

Project DEPLOY
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*“Industrial deployment of advanced system engineering methods for high
productivity and dependability”*



DEPLOY Deliverable D26

D14.11 Collaboration Report

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Executive summary

This document presents achievements obtained during the second year of the project, for establishing links and organizing co-operation activities with other ICT projects under the WP2007/2008 Objective « Service and Software Architectures, Infrastructure and Engineering », regarding objectives defined in [D3]¹.

This document completes previous report [D13]² covering achievements obtained during the first year of the project.

1 Introduction

This document presents achievements obtained during the second year of the project, for establishing links and organizing co-operation activities with other ICT projects under the WP2007/2008 Objective « Service and Software Architectures, Infrastructure and Engineering ». The co-operation aims at exploiting synergies between the projects and increasing the impact of the ICT initiative. The consortium members commit to provide contributions to the following activities, if applicable:

- **[A1]** Exploitation of synergies / technical concertation: participation to workshops, contribution to some of the working groups
- **[A2]** Joint activities for exchange, dissemination and training
- **[A3]** Production of dissemination material that can be used for communication towards the general public
- **[A4]** Co-ordination of standardisation efforts
- **[A5]** Contribution to repositories of reference implementations

This only covers the specific activities for collaboration with other projects. The other project WPs cover the individual project activities in some of these areas (e.g., dissemination, standardisation).

The specific plan for collaboration, including the specific working group this project was detailed in [D3], released at month 6. The present document reports on the activities done during the second year, completing the previous report [D13] covering the first year of the project.

2 Achievements

2.1 Formal Methods for Service Oriented Architecture

2.1.1 Foundation

Following the « SSAI FP7 Call 1 » projects meeting that took place in March 2008 in Brussels, we have identified a common thematic, namely “Formal methods for Service Oriented Architecture”, bridging over DEPLOY main focus (formal methods) and “Internet Technology” mainstream that most « FP7 Call 1 » projects adhere to.

A Discussion Group was created, with the objective of determining how formal methods would contribute to the specification, design, development and deployment of service oriented architectures, based on potential or real error risks analysis. This analysis would rely on experience gained through non-formal developments, as well as the reasons why some « SSAI FP7 Call 1 » projects are making explicit use of formal methods or plan to develop a formal framework (project ALIVE for example).



Figure 1: FM4SOA Working Group wiki

“Negative” testimony or feelings (justified or not) explaining why formalities are not welcome in SOA are also expected to contribute to the analysis.

In a second phase, it would be interesting to expose the results of this analysis (that we hope to be positive), to present case-studies including formalities and to explain what the added-value of this approach is. These case-studies, stored on the DEPLOY repository³, could be issued from ongoing DEPLOY case-studies/pilots, or could be proposed by external stakeholders. These results could be disseminated through collective workshops and “white papers”.

This Working Group has been initially planned to be a subgroup of the Service Engineering Collaboration Working Group. The purpose was that it contributes to larger, service engineering oriented objectives. Now it is a separate Working Group as it addresses specific thematics.

A wiki⁴ has been set up. It presents the Discussion Group objectives, lists the projects potentially interested in participating to the exchanges. It hosts all contributions from the Working Group members that could be discussions, statements, case-studies, etc. Everyone is invited to register and to contribute to this wiki, which has been updated regularly.

2.1.2 Dedicated workshop (February 2009)

The working group has organized a one-day event on February 16th 2009 in Düsseldorf at the iFM conference⁵ on the theme of the working group. More than ten talks were presented on themes centering around:

- Web services,
- SOA,
- fault tolerance,
- composition,

as well as using formal methods ranging from Event-B to Reo over to rewriting logic (see programme below).

The event was very successful, with sessions being attended by 20 to 35 people. A new installment of the workshop was planned within the FMCO symposium organized in November 2009 at FMWeek in Eindhoven.



Figure 2: FM4SOA WG workshop advertisement on iFM2009 website

The program is detailed below:

SOA and Fault-Tolerance

- REST: SOA without Contracts?
Stefan Tilkov (innoQ)
- Formal Modelling and Analysis of SOA-based Business Information Applications with Fault Tolerant Middleware
John Fitzgerald/Jeremy Bryans (University of Newcastle)

Reo and Pi-Calculus

- Using Reo for Composition of Web Services
Farhad Arbab (CWI)
- From compliant business process specifications to code
Natallia Kokash (CWI)

- Dependable Composition of Web Services and pi-calculus
Manuel Mazzara (University of Newcastle)

Alternate Approaches

- ProTest - property based testing for Erlang
John Derrick (University of Sheffield)
- Verification and Certification using rewriting logic
Santiago Escobar (University of Valencia)

Event-B

- Formal Modeling for Service-based Process Integration
Andreas Roth (SAP)
- Specification, Partitioning, and Composition Techniques for Web Application in the Context of Event-B
Abdolbaghi Rezazadeh (University of Southampton)
- Adding domain-specific constructs to (Event) B for developing and reasoning about grid applications
Pontus Bostrom (Åbo Akademi University)

2.1.3 Mailing list

In order to ease the communication among the FM4SOA collaboration Working Group, a dedicated mailing list has been set up. This mailing list is based on JSCLIST facilities, used by DEPLOY for internal and external communication.

