera on cardboard 19th century Germany*  
0 results found.

[←Previous Page](#) [Page 1/0](#) [Next Page→](#)





# Mapping demo

The user selects AAT term:  
“egg tempera”

Which maps to

ARTstor terms:

- Egg tempera, gesso on wood
- Egg tempera on wood
- Egg tempera on canvas
- Egg tempera on masonite
- Egg tempera on board
- Egg tempera on panel
- .....

Welcome to *MCD Art Explorer*

tempera on cardboard 19th century Germany

[Example search](#)

Your Query: *tempera on cardboard 19th century Germany*

Refine by Facet Mapping

**AAT Facets**

**AAT:**

Materials Facet

egg-and-oil tempera  
témpera  
egg tempera  
gom tempera  
wax tempera  
oil tempera  
casein tempera

**Target: ARTSTOR**




egg tempera, gesso on wood  
 egg tempera on wood  
 egg tempera on canvas  
 egg tempera on masonite  
 egg tempera, gold on wood  
 egg tempera on board

## Search Results

Current query: *egg tempera, gesso on wood|egg tempera on wood|egg tempera on canvas|egg tempera on masonite|egg tempera, gold on wood|egg tempera on board|egg tempera and pencil on hardboard|egg tempera, rice p, linen, beading|egg tempera on panel|egg tempera on gessoed panel*

52 results found.

[←Previous Page](#) [Page 1/3](#) [Next Page→](#)

 <p><b>Bird Pong</b></p> <p>Creator: Carrington, Leonora, 1917- Leonora Carrington Carrington, Leonora Material: egg tempera on panel Subject: Painting--England--20th C. A.D</p>	 <p><b>Tuesday</b></p> <p>Creator: Carrington, Leonora, 1917- Leonora Carrington Carrington, Leonora Material: egg tempera on panel Subject: Painting--England--20th C. A.D</p>	 <p><b>Palatine Predella</b></p> <p>Creator: Carrington, Leonora, 1917- Leonora Carrington Carrington, Leonora Material: egg tempera on panel Subject: Painting--England--20th C. A.D</p>
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# Mapping 1

- ◆ Use NLP and patterns to map the query:
- ◆ “tempera on cardboard 19<sup>th</sup> century Germany”
  - Subject: “tempera on cardboard”
    - Pattern: “painting on surface”
      - Tempera → AAT terms:
        - Tempera, egg tempera, gom tempera, wax tempera, ....
      - Cardboard → AAT terms: .....
  - Date and time: “19<sup>th</sup> century”
  - Location: “Germany”

# Mapping 2

- ◆ Map all the ARTstor indexing terms to AAT terms
  - Which is a batch processing done during the system implementation and the results are saved in the databases
  - During the search, the results can be showed instantly
    - The user can click on a AAT term and see the matching ARTstor terms
    - The search engine can display search results if any of the indexing terms are selected.

# Example 2: search for “China Clay”

Initial query:  
“China Clay”

-- the search is based on  
string matching only.

Welcome to *MCD Art Explorer*

china clay

[Example search](#)

Your Query: china clay

Current query: china clay  
91 results found.

[←Previous Page](#) [Page 1/5](#) [Next Page→](#)

**Refine by Facet Mapping**

AAT Facets

AAT:  
Materials Facet

China-clay  
china  
China wood oil  
piedra de China  
haya china  
silk, China  
china paint

Target ARTSTOR










- wood, kaolin
- wood, kaolin, animal hair, wool
- wood, kaolin, metal, fiber
- wood, feathers, kaolin

Select All Deselect All

Search

Geographic Names

Artist Names

 <p><b>Court Lady: Tomb Figure</b></p> <p>Creator: Material: clay Subject: Figurines   Sculpture--China: Tang--618-907 A.D   Tombs--China</p>	 <p><b>Wall painting fragment from Qin #3 Palace: det.: female palace servant  Bi hua yi zhang shi nu tu</b></p> <p>Creator: Material: clay Subject: Shanxi Sheng (China)--Qin #3 Palace   Fragments   Mural painting--China   Painting--China: Qin--211-206 B.C</p>	 <p><b>Wall painting fragment from Qin #3 Palace: horse wagons  Bi hua che ma tu</b></p> <p>Creator: Material: clay Subject: Shanxi Sheng (China)--Qin #3 Palace   Fragments   Horses   Mural painting--China   Painting--China: Qin--211-206 B.C</p>
 <p><b>Tomb of Ch'in Shih-Huang-Ti: Pit II: Clay Armored Infantryman 3/4 front view</b></p> <p>Creator: Material: Subject: Shaanxi Sheng (China)--Tomb of Ch'in Shih-Huang-Ti   Archaeology--China: Qin--211-206 B.C   Armor   Excavations (Archaeology)--China: Qin--211-206 B.C   Digs</p>	 <p><b>Nakshatra Cave: Half Figure of a Devata</b></p> <p>Creator: Material: clay Subject: Shorchuk (China)--Nakshatra Cave   Sculpture--Central Asia--7th C. A.D</p>	 <p><b>Nakshatra Cave: Head of a Devata</b></p> <p>Creator: Material: clay Subject: Shorchuk (China)--Nakshatra Cave   Sculpture--Central Asia--8th C. A.D</p>
 <p><b>Nakshatra Cave: Full Figure of a Devata</b></p> <p>Creator: Material: clay Subject: Shorchuk (China)--Nakshatra Cave   Sculpture--Central Asia--7th C. A.D</p>	 <p><b>Nakshatra Cave: Head of a Devata</b></p> <p>Creator: Material: clay Subject: Shorchuk (China)--Nakshatra Cave   Sculpture--Central Asia--8th C. A.D</p>	 <p><b>Nakshatra Cave: Head of a Devata</b></p> <p>Creator: Material: clay Subject: Shorchuk (China)--Nakshatra Cave   Sculpture--Central Asia--8th C. A.D</p>

