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Common Requirement Elicitation Approaches used by Some Software Development Teams in Afghanistan

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Abstract : Requirement elicitation is a serious phase in the requirement development process. Identification of accurate stakeholders plays an important role in requirement elicitation processas it discovers the needs of stakeholders. Besides the quality of the requirements depends on the elicitation mean that has been chosen to elicit requirements. Different means are proposed in the literature to elicit software requirements however depending on the situation and stakeholders there are different challenges which could make it difficult to implement certain means of requirement elicitation. In this paper we have we studied the common requirement elicitation approaches that are being used by the software development teams in Afghanistan. We have attempted to explore that how rigid the process of requirement elicitation is applied within the development teams. To propose the best methods of requirement elicitation in the context of Afghanistan we have studied what common challenges exist while eliciting software requirements.

Keywords: Requirements elicitation, Requirements engineering, Requirement elicitation approaches**.**

Introduction

Software requirement elicitation is the first step in software requirement engineering, it is considered as the most critical part of the software development.However, requirement elicitation process may not be same in all type of projects and stakeholder's context. It also differs between developed and developing countries. A method that is used in one country may not be applicable in another country due to the nature of the stakeholders and the domain of the project.For example,in China the development companies want to keep a good relationship with the leaders of the customer companies, and they solve customer's problem by presenting demo systems to them to avoid conflicts and uncertainties [1]. Software projects require high resources and perfect planning for development. If the requirement for the software is not accurate and are not well refined, it can cause the whole project to fail and will

not meet the user requirements. So, it is important to know about how to elicit requirements and what challenges are inherent in the elicitation process and how it can be mitigated. Besides this there are different means available so it is important to know what means should be used for requirement identification? The elicitation of requirements is a vital process, and anything wrongly done in this process can lead to the complete failure of the project or it can cause great rework which is a total waste of time and money. That's why it is important to get organized and consistent user requirements for successful system development [2].

Literature Review

The basic goal of the requirement elicitation process is to gain the knowledge about the needs of the users, to elicit requirement a requirement elicitation technique is used, usually this technique is selected based on the practice of the company or on the personal experience of requirement engineer. Many processes are included in the development of a software project among which requirement elicitation is a critical one for a project to be successful, requirement elicitation includes social pleasure as well there will be users which have different backgrounds from whom we acquire requirements, and it is needed to bring them all together which makes the requirement elicitation a difficult task [3].

There are different means of eliciting software requirements which are discussed in the following sections.

2.1 Modelsfor Requirement Elicitation

The information is a vital resource for any organization, to understand the flow of information and processes within organization greatly helps in developing information systems. It is certain that the stakeholders' information and the system features for creating a software is not enough, we require to understand the complete flow of the business process to develop a good software. To elicit requirements for a system business process modeling notation (BPMN) can be used to understand not only the workflow but also the information related to the activities performed within a process [4]. To understand the stakeholders and the characteristics of the project different models have been presented. It is a norm that stakeholders of the project are dispersed geographically most of the time, the collection of groupware tools used for requirement elicitation are selected on personal favorites by the people who are controlling the project, these tools may not be comfortable for all the group members to find a solution for this kind of problem Learning Style models (LSM) and groupware techniques can be helpful. In LSM stakeholders are categorized into different categories based on their characteristics and based on their characteristics a suitable tool is suggested for them to elicit requirements [5]. Beside the characteristics of stakeholders, it is also important to consider the characteristics of the project for example the type of the project, the situation in which the project is going to be developed and

the technical characteristics. If any of the characteristics changes a different elicitation approach is used to elicit requirements [6].

Different studies have presented different models but none of these models are validated 100 percent because it requires a wider empirical work to show what technique is appropriate in a specific content [7].

