Deliverable

WP 7: Technology Watch and Standardisation
D7.6
Standardisation Strategy and Impact Analysis Update

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December 31^{th}, 2005
EXECUTIVE SUMMARY

This document is the second one in a series of planned update documents for the DIP deliverables D7.3-D7.4 (standardisation strategy and impact analysis [19], [20]) in the course of the workpackage WP7 “Standardisation and Technology Watch”, and a follow-up to deliverable D7.5 (first update of the standardisation impact analysis [21]).

The deliverable directly contributes to the DIP main goal “Standard proposal”. As the consortium is committed to the main goals of DIP, it is of interest for every partner to get an overview and understanding of current standardisation activities and possible ways to actively support these.

This deliverable:

- Provides an update on new or ongoing activities based on the DIP “Standardisation Strategy and Impact Analysis” (D7.3-D7.4), and a follow-up to D7.5;
- Gives details about new or ongoing activities in the context of the SDK standardisation coordination group’;
- Describes interactions and relations to the WSMO activities.

Summarizing the document:

- The W3C started a formal standardization activity regarding the interchange of rules (RIF WG) and is considering starting formal standardization activities towards supporting semantics in Web Services;
- BPMi and OMG merged, and OMG took specific actions to improve the alignment of its standards and the Rule Interchange Format under specification at W3C;
- OASIS started a formal standardization activity regarding the deployment and execution of Semantic Web Services in a service-oriented architecture (SEE TC).

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**Abstract (for dissemination)**

This document is the second one in a series of planned update documents for the DIP deliverables D7.3-D7.4 (standardisation strategy and impact analysis) in the course of the workpackage WP7 "Standardisation and Technology Watch", and a follow-up to deliverable D7.5 (first update of the standardisation impact analysis).

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Standards, W3C, OMG, OASIS

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LIST OF KEY WORDS/ABBREVIATIONS

BMI DTF – Business Modelling and Integration Domain Task Force
BMM – Business Motivation Meta-model
BPDM – Business Process Definition Meta-model
BPEL – Business Process Execution Language
BPM – Business Process Management
BPMI – Business Process Management Initiative
BPMN – Business Process Modelling Notation
BPRI – Business Process Runtime Interface
OASIS – Organization for the Advancement of Structured Information Standards
OMG – Object Management Group
OSM – Organisational Structure Meta-model
OWL – Ontology Language
PRR – Production Rule Representation
RDF – Resource Description Framework
RIF – Rule Interchange Format
SBVR – Semantic of Business Vocabulary and Business Rule meta-model
SDK – Sekt, DIP, KnowledgeWeb
SWRL – Semantic Web Rule Language
XPDL – XML Process Definition Language
WSML – Web Services Modeling Language
WSMO – Web Services Modeling Ontology
WSMX – Web Services Execution Environment
W3C – World Wide Web Consortium
XML – Extensible Markup Language
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1 INTRODUCTION

This document is the second one in a series of planned update documents for the DIP deliverables D7.3-D7.4 (standardisation strategy and impact analysis [19], [20]) in the course of the workpackage WP7 “Standardisation and Technology Watch”, and a follow-up to deliverable D7.5 (first update of the standardisation impact analysis [21]).

In chapter 2 of this document, the actions that were recommended in D7.5 are reviewed.

Chapter 3 describes new and ongoing activities that have been started or continued, based on the former recommendations.

In chapter 4, we review relevant recent developments in related organisations and standards.

Finally, chapter 5 presents a conclusion as well as an outlook for future activities.

2 REVIEW OF ACTIONS RECOMMENDED IN D7.4 AND D7.5

Based on the analysis of activities undertaken during the previous semester to address the recommendations made in deliverable D7.4 [20], as described in deliverable D7.5 [21], D7.5 contained the follow-up recommendations that:

1. DIP and DIP members should continue to interact closely with W3C, and take a strongly supportive, even leading role in getting formal activities relative to the standardization of Web rule languages and semantic Web services framework started. DIP and DIP members should take an active role in such activities if and when they are started, to guarantee that DIP’s positions and interests are duly taken into account.

2. DIP should monitor related organizations for the emergence or progress of relevant activities: OMG, in particular, seems to be moving closer to areas of close concern to DIP, as witnessed by its planned merger with the BPMI.

