



# D17 WSMO Tutorial

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## Abstract

This document comprises the WSMO Tutorial efforts. The tutorial is intended to disseminate the Web Service Modeling Ontology WSMO to worldwide audiences interested in Semantic Web Services. The tutorial is presented at several international events.

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## 1. Introduction

The Web Service Modeling Ontology WSMO [[WSMO](#)] along with its related efforts in the WSML [[WSML Working Group](#)] and WSMX [[WSMX Working Group](#)] working groups presents a complete framework for Semantic Web Services, combining Semantic Web and Web Service technologies. Understanding the aims, design, and specification structure is a pre-requisite for successful dissemination and exploitation of WSMO as the basis for potential acceptance and usage of WSMO within research and development efforts around Semantic Web Services. The WSMO Tutorial presented in this document is the initial effort for dissemination of WSMO in international events to a world wide audience.

The objectives of the WSMO Tutorial is to enable attendees to:

- understand the idea and objectives of Semantic Web Services
- comprehend the aims, design principles, and specification structure of WSMO
- specify Semantic Web Services with WSMO
- apply WSMO technologies for Semantic Web Services
- correctly assess technologies, products, and developments within Semantic Web and Web Services technologies

The WSMO Tutorial is presented at different international events, whereby the concrete content of the tutorial presentation events change in accordance to (1) the concrete presentation event, and (2) changes / extensions performed within WSMO and related work. This document gives an general overview of the WSMO Tutorial, and gathers the slide sets and information of each presentation event of the tutorial.

This document is structured as follows: [Section 2](#) provides a general overview of the WSMO Tutorial, explaining the structure and content of the different parts of the tutorial; [Section 3](#) gathers information about the presentation events of the WSMO Tutorial, providing the slide sets for download and additional information on the specific event; [Section 4](#) concludes the document, gathering 'Lessons Learned' for dissemination and exploitation of WSMO into research, industry, and standardization bodies.

## 2. Overview of WSMO Tutorial

This section provides an overview of the structure of the WSMO Tutorial. The tutorial is separated in seven parts. Each part covers a specific aspect of the tutorial in a complete manner, and they are combined, shortened or extended for the purpose of a specific presentation event; the actual slide sets of the presentation events are provided in [Section 3](#). Also, further parts can be added to the tutorial when required in future presentation events.

The following gives a general overview of each part of the WSMO tutorial, explaining the aspects covered, the objectives of the part as a tutorial module, and the main references.

### 2.1 Part I - Introduction to the Semantic Web and Semantic Web Services

#### Coverage:

This part provides an introduction into the research fields of the Semantic Web and Semantic Web Services, providing a basis and rationale for the aspects addressed within the subsequent parts

#### Contents:

- vision of the Semantic Web
- Ontologies as the backbone technology for the Semantic Web
- Web Services:
  - the "promise" of Web Services
  - initial Web Service technologies: SOAP, UDDI, WSDL
- idea of Semantic Web Services
- challenges for Semantic Web Service technologies

#### Objectives:

- provide an overview of the aims of Semantic Web and Semantic Web Services
- rationale and foundation for the subsequent parts of the tutorial
- mainly for "newbies" to the field

#### References:

- Web Service Modelling Framework [[Fensel and Bussler](#)]
- [[WSMO Primer](#)]
- several other resources on the covered issues

### 2.2 Part II - Introduction to WSMO

#### Coverage:

This part explains the mission and design principles of WSMO, as well as the structure of the SDK-Cluster working groups around WSMO, WSML, and WSMX.

**Contents:**

- mission of WSMO: a fully-fledged ontological model for Semantic Web Services, to be submitted to a standardization body
- design principles and features of WSMO
- structure of the WSMO working groups

**Objectives:**

- introduce WSMO (objectives, design principles)
- inform about structure of WSMO working groups

**References:**

Working Group Homepages [[WSMO Working Group](#)], [[WSML Working Group](#)], [[WSMX Working Group](#)]

## 2.3 Part III - The Building Blocks of WSMO

**Coverage:**

This part introduces the top level notions of WSMO, explaining the design rationale, specification and usage, and the description elements for each top level component

**Contents:**

- WSMO Design global issues
- non-functional Properties
- WSMO top level notions:
  - Ontologies
  - Goals
  - Web Services (Capabilities, Interfaces)
  - Mediators
- examples for modeling

**Objectives:**

- as a core part of the tutorial, this part concisely presents and explains the WSMO top level notions
- attendees shall understand the necessity, the design principles, and the specifications of the WSMO top level notions
- introduce WSMO component modeling in WSML

**References:**

- Web Service Modelling Ontology [[WSMO](#)]
- [[WSMO Use Case](#)]

## 2.4 Part IV - Web Service Interfaces: Choreography and Orchestration

**Coverage:**

Web Service descriptions in WSMO are comprised of Capabilities as a functional description, and Interfaces for specifying how to communicate with a Web Service in order to consume its functionality as well as how the functionality of a Web Service is achieved by using other Web Services. The former Interfaces is called Choreography, the latter Orchestration.

