



Dimensionality of Evaluation Contexts for Ontologies

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Presentation Overview



- Background/Motivation
- Evaluation Context Dimensions
- Suggestions for Future Work

Background/Motivation



- NCOIC developed a set of Net Centric Attributes for evaluating systems and programs from a net centric perspective
 - It proved necessary to tailor which attributes were applicable in specific evaluation contexts
- NCOIC also conducted an “invited review” of the US DoD Net Centric Attributes in the 2009-2010 timeframe
- Exploration and analysis of the attributes with DoD stakeholders revealed a number of assumptions regarding the motivation for the attributes and how they were anticipated to be used
 - These assumptions were not explicit in the attributes themselves
 - DoD Programs often attempted to apply the attributes in contexts that differed from these assumptions in significant ways
- The NCOIC invited review recommended an explicit set of evaluation context dimensions to help programs decide which attributes to select for evaluation and how to apply them

Background/Motivation



- Ontology evaluation has similar evaluation context dimensions
- The set of possible ontology evaluation criteria is very large
 - Unlikely that it will be practical to apply every possible criterion in every evaluation
- The importance of a particular criteria in achieving the purpose of a particular evaluation depends on the evaluation context
- The appropriate target value or value range for a particular attribute may differ depending on evaluation context
- The appropriateness of a particular attribute type may also depend on some aspect of evaluation context
 - For example, levels of detail and degree of specificity depend on life cycle phase
 - Some attributes may only be “measurable” in certain application domains

Evaluation Context Dimensions



- Enterprise/Institutional Scope Dimensions
- Ontology Evaluation Scope Dimensions
- Ontology Application Domain Dimensions
- Ontology Life Cycle Phase Dimensions
- Ontology Evaluation Purpose Dimensions
- Other Evaluation Context Dimensions
 - Evaluation Process/Methods/Tools
 - Relationship between Ontology provider(s), user(s), and evaluators
 - Aggregation of evaluations over time and domains
 - Reputation/Experience Management
 - Comparability of evaluations, rating systems/conventions
 - Rating Liability, Privacy and Intellectual Property Rights
 - Evolution history/trajectory of Ontologies and associated evaluations

These dimensions are offered up as strawmen for consideration

Enterprise/Institutional Context Dimensions



- This subspace provides the institutional setting and scope portion of the evaluation context
 - It can be a social, virtual, political, economic, legally constituted or informal enterprise or institution
 - It often provides implicit institutional or domain scope boundaries for an ontology
 - It is the primary driver of the languages and representations used for the ontology
 - It may determine interoperability/compatibility requirements with other related ontologies
 - It is the primary driver of any regulatory, legal, privacy, intellectual property, and security evaluation criteria for ontologies
- Example instances include this forum, W3C, NATO, NIST, ISO, Individual companies, projects or divisions within companies, product lines, industry associations like NCOIC, etc.
- NCOIC has more detailed scope dimensions for enterprise context

Ontology Evaluation Scope Dimensions



- What portions/aspects of the Ontology are to be evaluated?
 - All of it?
 - Some subset of the Ontology?
 - Ontology plus instance knowledge base?
 - Reasoners that work with the Ontology?
 - Something else?
- What constituent parts comprise the ontology?
- Is it possible to evaluate a selected subset separately?
- Are there ancillary constructs or services that might be viewed as part of an ontology in some contexts?
 - For example, ontology compliance verification services
 - Naming services for ontology instances, like VINs for cars or domain names on the Internet

Lifecycle Phase Dimension



- This dimension of evaluation context focuses on where in the development lifecycle the ontology is being evaluated
- Some examples of context values along this dimension are:
 - The need for, and scope of, an ontology have been developed
 - Some portion of the formal representation of the ontology has been developed
 - All of the planned formal representation is complete
 - The ontology is populated with instance data
 - Reasoners have used the ontology to achieve real-world results
 - The ontology is in operational use
 - The ontology is evolving based on feedback from operational use
- Where the ontology is on this dimension can have a significant effect on what evaluation criteria might be appropriate
 - For example, who is using the ontology may be an important criteria in some contexts, but only if it is near one end of this dimension

Application Domain Dimensions



- How the ontology is anticipated to be used and in what operational domains it will be used will drive many evaluation attribute decisions
- This evaluation context subspace has a number of obvious sub-dimensions
 - Intensional versus extensional attributes
 - Ontology application types – how is it being used by systems and services on the network or in other contexts
 - For example, to drive software generation, to generate data queries, etc.
 - Which application domains does the ontology address/encompass?
 - How much of the application domains does the ontology cover?
 - What are the sources of domain-specific (i.e., extensional) attributes for evaluating ontologies in a given domain?
 - What are the related domains that users of the ontology might reasonably be expected to encounter?
 - Are there related ontologies in use that might constrain the evaluated ontology in its intended application domain?

Evaluation Purpose Dimensions



- This subspace characterizes the reasons for the evaluation at hand
 - There may be multiple reasons for evaluation, with some more important than others
 - The purpose may be tied to other evaluation context dimensions such as life-cycle phase and enterprise context, e.g.:
 - Decision to invest in further development of an ontology
 - Product Line plans, supply chain interoperability strategy
 - Review of an ontology for regulatory compliance
- Overall evaluation breadth and level of detail in evaluation criteria are driven by the Evaluation Purpose dimensions
 - Enterprise Context and ontology domain scope may constrain viable level of investment in ontology evaluation
 - Broader enterprise and domain scope generally merit more investment in ontology evaluation, but the business model for such investment becomes an issue

Other Evaluation Context Dimensions

- Evaluation Process/Methods/Tools/Services
 - E.g, evaluation workshops, self-evaluations, automated online evaluation services, formal certifications, etc.
- Relationship between Ontology provider(s), user(s), and evaluators, including business and socio-political models
- Aggregation of evaluations over time and application domains
- Reputation/Experience Management related to operational use of specific ontologies – in specific contexts
- Comparability of evaluations, rating systems/conventions
- Rating Liability, Privacy and Intellectual Property Rights
- Evolution history/trajectory of Ontologies and associated evaluations
- Ontology compatibility ratings
- Ontology translation and “mapping” services
- Others??

Suggested Future Work



- Additional Ontology Evaluation Context Dimensions?
- Flesh out context subdimensions and associated “scales”
- Categorize Ontology evaluation attributes as to applicable context dimensions and ranges (and vice versa)
- Consider impact of evaluation context on evaluation processes and tools