CONCERTO

Guaranteed Component Assembly with Round Trip Analysis for Energy Efficient High-integrity Multicore Systems

ARTEMIS

EXECUTIVE *summary*

CONCERTO aims to improve Model Driven Engineering practices and technologies to better address safety, reliability, performance, energy usage and other extra-functional concerns for embedded applications while guaranteeing correctness as component based systems are assembled.

CONTRIBUTION *to SRA*

CONCERTO addresses the development of safety-relevant high-integrity real-time embedded Industrial Systems in the context of the Automotive, Aerospace, Telecom, Petroleum and Medical domains. It contributes to the SRA by:

> Providing reference designs and architecture through the definition of a reference multi-domain architectural framework that enables a compositional approach to system construction with emphasis on extra-functional (real-time, dependability, and energy) properties for high performance multi-core platforms with monitoring at run-time.

> Establishing an integrated system design methodology and chains of tools by providing a modelling framework developed that supports a multi-view, hierarchical design space, with incremental development and early verification of extra-functional properties.

> Developing computing platforms for embedded systems that increase cross-domain reuse and interoperation through platform-independent compositional development of highly concurrent, complex multi-core systems.

MARKET INNOVATION *& impact*

CONCERTO takes on the challenge of mastering the foreseeable increase in embedded systems complexity by elevating the level of abstraction at which applications are designed and by automating the feasibility analyses needed for verification. CONCERTO will provide these capabilities for both single and multicore platforms enabling European software developers to harness the power of newer more advanced platforms without substantial increases in system design complexity. European technology providers will benefit from reduced time to market despite the increasing contribution of embedded systems and software and their increasing size and complexity.

Advanced hardware modelling capabilities to capture the full potential of new multicore platforms, while providing tools to ensure high quality and highly reliable systems will increase the quality and reliability of European embedded systems based products and services while providing new and innovative functionalities for the user.

RELEVANCE & CONTRIBUTIONS *to Call Objectives*

CONCERTO contributes directly to the following specific ARTEMIS Call 2012 objectives:

> Reducing the cost of the system design – through model driven, iterative development with capabilities for early verification, automated back propagation of verification results to the user model, and capabilities for automated code generation

> Achieving reduction in development cycles – especially in sectors requiring qualification or certification – using a model driven compositional approach with early V&V, back propagation and 100% automated code compresses

> Managing a complexity increase in embedded systems while achieving an overall reduction in effort – providing a multi-view, hierarchical design space, with incremental development, early V&V and automated transformations to platform specific concerns and to code

> Reducing the effort and time required for re-validation and recertification of systems after making changes – using a compositional approach and improved V&V automations along with monitoring and back propagation

> Achieving cross-sectorial reusability of embedded systems architecture platforms – through the use of standards, compositional guarantees, and automated transformations targeting domain specific concerns and platforms.
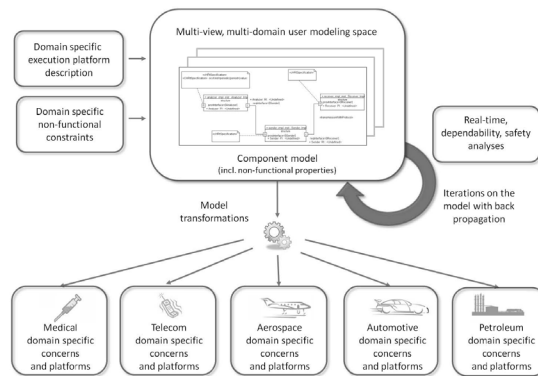
R&D INNOVATION *and technical excellence*

The CONCERTO framework that will be developed in the project will integrate:

> Correctness-by-construction for multicore systems with innovative model-to-code transformation techniques targeted at their special characteristics.

> A multi-view, hierarchical cross-domain design space sufficiently rich to enable a compositional approach to the next generation of complex, heterogeneous platform architectures.

> Support for iterative and incremental development of multicore systems through simulation and early model-based analysis, with fully automated back propagation of results to the user model.

> Hardware modelling facilities equipped to cope with the new generation of advanced, multicore platforms.

> Advances in run-time monitoring of mission- and operation-critical non-functional properties such as energy consumption on partitioned and multicore processor architectures.

The applicability of the CONCERTO solutions to multiple industrial domains (including Aerospace, Telecoms, Automotive, Petroleum and Medical) will be ensured through the elaboration of representative industrial use cases. CONCERTO builds on the previous CHESS project (www.chess-project.org) results from the ARTEMIS programme, as well as results of several other projects.

PROJECT *partners*

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www.artemis.eu
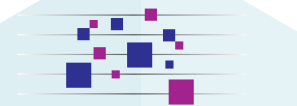
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WEBSITE
www.concerto-project.org

START
May 2013

DURATION
36 months

TOTAL INVESTMENT
9,65 M€

PARTICIPATING ORGANISATIONS
15

NUMBER OF COUNTRIES
8