3. The effort to integrate WSMO/WSML better within the existing Web services standards stack should be continued.

4. The role and activity of the SDK Standardisation Coordination Group should be re-examined and possibly re-aligned towards increased usefulness.

Sections 3.1 to 3.3 describe activities at W3C and OASIS relevant to recommendation 1, and DIP members’ involvement in these activities.

Sections 3.4 and 3.5 provide an update on, respectively, the activities leading to a better integration of WSMO/WSML in the Web Service standards stack, and the role and activities of the SDK Standardisation Coordination Group.

Chapter 0 describes the relevant activities in related organisations, as monitored by DIP.

All recommendations have thus been taken into account by the DIP consortium and corresponding activities will be continued during the remainder of the project.

3 ACTIVITIES IN THE REPORTING PERIOD

This section of the document describes DIP’s activities and interactions in the standardisation field, especially based on the recommended actions. It also provides an update on new or on-going standardisation effort relevant to DIP.
3.1 W3C Rule Interchange Format Working Group

The Technical Annex stresses that standardisation is of particular importance to DIP, as Semantic Web Services are meant as a shared means of communication between computers and between humans and computers. It also notices that building the Semantic Web Services layer requires a number of additional standards: now that OWL, the W3C ontology-representation standard, has laid the basis for knowledge representation on the Semantic Web, the next important missing piece is a standard for the representation of rules. Rules are thus an essential part of the puzzle for Semantic Web Services, as they are equally relevant to Web Services as a mean to represent and publish policies, constraints and capabilities.

Indeed, WSML specifies several levels of rule languages, e.g. WSML Rule [3], WRL [4], as well as RDF- and XML-based syntaxes to interchange rules written in these languages. However, rules are a mature technology, with thousands of deployed applications and many commercial and open products, each using their own proprietary rule languages (not even mentioning academic research prototypes). To enable rule interchange between non-WSMO and WSMO-based application, an interchange format is needed that is as independent as possible of the specifics of particular rule languages, while covering their essential features.

In this endeavour, it is also important for DIP to leverage the effort of the international community (of which the effort of the W3C is only a part).

In the conclusion of deliverable D7.5, there was a strong recommendation that DIP and DIP members should continue to interact closely with W3C, and take a strongly supportive, even a leading role in getting formal activities relative to the standardization of Web rule languages started.

In keeping with that recommendation, and consistently with its involvement in the organization and the W3C workshop on Rule Languages for Interoperability in April 2005, ILOG involved itself actively in defining and writing the charter for a working group on rule interchange standardization.

In July 2005, a first draft was circulated for public discussion on the workshop mailing list. The draft was revised based on the feedback from the discussion, and on September 26, 2005, a first version of the charter was submitted for review by the W3C Advisory Committee. On November 7, 2005, the W3C announced the formation of a working group chartered to specify an XML-based Rule Interchange Format [1]. The working group is co-chaired by Christian de Sainte Marie, from ILOG (and who manages ILOG’s participation in DIP), and Chris Welty, from IBM.

To quote from the charter [2]: “The Working Group is to specify a format for rules, so they can be used across diverse systems. This format (or language) will function as an interlingua into which established and new rule languages can be mapped, allowing rules written for one application to be published, shared, and re-used in other applications and other rule engines. Because of the great variety in rule languages and rule engine technologies, this common format will take the form of a core language to be used along with a set of standard and non-standard extensions. The Working Group is chartered to first establish the extensible core and possibly a set of extensions, and then (in Phase 2) to begin to specify additional extensions based on user requirements. These extensions need not all be combinable into a single unified language.”
The Working Group is therefore chartered to produce a core rule language plus extensions which together allow rules to be translated between rule languages and thus transferred between rule systems. The Working Group will have to balance the needs of a diverse community — including Business Rules and Semantic Web users — specifying extensions for which it can articulate a consensus design and which are sufficiently motivated by use cases (cf. also our analysis of the missing link to business usage in the Semantic Web Service standardisation stack, section 3.2 in deliverable D7.4).

