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Partners: CWI Stichting Centrum voor Wiskunde en Informatica (NL)

UCBL Université Claude Bernard Lyon 1 (FR)

USTUTT Universitaet Stuttgart (DE)

TILBURG UNIVERSITY Stichting Katholieke Universiteit Brabant (NL)

UNITN Università degli Studi di Trento (IT)

TARC-PL Telcordia Poland (PL)

THALES Thales Services SAS (FR)

PWC Pricewaterhousecoopers Accountants N.V. (NL)

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Project no. 215175

COMPAS

Compliance-driven Models, Languages, and Architectures for Services

Specific Targeted Research Project

Information Society Technologies

Start date of project: 2008-02-01 Duration: 36 months

D7.6 Final Dissemination Report

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TARC-PL Telcordia Poland, PL

Contributing partner(s):

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Dissemination Level		
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PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	X

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Abstract

This deliverable presents the final report on all the dissemination activities performed within COMPAS project during its 36 months duration.

1. Introduction

This deliverable summarizes all the dissemination activities in a comprehensive way by combining contributions from all the partners in a single consistent report.

1.1. Purpose and scope

The purpose of this deliverable is to provide the list and summary of the dissemination activities combining all the contributions gathered from project partners throughout the whole project duration. Since, the number of them is quite significant and the reports were updated over the whole duration of the project, it's crucial to provide a comprehensive summary, supported by appropriate measures and numbers, for the purpose of proper reporting of the results of Work Package 7 dissemination tasks.

The deliverable collects all the information on the following types of dissemination activities:

- **Publications and talks at international conferences,**
- **Teaching activities** (courses involving COMPAS research topics, PhD dissertations, etc.),
- **Produced dissemination materials,**
- **Produced prototypes,**
- **Industrial dissemination (industrial demos and workshops).**

The contributions include all the efforts from both academic and industrial partners.

The deliverable does not contain information on standardization efforts and collaboration with other projects, as it's already collected and summarized in the last version of deliverable [D7.4].

1.2. Document overview

The structure of this document is made up of the following chapters:

- Chapter 1 introduces purpose and scope of this document and provides a general overview of its structure and content. It also states acronyms of abbreviations used as well as definition of terms used.
- Chapter 2 includes summaries of all the dissemination activities including numbers where appropriate.
- Chapter 3 finally summarizes the achievements related to dissemination tasks in Work Package 7 and explains if all the objectives were met.

1.3. Definitions and glossary

The most important terminology concerning the COMPAS project is listed on the public COMPAS Web-Site [D7.1] available at <http://www.compas-ict.eu> section terminology. This helps to make the overall COMPAS approach more comprehensive for the general public.

1.4. Abbreviations and acronyms

BPEL	Business Process Execution Language
BPMN	Business Process Modeling Notation
MVNO	Mobile Virtual Network Operator
QoS	Quality of Service
SOA	Service-oriented Architecture
UML	Universal Modeling Language
WSDL	Web Service Definition Language
XML	Extensible Markup Language

2. Dissemination activities in COMPAS project

2.1. Academic Conferences and Journals

Number of book chapters	2
Number of journal papers	3
Number of conference proceedings	45
Number of workshop proceedings	9
Number of talks	9
Number of other publications	2
<u>Total number of publications and talks</u>	<u>74</u>

Table 1 Summary of published papers and talks throughout COMPAS project duration

The summary of published papers and talks has been presented in Table 1. COMPAS project research work has been widely disseminated in many publications written by all the project partners (both academic and industrial). The main channel included conference proceedings which comprises of **45 of published conference papers**. All of the conferences were international and well-known events in the corresponding research communities.

In addition to this high amount of papers at conferences and workshops, **2 book chapters** and **3 journal papers** were published.

The list of all publications and talks can be found on the public COMPAS website – <https://www.compas-ict.eu>

2.2. Teaching activities

Teaching activities related to COMPAS project include **17 theses** and several lectures at university courses and SSAIE summer school in Crete 2010.

