

# Meaningful Concept Displays:

## The First Step

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U.S.A.

# Getty Research Institute



The IMLS sponsored MCD Expert Panel was held at Getty Research Institute Dec. 9-10, 2010.

# Participants

- **PIs:** -- Murtha Baca, Xia Lin, Dagobert Soergel
- **OCLC** -- Rebecca Green, Diane Vizine-Goetz
- **Academic** -- Marcia Zeng, Jonathan Furner, Judith Klavans
- **Museum** -- Susan Chun, Bill Ying (ArtStor)
- **Library** -- Danuta Nitecki
- **Getty** -- Patricia Harpring, Joe Shubitowski, Joan Cobb, Ted Dancescu
- **Students** -- Katherine Bertel, Deng Jun, Diana Kusunoki, Catherine Hall

# Discussion Questions

- Thesaurus/KOS are useful and powerful.
  - But what are the challenges of making better use of them in real-world applications?
  - What can we do to demonstrate the power?
- Users need help in the information seeking process.
  - What kinds of help does the user need?
  - How can we provide the help?

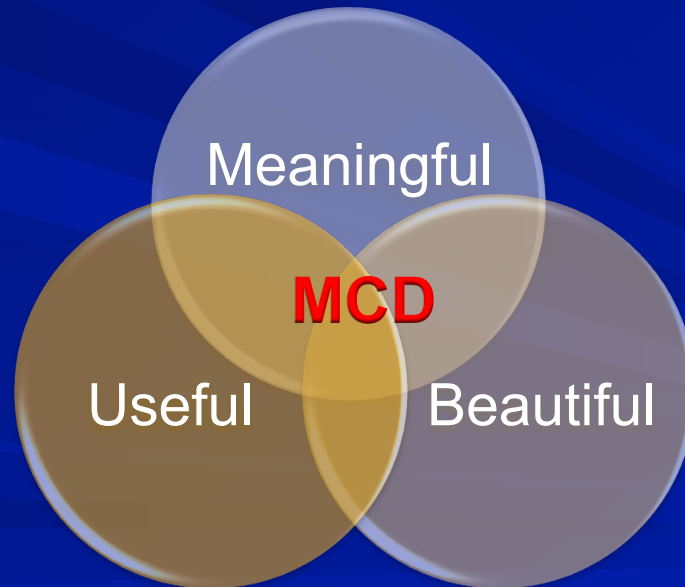


# The Missing Links

- Meaningful Concept Displays (MCD)
  - Significant impact of concept displays on the use of KOS
  - Importance of concept displays in assisting users in learning, sense-making, and discovery
- Tools to connect MCDs to multiple KOS and search systems
  - Connect to multiple Knowledge Organization Systems (KOS)
  - Utilize open Linked Data on the Web
- Demonstration sites to explore and show potentials of MCD
  - Developing usage cases
  - Developing evaluation protocols and criteria.

# What is MCD?

- MCD will be a development framework for KOS-based applications
- It aims to develop concept displays that are
  - Meaningful
  - Useful
  - Beautiful



# Defining “Meaningful”

## ■ Meaningful Displays

- Users should be able to understand the displays easily.
- The display should faithfully show the concept relationships or content structures it represents.
- The display should help user to see semantic relationships and generate new understanding or new insights of the underlying data.

# Meaningful?





# Visual Complexity

visual  
complexity

Search the VC database:

GO



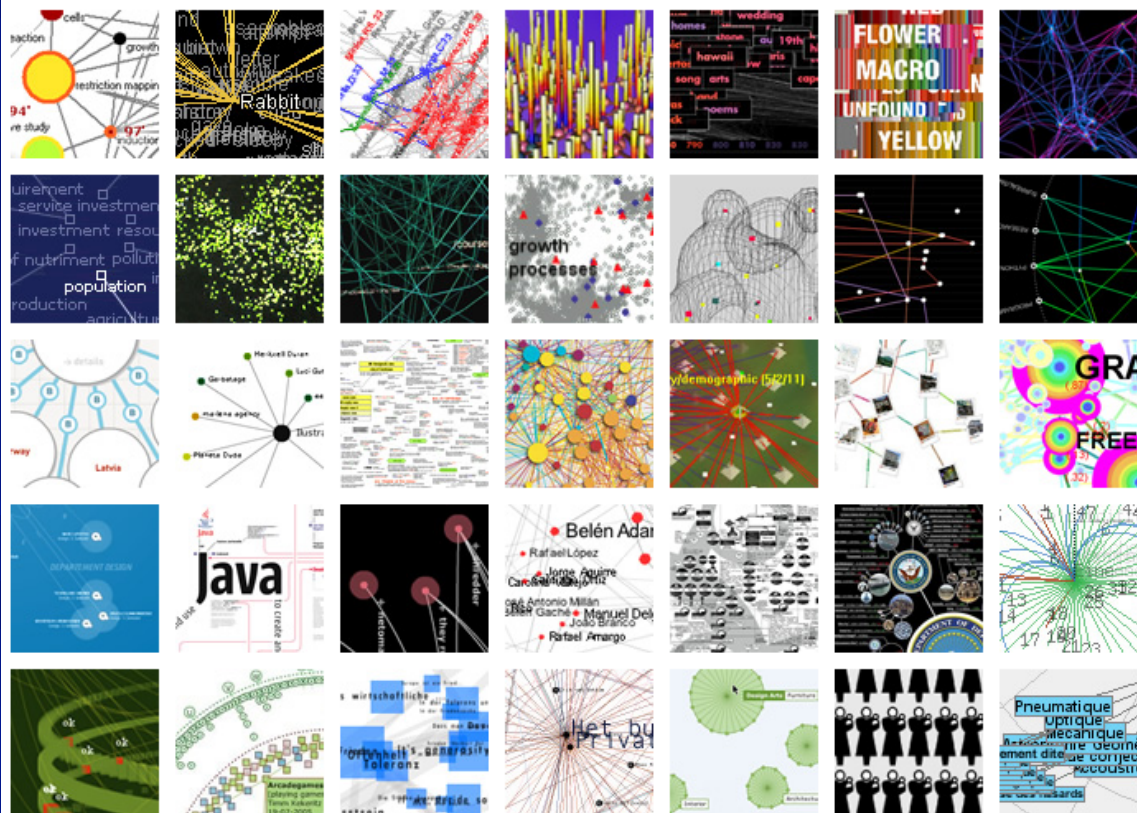
Great forms and surveys for everyone. [Learn More.](#)

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**Subject: Knowledge Networks (105)**



Indexing **742** projects



Filter by:

SUBJECT 

Art (62)

Biology (50)

Business Networks (28)

Computer Systems (30)

Food Webs (7)

Internet (30)

Knowledge Networks (105)

Multi-Domain Representation (60)

Music (36)

Others (60)

Pattern Recognition (26)

Political Networks (22)

## Semantic Networks (30)

Social Networks (93)

Transportation Networks (48)

World Wide Web (55)

[See All \(742\)](#)

