Project DEPLOY
Grant Agreement 214158
“Industrial deployment of advanced system engineering methods for high productivity and dependability”

DEPLOY Deliverable D37

D15.4 Year 3 Annual Dissemination/Exploitation Report

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http://www.deploy-project.eu
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1 Introduction

This document aims at reporting project achievements on dissemination and exploitation from DEPLOY during year 3. It is updated every year, completed with progress made, and delivered at month M12 (D14), M24 (D27), M36 (D37), and M48 (D52).

2 Achievements

This chapter presents DEPLOY’s third year dissemination and exploitation achievements.

2.1 DEPLOY Interest Group (DIG)

The DEPLOY Interest Group is a community that is of paramount importance for the project, as its members have specifically declared their interest and support. Hence the overall dissemination/exploitation activity is centred on the DEPLOY Interest Group, gathering companies, universities, and individuals interested in the RODIN platform. The DIG has privileged access to information such as bi-annual newsletter, dedicated hands-on sessions, etc.

DIG members may:
- join the group. A simple (electronic) letter of intent is sufficient. Joining the DIG is free of charge;
- provide feedback on the platform and related plug-ins, by using the platform and sharing experience and expectation;
- provide complementary case-studies and examples covering similar or new application domains;
- attend dedicated trainings and hands-on sessions, organized specifically for the DIG upon request.

Special attention is given to the DIG: dedicated means are allocated to help DIG members getting educated and gaining experience with the Rodin tools.

To increase membership in the DIG, our strategy is threefold:
- invite Rodin project followers to join the DIG,
- send personal invitations to join,
- promote the DIG at each dissemination event.

This will be coordinated with the organization of industrial days, local action of partners, etc., when possible.

Communication is ensured by a dedicated mailing-list, a newsletter, and industry days. DIG members will be personally invited to all our dissemination events.
Current DEPLOY Interest Group members are:

- Marc Benveniste (STMicroelectronics - France)
- Ian Oliver (Nokia - Finland)
- O. Sami Saydjari (Cyber Defense Agency)
- Ken Robinson (University of South Wales - Australia)
- Juan Bicarregui (Formal Methods Europe)
- Aryldo G. Russo Jr. (Acesso e Segurança - Brazil)
- John Brightman (AT ENGINE CONTROLS, UK)
- Vecheslav Kharchenko (National Aerospace University - Ukraine)
- Jean Mermet (Keesda - France)
- Viktor Mashkov (University J.E.Purkyne, Czech Republic)
- Colin O'Halloran (Qinetiq - UK)
- Andreas Enbacka (Sysart Oy, Finland)
- Gao Hongjiang (Xi'an Jitotong University, China)
- Maria Teresa Llano Rodriguez (Heriot-Watt University, UK)
- Hironobu Kuruma (National Institute of Informatics, Japan)
- Hrvoje Belani (University of Zagreb, Croatia)
- Camilo Rueda (Universidad Javeriana-Cali, Colombia)
- Paul Simon (Individual - France)
- Bruno Gomes (Federal University of Rio Grande do Norte, Brazil)
- Gudmund Grov (Heriot-Watt University - United Kingdom)
- Simon Hudon (ETH Zürich - Suisse)
- Xinben Li (Zhejiang Wanli Univ. - China)
- Bo Liu (University of Southampton - UK)
- M. Sushil Lecturer Merwyn Monteiro (University of New South Wale - Australia)
- Rod Chapman (Praxis - UK)
- Marcel Verhoef (Chess - NL)
- Divakar Yadav (U P Technical University - India)
- Ait-Sadoune (LISI/ENSMA - France)
- Kenyu Yamada
- Ruchika Lecturer
- Stéphane Badreau (Capgemini - France)
- Denis Grotsev (Kazakh National University - Kazakhstan)
- Abderrahman Matoussi (LACL Paris 12 - France)
- Dave Nuttall (MBDA Systems)
- Atif Mashkoor (Nancy University - France)
- Luke Wildman (WRSA, RAMS - Australia)
- Stephen Wright (University of Bristol - UK)
- Mahdi El Masaoudi (Sherbrooke University - Canada)
- Frederic Gervais (Université Paris-Est - Paris)
- Benjamin Aziz (STFC Rutherford Appleton Laboratory - UK)
- Peter H. Schmitt (KIT - Germany)
- Arun Kumar Singh (Uttar Pradesh Technical University - India)
- Bulent Gumus (TOBB ETU - Turkey)
- Martin de Groot (CSIRO - Australia)
- Jonathan Ostroff (York University - Canada)
- M. Rakesh (Waterford - Ireland)
- Barrie Horton (UK)
- Hideyuki Kikuchi (Fujitsu laboratory - Japan)
- Baran Izmir (UNSW - Australia)
- Li Qi-nan
- Yoshiki Sato (Oracle - Japan)
- Nadi (Professional Engineering)
- Fabien Belmonte (Alstom Transport)
- Alexei Polkhanov
- Guy Vidal-Naquet (Supélec)
- Ognian Pishev (Ocean Informatics)
- Ogawa Kiyoshi (NMIRI)
- Thomas McShane (Creighton University)
- Ta Weina (East China Normal University - China)

