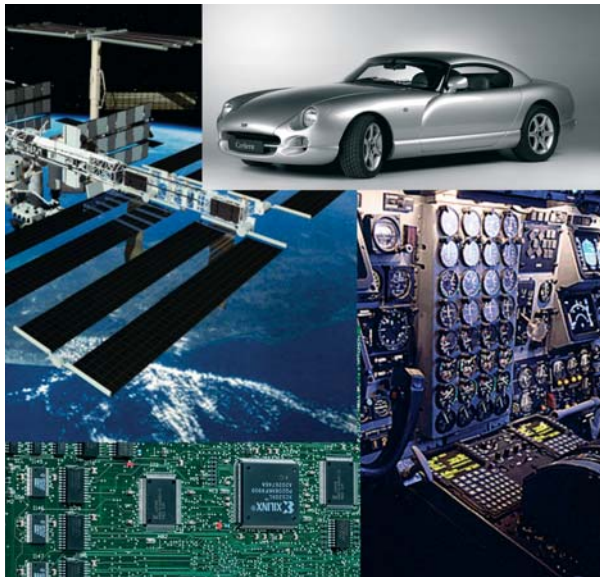




## PROJECT RESULTS

# Software Development Process

### for Real-Time Embedded Software Systems



***The diversity of programming languages and methodologies in use today is a major problem for those developing embedded real-time software. The current lack of development standards leads to incompatible strategies, making re-use and co-operation extremely difficult.***

#### **A common methodology**

It was essential to define a common methodology with adequate tool support that could widely be accepted. The DESS project brought together knowledge and expertise from a very large group of companies in different industry sectors to develop a flexible generic methodology for embedded systems. DESS enhances the quality of products through the re-use of tested, certified components, and thus significantly reduces development and recurring costs.

#### **Faster software design**

Over five billion processors and many millions of sophisticated

software-based products come onto the market each year. More reliable, faster software design methods are clearly needed with European companies currently dependent on US technologies. It is generally expected that the embedded real-time market will consolidate around a few main players.

DESS provides instruments that bring the benefits of modern Object-Oriented (OO) and Component Based Development (CBD) strategies to the embedded world with its unique constraints of limited time and memory resources. Its methodology helps developers build innovative architectures that are extendable, evolvable and re-usable.

#### **Future standard?**

DESS has defined an innovative object-oriented component-based software development methodology for embedded real-time systems, covering requirements from a broad range of domains and incorporating state-of-the-art principles, techniques, and tools, making it a strong candidate for a future standard.

#### **Raising productivity**

DESS makes it possible to handle complexity and raise productivity, while ensuring compatibility with existing approaches. It combines best practices from the classical V-model development cycle, the Unified Process (UP) approach and emerging incremental development methodologies, introducing three workflow approaches that focus on System Realization, Validation & Verification and Requirements Management. Extensions to the Unified Modelling Language (UML) are proposed, providing a better

## DESS (ITEA 99012)

#### **Partners**

- Barco
- CEFRIEL
- CiaoLAB Technologies
- DaimlerChrysler
- Estérel Technologies
- France Télécom
- Fraunhofer FIRST
- INRIA Rennes
- INRIA Sophia Antipolis
- K.U. Leuven
- Philips Semiconductors
- Siemens C-LAB
- Thales
- Thomson multimedia
- TU Eindhoven
- TXT
- UNIS
- Universität Magdeburg
- Universität Paderborn C-LAB

#### **Countries involved**

- Belgium
- Czech Republic
- France
- Germany
- Italy
- The Netherlands

#### **Start of the project**

October 1999

#### **End of the project**

December 2001



## PROJECT RESULTS



notational support for Component Modelling and Resource Constraint Modelling. UML extensions allow the formal specification of timing constraints across component boundaries.

### Quality of Service

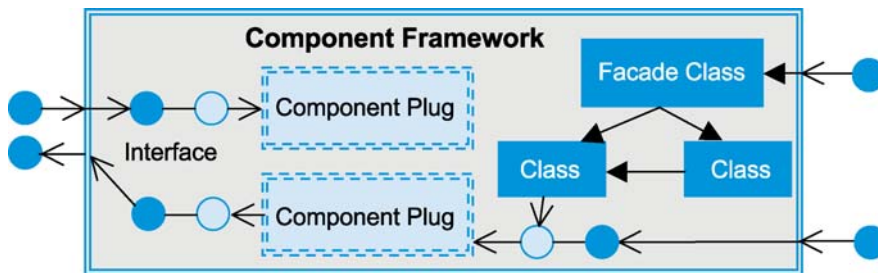
A standard for Component Specification and Documentation has been defined, making it possible to specify Quality of Service (QoS) aspects. Component frameworks and hierarchical component and connector decomposition are at the heart

processes that can be tailored to the specific context and needs of a company, division, system domain, project, etc.

### Main applications

DESS results have been directly integrated and exploited by several project partners:

- Estérel Technologies integrated the fast C compiler developed within DESS by France Télécom R&D in the latest Estérel Studio Release. The model checker developed within DESS has opened the way to a new family of development tools that make it possible to verify a system's timing behaviour using the code itself.
- Thanks to DESS results, UNIS can now provide unparalleled integration of product features into the embedded market, through Processor Expert.
- Companies such as Siemens, DaimlerChrysler and Barco are promoting the DESS results internally; broad acceptance of the methodology should influence tool vendors to adopt the extensions proposed in the project.



of the DESS methodology. There is a strong focus on tool support and code generators are available to support fast design-to-code mappings. The definition of a CBD process on top of the DESS methodology adds time and order dependency between the activities identified. It defines which workflow must perform which activity and generate which artefact at what time. The DESS methodology provides a methodological framework for defining CBD

Dissemination was very effective: about 25 international papers have been published, and project results presented at over 15 international conferences and workshops.

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ITEA was established in 1999 as a EUREKA strategic cluster programme. We support coordinated national funding submissions, providing the link between those who provide finance, technology and software engineering. We issue annual Calls for Projects, evaluate projects, and help bring research partners together. We are a prominent player in European software development with more than 5,000 person-years of R&D invested in the programme so far, and another 10,000 anticipated over the next five years.

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