Chapter 13
Approaches for Evaluating the Conformance and Interoperability of Ontology Engineering Tools

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ABSTRACT
This chapter presents two characteristics of ontology engineering tools that have a high relevance for the application of these tools, namely, their conformance and interoperability. It also discusses two methods for evaluating the conformance and interoperability of ontology engineering tools and the test data that can be used in such evaluations.

INTRODUCTION
Semantic technologies allow managing the meaning of the information available in the Web and exploiting this information in novel and richer ways. Recently, the Semantic Web community has seen an explosion of semantic technologies coming not only from research institutions but also from small and large companies. This explosion raises difficulties for early adopters since, with a move from research to industry, semantic technologies must meet new requirements that may have not been considered before and existing requirements may become stricter.

These difficulties unveil the necessity of having an easy way of evaluating semantic technologies that can be used not only by semantic technology experts but also by other people, for example, end users or software developers who do not master this kind of technologies.
This chapter presents two characteristics of ontology engineering tools that have a high relevance for the application of these tools, namely, their conformance and interoperability, and discusses two methods for evaluating the conformance and interoperability of ontology engineering tools.

Besides, the evaluations here defined can be performed with different test data. Since the quality of test data has a high influence on evaluation results, the chapter also contains the description of the test data to be used in these evaluations.

Our aim is to define these evaluations in a way that other people in their specific settings could reuse them. Therefore, these evaluations are described in detail following the conventions proposed by the ISO/IEC 14598 standard on software evaluation (ISO/IEC 14598).

Furthermore, since our ultimate goal is the automation of the evaluations, the chapter also describes a set of ontologies that allow representing the different information needed in the evaluation (inputs, outputs, and interpretations) and that support evaluation automation. These ontologies are lightweight since their main goal is to be user-friendly.

The rest of the chapter is structured as follows. First, it presents our understanding of conformance and interoperability for ontology engineering tools and gives an overview of the current situation regarding the evaluation of these tools. Then, it describes in detail the conformance and interoperability evaluations and the test data that can be used in such evaluations. Finally, it presents the conclusions drawn in this chapter and suggests future steps to perform.

**CONFORMANCE AND INTEROPERABILITY EVALUATION IN THE LITERATURE**

Ontology engineering tools, as any other software, can be evaluated according to a broad number of characteristics (for a detailed software quality model, see the ISO/IEC 9126-1 standard (ISO/IEC 9126)). This section discusses conformance and interoperability, which are two of the most relevant characteristics for ontology engineering tools since these tools need to satisfy these characteristics to support the construction of complex applications by using the existing standards. In addition, the section describes previous evaluations of these characteristics over ontology engineering tools.

**Conformance**

The conformance characteristic regarding ontology engineering tools is related to the ability of these tools to adhere to specifications. In the case of ontology engineering tools, the most relevant specifications to consider are those of the existing ontology representation languages (i.e., RDF(S) and OWL).

There are several different aspects of ontology engineering tool conformance with respect to an ontology language specification that should be taken into account:

- **Conformance regarding the ontology language model.** Since different tools have different internal knowledge representation models, it is important to know the similarities and differences between these internal models and the knowledge representation model of the ontology language. This disparity affects not only the use of the tool when developing ontologies but also the capabilities of the tool to interchange ontologies (either when importing ontologies from ontology documents or when exporting ontologies to ontology documents) as will be mentioned in the next section.

- **Conformance regarding the ontology language serialization.** Ontology languages have different serializations, both normative and non-normative (e.g., RDF/XML, N3, OWL/XML, etc.). A tool that supports an ontology language should also support