In order to populate the DIG with relevant users, we have initiated a survey (“We need to know who you are!”) where people have the opportunity to register to the DIG and to the newsletter as well.

For the time being, 60 answers have been collected, indicating that the typical user is from academia, working on Windows and doing research with Rodin.

2.2 DEPLOY Associates

The DEPLOY Associates (DAs) is a group created late 2009, gathering privileged industrial experimenters of the DEPLOY tools and methodology. The main goal of this group is to ensure broad dissemination of the results of the project (tools, methodology, documents, etc.) by:

- experimenting on new case-studies, possibly from domains not yet addressed by the DEPLOY project,
- ensuring that adequate training is delivered to the DA personnel in charge of the case-study, in order to obtain comparable results among DAs,
- collecting feedback (metrics, models, conclusions, etc.) from DA, in order to improve project deliverables and to demonstrate the extent to which they are applicable to industry.

The DEPLOY Associates receive specific and dedicated help from the DEPLOY project (training, consultancy, etc.).
Three DEPLOY Associates have been selected so far:

- **Automação E Systémas – Sao Paulo (Brazil)**
  AeS is a SME specialized in the design and development of embedded systems. Outside the project, Aes and ClearSy are collaborating on the deployment of platform screen-door control/command systems in the metro of Sao Paulo. AeS is investigating the use of RODIN for safety critical systems and as such has initiated two case-studies:
  - Dead-man control system
  - Safety monitoring function that prevent relay problems in a door system
  A one-week on-site training was delivered by Southampton in 2010. AeS is particularly interested in requirements engineering, modularization, code generation and ProB.

- **Critical Software Technologies – Southampton (U.K.)**
  CST, part of the Critical Software Group, is specialized in the development, verification and validation of software. As a DEPLOY Associate, CST plans to apply the RODIN tools and methods for the verification and validation of avionics and satellite software.
  On-site training was delivered by Southampton in 2010.

- **XMOS ltd – Bristol (U.K.)**
  XMOS is a “fabless” semiconductor company that develops multi-core, multi-threaded processors targeted at embedded systems markets. Some concepts found in XMOS technology are part of the transputer technology developed by that company in the 1980s. XMOS processor technology is general-purpose and has therefore been exploited in a range of different markets, including audio, display, communications, robotics and amateur innovation. The objective is to apply and extend the Event-B and RODIN based techniques for Instruction Set Architecture (ISA) analysis, by constructing a formal model of the Instruction Set Architecture (ISA) of the XCore microprocessor.

### 2.3 Events

DEPLOY results were presented at several occasions, listed in the table below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 22-25th 2010</td>
<td>Orford (Canada)</td>
<td>Deploy is heavily involved in the B conference, as well as in the Workshop on Tool Building in Formal Methods</td>
</tr>
<tr>
<td>March 17th 2010</td>
<td>Tokyo (Japan)</td>
<td>GRACE International symposium on Advanced Software. Organisation of Workshop on B Dissemination</td>
</tr>
<tr>
<td>April 15-16th 2010</td>
<td>London (UK)</td>
<td>SERENE 2010 – International Workshop on Software Engineering for Resilient Systems</td>
</tr>
</tbody>
</table>
### Table of Events

