



PROJECT RESULTS

Prospects for more effective testing

TTCN-3 speeds software-testing and boosts quality

The TT-Medal project has achieved a major breakthrough by developing a generic standardised solution for software system testing. It offers great potential for European industry to reduce test development and execution time while at the same time meeting demands for high product quality.

Testing is a fundamental step in the development of software-intensive systems as it checks the compliance of the product to end-user requirements. More effective testing provides a better and faster indication of product quality. And, as product quality is directly related to economic success in many industrial domains, increasing test efficiency is a major goal in today's system development.

Among existing testing languages, Testing and Test Control Notation (TTCN-3) is becoming increasingly important. It combines the advantages of increased productivity with expressive power. It also brings together a sufficient level of formalism with a component model

to enable the reuse of testware between different phases of a product's life cycle. TTCN-3 was the common underlying testing technology used in TT-Medal. The project significantly extended both the usability and awareness of TTCN-3.

Establishing common needs

TT-Medal included testing case studies in four different industrial domains: automotive, railway, telecommunications and financial. While specific testing requirements in these domains differ, several issues are common:

- The need for a universal testing language to combine different technological areas that require testing; and
- The end user, such as a domain expert responsible for the specification of test scenarios, defines a domain-specific test representation.

The methods and tools developed in TT-Medal were validated in demonstrators for each of the four domains. They proved the feasibility of a significant improvement in test efficiency, effectiveness and product quality, and confirmed that this same testing technology can be successfully applied to several different industrial domains. The success shows TTCN-3 has become a general purpose testing technology that could save European industry hundreds of million of euro annually.

Enabling automated test generation

In addition to developing a generalised test platform, specific research made significant advances in test case reuse, test case validation and automated test case generation. To

TT-MEDAL (ITEA 02010)

Partners

Conformiq Software
 CWI
 DaimlerChrysler
 FOKUS
 Improve Quality Services
 Logica CMG
 Nethawk
 Nokia
 ProRail
 Testing Technologies
 VTT Electronics

Countries involved

Finland
 Germany
 The Netherlands

Start of the project

April 2003

End of the project

December 2005

"TT-Medal has done a tremendous job in developing technologies, spreading awareness of TTCN-3 and of its potential application in new areas. Their case studies have played a vital role in disseminating TTCN-3 far beyond ETSI, and indeed far beyond the conventional TTCN-3 community. Well done!"



ANTHONY WILES, Manager and Senior Expert ETSI, Protocol and Testing Competence Centre (PTCC)



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enable automated test generation for systems of real industrial size, TT-Medal developed an approach combining various formal techniques – such as data abstractions and constraint solving. This approach was applied to generate test cases for telecommunications systems.

Tool chain benefits

Two types of tool vendors participated in TT-Medal:

1. **Software tool vendors** provided general test infrastructure based on TTCN-3. They benefited from application of their tools to industrial-scale problems. They also took advantage of the consolidated requirements definition across different domains. Within the project, software tool vendors selected generic requirements to implement. These prototype tools were then validated by the industrial partners and led to new product ideas; and
2. **Test device vendors** supplied specific hardware and interface adaptation to allow access to the system under test. They benefited from the implementation of real-world test systems. They proved the applicability and suitability of TTCN-3 technology as the basis of such specialised test devices.

Taking Europe one step forward

Software development is an important and ever increasing part of European industry. In any software product, testing requires between 25 and 50% of development resources. The latest research shows TTCN-3 can save up to 50% in these testing activities. Therefore, the greatest benefit TT-Medal provided is a testing technology that can offer European industry major cost savings.

Project results will be applied in diverse areas and domains. While tool providers will be able to integrate the results achieved into their existing product lines, research partners have extended their technology base for future R&D projects.

The various industries involved in TT-Medal will apply the results to improve the quality of their systems and to decrease the time to market for such systems. Improvements will be achieved by automated and effective test processes that are tightly integrated in the development process. Tools developed include graphical test design and automated test execution with TTworkbench; test generation and validation with Conformiq; and financial tests with TestFrame.

Major project outcomes

Dissemination

- One book, 40 papers, one proceeding, 26 additional presentations
- Eight national workshops
- 11 training courses
- Demonstrations at eight international exhibitions and conferences
- Asset box (www.tt-medal.org)

Exploitation

- Five prototype tools for tool vendors that are planned to lead to commercial products
- One collaboration between project partners
- One commercially available education track

Standardisation

- New release 3 of TTCN-3 in 2005 (adopted by ETSI in summer 2005)
- New parts for TTCN-3 standard (ETSI)
- Final release of U2TP in 2004 (adopted by OMG in spring 2005)

Winner of the ITEA Achievement Award 2005

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