Criteria catalogue for evaluating the success of automatic ontology construction

Quality attributes related to the way in which the ontology presents the domain knowledge. The main ones are:

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| **Criteria** |  |  |
| **Content:** The contents aspect has quality attributes that focus on the contents of the ontology. | Completeness: whether the ontology represents all of the knowledge of a subject domain |  |
|  |  | Syntactic completeness: how much the vocabulary of the ontology matches exactly that of the standard; |
|  |  | Semantic completeness: how much the vocabulary of the standard can be derived from the ontology |
|  | Correctness: whether the ontology accurately represents the knowledge of a subject domain |  |
|  |  | Compatibility: whether the ontology contains junk, i.e., contents not in the subject domain |
|  |  | Internal consistency: whether there is no self-contradiction within the ontology |
|  |  | External consistency: whether the ontology is consistent with the subject domain knowledge |
| **Presentation:** The presentation aspect has quality attributes related to the way in which the ontology presents the domain knowledge |  |  |
|  | Well formedness: syntactic correctness with respect to the rules of the language in which it is written. Like internal consistency, it is a precondition to all further analysis. |  |
|  | Conciseness: The key attribute for this is the lack of redundancy within the ontology, where an element is redundant if it can be derived from other elements of the ontology. This can also be measured by metrics |  |
|  | Structural complexity: This is particularly important when the ontology has redundancy. This is because redundancy often helps to improve usability but since each redundancy increases the complexity in different ways, it is useful to measure complexity and choose the least complex ontology |  |
|  | Modularity: How well the ontology is decomposed into smaller parts, to make it easier to understand, use, and maintain. These smaller parts, or modules, form ontologies of subdomains and may themselves refer to other modules. | <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7914198> |

Access the quality of the ontology

Is ontology syntactically correct? Does the ontology cover the domain of interest? Is the ontology comprehensive by user?

We can access the quality of the ontology against three dimensions:

* Syntactic: The syntactic quality dimension is on its face straightforward. If the ontology contains syntactic errors, then the software tool supporting the language used in model should be able to point these errors out to the analyst. However, a deeper issue is how complex a syntax should be used. There are, after all, many modeling languages. In tool-supported ontologies, the syntactic issue is richness and complexity of syntax rather than correctness
* Semantic: Semantic quality is how well the ontology reflects its universe of discourse
* Pragmatic: Pragmatic quality is how easy the ontology is to understand

Gruber formulated ontology design principles as five design criteria

* **Clarity-**effectively communicates intended meaning
* **Coherence** - sanctions consistent inferences
* **Extendibility-** anticipates uses of shared vocabulary
* **Minimal encoding bias**-as free as possible from implementation decisions
* **Minimal ontological commitment**-as few claims as possible about the world being modeled.