SYSMODEL

System Level Modelling Environment for SMEs

ARTEMIS

COMPLETED

EXECUTIVE *summary*

The SYSMODEL project aims at providing SMEs with system level modeling tools for the design and implementation of time and power critical, heterogeneous embedded systems. The vision is to allow SMEs to build cost-efficient ambient intelligence systems with optimal performance, high confidence, reduced time to market and faster deployment.

CONTRIBUTION *to SRA*

SYSMODEL will raise the level of abstraction for SMEs designing embedded systems by developing system-level modelling techniques. Modeling plays a central role in systems engineering. The use of models can profitably replace experimentation on actual systems with incomparable advantages such as:

> Enhanced modifiability of the model and its parameters
> Ease of construction through the integration of the models of heterogeneous components
> Generality by using genericity, abstraction and behavioural non-determinism
> Enhanced observability and controllability
> Possibility of analysis and predictability by the application of formal methods.

The general availability of the modeling methodologies will be facilitated by the open source and/or free software approach, where all tools will be made available free of charge.

MARKET INNOVATION *& impact*

SYSMODEL's potential impact is high since even a small improvement in the methodology used for embedded systems design by SMEs could result in a considerable improvement in their competitiveness and effectiveness.

The deliverables offered to the SMEs from SYSMODEL include:

> A modelling methodology described in a 'How to do system level performance modelling' manual
> Open source point tool prototypes for performance modeling and analysis
> A number of SME verification case studies that illustrate this methodology
> A comprehensive training programme taking the SMEs from awareness level through in-depth training to on-line tutorials.

The SystemC based modelling framework will define rules for expressing four different Models of Computation (MoC) and for composing these MoCs into a system with a well defined behaviour.

RELEVANCE & CONTRIBUTIONS *to Call 2008 Objectives*

The SYSMODEL proposal addresses ARTEMIS Sub-Programme 5 on Computing Environments for Embedded Systems, more specifically it addresses needs described in the workprogramme:

> Establishment of a common multi-domain architecture, APIs and design tool platform for advanced multi-core hardware and middleware solutions.
> Establishment of heterogeneous multi-domain architectures and integratable and interoperable tool suites to support massive real-time data-processing.
> Definition of a new programming model & new types of API to support platform-independent composition.
> Definition of performance & resource management models, meta-data and system layers in order to achieve global performance and resource optimisation and management.
> Development of design tools and associated runtime support to enable composability, predictability, parallelisation, aggregation and management of systems according to a service driven or data-centric approach, performance and energy modelling and analysis, verification, scalability.

Therefore the objective of the SYSMODEL project is to develop supportive modelling tools for the design and integration of hardware/software systems embedded in intelligent devices.

The focus is on the development of modelling concepts, methods and tools that master a system's complexity by allowing cost-efficient mapping of applications and product variants onto an embedded platform while respecting constraints in terms of resources (time, energy, memory, etc.), safety, security and quality of service. The initial focus is on applications mastered by the SMEs directly involved in the project, i.e. RFID, wireless systems, telecom, VoIP and audiology applications. It is expected that high-level system modelling tools could increase the design productivity in these SMEs by 30%.

R&D INNOVATION *and technical excellence*

Though SYSMODEL aims to develop general system-level models, the actual development will be based on real verification cases taken from the core group of SMEs. This will ensure that focus is on actual SME needs and the pilots will serve as test cases for validating the methodology developed. SYSMODEL will be organised in four phases:

> Phase I: The project starts by classifying of the systems produced by the SMEs. This selection is based on their technological and scientific challenges as well as how representative they are for the SMEs.
> Phase II: The emphasis in this phase is to develop the system-level models and a supporting modelling framework. The important issues are to select and integrate different modelling paradigms such that they are based on well founded theories and thus allow for both analytical and simulation based system analysis. Furthermore, a library of model components which supports the cases will be developed.
> Phase III: Verification of the system-level models by means of verification cases that are carefully selected among the core group of SMEs in order to represent a wide variety of modelling problems. The cases will include applications such as RFID, wireless systems, VoIP and audiology.
> Phase IV: Following the modelling activity a dedicated training programme will be developed and implemented in order to disseminate the system-level model, the methodology and the supporting tools to a large community of SMEs.

PROJECT *partners*