A Survey on Current Requirement Process Practices in Software Companies and Requirement Process Problems

Fauqia Ilyas
Dept of Computer Engineering, College of E&ME,
National University of Sciences and Technology,
Islamabad, Pakistan
fauqia.ilyas85@ce.ceme.edu.pk

Kinza Zahra
Dept of Computer Engineering, College of E&ME,
National University of Sciences and Technology,
Islamabad, Pakistan
kinza.zahra15@ce.ceme.edu.pk

Nadia Ambreen
Dept of Computer Engineering, College of E&ME,
National University of Sciences and Technology,
Islamabad, Pakistan
nadia.ambreen15@ceme.nust.edu.pk

Wasi Haider Butt
Dept of Computer Engineering, College of E&ME,
National University of Sciences and Technology,
Islamabad, Pakistan
wasi@ceme.nust.edu.pk

***Abstract*—Requirement engineering literature exemplifies the description of attributes and practicalities of the target system. Software requirements may ambit from high-level academic affirmation or restraint of a system to elaborated statistical functionalities. This paper exhibits the current practices of requirement process at Companies. A survey of ten companies is conducted with the assistance of definitive questionnaire. The results of the questionnaire is then compared and examined amongst all ten companies to discover what standards are being followed by the companies. An effort is made to evaluate the current criterions of Pakistani companies with respect to requirement engineering process.**

Keywords: SRS, Requirement Process, Software Requirement Engineering, Requirement Elicitation, Requirement Specifications

I. INTRODUCTION

The purpose of the study is to focus on the current practices of requirement process. In addition, the aim of this study is to examine the problems that might occur during the requirement process, that should be addressed in future research in order to improve the process. The problems in requirement engineering process have profound impact on the successful development of software.

Defects that are not identified and resolved during requirement process will have negative impact on all downstream activities.When these defects are discovered later, fixing these defects will take more time and cost [1]. Requirements problems not only reduce the quality of software but affects software development process[2].

Companies did not provide regular training to use management tools which affect the overall performance of the success of software development. As a result, requirements models are not properly documented and stored to back up the actual requirements [1].

Data was collected through a survey; questionnaire was distributed among different companies. Result shows that software companies are still facing problems in requirement process. It is noted that most of the requirement problems that are experienced by software companies were organizational rather than technical. The empirical study of process improvement, Herbsleb and Goldenson [3] found that organizational issues are the major hindrance in successful process improvement.

The organization of the paper is as follows: In Section 2, related work is presented. Section 3, Methodology is presented. Section 4, Results is presented. Section 5, supplies a comprehensive discussion about our discoveries. Section 6, limitations of our work. Sections 7, lastly, we summarize conclusion .Section 8, references.

II. RELATED WORK

Seven VSSE of RE were analyzed in Canada by Aaranda& Easterbrook (2007) [5]. Objective of the report is to examine RE practices in VSSEs [4, 5]. Companies are categorized on the basis of RE practices used by these software companies. The study concludes that companies with successful VSSE RE practices had a strong and different cultural structure. In charge of RE process were always experienced people.

In 2000, Nikula et al [6] demonstrated the results of the present Requirement Engineering process practices, of twelve small to medium sized companies in Finland. The study reports the level of adoption for RE practices. This study presents data about small and medium sized companies. Results show that the smaller company got a score of 0 out of a maximum of 30 points. Nikula concluded that the survey questions was not suitable for this small company[7, 8, 9, 10].

In 2004, Nikula portrayed a fundamental RE method [10]. Basic RE method was developed for small and low maturity organizations .Requirement development and requirement management techniques are presented in basic RE method. These techniques are established on principle RE techniques

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[6]. Requirements development and management techniques delivered in basic RE method might not be suited for VSSEs.

Large number of effects is related to requirement engineering in the process of software development [11]. Requirement engineering is a process of describing software, discovering stakeholders and their needs, performing analysis and implementation [12]. Deloitee 500 survey [13] shows that New Zealand is one of the most advanced countries in practicing pioneering technology. Beneficial requirement systems cut down the project cost and enhance quality of system Davis &Zowghi [14]. Two studies out of four are linked to requirement and question engineering [15, 16] that are being practiced in software organizations in New Zealand .General issues of software engineering practices are addressed in third and fourth studies [17, 18].

Interviews and questionnaire were applied to survey 16 companies of Australia in which 28 software projects were accomplished in 2005 [19]. Project effort involved in all activities of requirement engineering was viewed in study. Another study emphasizes on the difficulties and problems of eliciting requirements geographically [20].

