

Project IST 026850 SUPER

Semantics Utilized for Process management within and between Enterprises

Deliverable 11.4

Standards Watch and Assessment

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Authors (Partner)	Jörg Nitzsche (USTUTT), Tammo van Lessen (USTUTT), Hagen Völzer (IBM), Xuan Zhou (SAP)		
Deliverable Owner (Partner)	Jörg Nitzsche (USTUTT)	E-mail	joerg.nitzsche@iaas.uni-stuttgart.de
		Phone	(+49) 0711 – 7816 – 486

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Executive Summary

This deliverable presents an overview on emerging technology standards in the area of Web Services, Semantic Web, Semantic Web Services and Business Process Management. It continues deliverable 11.1 by reporting on the standardisation status of already assessed standards and specifications and assessing the usefulness and relevance of additional specifications and standards for SUPER.

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1 Introduction

The Service Oriented Architecture (SOA) is an approach to integrating enterprise applications in a flexible and loosely coupled manner. On a technological level, the Web Service technology is the most prominent realization of SOA today. SUPER builds on top of the SOA/Web Service stack to simplify enterprise application integration using machine-readable descriptions of Services and Processes. To avoid re-inventing the wheel, it is important to be aware of existing and relevant standards, and useful and primarily accepted work in the same problem space. Deliverable 11.1 covered and assessed most of the standards and preliminary work that was considered useful and relevant for the development of SUPER. This deliverable aims at assessing additional relevant standards and reporting the status of standardisation of the already assessed standards.

Following deliverable 11.1, four major domains can be identified. Following the structure of this document, these domains are:

- Web Services – are the most prominent implementation of a SOA and aim to solve integration problems. Broadly accepted related standards, like SOAP, are neither covered by deliverable 11.1 nor this deliverable. Only standards, which were considered being adapted for the development of SUPER technologies.
- Semantic Web – defines metadata, about resources on the Web, that machines can understand and process..
- Semantic Web Services – combine both technologies from above. Adding semantic descriptions to Web Services can help to automatically find and invoke appropriate Web Services fulfilling a (domain) specific business goal.
- Business Process Management – provides a new programming paradigm by composing existing services (e.g. Web Services) into a complex business process.

These domains build the foundation for the Semantic Business Process Management (sBPM), which is the main objective of SUPER.

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2 Standards Watch

Deliverable 11.1 provided an initial Assessment of standards that were considered relevant for SUPER. All standards and work-in-progress specifications of interest assessed in D 11.1 are listed in Table 1. It summarizes their relevance for SUPER by categorizing them into three groups.

- High relevance (H) – These standards/technologies are supposed to build the basis for SUPER. However, SUPER not only uses them, but might also have impact on their refinement and adaptation.
- Medium relevance (M) – Standards in this group are of interest for SUPER but do not belong to the SUPER core technologies.
- Low relevance (L) – The examination of the standards of this group has shown that they are not of great importance for SUPER. Nevertheless, some of their concepts can be helpful to the development of SUPER.

From the assessment different procedures arise for the different technologies. They are listed in particular in Table 1, column “Proposed Activity”.

Topic	Subject	Relevance for SUPER	Proposed Activity
Web Services	WSDL 1.1 [Christensen et al., 2001]	H	-
	WSDL 2.0 [Chinnici et al., 2007a; Chinnici et al., 2007b]	M	Monitor
	WS-Policy Framework [Asir et al., 2007]	M	Investigation of usage of PolicyAttachment mechanism to attach semantic annotations to processes. Observe standardisation process.
	WS-Metadata Exchange [Ballinger et al., 2004b]	M	Monitor with low effort.
	WS-Addressing [Gudgin et al., 2006]	M	Monitor with low effort.
Semantic Web	RDF [Brickley et al., 2004]	M	Monitor storage mechanisms

