

# ONSET Use Cases from existing and simulated ontologies

April 23, 2012

ONSET, the foundational ontology selection tool, assists the domain ontology developer in selecting the most appropriate foundational ontology. The domain ontology developer provides the requirements/answers one or more questions, and ONSET computes the selection of the appropriate foundational ontology and explains why. The current version (v1.2) includes DOLCE, BFO, GFO and SUMO. To download ONSET and access supplementary information go to <http://www.meteck.org/files/onset/>. The ONSET application was developed by Zubeida Khan as part of her BSc(honours) thesis in Computer Science at the University of KwaZulu-Natal, supervised by Maria Keet. It was further refined afterward to include other foundational ontologies and more data.

## 1 Use Cases

### 1.1 Scenario 1: Semantic Management of Middleware

Firstly, the tool was tested according to the requirements of [1] which is an application of the semantic web. Ontological choices of the test case include: descriptiveness, a multiplicative approach, possibilism, perdurantism, modularity (the existence of lightweight versions) and an executable language. ONSET has chosen DOLCE as a foundational ontology. The output of ONSET for this case study is displayed in Fig 1. This corresponds to the foundational ontology used in [1].

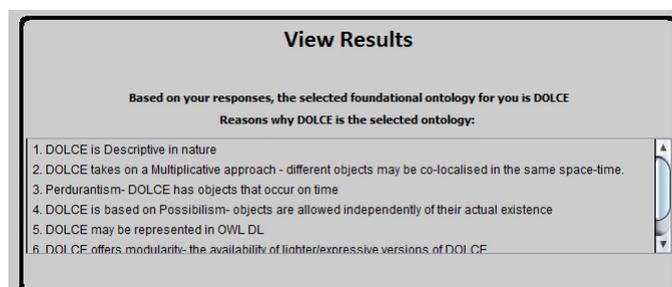


Figure 1: Output of ONSET: Scenario 1

### 1.2 Scenario 2: Microbial Loop Model Ontology

Secondly, ONSET was tested according to the requirements of [2], which describes a microbial loop model ontology. For this ontology, the requirements were: a realist approach, different levels of granularity, endurantism and perdurantism, temporal aspects and the usage of quality and qualia. ONSET chooses DOLCE as the selected foundational ontology. This corresponds to the foundational ontology used in [2]. However, there is a conflicting answer in this scenario: DOLCE is descriptive in nature whereas the user wants a realist ontology. The conflicting results present for this scenario is illustrated in the following screenshot.

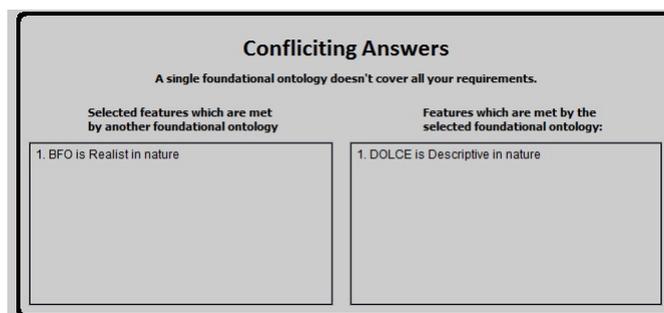


Figure 2: Output of ONSET: Scenario 2

### 1.3 Scenario 3: Ontology of Mental Disease

An ontology of mental disease is presented in [3]. It is required to be a realist ontology with a clear distinguishment between continuants and occurents (endurants and perdurants). Furthermore, it is to be registered with the OBO foundry. ONSET chooses BFO as a selected ontology for this study. This corresponds to the foudational ontology used in [3].

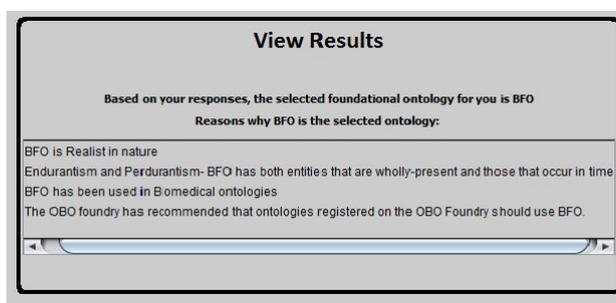


Figure 3: Output of ONSET: Scenario 3

### 1.4 Scenario 4: Scaling Effects

We show the functioning of scaling in ONSET by simulation of a scenario. Let us assume that there is an ontology to be created with the following requirements: an ontology of universals, realist in nature, to be represented in OWL DL, modularity (endurants and perdurants separate, built-in domain specific ontologies), applying it to formally represent scientific theory and a domain of life sciences. Without scaling, ONSET chooses BFO as the selected foundational ontology as can be seen in Fig. 4.

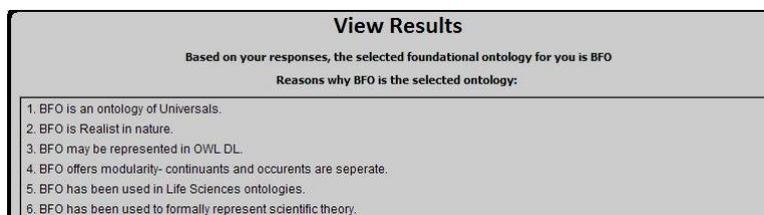


Figure 4: Output of ONSET: Scenario 4 (without scaling).

Scaling is then applied to ONSET. The categories are scaled in the following manner: ontological commitments is assigned a value of 1, representation languages 5, software engineering properties 3, subject domain 5, and applications a 4. Now ONSET chooses DOLCE as the selected foundational ontology (Fig. 5); hence, the results of ONSET changed for the same values as before but together with scaling.

The results of ONSET changed for the same scenario when scaling was implemented, demonstrating that the scaling feature of ONSET works properly.

**View Results**

**Based on your responses, the selected foundational ontology for you is DOLCE**

**Reasons why DOLCE is the selected ontology:**

1. DOLCE may be represented in OWL DL.
2. DOLCE offers modularity- endurants and perdurants are separate.
3. DOLCE offers modularity- it has built-in domain-specific ontologies including modules for plans, information objects, social notions an
4. DOLCE has been used in Life Sciences ontologies.
5. DOLCE has been used to formally represent scientific theory.

**Conflicting Answers**

**A single foundational ontology doesn't cover all your requirements.**

**Features that are met by another foundational ontology**

1. BFO is an ontology of Universals.
2. BFO is Realist in nature.
1. GFO is an ontology of Universals and Particulars.
2. GFO is Realist in nature.
1. SUMO is an ontology of Universals and Particulars

**Features that are problematic for the selected foundational ontology**

1. DOLCE is an ontology of Particulars.
2. DOLCE is Descriptive in nature.

Figure 5: Output of ONSET: Scenario 4 (with scaling).

## References

- [1] Oberle, D. Semantic Management of Middleware. In: The Semantic Web and Beyond. vol. I, Springer, New York (2006)
- [2] Keet, C.M. Factors affecting ontology development in ecology In: Ludascher, B. and Raschid, L. (Eds.): Data Integration in the Life Sciences 2005 (DILS2005), Vol. 3615 of LNBI, 20-22 July, Springer-Verlag, San Diego, USA, pp.46-62
- [3] Ceusters, W., Smith, B.: Foundations for a realist ontology of mental disease. Journal of Biomedical Semantics 1(1), 10 (2010)