A matter of perspectives

Talking About Talking About Topic Maps

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Outline

- Perspectives:
  - Introduction
  - Concepts

- Examples of Perspectives:
  - One territory seen in various perspectives

- Using Perspectives
The Problem with Ontologies

- Ontology: “an exhaustive and rigorous conceptual schema within a given domain”... [Wiki Encyclopedia]
  Misleading: there are several ways to describe information.

- Pragmatic attitude: regardless of how data was originally created, we need to see it a certain way for certain specific purposes.
  And... there is a multitude of different ways to look at data.

- Consequently, an ontology is no more no less than one particular way to look at data...
Interoperability vs. Integration

- Semantic Interoperability is the ability for systems to interchange certain kinds of data and incorporate them into processes.
  Systems

- Semantic Integration is the ability to aggregate information around its meanings.
  Humans

- Interoperability and Integration are different.
Interoperability: One World

- When systems are set to interoperate, the (unique) ontology on which they operate must be well defined. This is a closed information island.
  
  There can be an archipelago of information islands.
  
  Interoperability presupposes that all discrepancies will be resolved,

- Apparent diversity, but one common way of thinking, imposed by technology.
Integration: Bridge between worlds

- Integration supposes it's possible for every subject to have addresses in semantic spaces.

- What the subject is is a matter of perspective.
  
  In one person’s perspective, two expressions may be considered to be about the same subject.

  In another person’s perspective, the same two expressions may be considered to be about different subjects.
<table>
<thead>
<tr>
<th>ARTIFICIAL INTELLIGENCE</th>
<th>ARTIFICIAL SEMANTIC WEB</th>
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<tbody>
<tr>
<td>HUMAN INTELLIGENCE</td>
<td>HUMAN SEMANTIC WEB</td>
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<tr>
<th>HUMAN SEMANTIC INTEGRATION</th>
<th>ARTIFICIAL SEMANTIC INTEROPERABILITY</th>
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<tr>
<td>MANUAL</td>
<td>AUTOMATED</td>
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Talking About Perspectives

- Several layers:
  - Thing
  - Subject
  - Expression
  - Interpretation
  - Perspective
  - Pattern
  - View
A thing is considered to exist in the universe, independently of any observer.

It has no name, no description. It simply is.

We can't talk about it as such.
Subject

- A subject is an understanding of a thing.
- It is pure meaning. It's where the semantic universe begins.

This definition of subject is different from the one that is currently given by the Topic Maps Standard:

“Any thing whatsoever, regardless of whether it exists or has any other specific characteristics, about which anything whatsoever may be asserted by any means whatsoever.”
Expression

- An expression expresses a subject.
  An expression can be a name, a text, an oral phrase, a picture, a file, a URI, a record, an object.

- There are rules for processing expressions.
  Various technologies can be used to manipulate expressions: linguistic analysis, computer processing, relational databases, topic map processing etc.

- A “topic map” can be seen as a given set of expressions. But other information objects sets as well.
Interpretation

- Process of creating an expression for a subject.
- There are plenty of different ways to interpret a subject, therefore there are plenty of different ways to create an expression of a given subject.
- The context in which a subject is given an expression to represent it, is already defining a perspective.

Subject interpretation is sometimes described as “reification”, “proxification”, or “representation”. All these terms have the same problem as ontologies. Interpretation conveys a more relative vision.
Perspective

A perspective is a bias that is reflected in the interpretations that describe it.

Examples of perspectives include:
- Classification schemas (taxonomies)
- Database schemas/XML schemas
- Topic Map Data Model
- Ontology

Within a perspective, the expression of subjects is naturally “subjective”.
  It reflects a particular interpretation of the subjects.
Patterns

- Patterns are the rules, if any, to which expressions must conform within a given perspective.

- Patterns for subjects express:
  - How subjects are **discriminated**.
  - How new subjects can be **inferred** from existing ones.
  - How expressions are **combined** when they are interpreted as expressions for the same subjects.
View

- The motivation for using perspectives is to provide views.
- A view is a set of expressions selected for a given purpose. A document source is its author's view.
- Any user of information needs specific view(s) to fit his/her needs.
- One perspective can be rendered as several views. // One source, many outputs.
Lower Manhattan Perspectives

- Multiple perspectives on the same territory
- Variety, Complexity
- You may consider each map as a metaphor of an XML structured document instance. (Caption = Schema)
Tourist Guide Perspective

