ITEA 2

INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

Project Profile

Evolutionary validation, verification and certification

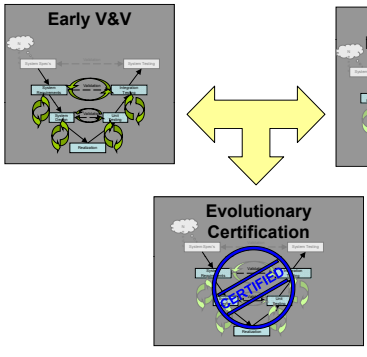
Enabling iterative and incremental development of certified software

Reliable, accurate, fast and low-cost validation and verification of software products is a cornerstone of modern high-tech industry. The EVOLVE project will enforce the creation of a methodological framework for early verification and validation of evolutionary software products through the accredited and certified integration of each component during every iteration in an incremental model-driven engineering (MDE) context.

High quality software is a key driver underpinning the digital revolution and an integral part of most products from global high-tech companies. Reliable, accurate, fast and low-cost validation and verification of such products is one of the cornerstones in the modern high-tech industry. However, many software organisations clearly lack efficient verification and validation technologies that would support rapid and high quality software development in a volatile business environment.

METHODOLOGICAL FRAMEWORK

The goal of the EVOLVE project is to create a methodological framework for early verification and validation of evolutionary products through the accredited and certified integration of each component. EVOLVE will provide an iterative and incremental methodology. Moreover, it is oriented by the agile and model-driven engineering paradigms, fostering accredited and certified component reusability in a broad sense.



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The target domain is the construction of software for real-time embedded systems, which may be subject to legal certification or internal company accreditation. Attention is focused on validation of both functional and non-functional properties, from requirements evaluation of an early architecture design to final customer acceptance.

To sustain the increase in the software content and reliance on software for safety-critical systems in industry, it is necessary to take the next step in process improvement. While many software-process-oriented projects focus on waterfall-like development processes, the real-life situation is different. In addition, industry needs to cope with evolutions during development as well as during the product life cycle.

ENSURING EARLY VALIDATION

EVOLVE will give an answer to these problems by tackling the aspects of early validation and looking to agile techniques for modular design verification and validation. Moreover, the project will improve the reusability paradigm by providing means to obtain internal company certification on components.

The results of EVOLVE will:

1. Shorten time to market by supporting incremental design;
2. Improve quality by providing methodologies for early verification and validation; and
3. Reduce costs by encouraging component reuse.

To achieve its goal, EVOLVE will explore

EVOLVE
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Partners

Autoliv
Barco n.v.
Critical Software
DS2
Elektrobit
European Software Institute
Fudeco
I3B
Ibermatica
Ingeteam
Mondragon University
Jönköping University
K.U.Leuven
Lero
Melexis
Nokia
Nokia Siemens Networks
Open License Society
Triphase
Universidad de Cantabria
VTT – Technical Research Centre of Finland

Countries involved

Belgium
Finland
Ireland
Portugal
Spain
Sweden

Project start

April 2008

Project end

March 2011

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three tracks to add evolution and certification to model-driven engineering:

- Early verification and validation during the first phases of a project, based on models and requirements;
- Incremental and iterative model-driven development (MDD) – Agile MDD development; and
- Evolutionary certification on two levels:
  1 Informal internal certification and homologation, and
  2 External official certification – e.g. for safety-critical applications.

Industrial case studies are foreseen on all three tracks to validate the methodology in real-life industrial environments to ensure the usability. Dissemination and exploitation activities are planned at the same time to spread the knowledge and experiences to a wider public.

IMPROVING THE SOFTWARE ENGINEERING PROCESS

The major visible results expected for EVOLVE are:

- Unified modelling techniques to describe all the relevant aspects of the system; and
- Iterative and incremental validation and verification techniques to develop certified components and products, without impacting business and time schedules and costs:
  - Certification activities integrated in normal development process, instead of a separate and stand-alone after-the-fact procedure on a final product, and
  - Reuse of validation and verification, and certification results and artefacts for new and derived variants of component and products.

The objective is to reduce development costs by early validation and verification, avoiding error propagation costs, while certification will not incur any additional costs.

Users of EVOLVE results will include:

- Industry, which will adopt the EVOLVE results in central methodology groups and disseminate them internally to their operational divisions, leading to products and services produced with higher productivity and less risks.
- Tool providers, which will enhance existing products by integrating them within the EVOLVE methodology, as well as building new products from EVOLVE.
- Universities and research institutes, which will integrate EVOLVE results in their software engineering courses, so placing the MDE and agile approach as a well-established method of software development for embedded systems in the education of Europe's next generation of software engineers, and raise their profiles in the areas of software and systems modelling. This will impact the subjects of work in basic research, contributions in standards communities and technology transfer to industrial partners.

KEY ACTIONS

- Verification and validation
- Certification
- Agile development
- Product family - product line, portfolio...

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■ ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services. As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

■ ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

■ ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.

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EVOLVE
(ITEA 2 - 07010) October 2008