• **VC Book** is now in progress

# A Dictionary View of “Brain”

Navigation: BACK FORWARD brain LOOK IT UP SEARCH: EN DISPLAY: EN EDIT PRINT SHARE HELP ON OFF

HISTORY WORD SUGGESTIONS (50) MY WORD LIST SETTINGS

kill hit

learning ability mental capacity brainpower wit mentality

encephalon

brain

nous mind head brainiac psyche genius mastermind Einstein organs variety meat

**NOUNS** ON OFF

that part of the central nervous system that includes all the higher nervous centers; enclosed within the skull; continuous with the spinal cord

mental ability

**ADJECTIVES** ON OFF

**VERBS** ON OFF

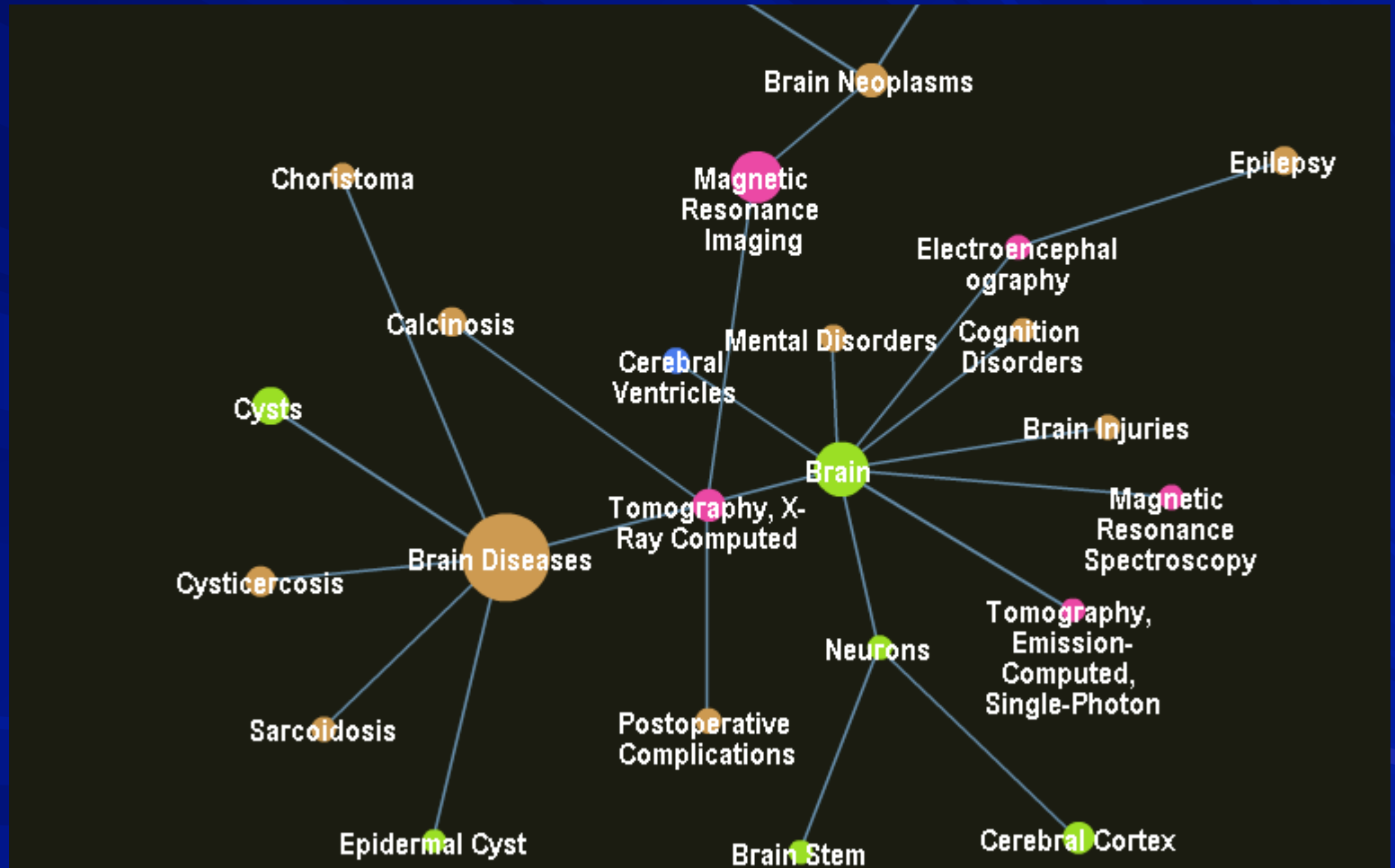
hit on the head

kill by smashing someone's skull

deal a blow to, either with the hand or with an instrument

**ADVERBS** ON OFF

# A “Brain” Map based on ...



MeSH

# “Meaningful” Knowledge Base

- Numerical or statistics Data
- Thesaurus
  - Terms and their definitions
  - Thesaurus (KOS) structures
- Contextual mapping
- Structures derived from usage or link patterns
  - Co-occurrences, co-citations, co-visited, etc.
- Linked Data?



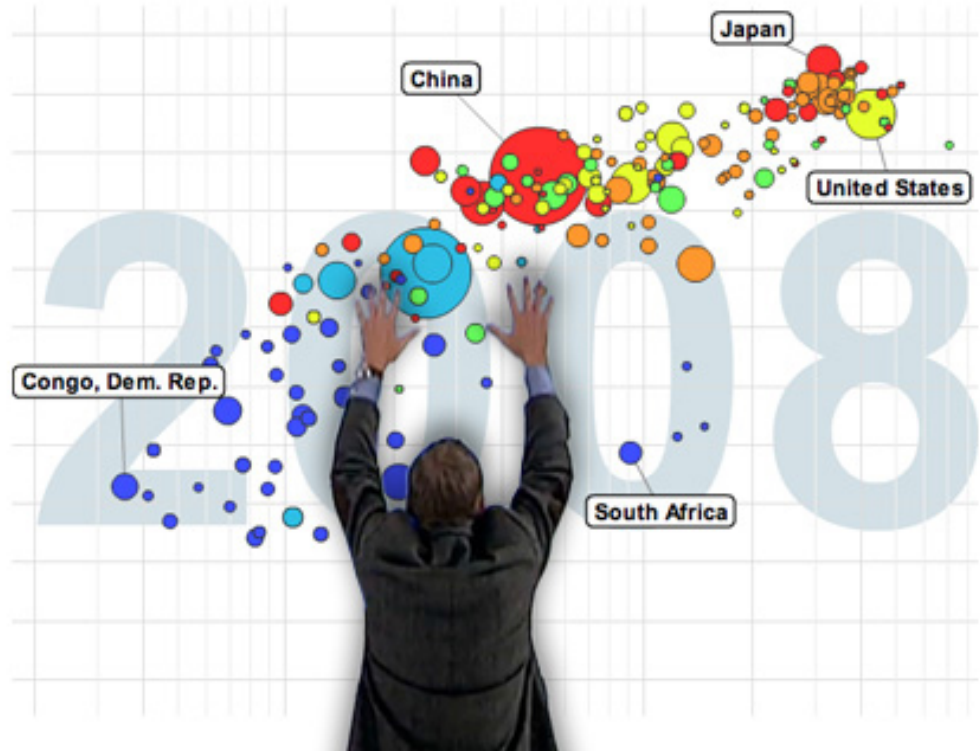
# GapMinder — for a face-based world view

## Explore the world

Gapminder World shows the world's most important trends.

- › Wealth & Health of Nations
- › CO<sub>2</sub> emissions since 1820
- › Africa is not a country!
- › Is child mortality falling?
- › Where is HIV decreasing?