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Topic	Subject	Relevance for SUPER	Proposed Activity
	ODM [ODM Spec, 2006]	M	Try to consider ODM methodology when modelling ontologies in SUPER
	OWL [McGuinness et al., 2004]	L	-
Semantic Web Services – Standards	WSMO [Roman et al., 2005]	H	Monitor with high effort because SUPER builds on it.
	WSML [de Bruijn et al., 2005]	H	Monitor with high effort because SUPER builds on it.
	OWL-S [Martin et al., 2004]	L	Monitor with low effort to see what competing frameworks do.
	SA-WSDL [Farrell and Lausen, 2007]	H	Monitor standardization activities for SA-WSDL. High effort because semantic annotations for BPEL can be done in a similar manner.
Semantic Web Services – Execution Environments	WSMX [Zaremba et al., 2005]	H	Monitor quality of source code and functionality of WSMX.
	IRS-III [Domingue et al., 2004]	H	Monitor functionality (choreography)
Business Process Modelling	WS-BPEL [Alves et al., 2007]	H	Monitor with high effort because SUPER builds on it.
	WS-CDL [Kavantzias et al., 2005]	L	-
	BPMN [OMG 2006]	H	Monitor with high effort because SUPER builds on it.
	BPDM [OMG 2008]	L	Monitor
	EPC	M	-

Table 1 – Standard assessments

The Status of the Standards where the proposed activity is monitoring is presented below:

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2.1 Web Services

2.1.1 WSDL 2.0

Status:

WSDL 2.0 has become a W3C Recommendation on June 26th 2007. There have been no significant changes to the previous version which was subject of D 11.1. However, the distribution of contents between the core document (part 1) and the adjuncts (part 2) has been revised. So far WSDL 2.0 has not been adopted by the industry to a remarkable extend.

2.1.2 WS-Policy Framework

Status:

The Web Services Policy Framework has become a W3C Recommendation on September 4th 2007. There have been no significant changes with respect to the attachment mechanism to the previous version which was subject of Del 11.1.

2.1.3 WS-Metadata Exchange

Status:

The status of standardisation of the WS-Metadata Exchange Specification is unchanged.

2.1.4 WS-Addressing

Status:

WS-Addressing has become a W3C Recommendation on May 9th 2006. There have been no significant changes to the previous version which was subject of Del 11.1.

2.2 Semantic Web Services

2.2.1 WSMO

Status:

The status of standardisation of WSMO is unchanged. There has been work on some of the deliverables of the WSMO working group, e.g. the specification of the "Ontology based choreography", but the core of WSMO stayed unchanged. Additionally, a new WSDL Grounding for WSMO choreography has been defined that takes SAWSDL into account.

2.2.2 WSML

Status:

The final draft of WSML 1.0 Specification has been released on August 8th 2008.

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2.2.3 OWL-S

Status:

The status of standardisation of OWL-S is unchanged.

2.2.4 SAWSDL

Status:

SAWSDL has become a W3C Recommendation on August 28th 2008.

2.3 Business Process Modelling

2.3.1 WS-BPEL

Status:

BPEL 2.0 has been approved as an OASIS standard on April 11th 2007. As already mentioned in Del 11.1 there have been no significant changes wrt. the existing core of the specification. Some control flow constructs have been renamed (e.g. <switch> was renamed to <if>) and some new control flow constructs have been added like for instance <forEach>. Furthermore some ambiguities have been resolved. The most interesting change is the enhanced extensibility. BPEL 2.0 allows defining new activity types using the <extensionActivity> mechanism. BPEL4SWS which has been developed in Del 1.3 and Del 1.10 makes use of this extensibility for defining new WSDL-less interaction activities and thus defines a compliant dialect of BPEL.

2.3.2 BPMN

Status:

Members of the SUPER consortium contributed to the current standardization process for the Business Process Modeling Notation BPMN 2.0. BPMN 2.0 standardization is a crucial project that will enable new use cases for users of BPM tools, because it establishes syntactical and semantic interoperability between BPM tools of different vendors. Major goals of this standardization project are:

- define a modelling language that is suitable for business as well as IT users
- define a Meta model for BPMN to support syntactic interoperability between tools
- define execution semantics to support semantic interoperability between tools
- refine data modelling and choreography modelling support from BPMN 1.1

A major challenge is posed by defining an unambiguous execution semantics for BPMN, because BPMN 1.1 is vague, not detailed and even contradictory in specifying its intention with respect to execution semantics. Moreover, giving semantics to some BPMN constructs (viz the inclusive converging gateway, aka OR-join) entails to solve open research problems in the BPM area.

