Ontology Summit 2013:
Ontology Evaluation Across the Ontology Lifecycle
Symposium, NIST, May 2, 2013

Track A: Intrinsic Aspects of Ontology Evaluation

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Intrinsic Aspects

• Track A focused on the evaluation of ontologies under the following intrinsic aspects
  – Is the ontology free of obvious inconsistencies and errors in modeling?
  – Is the ontology structurally sound? How do we gauge that?
  – Is the ontology appropriately modular?
  – Is the ontology designed and implemented according to sound principles of logical, semantic, and ontological analysis?
  – Which intrinsic aspects of ontology evaluation are of greater value to downstream extrinsic ontology evaluation?
  – Intrinsic Aspects Comparable to White/Glass Box Testing?
One Cut: Structural Intrinsic and Domain Intrinsic

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<th>Structural Intrinsic Aspects</th>
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• **Structural Intrinsic Evaluation**
  – Draws upon mathematical and logical properties such as graph-theoretic connectivity, logical consistency, model-theoretic interpretation issues, inter-modularity mappings and preservations, etc.
  – **Structural metrics** such as branching factor, density, counts of ontology constructs, averages, and the like are intrinsic
  – **Meta-properties** such as transitivity, symmetry, reflexivity, and equivalence may also figure in intrinsic notions
  – Does not depend at all on knowledge of the domain being modeled

• **Domain Intrinsic Evaluation**
  – Evaluation where some understanding of the domain is needed
  – Focus on ontological content methods such as better ontological and semantic analysis, including meta-property analysis (as provided by methodologies like OntoClean, etc.), and use of sound ontological theories of parts, 3D/4D, essence, identity, intentionality, causation, social roles
  – Domain knowledge and better ways to represent that, divorced as much as possible from application-specific domain requirements from extrinsic evaluation issues
Example Structural and Domain Intrinsic Evaluation Tools

- **OOPS!**: Reports on suspected improper uses of various OWL DL modeling practices
  - Described by MariaPovedaVillalon

- **OntoQA** to develop metrics for any ontology based on structural properties and instance populations
  - Described by SamirTartir

- **Macleod** for automatically checking the consistency, detecting invalid vocabulary terms, and determining provability of competency questions in Common Logic ontologies
  - As used in TorstenHahmann’s PhD dissertation

- The **OQuaRE** framework combines both context dependent and independent metrics
  - Described by AstridDuqueRamos
  - The OQuaRE team has stated their desire to better distinguish between these two categories of metrics

- **The OntoClean methodology**
  - Not reported on in Ontology Summit 2013, but generally well-known
  - Draws upon standard evaluative criteria originating from ontological analysis
Discussion Questions

1) Structural evaluation tests are the easiest set of tests to apply. Agree or disagree?

2) Structural evaluation provides the greatest ROI during ontology development. Agree or disagree?

3) Is ontology quality always relative to some external criteria? Can an ontology intrinsically be of high quality without respect to some criteria? Is ontology quality inherently second-order?

4) Does ontological analysis in terms of relatively agreed upon and sound theories (e.g., mereotopology, a theory of parts; distinguishing semantic vs. metaphysical analyses or commitments, a theory of referring expressions and their referents; 3D vs. 4D analyses; parsimony of representation; explicit intentional and causal focus; etc.) enable a better ontology?

5) If we were to rank criteria that a good (“quality”) ontology would have, what would be the first five criteria in order of importance?