[Load Gapminder World](#)



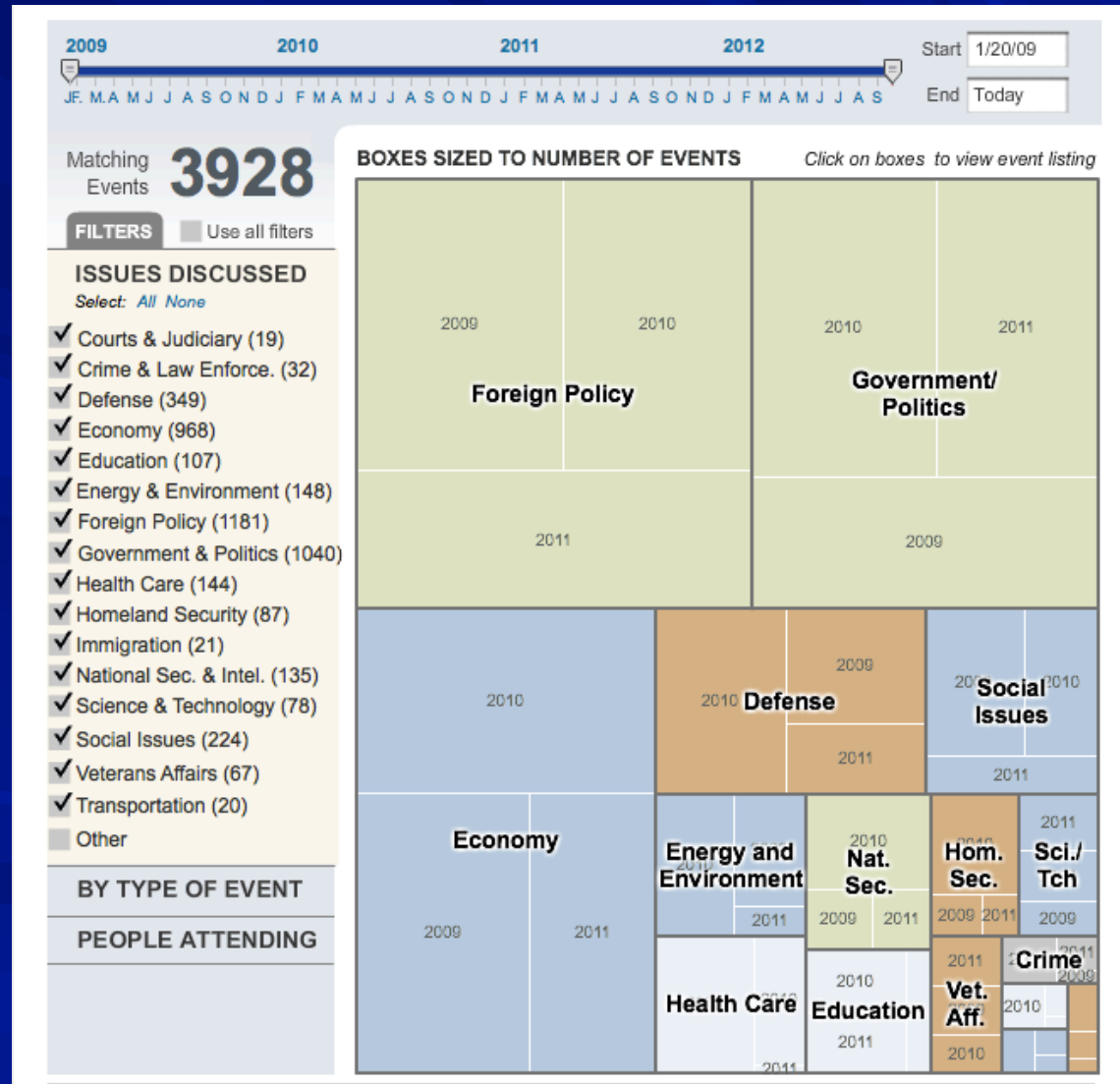
# “Meaningful” Projects

- HILT -- High-level Thesaurus
- STAR -- Semantic Technologies for Archaeological Resources
- STITCH – Semantic Interoperability to access cultural heritage
- CIDOC-CRM – CIDOC Conceptual Reference Model
- BioPortal --

# Defining “Useful” Displays

- For what purposes “visual displays” are created?
  - For effective use of KOS
    - Browsing KOS structures
    - Search query formulation & modification
  - For learning and discovery
    - Communicating knowledge structures to learners
    - Visual discovery and learning?
  - For development of “visual learning” culture
    - Engaging the user
    - Interactive

# Washington Post – POTUS Tracker

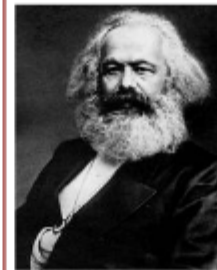
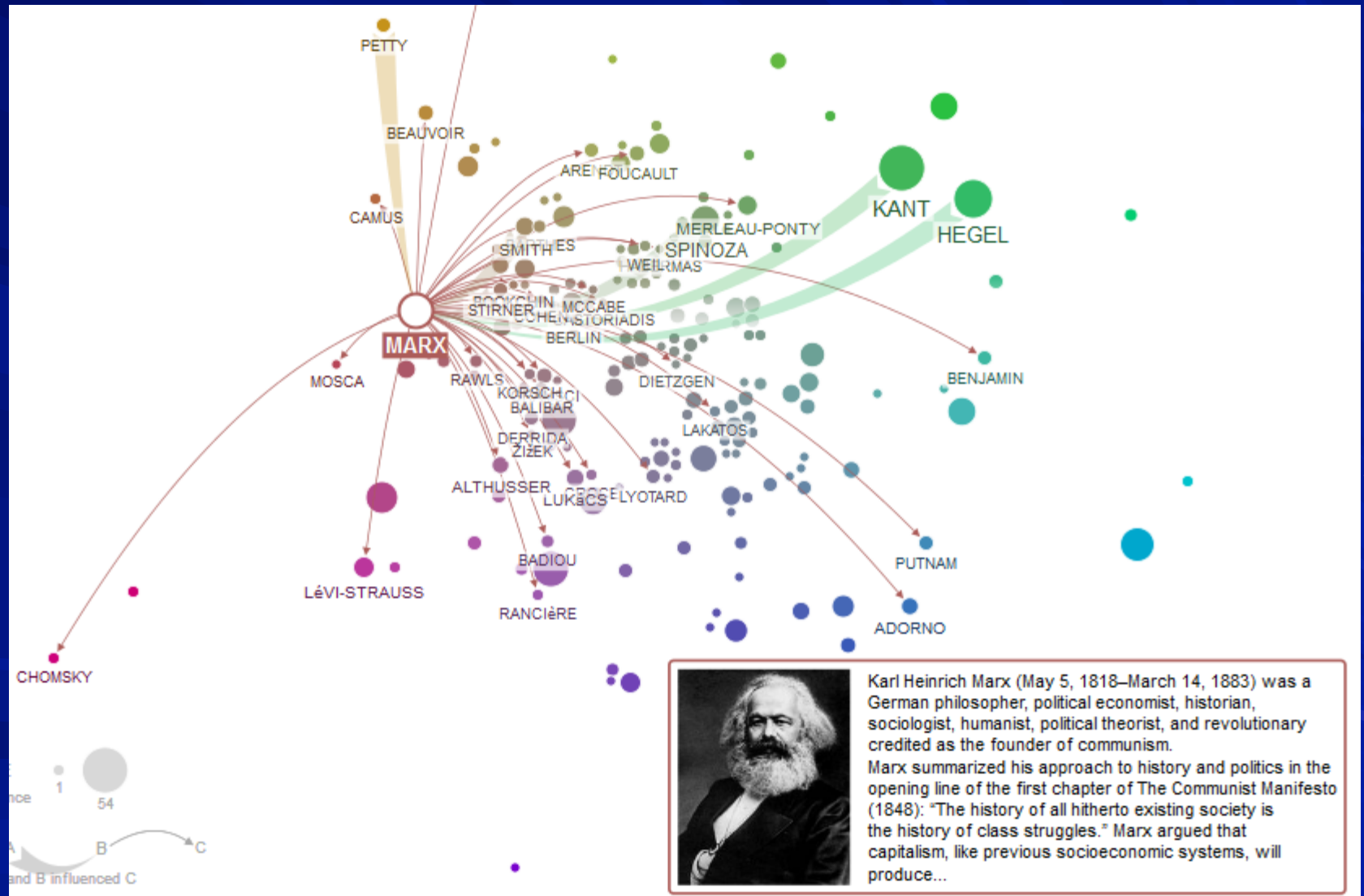




