NEWSLETTER Volume 3, April 2016

Introduction

Background

34 months ago, the ARTEMIS project CRYSTAL has been started. Since then the project members have been working with the goal of promoting interoperability when it comes to industrial engineering environments.

Project Extension of three months requested

Most of the work packages are currently on track. To fully reach the project objectives until M36 and to ensure that all work packages can finally achieve their objectives as stated in the description of work, the consortium has requested a project extension by 3 months to 31st of July, 2016. In this additional three months the project will focus on the completion of RTP, IOS and Platform Builder, Use Cases and demonstrators and on Assessment and Validation of the results. Furthermore, CRYSTAL will use the project extension to disseminate the project results in a final event in Madrid. Read more on page 7.

Topics presented in this newsletter

In this third newsletter you will find a summary overview of the **tangible results** achieved until now. A special focus is given to **Configuration and Change Management.** On pages 3-5 you can read further details about that. One of the major focus of the CRYSTAL project is **Standardization**. On page 3 you can read more about the Standardization activities and the Standardization strategy in CRYSTAL. The project partners took part in many interesting conferences, workshops and meetings. CRYSTAL was also main– and co-organizer of conferences and workshops. You can read nice stories about these meetings and events on page 8 in the section **CRYSTAL Highlights**.

Facts & Figures:

- 68 partners, 10 countries
- Start date: May 1, 2013
- End date: July 31, 2016
- Total budget: 82 M€
- JU funding: 13 M€
- National funding: 22 M€

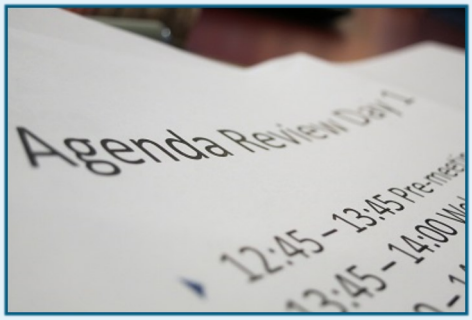
Special Points of Interest:

- Seamless life-cycle collaboration
- Common interoperability standard
- Safety-critical embedded systems
- Cross-domain RTP
- Reduce costs throughout the entire life-cycle
- Reduced time to market
- Smart integration

In this Issue:

Continuous quality assessment

JU Reviews are an essential part in the project and they took place on a regular basis as annual reviews and intermediate reviews. They help to proof the project progress against the defined work plan. The presentations of exciting demonstrators and the informative overview presentations help to get a good insight into the research activities in the project - but not only that! The feedback and input given by the reviewers was always valuable and the fruitful discussion led to a better understanding on both sides. The reviewers and the project officer appreciated the response to the review recommendations much and the management of such a big project and the cooperation within the consortium was seen by the reviewers as excellent. The project partners always liked the constructive atmosphere at the review meetings.



Picture 1: Typical Review Agenda

What's happening in CRYSTAL? Tangible results until now

Use Cases: implementation of **prototypes** in all four domains are available and provide answers to the project's challenges.

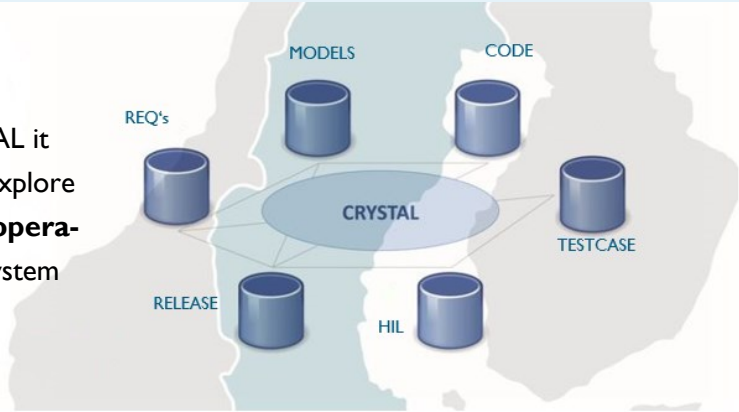
CRYSTAL is well connected with the OASIS-OSLC Member Section with representatives in the Steering Committee, contributors and observers of Working Groups.