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 20-21st 2010</td>
<td>Dusseldorf (Germany)</td>
<td>Organisation of Rodin Developer and User Workshop</td>
</tr>
<tr>
<td>November 8-9th 2010</td>
<td>Natal (Brazil)</td>
<td>SBMF 2010. Organisation of Workshop on B Dissemination</td>
</tr>
<tr>
<td>December 7th 2010</td>
<td>Timisoara (Romania)</td>
<td>Tutorial on DEPLOY</td>
</tr>
</tbody>
</table>

At the occasion of the ABZ conference, several presentations were given by DEPLOY and DIG members:

- Developing Camille, a Text Editor for Rodin - Jens Bendisposto, Fabian Fritz and Michael Leuschel
- Decomposition Tool for Event-B - Renato Alexandre Silva, Carine Pascal, Thai Son Hoang and Michael Butler
- An EMF Framework for Event-B - Colin Snook, Fabian Fritz and Alexei Iliasov
- Tool Support for Event-B Code Generation - Andrew Edmunds and Michael Butler
- Structured Event-B Models and Proofs - Stefan Hallerstede
- Reasoned Modelling Critics: Turning Failed Proofs into Modelling Guidance - Andrew Ireland, Gudmund Grov and Michael Butler
- On an Extensible Rule-based Prover for Event-B - Issam Maamria, Michael Butler, Andrew Edmunds and Abdolbaghi Rezazadeh
- A Refinement-Based Correctness Proof of Symmetry Reduced Model Checking - Edd Turner, Michael Butler and Michael Leuschel
- A Basis for Feature-oriented Modelling in Event-B - Jennifer Sorge, Michael Poppleton and Michael Butler
- Event-B Decomposition for Parallel Programs - Thai Son Hoang and Jean-Raymond Abrial
- Refinement Animation for Event-B -- Towards a Method of Validation - Stefan Hallerstede, Michael Leuschel and Daniel Plagge
- Supporting Reuse in Event B Development: Modularisation Approach - Alexei Iliasov, Elena Troubitsyna, Linas Laibinis, Alexander Romanovsky, Kimmo Varpaaniemi, Dubravka Ilic and Timo Latvala

- **B Dissemination Day workshop** *(Tokyo, 17 March 2010)*

This workshop, satellite event of the GRACE International Symposium on Advanced Software Engineering, held in Tokyo, was aimed at providing a clear picture of B/Event-B current status of development and exploitation, focusing on the support tools as well as the industrial applications:

- The Big Picture (T. Lecomte)
- System-level modeling with Event B (M. Butler)
- The Rodin platform (M. Butler)
- Model checking and animation with ProB (M. Leuschel)
- UML-B (M. Butler)
- Code generation (T. Lecomte / A. Requet)
- Automatic refinement (A. Requet)
- Industrial applications (T. Lecomte)

80 participants attended the workshop, with a majority from industry.


Following the workshop, we were visited several times by Japanese groups, doing surveys on industrial application of formal methods and/or starting to evaluate formal methods, in various domains

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**Workshop on B Dissemination**  *(Natal, Brazil, 8-9 November 2010)*

This workshop, satellite event of the SBMF 2010 conference, held in Natal (Brazil), has been organized within the framework of the DEPLOY project. Its objectives were to present current status, ongoing research and development related to B and event B languages, as well as applications to industry size problems. The first day was devoted to DEPLOY speakers, while the second day was open to any presenter.
This workshop enabled the setting of several technical meetings with AeS, our local DEPLOY Associates, and eased networking.

For the last year of the project, the plans are to organize a final event, combining a workshop for Rodin users and developers, and an industry day.
2.4 Electronic Dissemination

All materials related to DEPLOY and the Rodin platform are made electronically available:

- Platform and plug-ins source code
- Project deliverables, papers, and manuals
- Teaching material
- Models (including case-study description)

**Websites.** Two DEPLOY websites are related to the project:

- the official site, hosted by ClearSy and reachable at [http://www.deploy-project.eu](http://www.deploy-project.eu). It contains useful information about the project, its objectives. This site nicely integrates two other websites, hosted by Southampton University:
  - the DEPLOY repository ([http://deploy-eprints.ecs.soton.ac.uk/](http://deploy-eprints.ecs.soton.ac.uk/)), containing all the project deliverables, publications, tutorials, models, etc. External stakeholders are invited to contribute to the DEPLOY repository.
  - The wiki website ([http://wiki.event-b.org](http://wiki.event-b.org)), providing documentation for users and developers of the Rodin toolset.

