



Road2CPS

Speaker and Project Information

Smart Cyber-Physical Systems (ICT-1)

Clustering and Dissemination Event



Coordinator / Speaker information (both if different persons)**Short-CV**

Dr. Christian El Salloum finished his PhD studies in Computer Science in 2008 with Prof. Hermann Kopetz at the Vienna University of Technology. At the Vienna University of Technology he worked as an assistant professor at the Real-Time Systems Group, participated in several national and international research projects and was the global coordinator of the ARTEMIS ACROSS project. In 2013 he joined AVL and took the position of the global strategic and technical coordinator of the ARTEMIS CRYSTAL project. At AVL, Christian works also as a technology scout for big data and cloud computing and leads the data management strategy of the AVL Integrated Open Development Platform (IODP).

Abstract of presentation

The processes of developing, deploying, governing, operating and maintaining modern safety-critical embedded systems is highly complex and requires specialized tools supporting different activities throughout the entire product life cycle. Therefore, OEMs and suppliers are typically operating a large set of tools from different vendors often complemented by custom in-house solutions. Tool integration is often done in an ad-hoc manner by creating proprietary bridges between each pair of tools. Such an approach does not scale, since the number of required bridges grows exponentially with the number of employed tools.

The project CRYSTAL (CRITICAL sYSTEM engineering AccELeration) has identified the need for a standardized and open integration approach and establishes 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 allows loosely coupled tools to share and interlink their data based on standardized and open Web technologies that enable common interoperability among various life cycle domains. This reduces the complexity of the entire integration process significantly. OEMs will benefit from better supplier collaboration and reduced system design costs due to the improved and the smart integration of system analysis, safety analysis, and system exploration tools. In addition, the CRYSTAL IOS will increase the flexibility for all stakeholders and has the potential to deeply impact the market on a global level.

Partner in/ Coordinator of related projects (H2020-ICT-Programm – CPS/IoT or ECSEL/ITEA)

Project Information

<p>1 - Project Name: CRITICAL SYSTEM ENGINEERING ACCELERATION</p> <p style="text-align: right;">  </p> <p>Acronym: CRYSTAL/ Ref.nr.: 332830/ Duration: 01/2013-07/2016 Project Logo</p>		
<p>Project Facts / Website: www.crystal-artemis.eu/</p>		
<p>Funding: 13.47 M Euro (EU), 22.33 M Euro (National) Funding Scheme: FP7 Topic(s): Enabling Seamless Life-Cycle Collaboration for Safety-Critical Systems Engineering Call for Proposal: ARTEMIS-JU Call 2012 Related Projects: CESAR, SAFE, iFEST, MBAT Coordinator: Dr. Christian El Salloum, Annemarie Hamedler / AVL List GmbH (Austria) TRL: between 6 and 7 for 50% of the implemented tool chains.</p>	<p>Consortium:</p> <ul style="list-style-type: none"> • AVL List GmbH • Airbus Defence and Space GmbH • Airbus Defence and Space GmbH – Airbus Group Innovations • Airbus Group SAS • Airbus Operations Ltd - AirbusGroup Innovations • AirbusGroup Limited • AleniaAermacchi SpA • All4Tec • Alstom Transport • Ansaldo STS S.p.A. • ArcCore AB • Arcticus Systems AB • Austrian Institute of Technology • AVL Schrick GmbH • AVL Software and Functions GmbH • Barco N.V. • Centro de Innovación y Soluciones Empresariales y Tecnológicas, S.L. • Centro Ricerche Fiat SCPA • Chalmers tekniska högskola • Creative Intellect Consulting Ltd. • Daimler AG • ElektroBit • Fondazione Bruno Kessler • Fraunhofer • FUNDACION TECNALIA RESEARCH & INNOVATION • GMV, S.A. • Honeywell International, s.r.o. • IBM Nederland B.V. • IBM United Kingdom LT • Instituto Tecnológico de Informática • ITK Engineering • Kompetenzzentrum - Das virtuelle Fahrzeug, Forschungsgesellschaft mbH • Masaryk University 	<p>Relevant Domains</p> <ul style="list-style-type: none"> • Aerospace • Automotive • Health Care • Rail

