

# Current State of Semantic Annotations for WSDL

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**Abstract.** Semantic Annotations for WSDL (SAWSDL) is the first step within W3C towards standardizing Semantic Web Services. This specification defines how to add semantic annotations to Web service descriptions in WSDL. With our poster we<sup>1</sup> intend to present the current status of SAWSDL and to show how it fits within the Semantic Web Services research.

## 1 Introduction

Semantic Annotations in WSDL (SAWSDL<sup>2</sup>) is a W3C working draft that defines how to add semantic annotations to Web Service Description Language (WSDL<sup>3</sup>). It defines extension attributes that can be applied to elements in both WSDL and XML Schema in order to annotate WSDL interfaces, operations and their input and output messages. SAWSDL is the first step towards standardization in the area of Semantic Web Services. Semantic annotations in WSDL are used for these purposes:

- associating WSDL interfaces with some taxonomical categories to help semantic Web service discovery,
- describing the purpose or applicability of WSDL operations to help discovery or composition,
- linking and mapping inputs and outputs of WSDL operations to semantic concepts to help facilitate mediation and service discovery and composition.

While the semantic annotations are used to point to taxonomies, ontologies or mappings, SAWSDL is independent of any particular ontology or mapping language. The mechanism only requires that all the concepts can be identified with URIs.

SAWSDL can be split in two parts: semantic model references from elements in WSDL or XML Schema to concepts in a semantic model (usually an ontology or taxonomy), and data mappings between XML and semantic models. These two parts are described in the following two sections, with concluding remarks in the last section.

## 2 Model references

The first major part of SAWSDL is an attribute called `modelReference`. The value of the attribute is a list of URIs that reference concepts in a semantic model. SAWSDL

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<sup>1</sup> J. Kopecký is the chair of the SAWSDL WG; H. Lausen and J. Farrell are the spec editors.

<sup>2</sup> Draft specification of SAWSDL is available at <http://www.w3.org/TR/sawsdl/>

<sup>3</sup> Available at <http://www.w3.org/TR/wsdl20/>

defines how model references can be used on WSDL interfaces, operations, and on XML Schema elements or types.

On a WSDL interface, a model reference can provide a classification of the interface, for example by pointing into a products and services taxonomy like eCl@ss.<sup>4</sup>

Model references on a WSDL operation define what the operation does. This can be done with a direct reference to a verb concept or to a logical axiom or by specifying the operation's preconditions and effects. Known techniques like planning (automatic composition) can then use this information.

Model references on XML Schema elements and types define the semantics of the inputs or outputs of WSDL operations. These annotations can, for example, complement the preconditions and effects from the operation for the purpose of planning,<sup>5</sup> or the types can be used to verify type correctness of compositions.

In general, model references can have many uses, and indeed, SAWSDL does not limit the applicability of the attribute.

### 3 Schema mappings

Schema mappings transform between XML data described with XML Schema and semantic data described by a semantic model. Mappings can be used for example to support invocation of a Web service from a client that works natively with semantic data.

SAWSDL defines two extension attributes — `liftingSchemaMapping` and `loweringSchemaMapping`. These attributes are used to point from a schema element or type to a mapping that specifies (in any suitable mapping language, e.g. XSLT) how data is transformed from XML to the semantic level (lifting) or back (lowering).

A lifting schema mapping defines how an XML instance document conforming to the element or type defined in a schema is transformed to data that conforms to a semantic model. The input to the transformation is an XML element that represents a Web service message and the output will be semantic data (for example an RDF graph).

Similarly, a lowering schema mapping defines how data in a semantic model is transformed to XML instance data. The input is some semantic data and the output will be an XML element that forms a Web service message.

### 4 Conclusions

Semantic Web Services is an effort to automate various tasks common when using Web services, like service discovery, composition or invocation. In June 2005, the W3C organized a workshop on frameworks for semantics in Web services.<sup>6</sup> Among the submissions, WSDL-S<sup>7</sup> was identified as the only point of agreement, providing WSDL extensions for attaching semantic descriptions usable for automating the above tasks. Therefore the W3C later started a working group for Semantic Annotations in WSDL with WSDL-S as its input, and this poster presents the current status of this effort.

<sup>4</sup> eCl@ss Standardized Material and Service Classification, <http://ecllass-online.com/>

<sup>5</sup> IOPEs, i.e. inputs, outputs, preconditions and effects, are parameters in AI planning.

<sup>6</sup> <http://www.w3.org/2005/04/FSWS/workshop-report.html>

<sup>7</sup> <http://www.w3.org/Submission/WSDL-S/>