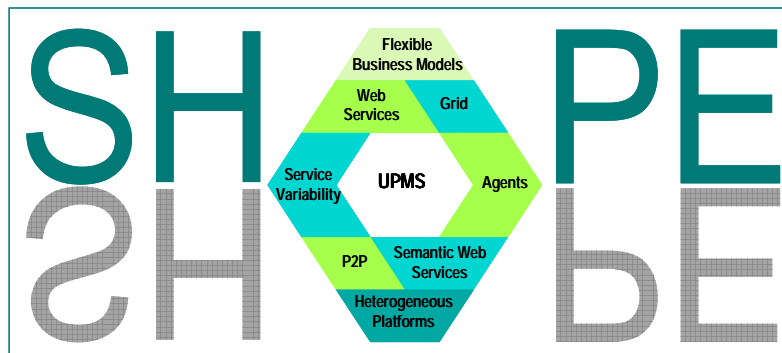


Service and Software Architectures, Infrastructures and Engineering
Collaborative Project
Semantically-enabled Heterogeneous Service Architecture and Platforms Engineering
Acronym
<b>SHAPE</b>
Project No
216408



## Deliverable D6.2

### Standardisation and Dissemination Plan

#### Work Package 6

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## Executive Summary

This report presents deliverable 6.2 “Standardisation and Dissemination Plan” of the SHAPE project, including the results of tasks T6.2 and T6.3 as defined in the Description of Work.

This deliverable highlights the dissemination and standardisation activities that will be carried out in the context of the SHAPE project. We start by highlighting the vision of the project, its expected impact and results, and then we detail on the dissemination activities that are envisioned in the context of the SHAPE project, more precisely: papers, Web site, open source, workshops, training, and standardization activities.

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# 1 The Vision and the Expected Results of the SHAPE Project

In this section we shortly introduce the project. We outline its scope and expected results, thus motivating the need for clear dissemination and standardisation plans, which are described in Sections 2 and 4 respectively.

## 1.1 The Vision of SHAPE

SHAPE aims to extend service-oriented architecture (SOA) with semantics and heterogeneous infrastructures (Web services, agents, Semantic Web Services, P2P and grid) under a unified service-oriented approach. The core objective is to support the development and realization of enterprise systems based on such a unified service-oriented approach. To achieve this, SHAPE will develop and test a model-driven engineering (MDE) tool-supported methodology for designing and implementing flexible business models and parameterised services on a Semantically-enabled Heterogeneous service Architecture (SHA) through model-driven engineering (MDE) approaches and standardisation of these results.

SHA (Semantically-enabled Heterogeneous service Architectures) extends SOA (Service-oriented Architectures) with semantics and support for heterogeneous architectural styles, including Web Services, Agents, SESA (Semantically-enabled Service Architectures), P2P, Grid and Components, under a unified service-oriented approach, to form a new and better basis for meeting the business requirements of enterprise wide systems.

The specific scientific and technological, as well as market and outreach objectives of the SHAPE project include:

- Develop a SHA reference architecture based on SOA reference models
- Develop metamodels with profiles and languages for SOA and SHA
- Develop modelling tools and services for SOA and SHA
- Create a model-driven methodology for SOA and SHA
- Realise model transformations and model deployment for SOA and SHA
- Standardise UPMS (ongoing RFP) and do a UPMSHA RFC in OMG
- Provide open source models and products for MDE4SOE and MDE4SHA
- Validate SHAPE results for 2 industrial use cases with SOA/SHA systems

## 1.2 Expected Results and Impact, and Dissemination Domains

SHAPE, with the provision of a standard foundation for platform independent specification of a broad range of service-oriented systems (through UPMS and UPMSHA) is expected to provide a better foundation for applications capable of interoperation – because the interoperability issues can be resolved and supported on a platform independent layer, separately from technology implementation details. Also the inclusion of semantics in the models allows for a better resolution of interoperability mismatches. This approach will be valid across business domains and organisations of all sizes.

Other expected results include:

- *Improved productivity and efficiency:* Through the provided metamodels and tooling the developers will be able to focus on the problem at hand rather than technical details. Parts of the development process will be automated through model transformations and code

generation. Closely integrated method support will guide the users of the tools to work in a coherent and efficient way.

- *Higher software reliability:* Typically implementation artefacts that can be generated through an MDE approach may be error prone when created manually. Having well tested transformations will remove such errors. Improved mastering of complexity Models in general help mastering complexity, by hiding the technical details of the platforms from the developers.
- *Novel service and engineering tools:* SHAPE will provide tools for service and software engineering through an integrated toolsuite (containing modelling tools and transformations) with closely integrated method support.

Last but not least, SHAPE will contribute to the open standards through the standardisation of UMPS and UPMSHA through the Object Management Group. This will provide new opportunities for many companies, including SMEs to start defining provided services on a higher level – and facilitate a technology independent service market.

The SHAPE Consortium will exploit and disseminate the results of the project according to different profiles:

- *End users* like Software Engineers will adopt the SHAPE results in their central methodology groups and disseminate them internally to their operational divisions, leading to products and services produced with higher productivity and less risks.
- *Tool providers* will integrate their existing products with the SHAPE framework, enhancing and also build new products based on the open source results from SHAPE.
- *Universities and research institutes* will integrate SHAPE results in their software engineering courses which will place the MDE approach as a well-established method of software development for SOA in the education of Europe's next generation of software engineers, and raise their profiles in the areas of software and systems modelling. This will impact the subjects of work in basic research, contributions in standards communities and technology transfer to industrial partners.

To achieve the expected impact on the profiles mentioned above, dissemination and explanation plans have been developed which are presented in the following sections.

## 2 Dissemination Plan

In order to raise public participation and awareness in these communities, SHAPE will use the following general channels for dissemination of the project:

- Production of promotional materials: a SHAPE flyer/brochure
- A project web site with public information about the project, progress and results
- Presentation of the project and its results at related thematic events, workshops and conferences
- Publications in journals, scientific and industrial periodicals
- Participation in related events organised by the EC
- Establish and/or communicate with relevant user groups
- Establishment of close links with other FP7 projects

The project partners will disseminate and exploit the results from the projects in the following ways.