	<ul style="list-style-type: none"> • Mate Consulting • Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek • Obeo • OFFIS e. V. • Orbital Aerospace • Personal Space Technologies • Philips Medical Systems Nederland B.V. • Politecnico di Torino • RGB Medical Devices • Sagem Défense Sécurité • Second University of Naples • SIEMENS AKTIENGESELLSCHAFT • SIEMENS INDUSTRY SOFTWARE GMBH & CO KG • Soyatec • Systemite AB • Technical University Eindhoven • Technische Universität Berlin • Technische Universität Berlin • Technische Universität Graz • Test and verification and Solutions Ltd. • Testing Technologies IST GmbH • Thales Alenia Space • THALES ALENIA SPACE ESPANA, SA • Thales AT • Thales Austria GmbH • Thales Global Services • Thales Research & Technology France • TTTech Computertechnik AG • Universidad Carlos III de Madrid • University of Freiburg • University of Genova • University of Naples "Federico II" • Valeo FR • Volvo Technology AB 	
<p>Main Objectives / Aims / Goals <i>5-10 lines text</i> CYRSTAL establishes and pushes forward an <i>Interoperability Specification (IOS)</i> as an open standard for the development of safety-critical embedded systems in the automotive, aerospace, rail and health care domain. This standard allows loosely coupled tools to share and interlink their data</p>		

<p>based on standardized and open web technologies that enable common interoperability among various life cycle domains. This reduces the complexity of the entire integration process significantly.</p>	
<p>3 to 4 bullet points</p> <ul style="list-style-type: none"> • CRYSTAL is an industry-driven application-/user-oriented project. • CRYSTAL implements – based on existing technologies (generic interoperable and federated technology bricks and services) – ready-for-use integrated tool chains that can be applied industrially in the partner’s engineering environment. 	<ul style="list-style-type: none"> • CRYSTAL will drive forward cross-domain reusability, ontology, and interoperability including an interoperability specification (IOS).
<p>Achievements/Highlights/Results/most striking achievements <i>5-10 lines text</i></p> <p>CRYSTAL establishes an interoperability specification (IOS), a reference technology platform (RTP) and a platform builder for setting up a system engineering environment (SEE). The project develops tool chains ranging from requirement analysis up to post sales surveillance of safety critical systems. Furthermore, generic engineering methods are developed which focus on simulation management, test coverage of requirements, safety risk management, certification management, and version control. Multiple use cases from four industrial domains (aerospace, automotive, train, health care) are used to drive the design towards interoperability between tools based on interfaces defined by the IOS. The CRYSTAL IOS uses and promotes the industry-wide interoperability OSLC standard and has developed various extensions (e.g. for configuration management, for safety) which constitute a major value for the whole embedded systems industry.</p>	
<p>3 to 4 bullet points</p> <ul style="list-style-type: none"> • The awareness of OSLC as an open standard for life-cycle interoperability was dramatically increased by CRYSTAL. • Multiple tool vendors support OSLC interfaces out-of-the-box in the recent versions of their tools. 	<ul style="list-style-type: none"> • Real-world industrial use cases • Impressive demonstrators in all four targeted industry domains (aerospace, automotive, train, health care)

<p>Impact/Successes 5-10 lines text</p> <p>The aims of CRYSTAL are ambitious and the expected results will have significant economical and societal impacts. OEMs will benefit from better supplier collaboration and reduced system design costs due to the improved and the smart integration of system analysis, safety analysis, and system exploration tools. In addition, 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.</p>	
<ul style="list-style-type: none"> • Products/Services • Patents • Spin-offs <ul style="list-style-type: none"> • <i>Strengthen the seamless use of model-based systems engineering techniques</i> • Improved system development <ul style="list-style-type: none"> Lower cost / less time Lower risk Less rework Higher Quality • Increased flexibility for OEMs <ul style="list-style-type: none"> No vendor-lock-in • New market opportunities for tool providers <ul style="list-style-type: none"> Facilitate innovation and market entry • Ensure Europe's leading edge position in development of safety-critical embedded systems 	<ul style="list-style-type: none"> • Standardisation aspects • Demonstrators/pilots • Other
<p>Gaps/Challenges Max 5 lines text</p> <p>Challenges that will remain after the project is the continuation of the required sustainability actions in order to establish the specifications of the IOS in the industry. The H2020 Project CP-SETIS has taken over the challenge to establish an IOS sustainability model across the runtime of individual research projects.</p> <p>...</p> <p>...</p> <p>...</p>	
<p>3 to 4 bullet points</p> <ul style="list-style-type: none"> • ... • ... 	<ul style="list-style-type: none"> • ... • ...
<p>Recommendations/ Work to be continued <i>Statements from the coordinator (optional- if there is something you want to state on next steps the EC should take, most pressing activities, ... anything else you want to emphasize)</i></p> <p>...</p> <p>...</p> <p>...</p> <p>...</p>	

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