2.1.4 Book

Following our participation to FMCO 2008⁶ (see [D13] for details), a book has been published:
 Formal Methods for Components and Objects
 7th International Symposium, FMCO 2008, Sophia Antipolis, France, October 21-23, 2008, State of the Art Survey
 Series: Lecture Notes in Computer Science
 Subseries: Programming and Software Engineering , Vol. 5751
 Boer, Frank S.; Bonsangue, Marcello M.; Madelaine, Eric (Eds.)
 2009, X, 299 p.
 ISBN: 978-3-642-04166-2

The DEPLOY part of the book includes 3 papers:

- Formal component models for sensor networks
Kaisa Sere & Mats Neovius (Åbo Akademi)
- Demonstrably Correct Compilation of Java Bytecode
Michael Leuschel (Dusseldorf University)
- The Rodin Platform for Incremental Modelling in Event-B
Stefan Hallerstede (Dusseldorf University)

2.1.5 Collaboration meeting (June 2009)

The working group has participated to the Collaboration Meeting, organized in Brussels on 10-11 June 2009 by the European Commission, the IRMOS, SLA@SOI and SOA4ALL projects.

Its objective was to raise the impact of the results of individual projects through networking, sharing experiences and participation to collaboration activities. At the occasion of a dedicated session on “Service and Software Engineering, Infrastructures and Engineering”, gathering contributors from:

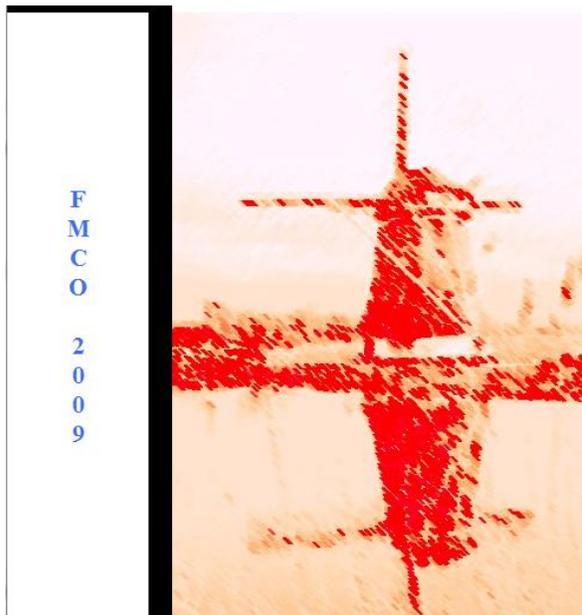
- MODEPLEX,
- DIVA,
- STATIS,
- SHAPE,
- AMPLE and
- DEPLOY

Activities of the Formal Methods Working Group were reported and future symposium (FMCO 2009) announced.

2.1.6 Symposium (November 2009)

A dedicated event, gathering many FP6 and FP7 projects, has been organized at the occasion of the FM'2009 conference held in Eindhoven. It was aimed at bringing together researchers and practitioners in the areas of software engineering and formal methods to discuss the concepts of reusability and modifiability in component-based and object-oriented software systems.

This year the above objective has been realized by a *concertation* meeting of the following European IST projects and network in the sixth and seventh framework:



- The IP-FP6 [BIONETS](#) projects on biologically inspired services evolution for the pervasive age.
 - The IST-FP6 project [CREDO](#) on modelling and analysis of evolutionary structures for distributed services.
 - The IST-FP7 project [COMPAS](#) on compliance-driven models, languages, and architectures for services.
 - The IST-FP7 project [DEPLOY](#) on industrial deployment of advanced system engineering methods for high productivity and dependability.
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- The IP-FP7 project [HATS](#) on highly adaptable and trustworthy software using formal methods.
 - The RD-FP7 project [INESS](#) on integrated European railway signalling system.
 - The STREP-FP7 project [MOGENTES](#) on model-based generation of tests for dependable embedded systems.
 - The IST-FP6 project [ProTest](#) on property based testing.
 - The IST-FP7 project [QUASIMODO](#) on quantitative system properties in model-driven-design of embedded system

The symposium was a three days event organized to provide an atmosphere that fosters collaborative work, discussions and interaction. Extended abstracts of the contributions have been

published after the symposium in a proceeding of “Lecture Notes in Computer Science” by Springer-Verlag.