## 2.1 Papers

Public research results from the project have been or will be published in conferences, workshops, international journals, and magazines. Several publications have been already published or are planned at this stage. This list will grow in the course of the project. In the following we give descriptions of the completed and planned papers:

### 2008

1. "Semantic Web Services Choreography: Contracting and Enactment" at International Semantic Web Conference
2. "A platform-independent metamodel for multiagent systems" at International Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)
3. "Agent-oriented software engineering: a model-driven approach" at Journal of Agent-Oriented Software Engineering (JAOSE)
4. "A Platform Independent Agent-based Modeling Language" at International Conference on Autonomous Agents and Multiagent Systems
5. "A Model-driven, Agent-based Approach for the Integration of Services into a Collaborative Business Process" at Internal Conference on Autonomous Agents and Multiagent Systems
6. "Modeling and Executing Service Interactions using an Agent-oriented Modeling Language" at International Conference on Advanced Information Systems Engineering (CAiSE'08)
7. "The Static Semantics of the Domain Specific Modeling Language for Multiagent Systems" at International Workshop on Agent-Oriented Software Engineering (AOSE 2008)
8. "The Dynamic Semantics of the Domain Specific Modeling Language for Multiagent Systems" at International Workshop on Agent-based Technologies and applications for enterprise interOPerability (ATOP 2008)
9. "A Platform Independent Metamodel for Service Modelling", Models 2008

The tables in the annex list potential workshops and conferences, journal, and magazines which will be targeted by the project.

## 2.2 Web site

The project will create and maintain a web-site for the projects containing the public results and news from the project. A first version of the web site is already in place and can be accessed at:

<http://www.shape-project.eu/>

In order to raise public awareness and to provide a common communication platform for the partners, the official SHAPE web portal has been launched at project Kick-Off. The central part of the website provides a public view onto the project and its progress. Its main menu is divided into the following parts:

- An overview about the main project objectives and goals.
- Consortium and contact information.
- A section for work package providing descriptions for each work package
- A section for project results, providing an overview on the progress and milestones reached by supplying the documents intended for the public.
- Publications and links that will provide further project material to the public audience.
- A download section for downloading tools that will be developed in the project.

- A blog section providing announcements of events such as conferences, workshops and meetings that are related to or hosted in the course of the SHAPE project.

In addition to the public part an internal section provides the project partners with a lightweight document and website management platform. It features the management of binary resources, such as publication drafts, meeting minutes, work plans, etc. The initial structure divides the content into separate sections for each work package, containing predefined subsections for deliverables, publications, items for public relations and other content - this is accompanied by the possibility to create further subdirectories within the system.

Essentially, the document management environment features facilities for uploading and browsing documents, version tracking of publication drafts and lightweight meta-data annotations.

All the people involved with the project have been provided with personal accounts to trace individual activities whereas the work package leaders are offered additional administrative features for modifying the dynamic content of the website's public sections. It is possible to conveniently publish deliverables and publications stored within the internal system directly on the main page as well as to create entries on events and links.

The internal environment has been originally developed by UIBK and offers the necessary stability, security, speed and maintainability of the application. Additionally, database backups are being performed periodically.

## 2.3 Open source

Various open source implementations and tools will be developed in the context of the project, and will be given access to them through the web-site. SHAPE has chosen an Open Source development strategy in order to provide a base infrastructure that will be reliable, stable, flexible, low cost and with a good support. Making our base infrastructure Open Source is the best choice to make it of durable quality. Moreover, having this base infrastructure Open Source will bring a large community and then will facilitate future introduction of new contributors (users, tool providers and academia); furthermore, SHAPE will be able to easily reuse MODELWARE and MODELPLEX Open Source components and integrate its own results into the already running Eclipse community. The choice of Eclipse has been driven by this consideration. Eclipse is already a successful Open Source project. It has in excess of 1 million of downloads and it has a very large community. An interesting aspect with the SHAPE MDE focus on standard models and metamodels is support for a move in the direction from Open source to Open models. Based on the development of Open Source reference implementations of UPMS and UPMSHA, the SHAPE project might provide valuable input to the NESSI NEXOF plans for an open source framework around services.

## 2.4 Workshops

Workshops will be organized through the course of the project at relevant international conferences to disseminate the SHAPE results and gather interest from both the industry and research communities. Some of the partners are already involved in the organization of the 3rd edition of the *Modeling, Design, and Analysis for Service-oriented Architecture Workshop*,<sup>1</sup> co-located with the 12th IEEE International EDOC Conference.

## 2.5 Training

The university partners will enrich their courses with results from the project, as well as present the results of the project in tutorials organized in conjunction with international conferences. The open source implementation of the various tools will be used in advanced teaching activities. The work of

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<sup>1</sup> <http://events.deri.at/mda4soa2008/>

the project will be disseminated also through seminars, student projects and theses (Diploma, BSc, MSc, PhD). The industrial partners will enrich their tradeshows and technical seminars for their existing and prospective customers with results from the project.

## 2.6 Dissemination to Other European Projects

The following EU funded projects are relevant to the SHAPE project, and a cooperation/dissemination with these projects is planned during the SHAPE project:

- SUPER (Semantics Utilised for Process management within and between EnteRprises)<sup>2</sup>
- COIN (COllaboration and INteroperability for networked enterprises)<sup>3</sup>
  - o ESI will work in the introduction of innovative services in the platform that will make use of the UPMS approach as a way to improve the interoperability of enterprise systems. In this sense, we plan to integrate the transformations developed in SHAPE in the COIN platform.
- Service Web 3.0<sup>4</sup>
- SOA4All: A Web of billions of Services<sup>5</sup>

The interactions with the above projects will take the form of face to face discussions, mailing lists discussions, phone conferences, meetings, etc.

