UNIVERSITI PUTRA MALAYSIA

APPROACH FOR SELECTING REQUIREMENT ELICITATION TECHNIQUE

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APPROACH FOR SELECTING REQUIREMENT ELICITATION TECHNIQUE

By

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This dissertation submitted to the School of Graduate Studies, Universiti Putra Malaysia,

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DEDICATION

To:

This dissertation is dedicated to my beloved Father (Hassan Hussein) and Mother (Fatima Osman) for their endless support and motivation (encouragement).

Abstract of dissertation presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for Master of software engineering

APPROACH FOR SELECTING REQUIREMENT ELICITATION TECHNIQUE

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

ABSTRACT

Requirements elicitation is an initial phase in software development. In this phase, requirements engineers gather the requirements of the software under development from users, stakeholders and customers. The techniques used for gathering requirements have a big influence on the quality of requirements and the success of project. Many requirements elicitation techniques (RET) such as: interview, prototype and observation can be used for requirements gathering process. One technique is not suitable for all different projects. Usually Requirement engineers select the RET based on personal preferences and assumptions such as; this is the only technique which they know. However, this subjective decision can result using inappropriate RET. Using unsuitable RET may decrease the quality of elicited requirements. Even though researchers proposed many techniques for elicitation, one of the challenging issues is to choose the suitable RET for specific situation. As result, the main purpose of this project is to help requirement engineers to choose suitable RET. To do that firstly, we identified factors that affect selecting RET. Secondly, approach to select suitable RET proposed. Thirdly, prototype developed to help requirements engineers to and ease the process of elicitation technique selection. Lastly experts invited to evaluate proposed approach and the prototype.

Abstrak tesis yang dikemukakan kepada Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Sarjana Kejuruteraan Perisian

PELAKSANAAN UNTUK MEMENUHI TEKNIK ELISITASI KEPERLUAN

FAKULTI SAINS KOMPUTER DAN TEKNOLOGI MAKLUMAT

ABSTRAK

Pemerolehan adalah fasa awal dalam pembangunan perisian. Dalam fasa ini, jurutera keperluan mengumpulkan keperluan perisian yang sedang dibangunkan dari pengguna, pihak berkepentingan dan pelanggan. Teknik yang digunakan untuk mengumpul keperluan mempunyai pengaruh yang besar terhadap kualiti keperluan dan kejayaan projek. Banyak teknik pemerolehan (RET) seperti temu bual, prototaip dan pemerhatian boleh digunakan untuk proses pengumpulan keperluan. Satu teknik tidak sesuai untuk semua projek yang berbeza. Biasanya jurutera Keperluan memilih RET berdasarkan pilihan peribadi dan andaian, seperti; ini adalah satu-satunya teknik yang mereka tahu. Walau bagaimanapun, keputusan subjektif ini boleh menafikan proses pemerolehan dan mengurangkan kualiti keperluan yang ditapati. Walaupun penyelidik mencadangkan banyak teknik untuk pemerolehan, salah satu isu yang mencabar adalah memilih RET yang sesuai untuk keadaan tertentu. Hasilnya, tujuan utama projek ini adalah untuk membantu jurutera yang diperlukan untuk memilih RET yang sesuai. Untuk berbuat demikian, kami mengenalpasti faktor-faktor yang mempengaruhi pemilihan RET. Kedua, kriteria pemetaan digunakan untuk menunjukkan RET yang sesuai. Ketiga, prototaip dibangunkan untuk membantu jurutera keperluan dan memudahkan proses pemilihan teknik pemilihan. Akhirnya pakar dijemput untuk menilai kebolehpercayaan kriteria yang dicadangkan dan kegunaan prototaip.

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APPROVAL

Thesis submitted to the Senate of University Putra Malaysia and has been accepted as fulfillment of the requirement for Master of Software Engineering.

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Supervisor,

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Jun, 2019

DECLARATION

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LIST OF ABBREVIATIONS

RE	REQUIREMENTS ELICITATION
RET	REQUIREMENTS ELICITATION TECHNIQUE
PD	PROBLEM DOMAIN
SUS	SYSTEM USABILITY SCALE

CHAPTER 1 INTRODUCTION

1.1 Background of the problem

Today's information and technology age, the software demand is growing day by day. Requirements engineering, an initial phase of software development, plays vital role in development of quality software. Requirements elicitation is the most important and initial phase in requirements engineering. The accomplishment of software relies on the satisfaction of its users. And the user satisfaction largely depends on the process of requirements elicitation [13].