An impressing number of **technical publications** are already available and counting. Go to the CRYSTAL homepage and find out what the scientific studies of the project say.

CRYSTAL **brought together** experts from industries (board members, CTOs, marketing directors, technical experts) and successfully promoted the developed technology.

Sustainability model for the IOS, RTP and Platform Builder SEE modeler have been defined.

Through CRYSTAL it was possible to explore **common interoperability** issues in System development.



The enhanced prototype for the **Platform Builder SEE modeler** has been built and is undergoing extensive tests.

Collaboration with **CP-Setis** to coordinate IOS-related activities, especially the formal standardization including **General Engineering Methods** and further extensions of the IOS.

Multiple tool vendors **support OSLC interfaces** out-of-the-box in the recent versions of their tools.

With the contributions of CRYSTAL, it was already possible to achieve tangible **standardization results**.

The **awareness of OSLC** as an open standard for life-cycle interoperability was dramatically increased by CRYSTAL.

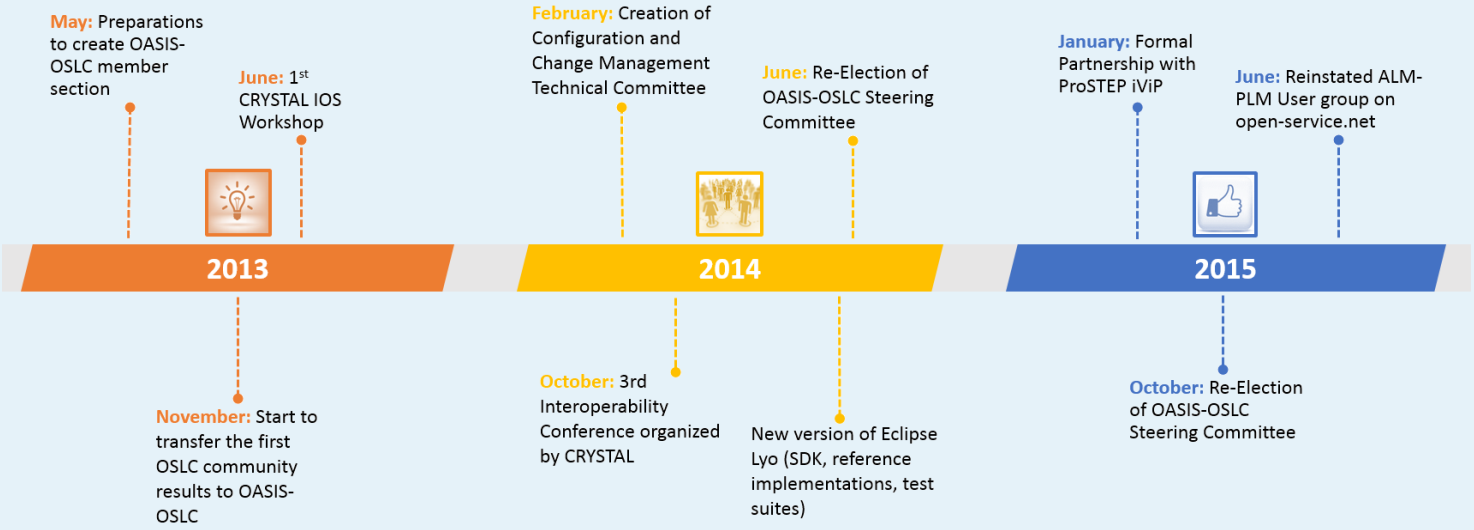
Public deliverables: To make collaboration efficient and easy, the consortium identified the project results that are essential for collaboration and made them publicly available, so that they can be shared easily.

