Report on adoption of OPENCOSS by an open-source community

D8.3

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<th>Work Package:</th>
<th>WP8: Standardization and Community Building</th>
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<tr>
<td>Dissemination level:</td>
<td>PU</td>
</tr>
<tr>
<td>Status:</td>
<td>Final</td>
</tr>
<tr>
<td>Date:</td>
<td>March 30, 2015</td>
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## Document History

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<td>Document creation and initial ToC</td>
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<td>V0.2</td>
<td>2015-03-24</td>
<td>Added training plan and stakeholders. Added licensing schema</td>
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<tr>
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<td>2015-03-30</td>
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<tr>
<td>V0.4</td>
<td>2015-03-30</td>
<td>Embedded suggestions from Paolo and Katrina</td>
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<td>V1.0</td>
<td>2015-03-31</td>
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Abbreviations

ARTEMIS  Advanced Research & Technology for Embedded Intelligence and Systems
CCL  Common Certification Language
CENELEC  Comité Européen de Normalisation Electrotechnique (European Committee for Electrotechnical Standardization)
CESAR  Cost-efficient methods and processes for safety relevant embedded systems
DACS  Data & Analysis Center for Software
DoW  OPENCOSS Description of Work
DX.Y  OPENCOSS deliverable X.Y
ERTMS  European Railway Traffic Management System
ETCS  European Train Control System
EVC  European Vital Computer
EVM  Earned Value Management
FMEA  Failure Mode and Effects Analysis
FTA  Fault Tree Analysis
GATC  Generic Automatic Train Control trainborne
GQM  Goal/Question/Metric
IEEE  Institute of Electrical and Electronics Engineers
IMA  Integrated Modular Avionics
ISA  Independent Safety Assessor
ISO  International Organization for Standardization
NASA  National Aeronautics and Space Administration
OMG  Object Management Group
QA  Quality Attribute
RECOMP  Reduced Certification Costs Using Trusted Multi-core Platforms
ROI  Return On Investment
RQ  Research Question
R&D  Research and Development
SAA  Safety Assurance Asset
SEooC  Safety Element out of Context
SLR  Systematic Literature Review
S&T  Scientific and Technical
TX.Y  OPENCOSS task X.Y
V&V  Verification and Validation
WP  OPENCOSS work package
Executive Summary

This document (deliverable D8.3) summarizes the results of the adoption of OPENCOSS platform by an open source community. D8.3 implements the Community Building Plan defined in Deliverable D8.1. It also contains recommendations for improving the OPENCOSS adoption by an open-source community.

The OPENCOSS consortium implemented a first fully-fledged version of the OPENCOSS tool platform during the project and has entrusted its further development and maintenance to an industrial open-source community, involving some members of the original OPENCOSS consortium. From early stages, it has been considered that a strong candidate for a suitable open-source community is the Eclipse ecosystem and in particular its Polarsys platform, which targets tools for embedded system development.

Task T8.3 in OPENCOSS actively coordinated with and contributed to the adoption process by Polarsys. The task started by drawing the interest of open-source communities in the project, by ensuring the availability of the means for the interaction and collaboration between the community members through the necessary communication channels, and by providing the helpfulness and support required to build and maintain the community. Finally, the task included maintaining the open-source nature of the project, and planning the releasing of the source code for developed technologies in the project as open-source.
1 Introduction

1.1 Scope and Purpose

Safety assurance and certification are amongst the most expensive and time-consuming tasks in the development of safety-critical embedded systems. European innovation and productivity in this market is curtailed by the lack of affordable (re)certification approaches. Major problems arise when evolutions to a system entail reconstruction of the entire body of certification arguments and evidence. Further, market trends strongly suggest that many future embedded systems will be comprised of heterogeneous, dynamic coalitions of systems of systems. As such, they will have to be built and assessed according to numerous standards and regulations. Current certification practices will be prohibitively costly to apply to this kind of embedded systems.

The OPENCOSS project aims to devise a common certification framework that spans different vertical markets for railway, avionics and automotive industries, and to establish an open-source safety certification infrastructure (hereafter referred to as OPENCOSS tool platform). The infrastructure is being realised as a tightly integrated solution, supporting interoperability with existing development and assurance tools. The ultimate goal of the project is to bring about substantial reductions in recurring safety certification costs, and at the same time increase product safety through the introduction of more systematic certification practices. Both will boost innovation and system upgrades considerably.

Since the OPENCOSS tool platform and its interfaces with relevant external tools will be made publicly available, work package WP8 looks at building a critical mass of suppliers and a large enough user community to maintain the infrastructure beyond the project’s life. OPENCOSS partners are fully aware of the complexity of the proposed technological platform, as well as the implications of its broader use by industry. The OPENCOSS consortium implemented a first fully-fledged version of the OPENCOSS tool platform during the project and has entrusted its further development and maintenance to an industrial open-source community, in which some members of the OPENCOSS consortium will maintain an active involvement in the future.

Task T8.3 in OPENCOSS actively coordinated and contributed to the adoption process by an open-source community. The task started by drawing the interest of open-source communities in the project, by ensuring the availability of the means for the interaction and collaboration between the community members through the necessary communication channels, and by providing the helpfulness and support required to build and maintain the community. Finally, the task included maintaining the open-source nature of the project, and planning the release of the source code for technologies developed in the project as open-source.

Deliverable D8.3 reports the results of this work.

1.2 OPENCOSS community objectives

The general objective of task T8.3 is to:

Establish an open source community to maintain OPENCOSS results and identify a roadmap beyond project completion.

This is part of a larger objective in WP8, which can be outlined as:
Establish a community of individuals and organisations with keen interest on OPENCOSS results and research areas, and identify a structured roadmap needed after project completion this will help increase the project quality, impact and visibility within the relevant communities of practice.

The specific objectives of task T8.3 can be summarised as follows:

- Ensure the success of the OPENCOSS community by making it fully operational before the end of the project.
- Guarantee that the strategy of the community will be industrially driven.
- Facilitate and support the collaboration among developers from different industries and domains by working for the same objectives and finding new means of collaboration.
- Become a global reference in the safety-critical system community.
- Empower the use of open and well-known standards for the implementation of the OPENCOSS platform.

In the scope of this task, an important activity is to share the ideas and design of the OPENCOSS platform with the wider community of practitioners of safety-critical systems engineering.

1.3 Structure of the Document

The rest of the deliverable is structured as follows. Section 2 provides a background description of the concepts behind the OPENCOSS philosophy for open-source results. Section 3 summarizes the OPENCOSS strategy to join the Polarsys community. Sections 4 and 5 describe community governance and activities to support OPENCOSS beyond the duration of the project. Section 6 and 7 present the recommendations and conclusions.
2 Background

This section presents some background information that might be necessary to understand the OPENCOSS philosophy for open-source community building.

