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Requirement Elicitation Model (REM) in the Context of Global Software Development

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ABSTRACT

Contxext:Requirement elicitation is difficult and critical phase of requirement engineering and the case is worst in global software development (GSD). The study is about requirement elicitation in the context of GSD. Objective: Development of requirement elicitation model (REM) which can address the factors that have positive impact and the factors that have negative impact during elicitation in GSD. The propose model will give solutions and practices to the challenges during elicitation. Method: Systematic literature review (SLR) and empirical research study will be used for achieving the goals and objectives. Expected outcomes: The expected results of this study will be REM that will help vendor organizations for better elicitation during GSD.

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1. INTRODUCTION

Requirement engineering (RE) is the systematic and discipline way of collecting user requirements for a software system and to manage it [1, 2]. The purpose of RE process is satisfaction of user needs and what customer wants from a software product [2-5]. Requirement elicitation is the first phase of RE during software development life cycle [6]. During elicitation phase we do direct communication with users or customers and gather requirements by applying various elicitation techniques. The quality of software system is more depended on the quality of how better the requirements are gathered [1, 7]. RE is very difficult when we do it locally but the case very difficult when the development is done globally where clients and vendors are separated by distance and face challenges like culture issues, time zone difference and difference in languages and terminologies. Due to extra challenges in GSD proper elicitation process is affected [8, 9].

2. MOTIVATION AND RELATED WORK

Miguel Romero [10] discusses that culture and time differences are big challenges in GSD. For reducing the effect of challenges it is necessary for people to share knowledge about requirements and have a proper knowledge management system. The author describes relevant skills for elicitation in GSD are; English language skills, understanding of cultures of others, computer mediated communication skills, use of proper communication protocols, ability to resolve conflicts and teamwork skills are needed for effective elicitation.

Nosheen Sabahat [6] after doing survey and interviews explains the effectiveness of elicitation techniques. She concluded that in GSD the most effective elicitation techniques are prototyping, scenarios

and interview. The prototype is considered to be the best technique in GSD because prototypes represents product earlier and customers are more satisfied. Scenarios are best in case where prototypes are difficult to make. Questionnaires and other traditional techniques are not suitable in GSD. The author propose iterative model where elicitation and analysis works iteratively at same time.

Bin Wen [11] discuss that traditional elicitation techniques are not enough to apply in GSD during collecting of requirements, collaborative techniques like social intelligent for networked software and semantic web technology should be selected during elicitation.

Gabriela N. Aranda [12] in his paper suggests the strategies to overcome the challenges like lack of face to face meetings and culture issues in GSD. Culture differences cannot be ignored but stakeholders can learn about these differences and training is the best solution for that. The author has explained in detail about the trainings and its strategies. Use of ontologies is suggested as best way to reduce language differences. Using ontologies can clarify the structure of knowledge and as well as reduce conceptual and terminological confusion. Technology selection must be discussed in team while doing elicitation because technology selection process is carried out by studying and confronting the personal preferences of people who need to work together.

Fabio Calefato [13] discuss that as face to face communication during elicitation in GSD is difficult but still it is possible to have systems and technologies that can be alternative to face to face communication. After empirical studies the author design computer mediated tool for synchronous text solution in case where face to face communication is difficult. The tool contains audio and video conferencing facility. The tool was further evaluated through case study using students.

Neetu Kumari [3] proposes the model which will address the issues with elicitation in GSD but the levels of this model are not defined. The model is limited to find the challenges only not the solutions. The characteristics of model are not explained. Further the methodology of collecting data from literature is not systematic so we need advance model which can address the challenges, critical success factors and the solutions for problems and challenges.

3. OBJECTIVES

The objective of this research study is to develop REM in order to support vendor organizations in better elicitation of requirements in the context of GSD. This model will address challenges and success factors during requirement elicitation. The propose model will address the solutions and practices needed to better implement success factors during elicitation and to reduce the effect of the challenges. For achieving the objectives, we will do the SLR and empirical study to find factors that are important during elicitation of requirements in GSD. For the implementation of factors, practices and solutions will be extracted through SLR and then questionnaire survey will be conducted to validate success factors, challenges and practices. Survey will be conducted in software industry to mention some new practices not mentioned in literature before. After finding the practices and solutions the propose model will be developed. The aim is to reduce the gap between researchers and software development vendors. Other researchers also adopted the same methodology in other fields to suggest such models [14].