CRYSTAL initiated OSLC-related Standardization Activities

Project-driven standardization activities

Prior to CRYSTAL, OSLC initiative was just an open community with a self-defined governance model created in 2008 by IBM and some major customers. At that time, OSLC was primary targeted towards development of IT applications (e.g., banking, insurance, large sales portals). Due to the influence of the strong community for embedded and safety critical systems, OSLC got more and more adopted in these areas, which is today the main, but not only focus of the community.

Even before the CRYSTAL project, some partners were already part of the community, based on their activities in predecessor projects. There were already plans to transform the community into a standardization organization, but at that time no standard existed. With the start of the project CRYSTAL, many activities have been started which were partially or completely motivated by the project and driven by CRYSTAL partners.



Picture 2: Timeline of OSLC-related standardization activities

During the course of the project, significant progress in OSLC specifications has been made based on the experiences during implementation of CRYSTAL use cases. One important step forward was the development of the OSLC-CCM specification which allows maintaining a federated configuration management across multiple systems which still can use their local CM concepts. Such a federated CM approach is essential in larger engineering environments and is required for many of the CRYSTAL use cases.

Today, OSLC is a widely accepted standard for Lifecycle Interoperability in Engineering and Software development environments under the governance rules of the well-recognized standardization organization OASIS. Many tool vendors have added OSLC support to their products and many end users are using OSLC to integrate commercial of the shelf tools with open source and home grown solutions in their development landscape.

Author: Rainer Ersch, Siemens AG and member in the OSLC Steering Group

Change and Configuration Management Update

Not the coolest topic around, but it turns up everywhere and is a must have for just about everyone involved in engineering.

It's needed to plan, work with and control the evolution of services, systems, products, software, hardware, documentation—the whole lot! Be it safety critical, deeply embedded, enterprise or a lean mobile app—all over the Internet of Things. How to keep my work aligned to that of colleagues, how to have a known base to work from, how to collaborate to contribute to releases and how to see what's in play and "what's where?" or "what works with what?". Of course processes are in place to pass audits and "prove" that we are compliant but behind the scenes the treadmills are often spinning like fury!

CRYSTAL General Engineering Method

gEM "Maintain Configuration":

Versioning of Artefacts

Configuring of Artefacts

Querying versions & configurations

Learning of changes

Within Crystal we identified "Maintain Configuration" as a set of re-usable and commonly occurring practices for day to day and occasional "higher ceremony" configuration management—practices around handling versions and configurations of any type of artefact.

But how to support this in a distributed collaborative approach to drive productivity?

Typically we've relied upon carefully keeping track ourselves, we've had dedicated configuration managers in larger projects, or a release manager to keep us safe and sane, we've used different configuration management approaches for different needs—with high ceremony change control for data going outside of engineering like bills of materials for supply or manufacturing or even the customer or software configuration management for parallel working with software or text based models or more typically spreadsheets or check lists for aligning across the disciplines. This becomes especially difficult when planning, working on or asking questions about a design variant, or, as we have seen with IoT projects, wide more disparate systems involving many contributors and different governance processes. Try to speed this work up and there is instant stress all around!

The good news is that more modeling & design tools gradually have been able to use well proven configuration management tools like Subversion, or GIT or IBM Clearcase; and due to experience of flexible agile development from the software world, this has allowed faster configuration control. In addition product lifecycle management tools have grown a wide range of interfaces for periodically storing domain information for the high-ceremony configuration management, such as from mechanical, electrical and electronic—often achieved by loading stored blobs in a controlled product or document structure.