**Publications.** The following articles (the publication list is on the website) have been published in 2010 and are available on the publications website:


36. Iliasov, Alexei and Troubitsyna, Elena and Laibinis, Linas and Romanovsky, Alexander and Varpaaniemi, Kimmo and Ilic, Dubravka and Latvala, Timo


The DEPLOY repository is composed of several subject areas (event-B language, industrial deployment, methodology, tool developments, and training). A snapshot of the resources currently available is given below:

- **Deploy Subject Areas (197)**
  - **Event-B (88)**
    - Event-B Examples (42)
    - Event-B Theory (16)
  - **Industrial Deployment (60)**
    - Automotive (1)
    - Business (10)
    - Other (5)
    - Pervasive telecoms (1)
    - Space (26)
    - Transportation (7)
  - **Methodology (101)**
    - Composition and reuse (26)
    - Other (9)
    - Proof and model checking (9)
    - Real-time systems (4)
    - Refinement (20)
    - Requirements and evolution (11)
    - Resilience (23)
    - Security (1)
  - **Tool developments (63)**
    - Code generation (3)
    - Model checking (12)
    - Model construction (8)
    - Other (3)
    - Provers (7)
    - Rodin platform (6)
    - Rodin plug-ins (13)
  - **Training (36)**
    - Event-B (25)
    - Rodin plug-ins (1)
    - Rodin tool (9)
**Metrics.** Statistics are collected in the project to evaluate Rodin platform and the DEPLOY project’s popularity. The measurement of DEPLOY websites hits from foreign IP addresses will provide an estimate of the awareness and the interest concerning DEPLOY in both the industry and academic worlds. Reverse links are used to improve our Google score, thus improving our visibility on the Net.

The start of the DEPLOY project has been announced via several media (mailing lists, user groups, etc.).

DEPLOY websites statistics (number of monthly unique visits) are given below (for the first 24 months of the project):

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</tr>
</tbody>
</table>

The platform has been downloaded 10 670 times, as follows:

**Platform exploitation.** A coordination structure has been created to drive the development done around the platform. A roadmap has been made available and is reachable on the DEPLOY website ([http://www.event-b.org/roadmap.html](http://www.event-b.org/roadmap.html)). External stakeholders are invited to contribute to the development of the platform, as
identified in the roadmap. A dedicated workshop was organized in September 2010, aimed at provided support to external developers. A one day –tutorial was set up at that occasion. A similar workshop will be organized at the end of the project.

In order to prepare the end of the project, we have started elaborating on the not-for-profit organisation that would be used for managing activities around the RODIN platform after January 2012. A tentative organisation and business plan is in annex 1, at the end of this document.

**Newsletter.** DEPLOY publishes a newsletter every 6 months, providing a clear view on:
- what is going on in the project,
- what its current status is, and
- what are the next steps.

All WPs are contributing to the newsletter, which is sent to persons having registered on the website (200 so far). All issues are archived on the website and can be downloaded anonymously. Newsletter #2 and #3 were released resp. in January 2009 and July 2009. Newsletter #4 will be released in January 2010.

**Project brochure.** A leaflet, presenting the project, was created at the beginning of the project and is now distributed at most conferences attended by DEPLOY partners.

**Training materials.** In relation with WP10 Technology Transfer, teaching material including:
- tutorials,
- large examples, entirely loaded on the platform, accompanied by extensive explanations

are available to the community, targeting practitioners (engineers, etc), teachers, researchers, etc. through the DEPLOY publications website.

New resources made available during 2010 are:

- Hoang, Thai Son Bucharest DEPLOY 2-day course. [Teaching Resource]
- Hoang, Thai Son Pre-reading material for the Bucharest DEPLOY 2-day Course. [Teaching Resource]
- Iliasov, Alexei A Lecture on modularisation method and plugin: Introduction and Parking Lot Case Study. [Teaching Resource]
- Hallerstede, Stefan and Hoang, Thai Son Post-material for Bucharest DEPLOY 2-day Course. [Teaching Resource]
- Snook, Colin Slides on UML-B used for Deploy Associate Training. [Teaching Resource]
2.5 Collaboration with ICT SSAI&E projects:

DEPLOY sets up co-operation activities with other ICT project under the WP2007/2008 objective “Service and Software Architectures, Infrastructure and Engineering”, in order to exploit synergies between other projects and to increase the impact of the ICT initiative.

