ITEA 2

INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

Project Results

TIMMO-2-USE: getting more for less

More predictable development, less time to market

In the TIMMO-2-USE project the design of an advanced timing framework to complement and extend automotive open-system architecture (AUTOSAR) enables significantly improved automation for more predictable development cycles, thereby cutting development risks and time to market. The result is much increased reliability, safety, robustness and fault tolerance with better early quality control.

In the context of automotive industry innovation through software and electronics, the introduction of next-generation electronic architectures for road vehicles brings new challenges to automotive systems development. While the current AUTOSAR standard has been key to strengthening the supply chain significantly and achieving better quality and warranty at lower costs, it still does not cover all the relevant timing information required throughout the entire development process. Mastering different types of timing constraints and dynamic behaviour is crucial to designing network-based, real-time automotive systems. This 'mastery' was the focus of the TIMMO-2-USE project.

SIGNIFICANT AUTOMATION BOOST

Efficient exchange of timing information is necessary between different modelling and analysis tools and various roles in the overall tool and supply chain, e.g., between OEM and Tier-1 suppliers. A first step in this direction was undertaken by the ITEA 2 project Timing Model (TIMMO) with the development of the Timing Augmented Description Language TADL and the description of timing information on all abstraction levels by referencing discrete events in EAST-ADL and AUTOSAR models. TIMMO-2-USE addressed significantly increased automation for more predictable development cycles in order to substantially reduce development risks and time-to-market. To increase reliability, safety, robustness, fault tolerance through a much higher degree of design automation, TIMMO-2-USE took in hand the specification, transition and exchange of relevant timing information throughout different steps of the AUTOSAR and EAST-ADL-based development process and tool chain.

Leading European automotive suppliers and tool vendors were involved in TIMMO-2-USE and to guarantee the acceptance of project results by automotive manufacturers,

TIMMO-2-USE
(ITEA 2 - 09033)

Partners

AbsInt Angewandte Informatik GmbH
Arcticus Systems AB
Chalmers University of Technology
Continental Automotive GmbH
Delphi France SAS
dSPACE GmbH
INCHRON GmbH
INRIA
Mälardalen University
Rapita Systems Ltd
Real-time at Work
Robert Bosch GmbH
Symtavision GmbH
Technical University of Braunschweig
Time Critical Networks AB
University of Paderborn/C-LAB
Volvo Technology AB

Countries involved

France
Germany
Sweden
United Kingdom

Project start

October 2010

Project end

September 2012

Contact

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TIMMO-2-USE established an OEM advisory board for early feedback and transfer of project results during the course of the project. The participation of leading automotive organisations not only guaranteed a high level of automotive engineering expertise but also excellent exploitation of the project's results. As many of the TIMMO-2-USE partners are AUTOSAR members, the project results will be deployed in the respective AUTOSAR working groups. In addition, tight interaction with the EAST-ADL community ensures smooth deployment into the EAST-ADL standard. This gives TIMMO-2-USE an excellent internationally competitive position.

FOUR CORNERSTONES

The timing framework developed in the project consists of four cornerstones. The first is use cases that define industrially applicable timing problems that have been addressed in the project. They serve as a harmonising factor for the other cornerstones. The second cornerstone centres on the development of a methodology that gives advice on how to approach the timing problems formulated by the use cases. The methodology consists of a set of independent processes (with tasks and work products), each dedicated to a specific use case. However, in order to keep them harmonised, they all share the same structure – called Generic Methodology Pattern (GMP). In this way, users are guided in combining the use case processes and to adopt them in their own organisations. The third cornerstone concerns tools and algorithms for management and analysis of timing information management and conversions in the development process as suggested by the methodology. The fourth cornerstone is an advanced timing modelling language, called TADL2, in which data can be transported between tools in a standard and unambiguous way, and is fully compliant and aligned with the AUTOSAR and EAST-ADL standards. The tools and algorithms and the language moreover relate to the methodology via tool mentors and TADL2 guides in order to create a harmonised whole. Tool mentors are attached to tasks in the methodology suggesting appropriate tools to perform the task. TADL2 guides provide a hint on how to use TADL2 to describe the necessary input and output work products of the tasks.

BENEFITS

The impact that such results have generated include shortened, predictable development cycles, reduced time-to-market through massive reuse, more efficient communication and collaboration between different parties involved in development, and less development risk with improved quality.
In the near future, the TIMMO-2-USE results will be applied during the development of time-critical systems while the long-term strategy will see continuous standardisation through AUTOSAR and EAST-ADL, including adequate tool support. Also, as new releases of AUTOSAR are adopted in the development process TIMMO-2-USE results will be naturally exploited. Furthermore, TIMMO-2-USE results will enhance and adapt real-time modelling and verification while from an academic perspective, project results will be exploited in the form of scientific publications, and increased tool support for experiments with novel analysis algorithms.

Major project outcomes

DISSEMINATION

- 1 Brochure, 2 Leaflets, 7 Newsletters
- 2 Press Releases, 1 Press article, 47 Conference/Workshop publications
- 2 Open workshops
- 3 Lectures, 13 Conference talks
- Special Session, DATE 2012, Dresden Germany
- 6 Exhibitions
- 3 public deliverables:
  - Use cases, requirements, State-of-the-art
  - Language specification
  - Methodology description

STANDARDISATION

- Major influence on the timing extension of next versions of AUTOSAR
- Possible influence on the next versions of the methodology of AUTOSAR
- Major influence on the timing extension of next versions of EAST-ADL
- Major influence on the next versions of the methodology of EAST-ADL

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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.

EUREKA

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