2.1 Stakeholders

This community must provide all system stakeholders with the resources for a successful communication and interaction with the rest of the roles defined in this document. The stakeholders include:

1. OPENCOSS partners themselves,
2. Industrial community
3. Scientific and Research community,
4. Open source communities,
5. Standardisation and regulatory bodies,

Each category is explored in a dedicated sub-section below.

2.1.1 OPENCOSS partners

The OPENCOSS partners represent the first stepping stone, which will become the seed of the community itself. From their responsibility and enthusiasm, new activities arise and community building will take its first step to maturity. We include in this group the External Advisory Board (EAB). We consider the EAB as the first potential independent users of the OPENCOSS platform users, hope that they will become full members of the community.

The OPENCOSS Consortium is itself a fairly large community representing different players (industry, academic and research, certification bodies, etc.) and therefore shall serve as a solid platform to build a wider community.

2.1.2 Industrial community

The ultimate goal of OPENCOSS is to improve the effectiveness of industrial safety-critical systems engineering practices. This is a general issue, with particular focus on harmonisation and reduction of certification costs. Consequently, the industrial community represents the key stakeholder to be targeted by the project’s dissemination activities. However, it is important to recognise that the industrial community in turn consists of heterogeneous communities that often operate in relative isolation, and they need to be targeted individually. In particular, different communities of practices are likely to be interested in different aspects of OPENCOSS. This depends on their role in the supply chain and certification of the products on the one hand, and details of the challenges currently faced by individual industrial sectors on the other.

The composition of the consortium naturally addresses “vertical” communities of practice (i.e. those associated with the different industrial sectors): automotive, aviation and railway. Furthermore, partners will utilise both their contact networks and the External Advisory Board to reach the other industrial communities not represented directly in the project: maritime, space, military, process industries (including nuclear power), and medical devices.
The industrial stakeholders primary become the users of the OPENCOSS platform and contribute(d) with their views and feedback. OPENCOSS is targeting heterogeneous views from different domains and roles on those domains. All of these are integrated into a consistent and global view. We have taken these different views into account to incrementally update the features of the OPENCOSS platform.

Orthogonal to the industrial sectors are a number of ‘horizontal’ groups of industrial stakeholders. These include:

- **Integrators of safety-critical platforms.** Within the industrial setting, platform integrators are ultimately responsible for the safety of the products delivered to the consumer market. They typically take primary responsibility for the assessment of the safety of the platform, integration of the overall safety case and certification.

- **Safety-Critical Equipment Suppliers.** Within the supply chain / extended enterprise, key equipment suppliers are responsible for assuring the critical properties of their products. Whilst in some jurisdictions it may be possible to certify key equipment, equipment suppliers need to support higher level integrators, in their certification processes, by provision of appropriate evidence and rationale on how the evidence supports the specific claims about the product. Therefore equipment manufacturers will be particularly interested in the specification of safety case modules in a form that means they can be integrated into the overarching safety case. They will also be interested in transferring certification artefacts (e.g. safety case modules) across certification jurisdictions and, thus, in the Common Certification Language that is a key enabling technology for this. Finally, Equipment Suppliers will have to preserve the integrity of the evidence they provide to platform integrators, and to ensure the integrity of the evidence both up- and down-stream of the supply chain.
• **Tool Vendors.** Tool vendors support both platform integrators and equipment suppliers, and they facilitate the exchange of relevant information between all supply chain and certification stakeholders. Consequently, support and buy-in from tool vendors is critical for the medium- to long-term success of the certification framework, as developed in OPENCOSS. Ultimately, the vendors buy-in has two aspects. Firstly, the project must promote the adaptation of the existing tools (e.g. RAMS tools, modelling environments, etc.) to the OPENCOSS architecture and working philosophy, in order to ensure that certification evidence can be supplemented by all necessary information and it is presented in the formats appropriate for the framework developed by the project. The OPENCOSS platform must be open to existing technologies and tools and this community will help to create interoperable interfaces (APIs) of OPENCOSS services with typical tools used in the safety critical system field. Secondly, it is necessary to generate sufficient interest in a tool vendor community for supporting the framework itself and, thus, to promote development of tools that will implement and enhance the OPENCOSS architecture (and prototype tools).

• **Consultancy provider.** They support both platform integrators and equipment suppliers. They provide their support in term of training, gap analysis, coaching, assessment and follow-on. They may also recommend best practices and best tools (though usually they do not directly sell tools like tool vendors).

### 2.1.3 Scientific and Research community

OPENCOSS identified a number of relevant active research projects with the view of establishing regular meetings and exchanges. The objective of this was to seek exchange of relevant experiences and results and utilise likely synergies between various projects. Whilst the project sought to establish contacts with all relevant ongoing projects, regardless of their funding source (industrial, national, or European / International), our primary focus was EU-funded projects. Sources of information were OPENCOSS partners’ participation in various projects to identify those where collaboration with OPENCOSS was likely to yield most benefits for both sides. The project also sought advice from the European Commission Services (and, in particular, the Project Officer) on a regular basis. Furthermore, OPENCOSS participated in any inter-project networking event organised, promoted or sponsored by the Commission, in order to continue reviewing and enhancing its network of research contacts. Overall, cross-dissemination research activities with other projects have taken place in a by series of regular (at least – annual) multi-party workshops:

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<td><strong>OPEES - Open Platform for the Engineering of Embedded Systems</strong> The project aims at the exploitation of the Topcased platform to be named Polarsys</td>
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<td>EXCROSS It is a Supporting Action of the European Commission to enhance cross-fertilization and synergies between safety research initiatives in the different transportation modes (e.g. road transportation, aviation, etc.). <a href="http://www.excross.eu/index.htm">http://www.excross.eu/index.htm</a></td>
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The scientific and research communities will continue to take advantage of an open-source platform by having facilities to use case studies, deliverables, and any other project outcomes for their research, educational, and training activities. The openness of the community will facilitate the impact of further research and academic activities to be done by this community.

As part of the future development, CCL language would be applied to a broader range of standards across more domains, to establish whether it can be validated as a "common model" i.e. uniformly applicable for supporting safety certification, or evolve to comply to some new domain, or possibly being not applicable in some cases.
One key extension would be to cover Security domain which has considerable synergies with safety.
A challenge would also be to help building bridges between standards evolution, for instance extending the SEooC concept introduced in ISO 26262 to other standards.

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<td>AIST (Japan)</td>
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<tr>
<td>University of York</td>
<td>Tim Kelly, Katrina Attwood</td>
<td>Research</td>
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2.1.4 Open source communities

The open source communities, however, form a very generic group of participants, from companies such as IBM to University-based contributors. It is rather seen as an exploitation strategy than a stakeholder representative exercise. For OPENCOSS a specific number of open source communities are relevant and can be seen as “special stakeholders”.

