The Product Life Cycle Ontologies and the IOF: Cases, Lessons, Best Practices

J. Neil Otte, neilotte@gmail.com

[Handout]

PROPOSAL

The IOF ought to officially adopt Basic Formal Ontology as an upper-level ontology and the Common Core Ontologies as mid-level ontologies. Then, the IOF should begin with the Product Life Cycle Ontologies, and revise, extend, and replace them as needed.

Common Core Ontologies (CCO) is a suite of mid-level ontologies, including ontologies of:

* Agents
* Artifacts
* Currency Units
* Events
* Extended Relations
* Geospatial
* Information Entities
* Modality
* Qualities
* Time
* Units of Measure

BFO-conformant, good documentation, widely-used, more polished than many OBO Foundry ontologies, and relevant to the domain of industry.

The Product Life Cycle (PLC) Ontologies is a suite of mid-level ontologies, including ontologies of:

* Commercial Entities
* Design
* Manufacturing Processes
* Maintenance
* Product Life Cycle
* Testing Processes
* Machines and Tools

*Pros*: BFO and CCO-conformant, and appropriate to the scope of the IOF. Presently, there is work underway to add to it an ontology for material properties.

*Cons*: Still a work in progress

CONSIDERATIONS IN FAVOR OF THE ABOVE

* BFO and the CCO are widely used, well-documented, and highly successful ontologies.
* Adopting BFO will bring in the resources of the National Center for Ontological Research.
* The PLC ontologies will provide users with clear examples of how their ontologies may be re-factored to be conformant with BFO.
* The governance of the PLC ontologies is available starting June 1, 2018.
* BFO has been approved as ISO/IEC standard 21838-2
* BFO is available in both OWL and CL (CLIF and FOL) formats

Resources

All ontologies discussed here, along with these slides and this handout, are available at: <https://github.com/NCOR-US/CHAMP>

The National Center for Ontological Research website and wiki are here:

<https://ubwp.buffalo.edu/ncor/> and <http://ncorwiki.buffalo.edu/index.php/Main_Page>

Side Two: Cases, Lessons, and Best Practices

1. The True Path Rule applies to asserted classes only. Use defined classes for convenience and to aid in conforming to the rule.

Ex. Product = ‘Artifact and bearer of some Product Role.’

1. When building reference ontologies, avoid creating many relations that double the semantic work being done by classes. Example:

Bad: ‘Product has\_product\_function some Product Function.’

Better: ‘Product bearer\_of some Function.’

1. Processes should be represented by classes, not relations.
2. Every class should receive an Aristotelian, or genus-species form, definition to be placed in a class annotation, and a separate annotation should list the term editor who is responsible for creating it.
3. If necessary, allow cheats and short cuts in application ontologies. Reference ontologies require representing what is true of reality, not what is expedient.
4. Creating hierarchies for artifact types is hard. Don’t forget to represent artifact functions, artifact manufacturers, past uses of artifacts belonging to the same product line, etc. This will aid querying for artifacts even in the absence of a well-built taxonomy of artifact types.
5. A service is a process. When you sign a service agreement, you don’t buy a service. You buy the claim on someone else to provide the service, and the seller acquires an obligation to provide that service upon request. Both the claim and the obligation may be represented with roles.
6. The completeness of your ontology doesn’t rest with whether or not someone’s preferred term is available in it, but rather, with whether or not your ontology can express the same meaning in an alternative vocabulary.
7. In class labels, use prefixes and sortal noun phrases. Examples:

Bad: Water

Good: Portion of Water

Bad: Work

Good: Process of Work

1. Certain terms like ‘color’ can refer both to a disposition (e.g. the power to induce others to have a certain qualitative experience) and the quality that is the base of the disposition (e.g. the surface grain structure responsible for reflecting light away from an object). When necessary, represent both.

1. Never confuse information with the entities the information is about. ‘5 centimeters’ is not a length; rather, it is a measurement that is about a length.