The first phase, scheduled over 18 months, will focus on specifying the core of the Rule Interchange Format (RIF), focusing on the XML syntax, the extensibility mechanism, the conformance policy and interoperability with RDF and OWL. In order to be able to focus on specifying sound foundations for the RIF, the expressiveness has been purposely limited to Horn logic and basic data types support for phase one. Useful semantic features that raise difficult and potentially theoretical questions (from the various kinds of negation to side-effects to arbitrary data sources etc) will be dealt with as standard extensions to the core RIF during phase two. The standard extensibility mechanism to be built in the standard will allow for the addition of further features (e.g. to deal with modality, uncertainty etc) at later stages.

The Rule Interchange Format Working Group (RIF WG) held its first face-to-face and kick-off meeting in Burlingame, CA, on December 8 and 9, 2005. The meeting was hosted by OMG and collocated with OMG’s technical meeting, in order to facilitate the alignment with the relevant on-going activities at OMG.

The working group charter indeed acknowledges the interdependence of the RIF work with other related efforts, e.g. RuleML, JSR 94, ISO Common Logic, OMG’s SBVR, and the relevant member submissions, including WRL (WSML rule). Regarding the Production Rule Representation (PRR) meta-model currently under specification at OMG1, the charter goes even further and mandates the appointment of a liaison to work with the PRR group “to maximize the value if these standards efforts in both group. The Working Group is encouraged to produce a document [...] showing how these standards work together” [2] (section 4.3).

The RIF WG has now 65 participants from 27 organisations, plus 3 invited experts. In keeping with the recommendation that the relevant DIP members (and, in particular, ILOG, DERI and FZI) take an active role in such an activity, to guarantee that DIP’s positions and interests are duly taken into account, ILOG has 3 participants in the RIF WG, including a co-chair; DERI: 7; and FZI: 3.

3.2 Follow-up to the W3C Workshop on Frameworks for Semantics in Web Services

The summary report for the workshop has been published in August 2005. It is available from the W3C Web site [2].

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1 In a related development, as part as its continuing involvement in the specification of the PRR meta-model, and, more particularly, of an exploratory study in preparation for the design of PRR OCL, ILOG developed a proof-of-concept prototype to translate from PRR OCL to its proprietary rule language IRL. The prototype is online at [http://www.sciences.univ-nantes.fr/lina/atl/atldemo/prronline](http://www.sciences.univ-nantes.fr/lina/atl/atldemo/prronline).
Following on from the workshop, two charters have been drafted to continue the work towards standardising the application of Semantic Web technology to Web services.

The first draft charter is for a Semantics for Web Services Characterization Group [6]. The Web Services Description Language (WSDL) specifies a way to describe the abstract functionalities of a service and concretely how and where to invoke it. The WSDL 2.0 specification does not include semantics in the description, thus two services can have similar descriptions while totally different meanings. The objective of the Semantic Annotations for WSDL Working Group would be to develop a mechanism to enable annotation of Web services descriptions. This mechanism would take advantage of the WSDL 2.0 extension mechanisms to build a simple and generic support for semantics in Web services.

The second draft charter one is for Semantic Annotations for WSDL Working Group [7]. The mission of the Semantics for Web Services Characterization Group would be to continue in the footprints of solutions like WSDL-S [8] and study the field of applications and identify key points that are not immediately solved using Web services technologies. This characterization effort would demonstrate the existence of requirements, hence the need for one or more pieces of a framework for the use of Semantics in Web services. If it succeeds in this characterization work, the Group is expected to propose future directions of work in the domain of Semantics for Web Services.

3.3 OASIS Semantic Execution Environment Technical Committee

At the beginning of November a new Technical Committee (TC) was formed at the OASIS eBusiness-standards consortium. The new committee is called the Semantic Execution Environment TC (SEE TC) and has the mission to develop guidelines, justifications, and implementation directions for deploying Semantic Web services in service-oriented architectures.

The SEE TC came about as a direct result of dissemination activities carried out under the auspices of DIP. In April 2005, Michal Zaremba and Adrian Mocan (National University of Ireland, Galway) travelled to the OASIS Symposium on the Future of XML Vocabularies [10] to present a tutorial on WSMO/WSML/WSMX. After the tutorial, they were approached by Patrick Gannon, director of OASIS and were invited to make a proposal for a Technical Committee at OASIS based on the work carried out in the WSMX open-source development.

