

## Project Results

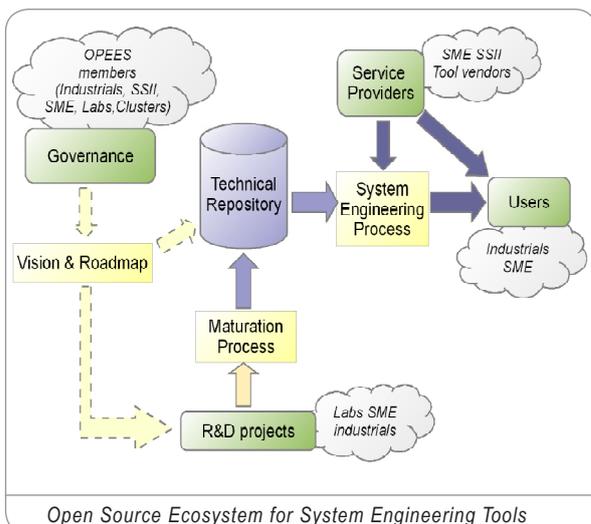
# OPEES

## From open-source platform to open-source ecosystem

*Open-source tools for system engineering allow the tools to be adapted to run on new hardware or benefit from the openness of the soft code to migrate more easily to a new version of the tools. An open tool platform makes it possible to adapt tools to one's own process and ensures the long-term availability of tools. OPEES aimed to create a community and build the necessary means and enablers to ensure long-term availability of innovative engineering technologies in the domain of dependable/critical software-intensive embedded systems.*

Long-term availability is essential to embedded-systems deployment. Imagine you have a problem in an embedded system. While the know-how to fix it may exist, if the hardware is no longer available or the tool chain too outdated so as to be incompatible, the embedded system cannot be rebuilt. Since the maximum support period for proprietary engineering tools tends to be ten years, it is necessary either to migrate to a new platform, to re-engineer the entire system or to accept the absence of support.

The ITEA 2 OPEES project set out to build a community to ensure the long-term availability of these open source tools for critical industrial sectors such as aerospace, transport and energy.



### THE PATH TO POLARSYS

The viability of such an ecosystem required several elements to be established during the project:

- An open and visible organisation with a worldwide dimension, implementing the business models/business plan and dissemination plan defined in the project, allowing the emergence of a European service industry able to create profitable business and employment
- An open technical repository that holds an initial set of core components and tools matured and assessed following the OPEES methodologies, and that supports collaborative works around these components
- A set of processes and guidelines for tools/components maturation, verification & qualification, for the candidate tools/components validated through experimentations on real use cases to ensure components durability and interoperability, through promotion of open standards, in adequacy with industrial needs, constraints and domain standards.

The outcome of these efforts became manifest with the creation of Polarsys, implemented as an Industry Working Group in collaboration with the Eclipse Foundation. Polarsys organises the open-source and business ecosystem around tools for the development of dependable embedded systems to create better tooling and enable long-term support for these tools as well as collaboration between embedded systems developers as tools end-users and tool developers. It implements a specific infrastructure to ease long-term availability of tools, providing a common and vendor-neutral build-and-test infrastructure designed to last for years.

### STRONG EUROPEAN DIMENSION

Many of the tools to be managed by Polarsys already existed and were being used by systems developers. For example, Astrium uses the TopCased UML2 model-driven engineering environment for embedded software and safety-critical application development in satellites while a number of OPEES partners

## OPEES (ITEA 2 ~ 08019)

### Partners

Adacore  
Airbus  
Alyotech  
Atos Origin  
CEA LIST  
CNES  
Combitech  
C-S  
Dassault Aviation  
EADS Astrium Satellites  
EADS Astrium Space Transportation  
Ericsson  
ICT-Norway  
Indra Sistemas  
INRIA  
Institut National Polytechnique de Toulouse / Institut de Recherche en Informatique de Toulouse – INPT/IRIT  
Katholieke Universiteit Leuven  
Linagora  
MBDA  
OBEO  
ONERA  
Software Quality Systems - SQS  
Space Applications Services  
TCP Sistemas e Ingeniería - TCPSI  
Thales  
Universidad Politecnica de Valencia - UPV  
University of Skövde  
Xipp