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We contributed here by co-authoring various parts of the execution semantics of BPMN, e.g.

- semantics of sequence flow and semantics of the gateways, including semantics of above mentioned OR-join and the complex gateway
- life-cycle of activities and their various forms
- semantics of Multi-instance and loop activities
- semantics of Sub-processes and ad-hoc sub-processes
- semantics of Data modelling elements

Our contributions are included in the current draft of the response to the OMG RFP for BPMN 2.0 submitted by IBM et al. The initial submission to the OMG is available as OMG document bmi/2008-02-06. The latest draft submitted to the OMG is available as OMG document bmi/2008-11-01.

2.3.3 BPDM

Status:

BPDM has become an OMG standard in November 2008. As already pointed out in Del. 11.1 none of the key players in BPM co-authored.

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3 Assessment of Additional Standards

3.1 BMM: Document centric business model/ User oriented business model

Purpose:

As one of the OMG’s Business Modeling Specifications, Business Motivation Model (BMM) is a standard for defining business plans and activities. It tries to provide business plan developer, business modeler and software developer a standard vocabulary to model the business goals, the corresponding strategy and how the management plans to achieve these goals. The main benefit is to produce an actionable business plan which satisfies the business requirement, before system design or technical development is begun.

Players Involved:

The Business Rules Group (www.businessrulesgroup.org) published the first version of Business Motivation Model in November 2000. Current submission comes from 88solutions, Adaptive Inc., Business Rule Solutions LLC, Business Rules Group, Business Semantics Ltd., Deere & Company, EDS, Fair Isaac Corporation, Hendryx and Associates, Inferware, KnowGravity Inc., Mega International, Model Driven Solutions, Neumont University, NIST, Pegasystems, Rule ML Initiative, TIBCO, Unisys and Xactium.

Brief Description:

The BMM provides a schema to model elements (goals, strategy, plan etc.) in the business plan. It identifies the influencers who will affect the strategy and plans. The model can also explain clearly what is motivating the business plan, what the goals are and how the business intends to achieve these. This helps to discover why certain actions are performed, and why certain decisions have been made or should be made. Specifically, the BMM does all of the following:

- It identifies factors that motivate the establishing of business plans.
- It identifies and defines the elements of business plans.
- It indicates how all these factors and elements inter-relate.

From the structural perspective, the BMM mainly consists of two areas (Figure 1):

- The first is the Ends and Means of business plans. Among the Ends are things the enterprise wishes to achieve — for example, Goals and Objectives. Among the Means are things the enterprise will employ to achieve those Ends — for example, Strategies, Tactics, Business Policies, and Business Rules.
- The second is the Influencers that shape the elements of the business plans, and the Assessments made about the impacts of such Influencers on Ends and Means (i.e., Strengths, Weaknesses, Opportunities, and Threats).

