CESAR - Cost-efficient Methods and Processes for Safety-relevant Embedded Systems

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Preface

This book describes the technical outcomes of CESAR, a project funded in partnership between the ARTEMIS Joint Undertaking and national authorities. From March 2009 through June 2012, CESAR combined the forces of 55 industrial and academic partners from 10 countries to develop "Cost-efficient methods and processes for safety relevant embedded systems." The ubiquitous presence of embedded devices in society has led to a plethora of methods and tools for their design and development. Given the common scientific basis of these approaches, there is a pressing need for standardization to enable the reuse of tools across domains. The main goal of the CESAR project was to address this need with the creation of a highly customizable systems engineering instrument, named the "Reference Technology Platform" (RTP). The RTP provides companies with an efficient, streamlined, component-based system development process and as a by-product, creates a de facto European standard for embedded systems design.

Another important goal of CESAR was to make significant technological advances in two of the engineering disciplines underlying many of the embedded system design process:

Requirements engineering, with an emphasis on standardizing both functional and nonfunctional requirements, and requirements across development stages, from conceptual design to implementation

Component-based development, with an emphasis on building highly customizable, reusable, and verifiable components, along with a composition strategy that allows the inference of reliability guarantees from component specifications in a scalable manner

Both the development of the RTP, and the desired technological advances in requirements engineering and component-based development are intended to assist system engineers with solving concrete design challenges in their respective domains. To demonstrate the general applicability of the CESAR approach to system design, the work plan contained significant work on pilot applications from various classical embedded system domains, namely, the aerospace, automotive, automation, and railway sectors. The presence of these sectors made the CESAR

consortium a very large and multifaceted community, composed of academic and industrial partners from a variety of domains and countries. All partners contributed to CESAR through individual and sometimes comparatively independent work packages and reported their results in numerous deliverables. The purpose of this book is to harmonize the overall results of CESAR, and to interpret them in a reusable way that abstracts from the "cultural specialities" of individual domains or partners. It is the hope of the editors that this book will ensure the sustainability of the project outcomes, by providing critical assistance, far beyond what the deliverables can achieve, in making the technical results of CESAR available *and usable* both to CESAR partners, as well as to companies outside the CESAR consortium, within Europe and worldwide.