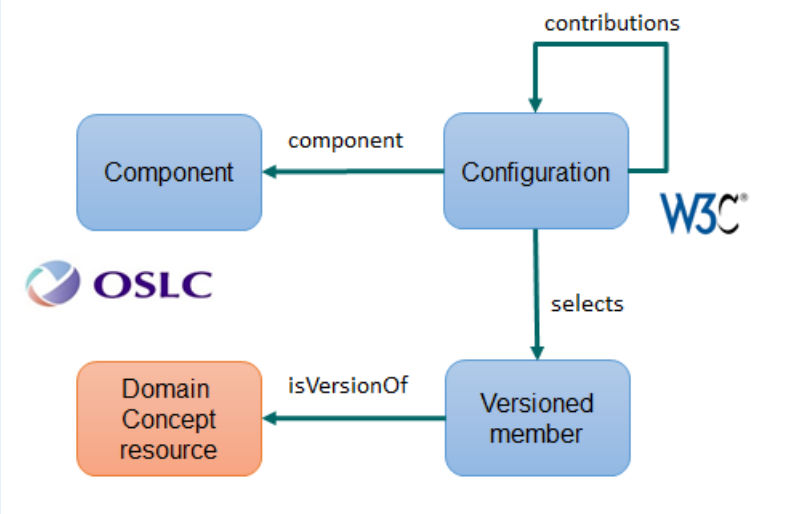
However these approaches require a lot of effort to align, be it, faster moving releases with slower high-ceremony, system level with cross-discipline, working sets across the disciplines, software aligned with almost anything else and so on—few teams have it automated—in general it's kept together by people, local check lists, local scripts and periodic sync-ups.

Configuration and Change Management (cont/d 2 of 3)

This diversity means its tough to react quickly and assemble exactly the set of data for a specific job, it also means that when there is a major release or problem that significant effort and time is needed to assemble, check and keep checking that what should be together, actually is together. Crystal is taking this challenge head on.

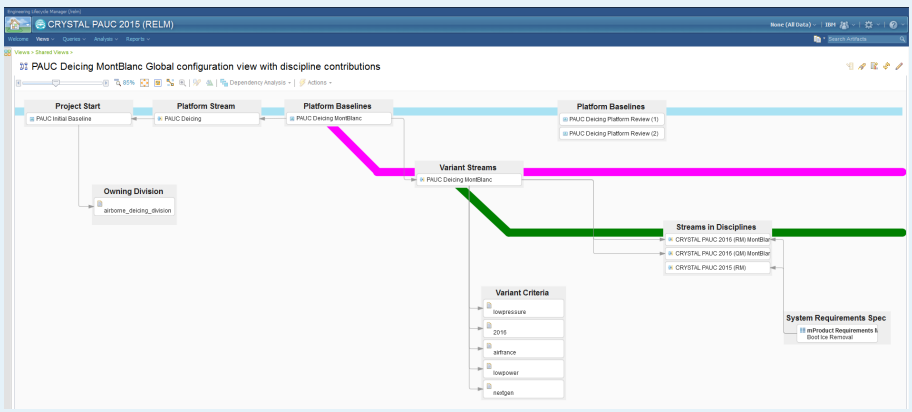
Now here's the good news, in the latest Crystal Inter-Operability Specification (IOS), Crystal partners have adopted the draft OASIS OSLC Configuration Management specification as the basis for improving Configuration Management interoperability in a domain neutral manner. This move allows configuration management to become a distributed collaborative capability and so teams can assemble and operate a System Engineering Environment that can break down the barriers to reduce manual handling, reduce back tracking and greatly reduce the need for release task forces that are often seen today. In addition, adding Change Logs via OSLC Tracked Resource Set reduces the overhead of change tracking and enables wholly new cross-discipline, cross-application views of artefact versions and configurations.

The main capabilities added to the Crystal IOS are: versioning of domain artefacts, artefact configuration through selection of versioned domain artefact resources, configuration and version genealogy, contributions of one configuration to another, e.g. for hierarchy & re-use, plus the ability to check which contributions are allowed into configurations. OSLC has adopted the W3 Linked Data Platform Container as the basis for the configuration resource: which should stand the IOS in good stead as that specification becomes more widely accepted. The OSLC specification for Configuration Management is roadmapped by OASIS for approval during 2016.



Picture 3: Summary of main resources

The Crystal Technical Board commissioned a workgroup on Configuration Management in the summer of 2014 and it has worked closely since that time and presented its results on multiple occasions including the Crystal EC progress reviews in June and December 2015.