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<td>PolarSys</td>
<td></td>
<td>Open source tools for embedded systems</td>
</tr>
</tbody>
</table>

2.1.5 Standardisation and Regulatory Bodies

Since the development, analysis and assurance of safety-critical platforms is highly regulated and standardised in most jurisdictions, standardisation and regulatory bodies are key stakeholders in the certification process and, consequently, they represent a key audience that must be targeted by OPENCOSS community building activities.

OPENCOSS will aim at improving the participation of the standardisation and regulatory bodies within the community by:

- Inviting representatives of these bodies to join the community
- Utilising partners’ contacts within standardisation and regulatory bodies to attend key community activities
- Bringing open-source project outcomes to the attention of standardisation and regulatory bodies through meetings and events.
2.2 Open source strategy in OPENCOSS

2.2.1 Adoption of Free Software and Open Source

2.2.1.1 Definitions
Free software is defined by the Free Software Foundation as “software that comes with permission for anyone to use, copy, and/or distribute, either verbatim or with modifications, either gratis or for a fee” 1.

The essential freedoms given by a Free Software license are:
- Freedom to run for any purpose,
- Freedom to study and adapt,
- Freedom to copy and redistribute,
- Freedom to improve and distribute the improvement.

In particular, to enjoy all these freedoms, the source code must be available.

The term “open source software”2 is used by the Open Source Initiative (OSI)3 to mean more or less the same as is implied by “free software”. However, the two notions do not exactly overlap: OSI accepts some licenses that the Free Software Foundation considers too restrictive4, and there are free software licenses which the OSI has not accepted. However, the differences in the extension of the category are small: nearly all free software is open source, and nearly all open source software is free.

Some common misconception of Free Software or Open Source Software is that it is incompatible with commercial products. This is wrong in many aspects:
- Commercial products can be open. There is no contradiction into that, as commercial products just mean that it’s a product designed to be used in business. As an example, all the products that AdaCore is delivering are commercial, industrial products, and Free Software as well.
- “Free” in Free software is to be understood in the freedom sense, not in the cost sense. You can sell Free Software, and you don’t have to make it publicly available at no cost.
- Next, about the need to release as Open Source: it all depends on the license of the software you are using. If this license has a strong copyleft on it (see ¡Error! No se encuentra el origen de la referencia. ¡Error! No se encuentra el origen de la referencia.), then indeed there are constraints on the derived work. However some open source license do not include copyleft, or have a weak copyleft, and can then perfectly be included in a closed source / proprietary software. Apple is a good example of this situation, the lower layers of OS X and iOS being open source software

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1 https://www.gnu.org/philosophy/categories.en.html
2 http://opensource.org/osd
3 http://opensource.org/about
4 As an example, the NASA Open Source Agreement v1.3 is not considered a free software license
(Darwin kernel), but not the rest of the Operating Systems. Another example is the BSD IP stack, used by most closed source networking software/OS.

2.2.1.2 OPENCOSS open source strategy

OPENCOSS aims at complying with both definitions, by making the source code, design documents and developer manuals available together with the OPENCOSS platform.

While the benefits of free software licenses to the end user are obvious, the choice of releasing a software in an open form is not for the copyright holder. However, in the context of OPENCOSS, this choice is natural for many reasons:

- A goal of OPENCOSS is to disseminate its results within Academia. An open source license will enable universities, research centres and laboratories to study easily the OPENCOSS concepts and evolve the OPENCOSS technology.
  
  Another goal of OPENCOSS is to make sure that the technology coming out of the project will be used in the industry. Making them available under an open source licence will facilitate adoption by industrial partners of the OPENCOSS consortium and third parties. It also means that tool providers, in and out of the OPENCOSS consortium, will be easily able to adapt and redistribute the platform, turning it into a de facto standard technology.

- All of this will contribute to the general OPENCOSS goal of building a community around the OPENCOSS platform. An active community needs stakeholders in the earlier stages of the technology cycle (e.g. like research labs), others further down, at the product and market levels, (e.g. software vendors) and finally users with demanding needs (e.g. industry). This community will enhance and support the OPENCOSS platform after the project is finished. Making the code available under an open source license will allow this community to bootstrap and easily share contributions without adding an unnecessary legal burden.

2.2.2 OPENCOSS licensing

2.2.2.1 Copyleft and License compatibility

Among the open source / free software licenses, one of the main differences concern the degree of “copyleft” of the license.

Copyleft software is free software whose distribution terms mandates that all versions derived from it are made available to third parties under the same terms. This shields the program, and its modified versions, from turning it into a proprietary, closed program.

This means, for instance, that copyleft licenses generally do not allow licensees to add additional restrictions to the license when they redistribute the software (though a limited set of additional clauses can be added, for instance to provide additional warranties or limiting the use of names of copyright holders for publicity). Copyleft licenses also require making source code available, so that all licensees actually have the same rights on the software as upstream recipients.

Copyleft licenses can be either “strong” or “weak”, depending on the extent of the obligation to use the same licence for derivative work. Strong copyleft licenses, such as the GNU General Public License\(^5\), mandates that all derivative work is made available under the same terms. Weak copyleft licenses, such as the GNU Lesser General Public License\(^6\) or the Eclipse Public License\(^7\), allow certain derivative work to be

\(^5\) https://www.gnu.org/licenses/gpl-3.0.en.html
\(^6\) https://www.gnu.org/licenses/lgpl-3.0.en.html
\(^7\) https://www.eclipse.org/legal/epl-v10.html
distributed under different terms. For instance libraries distributed under the LGPL can be combined with proprietary software under certain conditions; programs distributed under the EPL can be combined with proprietary plugins.

When combining different software components, it is needed to do so in a way that abides by the terms of the licenses of each component.

More precisely, if one combines component A (licensed under license \( L_a \)) with component B (licensed under \( L_b \)), planning to make the result available under license \( L_b \), then:

- \( L_a \) must grant a set of rights larger than the set of rights granted by \( L_b \);
- \( L_a \) must have a set of conditions that is included in \( L_b \)'s set of conditions.

If so, \( L_a \) is said to be compatible with \( L_b \). Such compatibility is not reflexive: \( L_a \) being compatible with \( L_b \) (e.g. can be re-distributed under the terms of \( L_b \)) does not mean that \( L_b \) is compatible with \( L_a \) (in most cases it is not).

For instance, if \( L_a \) is the GNU GPL and \( L_b \) is the BSD license, it’s not possible to copy/paste A’s code in B and redistribute the resulting software under the BSD license, because the conditions of the GNU GPL are more stringent than the conditions of the BSD license: there is no obligation to make source code available under the BSD licence. However the BSD license is compatible with the GNU GPL (e.g. can be redistributed as GNU GPL) as the GNU GPL meets all the conditions of the BSD license.