4. RESEARCH QUESTIONS

The work reported in this paper is based on the five research questions which have posted in the following way:

RQ1: What are the factors as identified from literature that have positive impact during requirement elicitation phase of RE in the context of GSD?

RQ2: What are the factors in real practice that have positive impact during requirement elicitation phase of RE in the context of GSD?

RQ3: What are the factors and challenges as identified from literature that have negative impact during requirement elicitation phase of RE in the context of GSD?

RQ4: What are the factors in real practice that have negative impact during requirement elicitation phase of RE in the context of GSD?

RQ5: Are there differences between the factors identified through the literature and the real-world practice?

RQ6: Is the REM practically successful in terms of finding and alleviate implementation factors and challenges faced by vendor organizations during elicitation in GSD?

Through SLR, RQ1 and RQ3 will be address i.e. studying what factors (CSFs and Cs) have already been reported in the literature. In future in order to facilitate vendors in implementing factors important for success of requirement elicitation, we will program/code the REM in the form of software. Moreover for

overcoming challenges faced by vendor organizations in GSD the REM will suggest solutions. This tool will produce different assessment reports and do different activities for the software vendor organizations.

5. DESIGN OF REM AND RESEARCH METHODOLOGY

The methodology of the REM consists of the following three phases.

Phase#1: SLR will be conducted for data collection.

Phase#2: Empirical study will be conducted to validate the result of SLR and to find the practices for the mentioned factors.

Phase#3: For evaluation and validation of REM, Case study will be conducted. To explain the aforesaid three phases the following subsections are added.

5.1. Collection of Data and its Analysis

CSFs (critical success factors): Factors that have a positive impact during requirement elicitation in GSD. CRs (critical Risks): Factors that have a negative impact during requirement elicitation in GSD. Practices: For implementing CSFs, practices will be extracted and used. SLR will be used to identify factors (CSFs and Cs). Through SLR we will extract, analyse and will explore data relevant to our research questions. SLR is different from ordinary literature reviews being formally planned and more systematic. According to Kitchenham [15] SLR is divided into 3 phases. First phase is planning the review, second is conducting the review and implementation is the last phase. Before conducting SLR a protocol will be designed which include all the steps needed for SLR. From research questions a search string will be constructed for different libraries accordingly. Search procedure and plan will be defined and then protocol will be executed. After execution, inclusion and exclusion criteria will be define to tell which paper to include in final list.

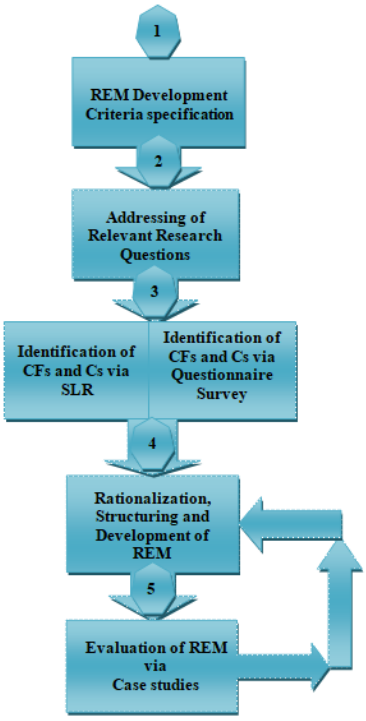

Figure 1. REM development cycle activities

To successfully implement factors (CSFs and Cs), a questionnaire survey will be conducted with experts working in the software industry. The purpose of this survey is:

a. Validation of the results of SLR.
b. To find new factors (CSFs and Cs) which are not previously identified.
c. To identify practices for the success implementation of (CSFs and Cs).

After REM is successfully design then for evaluation in real world environment case studies will be conducted in software industry.

5.2. Development of REM

For the design of REM we have used the five stages as shown in Figure 2. A similar approach has also been used by another researcher[16, 17].

The development of REM is the first stage; it is used to set criteria for REM success. The below mentioned two criteria will be used for the development and assessment of REM.

a. User satisfaction: This criteria focus on the satisfaction of end user from the result of REM. He / She should be able to use the REM without any confusion or ambiguity to promote objectives according to their requirements and assumptions.

b. Usability: This criteria emphasis on the structure easiness of the REM. It states that the structure of the REM should be flexible and easy to understand because organizations do not accept complex models and standards which require resources, training and effort.

