

8th ISKO Spain conference

León: 18-20 April 2007

**A new relationship for multidisciplinary  
knowledge organization systems:  
dependence**

**Claudio Gnoli** (University of Pavia)

**Mela Bosch** (University of La Plata)

**Fulvio Mazzocchi** (Italian National Research Council)

all members of ISKO Italia

# Disciplinarity is a key feature of KOSs

- special KOSs: MeSH, Agrovoc, AAT, ...
- general KOSs are like aggregates of special KOSs (meta-classifications):
  - Philosophy
  - Mathematics
  - Physics
  - [etc.]

# Multidisciplinary search is problematic

Each discipline is a separate universe with

- its own hierarchical structure
- its own facets
- its own terminology
- its own notation

So, how to search for a concept across disciplines?!

# KOSs should allow for better multidisciplinary search

- International Council for Scientific and Technical Information [1993]
- Beghtol [1995, 1998*a*, 1998*b*]
- Weinberg [1996]
- Williamson [1998]
- McIlwaine [2000]
- Szostak [2004, 2007, this conference]

# Classification by integrative levels. 1

Classes of phenomena instead of  
classes of disciplines

Classification Research Group:

Kyle, Foskett, Austin, ... 1958-1970

Integrative Level Classification research project:

ISKO Italia 2004-

# Classification by integrative levels. 2

“alpine oak-groves”

**forests : oaks : mountains**

 *levels*

**K** landforms

**K<sub>m</sub>** mountains

**M<sub>p</sub>** plants

**M<sub>p</sub>f<sub>m</sub>y<sub>q</sub>** oaks

**N<sub>y</sub>** ecosystems

**N<sub>y</sub>r** forests

 *levels*

# Integrative levels

- D energy
- E atoms
- F molecules
- G bulk matter
- H rocks
- L cells
- M organisms
- N populations
- R societies
- T artifacts
- W cultures
- X art works

*lower*



*higher*

# Structural relationships

K landforms

*hierarchy*

K<sub>m</sub> mountains

X art works and leisure

*hierarchy*

X<sub>wou</sub> alpinism

*dependence*

# Dependence

“A new feature has to be consciously incorporated in the alphabetical index, namely, a system of references from certain combinations of terms to at least the level above. [...]

If each level derives its parts from the level below, it seems reasonable to use this as a principle in making upward references.”

[Foskett 1961]

# Relationships in thesauri

- hierarchical (BT-NT)
  - generic
  - partitive
    - sub-sub-types?
  - instance
- associative (RT)
  - sub-types?
    - domain-specific sub-sub-types?

ALA 1997; Schmitz-Esser 1999; Tudhope et al. 2001;  
Soergel et al. 2004; Mazzocchi & Plini 2007

# Dependence in thesauri

- associative (RT)
  - related dependent term (RDT)

mountains

*RDT alpinism*

plants

*RDT forests*

# Dependence in classification

K landforms in the schedules

K<sub>m</sub> mountains

...

X art and leisure works

X<sub>w</sub> games, sports

X<sub>w0</sub> open air sports

X<sub>w0u</sub> alpinism « K<sub>m</sub>

in the search  
interface

K<sub>m</sub> mountains

*see also:* X<sub>w0u</sub> alpinism

# Dependence between main classes of phenomena

<b>F</b> molecules	«	<b>E</b>	
<b>G</b> bulk matter	«	<b>F</b>	
<b>L</b> cells	«	<b>F</b>	
<b>M</b> organisms	«	<b>L</b>	
<b>N</b> populations	«	<b>M</b>	
<b>O</b> perception	«	<b>M</b>	
<b>P</b> consciousness	«	<b>O</b>	
<b>Q</b> language	«	<b>O</b>	
<b>R</b> communities	«	<b>Q P M</b>	
<b>T</b> artifacts	«	<b>R H</b>	
<b>U</b> wealth	«	<b>T</b>	
<b>V</b> institutions	«	<b>U R</b>	
<b>X</b> art works	«	<b>T Q P</b>	

# Ontologies

- classes = concepts
  - subclasses
- slots = roles = properties
- facets = role restrictions

# Dependence in ontologies. 1

<i>ILC notation</i>	<i>ILC caption, OWL class</i>	<i>dependence ILC notation</i>	<i>OWL direct slot and facets</i>
<b>Xwou</b>	<b>Alpinism</b>	<b>Km</b>	<b>dependsOn</b> (Mountains, Landforms )