## 3 Standardisation Plan

The SHAPE project will provide metamodels, tool support, methodology and use cases on the Semantically-enabled Heterogeneous Service Architecture and Platforms Engineering domain. SHAPE is involved in standardization efforts within the OMG, and follows other standardization bodies, in order to be as much aligned as possible with the state of the art, the standards, and the most common practices and to bring innovations on top of this.

As we will see, “standards” is not a monolithic bloc, on which we can just add new features. Standards are moving, new standards are under construction and the combination of standards need a strong effort in selecting a consistent subset. One of the expected benefits of standards is interoperability. SHAPE will enforce to provide interoperable solutions in order to let the SHAPE tools be interconnected with commercial tools build on the concerned standards.

This section presents the SHAPE objectives in terms of standardization strategy. It aims at promoting and coordinating partners’ submissions to the various standardisation bodies such as:

- OMG (Object Management Group) with participations in various standardisations tasks (UML, MDA™ User Group, etc.).
- Eclipse Foundation, related with interoperability and open source issues for tools. It is well known for its Eclipse integrated development environment.
- ISO (International Standardization Organization). It is a network of national standards institutes from 146 countries working in partnership with international organizations, governments, industries and consumer representatives.
- INCOSE (International Council on Systems Engineering), related with system engineering. It was founded in 1990 and is a non-profit organization. Its main goal is to foster the

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<sup>2</sup> <http://ip-super.org/>

<sup>3</sup> <http://www.coin-ip.eu>

<sup>4</sup> <http://www.serviceweb30.eu/>

<sup>5</sup> <http://www.soa4all.org/>

definition, understanding, and practice of world class systems engineering in industry, academia, and government.

- W3C Consortium (World Wide Web Consortium). It was created in October 1994 to lead the World Wide Web to its full potential by developing common protocols that promote its evolution and ensure its interoperability for e.g. Web-Services and XML standards.
- OASIS (Organization for the Advancement of Structured Information Standards) is a non profit, international consortium that drives the development, convergence, and adoption of e-business standards.

The definition of a standardisation strategy objective consists in identifying each of the relevant standardisation bodies, the active partners in each of the standardisation bodies and a coordinated strategy to act. The execution of a standardisation strategy objective consists of carrying out the standardisation activities by coordinating the submissions and agreeing on voting mainly through a synchronization of actor's positions and roadmaps.

Quite a large number of standards are related to the SHAPE work. The Shape research activities are involving the following fields :

- Modeling and meta-modeling,
- SOA,
- Semantic Web Services,
- Onthologies,
- Methodologies,
- Business modelling : Business Process modelling, Enterprise Architecture,
- Agents,

For each of these fields, we can quote several standards, which themself have connections to other standards. Therefore, we get as a result quite a large number of interconnected standards.

The Figure below summarizes the main standards that are related to the SHAPE research.

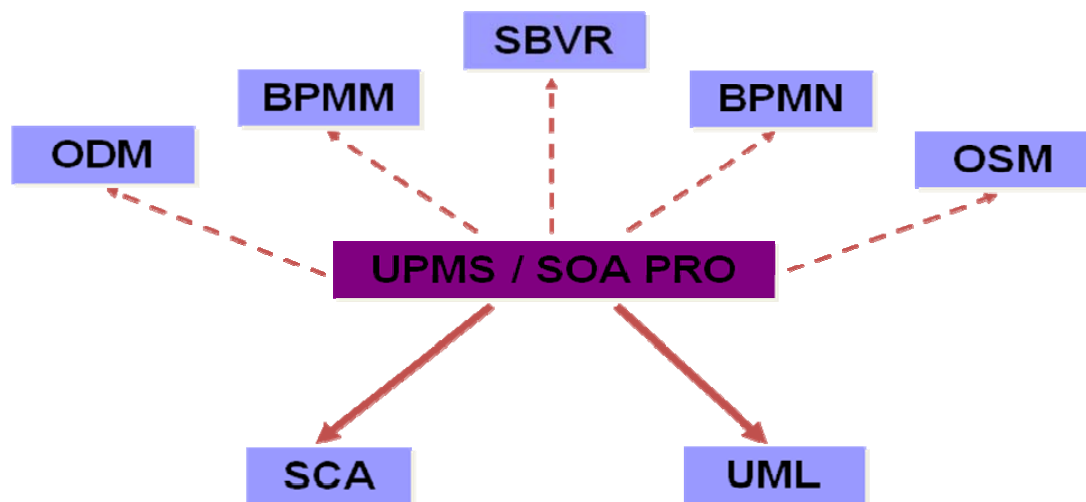
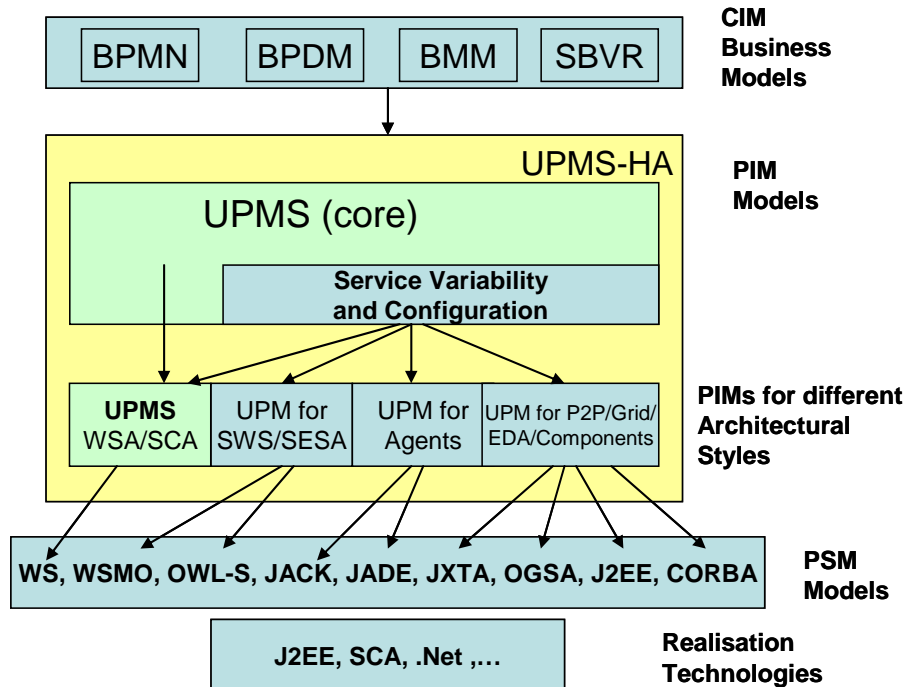


