Introduction to Ontology-based Standards in Geospatial Domains

Ontolog's Ontology Based Standards miniseries Session-5

Co-Chairs: Drs. Gary Berg-Cross (SOCoP) & Tara Athan (Athan Services)

Oct. 17, 2013

Session Overview and Agenda

1. **Opening Remarks for Session 5 – Gary Berg-Cross**

2. **Geospatial Standards and the Semantic Web (Luis Bermudez)**

3. **Observations & Measurement (Simon Cox)**

4. **W3C Semantic Sensor Network (Cory Henson) ... presented by Tara Athan**

5. **Driving the next generation of spatial standards: examples from hydro ontology (Torsten Hahmann)**

6. **Q & A - Open Discussion**

7. **Closing Remarks – Tara Athan**

As can been seen by our agenda today, we have invited people involved with key standards across several different parts of the geospatial realm and within the practice of ontology use.
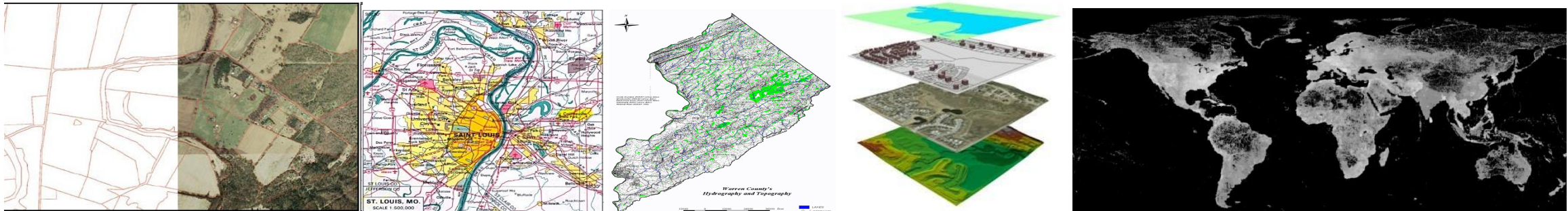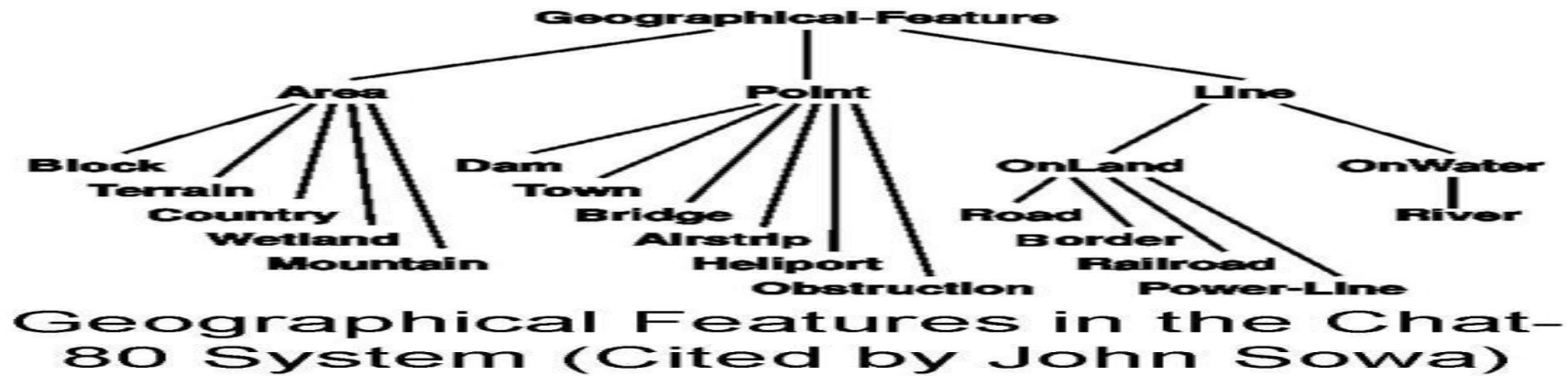
"

Goals of the Session within Overall Mini-Series Goals

The **overall goal** of this series is to advance the understanding of how ontologies can improve extant standards in a range of communities by providing better groundings which can result in Ontology-based Standards

• The session builds on work coming out of standards bodies like OGC, but also looks to progress on standards using ontologies

• One goal of this session is to further a dialog on the current status of geospatial standards and grounding in ontologies with an eye to the application of semantic technology that can help practitioners.

• We also hope to build on the previous session -**The Case for a "Quantities and Units of Measure" Ontology Standards** by considering related topics such as Observations and Measurements as well as ideas from the previous Ontology Summit on this topic.