Type of thesis	On-going	Finished
PhD dissertation	3	2
MS theses	2	6
Bachelor theses	3	1
<u>Total number of theses and disserations</u>	<u>8</u>	<u>9</u>

Table 2 Theses and dissertation related to COMPAS project

2.3. Dissemination material

The following **4 dissemination materials** have been produced by the University of Stuttgart.

2.3.1. The public project web site

The web site shown in Figure 1 (see <https://www.compas-ict.eu>) has been released in M03 [D7.1]. Since then it has been continuously updated for informing the public about recent news concerning dissemination, collaboration and meetings. Furthermore the web site contains a section dedicated to the project's terminology, concepts, prototypes and technical architecture. This section intends to help making the COMPAS approach more comprehensive for the general public. In addition, the web site contains a section for presentation of the project's results (deliverable downloads, publications).



Figure 1 COMPAS project website

2.3.2. The COMPAS project brochure (size A4)

The brochure presents the project at a glance (cf. the brochure exterior shown in Figure 2). Furthermore, the brochure can be individually customized (cf. the brochure interior shown in Figure 3) and was distributed at conferences, collaboration events or trade-shows where COMPAS partners were present.



Figure 2 The COMPAS project brochure (exterior)

COMPAS

The Compliance Life Cycle

The COMPAS project enhances business process languages, such as the Business Process Execution Language, with **compliance concepts and policies**. Furthermore, COMPAS is developing specification languages and models for expressing typical compliance concerns. A formally grounded and implemented behavioural model for services and **service composition** will be provided enabling the formal validation of compliance of composed services to the specifications. The project develops **monitoring and management** tools for tracking and validating those compliance concerns that can only be verified at run time, thus enabling the **governance** of compliance concerns. The entire compliance lifecycle is being addressed.

Compliance Concerns

Compliance refers to any explicitly stated **rule or regulation** prescribing any aspect of an internal or cross-organisational business process. Examples include: service composition policies, service deployment policies, service sequencing or ordering policies, information exchange policies, security policies, Quality of Service policies, business policies, jurisdictional policies, preference rules, and intellectual property and licences.

Compliance in SOA

Compliance rules are often pervasive throughout the SOA. That is, they have to be considered in all the SOA components, as well as at different development times, including analysis, design, and runtime. The project team is devising a design-for-compliance technology framework which will be used to ensure compliancy of the composition of **business processes and services**.

Model-driven Solution

The **Model-driven** Software Development approach can be used to enable organisations to develop custom business-compliance solutions faster, cheaper, and with less skilled programming. **Domain-specific languages** will be used to enable nonprogrammers to work with and understand the compliance models in their domain.

Diagram: The Compliance Life Cycle

The diagram illustrates the Compliance Life Cycle as a circular process divided into two main phases: **DESIGN TIME** and **RUNTIME**. The cycle consists of several interconnected stages: **Modelling**, **Specification**, **Static verification and validation**, **Generation**, **Using**, **Dynamic verification and validation**, and **Monitoring/ Governance**. The cycle is represented by a circular arrow pointing clockwise, with a dashed line separating the Design Time and Runtime phases.

Figure 3 The COMPAS project brochure (interior)

2.3.3. The COMPAS project poster (size: A1)

The poster is a customizable, high-resolution dissemination material for drawing attention (cf. Figure 4). For all created dissemination material the COMPAS corporate identity, which has been defined in [D7.1], has been used. The poster was also used at various dissemination events where COMPAS was present.



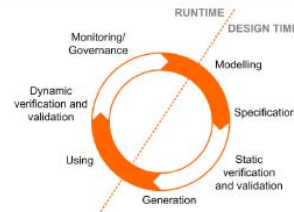
COMPAS

The COMPAS project designs and implements novel models, languages and an architectural framework to ensure dynamic and ongoing compliance of software services to business regulations and design rules. It uses model-driven techniques, domain-specific languages, and service-oriented infrastructure software to help organisations develop business-compliance solutions easier and faster. COMPAS addresses a major shortcoming in today's approach to SOA design. Various compliance concerns must be considered throughout the architecture, but to date the SOA approach has not provided a clear technological strategy or concept as to how to realise, enforce, or validate them.

