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A number of selected papers presented at ICEIS 2007 will be published by Springer, in a book entitled Enterprise Information Systems IX. This selection will be done by the conference Chair and program co-chairs, among the papers actually presented at the conference, based on a rigorous review by the ICEIS 2007 program committee members.
FOREWORD

This volume contains the proceedings of the Ninth International Conference on Enterprise Information Systems (ICEIS 2007) organized by the Institute for Systems and Technologies of Information Control and Communication (INSTICC) and the University of Madeira, in collaboration with ACM/SIGMIS and AAAI. Furthermore, the conference was sponsored by the Portuguese Foundation for Science and Technology (FCT).

ICEIS has become a major point of contact between research scientists, engineers and practitioners in the area of business applications of information systems. This year, five simultaneous tracks were held, covering different aspects related to enterprise computing, including: “Databases and Information Systems Integration”, “Artificial Intelligence and Decision Support Systems”, “Information Systems Analysis and Specification”, “Software Agents and Internet Computing” and “Human-Computer Interaction”. All tracks describe research work that is often oriented towards real world applications and highlight the benefits of Information Systems and Technology for industry and services, thus making a bridge between the Academia and the Enterprise worlds.

Following the success of 2006, ICEIS 2007 also had a number of satellite workshops, related to the field of the conference. This year we collaborated in the organization of the following ten international workshops: 7th International Workshop on Pattern Recognition in Information Systems; 1st International Joint Workshop on Wireless Ubiquitous Computing; 5th International Workshop on Modelling, Simulation, Verification and Validation of Enterprise Information Systems; 5th International Workshop on Security In Information Systems; 4th International Workshop on Natural Language Processing and Cognitive Science; 4th International Workshop on Computer Supported Activity Coordination; 3rd International Workshop on Model-Driven Enterprise Information Systems; 1st International Joint Workshop on Technologies for Collaborative Business Processes and Management of Enterprise Information Systems; 1st International Workshop on RFID Technology - Concepts, Applications, Challenges and 1st International Workshop on Human Resource Information Systems.

This year, ICEIS 2007 received 644 paper submissions from more than 40 countries in all continents. 72 papers were published and presented as full papers, i.e. completed work (8 pages/30' oral presentation), 198 papers reflecting work-in-progress or position papers were accepted for short presentation, and another 131 contributions were scheduled for poster presentation.

These numbers, leading to a “full-paper” acceptance ratio below 12%, and a total acceptance ratio below 65%, show the intention of preserving a high quality forum for the next editions of this conference. Additionally, as usual in the ICEIS conference series, a number of invited talks, presented by internationally recognized specialists in different areas, have positively contributed to reinforce the overall quality of the Conference and to provide a deeper understanding of the Enterprise Information Systems field.

A book of Selected Papers will be published, following the conference, by Springer in the newly created series ”Lecture Notes in Business Information Processing” (LNBIP). This series brings the
successful LNCS approach to areas such as business information systems, e-business, B2B integration, Enterprise applications and industrial software development.

The program for this conference required the dedicated effort of many people. Firstly, we must thank the authors, whose research and development efforts are recorded here. Secondly, we thank the members of the program committee and the additional reviewers for their diligence and expert reviewing. Thirdly, we thank the invited speakers for their invaluable contribution and for taking the time to synthesise and prepare their talks. Fourthly, we thank the workshop chairs and the special session chairs whose collaboration with ICEIS was much appreciated. Finally, special thanks to all the members of the local organizing committee, especially Jorge Cardoso, whose collaboration was fundamental for the success of this conference.

This year, the organization will distribute two awards to papers presented at the conference: the best paper award and the best student paper award, mainly based on the classifications provided by the Program Committee members.

We wish you all an exciting conference and an unforgettable stay in the lovely island of Madeira. We hope to meet you again next year for the 10th ICEIS, to be held in Barcelona - Spain, details of which are available at http://www.iceis.org.

