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D3.1 – Results of the technology validation (STEP-OWL-linking)

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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Document history

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1.0	28/01/2007	Lothar Klein	First submission of D3.1
1.1	10/09/2007	Lothar Klein	Revision according to instructions of review report
	01/10/2007	Anna-Lena Alfter	Final layout check
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1 Foreword

This document has been developed in a collaborative approach using the **www.MediaWiki.org** software running at the internal S-TEN website at **www.s-ten.net**. The MediaWiki software is known as the underlying platform for the famous **www.Wikipedia.org** site. The printable version of this document was compiled from individual pages by following guidelines from **www.WikiBooks.org**.

Hence this document is a placeholder document in terms of the deliverable D3.1 with respect to the contractual provisions with the European Commission. The complete document is available at the restricted area of the S-TEN web site¹:

<http://www.s-ten.eu/po/index.php?path=/deliverables/d3.1/>

Organizations and persons in charge of this document together with their main responsibilities:

CAESAR

- David Leal for the strategy on how to derive ontologies from STEP data models

FGH

- Bernhard Schowe-von der Brelie for the quality review
- Anna-Lena Alfter for layout check

LKBALTIC

- Giedrius Liutkus for the SPARQL mapping and getting all working together
- Vaidas Nargelas for the Jena - JSDAI link

LKSOFT

- Lothar Klein for the core STEP data model, example and use cases

1.1 *Changes made for the second edition*

Bugs have been fixed for these annexes:

11.4 STEP-derived Ontology used for the technical validation

- In line `<owl:intersectionOf rdf:parseType="Collection"/>` the trailing "/" had been removed


11.7 Resulting STEP-OWL dataset

- In line `<!ENTITY step "http://www.s-ten.net/d3_1_basic_step_ontology.owl#"` a trailing ">" was missing
- Two times `<iso1000:meter_scale>` has been replaced by `<iso1000:metre_scale>`

A new annex have been added due to comments from reviewers

11.11 Example XSLT coversion from STEP to OWL

¹ Online access is provided to the Project Officer and the Expert Reviewers.

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2 Executive summary

For a core subset of STEP data-models, common to several STEP Application Protocols, a corresponding STEP-Ontology on the basis of OWL has been derived. The derived ontology is not a syntactical one-to-one mapping of the STEP data model but is a semantically and logically enriched model beyond what is explicitly defined in STEP. Because of this not every possible detail in STEP is preserved in OWL, but on the other hand the result of this work can lead to an improvement of STEP in future.

When converting from a STEP-File (ISO 10303-21) or a STEP-XML (ISO 10303-28) dataset to OWL the instance identifier are used as names (rdf.id) for the created classes and individuals. However the instance identifiers are not globally unique and when generating the same STEP dataset again there will be likely new instance identifiers for the same concepts. This makes it difficult to convert data back from OWL to STEP.

However in the case of a STEP database with an SDAI (ISO 10303-22) interface the instances identifiers change into persistent labels. Now it is possible to convert a STEP dataset into OWL and some time later to receive new OWL statements referring to the persistent identifiers. This is the basis of entering new data into a STEP database via OWL and to merge it with the data already present there without having the need to develop special converter and merging algorithm as it was e.g. done in the European funded IDA-STEP project (year 2000 to 2004).

The refined and extended goal of workpackage 3 is now to build up a STEP-database which can be queried and enhanced through the Semantic web. This means that internally data is stored according to STEP and bi-directional access to the data is realized with an OWL based semantic web services.

The current draft implementations are based on the JSDAI API from LKSoft for the STEP side and on the JENA framework and its SPARQL engine on the OWL/RDF side. Testing is done with an artificial hand-made example using all basic STEP elements. The data is converted from STEP to OWL and also from OWL to STEP. In addition we show how new data referencing existing data can be written back into a STEP database.

The STEP-Ontology together with the provided example are intended to become publicly available on the S-TEN web-site and will be presented on international conferences. The implementation details however will remain confidential know how of the consortium.

3 Introduction

The purpose of this deliverable D3.1 is to report the results of Task 3.2 "Technological Validation" within WP3 "Linking with Design and Maintenance Knowledge" of the S-TEN project.

This task investigates the creation of an ontology from STEP (ISO 10303) which enables design data to be recorded using RDF/OWL. Ultimately the ontology derived from STEP will be integrated with other ontologies, as shown in the figure below.