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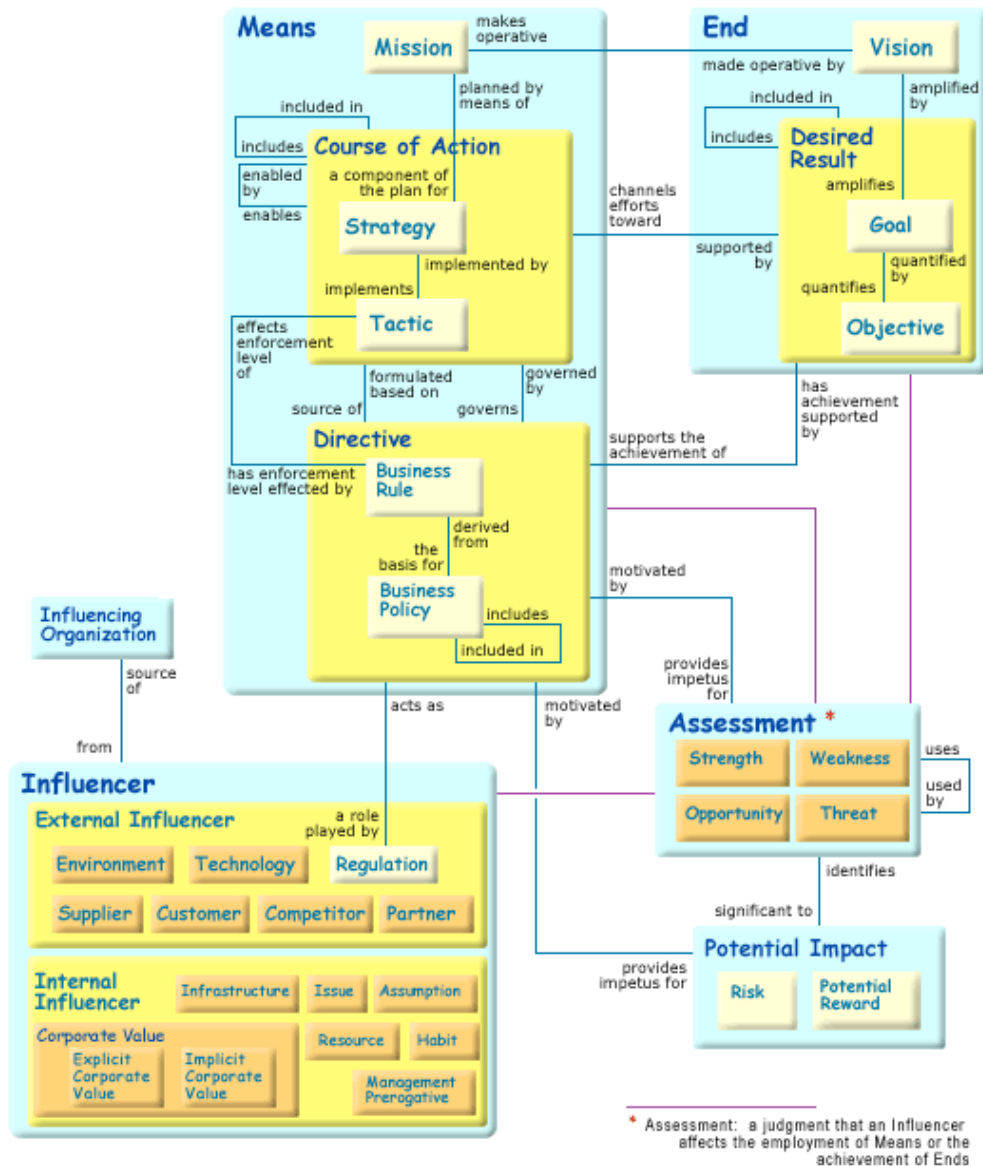


Figure 1: The Business Motivation Model Schema

The structure of the BMM provides the basis for logical design of easily-constructed tools for storing, cross-referencing and reporting the elements of business plans for business enterprises. Figure 1 also shows how the elements of a business plan are grouped, and how their connections and dependencies are. The Ends are the Goals and Targets of a company. An End is something a company wants to be or to achieve in the future. It does not give an explanation of how these goals should be achieved. This is done by defining the Means. Means describe the way of how the company wants to achieve its ends. Influencers can have an impact on the Ends and Means. This linking is qualified by Assessments and the Potential impact group.

The BMM is a user oriented business model, which helps developing, communicating, and managing business plans in an organized manner. The model positioned itself as a method to address the intersecting section of the “Owner” perspective and the “Why” interrogative in the Zachman’s enterprise matrix framework [1].

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Status:

The Business Rules Group (BRG) developed the BMM and published version 1.0 on the BRG web site (www.businessrulesgroup.org) in November 2000. The latest version of the paper was published in September 2007, reflecting the small number of changes made to the Business Motivation Model during the OMG standardization work. In September 2005, the OMG voted to accept the BMM as the subject of a Request for Comment (RFC). It is targeted to be an International Standards Organization (ISO) standard.