- Sightseeings
- Commented itineraries in tourist guide
- Was published a few days after Sept. 11, 2001
- Shows Subway stops

Tourist Overview Perspective (in French)

Usages
Sightseeings: Commented walking itineraries
Rated by value.
Overview (Table of Contents): Refers to Chapters.
In French (sort of)
Downtown Tourist Map

Usages
Sightseeings: Commented walking itineraries
Rated by value.
Overview (Table of Contents): Refers to Chapters.
In French (sort of)
Driving/Addressing Perspective

Usages

Driving (Main thoroughfares, one-way streets, Parking garages)

Address (Street Names, Numbers, Zip Codes, Neighborhoods)

Walking (Blocks, Street Names, Parks, Official Buildings)

Near Public Transportation?
Buses

- Should be simple: Street map with bus routes.
- Really is:
  3 different maps (there may be many more)
  Implicit knowledge:
  Map only shows New York City Transit buses
  City buses don't go outside of the 5 NYC boroughs.
  Two kinds of city buses: Local and Express
  Outer Boroughs have express buses going to/from Manhattan
    But some have also local buses to Manhattan.
  Local buses are mainly for local travel ride. They are far too slow to be usable for long-distance travel.
  Express buses can't be used for local travel. Cost more.
Manhattan Buses, Manhattan Perspective

Buses in Manhattan
Local Buses only
Subway represented too.
Manhattan Buses,
Brooklyn Perspective

Usages:
Public Transportation to and from Brooklyn.
Express/Local Buses
Subway also represented.
Manhattan Buses, Staten Island Perspective

- To and From Staten Island

Staten Island Bus Map, MTA, New York City Transit, December 2002.
Subway Rider Perspective

Usages: Riding Subway Routes
Rush/Non-rush hours
Transfers
Express/Local
Police Stations
Elevators/Escalators
Ferries

The Map, MTA Metropolitan Transportation Authority, May 2005 Edition
Subway, Historical Perspective

- 1906 IRT Subway Map
- Elevated & Subways
- Ferries to NJ
- Historical Value

Interborough Rapid Transit Company,
http://www.nycsubway.org/perl/caption.pl/?maps/historical/railways1906-54.gif
Subway, Railfan Perspective

Trackmap vs. subway map

http://www.nycsubway.org/maps/track/bigdowntown.png
Street/Subway Perspective

Merged Perspective
Entrance to each subway station
Transfer available
Subway routes marked at each station
Reconstruction Perspective

Usages:
- Map Damage to the Underground Utility Network.
- Help with Reconstruction

Underground Radar Tomography at Ground Zero
A hidden toll of the collapse of the World Trade Center on September 11 was extensive damage to the underground utility network that supports lower Manhattan. Sponsored by a grant from the Swedish government, a project using radar tomography to map below streets near ground zero has been underway since December to help with reconstruction of the network. In less than two months, a continuous 3D radar image down to a

Lower Manhattan Underground Radar Project,
http://www.lowermanhattan.info/construction/global/contact/
City Administration Perspectives

- 2000 Census tracts
- Street Center Lines
- Fire Districts
- City Health Districts

These four images are all portions of different layers of the NYCMap, all showing lower Manhattan. The layer labels here are arbitrary. A: Layer 1 shows census tracts from the 2000 census. B: Layer 2 shows street center lines. C: Layer 3 indicates the borders of fire districts. D: Layer 4 indicates city health districts. The NYCMap has many more layers, some of which aren’t publicly available because of security issues.
Common Perspective for All?

Pros

- Nice to have everything in one place (Seems rational)
- Layered Model
- Management Tool
- Discovery Tool
- Harmonization: common model, common goals

Cons

- Information Overload
- Loss of Focus
- Increased Complexity
- Difficult/Impossible to Maintain
- Prerequisite: Agreements
- Conflicting requirements
Bottom-Up versus Top-Down

- Top-Down works for information islands.
- Interoperability requires top-down

- Integration using customized perspectives can be used for bottom-up approaches.
Semantic Integration and the Topic Maps Reference Model

- Integrated views are made under pre-defined perspectives.
- The subject-centric approach proposed by the TMRM has the potential to become a technical solution for dealing with multiple information perspectives.
Maps Express Perspectives

- Maps are views that result from perspectives. 
  Perspective can be explicit but is often implicit.
- Topic Maps are … maps.
- Disclosure, disclosure, disclosure
- Information Perspectives may be the new hot thing.
Questions