ARTEMIS Call 2008 Project
100022

CHESS

Composition with Guarantees for High-integrity Embedded Software Components Assembly

EXECUTIVE *summary*

The CHESS project seeks to improve model-driven engineering practices and technologies to better address safety, reliability, performance, robustness and other extra-functional concerns while guaranteeing correctness of component development and composition. System development costs will be reduced through extensive use of provable automation and model transformation engines specifically for high-integrity applications in the railway, space and telecommunications domains, and through the identification of feasible solutions to complex system challenges earlier in the development process.

CONTRIBUTION *to SRA*

Project results will help reduce fatalities and injuries within the EU by building cost-efficient processes and methods that better support the development and operation of safety-enabling embedded systems. New modelling tools and methods will enable more complex avionics, communications and transportation systems to be developed with built-in assurances of safety, reliability and robustness. Use of new compositional techniques will allow components to be assembled and reconfigured while still guaranteeing their safety, performance and reliability, which will shorten time to market for new products as well as reduce the costs of development since existing sub-components can be more easily reused and re-integrated into new products.

MARKET INNOVATION *& impact*

CHESS technologies will reduce the system development costs of high-integrity embedded systems for railways, space and telecommunications, enabling a new generation of more complex systems to be developed that are safe and reliable yet cheaper to evolve and thereby address the changing needs of citizens and industry. New opportunities for European industries will appear as leadership in the emerging market for flexible, yet high-integrity software components is made possible through industrial exploitation of CHESS technologies. European embedded systems developers will acquire new world class skills in the handling of extra-functional properties such as safety, security and dependability for critical real-time software systems.

RELEVANCE & CONTRIBUTIONS *to Call 2008 Objectives*

CHESS addresses two key industrial priorities of providing reference designs and architectures, and also new design methods and tools. It directly responds to the challenge of reducing the system development cost through the extensive use of provable automation and model transformation engines, specifically intended for the high-integrity application domain. These new CHESS technologies will directly reduce the cost of system design along with the number of development cycles required to deliver new products to market.

The project takes on the challenge of mastering the foreseeable

increases in system complexity by elevating the level of abstraction in the user model space and by automating the feasibility analysis and feedback from the solution space. This will specifically assist organisations in managing increases in complexity.

CHESS contributes to the reduction in the effort and time required for revalidation and re-certification after changes are made by relying on a suite of formally proven and property-preserving transformations.

R&D INNOVATION *and technical excellence*

The CHESS project aims to capture extra-functional concerns and extend model-driven engineering industrial practices and technology approaches to specifically address the architectural structure, the interactions and the behaviour of system components while guaranteeing their correctness and the level of service at run time. New modelling languages capable of handling extra-functional properties for real-time embedded systems will be developed and validated by industrial organisations from the railways, space and telecommunications domain.

New development tools providing more efficient evaluation of the extra-functional properties of embedded systems components will support the verification of extra-functional properties of components at the abstract model level with extra-functional requirements mapped onto the architectural model, attached to components, and preserved at run time.

CHESS addresses the challenges of property-preserving component assembly in real-time and dependable embedded systems. It supports the description, verification and preservation of extra-functional properties of software components and will provide fundamental improvements in the software quality of EU's high-integrity real-time embedded systems.

PROJECT *partners*

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CHESS

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START
February 2009

DURATION
36 months

TOTAL INVESTMENT
€16.1 M

PARTICIPATING ORGANISATIONS
19

NUMBER OF COUNTRIES
5