This part of the tutorial explains the notions of WSMO Web Service Interfaces, their differentiation and interplay, and the description elements of Choreography and Orchestration in WSMO.

### Contents:

- design of WSMO Web Service description
- aim of WSMO Web Service Interfaces overall specification
- aim, aspects, and description of Choreography in WSMO
- aim, aspects, and description of Orchestration in WSMO
- differences and interrelation of Choreography and Orchestration
- how Web Services Interfaces tackle the architectural ideas of Web Services as the next generation integration technology

### Objectives:

- explain the motivation and aims of Choreography and Orchestration in WSMO
- explain objectives, aspects, and approach for Choreography and Orchestration in WSMO
- enable attendees to understand the objectives and challenges of Web Service Interfaces

### References:

- [\[WSMO\]](#)
- [\[WSMO Choreography\]](#)
- [\[WSMO Orchestration\]](#)

## 2.5 Part V - The WSMO Languages: WSML

### Coverage:

The Web Service Modeling Language WSML is developed within the [\[WSML working group\]](#), a sub working group of WSMO. The aim of WSML is to develop a combined ontology language for the Semantic Web and Semantic Web Services, overcoming the deficiencies of existing ontology languages.

This part of the tutorial explains the objectives and design of WSML.

### Contents:

- aims, rationale, and starting points of WSML
- WSML Syntaxes: normative, XML, OWL / RDF
- Variants of WSML: WSML-Core, WSML-Flight, WSML-Rule, WSML-OWL, WSML-Full
- specification, structure, and interrelation of WSML Variants
- WSML modeling examples

**Objectives:**

- explain rationales & aims of WSML
- explain WSML Syntaxes & Variants
- outline further development steps

**References:**

- [[WSMO](#)]
- [[WSML Working Group](#)]
- main WSML Deliverables : D2, D16, D20.1/2/3

## 2.6 Part VI - The Execution Environments: WSMX and IRS 3

**Coverage:**

This part provides an overview of WSMO implementations: the Web Service Execution Environment WSMX, the reference implementation of WSMO developed within the WSMX working group, and the Internet Reasoning Service IRS developed by the Open University.

**Contents:**

- Web Service Execution Environment WSMX:
  - aims and overview
  - WSMX Architecture Walk-Thru
  - WSMX Conceptual Architecture
  - Execution Semantics
  - Web Service Execution in WSMX
  - Data Mediation Module
  - Implementation
  - WSMX next steps
- Internet Reasoning Service IRS:
  - overview (aims, design principles, history )
  - IRS Framework
  - IRS 3 (WSMO-compatible)
    - Features
    - Architecture
  - differences to WSMO / WSMX
- demonstrations of WSMX and IRS 3

**Objectives:**

- provide an overview of the implementations of WSMO
- present WSMX as the WSMO reference implementation

**References:**

- [[WSMX Working Group](#)]
- main WSMX deliverables: D9, D10, D13.0 - D13.6,
- [[IRS](#)]

## 2.7 Part VII - Hands On Session

### Coverage:

This part allows attendees to learn how to create Semantic Web Services themselves by using the technologies presented in Part VI. Attendees are provided with a computer and the required resources

### Contents:

- Hands On Session Setup: Domain (train travelling), Tools, and Tasks Description
- Walk-Thru to tools
- hands-on session by attendees with support

### Objectives:

- allow participants to create & use Semantic Web Service themselves
- deepen the understanding of the theoretical parts by "do-it-yourself"
- enable attendees to test and use WSMO tools

## 3. Presentation Events

This section gathers the slide sets of the individual presentation events of the WSMO Tutorial along with additional information.

### 3.1 AIMSAs 2004

#### Date:

01 September 2004

#### Presentation Event:

[AIMSA 2004](#): The Eleventh International Conference on Artificial Intelligence: Methodology, Systems, Applications. The Semantic Web Challenge, Varna, Bulgaria, September 2nd-4th, 2004.

#### Slide Set (as ODF and PPT):



#### Additional Information:

- full day tutorial
- 25 participants
- focus of tutorial: overview, conceptual structure of WSMO

### 3.2 Net Object Days 2004

**Date:**

27 September 2004

**Presentation Event:**

[Net Object Days 2004](#): The Fifth Net Object Days, Erfurt, Germany, September 27th - 30th, 2004.

**Slide Set** (as ODF and PPT):**Additional Information:**

- full day tutorial
- 10 participants, mostly "experts" in the field
- focus of tutorial: overview, conceptual structure of WSMO, implementation
- The Tutorial has been recorded on video; the video can be downloaded for each part of the tutorial in the corresponding subsections of [Section 2](#).