Charter of SEE TC

The intent of the SEE TC is described in its charter [11], part of which is reproduced below:

“The OASIS SEE TC aims to continue work initiated by the WSMX project and working group visible at http://www.wsmx.org and several other projects in Europe such as DIP (http://dip.semanticweb.org/), ASG (http://asg-platform.org/) and other projects in the area of Semantic Web Services which will start in the coming months. The aim of the SEE TC is to provide guidelines, justifications and implementation directions for an execution environment for Semantic Web services. The resulting architecture will incorporate the application of semantics to service-oriented systems and will provide intelligent mechanisms for consuming Semantic Web services.”
Service-oriented architectures anticipate a large number of ambient heterogeneous computational services that may be utilized in various combinations. However, a typical composition of services to meet a business goal often is an attempt to coordinate disparate resources from multiple sources -- services that may not know, or fully understand, each other in advance. When planning to invoke multiple services, it is not always readily apparent whether the methods and outputs of one service meet the requirements of another. So some interpretation, mediation or common understanding is essential for any significant deployment. The SEE TC will define methods for using semantic technologies to solve these coordination and automation issues.

The TC also will define the functional components of such an SWS system and the semantics descriptions of these components' interfaces. The TC will also define a formal description of execution semantics of such a system. In addition, the TC will define a generic and open framework, using metadata, to allow for new components to be plugged into the system and made available to the execution engine dynamically. Further, after providing the basic methods described above, or in parallel if appropriate, the SEE TC will seek to develop specifications addressing specific problem sets covering the spectrum from a general purpose environment to a specific business-domain-focused applications addressing financial, telecommunication, military and e-Government applications of Semantic Web Services technologies.”

**Deliverables of SEE TC**

The OASIS SEE TC will develop two technical specifications described below, which are deliberately aligned to take up the products of research in DIP:

1. Semantic Web Services Architecture and Information Model

**DIP Member Participation in SEE TC**

The following DIP partners are actively involved in the OASIS SEE TC:

- National University of Ireland, Galway (NUIG)
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- NIWA
- Ontotext

Additionally, the publicly available Use Case documentation for DIP has been submitted to the SEE TC as part of the TC’s primary input.

**3.4 WSMO/WSML integration within the Web Service standards stack**

The Web Service standards stack is the collective name for a collection of protocols that are at various stages of approval by standards organisations, mainly W3C and OASIS. The relation of WSMO/WSML to relevant protocols in this stack has been documented in a document titled “Relationship of WSMO to other Relevant Technologies” [9], available as part of the WSMO member submission to the W3C.
In particular, chapter 6 provides a summary table of the relationship: WSMO covers most of the elements introduced in OWL-S and introduces additional elements that increase its applicability particularly in the domain of eCommerce. Additional elements include a focus on goal-driven service invocation as well as both data and process mediation. On the other hand, it is clear that WSMO is in an earlier stage of development than OWL-S. Descriptions of aspects such as grounding, choreography and orchestration are still under-specified but are expected to gain in strength over the next twelve months.

With the noticeable exception of the work since started at OASIS, as described above, which is not included, this document remains an appropriate description of the situation.

3.5 SDK Standardisation Coordination Group

Based on the recommendation in the previous version of this document series [21] the role and activity of the SDK Standardisation Coordination Group (SDK-SCG) was re-examined.

During the last reporting period no new coordination activity was driven from within the SDK-SCG. The original goals of the SDK-SCG were already fully accomplished. They were to 1.) strengthen the awareness for the necessity of standardisation activities within EU projects and 2.) guide the activities of several EU projects jointly towards the ‘right’ standardisation bodies and working areas.

The positive results of the SDK-SCG work in the past could be proven by the fact that more and more partners are actively working and participating in major standardisation activities, like e.g. W3C and OASIS driving the standardisation in the area of Semantics and Web Services.

In retrospect, after the initiation of the SDK-SCG started a very active phase with several conference calls and email exchanges between the three projects. This first phase was accompanied by presentations of the SDK-SCG mission at SDK general assembly meetings. The second phase was affected by partners already being involved in standardisation activities and discussing these in the SDK-SCG. The last phase, which reflects the current situation, shows strong engagement of several SDK partners in a number of important standardisation activities at W3C, OASIS and OMG.

In the current situation there is no need for an active driving SDK-SCG. Current partners “know” that standardisation activities are an integral prerequisite for successful EU projects. The respective standardisation bodies and working groups are identified and the work in these groups started.