# Defining “Beautiful”

- Attractiveness/Aesthetics
  - Pleasant to the eyes
  - Engaged
  - Intimacy
- Predictable action/interactions
  - Instant and smooth responses
  - Trustful
  - Good user experience
- Usability
  - Simple
  - Natural cognitive recognition
  - Less is more

# EdgeMap:



Karl Heinrich Marx (May 5, 1818–March 14, 1883) was a German philosopher, political economist, historian, sociologist, humanist, political theorist, and revolutionary credited as the founder of communism. Marx summarized his approach to history and politics in the opening line of the first chapter of *The Communist Manifesto* (1848): "The history of all hitherto existing society is the history of class struggles." Marx argued that capitalism, like previous socioeconomic systems, will produce...

# Google Public Data

## Datasets

Metrics

### Any data provider (76)

Eurostat (9)

U.S. Census Bureau (5)

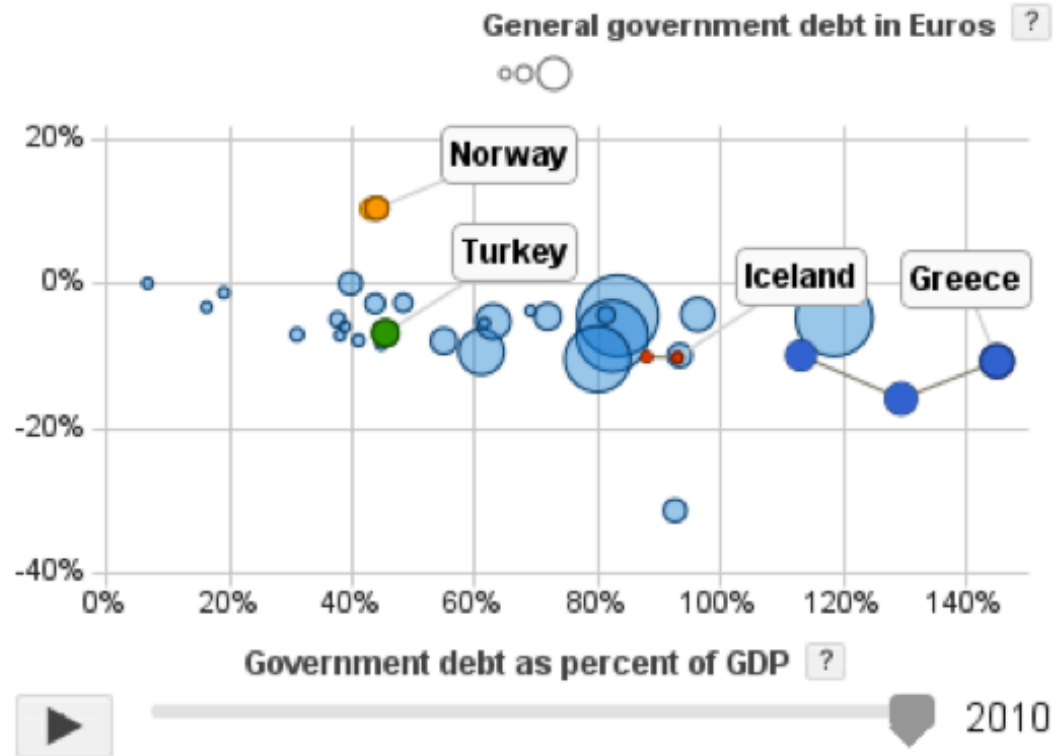
U.S. Bureau of Labor  
Statistics (3)

World Resources  
Institute (2)

Energy Information  
Administration (2)

[My Datasets](#)