Joaquim Filipe  
I.P.Setúbal/ INSTICC, Portugal

José Cordeiro  
I.P.Setúbal/INSTICC, Portugal

Jorge Cardoso  
Universidade da Madeira, Portugal
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R-TOOL: A SUPPORTING TOOL FOR A QUALITY ORIENTED REUSE STRATEGY

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Abstract: The quality of reusable elements must be rigorously monitored and guaranteed before they can be reused, this is known as Certification. High levels of certification of these elements generate trust and stimulate reuse. In this paper we describe the development of a tool based on quality oriented reuse strategies. To this end, we take as starting point an ontology that rigorously correlates the essential concepts of systematic reuse to quality. This ontology reinforces the proposed strategy, which in turn is supported by the tool. The methodology used is based upon the Methodological Systemic Framework for Information Systems Research. For the development of the tool, we used the iterative incremental development process Rational Unified Process (RUP.) We took into account the inception and elaboration phases, and developed an iteration of the construction phase. As a result of the development process we built a tool which supports the main activities of the proposed strategy. These activities are Certify Domain Models, Requirement Specifications, Architectural Designs and Code, through checklists, allowing to store, classify, search and recovery the reusable elements and its properties.

1 INTRODUCTION

We can reuse not only software components but also artifacts that were developed along the development process (Reifer, 1997).

The certification of reusable elements allows developers to assure high levels of quality before the elements are reused. Reuse promotes improvements when developing software, since it increases productivity and quality within the development process (Sommerville, 2004).

The objective of this paper is to build a tool which supports a quality oriented reuse strategy.

The strategy aims to systematically introduce reuse since the beginning of the software development process, conceiving the reuse not only of Software Components but also of other artifacts such as Domain Models, Requirement Specifications, and Architectural Design.

Next, in section two we present a summary of the background upon which the research was developed. In section 3 we will describe the research methodology. Section 4 describes the strategy to support quality oriented reuse. Section 5 presents the development of the supporting tool. Finally, section 6 presents some concluding remarks and future work.

2 BACKGROUND

According to Frakes and Kang (2005), software reuse is the use of existing software or software knowledge to construct new software. Systematic reuse is introduced early in the life-cycle of software development. It is a formal and well-documented process, it is domain-specific and based on a re-creative process (Sodhi and Sodhi, 1999). Reusable assets can be either reusable software or software knowledge. According to (Reifer, 1997) there are six properties for software products to become reusable assets: Domain Specific, Generalized Form, Fixed Functionality, Known Performance, Well-bounded Interfaces, Demonstrable Quality.

The Asset Management is the process used to manage the reusable elements making them available to users in a satisfactory way. This process considers four activities: Library Management, Library Population, Library Operation, and Library Maintenance (Reifer 1997).

Library Population includes the certification process that guarantees an element possesses a particular property (Li et al., 2002). The V&V activities use techniques which are classified into: static (revisions, inspections, walkthroughs, audits), dynamic (white-box testing and black-box testing),
inquisitive (questionnaires, checklists and scenarios), and measuring activities (architecture description languages, and metrics).

Ghiotto et al. (2006) proposed ontology where these reuse concepts and quality concepts are linked. This ontology was the base for the proposed tool in this paper.

3 METHODOLOGICAL FRAMEWORK

This research used the Methodological Framework for Research of Information Systems (Pérez et al., 2004).

The adaptation of the Methodological Framework for this work consists of ten steps: 1) Documentary and bibliographical research; 2) Background Analysis; 3) Formulation of the Objectives and Scope of the Research; 4) Adaptation of the Methodological Framework; 5) Proposal of a strategy to support quality reuse; 6) Analysis of Context; 7) Application of the DESMET Methodology (Kitchenham, 1996), the method most appropriate to evaluate the strategy was the feature analysis-survey; 8) Evaluation of the proposed strategy; 9) Analysis of the results; 10) Conclusions and Recommendations.

4 PROPOSED STRATEGY

The proposed strategy to be supported by the tool was based in three paradigms (Ramachandran, 2005; Reifer, 1997): 1) it specifies the domain, 2) it is supported by the process and 3) it has organizational and management support. From a quality point of view the strategy will follow the GQM (Basili, 1992) paradigm. The objective of the measurement will be identified for each type of reusable element using their characteristics. Metrics will be used to determine the level of certification of the elements.