This topic is covered by the “Collaboration Plan” document.
Annex 1

DEPLOY Not For Profit business plan

This document is still under construction and discussion, and is likely to evolve.

The Company
Having taken advice it is probably not appropriate to set up an actual “Not For Profit” Company since this leads to the involvement of the UK Charities Commission and greatly increased year end reporting in order to satisfy Charities legislation. Since we are not seeking charitable status it is much easier to set up an ordinary Limited Company where the Articles of Incorporation state that profits will never be distributed to shareholders. This creates the same effect, a Company where shareholders do not benefit financially, but without the stricter accounting regime. It is proposed that the Company be run from Newcastle who will handle the management and administration of the process. There will also be an independent Strategy Committee responsible for the overall direction. The Company will also need a Partner to take hands on responsibility for the future maintenance and development of the tool. At the end of DEPLOY, we could consider passing responsibility for the “Event B” website to this Company, and therefore probably to Newcastle, or have it run by Southampton.

Strategy Committee
This Committee will be chaired by Michael Butler. Membership of the Committee will be by invitation only and we’d expect key internal stakeholders to be represented as well as enlisting expertise from outwith Deploy. The Committee will follow the model of the previous incarnation which although created, never actually met. We should revisit that membership list to see if there are members we’d like to re-invite.

Platform Development and Maintenance
The Development Partner, assuming a volunteer can be found, would take over responsibility for the maintenance and improvement of the platform and for bug fixing. It would also be necessary to take some responsibility for plug-ins, probably along the line of the early warning system for non compatibility currently being discussed in WP9

Company Model(s)
There are at least 2 potential models for the Company. One possibility would be to look at subscriptions as the major source of income. Such subscriptions could come from at least some of the following categories

- Individuals (academic and Industrial)
- PhD students
• SMEs
• Large Companies
• Projects (STREP and IP)

Alternatively, we could run the enterprise based on one major subscription or sponsorship. This is certainly worth exploring since it removes a large part of the administrative overhead of the Company. It may be worth looking for such a Sponsor, with China and India being potentially rich seams to explore. For now, there is little point in excluding either financial model and we should explore them (and any others we consider viable) in parallel.

**Finances**
In the beginning, it may be necessary to take the Company forward at minimal cost in order to match to income. If this is the case then running costs for the first year may amount to around €40k, made up of

- Admin support €7k, based on around 1 day per week
- Workshop etc costs €7k
- Development support €20k, based on around 1 day per week
- Travel costs for Strategy Committee €6k (10 members, 2 meetings per year)

If this cost was to be raised by subscription only then a possibility for a fee structure would be:

<table>
<thead>
<tr>
<th>Membership</th>
<th>Fee (per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>€100</td>
</tr>
<tr>
<td>PhD student</td>
<td>€50</td>
</tr>
<tr>
<td>SME</td>
<td>€300</td>
</tr>
<tr>
<td>Non SME</td>
<td>€800</td>
</tr>
<tr>
<td>STREP</td>
<td>€1500</td>
</tr>
<tr>
<td>IP</td>
<td>€2500</td>
</tr>
</tbody>
</table>

One potential break even scenario would then be

- 3 IP: €7500
- 8 STREP: €12000
- 15 non SME: €12000
- 15 SME: €4500
- 20 PhD: €1000
- 30 Individual: €3000

It would also be possible to raise revenue by running workshops, conferences and training for both members and non members and charging a fee for registration. It may be that some membership bands would have to include some activities and this is covered by the budget line for such costs. All events should still be able to generate additional income, thus reducing the number of subscriptions needed for break even.

**Activities**
Many of the activities carried out by the Company would be those currently being done under the DEPLOY banner. They would include:

- **New platform and plug-in releases** – members may be allowed to be early adopters of new versions.
- **Bug Fixing** – with a priority service for members
- **Consultancy services** – including plug-ins to order, with preferential rates for members
- **Training** – The Company could run training courses for all, with preferential rates for members. It would also advertise training being run by others.
- **Workshops** – including something along the lines of the current “Users and Developers” workshop, and other events, again with preferential rates for members
- **Conferences** – including tutorials and run as dissemination events