Figure 1 UMPS/SOA PRO related standards

At the center of the Figure, UPMS/SOA PRO is an ongoing work that will provide a UML profile for modelling services. The SHAPE project is deeply involved in this standard which is the main standard related to SHAPE. This standard by itself is connected to other standards : UML is the foundation on which UPMS/SOA PRO is built. SCA is a reference architecture for services, on which UPMS/SOA PRO takes many references.

The standards on top of UPMS concern mainly the elements that are defined before the architecture definition. The reference to them is mainly concerned by a search for continuity in the system development lifecycle.

All these standards are using metamodels and therefore implicitly rely on MOF/XML technologies.



**Figure 2 UPMS (core) and UPMS-HA – connection to technologies and domains**

In this figure, we see how UPMS relates to other techniques, which imply the usage of the related standards.

This rest of this section is structured as follows. Subsection **Error! Reference source not found.** presents each standardisation organization of interest for the SHAPE project, as well as the partners' roles and their activities within each standardization body.

## 4 OMG Standardisation and SHAPE

### 4.1 Object Management Group (OMG)

This chapter will position the SHAPE work and strategy against the various concerned, existing and upcoming OMG standards. The SHAPE participants will use their knowledge and participation within the OMG and other standards in order to present a map of the standards having connection to the shape work, and to bring insight knowledge.

The Object Management Group (OMG)<sup>6</sup> is a consortium that produces and maintains computer industry standard specifications for interoperable enterprise applications. Its members include virtually every large company in the computer industry, and hundreds of smaller ones. The OMG's flagship specification is the multi-platform Model Driven Architecture (MDA),<sup>7</sup> recently launched but already well known in the industry.

It is based on the following modelling specifications: MOF,<sup>8</sup> UML,<sup>9</sup> XMI,<sup>10</sup> and CWM.<sup>11</sup> The OMG's own middleware platform is CORBA,<sup>12</sup> which includes the Interface Definition Language OMG IDL,<sup>13</sup> and the protocol IIOP.<sup>14</sup>

The Object Management Architecture (OMA)<sup>15</sup> defines standard services that will carry over into MDA™work shortly. OMG Task Forces standardize Domain Facilities<sup>16</sup> in industries such as healthcare, manufacturing, telecommunications, and others. Standards organizations and other consortia maintain liaison relationships with OMG. OMG is an ISO PAS submitter, able to submit our specifications directly into ISO's fast-track adoption process. OMG IDL is already an ISO standard and ITU-T recommendation.<sup>17</sup>

OMG is the main standardization target for SHAPE. SHAPE intends to reach a level where it can propose its results as standards or as contributions to standards within the OMG.

## 4.2 UML Profile and Metamodel for Services - UPMS

This is the main focus of SHAPE contributions. SHAPE partners worked together to submit the UPMS-HA submission in June 2007 and has after that worked on merging and joining the 3 initial submissions which merged into one in September 2007, split into two (UPMS and SOA Profile) in December 2008 and merged back into one in March 2008. A joint revised submission was delivered on May 28<sup>th</sup> 2008 (UPMS/SOA-Pro), and a new revised submission is in the works for August 25<sup>th</sup>, 2008.

## 4.3 Meta Object Facility - MOF

(Meta Object Facility 2 ptc/04-10-15)

The Meta Object Facility (MOF), an adopted OMG standard, provides a metadata management framework, and a set of metadata services to enable the development and interoperability of model and metadata driven systems. Examples of these systems that use MOF include modeling and development tools, data warehouse systems, metadata repositories etc.

MOF2 is used to specify metamodels, in particular UML2 which is being extended by the UPMS/SOA PRO Profile. It is expected that the Service modeling capability metamodel would need the facilities of CMOF rather than EMOF (in the same way CMOF is used by UML2 itself) - though this is not a requirement. This is also indicated through the requirement to reuse portions of the UML2 metamodel which is in CMOF.

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<sup>6</sup> <http://www.omg.org>

<sup>7</sup> <http://www.omg.org/mda>

<sup>8</sup> <http://www.omg.org/cwm/>

<sup>9</sup> <http://www.omg.org/uml>

<sup>10</sup> <http://www.omg.org/uml/>

<sup>11</sup> <http://www.omg.org/cwm>

<sup>12</sup> <http://www.omg.org/gettingstarted/corbafaq.htm>

<sup>13</sup> [http://www.omg.org/gettingstarted/omg\\_idl.htm](http://www.omg.org/gettingstarted/omg_idl.htm)

<sup>14</sup> <http://www.omg.org/gettingstarted/corbafaq.htm#RemoteInvoke>

<sup>15</sup> <http://www.omg.org/gettingstarted/specintro.htm#OMA>

<sup>16</sup> <http://www.omg.org/homepages/index.htm>

<sup>17</sup> <http://www.corba.org/standards.htm>

The SHAPE metamodel will be based on MOF

## 4.4 UML 2

The Unified Modeling Language, an adopted OMG standard, is a visual language for specifying, constructing and documenting the artifacts of systems. It is a general-purpose modeling language that can be used with all major object and component methods, and that can be applied to all application domains (e.g., health, finance, telecommunications, aerospace) and implementation platforms (e.g., J2EE, .NET).

The UPMS/SOA PRO specification should, where appropriate (e.g. for component modeling), integrate with or reuse the UML2 metamodel – either ‘in the large’ or in factored form (using capabilities from InfrastructureLibrary or Superstructure). Profiles contained in submissions should be UML2 Profiles.