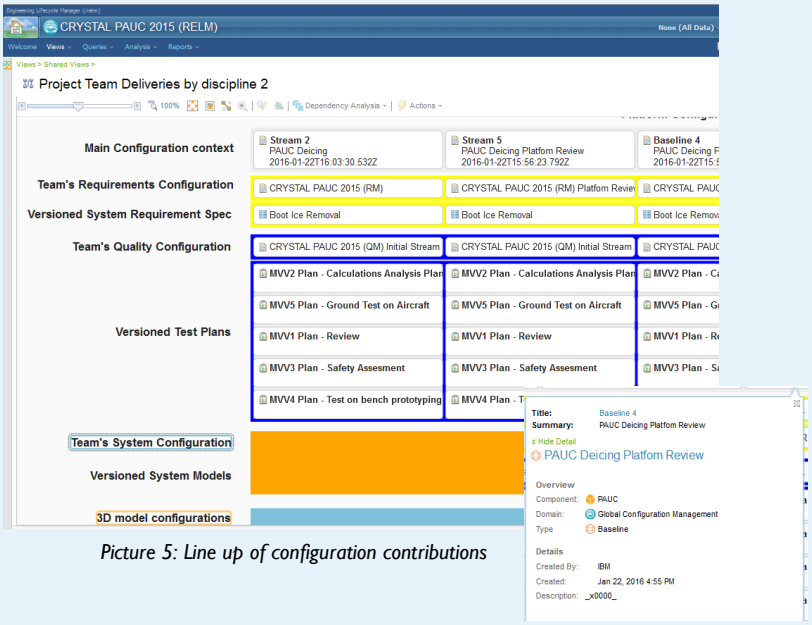
Picture 4: Showing the evolution of variants

A major highlight of the work has been to build up examples of real usage in the Public Aero Use Case (WP2.08) and another partner use case (WP2.11). In this example a team using the IBM Continuous Engineering solution can see how their working configurations for a de-icing system variant are derived from a platform configuration; fixed baselines and working streams are shown. Other views are tailored to which configuration is being worked so the team can see exactly which artefacts are in play and have relations to each other, such as for change impact analysis.

Configuration and Change Management (cont/d 3 of 3)

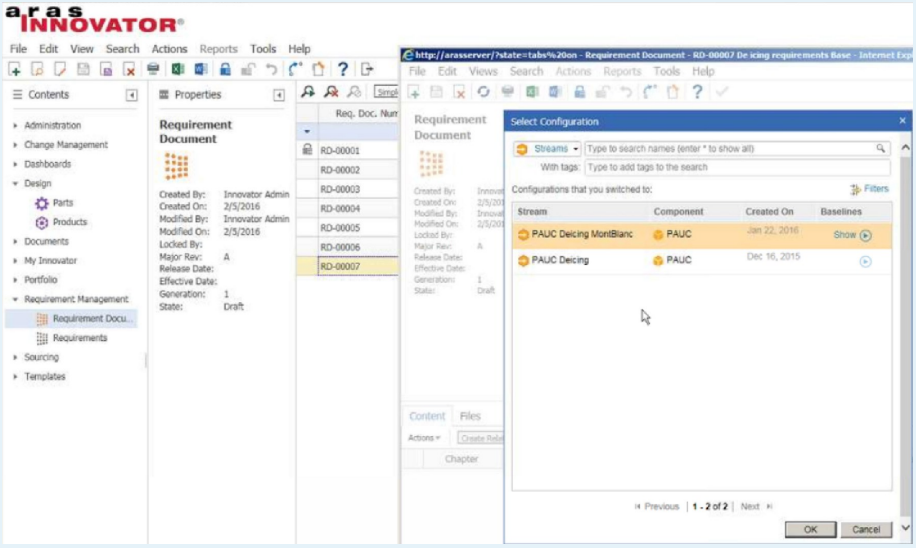
IBM and Airbus have demonstrated multiple examples using the IBM Continuous Engineering solution across Requirements Management, Quality Management, Design Management and more.

