

# Interoperability of Protégé using RDF(S) as interchange language

Raúl García-Castro, Asunción Gómez-Pérez

Ontology Engineering Group, Departamento de Inteligencia Artificial.  
Facultad de Informática, Universidad Politécnica de Madrid, Spain  
{rgarcia,asun}@fi.upm.es

**Abstract.** The Knowledge Web<sup>1</sup> European Network of Excellence, in order to assess and improve the interoperability of ontology development tools, has organised a benchmarking of the interoperability of ontology development tools using RDF(S) as interchange language. This paper presents the participation of Protégé in this benchmarking.

## 1 Introduction

The technology that supports the Semantic Web appears in different forms (ontology editors, repositories, reasoners, etc.) and, while all these tools use ontologies, not all of them share a common knowledge representation model. Moreover, a single tool can support different knowledge models, such as Protégé that can model ontologies using frames or OWL. This diversity in representation formalisms causes a problem when tools try to interoperate, affecting users who want either to interchange their ontologies from one tool to another, or to use their preferred tool when developing ontologies collaboratively.

Nowadays, users of ontology development tools do not know whether ontologies can be properly interchanged between two ontology development tools and, if so, which are the consequences of this interchange, such as addition or loss of knowledge. This leads to a slower uptake of ontology development tools by end users, both in the academia and the industrial world.

Knowledge Web, in order to assess and improve the interoperability of ontology development tools, has organised a benchmarking of the interoperability of ontology development tools using RDF(S) as interchange language.

This paper presents the RDF(S) interoperability benchmarking that is currently in progress, the benchmark suites that are being used in it and the participation of Protégé in it, as it is one of the leading ontology development tools.

## 2 Interoperability benchmarking

The benchmarking of the interoperability of ontology development tools using RDF(S) as interchange language follows the benchmarking methodology for ontology tools developed in Knowledge Web [1]. Participation in the benchmarking

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<sup>1</sup> <http://knowledgeweb.semanticweb.org/>

is open to any organization, and all the relevant information about it is available in a public web page<sup>2</sup>.

The interoperability of ontology development tools using RDF(S) for ontology interchange requires that the importers and exporters from/to RDF(S) of the tools work accurately in order to interchange ontologies correctly. Therefore, the experimentation included three consecutive stages:

- **Agreement stage.** The first step is to agree on the definition of the benchmark suites, which will be common for all the tools, as the quality of these benchmark suites is essential for the benchmarking results.
- **Evaluation stage 1.** The RDF(S) importers and exporters of the ontology development tools are evaluated with the agreed versions of the benchmark suites.
- **Evaluation stage 2.** The second evaluation stage covers the evaluation of the ontology interchange between ontology development tools.

Seven tools are currently participating in the benchmarking, of these four are ontology development tools: KAON, OntoStudio, Protégé using its RDF backend, and WebODE; and three are RDF repositories: Corese, Jena and Sesame.

When writing this paper, the benchmarking participants are in the *Evaluation stage 2*. By the beginning of June 2006, the experimentation will be finished, and the results obtained will be available in the benchmarking web page.

### 3 Benchmark Suites

The benchmark suites used in the benchmarking are composed of benchmarks that import, export or interchange an ontology that models a simple combination of knowledge model components (classes, properties, instances, etc.). The process followed for defining these benchmark suites can be found in [2].

The **RDF(S) Import Benchmark Suite** is used to perform an exhaustive evaluation of the RDF(S) import capabilities of ontology development tools. It contains 82 benchmarks and has been built regarding the components of the RDF(S) knowledge model (classes and class hierarchies, properties, instances, and literals) and the combinations that can be obtained with these components.

The **RDF(S) Export Benchmark Suite** is used to perform an evaluation of the RDF(S) export capabilities of ontology development tools. It contains 66 benchmarks and has been built regarding the common components of the knowledge model of ontology development tools (classes and class hierarchies, datatype and object properties, instances, and literals) and the combinations that can be obtained with these components.

The **RDF(S) Interoperability Benchmark Suite** is used to evaluate the interoperability of ontology development tools by testing the interchange of ontologies from one origin tool to a destination one, and vice versa. It contains 66 benchmarks and has been built regarding the common components of the

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<sup>2</sup> [http://knowledgeweb.semanticweb.org/benchmarking\\_interoperability/](http://knowledgeweb.semanticweb.org/benchmarking_interoperability/)

knowledge model of ontology development tools and the combinations that can be obtained with these components. As these components are the same as those in the RDF(S) Export Benchmark Suite, the ontologies defined in these two benchmark suites are the same.

## 4 Protégé results

The interoperability benchmarking described in this paper is now taking place and the authors of this paper are carrying out the experimentation with Protégé.

The results for the Protégé ontology editor using its RDF backend that are available at present are the raw results of the evaluation of its RDF(S) importers and exporters<sup>3</sup>. By June 2006, once the benchmarking has finished, we will get public results with detailed information about the current interoperability of Protégé, including:

- Analysis of the evaluation of Protégé’s RDF(S) importer and exporter.
- Analysis of the evaluation of Protégé’s interoperability with the other participant tools using RDF(S) as interchange language.
- Recommendations for Protégé users on practices and best practices for achieving interoperability.
- Recommendations for Protégé developers for improving the interoperability of Protégé.
- Recommendations for tool developers on developing interoperable systems.

We have also started to organise a benchmarking activity<sup>4</sup>, similar to this, for benchmarking the interoperability of ontology development tools using OWL as the interchange language.

## Acknowledgments

This work is partially supported by a FPI grant from the Spanish Ministry of Education (BES-2005-8024), by the IST project Knowledge Web (IST-2004-507482) and by the CICYT project Infraestructura tecnológica de servicios semánticos para la web semántica (TIN2004-02660).

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<sup>3</sup> [http://knowledgeweb.semanticweb.org/benchmarking\\_interoperability/evaluation\\_stage\\_1\\_results.html](http://knowledgeweb.semanticweb.org/benchmarking_interoperability/evaluation_stage_1_results.html)

<sup>4</sup> [http://knowledgeweb.semanticweb.org/benchmarking\\_interoperability/owl/](http://knowledgeweb.semanticweb.org/benchmarking_interoperability/owl/)