



PROJECT PROFILE

Optimising HW-SW co-design flows

to speed innovative electronics product development

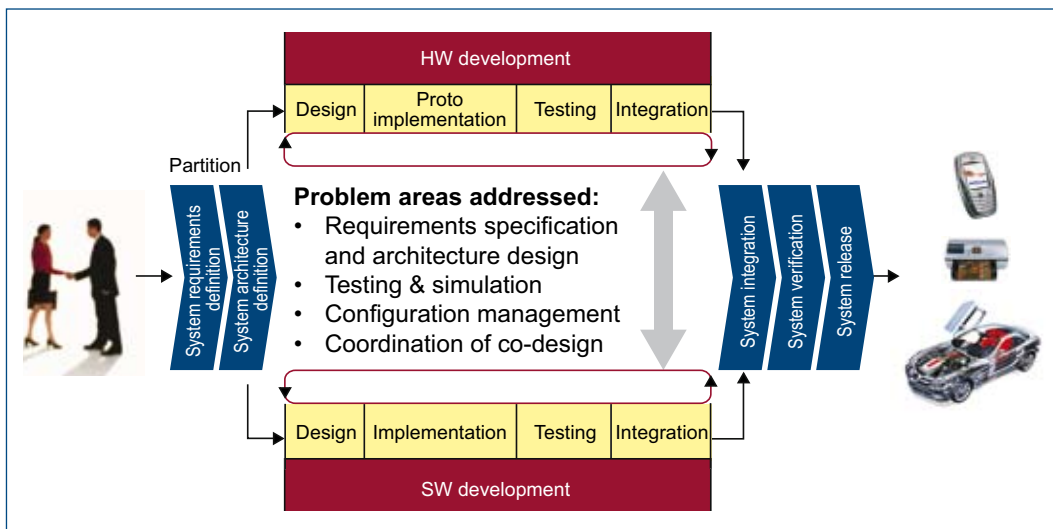
Twins addresses co-design – hardware and software integration – problems in electronics product development. It is tackling several areas of co-design: requirement engineering, architectural design, life cycle and configuration management and testing. These will jointly lead to the Twins platform for design integration and validation. Taking an interdisciplinary approach and creating co-design system flow, techniques and tools will improve complex distributed and real-time embedded systems in the automotive, aerospace, copier and printer, power supply, telecommunications and electronics industries. The resulting methodologies will enable faster and lower cost development of highly innovative components.

With the rapid growth of electronics products in everyday life, development of the design flow for co-design becomes more and more important. Although different

disciplines are closely linked in the end products, the development of electronics components is often a sequence of mono-disciplinary processes. Typically, the mechanical part is designed first, then the hardware infrastructure fixed and, finally, the embedded software developed. This way of developing electronics products creates problems above all for software engineers.

Tough competition to European electronics product manufacturers from North America and Asia has led to demanding lead-time requirements. Therefore, a tool-supported seamless co-design flow for both hardware and software must be established to improve for example system verification and validation.

Designing complex products
The general goal of Twins is to design, implement and trial better HW/SW engineering and management methods, techniques and



TWINS (ITEA 05004)

Partners

- Audi/AEV
- BARCO
- CBT
- CEA List
- Cetic
- Espotel
- Fraunhofer IIS
- Innovalia Association
- ITWM
- LaQuSo - TU Eindhoven
- LogicaCMG
- Metso
- NBG Industrial Automation
- Neopost Technologies
- Nokia
- Océ Technologies
- OTB
- pure Systems
- Q-Star
- Rhea System
- Scaleo chip
- Schneider-Electric
- Siemens VDO
- Sioux
- SQS
- VTT
- ZIV P+C

Countries involved

- Belgium
- Finland
- France
- Germany
- The Netherlands
- Spain

Project start

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Project end

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Contact

Project Leader:
Rini van Solingen
LogicaCMG, the Netherlands

Email:

rini.van.solingen@
logicacmg.com



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tools by improving co-specification and allocation requirements, co-optimising HW/SW architectures, improving life-cycle and configuration management of evolving products and components, and adapting techniques for automatic generation of tests for multi-disciplinary products.

To achieve this, Twins is addressing four areas of co-design:

1. **Requirements engineering**
– deriving needs from text documents and translating them into formal requirements;
2. **Software/hardware architecture design and co-optimisation** using simulation and emulation techniques;
3. **Life-cycle and configuration management** of evolving products and hardware or software components; and
4. **Improving testing of multi-disciplinary products** by providing a system able to run tests based on HW/SW simulation to detect problems early in the life cycle.

Results of Twins will benefit both electronic manufacturers looking to improve co-design processes for the hardware and embedded software in their products, and quality assurance providers by increasing and improving verification and validation services to embedded software manufacturers, supported by solutions developed with the latest technologies.

Improving competitiveness

The Twins project should help improve the competitiveness of European industry by providing a platform to design new, higher quality electronic components with a growing number of innovative and individual functions faster and more effectively, reducing the number of redesign loops and providing techniques for testing and verification of the whole HW/SW system.

The resulting platform will support simulation at different levels of development: animation of requirements and design models,

driven by test cases or piloted by the user; joint simulation of software and hardware components to cycle-level accuracy in order to test satisfaction of functional and non-functional requirements; and software simulation combined with hardware emulation for speed.

This will involve crossing many technical barriers, including:

- Common modelling of both hardware and software components, encouraging a dialogue between hardware and software experts and enabling irreversible design decisions to be delayed as long as possible;
- Support for the formalisation of both hardware and software requirements, and for the derivation of design models respecting requirements;
- Integration of tools for model animation, hardware and software simulation/emulation and automatic test generation to enable early detection of design errors and avoid slow and expensive manual crafting of test cases; and
- Definition of reusable hardware components facilitated by common modelling of both software and hardware.

ITEA Office

Eindhoven University of
Technology Campus
Laplace Building 0.04
PO box 513
5600 MB Eindhoven
The Netherlands
Tel : +31 40 247 5590
Fax : +31 40 247 5595
Email : itea2@itea2.org
Web : www.itea2.org

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