



## PROJECT RESULTS

# Software development made more efficient

### Application of agile processes speeds up embedded software development and boosts quality



*Agile solutions cut time to market, while improving productivity and quality*

**The AGILE project provided compelling industrial proof that significant cost savings and quality improvements are possible when agile processes are applied. In extensive trials with more than 1,800 engineers and managers in 68 industrial pilot projects, AGILE demonstrated up to 70% reductions in total R&D lead time and costs. This offers European industry a significant opportunity.**

Changing product requirements, rapidly evolving technologies and time-to-market constraints are common challenges in embedded software development, yet the sheer volume of software continues to grow rapidly. Current engineering methods make it necessary to freeze requirements, architectures and schedules in the R&D phase to achieve stability. This is paradoxical since embedded software markets are highly volatile and often take unexpected turns. Clearly, new approaches are needed that enable incorporation of innovations and

last-minute changes throughout the product development phase.

Agile software processes do precisely that. They are change-driven, place emphasis on working software and allow for increased stakeholder interaction to minimise communications problems. However, at the start of the project, little was known about adapting agile processes to complex systems engineering projects.

#### Extensive number of trials

There have been many attempts to combine agile and embedded software development. The AGILE team studied the use of agile methods in embedded software development in 68 industrial trials involving more than 1,800 engineers in 17 European companies over a 2.5-year period.

Just over half the trials lasted less than six months; while 17% lasted over a year. About one third required less than ten person-months of effort, while another third consumed between 10 and 50 person-months. Evidence was also collected on the use of agile solutions in mega-sized projects, with 8% of trial evidence coming from projects with a commitment of over 500 person-months. The project findings are extremely significant as 73% of trials resulted in either a positive or a very positive outcome.

Project partners reported the following improvements:

- Lead-time reductions up to 70%;
- Total development cost reductions up to 70%;
- Productivity up to eight times greater than the industry average;

## AGILE (ITEA 03003)



#### Partners

- Barco Avionics
- E2S
- Engisud
- ESI
- Exoftware
- FAGOR
- Ficosa
- F-Secure
- Hantro
- Kapion
- KU Leuven
- Medius
- Nemetschek
- Nokia
- P4Q
- Philips
- SQS
- TCP
- VTT Technical Research Centre of Finland

#### Countries involved

- Belgium
- Bulgaria
- Finland
- Ireland
- Italy
- The Netherlands
- Slovenia
- Spain

#### Start of the project

April 2004

#### End of the project

December 2006



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- Quality improvements 3.5-times better than the industry average, with an up to 99% improvement in comparison with historical company data;
- Customer satisfaction of 4.9 on a scale of 5; and
- 70% developer satisfaction with the agile process applied.

The results are impressive and motivated some of the partners – such as Engisud and F-Secure – to develop totally new production models for their companies to foster their agile capabilities.

### Important role for tooling

A key enabler for agile development was found to lie in proper tooling for development. It is evident that current software development and management tooling is not optimised for agile production. Even well-known project-management tools appear to fall short as they do not handle well the requirements of two-to-six-week production cycles, product backlog management and extensive automation.

According to a Gartner report, tools that foster agile capabilities, such as closer interaction between software- and hardware-centred development teams at a much earlier stage of the design process, are gaining market acceptance. This report predicts so-called 'electronic system level' (ESL) tools will be next big change for the design-tools-automation market; Gartner sees ESL tools having a market of up to €360 million by 2008.

AGILE produced 12 tools to support agile software development of embedded systems. Four of these tackle problems related to project management.

Three of the tools will be commercialised in 2007 or 2008, including:

1. ATO, developed by E2S in collaboration with KU Leuven and Barco Avionics, supports model-driven development in an agile environment; and
2. Softfab, developed by Philips, is a fully automated test management and build tool that provides a very intuitive and efficient interface for all the test script execution. The tool was tested in several companies in the AGILE project.

### Institute to foster adoption

AGILE project members are seeking an opportunity to establish an Embedded Agile Institute in Europe to foster adoption of agile processes in European software-intensive companies. As a service, AGILE members have launched an interactive House-of-Agile web portal (<http://www.houseofagile.org>) to disseminate their results beyond the consortium. It is a collaborative wiki-style solution that enables the community to update the contents.

Research is being continued in the ITEA 2 FLEXI project, which is developing solutions for applying agile processes in the large and very large embedded software projects.

### ITEA 2 Office

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ITEA - Information Technology for European Advancement - is an eight-year strategic pan-European programme for pre-competitive research and development in embedded and distributed software. Our work has major impact on government, academia and business.

ITEA was established in 1999 as a EUREKA strategic cluster programme. We support coordinated national funding submissions, providing the link between those who provide finance, technology and software engineering. We issue annual Calls for Projects, evaluate projects, and help bring research partners together. We are a prominent player in European software development with some 10,000 person-years of R&D invested in the programme so far.

ITEA-labelled projects build crucial middleware and prepare standards, laying the foundations for the next generation of products, systems, appliances and services. Our projects are industry-driven initiatives, involving complementary R&D from at least two companies in two countries. Our programme is open to partners from large industrial companies, small and medium-sized enterprises (SMEs) as well as public research institutes and universities.

### Major project outcomes

#### Dissemination

- 112 publications: journals, conferences, PhDs, MScs, book chapters and newsletters
- Three international conferences, three international workshops and two TV broadcasts
- More than 150 invited talks, including 10 keynotes in conferences/seminars
- Agile asset box in [www.houseofagile.org](http://www.houseofagile.org), including training videos in five different languages

#### Exploitation

- 12 prototype tools with 3 about to be commercialised
- Four new methods
- In process of setting up an Embedded Agile Institute

#### Standardisation

- Contributions to two standards: IEEE 1648 and DO-178C