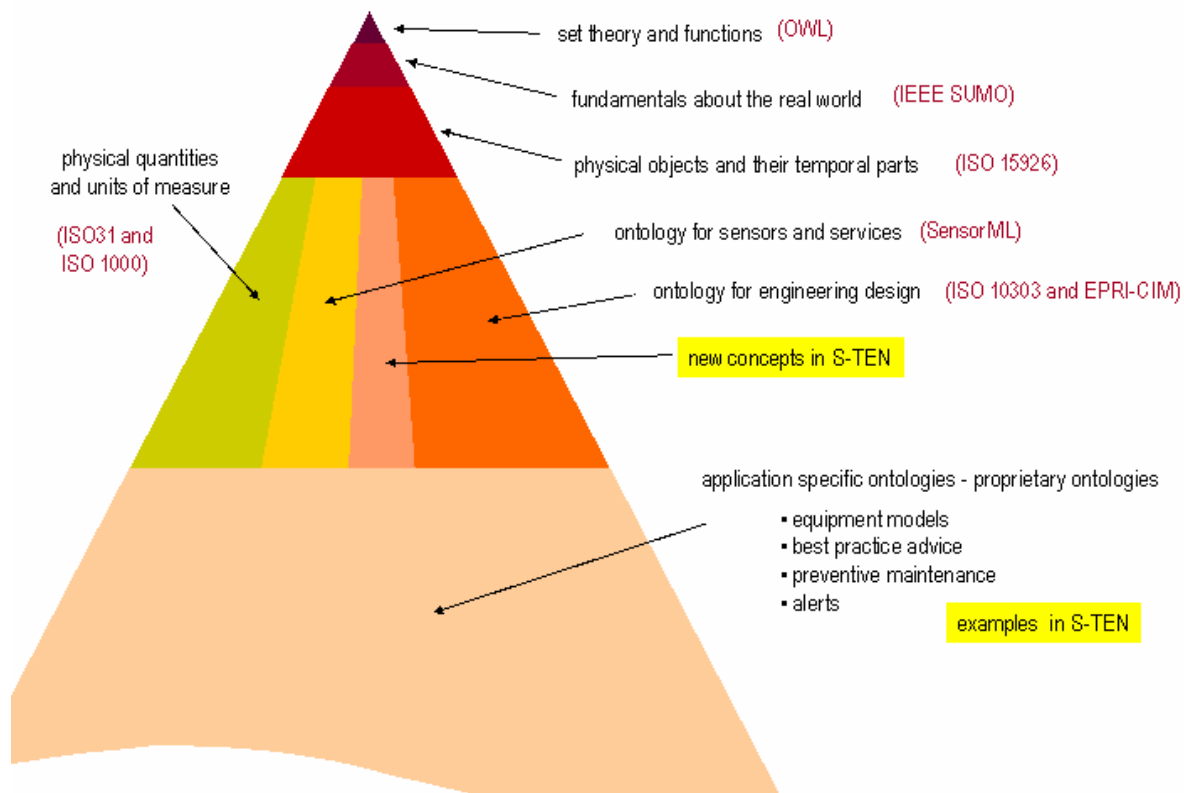



Figure 1: Hierarchy of ontologies used in S-TEN

The integration is not specified in this deliverable because it depends upon the top of the hierarchy, which is still being defined within task 2.1. The integration with the top of the hierarchy will be specified within deliverable D3.2 "Methodology for deriving ontologies from information models".

3.1 Excerpt from the Description of Work, WP3

Enabling seamless data exchange in both directions between STEP and OWL. This includes offering STEP design data available in a STEP database as OWL services and also being able to record actual OWL datasets in a STEP database. This will also allow to directly link design data with maintenance data in a STEP database using AP239.

The overall goal of WP3 is to make STEP data available to the OWL world and to merge OWL data back into STEP. From the current perspective we see that it makes most sense

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- to publish detailed design data, based on AP203/210/212/214, in OWL so that it can be used and referenced by other OWL devices, and
- to collect actual configuration and maintenance data available in the OWL world in a STEP database using AP239 (PLCS) and to visualize it from there.

3.2 Details for task 3.2 from DOW

In the task description 3.2 the following objectives for D3.1 are defined:

- creating and testing basic technology for linking STEP and OWL for a limited, small area of a selected STEP AP and a corresponding OWL representation.
- developing early draft ontology for the limited STEP area.
- developing basic software tools to demonstrate the feasibility of data exchanges, both from
 - a) STEP to OWL and from
 - b) OWL to STEP.

And it ends with: "The experiences and results gained in this task will be an important basis for the following, main tasks of WP3."


Because of this D3.1 contains draft results for the later deliverables in this workpackage:

- D3.2 "Methodology for deriving ontologies from information models (initial version in month 16, final version in month 20)"
- D3.3 "Ontologies derived from STEP data models (basis for possible standardization, covering major part of AP203, AP210, initial version in month 16, final version in month 20)"
- D3.4 "Software prototype to convert STEP data to OWL and offering it to the web (month 30)"
- D3.5 "Software prototype to convert OWL data to STEP and merging in with already existing STEP data (month 30)"

In addition this delivery is documenting how the milestone

- MS3.1 "Technology validation completed (month 10). At this milestone, the basis for the further technology development in WP3 is available."

is achieved.

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Important notice

The following chapters are not subject to this placeholder document as they are represented directly in HTML files.

The entire report can be accessed via:

<http://www.s-ten.eu/po/index.php?path=/deliverables/d3.1/>