### 2.2.2.2 License strategy for OPENCOSS

It has been decided among the OPENCOSS partners that a weak copyleft license was to be applied to the OPENCOSS software, in particular to allow proprietary plugins to the OPENCOSS platform.

This choice has been made to allow the distribution of the OPENCOSS platform together with proprietary products integrated with it, such as ALM/PLM or evidence managers.

The figure below shows the different layers of the OPENCOSS platform, with the blue and velvet parts being free software, and the red parts potentially proprietary software.

![Figure 1. Layers of an OPENCOSS platform distribution](image-url)
2.3 OPENCOSS Architecture and Release Scheme

2.3.1 Dependencies analysis

Concerning the choice of the actual license(s) for the release of the OPENCOSS platform, some extra considerations need to be taken into account, in particular the compatibility of the chosen license with the different dependencies of the OPENCOSS platform (see ¡Error! No se encuentra el origen de la referencia. ¡Error! No se encuentra el origen de la referencia.), whose dependencies make OPENCOSS a derivative work of those modules.

As a reminder, below is the architecture of the OPENCOSS platform, as described in the document “D3.3 Integrated OPENCOSS platform”:

![Figure 2. OPENCOSS Implementation Architecture](image)

The above architecture shows a strong dependency over several key frameworks:

- CDO server and client
- Eclipse environment with various plugins
- Tomcat for the web services

Below is a non-comprehensive list of the dependencies for OPENCOSS:
Report on adoption of OPENCOSS by an open-source community

2.3.2 License of the core platform modules

Due to the strong link between the OPENCOSS architecture and the Eclipse environment, and also because the OPENCOSS platform dependencies are compatible with the Eclipse Public License (EPL-1.0), and this license meets the OPENCOSS consortium objective of releasing the platform under a free software license with weak copyleft, it has been decided that the platform will use the EPL-1.0 globally, for all core modules. Hence, will be released under EPL-1.0 the following modules:

- The webapp modules: process manager, evidence manager, reports
- The eclipse editors
- The CDO server

2.3.3 Integrated external tools

During the project, two external tools have been used to demonstrate the integration of the OPENCOSS platform with other tools in the safety-critical toolchain: Medini Analyse from IKV as evidence manager, and Process Director from Atego as PLM (Product Lifecycle Management). Those tools along with the adaptors developed for this integration do not need an open source release. The exact license applied to those tools and adaptors remain the choice of their owner.

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9 http://www.apache.org/licenses/LICENSE-2.0
10 http://www.gnu.org/licenses/old-licenses/lgpl-2.1.en.html
11 http://svnkit.com/license.html
3 OPENCOSS at Polarsys

From the early stages of OPENCOSS, a strong candidate for the project’s open-source community was the Eclipse ecosystem and in particular its Polarsys platform, targeting tools for embedded system development. After a careful evaluation, the OPENCOSS consortium decided to join Polarsys. This section describes Polarsys and the rationale behind the project’s decision.

3.1 Polarsys Description

Eclipse is an open source community whose projects are focused on building an open development platform comprising extensible frameworks, tools, and runtimes for building, deploying, and managing software across the lifecycle.

Polarsys is an Industry Working Group, which is part of Eclipse, created by large industry players (mainly, aerospace, defence and security, energy, health care, telecommunications and transportation) and by tool providers to collaborate on the creation and support of open source tools for the development of embedded systems.

The goals of Polarsys are:

- Providing means of collaboration between end user companies
- Organizing sustainable commercial services and ecosystems around open source components
- Fostering exchanges between academics and industry partners
- Managing the quality and maturity of tools and components from early research prototypes through to obsolescence
- Providing the documents and qualification kits required for certification
- Recognizing project maturity and company know-how and commitment through a branding process.
- Ensure long-term longevity of tools since they must last for a very long time, in some industries up to 30-80 years

Polarsys hosts a number of solutions/projects in the following areas for the development of embedded systems:

- Modeling
- Compiling, debugging, tracing
- Application Lifecycle Management process and tools – configuration management, change management, issue tracking, requirement management, project reporting
- Test and verification frameworks and tools targeting embedded software methods, static analysis, simulation, and early validation Embedded components (RTOS, runtime, middleware, etc.)
- SoC (System on Chip) simulation and hardware logic (VHDL, SystemC, etc.)

All of the Polarsys solutions are based on technology and tools that have been deployed by large-scale systems engineering teams. All the solutions are open source and are provided free of charge under the Eclipse Public License (EPL).

Polarsys does not intend to systematically re-develop tool components. A lot of very good solutions answering some industrial needs already exist in open source. But most of the time, specific issues like durability or certification are not taken into account. In this case, Polarsys plays its part by completing tool
components assets, setting up specific support, and coordinating development and support. This is why Polarsys is open to host existing tools that satisfy the most important industrial needs.

3.2 OPENCOSS strategy in Polarsys

The innovation required to advance OPENCOSS tools needs to be driven by the key industrial companies. This is why OPENCOSS partners believe that the PolarSys Working Group is a perfect environment for open innovation and industrial feedback.

More concretely, there is a shared set of specific goals between Polarsys and OPENCOSS, which motivates the OPENCOSS consortium to join Polarsys:

- **Open Innovation**: Ensuring the highest levels of productivity, reliability, safety, service, and performance implies a continuous effort of research and development in software tools.
- **Computer Assistance and Automation**: The numerous and complex operations required to develop and maintain industrial systems imply a high level of automation based on software tools.
- **Certification (e.g. DO178C, ISO26262, EN 50128/50126/50129, etc.)**: The development of safety-critical and embedded systems must comply with strict regulations impacting both the final product and the development process and tools used to build them.
- **Very Long Term Support**: The tool chain needs to remain operational for the life cycle of the products; many industries need more than 10 years, and some need up to 80 years.

By joining Polarsys, OPENCOSS partners expect that the project solutions will evolve in pace with the more challenging requirements of modern engineering teams and will provide more flexible extensibility and customization that makes it easier to adopt the tools to the methods and processes of industrial engineering teams. Other initiatives, such as OpenECTS (http://www.openetcs.org/) working on the safety-critical railway domain and with plans to join Polarsys, will also create new opportunities to evolve OPENCOSS solutions.

Two kinds of projects are supported in Polarsys:

- **Hosted Projects**: The technical tool artefacts are hosted by Polarsys.
- **Coordination Projects**: Most of the technical artefacts are hosted elsewhere, and Polarsys focuses on user coordination and specific artefacts (patches, qualification kits, etc.).

OPENCOSS tool platform is planned to be hosted by Polarsys. To do so, one core OPENCOSS project partner (TECNALIA, in its role of OPENCOSS coordinator) will submit the tools to be accepted as part of Polarsys, according to its governance rules.