The program is detailed below:

CREDO SESSION

- The CREDO methodology
Immo Grabe and Mahdi Jaghourri (CWI)
- Modeling and analysis of the ASK
Andries Stam (Almende)

COMPAS SESSION

- Model-checking Reo Connectors using mCRL2
Natallia Kokash (CWI)
- The formal specification of compliance constraints
Amal Elgammal (Tilburg University)

HATS SESSION

- HATS project overview and scalable verification
Reiner Hähnle (Chalmers University of Technology)
- Modular specification and verification in HATS
Arnd Poetzsch-Heffter (University of Kaiserslautern)
- Design of an abstract behavioural specification language system
Martin Steffen (University of Oslo)

DEPLOY SESSION

- Verification and Testing of Service Choreographies
Andreas Roth (SAP)
- Structured Event Refinement
Michael Butler (University of Southampton)
- Patterns in formal development by refinement
Alexei Iliasov (Newcastle University), Linas Liabinas, and Elena Troubitsyna (Åbo Akademi University)

MOGENTES SESSION

- Mapping UML Models to Action Systems for Testing an Interlocking System
Rupert Schlick (Austrian Institute of Technology) and Willibald Krenn (Technical University of Graz)
- Testing Hybrid Systems with Action Systems
Bernhard K. Aichernig (Technical University of Graz)
- Testing Simulink with a Lattice of Faults
Daniel Kroening (ETH and Oxford University)

INESS SESSION

- About the INESS work of the UK consortium
Jim Woodcock (University of York)
- Validating Europe's Interlocking Requirements in xUML with mCRL2 and LTSMIN
Jaco van de Pol (University of Twente)
- Formal methods in Dutch railways in the past
Jan Friso Groote (Eindhoven University of Technology)
- Technical details of MDA
Richard Paige (University of York)

PROTEST SESSION

- Property-based testing - ProTest
John Derrick (University of Sheffield)
- Combining software model inference with model-based testing
Neil Walkinshaw (University of Sheffield)

QUASIMODO SESSION

- Abstraction of Probabilistic System
Holger Hermans (Saarland University)
- Real-time Interface Theories
Kim G. Larsen (Aalborg University)

BIONETS SESSION

- Formalism and platform for autonomous distributed components
Ludovic Henrio (INRIA Sophia-Antipolis)

FMSOA SESSION

- Verification and Certification using Rewriting Logic
Santiago Escobar (Universidad Politécnica de Valencia)

2.1.7 Concertation Meeting (October 2010)

DEPLOY will be in charge of co-organizing the next collaboration meeting that will take place in Brussels on October 19-20 2010.

2.2 Other collaborations

DEPLOY have confirmed several cooperations with other FP6/FP7 projects. These cooperations are listed below:

- A meeting of the Trust & Security collaboration group (also called TG6) has been held at CETIC end on March 2009⁷. DEPLOY FM4SOA WG activities have been presented, as well as the eBusiness security work performed in our WP4. Several European projects were represented: EDUTAIN, SERSCIS, IRMOS, PRIMELIFE, BREIN, MASTER, AWARE, SmartLM, GridTrust, Reservoir, BEinGRID and DEPLOY.
- Collaboration with GridTrust on a WP6 thematic (requirements, KAOS-EventB mapping), with the objective of developing a Event-B based methodology for the refinement of security policies on next generation Grids.
- Collaboration with XtremOS FP6 project for parallelizing model checking for Event-B.
- Collaboration with Moebius FP6 project concerning compilation of Java bytecode

Being one of its founding members, SAP is participating in the European NESSI initiative aiming at providing a unified outlook for Services Architectures and Software Infrastructures for European research organizations. The work of NESSI is strongly influencing the projects of the European Union's Seventh Framework Program, such as MASTER, Reservoir, SLA@SOI, and SOA4All, in which SAP is involved as a partner. SAP is also collaborating with Modelplex FP6 project on model-based testing techniques involving formal models.

Finally, Cetic is:

- interacting with the ITEA2 Spices project on Support for Predictable Integration of mission Critical Embedded Systems.
- collaborating with CE-IQS research project aiming at the quality of system engineering together with University of Louvain, Namur, Mons and a number of industries of the Walloon region

3 References

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- ¹ [D3] Collaboration Plan - <http://www.deploy-project.eu/pdf/D14.9-CollaborationPlan-1.0.pdf>
- ² [D13] Collaboration Report - <http://www.deploy-project.eu/pdf/FV2-D14.10-Collaboration-report%5b1%5d.pdf>
- ³ <http://deploy-eprints.ecs.soton.ac.uk>
- ⁴ http://www.deploy-project.eu/mediawiki/index.php5?title=Formal_Methods_for_SOA_and_Internet_of_the_Future
- ⁵ <http://www.formal-methods.de/ifm09/workshops.html>
- ⁶ <http://fmco.liacs.nl/fmco08.html>
- ⁷ <http://www.eu-ecss.eu/private-area/trust-security/trust-and-security/>