## General government surplus/deficit as percentage of GDP Countries



# System Demo

- Visual Concept Explorer:
  - <http://research.ischool.drexel.edu/vce2/>



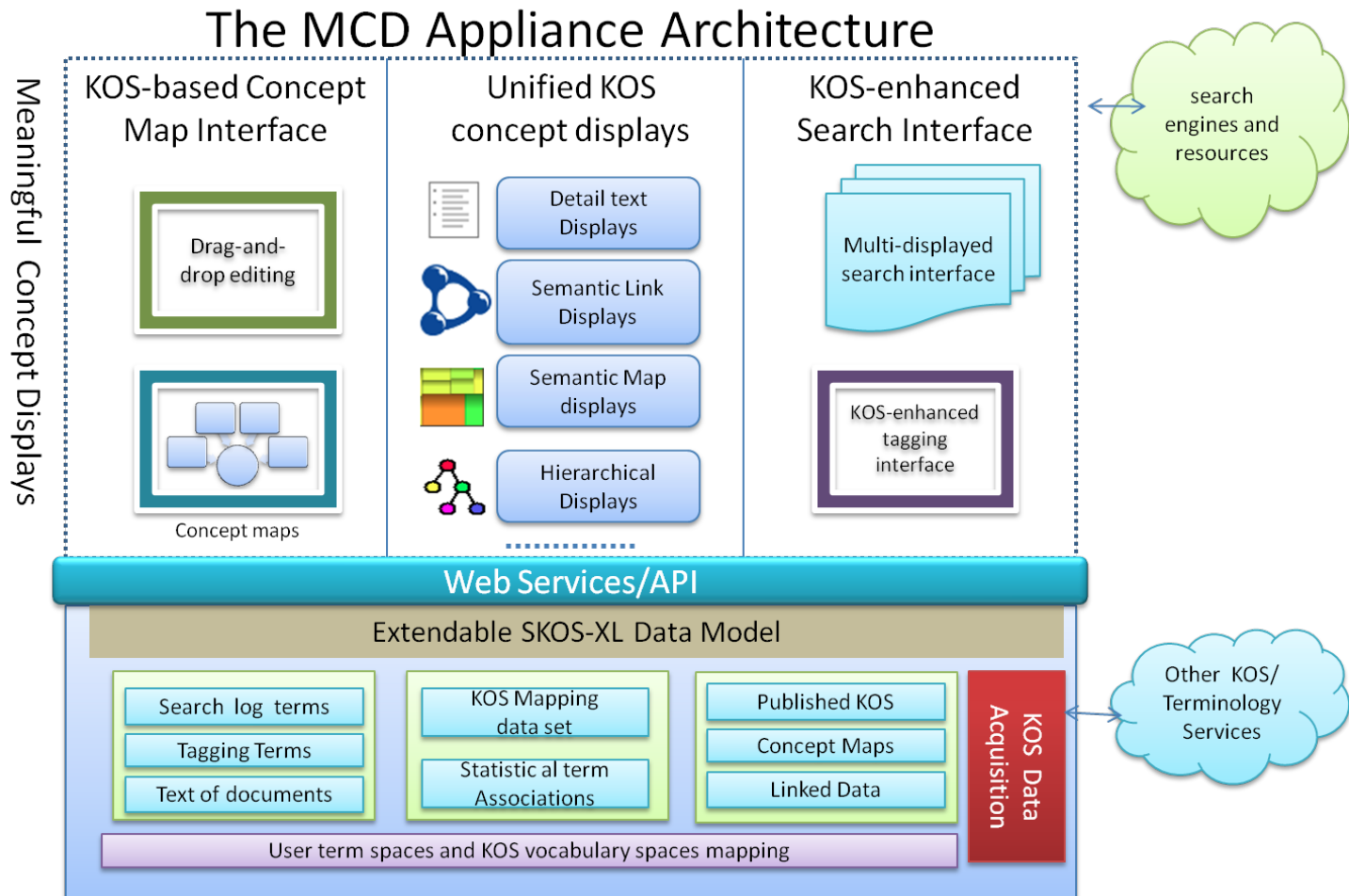
# The Proposed Project

- Develop a proof-of-concept **Meaningful Concept Display Appliance** aiming to Improve user's searching, browsing, and learning experience with KOS and relevant content/collections.
- Test the MCD appliance with ARTstor, Getty, and Indianapolis Museum of Arts (IMA) sites.

# Project Collaborators

- Drexel -- Xia Lin, Weimao Ke
- University at Buffalo – Dagobert Soergel
- Getty -- Murtha Baca
- IMA – Robert Stein
- Artstor – William Ying
- Drexel Library -- Danuta A. Nitecki,

# The Original Design



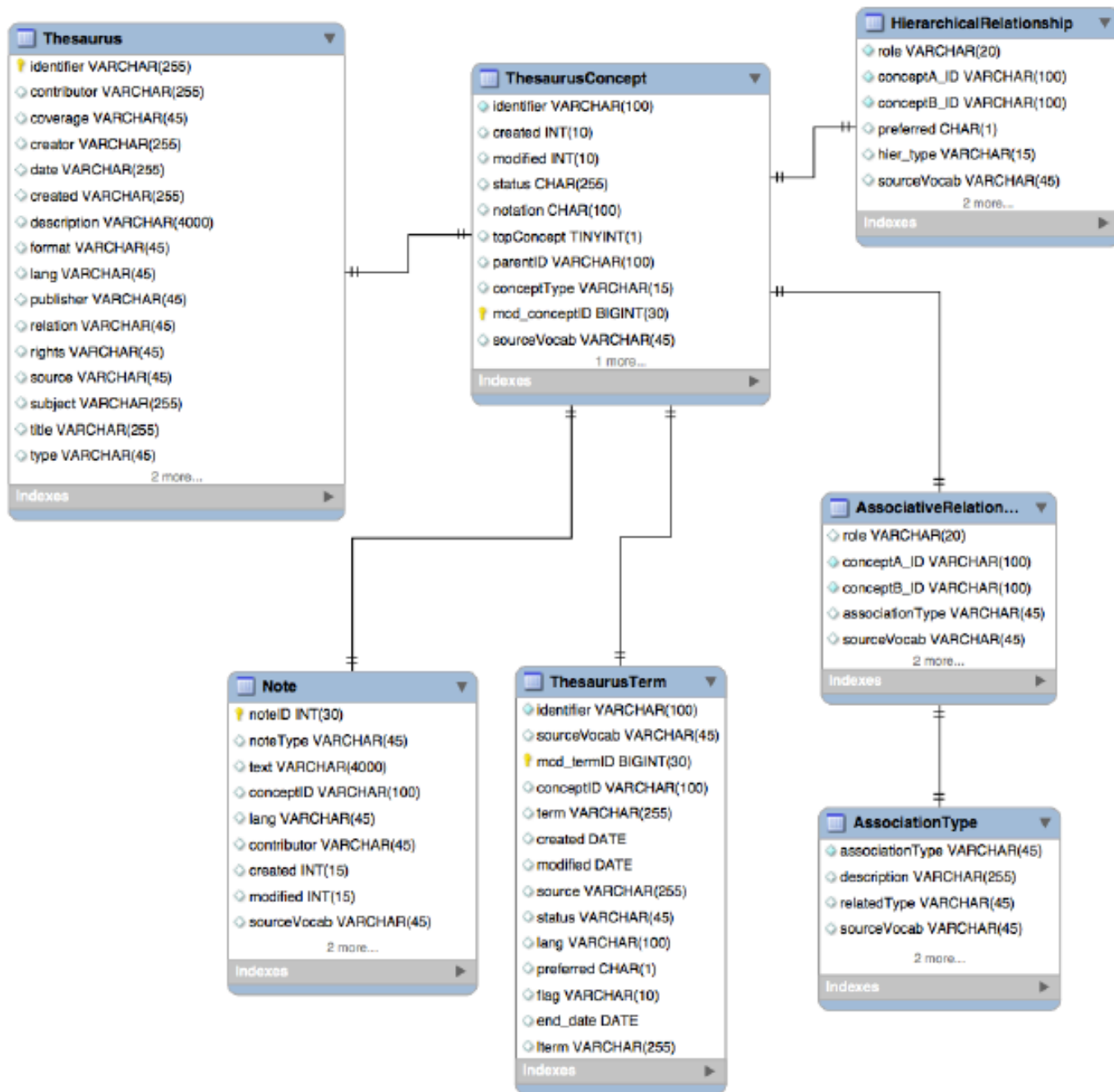
# Current Work & Sub-goals

- Creating a unified vocabulary database & APIs
- Query expansion through AAT mapping
- Learning & understanding user's needs
- Developing KOS concept displays



# Task1: Database & APIs

- ISO-25964 based data structure
  - Standard-based and extendable
  - Focusing on concepts, hierarchical relationships, associative relationships, and various notes.
  - Having an “associationType” table
  - Testing now with AAT, TGN, and ULAN loaded into one database.
  - Questions:
    - how do we add additional information not in the standard?



# Current APIs

## ■ Examples online:

[http://mcd.ischool.drexel.edu/search/api/  
API-help.php](http://mcd.ischool.drexel.edu/search/api/API-help.php)

- GetTerms()
- GetConcept()
- GetAssociative();
- getChild(), GetParent()
- getRelatedTerms()
- getVariantTerms()
- .....

# API Outputs

- SKOS-XL-based XML schema for a concept and its **neighborhood**
  - <MCDConcept>
    - <source\_info/>
    - <variance/>
    - <parent/>
    - <children/>
    - <associate/>
  - </MCDconcept>