## 4.5 Semantics of Business Vocabulary and Rules (SBVR)

SBVR defines the vocabulary and rules for documenting the semantics of business vocabularies, business facts, and business rules; as well as an XML schema for the interchange of business vocabularies and business rules among organizations and between software tools. This specification is interpretable in predicate logic with a small extension in modal logic. This specification supports linguistic analysis of text for business vocabularies and rules, with the linguistic analysis itself being outside the scope of this specification. This specification is applicable to the domain of business vocabularies and business rules of all kinds of business activities of all kinds of organizations. It is conceptualized optimally for business people rather than automated rules processing, and is designed to be used for business purposes, independent of information systems designs. This specification is applicable as input to transformations by IT staff into information system designs, using a combination of decisions from system architects and Platform Independent Model designers together with software tool function.

SBVR (bei/05-08-01) covers business concepts and rules expressed in semi-formal natural language with a logic- and MOF-based formal underpinning. This has an even higher (than ODM) overlap with service contracts and specifications. As for ODM, it should be possible to transform and/or trace services models in the services profile to such conceptual models.

## 4.6 MOF Queries Views Transformations ad/05-07-01

The QVT standard is a language for expressing model transformations and views. This capacity is extensively used for MDA technology, in particular for implementing model transformations.

It may be used to express the actual transformations from services models to Web Services and other execution environments. QVT may also be used for tracing levels of abstraction such as Business-Conceptual-Logical-Physical data models (whether automatically generated or not) to candidate service architectures captured using the services profile.

## 4.7 XMI

The XMI 2.1 standard (formal/05-09-01) specifies the format for metamodel and model interchange. XMI is a mechanism that from a MOF based metamodel provides an XML schema to interchange instances of the metamodel (models). Each OMG standard expressed as a metamodel provides its interchange schema using XMI.

## 4.8 Reusable Asset Specification (RAS)

RAS (formal/05-11-02) is a set of guidelines and recommendations about the structure, content, and descriptions of reusable software assets. The specification identifies some categories, or rather types or profiles and provides general guidelines on these profiles. The Reusable Asset Specification (RAS)

addresses the engineering elements of reuse. It attempts to reduce the friction associated with reuse transactions through consistent, standard packaging.

RAS may be used to describe services models as reusable assets.

## 4.9 UML Profile for Enterprise Distributed Object Computing,

The Joint UML for EDOC Profile Submission (ptc/02-02-05) is a specification for a UML Profile for Enterprise Distributed Object Computing. The vision of the EDOC Profile is to simplify the development of component based EDOC systems by means of a modeling framework, based on UML 1.4 and conforming to the OMG Model Driven Architecture.

EDOC was based on UML1.4 and had to deal with insufficient support of component based modelling in UML1.4. EDOC has not evolved for UML2.0, and can be considered as obsolete. Ideas from EDOC still have interest for the UPMS/SOA PRO standard. As a side note, many key person involved in the EDOC standard are involved in the UPMS/SOA PRO standard.

## 4.10 Business Process Definition Metamodel (BPDM)

The “Business Process Definition Metamodel” (BPDM) is a framework for understanding and specifying the processes of an organization or community. BPDM provides the capability to represent and model business processes independent of notation or methodology, thus bringing these different approaches together into a cohesive capability. This is done using a “meta model” – a model of how to describe business processes – a kind of shared vocabulary of process with well defined connections between terms and concepts. This meta model captures the meaning behind the notations and technologies in a way that can help integrate them and leverage existing assets and new designs.

This standard covers the definition of business organizational processes. It is expected that these processes could be used to specify requirements that must be fulfilled by solutions using an SOA, and captured using the services model. Service contracts could provide a linkage between architected services solutions and business operational requirements specified in BPDM.

## 4.11 Ontology Definition Metamodel (ODM)

The Ontology Definition Metamodel (ODM), as defined in this specification, is a family of MOF metamodels, mappings between those metamodels as well as mappings to and from UML, and a set of profiles that enable ontology modeling through the use of UMLbased tools. The metamodels that comprise the ODM reflect the abstract syntax of several standard knowledge representation and conceptual modeling languages that have either been recently adopted by other international standards bodies (e.g., RDF and OWL by the W3C), are in the process of being adopted (e.g., ommcon Logic and Topic Maps by the ISO) or are considered industry de facto standards (non-normative ER and DL appendices).

ODM has overlap with service contracts and specifications providing knowledge about a particular domain. It should be possible to transform and/or trace data models in services model to such conceptual models or ontologies.

## 4.12 Organization Structure Metamodel (OSM)

This specification is not yet adopted. Its metamodel covers organization structures and relationships and contact information. It may therefore be used to describe roles service providers play in a services model and provide a linkage between service providers and the business organizational operations.

## 4.13 Knowledge Discovery Metamodel (KDM)

This metamodel covers data structures from both a persistent (database) and program language perspective. It may be relevant for data exchanged between service consumers and providers, and for persistent data required by service implementations.

## 4.14 Object Constraint Language (OCL)

The Object Constraint Language (OCL), an adopted OMG standard, is a formal language used to describe expressions on UML models. These expressions typically specify invariant conditions that must hold for the system being modeled or queries over objects described in a model. Note that when the OCL expressions are evaluated, they do not have side effects; *i.e.* their evaluation cannot alter the state of the corresponding executing system.

## 4.15 BPMN 2.0

BPMN 2 is a major release for the Business Process Modeling Notation standard. BPMN is a very popular business process model. The 1.0 version only standardizes the notation. BPMN 2 will provide an extended semantics, and a metamodel support for it.

## 4.16 BMM – Business Motivation Metamodel

Business requirements can be captured using the OMG Business Motivation Model (BMM). BMM can be used to capture the means to meet some desired ends. The ends may be defined by a business vision amplified by a set of goals and objectives representing some desired result. The means are the sources of action that when carried out meet the ends producing the desired result as measured and verified by some assessment. Sources of action may represent or be carried out by interactions between consumers with needs and providers with capabilities.

