The 8th IEEE International Conference on

Advanced Learning Technologies

Santander, Spain
1 - 5 July 2008

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Kinshuk
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Preface

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Los Alamitos, California

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IEEE Computer Society Order Number P3167
BMS Part Number CFP08261-PRT
ISBN 978-0-7695-3167-0
Library of Congress Number 2008922406

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Editorial production by Lisa O'Conner
Cover art production by Joe Daigle/Studio Productions
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A Simulator for Education and Training in Global Requirements Engineering: a Work in Progress

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Abstract

The requirements elicitation process is that which is the most critical in software development. For this reason it is necessary to train professionals in the skills needed to confront this process. Traditionally this has not been an easy task and with the arrival of new paradigms such as Global Software Development (GSD) it has become more difficult. It thus becomes necessary to rely on new methods and tools which should support this process in a GSD environment. In this work we outline the characteristics of a simulator for the education and training of global requirements engineering and indicate the competences that this simulator would allow us to develop.

1. Introduction

Requirements elicitation (RE) is the most critical process in software development [1]. It is therefore fundamental to have professionals trained in this process, who are capable of accomplishing top-quality requirements elicitation.

Unfortunately, this does not occur in universities, principally because the method of teaching is centered on theory and the students rarely get involved in real projects [2]. In addition, the current trends in software development and their effect upon RE are not generally considered.

Global Software Development (GSD) [3] is one of those trends. In GSD the stakeholders are distributed throughout several countries. The geographic and temporal distance, language and cultural differences between stakeholders increase the difficulties in developing the RE process [3].

In order to confront the difficulties of GSD environments, the various dimensions of teaching must be adjusted, i.e.: contents, learning tools, learning techniques, assessment strategies, learning outcomes and professional competences.

Various strategies for the teaching of software engineering in GSD are beginning to appear in literature. We have observed the following strategies: curricular changes [2, 4], post-graduate specialization [5], a project for software development between universities in different countries [6, 7], and a stronger interaction between industry and the academic world [8].

In this work we outline an interactive simulation tool that permits the support of the training of engineers in the global requirements elicitation process. This simulator may be a previous step towards students' participation in real projects developed between universities and the GSD industry. In fact, the experience acquired with the simulator would diminish the risk of non-qualified people being involved in real projects. Furthermore, a virtual industrial partner is provided by means of the simulator for universities that do not have one.

The following section describes the simulator and the skills that it will be able to develop in our students.

2. The Simulator Proposal

Simulation is a technique which has been used in teaching for many years. It is successfully used, for

978-0-7695-3167-0/08 $25.00 © 2008 IEEE
DOI 10.1109/ICALT.2008.24

example, in medicine and aviation. The main advantage is that it allows students to train themselves without the risk of a real environment and at a lower cost.

We propose a simulator of the requirements elicitation process in the global context in which the student (taking on the role of an RE engineer) interacts with various stakeholders which will be virtual agents and/or real humans. The simulator will allow the professor to create new lessons, indicating the description of the scene, the virtual agents to be used, personality and culture. Fig. 1 shows the elements which are a part of the system and the actors that interact with it.

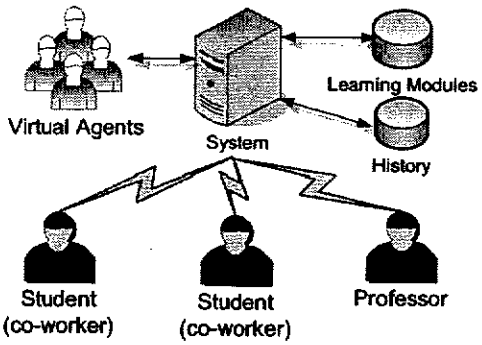

Fig. 1. Abstract model of simulation environment

The interaction will be natural through the use of the main tools of electronic communication used for requirements elicitation: instant messaging and Chat, E-Mail, Telephone and Video Conferencing.

2.1 Competences to develop with the Simulator

In short, the simulator will teach the 18 competences listed bellow (see Table 1) by means of the following features:

1. Interaction with virtual agents of different nationalities.
2. Interviews with the stakeholders.
3. The lessons are focused on the specific problems of RE in GSD to allow the student to confront with a common difficult situations.
4. The elaboration of the requirements document.
5. The validation of the requirements document.