Although any OPENCOSS partner can contribute to the tools evolution, the core OPENCOSS partner in Polarsys shall play a key role by:

- Preparing OPENCOSS code, together with Eclipse and Polarsys members, to be released/hosted in open source.
- Operating dedicated code repositories, build chains, test facilities, etc.
- Fostering exchanges between OPENCOSS partners and Polarsys industry partners
- Proposing OPENCOSS tool enhancements (industry-friendly functionalities, new features, security and reliability features, tool connectors with other Polarsys tools, among others).
- Managing the quality and maturity of OPENCOSS tools
• Ensuring open innovation through the sharing of the research, development, and maintenance efforts as far as possible
• Fostering sustainable commercial services and ecosystems around the OPENCOSS tools

The main goal is to use OPENCOSS partner’s technical expertise in the tool platform and comprehensive understanding of the project's challenges, in an effective way by offering continuous support for industrial players wishing to use these technologies in a cost-effective way for critical, long-term projects.
4 OPENCOSS Community Governance

4.1 Governance Principles

Governance relates to consistent management, cohesive policies, guidance, processes and decision-rights for a given area of responsibility. The management or governance of an open source community is directly related to the type of this community and what kind of product or result does it offers to users. It is therefore a critical aspect to be taken into account when creating an open source community. How the community is managed and the type of licence hold is the key aspect when talking about open source communities.

The definition of the OPENCOSS tool platform governance processes will be aligned to the Polarsys Charter (see Polarsys Working Group Charter: https://www.eclipse.org/org/workinggroups/polarsys_charter.php).

In this section, we discuss some considerations relating to governance in the OPENCOSS context.

The rules of engagement of the open-source Eclipse model are based on three principles:

- **Open:** Eclipse is open to all; Eclipse provides the same opportunity to all. Everyone participates with the same rules; there are no rules to exclude any potential contributors which include, of course, direct competitors in the marketplace.
- **Transparent:** Project discussions, minutes, deliberations, project plans, plans for new features, and other artifacts are open, public, and easily accessible.
- **Meritocracy:** Eclipse is a meritocracy. The more you contribute the more responsibility you will earn. Leadership roles in Eclipse are also merit-based and earned by peer acclaim.

Meritocratic projects often start life with a small number of decision makers (at the beginning Tecnalia will be the OPENCOSS core partner in Polarsys). Possibly only a single person in charge of designing or distribution the decision control. However, even having a community with a minimal structure, it will ensure that the members controlling the strategy in the present will be ones in charge of identifying the future contributors for the community. This way they ensure a common vision for the project and a long-term strategy. Decision-making responsibilities are usually reserved for those willing and able to understand and appropriately represent the views of the wider community. The OPENCOSS ecosystem will then move to a fully flat structure (i.e. one in which decision control is distributed among community members) in recognition of the project’s contribution (meritocratic governance).

Polarsys governance is based on the following principles:

- Polarsys is a user-driven organization,
- A means to foster a vibrant and sustainable ecosystem of tool components and service providers,
- A means to organize the community of each project or tool component so that users and developers define the roadmap collaboratively.

Regarding OPENCOSS within Polarsys, some processes that are inherent to OPENCOSS evolution will be adopted and put them into practices so as to run effectively the Polarsys community after the project ends. Some of these processes will be the communication mechanism such as the mailing list, forum/discussion guidelines, wiki contribution guidelines. Other important processes to define will be coding and releasing guidelines, community decision-taking processes and voting processes. These processes are supported by Polarsys and regulated in the Polarsys Working Group Charter.
4.2 Core Community Governance Rules

In order to participate in Polarsys, an entity (TECNALIA in our case) must be at least a Solutions Member of the Eclipse Foundation, have executed the IWG Participation Agreement, and adhere to the requirements set forth in the Polarsys Working Group Charter.

In order to propose OPENCOSS tools to be part of Polarsys, an entity must be a Committer Member. Committer members are individuals who through a process of meritocracy defined by the Eclipse Development Process are able to contribute and commit code to Polarsys projects for which they are responsible. Committers may be members by virtue of working for a member organization, or may choose to complete the membership process independently.

All Polarsys Members must be parties to the Eclipse Membership Agreement. In the event of any conflict between the terms set forth in this Polarsys Industry Working Group Charter and the Eclipse Foundation Bylaws, Membership Agreement, Eclipse Development Process, Eclipse Industry Working Group Process, or any policies of the Eclipse Foundation, the terms of the Eclipse Foundation Bylaws, Membership Agreement, process, or policy shall take precedence.

The Intellectual Property Policy of the Eclipse Foundation will apply to all Polarsys activities. Polarsys will follow the Eclipse Foundation’s IP due diligence process in order to provide clean open source software released under EPL or any other licenses approved by the IWG and the Eclipse Foundation Board of Directors, such as BSD-like and LGPL.

The Eclipse Foundation Development Process will apply to all Polarsys open source projects. In particular, the project lifecycle model and review process will be followed by all Polarsys open source projects.

4.3 Community Services

The following Polarsys Community Services are of importance for OPENCOSS evolution:

Collaboration Infrastructure: Polarsys leverages the usual Eclipse open source collaboration infrastructure. As such, source code repositories, Bugzilla, wikis, forums, project mailing lists, and other services provided as the open source collaboration infrastructure are publicly visible. Committers have write access to this infrastructure, and as such have the rights and obligations as set forth in the Eclipse Development Process and the various Eclipse committer agreements.

LTS Build and Test Infrastructure: Additionally, Polarsys aims to provide a specific build and test infrastructure for long term support. This infrastructure will enable build and test of specific long term releases for a duration of up to 10 years in a first version, and up to 40 years with an adequate usage of virtualization technologies.

Access to LTS Binary Releases: Polarsys will produce public binary releases modeled after the Eclipse release train process, including Service Releases SR1 and SR2. Polarsys long term support releases (post SR2) are only accessible to Polarsys member companies. Such binary code may not be redistributed unless it is integrated into, or updates, a commercial software product or custom-developed software, and is distributed pursuant to an Object Code License.

Hosting Custom Build on the Polarsys Infrastructure: This service gives the capability of using the Polarsys test and build infrastructure in order to create member-specific bundles. These bundles can create another combination of Polarsys components and are private to the member who defines and uses them.
**Maturity Assessment Program:** Maturity assessment is at the core of the Polarsys' goal of providing industrial quality tools. It consists of the evaluation of component maturity according to a classification similar to TRL levels. This evaluation is done collaboratively by component developers, component integrators, and component users.

**Access to Qualification Kits:** Many Polarsys components are used in the development of certified and qualified embedded software. As such, specific documentation is needed and is adapted in the context of a given certification process. These documents, like development plans and test plans, are part of the Polarsys qualification kits available for the components.