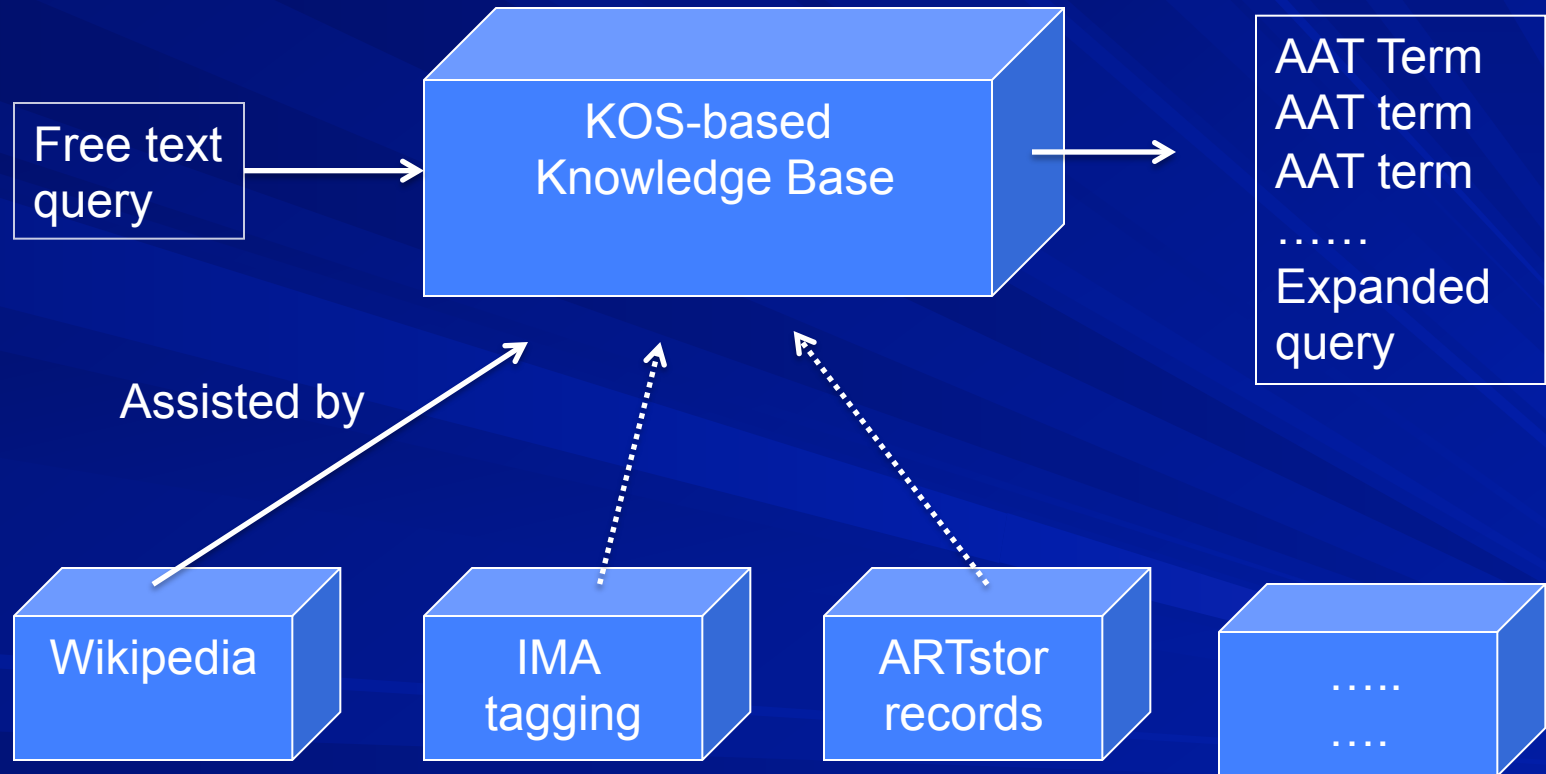
```

<MCDconcept id="300069049" term="Holiday">
  <source_info>
    <vocabulary> AAT </vocabulary>
    <originalID> 300069049 </originalID>
    <facet> Activities Facet </facet>
    <HierarchyCode> <HierarchyCode>
    <definition> </definition>
    <notes> Refers to days on which custom or the law
dictates a suspension of general business activity to
commemorate or celebrate particular events. The term more
specifically refers to religious feast days or holy days that
are specified for religious observance. </notes>
  </source_info>
  <variance>
    <MCDconcept id="" term="holiday"/>
    <MCDconcept id="" term="holy days"/>
    <MCDconcept id="" term="holydays"/>
  </variance>
  <parent>
    <MCDconcept id="300069084" term="events"/>
    <MCDconcept id="" term=" "/>
  </parent>
  <children>
    <MCDconcept id="" term="legal holidays"/>
    <MCDconcept id="" term="local holidays"/>
    <MCDconcept id="" term="national holidays"/>
    <MCDconcept id="" term="religious holidays"/>
  </children>
  <association>
    <relation>
      <type>associative</type>
      <termId> <termID>
      <term> </term>
    </relation>
  </association>
</MCDconcept>

```



# Task Two: Query Expansion



# Mapping through Wikipedia

- Search the query term in Wikipedia
- Compare the titles of search results to AAT
- Pick the best matching ones:
- Examples:
  - "art nouveau architecture, modern" –
    - Modern European styles and movements – art nouveau
    - Italian styles and movements> Stile Liberty
  - "korean painting" --> Persons, Artists -- Li Insang
  - "great wall of ancient china" --> Zhonghua -- Wan-li Ch'ang-ch'eng (Great Wall of China) (TGN)

# Other Mappings

- Use ARTSTOR metadata files for mapping
- Use ARTSTOR search log files for mapping
- Use IMA tagging for mapping

