Ontology Summit 2013
Ontology Evaluation Across the Ontology Lifecycle
Track C: Building Ontologies to Meet Evaluation Criteria
Synthesis 1: 21st Feb 2013
Ontology Development Methodologies for Integrating Ontologies

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Co-Champions

Track Background

- There are two approaches that can be taken to assuring the quality of an ontology:
  1. Measure the quality of the result against the requirements that it should meet.
  2. Use a process or methodology which will ensure the quality of the resultant ontology.
- If you wait to the end of ontology development to measure the quality, the costs of correction of any errors are likely to be high. Therefore using a process or methodology that builds quality into an ontology can have significant benefits. At present, however, it is unclear if there is any process or methodology that, if followed, is sufficient to guarantee the quality of a resulting ontology, and most of those that do exist are relatively informal and tend to require expert support.
- A consideration in evaluating ontologies is the different scenarios in which they are used. For example, one might be used as a formal conceptual model to inform development and another might be used in an ontology based application. Both the evaluation criteria and the development methodologies employed may vary widely.

Track C Mission and Objectives

Mission

To investigate the state of the art in ontology development methodologies, including key achievements and key gaps that currently exist.

Objectives

1. Examine the explicit and implicit methodologies that are known to exist.
2. Understand the role that upper ontologies play in ontology development methodologies.
3. Understand the role of ontological patterns in ontology development methodologies.
4. Identify how to apply the intrinsic and extrinsic aspects of ontology evaluation identified by the other tracks, within the applicable development methodologies.
5. Identifying how to frame the applicable ontology development methodologies within the frameworks of established quality assurance regimes (such as ISO 9000 and CMMI) for industrial applications.

Sessions

- Ontologies come in two main varieties, ontologies for integration and ontologies as applications.
- We have sessions around methodologies for developing each of these types with the aim to establish the differences and similarities in the methodologies found amongst those types and between them.
- Session 4 – 7th February 2013
  - **Ontology Development Methodologies for Integrating Ontologies**
- Session 9 – 14th March 2013
  - **Ontology Development Methodologies for Reasoning Ontologies**

Session 1: Ontology Development Methodologies for Integrating Ontologies

Professor Barry Smith (University at Buffalo, US)

- Ontological realism as a strategy for integrating ontologies'

Mr. Chris Partridge (BORO Solutions, UK)

- Ontology Architecture - Top Ontology Architecture

Mr. Anatoly Levenchuk (TechInvestLab, RU)

- ISO 15926 Reference Data Engineering Methodology

Mr. Mike Bennett (EDM Council, UK)

- Quality Considerations for an Industry Standard Ontology

Track C Session 1 Key Points

- Smith:
  - Semantic silos, KR, Evidence based ontology development
  - Develop a methodology around this requirement
  - Common upper ontology criteria (BFO)
- Partridge:
  - Metaontological choices;
  - The need to build this into a methodology
- Levenchuk:
  - Defining methods for ontology development
  - Extension of data model development or something different?
- Bennett:
  - Why methodology (genius v methodology);
  - Ontology as CIM; which measures apply?
  - Precision v Presentation

Smith: Ontological Realism

- Knowledge representation, common language
- Common ontology, semantic silos
- Evidence based ontology development
  - How to identify the best ontology for common concepts
    - Authority, homesteading, voting etc.
    - Textbook – publicly accessible reference
- Methodology around this
- Upper ontology – BFO / Lattice of theories

Partridge: Top Ontology Architecture

- Larger projects require an architecture
- Conceptual model
- Context: large-ish ontology project
- Choices: Top ontology? Domain ontology?
  - The Buy v Build equation, applied to ontologies
- Metaontological choices
  - Interdependence between these choices
  - Putting this into a methodology
  - Make these choices explicit

Levenchuk: ISO 15926

- Context: ontology based systems federation
  - Use of ontology in the broader engineering of a system
  - Methodology for reference data development
    - And the role of ontology within this
- Practical experience in developing this
  - Situational method engineering
    - Develop method tailored to each specific project
    - How to apply this in ontology
- Theory:
  - Use of ISO 24744 as a standard for describing a method;
  - Use of ISO 15926 as the method so described
- What's a method?
  - Products, system, process, organization, language
  - Looked at Reference Data lifecycle
- Questions: Do we need "Ontology engineering" as a separate component of this, or is it an extension of "Software Engineering"?

Bennett: Quality for Industry Standard Ontology

- Background on why methodology
- Ontology as Computationally Independent Model
  - Requirements for CIMs; for standards
  - Applying these to ontology
- Metaontological requirement for CIM
  - Implementation independent
  - Business Validation requires business readability
- Experience: expectations based on OWL as an application
  - Which of the things about an ontology application should be applied to ontology as CIM?
  - Precision versus Presentation
- Methodology requirements
  - Business semantics (abstraction, grounding etc.)
  - Use of tools seen on this Summit: which to apply, to what kinds of ontology (CIM v PSM) and how?
  - Iterative development of CIM / application ontologies

Observations and Feedback

- We looked at quality considerations for ontologies used as conceptual models rather than applications
  - There are two perspectives on this:
    - Conceptual model as part of systems development methodology
    - Methodological considerations for the development of the ontology itself
  - Most material was focused on the latter
- Quality measures that may be applicable to this kind of ontology requirement
  - Selection criteria for reuse of ontologies, upper ontologies
  - Choices in the selection of ontologies and in the underlying ontological commitments
  - Grounding of concepts in prior art, established (textbook) meaning

Summary:

- We seemed to have a kaleidoscope of the pieces of a possible methodology
  - But not the methodology itself
  - Some pointers for a framework to develop methodology
  - Methodological elements in the use of upper ontologies
- Each of the choices described needs to be fitted within the process flow for development of the relevant kind of ontology
  - These may not all fit in to the same process flow as they may apply to different uses of the integrating ontology / conceptual ontology
- Could have emphasized more about business SME validation
  - As part of the methodology itself
- Conclusion: Validated the need for a formal methodology and identified a lot of the pieces. There is work to be done!