

Project Profile

Modelica – AUTOSAR Interoperability to support Vehicle Functional Mock-up

Digital mock-up (DMU) has been the automotive industry best practice that for many years has enabled many engineers from different disciplines to collaborate in the virtual world to define future real products better. However, until now this has been static – i.e. it did not take much account of product behaviour. In particular, the dynamic behaviour of embedded systems and software was neither managed nor simulated in DMU. The purpose of MODELISAR is to introduce functional mock-up (FMU), a next generation of methods, standards and tools to support collaborative design, simulation and test of systems and embedded software.

The objectives of MODELISAR are threefold, to:

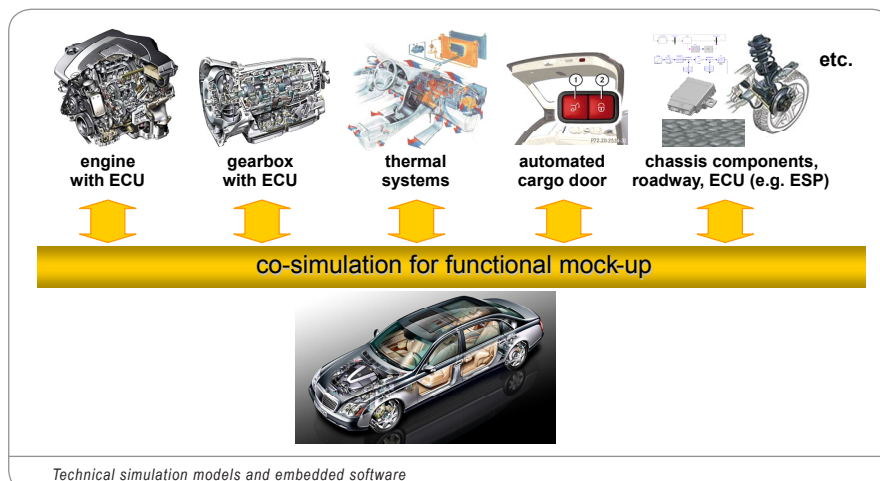
1. Enable concurrent design of embedded systems and software, leveraging state-of-the-art technologies:
 - The open Modelica language for component-oriented systems modelling and simulation; and
 - The AUTOSAR standard for automotive embedded software.
2. Define advanced runtime interoperability interfaces to enable open co-simulation between virtual product models, especially in Modelica, and the executable embedded software, with various configurations.
3. Deliver a smooth, traceable and

integrated process for embedded systems and software across the product life, based on Dassault Systèmes V6 Product Life Management (PLM).

BENEFITS TO THE AUTOMOTIVE INDUSTRY

MODELISAR will deliver a series of benefits to the automotive Industry:

- It will become possible to design the embedded systems and software concurrently in context for the vehicle functional mock-up. This will:
 - Allow early detection of defects in systems and software, which will dramatically reduce the costs of fixing problems and cut the time to market, and
 - Enable collaborative innovation between systems and software teams, instead of the traditional 'throw over the wall' process;
- Test will be carried very early on the functional mock-up, instead very late on physical prototypes. This means:
 - Cycles will be reduced, and
 - Huge prototype testing costs will be saved; and
- The workflow between Modelica-based systems modelling and AUTOSAR-based embedded software generation will be seamlessly integrated and controlled. As a result:



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Partners

ARMINES
 Arsenal Research
 ATB
 AVL
 Berata
 Daimler
 Dassault Systèmes
 David
 DLR
 Dynasim
 Extessy
 FhG First, IIS EAS, SCAI
 Geensys
 Halle University
 IFP
 Imagine
 INSPIRE
 INTEC
 ITI
 LMS International
 QTronic
 Schneider Electric
 Trialog
 Triphase
 TWT
 Verhaert
 Volkswagen
 Volvo

Countries involved

Austria
 Belgium
 France
 Germany
 Sweden

Project start

July 2008

Project end

June 2011

Contact

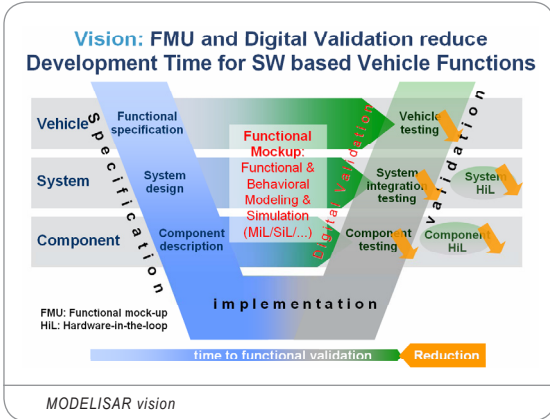
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- The overall process will become clear and fully traceable, making it possible to manage product liability, and
- AUTOSAR data will be configured together with the systems and mechanical configurations, making it possible to foresee the impact of both variety and variability on systems and software management.

DEVELOPING BREAKTHROUGH TECHNOLOGIES

MODELISAR will develop the following breakthrough technologies:

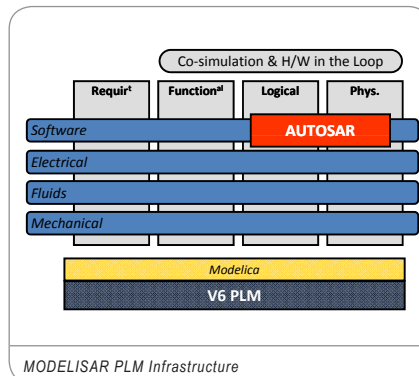
- **At build time:** The Modelica language and compilers will evolve to provide better support for AUTOSAR – for example, support will be provided for the AUTOSAR virtual functional bus;
- **At run time:** A new interface standard – the functional mock-up interface (FMI) – will be developed to ensure run time co-simulation interoperability across all simulation tools contributing to the functional mock-up;
- **At test time:** Testing methodologies will be adapted to the new integrated process; and
- **Throughout the life cycle:** Data will be integrated into the V6 PLM database, and maintained consistently and traceably.

MODELISAR will deliver the following:

- The open FMI standard specification and the specification of the necessary evolutions of Modelica;
- The adaptation of the partners' Modelica & AUTOSAR compilers to FMI;

- Adaptation of the partners' tools for modelling, simulation and testing to FMI; and
- The proof of concept of MODELISAR functional mock-up on industrial automotive scenarios such as:
 - Power-lift gate;
 - Cabriolet top;
 - Engine gearbox;
 - Mechatronic shifting;
 - Electronic drive;
 - Chassis control;
 - Combustion and ignition;
 - Climate comfort;
 - Electronics and cardboard;
 - Energy management.

The overall process will be integrated into the ENOVIA V6 PLM database and processes. The overall workflow will be demonstrated.



SINGLE OPEN PLM ENVIRONMENT FOR SYSTEMS AND EMBEDDED SOFTWARE CO-SIMULATION

MODELISAR will make it possible to master the complete design and validation cycle for systems and software in a single open environment. The integration of the state-of-the-art tools for Modelica, AUTOSAR and Dassault Systèmes V6 PLM technology will provide a strong competitive advantage to European MODELISAR early adopters.

Not only will this dramatically simplify the automotive design process, but it will also enable rapid design iterations through multiple hybrid simulations on the functional mock-up, thus leading to better vehicles in a shorter time and without the cost of over-expensive tests.

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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.



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