This view shows how a combination of IOS Configuration Management and Tracked Resource Set, using OSLC, allows live views of versions and configurations across different working streams and fixed baselines, or releases. From these views the system team can plan and engage directly with their work in context: managers can see who is responsible for what deliveries, right across the disciplines.



Picture 5: Line up of configuration contributions

As part of Crystal dissemination, and most recently, a prototype which involves a PLM user, say a Product Manager, in Aras Innovator, identifying, selecting and linking a Enterprise Change Request (ECR) to a version controlled requirement baseline configuration in the IBM Requirements Management world. From this use of linked data, the Product Manager automatically creates work items for System Engineering from the type of artefacts added to the ECR—to update a Requirements baseline or say a Part like a 3D valve model or a software release. In this way Configuration Management can be combined with Change Control, both enabled by OSLC within the Crystal IOS, to enable a team to tune their working practices to be just enough for agility and just enough to meet compliance.



Picture 6: Standardised user interface for remote access to a Requirements baseline

Here a Product Manager selects a remote System Requirements Specification released baseline using an OSLC Configuration consumer extension to the Aras Innovator PLM application. This "web link" for this versioned Spec can be stored in Aras and used to automatically create Work Items using the OSLC Change Management specification in the IBM Continuous Engineering solution.

Author: Gray Bachelor, CTO Office, IBM Watson Internet of Things with acknowledgement to the Crystal working group for Configuration Management—especially to Airbus and Aras Corporation.

Announcement

Hold the date!

Critical System Engineering Acceleration

- CRYSTAL Final Dissemination Event -

in conjunction with the

*5th Conference on Interoperability for Embedded Systems Development Environments**

When: June 15-16, 2016

Location: Madrid, Universidad Carlos III de Madrid,

Avd. de la Universidad 30, 28911, Leganés, Madrid, Spain

This event is organized in collaboration with the ARTEMIS projects CRYSTAL and CP-Setis. The goal of this event is to present achieved results in the project regarding sustainable interoperability for embedded systems development environments. 1.5 days full of highlights about the CRYSTAL approach in establishing and pushing 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.

The event includes:

- *Well-known **keynote speakers** will talk about inspirations in engineering in the future.*
- ***End Users and Tool vendors** will explain how CRYSTAL has influenced their business from management perspective.*
- *In **technical presentations** based on use cases you will get insight to the challenges and achievements in CRYSTAL.*
- ***Technical highlights** will be presented in the **exhibition area**. There you can freely walk around to see demos and posters around interoperability in embedded systems development environments.*
- ***Standardization Organizations** talk about experiences during the implementation of CRYSTAL use cases.*

Registration & Information

More information will follow soon! In the meantime, keep an eye on the

CRYSTAL website: http://www.crystal-artemis.eu/events/final-dissemination-event.html

*This event is promoted by ProSTEP iViP, OASIS-OSLC, eit Digital, CP-Setis, ARTEMIS-IA

Don't miss this!

CRYSTAL Highlights

November 2015: Workshop on Life-cycle Interoperability – OSLC in practice

Picture 7 : Interactive session

Many interested participants joined us on November 2nd for the workshop on Life-cycle Interoperability. Our goal was to propose and discuss ways to achieve sustainable interoperability for embedded systems development environments. A special focus was on Open Services for Lifecycle Collaboration (OSLC) and the challenge of putting this standard into practice. In impulse talks and interactive sessions, the main challenges regarding the OSLC approach could be pointed out. The Workshop was organized in collaboration with the ARTEMIS project CRYSTAL, CP-Setis and the Eclipse Foundation as part of EclipseCon Europe 2015.