# Example 2

Queries after mapping:

“Wood, Kaolin;  
Wood, Kaolin, animal hair;  
Wood, Kaolin, metal, fiber;  
Wood, Kaolin, animal hair, wool;  
Wood, Kaolin, metal, fiber;  
Wood, feathers, kaolin”

Welcome to *MCD Art Explorer*

china clay

[Example search](#)

Your Query: china clay

**Refine by Facet Mapping**

AAT Facets

AAT:  
Materials Facet

China-clay  
china  
China wood oil  
piedra de China  
haya china  
silk, China  
china paint

**Target: ARTSTOR**







wood, kaolin  
 wood, kaolin, animal hair, wool  
 wood, kaolin, metal, fiber  
 wood, feathers, kaolin

Geographic Names

Artist Names

Current query: wood, kaolin|wood, kaolin, animal hair, wool|wood, kaolin, metal, fiber|wood, feathers, kaolin  
7 results found.

[←Previous Page](#) [Page 1/1](#) [Next Page→](#)

 <p><b>Mask: Female Pwo mask Zaire</b></p> <p><b>Creator:</b> <b>Material:</b> wood, kaolin, metal, fiber <b>Subject:</b> Earrings   Hairstyles   Jockwe   Pwo   Special Societal Groups--Tribal Africa: Jockwe   headdresses   masks</p>	 <p><b>Bush Spirit Figures</b></p> <p><b>Creator:</b> <b>Material:</b> wood, kaolin, animal hair, wool <b>Subject:</b> Baule   Figurines   Special Societal Groups--Tribal Africa: Baule   Woodcarving   female figures</p>	 <p><b>Mask (Gabon)</b></p> <p><b>Creator:</b> <b>Material:</b> wood, kaolin clay <b>Subject:</b> Special Societal Groups--Tribal Africa: Vuvi   Vuvi   funeral ceremonies   masks</p>
 <p><b>Mask Gabon</b></p> <p><b>Creator:</b> <b>Material:</b> wood, feathers, kaolin <b>Subject:</b> Fang   Hairstyles   Special Societal Groups--Tribal Africa: Fang   headdresses   masks</p>	 <p><b>Mask, lukwakongo (Zaire)</b></p> <p><b>Creator:</b> <b>Material:</b> wood, kaolin <b>Subject:</b> Beards   Lega   Special Societal Groups--Tribal Africa: Lega   initiations   masks</p>	 <p><b>Mask, lukwakongo (Zaire): det.: le profile</b></p> <p><b>Creator:</b> <b>Material:</b> wood, kaolin <b>Subject:</b> Beards   Lega   Special Societal Groups--Tribal Africa: Lega   initiations   mas</p>

# Towards Meaningful Displays

## Welcome to *MCD* Art Explorer

tempera on cardboard 19th century Germany

Go!

[Example search](#)

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### Refine by Facet Mapping

#### AAT Facets

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Target: ARTSTOR

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egg tempera on canvas

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## Search Results

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[←Previous Page](#) [Page 1/3](#) [Next Page→](#)



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Go!

[Example search](#)

Your Query: *tempera on cardboard 19th century Germany*

### Art & Architecture Thesaurus

- ▼ Associated Concepts Facet
- ▶ Physical Attributes Facet
- ▼ Styles and Periods Facet
- ▼ Agents Facet
- ▼ Activities Facet
- ▼ Materials Facet
- ▼ Object Facet
- ▼ Brand Names (Facet)

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[←Previous Page](#) [Page 1/3](#) [Next Page→](#)



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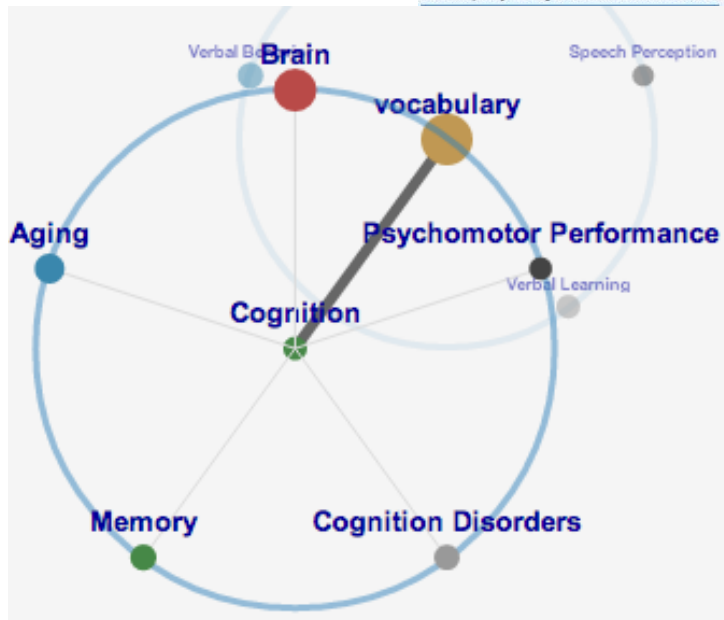
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[←Previous Page](#) [Page 1/3](#) [Next Page→](#)



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# Conclusions

- ◆ Meaningful displays come from meaningful mapping.
- ◆ KOS mapping can be done at both the global level (the whole vocabulary) and the local level (individual terms)
- ◆ KOS mapping needs to be done interactively
  - The algorithmic mapping results are presented through MCDs.
  - The user interacts with MCD to get the best of the mapping results.
  - The mapping process and the searching and browsing process should be integrated.