# Dependence in ontologies. 2

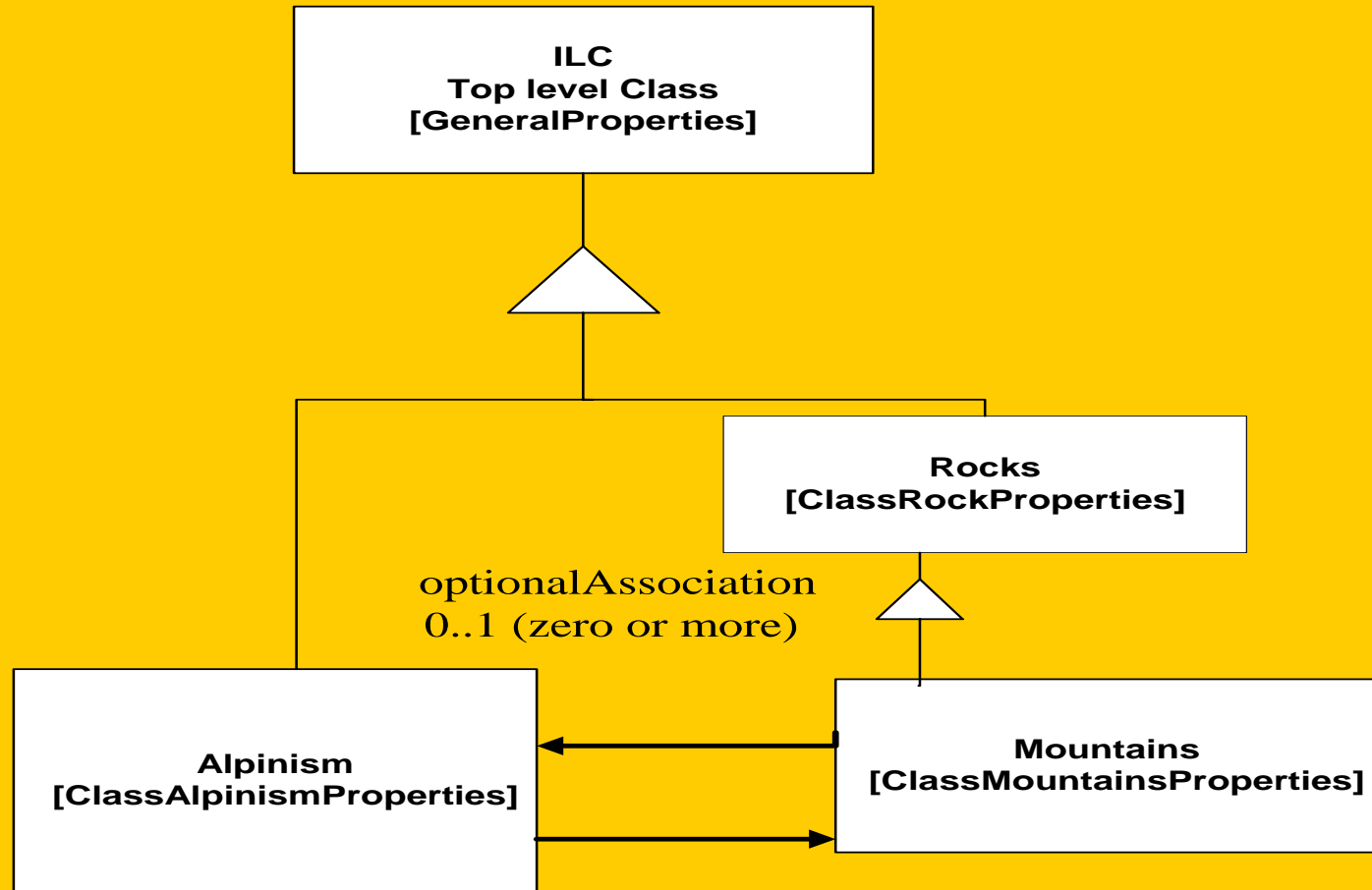
Can deductive properties be applied?

**Alpinism *dependsOn* Mountains**

**Mountains *dependsOn* Rocks**

→ **Alpinism *dependsOn* Rocks**

# Dependence can be modeled as a restriction of an association



AssociationWithRestriction: dependsOn

# Conclusions. 1

Disciplinary KOSs assume users will follow the organization they are familiar with

But KO has two functions:

- representing existing literature
- suggesting new paths through discovery of relations [Szostak in this conference]

# Conclusions. 2

So we need:

- less domain-specific KOSs
- more interoperable retrieval tools independent from domain

Dependence looks as a useful relationship to these purposes.

thank you!  
gracias!  
gràcies!  
grazie!



[gnoli@aib.it](mailto:gnoli@aib.it)  
[melaboschit@yahoo.it](mailto:melaboschit@yahoo.it)  
[mazzocchi@iia.cnr.it](mailto:mazzocchi@iia.cnr.it)