**IP Due Diligence:** IP due diligence is necessary for verifying that the committers have the right to open-source the code they put in Polarsys. It is also necessary to check that the different integrated components have compatible licenses. This is even more important in Polarsys, as Polarsys allows not only EPL licensed components, but also BSD-style licensed components and LGPL licensed components.

**Branding Process:** The branding process aims at rewarding the skills and investment of service providers. The brand recognizes that service providers are able to extend or provide long term support for a component.

### 4.4 Common Governance Dispositions

The dispositions below apply to any governance action around OPENCOSS in the context of Polarsys.

#### 4.4.1 Good Standing

A representative shall be deemed to be in good standing, and thus eligible to vote on issues coming before the body he in which he participates, if the representative has attended (in person or telephonically) a minimum of three (3) of the last four (4) body meetings (if there have been at least four meetings). Appointed representatives on the body may be replaced by the member organization they are representing at any time by providing written notice to the Steering Committee. In the event a body member is unavailable to attend or participate in a meeting of the body, he or she may send a representative and may vote by proxy, which shall be included in determining whether the representative is in good standing. As per the Eclipse Foundation Bylaws, a representative shall be immediately removed from the body upon the termination of the membership of such representative’s member organization.

#### 4.4.2 Voting

**Super Majority:** For actions (i) requesting that the Eclipse Foundation Board of Directors approve an additional distribution license for Polarsys projects; (ii) amending the terms of the Polarsys Participation Agreement; (iii) approving or changing the name of Polarsys; (iv) approving changes to annual member contribution requirements; any such actions must be approved by no less than two-thirds (2/3) of the representatives in good standing represented at a Steering Committee meeting at which a quorum is present.

#### 4.4.3 Term and Dates of Elections
This section only applies to the Steering Committee, the Architecture Committee and the Quality and Branding Committee.

All representatives shall hold office until their respective successors are appointed or elected, as applicable. There shall be no prohibition on re-election or re-designation of any representative following the completion of that representative’s term of office.

**Steering Committee Members:** Steering Committee member representatives shall serve in such capacity until their removal by their respective appointing member organization or as otherwise provided for in this charter.

**Elected Representatives:** Elected representatives shall each serve one-year terms and shall be elected to serve from April 1 to March 31 of each calendar year, or until their respective successors are elected and qualified, or as otherwise provided for in this charter. Procedures governing elections of representatives may be established pursuant to resolutions of the Steering Committee provided that such resolutions are not inconsistent with any provision of this charter.

### 4.4.4 Meeting Management

**Place of Meetings:** All meetings may be held at any place that has been designated from time-to-time by resolution of the corresponding body. All meetings may be held remotely using phone calls, video calls, or any other means as designated from time-to-time by resolution of the corresponding body.

**Regular Meetings:** No body meeting will be deemed to have been validly held unless a notice of same has been provided to each of the representative in good standing at least thirty (30) calendar days prior to such meeting, which notice will identify all potential actions to be undertaken by the body at the body meeting. No representative will be intentionally excluded from body meetings and all representatives shall receive notice of the meeting as specified above; however, body meetings need not be delayed or rescheduled merely because one or more of the representatives cannot attend or participate so long as at least a quorum of the body (as defined in the Common Dispositions section above) is represented at the body meeting. Electronic voting shall be permitted in conjunction with any and all meetings of the body, the subject matter of which requires a vote of the body to be delayed until each such representative in attendance has conferred with his or her respective member organization as set forth in the Voting section above.

**Actions:** The body may undertake an action only if it was identified in a body meeting notice or otherwise identified in a notice of special meeting.

**Invitations:** The body may invite any Polarsys member to any of its meetings. These invited attendees have no right of vote.

### 4.5 Steering Committee

#### 4.5.1 Powers and Duties

Steering committee members are required to

- Define the strategy of the IWG
- Define the global roadmap
• Discuss and amend the charter and the participation agreement
• Define the budget and fees each year
• Define and follow marketing and communication activities
• Invite guest members

4.5.2 Composition
• Each Steering Committee member of the IWG has a seat on the Steering Committee.
• At least one seat is allocated to participant members. An additional seat on the committee shall be allocated to the participant members for every additional five (5) seats beyond one (1) allocated to Steering Committee members. Participant member seats are allocated following the Eclipse "single transferable vote", as defined in the Eclipse Bylaws.
• The Steering Committee elects among its members a chairman who will represent the IWG. They will serve from April 1 to March 31 of each calendar year, or until their respective successors are elected and qualified, or as otherwise provided for in this charter.

4.5.3 Meeting Management
The Steering Committee meets at least twice a year.

4.6 General Assembly

4.6.1 Powers and Duties
• Approve changing the name of Polarsys.

4.6.2 Composition
Each Steering Committee and Participant Member of the IWG has a seat on the General Assembly.

4.6.3 Meeting Management
The General Assembly meets at least once a year.

4.7 Architecture Committee

4.7.1 Powers and Duties
Architecture Committee members are required to
• Ensure the technical consistency of Polarsys projects
• Ensure that Polarsys projects achieve VLTS objectives
• Recommend technologies
• Establish technical guidelines
• Validate new project proposals

4.7.2 Composition
• Each Steering Committee Member of the IWG has a seat on the Architecture Committee.
• Each Project Planning Committee elects one of its members to the Architecture Committee.
• The Architecture Committee elects a chairman who reports to the Steering Committee. This chairman is elected among the members of the Architecture Committee. He will serve from April 1 to March 31 of each calendar year, or until his successor is elected and qualified, or as otherwise provided for in this charter.

4.7.3 Meeting Management
The Architecture Committee meets at least twice a year.

4.8 The Quality and Branding Committee

4.8.1 Powers and Duties
The Quality and Branding Committee members are required to

• Ensure the consistency of the branding process and attribute maturity labels (see the Branding Charter Wiki Page)
• Define the IWG quality kit and maturity process
• Validate that the projects conform to the IWG quality kit
• Validate that the projects apply the IP process

4.8.2 Composition

• Each Steering Committee member of the IWG has a seat on the Quality and Branding Committee.
• At least one seat is allocated to participant members. An additional seat on the committee shall be allocated to the participant members for every additional five (5) seats beyond one (1) allocated to Steering Committee members. Participant member seats are allocated following the Eclipse "single transferable vote", as defined in the Eclipse Bylaws.
• The Quality and Branding Committee elects a chairman who reports to the Steering Committee. This chairman is elected among the members of the Quality and Branding Committee. He will serve from April 1 to March 31 of each calendar year, or until his successor is elected and qualified, or as otherwise provided for in this charter.