October 2015: ProSTEP iViP – OASIS OSLC Conference

Seamless Lifecycle Integration - based on open standards in conjunction with 4th Interoperability Conference

One day full of information under the lead-theme ALM – PLM Interoperability. Impulses for enabling information flows between different engineering disciplines were given. In industry-relevant talks possibilities of OSLC were discussed and demonstrated. Experts and newcomers who were interested in solving systems engineering challenges in smart ways participated to this event. The keynote focused on the applicability of the integration of MBSE artefacts into an extended PLM Backbone as a cornerstone for the future development and traceability of interdisciplinary and communicating systems (Industrial Internet/ Industry 4.0) and was held by Prof. Martin Eigner from TU Kaiserslautern.

October 2015: ARTEMIS Technology Conference

The CRYSTAL project partner AleniaAermacchi participated to the ARTEMIS Technology Conference, which took place from 6-8 October 2015 in Turin. An approach for defining an efficient and interoperable System Engineering Environment (SEE), aimed to develop a complex system in accordance with the applicable System Development Life Cycle Process and ensuring product's quality was successfully presented.

September 2015: 3rd General Assembly Meeting

Picture 8 : One night out in Rome

The 3rd General Assembly meeting of the CRYSTAL project was successfully held from September 29 to 30, 2015 in Rome. After a short welcome, interesting presentations and fruitful discussions, the first day was rounded off by the social event at the "Osteria Brunetti" where the project partners had the chance to further discuss project related topics in a nice atmosphere. On the second day the sub project leaders and their teams presented their fascinating demonstrators during a guided tour in the open market place. Later on, the partners could freely walk around to get detailed information about the demonstrators. The second day was concluded with presentations of the roadmap to successfully reach the CRYSTAL project objectives, the Standardization and Sustainability Strategy.

June 2015: CRYSTAL 2nd Annual Review

The 2nd annual review meeting was held in Hamburg at the Airbus premises - a big thank you to Airbus for the hospitality! The review conditions were quite challenging for the reviewers: the project delivered a pile of 28 cm double-sided printed documents which corresponds to approx. 5,000 pages. But the reviewers don't let things get them down and went through all this paper work. The reviewers were rewarded with valuable contributions and excellent performance by all of the presenters at the review meeting! The final feedback of the project officer and the reviewers was quite good: the Use Cases show good advance and are well documented and a good cooperation in the consortium can be seen.

Major Milestones and Next Steps

Major Milestones

Results by M34

- Refined Use Cases and engineering methods available
- Interoperability specification (IOS) V2
- Defined engineering methods relying on the IOS available
- Extension and consolidation of the IOS based results
- Prototypes of integrated system engineering environments in the 4 domains (aerospace, automotive, health care & rail)
- Standardization activities

Outlook

- Final implementation of Technical Items
- Completion of RTP, IOS and Platform Builder
- Finalize the implementation of IOS adaptors and system engineering environments
- Assessment and Validation of project results
- Continue collaboration with other European initiatives to make the CRYSTAL IOS a sustainable result
- Final dissemination event of the project results

Events & Publications

Upcoming events

- April 13-14, 2016 , ARTEMIS Spring Event, Vienna (https://artemis-ia.eu/upcoming-events.html
- April 20-21,2016: ProSTEP iViP Symposium 2016, Stuttgart (http://www.prostep.org/)
- May 23-25, 2016, 9th, Symposium Virtuelles Fahrzeug, Graz, (http://www.gsvf.at/index.php/en/)
- June 15-16, 2016: CRYSTAL Final Dissemination Event in conjunction with the 5th Conference on Interoperability for Embedded Systems Development Environments, Madrid
- September 15-16, 2016: Final review meeting, Best

CRYSTAL publications

An impressing number of technical publications with good content have been produced. We are happy to share with you these publications on our homepage. Please go to the CRYSTAL homepage to download the documents or read them online. Enjoy reading!

http://www.crystal-artemis.eu/dissemination/publications.html

CRYSTAL public deliverables

A large number of important deliverables are made public on the homepage. Please go to the website to download the deliverables. Don't miss this!

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

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