### Countries involved

Belgium  
France  
Norway  
Spain  
Sweden

### Project start

January 2009

### Project end

December 2012

### Contact

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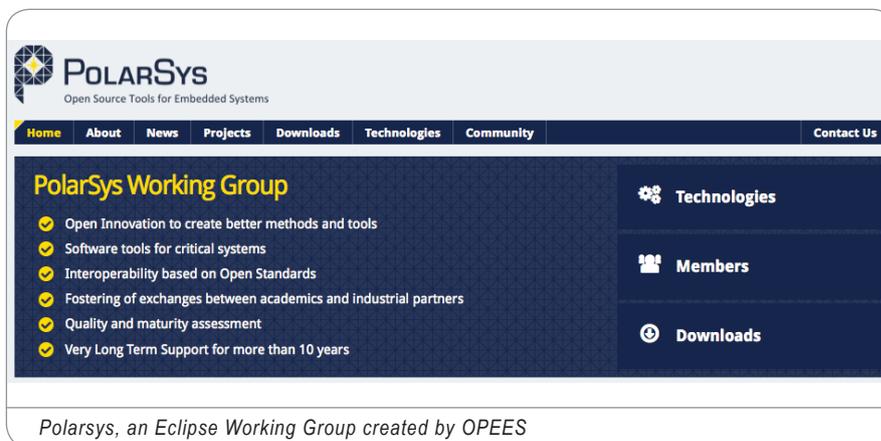
use Frama-C to check the correctness of embedded software. However, several new technologies had to be developed, including important components for model-based systems engineering. These included parts of Papyrus, TopCased, GeneAuto as a qualifiable code generator, Unisim for simulation, Binary Interface Tool to handle interfaces between components and ArCon to validate models. The objective was to have all the parts of a full-feature tool chain.

The strong European dimension of the project consortium, involving large organisations as well as smaller companies and research teams, along with the dissemination activities enabled the OPEES initiative to spread through a larger number of European countries by establishing collaborations with other projects like CESAR, VERDE, OpenCOSS and CHESS. National and European competitiveness clusters also provided strong support to OPEES, playing an important role regarding dissemination. The offer of long-term support by some service providers (larger organisations and SMEs) for OPEES components not only demonstrated

the interest in a medium-term relationship among technology experts, service providers and industrial end users but provided a boost to the aim of scaling up this LTS relationship with other end users, and for other Polarsys components to expand the ecosystem around Polarsys.

### REINFORCING THE EUROPEAN POSITION

The creation of very long-term support for a business-oriented, open source framework and community driven by end users is a real innovation generated by this project. The key outcomes are the open and visible Polarsys structure that allows the emergence of a European service industry, a common vision and roadmap, which enables the results of R&D collaborative projects to be extended and shared through an open technical repository of tools/components in the domain of embedded systems/software engineering. Polarsys reinforces the European influence in the worldwide Eclipse community and positions Europe at the centre of the Embedded and Industry community in Eclipse.



**PolarSys**  
Open Source Tools for Embedded Systems

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**PolarSys Working Group**

- Open Innovation to create better methods and tools
- Software tools for critical systems
- Interoperability based on Open Standards
- Fostering of exchanges between academics and industrial partners
- Quality and maturity assessment
- Very Long Term Support for more than 10 years

Technologies  
Members  
Downloads

*Polarsys, an Eclipse Working Group created by OPEES*

## Major project outcomes

Creation of Polarsys as an Eclipse Industry Working Group that outlives the OPEES project

### DISSEMINATION

- >20 publications including OPEES Open Source Business Model Guide, Catalog of OPEES Services, Identification of OPEES technological domains, Interoperability Specification for OPEES Components, Contract-Based "OPEES Components" Composability, Exploring Tool Support for Long-term Maintenance of Digital Assets
- >25 presentations at conferences/fairs including EclipseCon Europe 2012, ERTS 2012, Embedded World Conference 2012, FOSSA 2010, DASIA 2011

### EXPLOITATION

- 7 new Open Source components
- 19 Open Source components in the Polarsys technical repository including Acceleo, Arcon, ATL, EGF, GeneAuto, Papyrus, Polychrony, Topcased
- 25 services tested to support the Polarsys community

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■ ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services.

As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

■ ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

■ ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.



**OPEES**

(ITEA 2 - 08019)

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