## 4.17 Information Management Metamodel (IMM)

This standard is still under construction. The IMM metamodel is a standard addressing information management needs including:

- MOF2 Metamodel for Information Management (IMM)
- UML2 Profile for Relational Data Modeling, with a mapping to the IMM metamodel and SQL DDL
- UML2 Profile for Logical (Entity Relationship) Data Modeling, with a mapping to the IMM metamodel
- UML2 Profile for XML Data Modeling, with a mapping to the IMM metamodel and XML Schema

- UML2 Profile for Record Modeling, with a mapping to the IMM metamodel and COBOL Copybooks
- A standardized 'Information Engineering' data modeling notation with a mapping to the IMM metamodel

It may therefore be used to describe service data and specific rules for XML exchange of service data in transformations from service models to Web Services.

## 4.18 UML Profile and metamodel for DODAF and MODAF (UPDM)

This standard is focusing on a metamodel and UML profile for an Enterprise Architecture framework based on the US DODAF and the UK MODAF Architectural Frameworks. The initial RFP focused on the first version of these frameworks. Lately NATO has developed NAF v1.3 (NATO Architecture Framework version 1.3, which included a set of Service Oriented Views). In the adoption voting process of the final submission to UPDM a number of organisations voted it down, and wanted instead an adopted OMG UPDM standard to be based on the newer version of MODAF 1.2 and DODAF 2.0 which will include the Service Oriented Views. Now a core team of submitters have formed a new submission group which is working on doing this as a submission under the RFC – Request For Comment procedure, in order to speed up time. A version of this is planned for end of August 2008, and they are also looking for a harmonisation with UPMS.

See <http://updmgroup.org/> for the UPDM group press release on this.

See Service oriented views of MODAF 1.2 here <http://www.modaf.org.uk/gSOV/>

Because of the planned inclusion of service oriented modelling in UPDM, and the Enterprise Architecture link to Business and goal/capability modelling in the strategic and operational views this standard becomes important for the SHAPE project to relate to. One idea could be to adopt the content/intentions of this, but to replace the specific metamodels here with the standard metamodels and notation of BPMN, BPDM, BMM and OSM from other OMG standardisation processes.

### SOFTEAM Standardisation Activities

SOFTEAM is a domain contributing member of OMG, focused on the analysis and design area. SOFTEAM has been contributing to the OMG standards since the birth of the analysis and design task force (1996), in order to participate to the definition of the UML™ standard. SOFTEAM has been leading the SPEM definition standard and parts of the UML™ standard. In particular, SOFTEAM has been driving the definition of the Profile technology within the OMG.

SOFTEAM is involved with several standards under construction within the OMG. In particular SOFTEAM participates in the specification of UPMS and BPMN2.

SOFTEAM intends to pursue its efforts within the standard elaborations and enhancements, in particular by participating to the UML™ FTF and RTF. SOFTEAM intends to be proactive in the introduction of SHAPE results as standards within the OMG.

### ESI-Tecnalia Standardisation Activities

ESI is a platform member of the OMG since 2006. It is involved in the development of several standards such as SPEM, and it is present in the MDA vendor directory. The ESI has applied their knowledge on SPEM 2.0. to model the CMMI® processes and he is currently selling services based on SPEM2.0.

ESI currently is involved in the specification of the UPMS, in that line they ESI has played the role of main editor of one of the two first submissions to the UPMS standard.

ESI objective is to build products over the UPMS standards following a MDA approach to drive the business requirements down to specific platforms such as WSA. The ESI long term objective is to make this technology applicable in the SME's as a way to improve their interoperability and performance.

### **DFKI Standardisation Activities**

DFKI is involved with two standards under construction within the OMG. In particular DFKI participates in the specification of UPMS and AMP (Agent Metamodel and Profile).

### **SAP Standardisation Activities**

SAP is a platform member in OMG and participant in analysis and design platform task force group.

### **SINTEF Standardisation Activities**

SINTEF is an academic member in OMG and participant in analysis and design platform task force group. SINTEF is currently coordinating the joint UPMS submission team.

## **5 Other standards relevant to SHAPE**

- [Web Services Architecture](#), W3C Working Group Note, 11 February 2004. This document defines the Web Services Architecture. It identifies the functional components and defines the relationships among those components to effect the desired properties of the overall architecture.
- [XSD 1.0 Specification](#), See also [Web services specifications](#) and [EMF](#) which includes an implementation of XSD and an XSD editor. Defines an XML document language for describing data schemas.
- [Service Data Objects](#) (SDO) is designed to simplify and unify the way in which applications handle data. Using SDO, application programmers can uniformly access and manipulate data from heterogeneous data sources, including relational databases, XML data sources, Web services and enterprise information systems.
- [Web Services Definition Language](#) (WSDL) is a language for describing web services interfaces and bindings to endpoints providing the interfaces.
- [Service Component Architecture](#) (SCA) describes a means of defining service components that consist of the wiring together of other service component implementations into deployable assemblies.
- [Web Services Business Process Execution Language](#) (WSBPEL) is a leading proposed textual notation for specification of web services processes. See also the [eclipse BPEL project](#).
- [Software Services Profile](#) is an IBM developerWorks article describing a UML profile for software services, a profile for UML 2.2 which allows for the modeling of services, service-oriented architecture (SOA), and service-oriented solutions. The profile has been implemented in IBM Rational Software Architect, used

successfully in developing models of complex customer scenarios, and used to help educate people about the concerns relevant to developing service-oriented solutions.

- OASIS SOA Reference Model: Organization for the Advancement of Structured Information Standards (OASIS), “Service Oriented Architecture (SOA) Reference Model,” Public Review Draft 1.0, 10 February 2006, provides the foundation for the glossary for UPMS/SOA PRO. It is based on the Reference Model for Service Oriented Architecture 1.0, Committee Specification 1, issued 2 August 2006.