4.8.3 Meeting Management
The Quality and Branding Committee meets at least twice a year.

4.9 Project Planning Committees

Each component or release train (bundle) in the IWG is driven by a Project Planning Committee.

4.9.1 Powers and Duties
Project Planning Committee members are required to

• Instantiate IWG global roadmaps for the project
• Apply the Architecture Committee recommendations
• Plan and arbitrate defects fixes and improvements implementation
• Ensure the relationships with the technical team of the project

4.9.2 Composition

• Each Steering Committee or participant member of the IWG can have a seat on the Project Planning Committee.
• Each Project Planning Committee elects a chairman who will represent it to the Architecture Committee. This chairman is elected among the members of each Project Planning Committee. He will serve from April 1 to March 31 of each calendar year, or until his successor is elected and qualified, or as otherwise provided for in this charter.

4.9.3 Meeting Management

The Project Planning Committees meet at least twice a year.

4.10 Project Management Committees

Any Project Management Committee (PMC) established by Polarsys shall be governed by the Eclipse Development Process.
5 Community Evolution Strategy

5.1 Dissemination related to OPENCOSS Community

This section shows the strategy to disseminate OPENCOSS results in order to reinforce the open-source community. Work package WP9 provides additional insights in OPENCOSS dissemination plans and actions.

The OPENCOSS project generated dissemination material that will be used to perform dissemination beyond the project life. A complete list of the dissemination material as used within the OPENCOSS community is as follows:

- External publications
  - General short abstract,
  - General long abstract,
  - Public project deliverable
  - Position paper (OPENCOSS position paper),
  - Web site (including access to deliverables and calendar of external events),
  - Brochure, leaflet,
  - Press releases (at Kick-Off, major milestones, project completion),
  - Internet Communities, Social Networks (LinkedIn and Facebook),
  - Newsletter,
  - Technical papers and presentations (for Journals and Conferences),

- Presentations
  - Short Project presentation (powerpoint) about 5 minutes,
  - Long Project Presentation (powerpoint) about 20-30 minutes,
  - A video describing OPENCOSS features,
  - Poster roll-ups,

- Internal publications
  - Collaboration platform (reserved to project partners only), containing:
    - Wiki
    - Calendar of internal event
    - Internal repository,
  - Internal project deliverables.

The material already has a unified lay-out as every member needs to use the templates provided in the repository. The statistics on activities on dissemination show good results. There are about 37 papers published (and a number waiting for approval). There were about 44 events where OPENCOSS was presented with an outreach of approximately 4,000 safety professionals (mostly by industry). Two workshops have been organised by OPENCOSS (SASSUR 2012-2013-2014-2015 and ICSR 2013). OPENCOSS results have been presented to external companies and research institutions. Two workshops were held with the External Advisory Board.

A special issue of the IEEE Software magazine addressing Safety-Critical Software was published which included a side-bar section fully dedicated to OPENCOSS.

Finally, a subset of all papers originated under the OPENCOSS Project has been planned to be published in a book titled Safety and Assurance in Critical Systems, with the following approach (the publisher will be Springer):

- the best papers of OPENCOSS
systematically collected
and logically organized

In the context of the Polarsys Working Group, internal communication among the members will ensure that results are known by all the stakeholders, therefore enabling effective collaborative work. Communication at Polarsys will be also supported by Polarsys. The following Polarsys channels may be used:

- Mails,
- Teleconferences (Skype, WebEx),
- Polarsys Collaboration Platform (repository, wiki),
- Live Meetings/Internal presentations,
- Seminars/tutorials/internal workshops,
- Master and doctoral thesis.

Note that these channels do not necessarily only reach the Polarsys group.

Communication with external people (External to Polarsys) is the means to disseminate the project results to the target group identified in Section 2.1. The means to reach these target groups are:

- In-company dissemination or training, targeting other divisions/departments,
- Conferences,
- Workshops,
- Summer Schools,
- Publications in scientific and professional journals (e.g. IEEE magazines),
- Participation in Network of Excellence and Professional Groups (e.g. EICOSE),
- Masters and doctoral theses,
- Visits & Presentation,
- Tutorials,
- Webinars/video lectures,
- Cooperation with other Research projects as SafeCer, Cristal, EMC2, CHESS, etc.,
- Contribution to standardisation bodies (e.g. ISO, IEEE, OMG, INCOSE).

For all these activities, the funding will be found in OPENCOSS partner investments, new research projects and Polarsys support.

5.2 Users Training related to the OPENCOSS Community

The main objective of the training activities is to encourage the adoption of the OPENCOSS results in the standardization bodies, academic, and industrial communities. A secondary objective of training activities is to provide a common knowledge base for internal communication and stimulate the OPENCOSS consortium through the mutual exchange of knowledge experience and working methods. It is obvious that the internal training should precede the external in most cases.

Therefore, the start of the project was more characterized by internal training activities rather than external. Once the partners had the same level of knowledge on a subject they jointly set up external dissemination, training, and exploitation.

In order to achieve both training objectives, two different activities have been performed:
• External training - to support adoption of OPENCOSS results (described in Section ¡Error! No se encuentra el origen de la referencia.)
• Internal training - to support knowledge exchange within the project (described in Section ¡Error! No se encuentra el origen de la referencia.)

Internal and external training uses various types of electronic documents, such as presentations, tutorials and videos. OPENCOSS is centered on “openness”, for example open-platform, open-source and open-documentation. To pursue the OPENCOSS strategy towards “openness”, the training material should be accessible to other communities where possible.

A number of inter-project training courses have been performed. The most important courses addressed the 3 safety standards of Avionics (ARP and DO178C), Railway (CENELEC), and Automotive (ISO 26262). These courses acted like workshops where experts of different domains met and compared their approaches with the intent to harmonize understanding and fostering a Common Certification Language.

5.2.1 Training Target Groups and Material

The following groups, within the consortium, the EU, and worldwide, represent specific targets for training activities:

• Project partners
• Industrial community
• Prime contractors, OEM
• Suppliers
• Tool Vendors
• Consultancy/Training providers
• Scientific community, including students
• Academic Institutions, including students
• Standardization Bodies and Organizations
• Agencies (e.g. ESA, ERA, etc.)

Many different training materials are required to support the OPENCOSS training. The identified training material is listed below:

• Training Presentation
• Training Leaflet
• Teacher Profile
• Training Satisfaction Survey (one per participant). OPENCOSS Deliverable D9.2B provides details.
• Training Participants List
• Training Announcement
• Training Plan
• Training Calendar (see Appendix B)
• Training Reports

5.2.2 Project and Risk Management Training

Tecnalia and Hans Peter Dahle gave a first internal training presentation on 17 November 2011. Supporting material was provided via the OPENCOSS Subversion repository12. The main objective was to familiarize the OPENCOSS consortium with the administrative tasks within the project.