# Task 3: User's Need

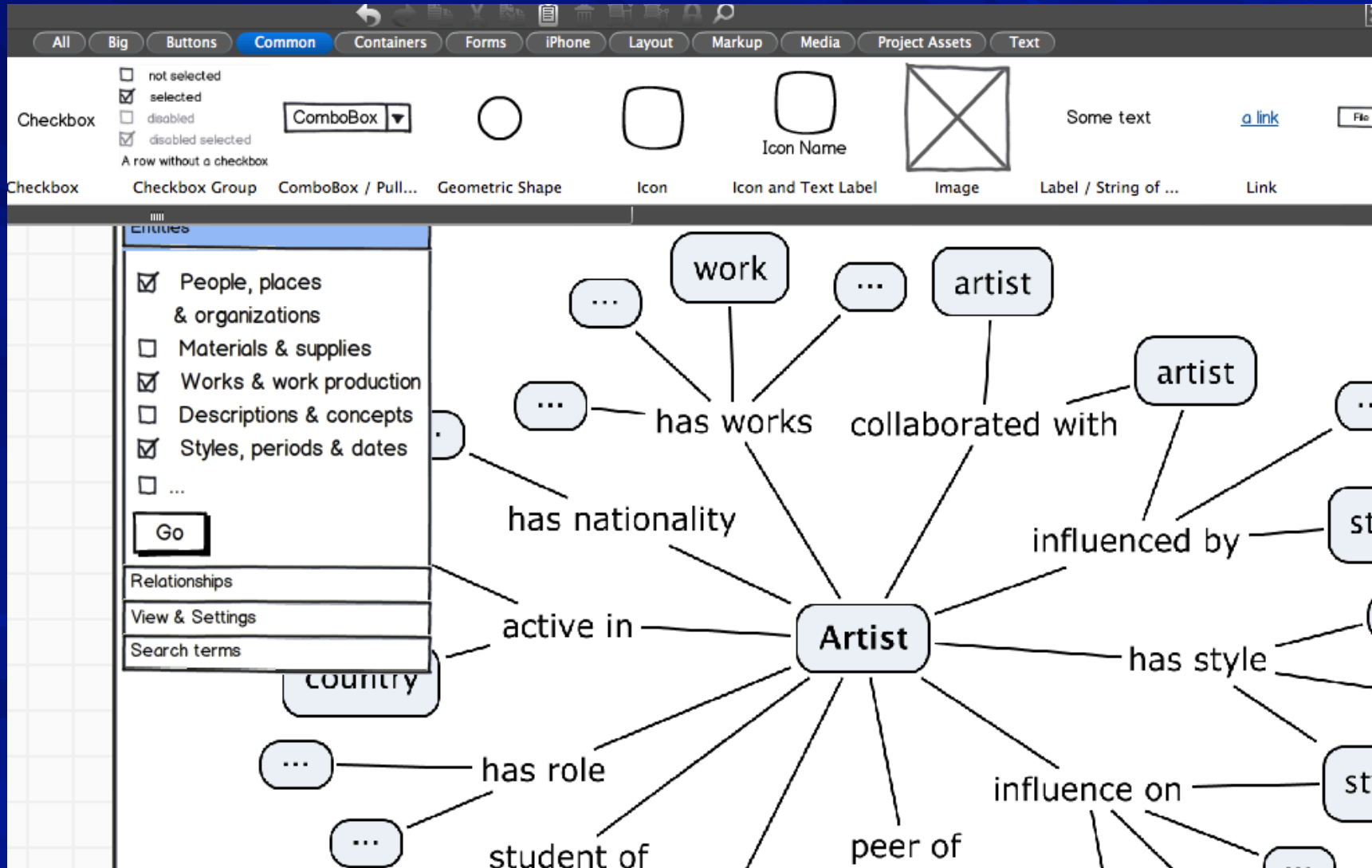
## ■ IMA Survey results

- Improve – Browse or search by artist
- It would be helpful to have some filters .....
- Casual browsing – like to click through related images or collections
- Need to replace the tags with curatorial mandated keywords
- Most people did not notice the facets.

## ■ Use of MCD for

- Query refinement
- Searching and Browsing?
- Learning and discovery?

# User Participatory Design





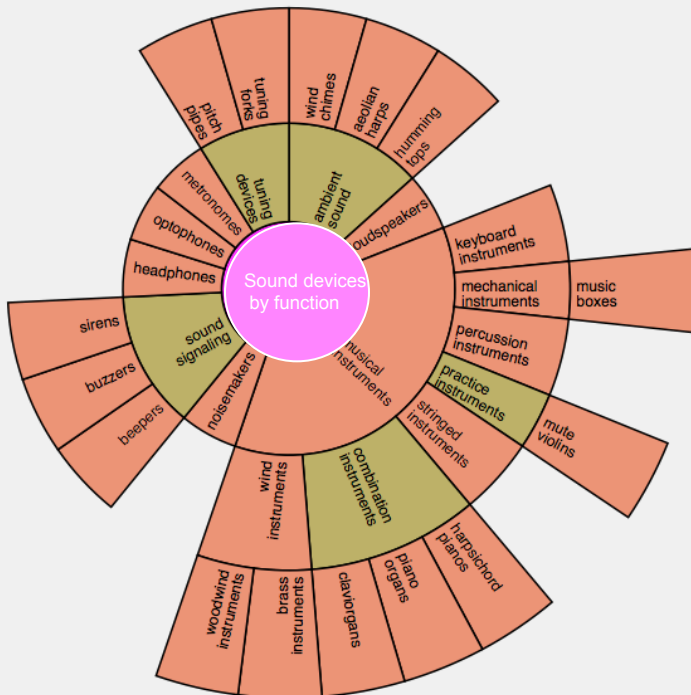
# Task 4: Developing MCD displays

- Developing global views
- Developing local concept neighborhood views
- Integrating hierarchical and associative views
- Developing new interaction styles
  - Touch-screen?

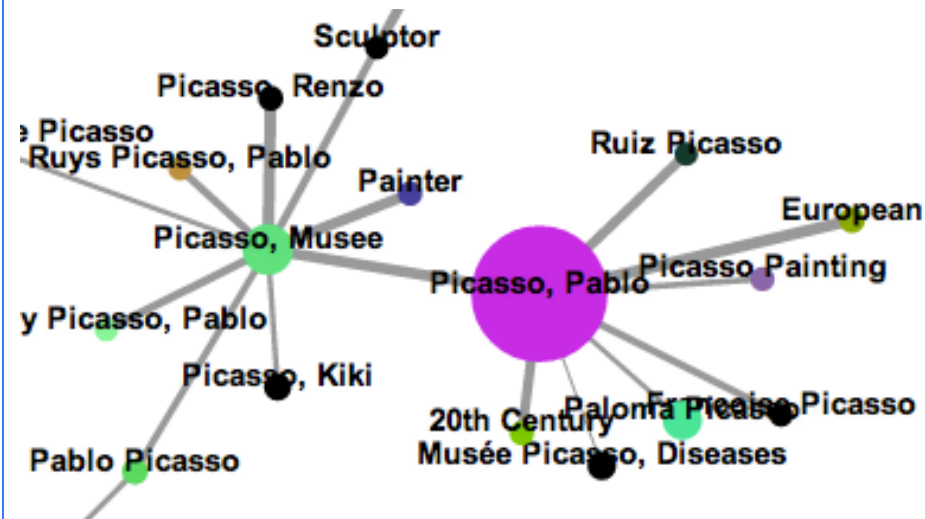
# Developing Concept Displays

## ■ Sample AAT Concept Explorer Interface

Global View



Concept View



# Search Interface Design

**[ - ] Alternate Terms**

Modify your search with these terms [?]

- + [Agia Sofia](#)
- + [Sancta Sapientia](#)
- + [Church of the Holy Wisdom](#)

---

**[ - ] Visual Explorer**

[View Larger Map >>](#) [?]

---

**[ - ] Narrow Your Results**

Narrow Your Search:

**Classification**

- [Architecture and City Planning \(11\)](#)
- [Garden and Landscape \(10\)](#)
- [Manuscripts and Manuscript Illuminations \(9\)](#)
- [Paintings \(8\)](#)
- [Prints \(7\)](#)
- [Sculpture and Installations \(6\)](#)

**Format**

- [Painting \(77\)](#)
- [Sculpture \(66\)](#)
- [Multimedia \(55\)](#)

**Creator**

- [Creator Name \(44\)](#)
- [Creator Name \(33\)](#)
- [Creator Name \(22\)](#)
- [Creator Name \(11\)](#)

[Advanced Search](#)

Your Search: **Hagia Sofia** >> Term: Ayasofya [X] [?]

