

## Introduction to Special Issue: Quality in Information and Communications Technology

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Quality is increasingly regarded as a major success factor in Information and Communications Technology (ICT). Devising high-quality approaches to ICT development is simultaneously a grand challenge and an opportunity in a very competitive area. The articles published in this issue correspond to extended versions of a selection of papers originally presented in the 2010 edition of the International Conference on the Quality of Information and Communications Technology (QUATIC 2010).

QUATIC was first launched in the mid-nineties and is steered and promoted by CS03, the Commission for Quality in Information and Communication Technologies of the Portuguese Institute for Quality.

Since its inception, QUATIC conference has kept a tradition of a forum where researchers and practitioners have the opportunity of refreshing and exchanging ideas on best practices on Quality in ICT. QUATIC became an international conference in 2001 and its frontiers have kept enlarging

since then, as demonstrated by the participation of authors and committee members from almost 40 countries in the 2010 edition.

The conference considers the existence of several areas of interest that gather a set of related topics:

- Quality in ICT Verification and Validation
- Quality in ICT Service Management
- ICT Process Improvement and Assessment
- Quality Evolution in ICT
- Standardization and Certification in ICT
- Quality in ICT Requirements Engineering
- Quality in Model Driven Engineering
- Quality in ICT Reengineering and Refactoring
- Quality in Agile Methods
- Quality in Web Engineering
- Teaching ICT Quality

The five articles that have been selected to appear in this issue cover some of the above ICT Quality topics.

The first paper entitled “Investigating the Evolution of Code Smells in Object-Oriented Systems”, by Chatzigeorgiou and Manakos, concerns the evolution of code smells in a software process. Code smells reflect software design problems. In this paper, the authors discuss code smells’ evolution patterns, to identify when code smells are introduced (right from the beginning, or in the course of software evolution), how frequently refactoring activities are performed to remove them, and whether the removal of design problems results from deliberate maintenance activities or as a side effect of software evolution. The paper reports evidence collected from two open-source projects and concerning four code smells, to support the identification of the evolution patterns.

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The second paper entitled “Testing Operational Transformations in Model-Driven Engineering”, by Ciancone, Filieri and Mirandola, presents an approach called Model trANSformation Testing (MANTra) to unit testing Query View Transformation Operational (QVTO) transformations. Model transformations, like other software artifacts, can be inconsistent and produce undesirable effects. MANTra allows developers to design their test cases directly within the QVTO language and to verify them within the same transformation environment. This provides adequate support for verifying the correctness and suitability of model transformations, which is an essential feature for building high-quality software using a model-driven approach.

The third paper entitled “Applying Grounded Theory to Understand Software Process Improvement Implementation: A Study of Brazilian Software Organizations”, by Montoni and Rocha, discusses the challenges of Software Process Improvement (SPI) and the critical success factors that can be learned from the perspective of consultants of SPI implementation initiatives in Brazilian companies. The authors use the Grounded Theory methodology, which is particularly suitable for studying human behavior and organizational cultures, to build a theoretical framework that identifies institutional contextual factors that have an influence on the success of an SPI initiative, and which strategic actions can be taken by SPI implementation actors to reinforce or change such influences.

The fourth paper entitled “The DynaRIA Tool for the Comprehension of Ajax Web Applications by Dynamic Analysis”, by Amalfitano, Fasolino, Polcaro and Tramontana, presents the DynaRIA tool which helps developers in understanding, debugging, testing, and assessing the quality of rich internet applications. The DynaRIA tool allows

tracing application executions and abstracting them with UML sequence diagrams, that show the flow of interactions among the layers and modules of Ajax applications, providing support for better understanding their runtime behavior. The usage of the tool is illustrated with four case studies taken from two real-world Ajax applications.

Finally, the paper entitled “Web-GIS Models: Accomplishing Modularity with Aspects”, by Urbieto, Oliveira, Araújo, Rodrigues, Moreira, Gordillo, and Rossi, discusses how to improve the modularity in Web Geographical Information Systems. The abstract spatial concerns (e.g. the user’s location) in those systems are typically not only crosscutting, but also volatile. This challenges the ability to adapt and evolve these systems. The authors model abstract spatial concerns with aspects, using Modeling Aspects using a Transformation Approach (MATA). Using aspects deals with the crosscutting nature of these concerns and also supports controlling their volatility, in the aspect composition phase, by plugging and unplugging concerns. The paper contributes a catalog of reusable GIS crosscutting concerns, which can help improving the quality of Web-GIS applications.

We would like to express our gratitude to the reviewers, who very carefully and professionally screened all the submissions, and through their insightful comments and suggestions ensured the very high quality of these papers.

We would also like to thank all the authors of submitted papers for their great efforts. They made considerable improvements with respect to the papers originally published in the QUATIC conference.

Finally, we would like to acknowledge the Editor-in-Chief, Michael G. Hinchey, for generously supporting this special issue.