Reusing General Ontologies

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What is a general ontology?

General or common ontologies specify a conceptualization of generic topics such as time, space, and mereology.

What is Common Ontology Reuse?

General or Common Ontology Reuse refers to the process of using general or common ontologies in the solution of different problems.

Reusing General Ontologies

Definition

General or Common Ontology Reuse refers to the process of using general or common ontologies in the solution of different problems.

Goal

The goal of this process is to find and select general or common ontologies to be integrated in the ontology network being developed.

Input

Groups of competency questions (CQs) included in the ORSD of the ontology network to be developed, and the implementation language of such ontology.

Optionaly, there may be a set of tables that compare across the same criteria the candidate ontologies to be reused.

Output

A general or common ontology integrated in the ontology network being developed.

Who

Software developers and ontology practitioners involved in the ontology development. The help of an ontology practitioner familiarized in formal ontologies/theories may be required.

When

The general or common ontology reuse process should be carried out after the ontology specification activity.

How have we tested the proposed process?

Phase 1. Application of the 1st version of the process

Esperonto project (IST-2001-34373)

The main objectives of Fund Finder are to allow Web users to ask for funding resources. A time ontology was reused to model deadlines and other temporal features.

Phase 2. Refinement and application of the 2nd version of the process

NeOn project (IST-2005-027595)

The Pharmaceutical Product Ontology will be used as a bridge between systems. A mereology ontology was reused to model the parts of the drugs.

Phase 3. Controlled experiment (by January-February 2010)

Course in Ontologies and the Semantic Web in the Master in AI at UPM

We will measure the correctness of the ontologies built, and the precision, intelligibility, etc. of the description of each phase of the process. We will compare the direct reuse of the supporting theories and the reuse of the implementation of general ontologies.

Motivation for reusing general ontologies

(1) General ontologies are not constrained to particular domains and, consequently, can be reused in different domain ontologies. (2) They are usually based on well studied theories.

Which is the process?

Activity 1. Identifying the type of general ontology to be reused

Activity 2. Identifying the most significant definitions and axioms of the support theory. (This can require to carry out a background study on the support theory)

Activity 3. Carrying out a comparative study

Task 4.1. Analyzing the host CQs

Task 4.2. Identifying the features of the general ontologies

Task 4.3. Determining the general ontology that best fits

Task 4.4. Select a general ontology

Activity 4. Customizing the selected general ontology

Task 5.1. Pruning the general ontology

Task 5.2. Enriching the general ontology

Task 5.3. Translating the general ontology

Task 5.4. Evaluating the obtained general ontology

Activity 5. Integrating the general ontology
How to execute the process?

Activity 1. Identifying the type of general ontology to be reused

Activity 2. Identifying the most significant definitions and axioms of the support theory

Activity 3. Carrying out a comparative study

Activity 4. Selecting a general ontology

Activity 5. Customizing the selected general ontology

Activity 6. Integrating the general ontology

Rules on the CQs of the network ontology

Examples of the condition

| The word when appears ⇒ time | When is the deadline of a conference call? |
| Some of the following words appears: after, before, at the same time, hour, minute, etc. ⇒ time | Is the deadline of the call of conference 1 before the deadline of conference 2? |
| A relation that establishes an order is mentioned. ⇒ mereology | What is the composition of the drug? Remark: A substance x can be a component of y, y can be a component of z, and so on, in such a way that an order x < y < z is established. |
| Links, connections, associations, chemical bonds, etc. are mentioned ⇒ topology | Which are the substances bounded with substance 1? |

Activities 3. Carrying out a comparative study

<table>
<thead>
<tr>
<th>TIME ONTOLOGIES</th>
<th>Unrestricted time Ontology</th>
<th>Simple Time Ontology</th>
<th>DAML Time Ontology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Points</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Time Interval</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Relations between time points</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Different granularities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Time zones</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Criteria to select general ontologies

- Weight

<table>
<thead>
<tr>
<th>Criteria to select general ontologies</th>
<th>Range of values: (Low:1, Medium:5, High:10) (less is better) Unknown is transformed into 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reuse economic cost (it is measured by asking the owner for an estimate)</td>
<td>10</td>
</tr>
<tr>
<td>Reuse time required (it is measured by trying the connection to the server)</td>
<td>7</td>
</tr>
<tr>
<td>Understandability effort (Low, Medium, High) (the more the better) The sub-criteria are measured by direct evaluation of the engineer.</td>
<td></td>
</tr>
<tr>
<td>Quality of the documentation</td>
<td>8</td>
</tr>
<tr>
<td>Availability of external knowledge</td>
<td>7</td>
</tr>
<tr>
<td>Code clarity</td>
<td>8</td>
</tr>
<tr>
<td>Also Integration effort and reliability</td>
<td></td>
</tr>
</tbody>
</table>

Additional information:

- NeOn Deliverable D5.4.1 [http://www.neon-project.org/web-content/images/Publications/neon_2008_d5.4.1.pdf]
- FOIS’08 “Selecting and Customizing a Mereology Ontology for Its Reuse in a Pharmaceutical Product Ontology” Mariano Asunción Gómez-Pérez, Fernández-López, Mari Carmen Suárez-Figueroa

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IST-2005-027595
NeOn-project.org