International Association for Ontology and its Applications (IAOA)

Semantic Web Applied Ontology Special Interest Group (SWAO SIG)

Ontology Summit 2014 Symposium
April 29, 2014

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There is a large common ground between the Semantic Web (and Linked Data) and the Applied Ontology (largely focused on ontological analysis) communities in terms of their perspectives on ontologies.

*The Semantic Web community* emphasizes:
- Gaining traction/adoption of semantic technologies on the WWW, and exposing data
- The employment of a bottom-up approach
- Much of the use of SW technologies, however, occurs not on the open Internet, but on Intranets closed off to more widely distributed communities and issues
- In general, these Intranets require more precise ontologies primarily because they have more specialized use cases for ontologies, some of which require more precise automated reasoning

*The Applied Ontology community* uses Semantic Web technologies, but often in Intranets, where the domain requirements are more precise, and often require more complex automated reasoning.
There is a large common ground between the Semantic Web (and Linked Data) and the Applied Ontology (largely focused on ontological analysis) communities in terms of their perspectives on ontologies.

- **The Semantic Web community**
  - Emphasizes:
    - Gaining traction/adoption of semantic technologies on the WWW, and exposing data
    - The employment of a bottom-up approach
    - Much of the use of SW technologies, however, occurs not on the open Internet, but on Intranets closed off to more widely distributed communities and issues
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  - Uses Semantic Web technologies, but often in Intranets, where the domain requirements are more precise, and often require more complex automated reasoning

Sound familiar?
Yes, it should.

We kicked off the IAOA SWAO SIG in November, 2013.

It was input into the themes considered for Ontology Summit 2014.
Ontology Spectrum: Range of Models

**Logical Theory**
- Modal Logic
- First Order Logic
- Description Logic
- DAML+OIL, OWL
- UML

**Conceptual Model**
- RDF/S
- XTM
- Extended ER

**Thesaurus**
- ER

**Taxonomy**
- DB Schemas, XML Schema
- ER

**From less to more expressive**

- Strong semantics
- Semantic Interoperability
- Structural Interoperability
- Syntactic Interoperability

- Weak semantics
Ontology Spectrum: Generality & Expressiveness

**Strong Semantics**
- Modal Logic
- First Order Logic
- Description Logic
- DAML+OIL, OWL
- UML

**Semantic Interoperability**
- Problem: Very General
  - Semantic Expressivity: Very High

**Conceptual Model**
- Is Subclass of
- Is Disjoint Subclass of
- With transitivity property

**Logical Theory**
- Modal Logic
- First Order Logic

**Weak Semantics**
- Thesaurus
- Has Narrower Meaning Than
- Taxonomy
- Is Sub-Classification of

**Syntactic Interoperability**
- Structural Interoperability

**Problem**
- Local
  - Semantic Expressivity: Low
- General
  - Semantic Expressivity: Medium
- Very General
  - Semantic Expressivity: Very High

From less to more expressive
Ontology Spectrum: Generality & Expressiveness

- **Logical Models**
  - Modal Logic
  - First Order Logic
  - Description Logic
  - DAML+OIL, OWL
  - UML

- **Conceptual Models**
  - Is Subclass of
  - Is Disjoint Subclass of
  - Property

- **Thesaurus**
  - Has Narrower Meaning Than
  - Is Sub-Classification of

- **Taxonomy**
  - Problem: Local
  - Semantic Expressivity: Low

- **DB Schemas, XML Schema**
  - Problem: General
  - Semantic Expressivity: Medium

- **Extended ER**
  - Problem: General
  - Semantic Expressivity: Medium

- **RDF/S**
  - Problem: Very General
  - Semantic Expressivity: Very High

**Semantic Interoperability**
- Internet Semantic Web: generally less expressive models because less complex applications
- Weak semantics

**Syntactic Interoperability**
- RDF ≡ EER?
- Strong semantics

From less to more expressive

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Ontology Spectrum: Application

More Expressive Semantic Models Enable More Complex Applications
Ontology Spectrum: Application

- **Logical Theory**
  - Concept (referent category) based
  - Term - based
  - Controlled Vocabularies

- **Conceptual Model**
  - Thesaurus
  - Taxonomy

**Expressivity**

- More Expressive
  - Internet Semantic Web: generally less expressive models because less complex applications

**Application**

- Categorization, Simple Search & Navigation, Simple Indexing
- Synonyms, Enhanced Search (Improved Recall) & Navigation, Cross Indexing
- Enterprise Modeling (system, service, data), Question-Answering (Improved Precision), Querying, SW Services
- Real World Domain Modeling, Semantic Search (using concepts, properties, relations, rules), Machine Interpretability (M2M, M2H semantic interoperability), Automated Reasoning, SW Services
Upper, Middle, Domain Ontologies

- Most General Thing
  - Time
  - Identity
  - Space
  - Material
  - Organizations
  - Facilities
  - Events
  - Roles

- Artifacts

- Upper Ontologies (Generic Common Knowledge)
- Middle Ontologies (Domain-spanning Knowledge)
- Lower Ontologies (individual domains)
- Lowest Ontologies (sub-domains)

- Areas of Interest
  - Analyst Business Analyst
  - Financier
  - E-Commerce Org
  - Amazon
Upper, Middle, Domain Ontologies & Bottom-up Mid-Level Ontological Patterns

Top-down Analytical Ontologies

Upper Ontologies
(Generic Common Knowledge)

Middle Ontologies
(Domain-spanning Knowledge)

Lower Ontologies
(individual domains)

Lowest Ontologies
(sub-domains)

Best: We meet in the middle!

Bottom-up Emerging Pattern Ontologies
IAOA SWAO

• Join!
  – Join the IAOA
  – Join the IAOA SWAO SIG as either an IAOA member or not

• Co-Chairs:
  – Andrea Westerinen (Nine Points Solutions, LLC)
  – Elie Abi-Lahoud (University College Cork – Ireland)
  – Michael Bennett (Hypercube Ltd.)

• SWAO Mission

• Events, events, events!
  – Proposed ISWC 2014 Workshop: No go, but possible other venues!

• Let’s continue Ontology Summit 2014!
  – Workshop, Journal Issue, Book, more