12 Internal link: https://svn.win.tue.nl/repos/opencoss/00_Project_Handbooks_and_Guidelines/
5.2.3 Goal Structured Notation (GSN) Training

The University of York gave a two-day training event on Goal Structured Notation (GSN) at the University of York on 22 and 23 November, 2011.\[13\] Supporting material was distributed to attendees. The main objective was to create a common knowledge on the GSN formalism. The first day of the workshop was dedicated to safety cases: basic concepts, safety arguments, evidences, development and maintenance, review and evaluation, modularity. On the second day, the GSN was presented together with practical exercises to model safety cases. This training was relevant to all participants of the OPENCOSS consortium, especially those involved in WP4 and WP5, and several partners attended the course and provided positive feedback afterwards.

5.2.4 Model-Based Engineering (MBE) Training

Atego France, Atego UK and Tecnalia gave a presentation on Model-Based Engineering via WebEx on 9 December 2011. Supporting material was provided via the OPENCOSS Subversion repository. The main objective was to create a common knowledge on model-based engineering and to understand how these concepts can be used in OPENCOSS. The presentation had two main parts. The first one dealt with the basic concepts of MBE (e.g. what is a model, meta-model, profile, modelling language, domain-specific modelling language) and it was provided by Atego. The second one dealt with the potential use of modelling and meta-modelling in OPENCOSS and it was provided by Tecnalia.

5.2.5 ISO 26262 Training

Intecs provided training on the ISO 26262 safety standard in September 2012.\[14\] The main objective was to create a common knowledge on the safety automotive norm. John Favaro and Giovanni Sartori presented the material, which was reviewed by CRF to assure that relevant important aspects of the standard were presented and discussed. The workshop represented an unprecedented opportunity to expose the concepts of ISO 26262 to an audience well-skilled in safety engineering but lacking specific ISO 26262 competences. A brief “safety manifesto” was elaborated with the main common concepts and it was circulated for comments.

Afterwards, the participants expressed their positive feedback in the course evaluation report.

5.2.6 CENELEC Standards Training

RINA and ATEGO provided training on CENELEC safety standards in November 2012.\[15\] The main objective was to create a common knowledge on the main safety-related railway standards: EN 50126, 50128, and 50129.

5.2.7 DO-178B and DO-254 Training

In addition to the internal training, provided and funded by the OPENCOSS consortium, OPENCOSS has also provided some “facility training”. This is provided by an outside agency in order to increase the knowledge...

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\[15\] Internal link: svn.win.tue.nl/repos/opencoss/WP9/Training Material/CENELEC Training 2012 november/
within the OPENCOSS consortium, such that the consortium itself can attend external training, at a reduced price. The training is not included in the OPENCOSS effort (participants, teachers and supported material) but it can be regarded as an internal training since it serves the same goal; to provide the partners with a common knowledge base. It is not external, since the training does not affect any OPENCOSS result.

Atego HighRely has provided a DO-178/254 training at a discounted price for the OPENCOSS consortium, for two days, 02 and 03 February 2012, in Toulouse, France.

The main objective was to focus on minimizing DO-178 certification costs, maximizing benefits, and providing the best DO-178 industry practices. The DO-178 training provides an overview including scheduling, cost-estimation, and tool selection, along with objective descriptions and experiences. Positive feedback was received.
6 Recommendations

6.1 Recommendations from the External Advisory Board

For the sake of simplicity and centralization, the recommendations from EAB members for community building has been reported in deliverable D8.4 together with all the recommendation from the EAB members.

6.2 Recommendations from OPENCOSS project

OPENCOSS has been accepted to become one key “element” of the Polarsys open source platform taking in charge of the unique aspects related to certification.

Polarsys is an open source platform, funded by national French investment and mainly to support large avionics projects is now becoming a truly European (and international) initiative. It becomes one of the best open source platform “driven by a set of customers” (Airbus, Continental, Ericsson, Thales, etc) and supports the entire life cycle for critical system development, cross domain. It includes Avionics (Airbus), Automotive (Continental), Telecom (Ericsson) but likely also railway (by Deustche Bahn, with its OpenETCS initiative).

Polarsys is deemed the best “host” for OPENCOSS software to foster its visibility and wider dissemination.

Next steps:

Work at implementing a strong industrial adoption program to create an open infrastructure and ecosystem to facilitate its integration with other ecosystems for CPS (Cyber-Physical Systems) development (e.g. ECSEL/Artemis platforms).

Dissemination:
- Consolidation of an OPENCOSS Community (Users, developers, etc.) as part of Polarsys platform.
- Create Rules, Policies, Board of the community within Polarsys
- Eco-system creation: interconnections of different actors though Conferences, Communities, new Projects.
- Include Industrials from EAB in the new community.
- Work on socio-technical barriers for industrial adoption
- Industrial demonstrators in real environments, within new innovation projects

Usability:
- Bidirectional equivalence map as today equivalence is only on direction
- Export feature to external tools in order to have bidirectional exchange
- Link with other platforms (ECSEL: ex-Artemis, etc.)
- Ease mapping between user internal certification process and OPENCOSS standard/projects
  - Based on role and participant mapping provide filtered and pre-populated views
  - Extend this usage to project reuse

Reliability:
- Implement checks and filters:
  - To improve user experience by displaying only relevant information
• To prevent to associate activities in an artefact area

Performances:
• Improve overall performance for instance the time to create an assurance project

7 Conclusions

Deliverable D8.3 presents the report on open-source community building in the OPENCOSS project.

We presented the main principles behind the OPENCOSS philosophy to release project developments in open source, as well as the main strategic decisions to guarantee the long-term evolution and maturity of the tools. This report summarises efforts to draw the interest of open-source communities in the project, by ensuring the availability of means for interaction with and collaboration between the community members through required communications means, and by providing helpfulness and support required to build and maintain the community.

From the early stages of OPENCOSS, a strong candidate for the open-source community has been the Eclipse ecosystem and in particular its Polarsys platform, which targets tools for embedded system development. After a careful evaluation, the OPENCOSS consortium decided to join Polarsys. The innovation required to advance OPENCOSS tools needs to be driven by the key industrial companies. This is why OPENCOSS partners believe that the PolarSys Working Group is a perfect environment for open innovation and industrial feedback.

By joining Polarsys, OPENCOSS partners expect that the project solutions will evolve in pace with the more challenging requirements of modern engineering teams and will provide more flexible extensibility and customization that makes it easier to adopt the tools to the methods and processes of industrial engineering teams.

Finally, we described the strategy, actions and framework defined by OPENCOSS partners in order to ensure the success of the OPENCOSS community by making it fully operational before the end of the project, guarantee that the strategy of the community will be industrially driven, and to become a global reference in the safety-critical system community.