For the near future, with other EU projects joining the SDK, there may emerge the need to revitalize the SDK-SCG. An already established extension (in Nov. 2005) of the SDK is the ESSI cluster [22]. The SDK cluster has strategically aligned with the EU funded integrated project “ASG” (Adaptive Services Grid [23]) resulting in the formation of the “European Semantic Systems initiative” cluster.

The new ESSI Cluster combines Semantic Web Services and Semantically empowered system solutions with semantically empowered service-oriented architectures. ASG will add value to the new ESSI cluster by providing a proof-of-concept prototype of an open platform for adaptive services discovery, creation, composition and enactment. This could also lead to the extension of the SDK-SCG working charter with the above
mentioned three phases as a progress spiral and additional focus areas for standardisation activities.

As more new EU projects from Call4-FP6, e.g. TRIPCOM, SUPER, are starting in 2006 their work in this area, a further expansion of the cluster could be foreseen. As described for the ESSI cluster above, with new partners joining the cluster the necessity of the standardisation coordination group and their work may amplify again.

4 RELATED ORGANISATIONS AND STANDARDS
This chapter provides a brief update on standardization activities outside the DIP community that are related to work in DIP. It covers

- extensions to the BPEL standard
- the merger of BPMI with OMG
- support of the XPDL standard from WfMC by software vendors

4.1 Extensions to the BPEL standard
BPEL (Business Process Execution Language) is the dominating standard for specifying complex business processes based on web services [12]. Most software vendors in BPM (Business Process Management) already support import and export of BPEL. For the development of BPEL 2.0 there are two major areas in which extensions to BPEL are currently proposed, namely

- BPEL4People, covering human user interactions and
- WS-BPEL 2.0 Extensions for Sub-Processes

WS-BPEL Extension for People [13] has been proposed by IBM and SAP in order to cover human user interactions with automated business processes. BPEL4People is layered on top of the BPEL language and thus allows the composition of new features with BPEL core features. These new features include generic human roles, such as “process initiator”, “process stakeholder”, “potential owners”, and “business administrator”. Moreover, BPEL4People introduces a new BPEL activity called “people activity”. Finally, tasks are used to describe indivisible units of work performed by a human being.

WS-BPEL 2.0 Extensions for Sub-Processes [14] “allows for the definition of sub-processes that can be reused within the same or across multiple WS-BPEL processes”. The basic idea is to allow the interoperable invocation of sub-processes across infrastructures from different software vendors. The main difference between such a sub-process and a complete business process is that the lifecycle of a sub-process can be coupled to the lifecycle of the parent process. Moreover, a sub-process can access data from its parent process.

Although the extensions so far only have the status of proposals and have not yet been accepted as an official part of the BPEL standard, it is recommended to closely follow the development in these areas. Moreover, work on choreography and orchestration in DIP should support similar functionality as provided by BPEL4People and the BPEL extension for sub-processes. The fact that IBM and SAP are pushing these extensions is an indicator of the practical relevance of these extensions and also makes it very likely that the extensions will be integrated into the official BPEL standard in version 2.0.
4.2 Merger of BPMI with OMG

In June 2005 BPMI (Business Process Management Initiative) and OMG (Object Management Group) announced the merger of their activities in the area of BPM (Business Process Management). These activities will now be carried out in the BMI (Business Modeling & Integration) Domain Task Force of the OMG [15].

The BPMN (Business Process Modeling Notation) standard developed by BPMI and the Business Motivation Model (BMM) developed by OMG’s Business Rules Group have been submitted to the OMG adoption process in September 2005. Another standard defining the Semantics of Business Vocabulary and Business Rules (SVBR) is currently under vote for formal adoption.

It remains to be seen whether the merger and the new BMI DTF will lead to a wider acceptance of BPMN and related standards. So far, the majority of software vendors have focused on supporting BPEL and support for BPMN is still somewhat limited. This might change in the future, as the backing of the OMG will very probably increase acceptance of BPMN. It is thus recommended to closely monitor future take-up of BPMN by software vendors and to take into account BPMN in the development of choreography functionality within DIP and WSMO.

The scope of the BMI DTF is considerably larger than functionality captured by BPMN or BPEL. It aims at developing specifications of integrated models to support management of an enterprise, promoting inter- and intra-enterprise integration and collaboration of people, systems, processes, and information across the enterprise, including business partners and customers. As such, it includes standardisation efforts related to organisation modelling (OSM), business process modelling (BMM, BPDM, BPRI and BPMN), and business rules modelling (SBVR and PRR).