Requirement engineering practices includes the surveys by Regnell, Beremark, and Eklundh (1998), Tvete (1999), and Weidenhaupt et al. (1998). Regnell et al. describes the requirement engineering process improvement, their affirming results and challenges. Tvete explains the process, excerption and problems in gathering requirement engineering. Weidenhaupt et al did some broad surveys on basis and their utilization in requirement engineering [21, 22, 23].

There are some surveys that discuss current practices amongst requirement process [6, 24, 25, 26, 27, 28, 29,], all the organizations and projects that are taking part in this survey contain large number of people, requirements and time duration. Mainly small companies were targeted for this survey.

Thirty six RE practices for small software companies that help to improve Requirements engineering process exhibited by Dorr et al [30]. RE practices are classified by elicitation, analysis, specification and verification/validation.

III. METHODOLOGY

A. Survey Questionnaire

We used survey questionnaire technique to gather data on process problems. The advantage of questionnaire is to collect large amount of information from different companies in short time and in cost effective way.

We distribute survey questionnaire among 10 different software companies. Results will be drawn after data analysis of gathered data. We use statistical analysis to evaluate results.

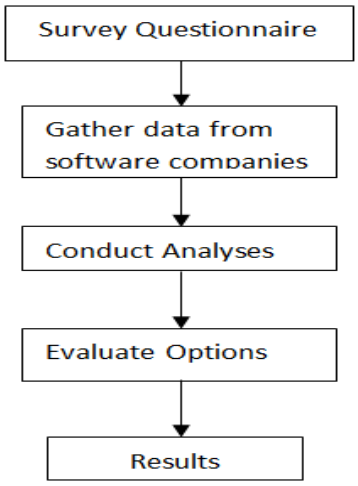

Figure 1: Process used

B. Data Analysis

The general objective of this survey is to examine the current practices of requirement processes and to identify requirement process problems.The results of the survey have been analysed by usingBasic statistical methods [31]. It is supported by following objectives:

On the basis of questionnaire we categorised questionnaire into current requirement process practices and organisational problems.

Respondents were asked to tell about the current requirement process practices in their company which includes:

1. Use of standards
2. Programming language
3. Process model
4. Technique for eliciting requirements

Second part of questionnaire includes organisational problems such as lack of skills, poor staff retention, involvement of intended users, poor user understanding, domain knowledge and inadequate resources all these issues are human-based. Respondents suggest their view by choosing any one choice from these strongly agree, agree, disagree or strongly disagree. On the basis of that it tells about the proportion of impact of organisational problems on requirement process that will affect the successful software development.

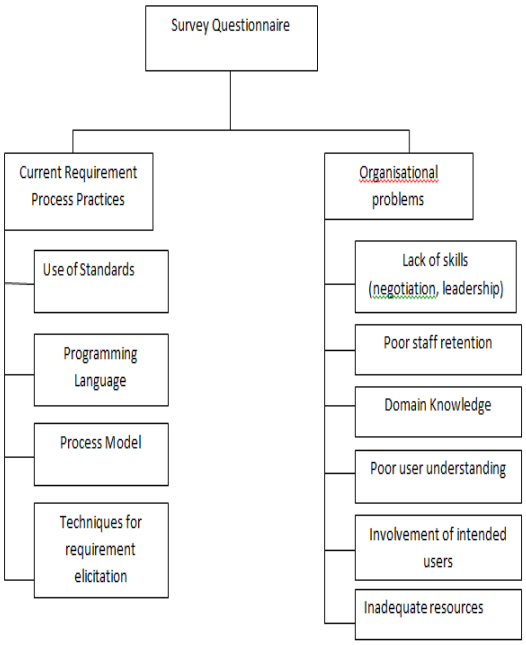

Figure 1: Questionnaire structure

IV. RESULTS

The use of standards and procedures is required to bring uniformity and control to the process of Developing a software product [31]. In this survey, our respondents were asked about the standard to which they refer such as IEEE, ISO 9000, CMM, other international, local standards or none at all. From the analyses the result shows that surprisingly, 10% of organizations are still unaware of the importance of standards in producing high quality products, 30% companies are using local standards, 20% of companies are using ISO9000 standard and 40% companies are using IEEE standards and none of them are using CMM (0%) [32] to control their software development process.

Table 2 lists the programming languages used by the respondents during development Activities [32]. It is obvious from Table 2 that object oriented is the most popular languages used by the organizations.

Table 3 lists the process models that are used by the respondents.It shows that spiral model is used by 40 % companies.

Table 4 lists the techniques for gathering requirements from customer. It shows that majority companies use interview technique for eliciting requirements from customer. Interview technique is best way to elicit customer response.