<http://www.oasis-open.org/committees/download.php/16587/wd-soa-cd1ED.pdf>

## 5.1 Eclipse Foundation

The Eclipse Foundation<sup>18</sup> is an independent non profit organisation dedicated to providing an Open Source software development platforms, and fostering a community of developers and an ecosystem of complementary tools, plug-ins and services.

The software is provided under the Eclipse Public Licenses, based on the Common Public License; this is an Open Source license.

The Eclipse Foundation has a board of directors drawn from its member companies (which includes IBM and THALES). This board is responsible for overseeing the technical financial affairs of the Foundation.

Within Eclipse there is a hierarchy of projects, starting with Top-Level projects and each run by a Project Management Committee. Each Top-Level Project consists of Projects and Subsystems.

SHAPE may deliver its Open Source deliverables through the Eclipse Foundation, integrating them with the Eclipse platform and making the results widely available. By this means, the SHAPE project will provide key model-driven components, encouraging further development of the market of model driven for SOA.

### 5.1.1 ESI-Tecnalia

ESI has been working in these last four years in the extension of the eclipse platform to implement the MDA approach in different domains. Based on those activities the ESI has a proven experience in the usage of certain technologies in the eclipse platform that will be useful in the SHAPE project. Some of these technologies are EMF and GMF.

The ESI will be interested in the dissemination of the SHAPE results in the context of the eclipse foundation.

### 5.1.2 SAP

SAP is a strategic member of Eclipse Foundation. SAP was a member of the Board of Stewards of the original Eclipse organization and has been a member of the Board of Trustees of the new Eclipse Foundation organization.

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<sup>18</sup> <http://www.eclipse.org>

## 5.2 The World Wide Web Consortium (W3C)

“The World Wide Web Consortium (W3C) develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential. W3C is a forum for information, commerce, communication, and collective understanding.”<sup>19</sup>

W3C has developed most of the fundamental standards behind the World Wide Web. Current standards include Web Service Definition Language (WSDL) and SOAP.

### 5.2.1 SAP

SAP is a member of the W3C Advisory board. SAP is a participant in the WSDL working group and co-submitter as well as in the WS-Addressing Working Group.

### 5.2.2 DFKI

DFKI is participant in the Math Working Group and in the Semantic Web Best Practices: WordNet Task Force.

## 5.3 The Organization for the Advancement of Structured Information Standards (OASIS)

The Organization for the Advancement of Structured Information Standards (OASIS)<sup>20</sup> is a “not-for-profit consortium that drives the development, convergence and adoption of open standards for the global information society. The consortium produces more Web services standards than any other organization along with standards for security, e-business, and standardization efforts in the public sector and for application-specific markets. Founded in 1993, OASIS has more than 5,000 participants representing over 600 organizations and individual members in 100 countries.”<sup>21</sup>

### 5.3.1 Semantic Technology Institute (STI) Innsbruck

STI Innsbruck has been a member of OASIS for the last number of years and currently co-chairs the Semantic Execution Environment Technical Committee (SEE-TC). The aim of the SEE-TC is to provide guidelines, justifications and implementation directions for an execution environment for Semantic Web services. The resulting Semantic Execution Environment (SEE) is at the core of a Semantically-enabled Service Oriented Architecture (SSOA) and as such will play a role in the SHAPE as one of the concrete technologies that UPMS will be grounded to. STI Innsbruck will continue to lead the SEE-TC through its involvement in the SHAPE project and will use the group as means to disseminate and standardise results of SHAPE, specifically in the areas of Methodologies for building Semantic Web Services.

### 5.3.2 SAP

SAP is a foundational sponsor and board member of OASIS. SAP is a member in several technical committees and participate for example the specification of UDDI, WS-BPEL, BPEL4People and WS-HumanTask.

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<sup>19</sup> <http://www.w3.org/>

<sup>20</sup> <http://www.oasis-open.org>

<sup>21</sup> <http://www.oasis-open.org/who/>



## SUMMARY - Strategy for the SHAPE project

### 5.4 Overview

As shown in chapter 3, there are numerous standards related to SHAPE research subjects. Several standards cover the same subject or subjects having an important intersection. There are weaknesses in standard, in that several organizations provide standards related to similar targets, and also in that there are conflicts within the same standardization body (such as typically the OMG).

In addition to these points, we shall not forget that these standards have versions and evolutions: their compatibility should be checked against these evolutions. SHAPE also deals with standards under construction, the main being UPMS/SOA PRO.

Standard specifications almost always have the requirement to comply with other existing standards. That compliance is often a weak paragraph, explaining some mappings between concepts, which is far from providing a global coherence and from guaranteeing interoperability.

### 5.5 Issues and decisions

The main issue for standards is the interoperability between UML and business related standards. The most pre-eminent example is the UML activity diagram, which is in competition with BPMN. Activity diagram could have been used for business process modelling, but the market and several members in the OMG developed the BPMN standard.

UML is an important standard, at the core of the SOA PRO standard, while BPMN is a standard widely recognized by business process practitioners.

BPDM has raised a lot of controversy, as its own interest : it is a metamodel without notation, and it competes with XPDL which is business process model interchange format. The BPMN2 standard is doing a lot of efforts to comply with BPDM, which is not a well accepted standard on the market.

In addition to these issues, the BPDM and BPMN2 standards do not provide any solution to couple to UML, at least for its static part. We would like to express that a BPMN data flow is an occurrence of a business object (A UML Class), or that a lane (BPMN) represents an Actor (UML) or a package, and have connections to the rich set of behaviour modelling capacities of UML : State, Sequences, collaborations, etc. BPMN2 does not provide any solution to this.

Therefore, the SHAPE project shall provide solution to integrate UML and BPMN, and also solutions to interoperate BPMN models; XPDL, as a widely accepted solution may be the way to follow on this last issue.

Figure 1 shows the summary of the main standards to cope with for SHAPE. SHAPE will focus on these standards. In addition, several OMG standards are "support standards", such as MOF, UML Profiles, XMI, they will be naturally supported. As SHAPE has chosen the EMF open source infrastructure, this will help in having a MOF compliant support.