Many technical geospatial standards (e.g. ISO/TC 211 General Feature Model):
Many types/sub-types of Geospatial objects & captured data

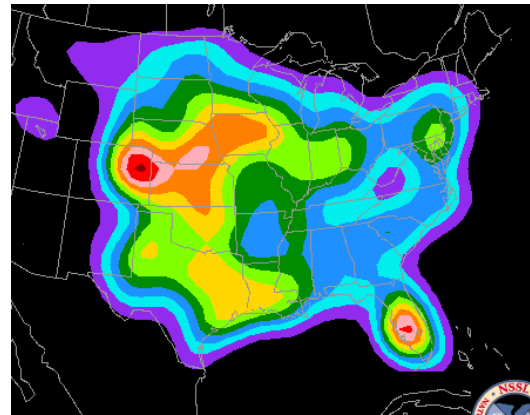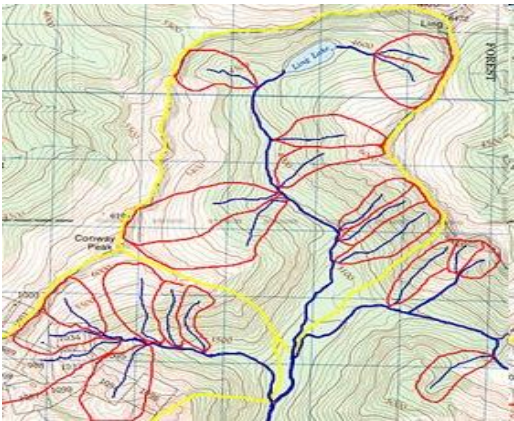Geographical Features in the Chat–80 System (Cited by John Sowa)

Raster data: TIF, JPEG, SID, JP2, GIF, or we may use a GIS specific format, such as GeoTIFF, ArcInfo GRID or Imagine .IMG.

Vector data: ESRI Shape File, a AutoDesk DWG file or in a Geodatabase Feature Class.

Features, Geometries, Places, geonames, maps, layers, processes.....

Ontology is not new to Geospatial Topics

- We are over10 years from Smith and Mark's *Geographical Categories: An Ontological Investigation*– one of top 10 cited articles in the geographical or broader/related geospatial (GS) or GIS/GIScience field(s) involving maps etc.
  - The semantic problem, "what is a region?"

Still much geospatial data & web feature service have standardized terms but lacks adequate semantics.

W3C Incubator Group on Geospatial Ontologies

- The W3C Geospatial Incubator Group defined seven categories of Geospatial foundation ontologies to represent geospatial concepts and properties for use on the Worldwide Web.
  - Geospatial Feature Ontology
    - Implied in here is the idea of a "geospatial object"
  - Feature Type Ontology e.g.
    - regions, parcels of land and water-bodies, topographic features such as bays, promontories, mountains and canyons, hills and valleys, roads, buildings, bridges, as well as the parts and aggregates of all of these.
  - Basic Spatial Relationship Ontology
    - topological and qualitative ideas of "near", "connected", "around"," intersects", "touches", "crosses", "within/contains", and "overlaps".
      - GeoSPARQL effort has made these more readily available as part of LOD.
  - Toponym (Place name) Ontology
  - Coordinate Reference / Spatial Grid Ontology
  - Geospatial Metadata Ontology
  - (Geospatial) Web Services Ontology
    - Federal Geographic Data Committee supporting shared and standards-based services and focus on applied information for improved decision making.

  - see http://www.w3.org/2005/Incubator/geo/XGR-geo-ont-20071023/)

Other Efforts

- Benchmark survey of the GS ontology landscape (Geospatial Ontology Trade Study) conducted in 2007
  - reviewed spatial conceptualization in foundational and upper level ontologies domain and commercial standards (e.g. GML)
  - Several of the GS ontologies discussed in the trade study have been made available in the SOCoP OOR as part of NSF's funding of the SOCoP INTEROP effort.
- Formalization of GeoSPARQL which was presented previously in SOCoP's Virtual Workshop on Semantics in Geospatial and Other Architectures: Design and Implementation (2013-05-07).
- USGS's The National Map work converting the 8 standard layers of The National Map to RDF form
  - land cover, structures, boundaries, hydrography, geographic names, transportation, elevation, and orthoimagery

Noted: Tension between a theoretical ontology community and a standards community

1. Get it completely right (the perfect) vs. Get it working (the good)

2. Being successful (get past the tipping point) vs. Being right (domain and computer science)

3. Reality model (scientific) vs. Present practice model

4. A wrong branch vs. a permanent branch

5. National bodies vs. journals/referees

6. Different representation levels (identification, measurement, and market issues)

Part of Bill McCarthy, Michigan State University, in an Ontolog session talk "Ontologically-Driven Standards -- the Natural Tensions"

Upcoming Sessions and Events

- Ontology-based Financial Standards (e.g. ISO 15944, FIBO)
[MikeBennett, BillMcCarthy,ElieAbiLahoud] Thu 2013.11.07 session-6

- How ontologies can help with the formal specification of the natural language standards Thu 2013.12.12 session-7

[SimonSpero, RichardMartin, MarkJohnson, KenBaclawski, AdamWyner]

Two SOCoP sponsored events are coming up.

1.Workshop on Semantics in Geospatial Architectures: Applications and Implementation
October 28-29, 2013,Pyle Center (702 Langdon Street, Madison, WI), University of Wisconsin-Madison (http://www.ssec.wisc.edu/meetings/geosp_sem/)

2. **GeoVoCamp** in Ballston VA at the NSF facility on Nov 18-19 (M-T) 2013
Follow-up to prior GeoVoCamps including those held in Santa Barbara, Dayton and DC in 2012 and at Santa Barbara CA in 2013. As with previous workshops this will be organized around 4-5 Work Groups.   See http://vocamp.org/wiki/GeoVoCampDC2013