Table 5 shows that only few companies are conducting regularly training sessions for eliciting requirements and rest of the companies are not conducting training sessions which affect the successful development of software. Table 5 also shows that majority of the companies involve user on regular basis during development process which is best way to get customer response on timely basis.

Table 6 lists various organizational process problems. Respondents suggest that organizational issues have profound impact on the success of software development.

TABLE 1 : USE OF STANDARDS

Type of standards	Number of organization	Percentage (%)
IEEE	4	40
ISO 9000	2	20
Local	3	30
None	1	10
Total	10	100

TABLE 2: USE OF PROGRAMMING LANGUAGE

Type of standards	Number of organization	Percentage (%)
Visual Studio	2	20
Object Oriented	8	80
4GL(e.gsql)	0	0
3GL(e.gcobol)	0	0
Total	10	100

TABLE 3: USE OF PROCESS MODEL

Type of process model	Number of organization	Percentage (%)
Waterfall	3	30
Spiral	4	40
Prototyping	0	0
Other	3	30
Total	10	100

TABLE 4: TECHNIQUE FOR ELICITING REQUIREMENTS

Companies	Interview	Questionnaire	Workshops	Document Review
1	yes	yes	yes	yes
2				yes
3				yes
4	yes			
5				yes
6	yes	yes	yes	
7	yes			
8	yes			
9	yes			
10	yes			

TABLE 5: PROBLEMS

Companies	Training sessions	User involvement
1	sometimes	Sometimes
2	never`	Sometimes
3	never	Sometime
4	never	Weekly
5	never	Sometimes
6	regularly	Regularly
7	never	Sometimes
8	never	Weekly
9	never	Never
10	never	Sometimes

TABLE 6:ORGANIZATIONAL PROBLEMS

Problems	1	2	3	4	5	6	7	8	9	10
Lack of skills	A	S/A	A	A	S/A	S/A	S/A	S/A	S/A	A
Poor staff retention	A	A	S/A	A	S/A	S/A	A	A	S/A	A
Involvement of intended users	A	S/A	A	S/A	S/A	A	S/A	S/A	A	A
Poor user understanding	A	D/A	A	D/A	S/A	A	D/A	A	A	A
Domain knowledge	A	S/A	S/A	A	S/A	S/A	A	S/A	A	A
Inadequate resources	A	A	A	D/A	A	S/D	A	D/A	A	A

S/A = Strongly agree; A=Agree; D/A =Disagree ; S/D =Strongly Disagree

V. DISCUSSION

In order to produce high quality software standards and methodologies should be used extensively. From the analysis result indicates that most of the companies follow IEEE and ISO9000 widely. Programming language that is most commonly used by companies during development process is object oriented, and only few companies are using visual language.

Normally, specific software process models such as Waterfall, spiral, rapid prototyping will be used to develop software. The most acceptable model that was regularly and always used is the spiral model. Result shows that none of the company use prototyping model. The most critical activity that always arises during software development is the collecting requirement of the proposed system. This activity is vital to have a clear understanding on the needs of user or/customer.

Therefore, in order to simplify the requirement collection process, some techniques and methods have been introduced. Interview seems to be the most popular technique that has always been used by the organization.

Companies experiencing problems during requirement process were organisational. Organisational issues are human-based, for example, lack of leadership and negotiation skills of developer and poor staff retention [33].

Training of employees is an important item. Most of the companies don't conduct training session for eliciting requirements which will affect the success of software. Majority companies involve user which helps to elicit correct requirement. Companies should conduct regular training sessions for developers and project managers in order to improve software development and project management skills.

Respondents suggest that the following factors that are mentioned in table 6 have high impact on requirement process. Organisational issues have large impact on requirement process as compared to technical issues. Organisational issues are related to human. Lack of skills, Poor staff retention, Involvement of intended users, poor user understanding, domain knowledge and inadequate resources are factors that have profound impact for developing successful software.

VI. LIMITATIONS

In this study we present detailed data collected from 10 different software companies. It may not be appropriate to generalise from such a comparatively small representation, while our data should provide prospective start-points for additional study.This paper focuses only on organizational problems; further research might contribute focuses on other areas of problems rather than organizational problems.

VII. CONCLUSION

The results of the study have laid out some important points to be considered such:

- Most of the organization follows ISO9000 and IEEE standards while 10% are still lacking in the use of standards.
- Most of the companies prefer object oriented language for developing software.
- For the deployment of process model, the spiral method was more acceptable compared to other models such as object oriented and reuse oriented.
- Most of the companies use interview technique for eliciting requirements from customer which is best technique to extract requirements to influence user response.

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