There are four phases In Requirements engineering (RE) process: requirements elicitation, requirements analysis, requirements specification, requirements validation and requirements management [24]. The aim of requirements elicitation is to capture and discover of stakeholder needs to identify what features the software system should have. Preparation, execution and analysis are required for each session of elicitation [8]. In the preparation of elicitation session needs: understanding application domain; identifying the sources of requirements; analyzing the stakeholders; selecting requirements elicitation techniques; and eliciting requirements [25]. In this project, we focus on fourth point which is selecting requirements elicitation techniques. Requirements elicitation is not easy task and a lot of human activity involved. Errors In this phase can affect the following phases of software development [16]. According to [42], most of the software projects were not successful. 31% of the projects cancelled while 53% of projects faced challenges such as cost overrun, budget overrun or content deficiencies. Only 16% of the projects were successful. About 50% of all software projects fail because the final product does not meet the user expectations and demands. One of the reasons is poorly defined requirements. It seems that a lot of the delivered software does not meet or fully meet the expectation of the

end user. Poorly defined system requirements are largely caused by ineffective collection of requirements [43]. It is not important how many techniques employed but how these techniques are fit to capture the needs of stakeholders [30].

One of the challenging issues in requirement elicitation is selecting requirement elicitation techniques for specific situations. A number of factors influence the process of selection RET [7]. Project degree of criticalness, project size project complexity [6], and number of stakeholders [8] are examples of the factors that influence the selection of suitable technique. If the number of stakeholders involving in the process of elicitation process, for example, questionnaire is more suitable than interview because using questionnaire we can reach large number of people using online.

Bell et al. [44], highlighted: "The requirement for a system do not arise naturally; instead, they need to be engineered and have continuing review and revision". Requirement engineers are expected to employ good appropriate technique(s) that fit to the current situation in order to get the quality requirements. According to Hickey & Davis [18], requirement engineers who have extensive experience in requirement elicitation have ability to select the right elicitation techniques, but the majority of the requirement engineers have less experienced. So it is difficult for requirement engineers to choose the right techniques in the right situation. Requirement engineers select the technique based on personal preferences and assumptions such as: this is the only technique which they know them [5, 6, 8, and 19] which results low quality requirements [5].

1.2 Problem statement

Requirements elicitation is an initial and most critical phase in requirements engineering. The aim of requirements elicitation is to capture and discover of stakeholder needs [8]. S There are

many techniques for requirements elicitation but there is no single technique which suitable for all different situations [5, 30]. Selecting the appropriate elicitation technique is very important and helps to produce complete and consistent requirements [29].

Mostly, requirement engineers select the techniques for elicitation based on personal preferences such as: this is the only technique which they know; this technique worked before so they believe it will work again for them, they follow methodology that recommends this the technique and they guess this technique is effective in the current circumstances [6, 8, and 19]. However this subjective-based decision can bias the elicitation process and reduce the quality of elicited requirements [5]. Selecting unsuitable technique has negative consequence on the quality of requirements. Because of wrong requirements, numbers of issues may arise such as: late system delivery; cost may be more than estimated; dissatisfaction of end-user and customer, decrease of system reliability and there may be regular system defects [30].

As a result, the main purpose of this study is to help requirements engineers to choose suitable requirement elicitation technique(s). Firstly, factors that influence selection of requirement elicitation technique have been identified. Secondly, proposed an approach of mapping factors that affect the selection of requirements elicitation technique to suggest appropriate elicitation technique. Third, prototype developed to ease the process of selecting RET. Lastly requirements engineers/system analysts invited to evaluate the reliability of proposed criteria and usability of the prototype.

1.3 Objectives

The main objectives of this project are:

- To identify factors that influence the selection of requirement elicitation technique
- To map the affecting factors and suggest suitable elicitation techniques

- To develop prototype tool for requirement engineers
- To evaluate the reliability of proposed approach and the usability of prototype

1.4 Project scope

This project focuses on 14 requirements elicitation techniques (RET) 19 factors that affecting the selection of RET. Based on these factors, approach is proposed to help requirements engineers or system analysts to choose the suitable elicitation technique. Prototype which based on the proposed approach developed to ease and automate the process selecting RET. This prototype is helpful in requirements engineering phase. It can be used only for selecting suitable requirements elicitation technique, but other requirements elicitation activities such as, recording requirements are not included in this project.

1.5 Thesis organization

CHAPTER 1 introduces the overall study. This chapter briefly discusses about background of the problem, the problem statement, project objectives, project scope and organization the thesis.

CHAPTER 2 highlights the previous study that also focused on the same topic (selecting requirement elicitation technique).

CHAPTER 3 provides the overall methodology that we used to conduct in order to achieve the objectives of this study.

CHAPTER 4 discusses the proposed approach for selecting the requirements elicitation techniques. This chapter discussed the factors that influence the selection of RET, suitability matrix table, and the mapping criteria used to suggest the suitable requirements elicitation technique.

CHAPTER 5 explains the prototype development for requirement engineers. The chapter summarizes how we developed the tool such as steps taken and tools used.

CHAPTER 6 explains evaluation of the proposed criteria and prototype. This chapter discussed how we evaluated the proposed approach and the prototype.

CHAPTER 7 gives explanation about the conclusion, future work and recommendations. In this chapter the achievements and the limitations of the study are provided.

1.6 Chapter summary

This Chapter has provided a summary of the thesis. The Chapter briefly explained the background of the problem and the statement of problem. The Chapter also described the project objectives, scope of the project, and the organization of the thesis.

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