Compliance Concerns	Compliance in SOA	Model-driven Solution
<p>Compliance refers to any explicitly stated rule or regulation prescribing any aspect of an internal or cross-organisational business process. Examples include: service composition policies, service deployment policies, service sequencing or ordering policies, information exchange policies, security policies, Quality of Service policies, business policies, jurisdictional policies, preference rules, and intellectual property and licences.</p>	<p>Compliance rules are often pervasive throughout the SOA. That is, they have to be considered in all the SOA components, as well as at different development times, including analysis, design, and runtime. Various compliance concerns must be considered throughout the architecture. The project team is devising a design-for-compliance technology framework which will be used to ensure compliancy of the composition of business processes and services.</p>	<p>The Model-driven Software Development approach can be used to enable organisations to develop custom business-compliance solutions faster, cheaper, and with less skilled programming. Domain-specific languages will be used to enable nonprogrammers to work with and understand the compliance models in their domain.</p>

The Compliance Life Cycle

The COMPAS project enhances business process languages, such as the Business Process Execution Language, with compliance concepts and policies. Furthermore, COMPAS is developing specification languages and models for expressing typical compliance concerns. A formally grounded and implemented behavioural model for services and service composition will be provided enabling the formal validation of compliance of composed services to the specifications. The project develops monitoring and management tools for tracking and validating those compliance concerns that can only be verified at run time, thus enabling the governance of compliance concerns. The entire compliance lifecycle is being addressed.



Consortium

COMPAS is a Specific Targeted Research Project (STREP) funded by the European Commission under the 7th Framework Programme. The project has a budget of 3,920,000 € and started in February 2008 with a duration of 36 months. Furthermore COMPAS is a NESSI Project and plans standardization of some parts of its contributions. Project partners are: Technische Universität Wien (Austria), Stichting Centrum voor Wiskunde en Informatica (the Netherlands), Université Claude Bernard Lyon 1 (France), Universität Stuttgart (Germany), Stichting Katholieke Universiteit Brabant (the Netherlands), Università degli Studi di Trento (Italy), Telcordia Poland (Poland), Thales Services SAS (France), PricewaterhouseCoopers Accountants N.V. (the Netherlands).



Figure 4 The COMPAS project poster

2.3.4. The COMPAS report “Achievements & Lessons Learned” (A5 brochure)

The report summarizes the achievements made in the project and provides a reflection on the project, providing a holistic overview on the project. All partners contributed one or more sections to this report. They reported on their individual contributions, lessons learned, and on the prototypes they developed. The report has been compiled and edited by USTUTT.

2.4. Produced prototypes

More than the total of 10 prototypes have been developed during the COMPAS project lifetime. Some of them are frameworks and toolsets which comprise of many other

subcomponents or particular tools. Most of them are open-source. The most important ones are listed below:

- **Android WatchMe** is an Android mobile phone application developed for demonstration of MVNO Advanced Telecom Services scenario. The application connects with COMPAS project prototypes running online and presents online delivery of composed video and audio streams on demand. Further information about the tool is included in deliverable [D6.3].
- **Business Process Illustrator (BPI)** is a web-based tool for monitoring the execution of business processes. It allows to view a graph of a process model enriched with status information of a process instance. The process graph is refreshed regularly. Additionally the user can adapt the graph by highlighting or omitting activities.
- **Compliance Governance Dashboards (CGD)** aims at reporting on compliance, creating an awareness of possible problems or violations, and facilitating the identification of root-causes for noncompliant situations. The tools include Runtime Governance Dashboard and Offline Governance Dashboard. More information can be found in deliverable [D5.5].
- **Compliance Request Language Tools (CRLT)** serves two main purposes. First, it offers the interface for the Compliance Requirements Repository to define, store and maintain compliance requirements in various abstractions together with related aspects such as compliance risks, sources, controls and rules. Second, it enables compliance and business experts to formulate compliance requests at design time for checking end-to-end business processes and process fragments against formalized regulatory compliance requirements. More information on each of the components included in the provided toolset can be found in deliverable [D2.6].
- The **Eclipse Coordination Tools (ECT)** is a framework for verifiable design of component and service-based software using the coordination language Reo. Reo presents a paradigm for composition of distributed software components and services based on the notion of mobile channels. Software application designers can use Reo as a "glue code" language for compositional construction of connectors that orchestrate the cooperative behavior of components or services. The ECT framework consists of a set of integrated tools that are implemented as plug-ins for the Eclipse platform. ECT provides functionality for converting high-level modeling languages such as UML, BPMN and BPEL to Reo, for editing and animation of Reo models, synthesis of automata-based semantical models from Reo, annotation of Reo and automata with QoS constraints and verifying these models using dedicated model checking tools. ECT is an open source project. More information on ECT can be found in deliverables [D3.3] and [D3.5].
- **Fragmento** is a Fragment-oriented Repository that is dedicated to the management of process-related artefacts, such as BPEL processes, WSDL documents, deployment descriptors, and especially, process fragments. Fragmento provides particular functionality in addition to the basic repository functionalities for handling process artefacts (persistence, storage, search, retrieval, version management). Fragmento provides XML schema validation, and provides an extensibility mechanism for integration of additional validation functions.

