CRYSTAL - Seamless Life-Cycle Collaboration for Safety-Critical Systems Engineering

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The Interoperability Specification (IOS) based on OSLC enables seamless integration of development tools for safety critical embedded systems.

A truly European Dimension

CRYSTAL (CRitical sYSTem engineering AcceLeration) as an ARTEMIS Innovation Pilot Project (AIPP) takes up research results of previous projects in the field of Reference Technology Platform (RTP) and Interoperability in order to enhance and mature them with the clear target of industrial take-up. Following the ARTEMIS mission to strengthen the European industry for Embedded Systems, CRYSTAL fosters cross-domain reusability (aerospace, automotive, health, and rail) and pursues driving forward the Interoperability Specification (IOS) towards standardisation. 70 partners from 10 European countries are cooperating in this 3 year project with a total investment of 82M€ to accelerate critical system engineering. The CRYSTAL project was successfully started on May 1st, 2013.

Background

The process of developing, deploying, governing, operating, and maintaining modern safety-critical embedded systems is highly complex and requires specialized tools supporting different activities throughout the product life cycle. The overall process can be effective and efficient only, if it supports collaboration among all involved stakeholders and consequently interoperability between the tools they are using. The main technical challenge in addressing this problem is the provision of open and common interoperability technologies supported by the different tools that generate and provide access to data covering the entire product lifecycle.

Project

The project CRYSTAL takes up the challenge to establish and push forward an Interoperability Specification (IOS) as an open European standard for the development of safety-critical embedded systems in the automotive, aerospace, rail, and health care domain. This standard will allow loosely coupled tools to share

and interlink data based on standardized and open technologies that enable common interoperability among various life cycle phases.
To ensure readiness for industrial take-up, CRYSTAL is driven by real-world industrial use cases and builds on results of successful predecessor projects like CESAR, iFEST, MBAT, p/nSAFECER, SAFE, TIMMO-2-USE, and OPENCOSS, on European and national level.

Technical Innovation - The Interoperability Specification

One of the major outcome of the CRYSTAL project is the CRYSTAL Interoperability Specification (IOS).
In SafeTRANS News 3/2011 the CESAR project partner reported that the CESAR project has selected the emerging open standard OSLC (Open Services for Lifecycle Collaboration: http://open-services.net) as basis for the CESAR interoperability specification IOS. Now almost 3 years and some projects later (MBAT, iFEST and now CRYSTAL), it can be stated that this was the right decision. The iFEST project came in an independent evaluation to the same conclusion that OSLC is the right approach for their interoperability needs. MBAT continued with the IOS foundation laid by CESAR and adopted it for their "Combined Model-based Analysis and Testing of Embedded Systems" methodologies. CRYSTAL has now taken over with writing the story further.
In the meantime, the open OSLC initiative has grown up from a "loosely coupled" web community, to a member section of the open standard organization OASIS (http://oasis-oslc.org). Many commercial and open source products have adopted the open standard and the number of participating organization is constantly growing. The ARTEMIS projects are very well connected with the OSLC standard organization though key project members serving as OSLC Steering Committee members and workgroup leads. Although OSLC is already an excellent basis for the CRYSTAL IOS, the project has already identified some additional needs for interoperability in their use cases, which will most likely lead to enhancements of the OSLC standard and an extension of the CRYSTAL IOS to other system engineering standards.
CRYSTAL is implementing the IOS in industrial use cases and project partners will deliver more than 100 interoperable building blocks for constructing tailor-made systems engineering environments. These building blocks address Requirements Based Engineering, Heterogeneous Simulation, Safety Engineering, Product Lifecycle Management, Multi-viewpoint Engineering, Variability Management and other engineering domains.

Innovation environment around the Interoperability Specification (IOS) consisting of R&D projects and stakeholders.

Market Innovation & Impact

CRYSTAL has the critical mass to create impact. The technologies provided in CRYSTAL will lead to faster development cycles including early validation of design concepts. The CRYSTAL IOS will increase the flexibility for all stakeholders and has the potential to deeply impact the market on a global level. OEMs can easily combine tools from different vendors, and tool vendors will be able to find new market opportunities in an open and extensible environment.

http://www.crystal-artemis.eu/

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CRYSTAL - Short Facts	
Duration:	01.05.2013 - 30.04.2016
Coordinator:	AVL List GmbH
Total Budget:	~ 82 M €
Total Funding:	~ 36 M €
Funding organisations:	ARTEMIS Joint Undertaking
Consortium:	68 partners from 10 countries (AT, BE, CZ, DE, ES, FR, IT, NL, SE, UK)
Application:	Automotive Healthcare Aerospace Railway