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.

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.

What is Common Ontology Reuse?

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.

Optionally, 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.

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

Activity 4. Select a general ontology
- 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

Activity 5. Customize 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 6. Integrating the general ontology

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

Reusing General Ontologies

How to execute the process?

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

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?*

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

E.g. time

Time points, time intervals, relations between points, different granularities, etc.

Activities 3. Carrying out a comparative study

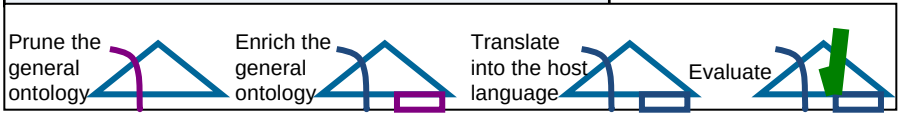
	Unrestricted time Ontology	Simple Time Ontology	DAML Time Ontology
Time Points	☑	☑	☑
Time Interval	☑	☑	☑
Relations between time points	☑	☑	☑
Different granularities		☑	☑
Time zones			☑

Activity 4. Selecting a general ontology

CQ Transformation rules	Example of transformation
TIME ONTOLOGIES	
When ⇨ *temporal point* or *temporal interval*	*When is the deadline of a call?* ⇨ *Which is the temporal point of the deadline of a call?*
Before ⇨ before	*Is the deadline of the call of conference 1 before of the one of conference 2?* ⇨ *Is the temporal point of the deadline of the call of conference 1 before of the one of conference 2?*
MEREOLOGIES	
A relation that establishes a (partial) order. ⇨ part of	*What is the composition of the drug?* ⇨ *Which are the parts of the drug?*

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

Activity 5. Customizing the selected general ontology



Activity 6. Integrating the general ontology

Additional information:

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- *NeOn Deliverable D5.4.1 (http://www.neon-project.org/web-content/images/Publications/neon_2008_d5.4.1.pdf)*
- *FOIS'04 Paper: "Searching for a Time Ontology for Semantic Web Applications". Mariano Fernández-López and Asunción Gómez-Pérez*
- *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*