Notice that the Business Process Definition Modelling (BPDM) RFP was re-opened in order to allow former BPMi members to submit proposals. Most if not all of the current submitters expect the BPDM metamodel to support the BPMN graphical notation. As such it is possible that the BPDM specification will include refinements to the BPMN specification. The OMG process allows a submission to include changes to adopted specifications if they are appropriate for alignment of the new specification. This may be a vehicle for enhancements to the BPMN specification that are beyond the scope of the BPMN finalization task force (FTF). The FTF is chartered to resolve editorial issues, ambiguities and errors in a specification, but not to make substantive changes (as determined by the Architecture Board and voters on the FTF final report). BPDM may be relevant to DIP’s work on SWS composition (WP4a).

4.3 Support of XPDL by software vendors

XPDL (XML Process Definition Language) is a standard developed by the Workflow Management Coalition (WfMC) [17]. XPDL provides an XML-based file format that

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2 Due to this prominent role of BPEL, BPMN also contains a mapping to BPEL. However, not all BPM processes can be mapped to BPEL [16].

3 Notice that ILOG supports BPMN in its ILOG JViews Diagrammer product. The GUI of the prototype SWS composer delivered internally as DIP deliverable D4a.9 is based on ILOG JViews Diagrammer.
can be used to exchange process models between tools. XPDL version 2.0 has been extended so that it can now be used as a file format for BPMN.

XPDL contains features such as roles, task priorities or deadlines, which are highly relevant for human workflows. These features are missing in the current BPEL standard, which focuses on fully automated processes. Software vendors with a strong background in workflow management, such as FileNet, Savvion or Fuego, therefore tend to favour XPDL over BPEL. BPEL, on the other hand, is supported by infrastructure vendors, such as BEA, IBM, Microsoft, SAP/IDS Scheer, Oracle, TIBCO, or webMethods.

On the long run, BPEL will probably provide functionality similar to XPDL and the three competing standards BPEL, BPMN and XPDL will be harmonized. Some vendors already offer transformations from XPDL to BPEL. Until such a harmonization is achieved it is recommended to closely monitor future development of XPDL and its take-up by software vendors. Moreover, XPDL should be taken into account in the development of orchestration functionality within DIP and WSMO.

5 CONCLUSION

During the six months since the publication of D7.5, the landscape of Semantic Web Services and Semantic Web Services related standards and standardization activities evolved in directions that can be seen as positive from DIP’s point of view:

- The W3C started a formal standardization activity regarding the interchange of rules and is considering starting formal standardization activities towards supporting semantics in Web Services;
- BPMi and OMG merged, and OMG took specific actions to improve the alignment of its standards and the Rule Interchange Format under specification at W3C;
- OASIS started a formal standardization activity regarding the deployment and execution of Semantic Web Services in a service-oriented architecture.

Our recommendation is that DIP and DIP members should continue to interact closely with these organizations (W3C, OMG and OASIS), and continue to take an active role in any relevant activities if and when they are started, to guarantee that DIP’s positions and interests are duly taken into account. In addition, DIP should closely monitor and participate in the inception of any Semantic Web Services oriented activity at W3C, and, in particular, those under consideration regarding semantic annotations in WSDL and the semantics for Web Service characterization.

In summary, our recommendations for the next six months period are to:

- Continue activity in W3C, OASIS and OMG, closely monitoring alignment with WSMO/WSML and utility for DIP;
- Monitor and even participate to potential developments at W3C of new activities related to semantic annotations in WSDL and the semantics of Web Services characterization;

4 BPEL4People aims at integrating these workflow features into the BPEL standard (see above).
• Continue effort to integrate WSMO/WSML better within the existing Web service standard stack, in particular within W3C;
• Closely follow the development in the BPEL areas;
• Closely monitor future take-up of BPMN by software vendors and take into account BPMN and BPDM in the development of choreography functionality within DIP and WSMO.
• Closely monitor future development of XPDL and its take-up by software vendors. Monitor efforts towards harmonisation with BPEL and BPMN. Moreover, XPDL should be taken into account in the development of orchestration functionality within DIP and WSMO.

REFERENCES