### 3.3 ISWC 2004

**Date:**

06 November 2004

**Presentation Event:**

[IWSC 2004](#): The Third International Semantic Web Conference, Hiroshima, Japan, November 06th - 11th, 2004.

**Slide Set** (as ODF and PPT):**Additional Information:**

- half day tutorial
- tutorial on Semantic Web Services: OWL-S and WSMO
- focus of tutorial: challenges of Semantic Web Services, OWL-S, WSMO, and comparison

## 4. Conclusion and 'Lessons Learned'

The aim and intention of the WSMO tutorial is to disseminate WSMO to worldwide audiences, enabling attendees to understand the challenges arising within Semantic Web Services, and how these are addressed and solved within the Web Service Modeling Ontology WSMO; further attendees shall know the main technologies and systems of WSMX, and in the end enable attendees to correctly assess technologies, products, and developments within Semantic Web and Web Services technologies.

Wide spread dissemination of WSMO is of major importance with regard to the acceptance and usage of WSMO within research and development efforts. With the WSMO Tutorial presented at different events, we have reached a wide spread audience with different backgrounds and interest. In order to provide useful information for further dissemination activities, the following gathers feedback and comments retrieved from attendees:

- Attendees have been from very different backgrounds - the overall feedback was that WSMO is regarded as a suitable framework for Semantic Web Services. Especially the clearness of the framework as well as the unambiguity of the WSMO components and their clearly defined interrelations have been considered as important, good and useful.
- The structure and content of the tutorial was considered to be well designed, thus enabled attendees to easily follow the course of the tutorial.
- Most attendees were "newbies" to the field of Semantic Web Services; these attendees reported the tutorial to be a very good overview and introduction of the field. An impression is that the idea of Semantic Web Services as followed in WSMO is not really known in the community in a wide spread manner.
- Attendees had different specific backgrounds (Semantic Web and ontologies, ontology design and ontology languages, Web Services "without semantics", specific aspects of Semantic Web Services like discovery or composition). The tutorial could address all these different aspects, but it is an overall overview. Some attendees mentioned interest in additional tutorials with more narrow scope, focusing on some specific interest.
- Attendees that knew WSMO before from the Website reported that they did not understand WSMO without the tutorial; an overview document explaining the aim, scope, and structure of WSMO was requested.
- Surprisingly, questions on relation of WSMO to OWL-S and W3C recommendations were very few (indicating that most attendees are newbies to the field).

Summarizing, we conclude that the WSMO Tutorial is an important and successful dissemination activity for WSMO. As we have the experts in the group for the specific parts of the tutorial, the presentations were high quality and went beyond the contents of the slide sets; this seems to be an important "pre-condition" for successful dissemination within expert groups. Besides, from the reaction and the feedback received from attendees, we conclude that (1) WSMO has a huge potential to be used and accepted for Semantic Web Service technology development, but (2) that the idea of Semantic Web Services is not very popular in the community; especially with regard to the latter aspect, successful future dissemination and exploitation of WSMO seems to be a challenging task and should be addressed carefully and well planned.

## References

**[Fensel and Bussler, 2002]** D. Fensel and C. Bussler: *The Web Service Modeling Framework WSMF*, Electronic Commerce Research and Applications, 1(2), 2002.

**[IRS]** Internet Reasoning Service IRS, Research Project of the [Knowledge Media Institute](http://kmi.open.ac.uk/projects/irs/) of the [Open University](http://open.ac.uk/), Milton Keynes, England; IRS homepage: <http://kmi.open.ac.uk/projects/irs/>.

**[WSMO]** D. Roman, U. Keller, H. Lausen (eds.): *Web Service Modeling Ontology*,

WSMO Working Draft D2, most recent version available at <http://www.wsmo.org/2004/d2/>.

**[WSMO Primer]** Arroyo, S.; Stollberg, M. (eds.): *WSMP Primer*, WSMO Working Draft D3.1, most recent version available at <http://www.wsmo.org/2004/d3/d3.1/>.

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**[WSMO Orchestration]** Roman, D., Vasiliu, L.; Bussler, C. (ed.): *Orchestration in WSMO*, WSMO Working Draft D15, most recent version available at: <http://www.wsmo.org/2004/d15/>.

**[WSMO Use Case]** Stollberg, M.; Lausen, H.; Lara, R.; Polleres, A. (ed.): *WSMO Use Case and Testing*, WSMO Working Draft D3.2, most recent version available at: <http://www.wsmo.org/2004/d3/d3.2/>.

**[WSMO Working Group]** WSMO Working Group webpage: <http://www.wsmo.org>.

**[WSML Working Group]** WSML Working Group webpage: <http://www.wsmo.org/wsml/>.

**[WSMX Working Group]** WSML Working Group webpage: <http://www.wsmx.org>.

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