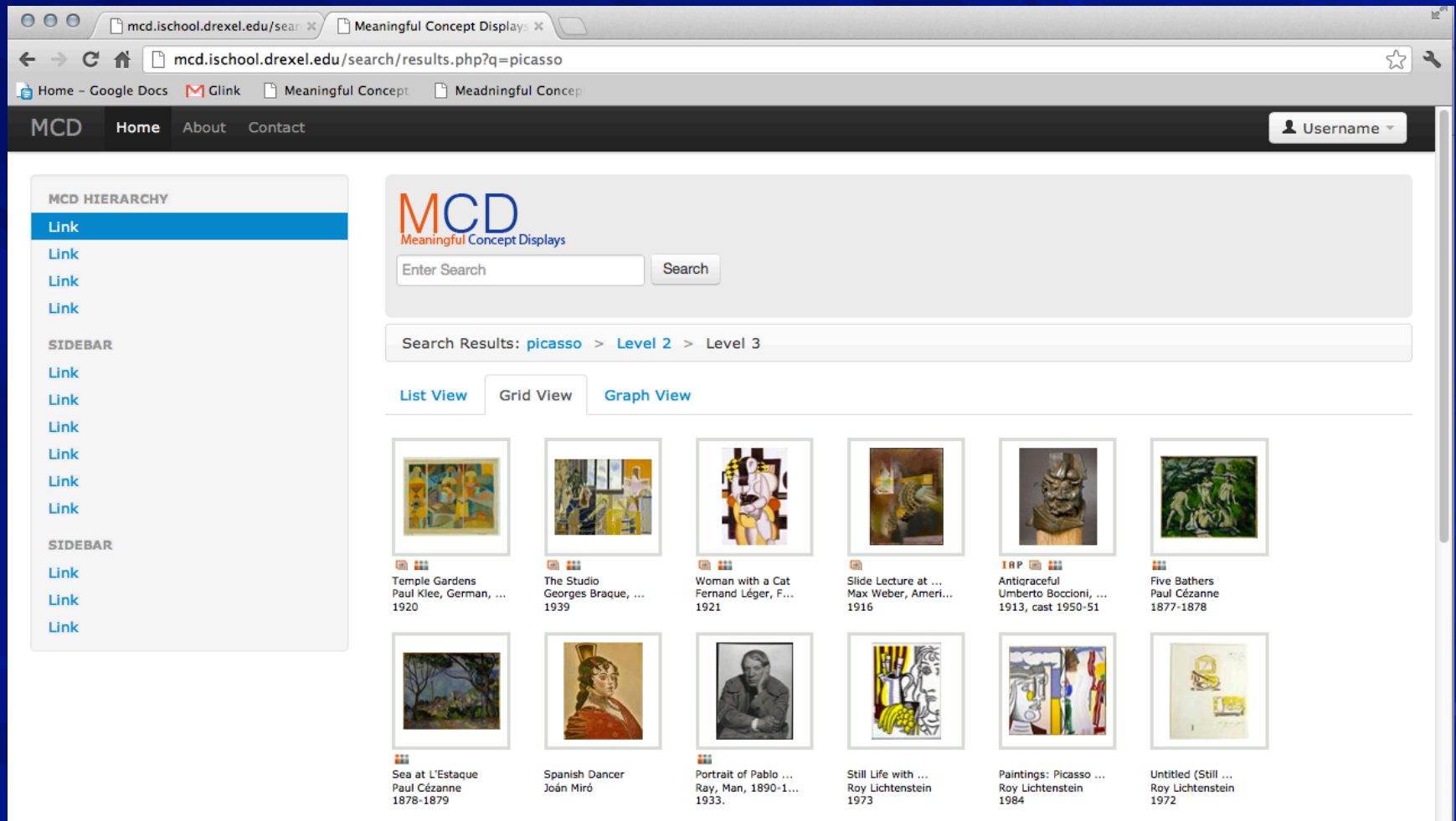
Sort by ▼ Relevance    [Images/page ▼ 24]    [Icons]    Page 1 of 4 [Next] [Previous]

**123 result(s) for "Hagia Sofia"**

Click page to select. Double click to enlarge. Click caption to view full record.

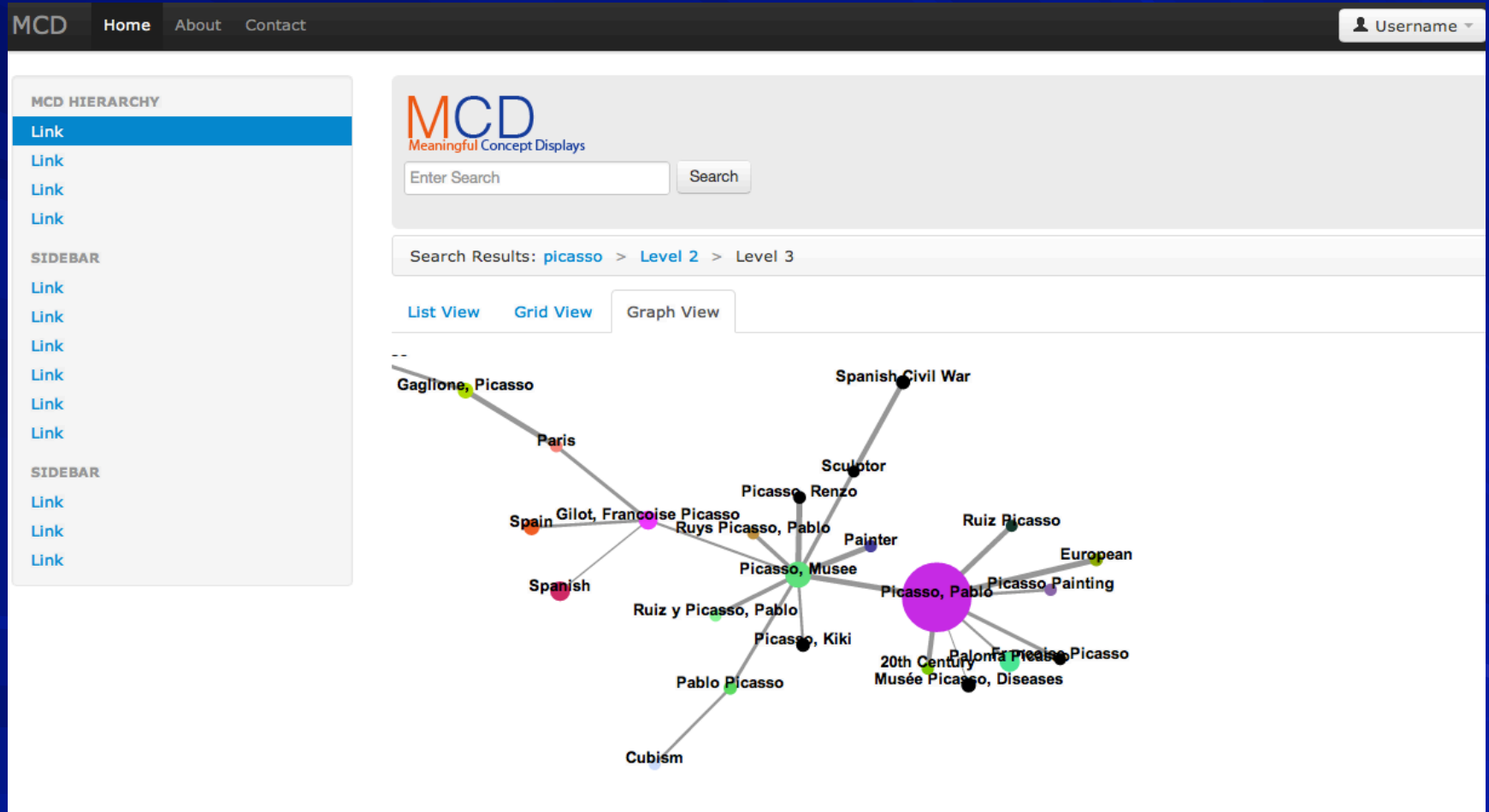
Hagia Sofia Comp... church designed and ... church, 532-7; d...	Hagia Sofia Comp... church designed and ... church, 532-7; d...	Hagia Sofia Comp... church designed and ... church, 532-7; t...	Hagia Sofia Comp... church designed and ... church, 532-7; t...
Hagia Sofia Comp... church designed and ... church, 532-7; d...	Hagia Sofia Comp... church designed and ... church, 532-7; t...	Hagia Sofia Comp... church designed and ... church, 532-7; t...	Hagia Sofia Comp... church designed and ... church, 532-7; t...
Hagia Sofia Comp... church designed and ... church, 532-7; d...	Hagia Sofia Comp... church designed and ... church, 532-7; t...	Hagia Sofia Comp... church designed and ... church, 532-7; t...	Hagia Sofia Comp... church designed and ... church, 532-7; t...

# Twitter Bootstrap-based Interface



Testing: <http://mcd.ischool.drexel.edu/search/>

# Interface - Graph View





# Summary

- MCD – the intersection of multiple disciplines