In order to select the most suitable competences to be developed in students, we have first carried out a bibliographical review in search of the generic and specific competences that a professional must have if s/he is to work in requirements elicitation. Second, we have identified the relevant competences for GSD based on its issues and critical factors (by means of summarizing, adding and deleting competences from the list from the first step). Then, we have chosen the competences are not generally considered in the training of engineers in universities or are poorly taught with little or no practical exercises.

Table 1: Competences to be developed with simulator

1	Computer mediated Communications[9, 10]	1, 2
2	Communication proocols [9, 11]	1, 2
3	Virtual team skills [4, 10]	1, 4
4	Ability to work in an international context [12]	1, 2, 3
5	Appreciation of diversity and multiculturality [12, 13]	1, 2, 3
7	Living with ambiguity/uncertainty in Remote Teams [10]	1, 2, 3
8	Ability to learn quickly about a domain or technology in order to begin project planning [6]	2, 4
9	Capacity to adapt to new situations [12]	3
10	Understanding of cultures and customs of other countries [9, 12]	1, 2, 3, 4
11	Comprehension of GSD Critical Factors	1, 2, 4
12	Comprehension of Elicitation Sources (e.g. stakeholders, domain experts, operational and organization environments, etc.) [13]	2, 3
13	Comprehension of Software requirements specification [13, 14]	4, 5
14	Comprehension of reviews and inspection of requirements[13, 14]	5
15	Knowledge of analyzing quality (non-functional) requirements (e.g. safety, security, usability, performance, root cause analysis, etc.) [13]	4, 5
16	Knowledge of managing changing requirements [13, 14]	4, 5
17	Elicitation of real requirements based on stakeholder's need using an Interview Technique and computer mediated communications	2, 3, 4, 5
18	Representation of functional and non-functional requirements for different type of systems	3, 4, 5

2.2 Tracking the learning process

Initially, the students must enter their data with the aim of tracking the learning process. Then the system must show the different lessons or units that it has developed, showing their results. In addition, the system must permit a review of the history of conversations with each of the stakeholders. Another capability of the system will be to show the lessons that it has not developed, allowing the student to select any of them.

2.3 Simulation process

When students perform a lesson selection, the system must submit the context of the problem in which the elicitation is developed and show the participant stakeholders and their roles.

Through interviews with the various stakeholders (who will be of different nationalities) the students should prepare a list of requirements, both functional and non-functional, which should be sent to the system for its validation at the end of the simulation with the purpose of measuring the quality of the work done by the student. The system should provide an interface for keeping a list of the student's requirements.

2.4 Assessment strategies

The simulator will validate the student's work by means of a questionnaire in which it will present various requirements (both functional and non-functional) and the student will have to indicate whether or not they correspond with what the users need. The requirements document will be checked to detect faults such as: ambiguous requirements, non-existent requirements unspecified requirements, etc. Besides this evaluation, the system will also record the questions that the student has formulated in an inadequate way in consideration of the cultural differences and protocol of communication (manner of greeting and taking one's leave, degree of formality informality etc.).

3. Conclusion

In this work we have proposed the features of a simulator with which to a train global requirements engineer and the competences that we have attempted to develop in students in order to prepare them for global software elicitation process.

4. Acknowledgments

This work is partially supported by the MELISA project (PAC08-0142-3315), JCCM Consejería de Educación y Ciencia, in Spain; ESFINGE project (TIN2006-15175-C05-05) MEC (Dirección General de Investigación)/FEDER in Spain; he CompetiSoft project (506AC0287, CYTED program).

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Revised: 21 January 2008

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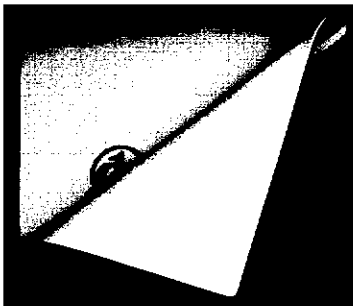

Published by the IEEE Computer Society
IEEE Computer Society
PO Box 3014
Los Alamitos, CA 90720-1314

ISBN 978-0-7695-3167-0
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