### 5.6 Conclusions

In this deliverable we emphasised the dissemination and standardisation activities that are planned during the SHAPE project development. The core dissemination activities consist of: publications in journals, conferences, and workshops, organization of workshops, and trainings. The SHAPE standardization roadmap summarizes all anticipated standardization activities of SHAPE partners in the standardization bodies described above. The roadmap contains for each activity the participating or supporting SHAPE partners and an indication of the primary partner(s).

## ANNEX (Relevant Workshops, Conferences, Journals, and Magazines)

**Table 0-1. Workshops and Conferences.**

Name	URL
Asian Semantic Web Conference	<a href="http://www.aswc2008.org/">http://www.aswc2008.org/</a>
European Semantic Web Conference	<a href="http://www.eswc2008.org/">http://www.eswc2008.org/</a>
International Conference on Knowledge Discovery and Data Mining	<a href="http://www.kdd2008.com/">http://www.kdd2008.com/</a>
International Conference on Service Oriented Computing	<a href="http://www.icsoc.org/">http://www.icsoc.org/</a>
International Semantic Web Conference	<a href="http://iswc2008.semanticweb.org/">http://iswc2008.semanticweb.org/</a>
World Wide Web Conference	<a href="http://www2008.org/">http://www2008.org/</a>
International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)	<a href="http://gaips.inesc-id.pt/aamas2008/">http://gaips.inesc-id.pt/aamas2008/</a>
International Conference on Advanced Information Systems Engineering (CAiSE)	<a href="http://www.lirmm.fr/caise08/">http://www.lirmm.fr/caise08/</a>
International Conference on Intelligent Agent Technology (IAT)	<a href="http://datamining.it.uts.edu.au/wi08/html/iat/">http://datamining.it.uts.edu.au/wi08/html/iat/</a>
International Conference on Service Oriented Computing (ICSOC)	
German Conference on Multi-Agent system TEchnologies (MATES)	<a href="http://www.wi2.uni-trier.de/mates08/">http://www.wi2.uni-trier.de/mates08/</a>
Programming Multi-Agent Systems (ProMAS)	<a href="http://vsis-www.informatik.uni-hamburg.de/events/ProMAS2008/">http://vsis-www.informatik.uni-hamburg.de/events/ProMAS2008/</a>
Service-Oriented Computing: Agents, Semantics, and Engineering (SOCASE)	<a href="http://www.swin.edu.au/hosting/socas e2008/">http://www.swin.edu.au/hosting/socas e2008/</a>
Agent-Oriented Software Engineering (AOSE)	<a href="http://grasia.fdi.ucm.es/aose08/">http://grasia.fdi.ucm.es/aose08/</a>
Agent-based Technologies and applications for enterprise	<a href="http://www-ags.dfki.uni-sb.de/~kuf/atop/">http://www-ags.dfki.uni-sb.de/~kuf/atop/</a>

interOPerability	
Models	<a href="http://www.modelsconference.org/">http://www.modelsconference.org/</a>
EC-MDA	<a href="http://www.fokus.fraunhofer.de/go/ecmda2008/">http://www.fokus.fraunhofer.de/go/ecmda2008/</a>
ICSE	<a href="http://icse08.upb.de/">http://icse08.upb.de/</a>
I-ESA	<a href="http://www.aidima.es/iesa2008/">http://www.aidima.es/iesa2008/</a>
EDOC	<a href="http://www.lrz-muenchen.de/~edoc2008/index.html">http://www.lrz-muenchen.de/~edoc2008/index.html</a>
ICSOFT	<a href="http://www.icsoft.org/">http://www.icsoft.org/</a>

Table 0-2. Journals.

Name	URL
ACM Transactions on Database Systems	<a href="http://www.acm.org/tods">www.acm.org/tods</a>
ACM Transactions on Information Systems	<a href="http://www.acm.org/pubs/tois/">www.acm.org/pubs/tois/</a>
ACM Transactions on Internet Technology	<a href="http://www.acm.org/pubs/periodicals/toit/">www.acm.org/pubs/periodicals/toit/</a>
ACM Transactions on Software Engineering and Methodology	<a href="http://www.acm.org/pubs/tosem/">www.acm.org/pubs/tosem/</a>
Applied Ontology - An Interdisciplinary Journal of Ontological Analysis and Conceptual Modeling	<a href="http://www.applied-ontology.org/">http://www.applied-ontology.org/</a>
IEEE Transactions on Knowledge & Data Engineering	<a href="http://www.computer.org/tkde">www.computer.org/tkde</a>
IEEE Transactions on Parallel & Distributed Systems	<a href="http://www.computer.org/tpds/">www.computer.org/tpds/</a>
IEEE Transactions on Software Engineering	<a href="http://www.computer.org/tse/">www.computer.org/tse/</a>
International Journal on Semantic Web and Information Systems	<a href="http://www.ijswis.org/">http://www.ijswis.org/</a>
Journal of Web Semantics	<a href="http://www.websemanticsjournal.org/">www.websemanticsjournal.org/</a>
LNCS Journal on Data Semantics	<a href="http://www.springeronline.com/sgw/cda/front_page/0,10735,5-164-22-14204130_0,00.html">http://www.springeronline.com/sgw/cda/front_page/0,10735,5-164-22-14204130_0,00.html</a>

International Journal of Agent-Oriented Software Engineering (IJAOSE)	<a href="http://www.inderscience.com/ijaose/">http://www.inderscience.com/ijaose/</a>
Internal Journal on Autonomous Agents and Multi-Agent Systems (JAAMAS)	<a href="http://www.springer.com/computer/artificial/journal/10458">http://www.springer.com/computer/artificial/journal/10458</a>

Table 0-3. Magazines.

Name	URL
Communications of the ACM	<a href="http://acm.org/cacm/">http://acm.org/cacm/</a>
IEEE Internet Computing	<a href="http://www.computer.org/internet">www.computer.org/internet</a>