Furthermore Fragmento provides an extensibility mechanism for custom query functions. This allows the implementation of search functions beyond the metadata of a process artefact (e.g., concerning the structure of a process fragment). Fragmento also provides mechanisms for definition of bundles, which allows packaging all artefacts related to a process (or fragment) together into one package. More information on Fragmento can be found in deliverable [D4.4].

- **The Model-Aware Repository and Service Environment (MORSE)** is a service-based environment for the storage and retrieval of models and model-instances at both design- *and* runtime. Models, and model-elements are identified by Universally Unique Identifiers (UUID) and stored and managed in the MORSE repository. The MORSE repository provides versioning capabilities so that models can be manipulated at runtime and new and old versions of the models can be maintained in parallel. More information on MORSE is available in deliverable [D4.4].
- **The Pluggable Framework for Apache ODE** extends the Apache ODE BPEL engine to support a generic eventing framework. The eventing framework consists of generic events and an architecture for handling the events. The events are tailored towards BPEL, but independent of the concrete engine used. That means, the BPEL engine can be exchanged with another BPEL engine and the events remain the same. Therefore the code dealing with the events does not need to be changed. This is a basis for a BPEL monitoring infrastructure being engine independent. More information on the Framework is included in deliverable [D4.4].
- **The View-based Modeling Framework** provides flexible, extensible methodology and tooling for modeling, developing, and maintaining business processes based on the notion of view models -- a realization of the separation of concerns principle, and the model-driven development paradigm -- a realization of the separation of abstraction levels. The core concepts of the framework are extended or refined to represent and integrate business compliance concerns. Finally, process implementation, deployment configurations, runtime monitoring directives, and so on, can be automatically generated from view models. Further information on the View-based Modeling Framework can be found in deliverable [D1.3].

Web references to almost all of the listed prototypes can be found on COMPAS public website [D7.1].

2.5. Industrial dissemination

There have been **11 demonstrations** to external industrial companies presented and **3 workshops** that have been organized by COMPAS consortium partners to disseminate the COMPAS project results and ideas by presentations and demonstrations.

2.5.1. Demonstrations

- COMPAS project was presented to French companies by UCBL during LIRIS-Enterprises meeting in 2009

