



# VARIES

VARiability In safety-critical Embedded Systems



## EXECUTIVE summary

VARIES helps embedded systems (ES) builders to *unleash the full potential of variability* in safety-critical ES by (i) enabling companies to make *informed decisions on variability use*; (ii) providing *effective variability architectures and approaches*; and (iii) offering *consistent, integrated and continuous variability management* over the entire product life cycle.

## CONTRIBUTION to SRA

VARIES contributes to the following quantifiable SRA targets (2008 baseline, 2016 target) to:

- > reduce the cost of the system design by 15%
- > achieve 15% reduction in development cycles, especially in sectors requiring qualification or certification
- > manage a complexity increase of 25% with 10% reduction in effort
- > reduce the effort and time required for re-validation and recertification of systems by 15%

In addition, VARIES will contribute to the following SRA targets to:

- > achieve cross-sectoral reusability of ES devices and architecture
- > integrate a chain of European-sourced tools, based on ARTEMIS results, to support ES development
- > create a Centre of Innovation Excellence (CoIE) on variability management
- > develop major educational programmes and technology acquisition programmes to deliver new skills in less than 2 years

## MARKET INNOVATION & impact

VARIES aims to boost the competitiveness of the European ES

industry through a better understanding of what drives variability decisions, by creating ways to describe and exchange variability information in objects and by providing and extending variability management in safety-critical ES across the entire lifecycle.

VARIES targets the following concrete industrial objectives:

- > reusability by combining product line engineering and variability management concepts
- > more predictable and shorter time to market
- > better productivity through reuse strategies adapted for ES
- > reduction of product engineering effort while delivering the functionality required and guaranteeing reliability and quality levels
- > smooth transition to a product line approach

The VARIES project will provide prototype tooling to support new ideas and insight gained in the project.

## RELEVANCE & CONTRIBUTIONS to Call Objectives

VARIES contributes to the following industrial priorities

- > *"Reference Design and Architectures"*
  - VARIES targets the embedded systems development of safety-critical product variants in a product portfolio such that these product variants can be built on the basis of a compositional design from shared HW and SW assets.
- > *"System Design Method and Tools"*
  - VARIES will build a reference platform in which different tools can be instantiated and linked to support the process flow for developing safety-critical ES product variants, across the whole product lifecycle, tailored to a company's specific context.

- Tools and design processes will be proposed at system and organisation level to support the development of product variants in a product portfolio.
- Testing, validation and verification tools for HW and SW assets in the context of product variants will be enhanced.

VARIES will enhance variability modelling concepts in the fields of ES variability analysis and towards product line certification.

VARIES directly contributes to ARTEMIS Sub Programme 1 (ASP-1): "Methods and processes for safety-relevant embedded systems", in particular to following ASP-1 objectives:

- > **"A model-driven process for the compositional development of safety and security critical systems."**
  - Product variants composed from reusable, modular building blocks across a company's product portfolio and beyond.
- > **"An analysis methodology to establish an industrially applicable methodology for exploration of design spaces and multi-criteria constraint satisfaction and design and development decision making, with particular regard to safety properties."**
  - The design space of a product platform needs to support the design spaces of individual product variants. Other topics are acceptance, verification and certification tests for safety properties for the product variants.

### R&D INNOVATION and technical excellence

ES builders must deliver new products with speed, diversity, high quality and at acceptable cost.

*Product variability* - the art of managing the creation, evolution and maintenance of different variants of a product - is crucial in safety-critical ES development. Variability in ES cannot be simply disassembled into the variability of a product's sub components (e.g., safety functions). Few generic solutions can be found that fit all; instead there is a multitude of very specific variability solutions for very specific variability needs (long tail market). To unleash the full potential of product variability in safety-critical ES, VARIES defined three key objectives:

- > *Enable companies to make an informed decision on variability use in safety-critical ES*
- > *Provide effective variability architectures and approaches for safety-critical ES*
- > *Ensure consistent, integrated and continuous variability management over the entire product life cycle*

To reach this ambitious goal, VARIES will create a reference framework for managing variability in safety-critical ES, comprising methods, tools, models, reference architectures and relevant knowledge. This framework will help address the 'variability paradox':

#### ***How can the benefits offered by introducing variability into ES outweigh the increased product complexity caused by variability?***

Validating the results across industry domains will ensure broad applicability of the results.

In addition, VARIES will establish a *Centre of Innovation Excellence (CoIE)* to help the European ES industry address its specific variability challenges by creating sustainable access to the long tail market of variability services.

### PROJECT partners



[www.artemis.eu](http://www.artemis.eu)

# VARIES

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WEBSITE  
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START  
May 2012

DURATION  
36 months

TOTAL INVESTMENT  
€13.0 M

PARTICIPATING ORGANISATIONS  
22

NUMBER OF COUNTRIES  
7