Data collection and analysis is the stage 2. Rationalization and structuring of results will be performed in stage 3. Development of REM based on the results of empirical studies in stage4. Evaluation and validation of the REM via case studies will be performed in final stage i.e. stage 5.

Planned structure of the REM is shown in Figure 3. Relationship between REM levels is also shown, factors/risks and practices used to address risks and success implementation of RE process.

5.3. REM Structure

We will build the structure of the REM on the bases of following three extensions.

a. REM levels
b. Factors (CSFs, Cs) in each level
c. Practices and solutions for the implementation of factors

Classification of CSFs and Cs in different categories will be the base for defining the levels of REM. Each level will be consisting of different factors (CSFs and Cs). For each factor in the particular level, practices will be given for its proper implementation. Like CMMI and other models, for organizations to achieve certain level they must address and should follow the practices for each CSFs and Cs under that particular level.

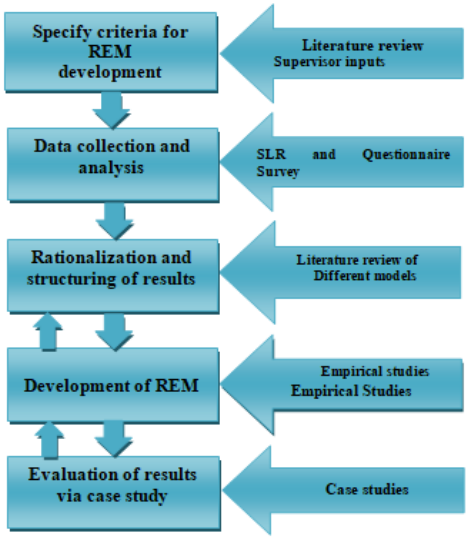

Figure 2. REM development stages

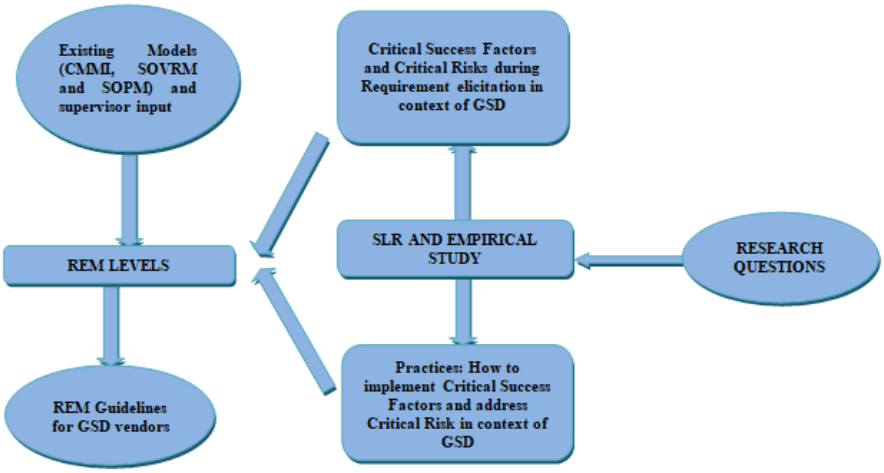

Figure 3. REM structure

5.4. REM Evaluation

REM will be validated through industrial case studies. For case studies maximum of five organizations will be enough. Case study is the best tool for evaluating any model in real environment. A focus group session will be arranged to get feedback from the participant about REM. The criteria will be ease of use and user satisfaction as discussed in section 5.2. In focus group evaluation two or more people interact and generate ideas without getting help from researcher. Focus group is more open as compared to individual interview.

6. RESEARCH CARRIED UPTO DATE

We have done the following research work so far:

a. Identification of problem and objectives
b. Research questions specification
c. Selection of research methodology
d. Defining structure of REM
e. Evaluation method selection
f. Conduct of SLR

7. CONCLUSION AND FUTURE WORK

In our paper we have presented the structure of REM with different levels and phases. We have discussed how this model will help vendors in better implementation of success factors during elicitation in GSD. Detail methodology for the development of REM was introduced. This model will be used as tool for software developers and will produce different assessment reports in different situations.

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