- COMPAS has been presented at Thales D3S Technodays 2009
- During year 2009, Thales introduced the concepts of COMPAS, particularly its monitoring function, at a meeting with the Director of Information Systems and ICT Security Officer of the French “Caisse Nationale d'Assurance Maladie”. COMPAS has also been introduced to many foreign customers and prospects
- COMPAS was also presented to Thales SOA-IS Security workgroup, on November 6th, 2009 and to SOA Days organized by Thales KTD SCIS (Key Technology Domains - Software & Critical Information Systems), on November 17th-18th, 2009
- COMPAS project has been presented at the Telcordia Applied Research 2010 Year-End Strategic Research Program Review in Piscataway, New Jersey – the presentation was addressed not only to all the interested employees of Telcordia Applied Research, but also to many guests from important institutions, organizations and telecommunications industry from USA
- COMPAS project demonstration at 2010 EU ICT Days in Brussels at the NESSI stand - COMPAS as NESSI compliant project (presented by TARC-PL and CWI)
- In November 2009 the consortium members Aliaksandr Birukou and Fabio Casati from University of Trento (UNITN) have presented the COMPAS project at “BankIT Forum”, a major event for banking and finance industries in Eastern Europe
- UNITN presented COMPAS at the collaborative workshop for EU projects of the Software and Services group (during the ICSOC’09 in Stockholm)
- TARC-PL demonstrated COMPAS case study at the ICOSC’10 conference in San Francisco
- David Schumm from the COMPAS project and Daniel Schleicher from the MASTER project, both working at the University of Stuttgart (USTUTT), gave a presentation on compliance management in automated business processes at IBM Global Business Services in Ehningen, Germany.
- Ernst Oberortner, Aliaksandr Birukou and Pascal Bisson participated in the NESSI Project summit which took place on the 12th-13th of April 2010, in Valencia, Spain. They have demonstrated the COMPAS booth showcasing project results and making useful contacts. Also, together with MASTER they organised a session on compliance management where compliance management approaches of both projects have been presented in details.

2.5.2. Organized workshops and sessions

- PwC Organised a round table session together with TILBURG. PwC and TILBURG invited companies that are involved in SOA and have challenges regarding compliance. In addition TILBURG invited several academics that do research in the area of SOA. The round table mainly focussed on how to achieve compliance in a SOA environment
- TARC-PL organized three days event for disseminating the results of COMPAS - 1st Compliance Workshop in Warsaw, where external people from various industries were invited to participate, share the common vision on compliance in SOA and

Business Processes and created plans for future collaboration and practical exploitation of the project

- ThereSIS organised February 16, 2010 a workshop session with THALES Critical Information System Business Line (CIS BL). The aim of the workshop was to identify COMPAS components that may be part of the service components constituting a new PMS of the DSC Thales Division.

3. Summary

All the objectives of dissemination tasks in COMPAS project have been met. As a summary the following numbers represent specific measures of the achieved results:

- **74 publications** in major conference proceedings, workshop proceedings, journals and books,
- **9 talks** given at major conferences and workshops,
- **17 thesis** related to COMPAS, finished and ongoing at the universities participating in the project,
- the set of **4 dissemination materials** (official web-site, poster, leaflet and report) prepared for the purpose of COMPAS presentations,
- more than **10 prototypes** prepared (most of them open-source),
- industrial dissemination including **11 demonstrations** and **3 organized workshops**.

The deliverable does not include information on standardization efforts and collaboration with other projects, as it's already collected and summarized in the last version of deliverable [D7.4].

4. Reference documents

4.1. Internal documents

[DoW]	“Description of Work” for COMPAS, final version of 2008-02-01
[D1.3]	“MDSO software framework for business compliance”, 2009-12-31
[D2.6]	“Implementation of an Integrated Prototype Handling Interactive User Specified Compliance Requests in a Compliance Language”, 2010-12-31
[D3.3]	“Verification tools for service description”, 2009-12-31.
[D3.5]	“Service Model Interpreter/Simulator Engine”, 2010-12-31.
[D4.4]	“Supporting Infrastructure”, 2010-12-31
[D5.5]	“Final Prototype of Compliance Governance Dashboards”, 2010-12-31
[D6.3]	“Case Study Execution and Assessment Report”, 2010-12-31
[D7.1]	“Public Web-Site”, http://www.compas-ict.eu

- [D7.3] “Plan for the use and dissemination of foreground and Technology Implementation and Business Plan (TIBP)”, 2011-01-31.
- [D7.4] “Report of collaboration activities and updates of the collaboration activities plan”, 2011-01-31

4.2. External documents

- [NEXOF] NESSI Open Framework - Reference Architecture (NEXOF-RA): NEXOF-RA Glossary, NEXOF-RA-specific and Not-NEXOF-RA-specific terms, <http://www.nexof-ra.eu/?q=node/187>