SUPER Recommendation:

The BMM is a metamodel that provides a vocabulary for corporate governance and strategic planning. It mainly targets enterprises, but the same approach could be applied to organizations in general, even organizations of small size. As a goal-driven technique, the vocabulary generated through its application could be used to annotate the IT artifacts, especially the goals derived from the strategy. Also the assessment elements could be used for the monitoring purpose.

3.2 SBVR : Integration oriented business model

Purpose:

The vision of SBVR is to reduce time and costs for companies in transferring business context / business rules into their IT systems. This approach tries to offer an easy way for business users to express the semantics of their domain vocabulary and rules.

Players Involved:

In response to OMG’s Business Semantics of Business Rules (BSBR) RFP in 2003, the Business Rules Team submitted the Semantics of Business Vocabulary and Business Rules (SBVR) in 2005. Current submission is based on the contribution from Adaptive, Automated Reasoning Corporation, Business Rule Solutions LLC, Business Rules Group, Business Semantics Ltd, Fujitsu Ltd, Hendryx & Associates, Hewlett-Packard Company, InConcept, LibRT, KnowGravity Inc, MEGA, Model Systems, Neumont University, Perpetual Data Systems, Sandia National Laboratories, The Rule Markup Initiative, Unisys Corporation and X-Change Technologies Group.

Brief Description:

Today the IT department has to adjust the systems by adding business rules, mostly in the “if... then...” form or by decision tables. The business users have to explain their needs to the IT staff, who tries to implement these rules into their systems. The goal of SBVR is to shorten the gap between these business rules and related business applications.

SBVR defines how business vocabulary and business rules have to be documented, for their application in Platform Independent Models (PIM). It also provides a XMI schema for the interchange of Business Vocabulary and Business Rules between software applications and among organizations.

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The first step of SBVR is to provide a schema of how Business Users can document and define their domain specific business vocabulary. The next step is to define Business rules based on this business vocabulary. This helps to get the same meanings on business vocabulary among the whole organization. Business users could define their vocabulary and business rules in a stand-alone software tool, and then they can be published, managed and archived.

Another feature of SBVR is that “fact types” can be defined, for example “rental has drop-off branch”, “rental has return branch”, “renter has rental”, etc. which can express a database schema in an IT system. These business vocabulary and definition could be used to compile user interfaces automatically.

Status:

In June 2003, OMG issued the Business Semantics of Business Rules (BSBR) RFP, with the objective to support modeling of business rules by business people in business language: natural language, common graphics, and tables. In 2004, the BRG (as a part of the Business Rules Team (BRT)) responded to the RFP. In September 2005, the BRT's final submission, the Semantics of Business Vocabulary and Business Rules (SBVR) was accepted by the OMG to move into the 'finalization' stage of the OMG standardization process. In March 2006, the first Interim Specification document of the Semantics of Business Vocabulary and Business Rules (SBVR) standard was issued.

SUPER Recommendation:

SBVR is another business model specification, which deals with domain knowledge and their formalization. As an integral part of the OMG MDA approach, it is very relevant to the SUPER vision in connecting business with IT.

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4 Conclusions

This deliverable reported on the assessment of additional Standards relevant for SUPER and the continuous Watch of Standards that were already assessed in deliverable 11.1.

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6 Acronyms

BPDM	Business Process Definition Metamodel
BPEL, BPEL4WS	Business Process Execution Language (for Web Services)
BPMN	Business Process Modelling Notation
EPC	Event-driven Process Chains
IRS	Internet Reasoning Service
MDA	Model Driven Architecture
OASIS	Organisation for the Advancement of Structured Information Standards
ODM	Ontology Definition Metamodel
OMG	Object Management Group
OWL	Web Ontology Language
RDF	Resource Description Framework
SA-WSDL	Semantic Annotations for WSDL
SUPER	Semantics Utilized for Process management within and between EnteRprises
SWS	Semantic Web Services
W3C	World Wide Web Consortium
WS	Web Services
WS-BPEL	See BPEL.
WS-CDL	Web Services Choreography Language
WSCL	Web Services Conversation Language
WSDL	Web Service Description Language
WSML	Web Service Modelling Language
WSMO	Web Service Modelling Ontology
WSMX	Web Service Modelling Execution Environment