4.1 Objectives of the Strategy

The objectives of the reuse strategy are: 1) To introduce reuse within the software development process; 1.1) To implement reuse at an early stage of the life cycle; 1.2) To reuse other elements in addition to the code; 2) To reduce the timeframes associated with the process of software development; 3). To reach the third level of the Software Reuse Maturity Model-RMM (Sodhi y Sodhi, 1999). The repository must be populated with certified and validated elements. A set of initial metrics are implemented to reflect the benefits of reuse in terms of production of high quality and better profitability; 4) To increase the levels of quality of each reusable element before its reuse; and 5) To promote reuse within the development group.

4.2 Components of the Strategy

We identified the following components in the strategy: a) Domain Analysis in the development process; b) Domain Analyst Role; c) Reuse within all the phases of the software development process; d) Use of standards and e) Use of a repository of reusable elements.

5 DEVELOPMENT OF R-TOOL

5.1 Inception Phase

The purpose of the Inception phase is to achieve an agreement with the stakeholders, regarding the objectives of the project (Rational, 2000; Kruchten, 2003).

5.1.1 Vision

This document provides a complete vision of the software system under development and supports the contract between the funding authority (Research Lab for Information Systems, LISI) and the development entity. The problem is to store large amounts of software elements and/or information manually which exhibit great potential for reuse. This problem affects analysts, architects and developers. One solution is to automate the storage, classification, search and recovery of the software elements.

5.1.2 Functional Requirements Specification

This document is used to express the behavior of R-tool. The functional requirement are: Log system users, Register users, Authenticate users, Certify reusable elements, Introduce reusable elements to the repository, Eliminate the reusable elements, Browse a catalogue of reusable elements, Locate reusable elements, Recover reusable elements, Modify checklists, Produce time statistics, Manage reuse statistics, Send an e-mail to the author of the element when it is reused, Manage Patterns, Specify Goal Question Metrics, Certify Use Case Diagrams and Activity Diagrams, Certify through checklists, Answer to checklists, Management of vocabulary.
5.1.3 Supplementary Requirements Specification

We take as a reference the quality model ISO/IEC 9126 to present a list of detailed complementary requirements for R-tool: 1) The system must be a web application; 2) The system must be sustainable and evolving; 3) The system must be user-friendly; 4) The system must be efficient; 5) The system must be tolerant to failures; 6) The system must reflect the reuse philosophy.

5.1.4 Initial Use Case Model

The use case model of the tool for support of the quality reuse strategies shows a total of 74 use cases. Figure 1 shows the global vision of the actors and sub-systems of the tool.

Figure 3 shows a diagram of the use case for the Requirement Specification Certification Subsystem.

5.2 Elaboration Phase

The purpose of the Elaboration phase is to determine a baseline for the system. We present the Conceptual Model of the Logical View for the tool (see Figure 4).

The use cases which are critical for the first iteration of the Construction phase of the (RUP) methodology are related to the Elements and Certification Subsystem (see Figure 2).

Figure 2: Elements and Certification Management Subsystem.

Figure 4: Conceptual Model of the tool.
5.3 Construction Phase

The reach of the construction phase for this version of the tool is limited to only one iteration, in which we implement the use cases identified as critics: 1) Certifying four types of reusable elements: Domain Model, Requirement Specification, Architectural Design and Code Modules. There are three types of diagrams that can be certified: Use Case, Activity, and Class Diagrams; 2) To store reusable elements in a repository; 3) Eliminate reusable elements from the repository; 4) Search for reusable elements through four types of search: by name, by keyword, by project and by catalogue consult; Modify checklists used as certification mechanisms.

The first version of the tool presents a checklist to certify Requirements Specifications, that includes some questions, e.g. Has all business use cases been classified according to its relevance (primary, secondary, optional)?, Do the requirements define all the information that will be displayed to user?, etc.

The properties stored for each reusable element are: File name, Element name, File type, Author e-mail, Description, Time employed in elaborating the element, Language, Project where the element was developed, Keywords, Certification level, Performance (code), Use restrictions, Environmental restrictions, etc.

6 CONCLUSIONS

Checking for the desired quality characteristics for each element the tool allows us to guarantee that the reusable elements have an adequate level of quality. In addition, the tool promotes reuse and allows users to certify storage, search and recover reusable elements. The tool will keep track of their properties and history in any organization.

Future work considers the evolution of the tool as well as the development of methodologies and quality methods which favor quality reuse during the software’s development process.

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