2.2 Methods for Requirement Elicitation

The people involved in the requirement elicitation process belong to different domains and have different level of knowledge and understanding as well as they has different level of conveying their message so it is not possible to use a single method for all types of stakeholders [8].
Different methods are available for eliciting the requirements and these different methods vary from project to project heavily depends on factors like application domain, type of the system being developed and the current stage of the development. Each method has it is own strengths and weaknesses, a method used in one situation with a customer may not be applicable in a different situation with different type of customer, each method is different in it is complexity, simplicity, cost, available information etc. [9]. Furthermore, it is important to understand that the methods of requirement elicitation vary in different [1]. So, choosing the right method for requirement elicitation is a challenging task.
According to the research studies interview is the most common method that is used for requirement elicitation; but it is effective only if interaction quality of the participants is good, it is important that the interviewee have proper knowledge of the system and should properly answer the questions for better and clear requirements [10][11]. However,in so many cases the stakeholder may not have enough knowledge about the system they have built and want to enhance the system with some new features or may the stakeholders don't have enough time to meet the requirement engineers and allow them to gather requirements, in such cases it is better for the analyst to study the existing documents available which is called document investigation. It is a good technique to start the elicitation process with. On one hand it saves a great amount of time on the other hand it is not expensive [12].

2.3 Tools for Requirement Elicitation

Eliciting requirements collaboratively may have many challenges like problems of scope, volatility and problem of understanding among which the problem of understanding is considered to be the biggest cause of failure of projects [13]. Founded on communication the social nature of the requirement elicitation is obvious, the research in recent years have used different communicative techniques to rise the opportunities for effective requirement elicitation. These methods consist of interviews, group works however these methods still have some limitations like

misunderstanding of requirements.To improve the involvement of stakeholders the concepts of gamification has been used to generate new requirements to improve the elicitation process. There are several tools available for collaborative requirement elicitation like iRequire, Athena, wikis etc. with these tools collaborative requirement elicitation can increase the participation of stakeholders and can result in quality requirements [14].Sometimes the number of stakeholders can be huge so it is important to choose the stakeholders wisely for a large-scale project and without proper tools it will be hard to choose the right stakeholders. Large scale projects mostly have three problems.

(1) Information is burdened

(2) Insufficient involvement of stakeholders.

(3) Prejudiced prioritization of requirements.

To mitigate these problems some tools can be used for example "Stakerare"which uses social network and collaborative filtering techniques to filter larger sets of data for information. The accuracy of identifying requirements was increased by 10% by using stakerare. Comparing the time factor stakerare method took 56 hours less than the time spent using existing methods.However, if the initial requirements given to the tools are not well elicited it can cause problems in generating new requirements [15].Furthermore, it is possible that Software projects have many important stakeholders, but as in some large projects the stakeholders are of different type or in distributed software where stakeholders are dispersed it is hard to involve them in requirement elicitation process specifically when they are not in organization reach. For this purpose, the current characteristics of Facebook can be used for requirements elicitation, negotiation, and prioritization. The advantage of using social media is that for some software projects reaching to many possible users is a difficult task and social media can help greatly in this regard. However, if the moderator is not motivated it can result in poor requirements [16].

The tools proposed in the literature could greatly help in the process of requirement elicitation; however, in some scenarios it could cause problems for the requirement elicitation process. And therefore, we should not only be dependent on such tools.

2.4 Framework for Requirement elicitation

A framework is the description of a set of rules, standards, ideas and practices that creates a foundation for a way to recognize the research within a body of knowledge. Based on different factors and problems the researchers have suggested different frameworks to elicit requirements [17]. For example, knowledge is a factor and has an important role in the elicitation process however not all requirement engineers have enough knowledge because some may be less experienced while some others may have enough experience so to consider the knowledge of a requirement engineer a framework is needed to decide a method of elicitation [18] Another important factor in eliciting the software requirements is the gap in communication between the

end users and the developers. To remove the gap frameworks can play an important role and studies have validated the results of implementing the frameworks to remove the gap of communication [19].Atwo-way effective communication between users and stakeholders is important. The failure in effective communication may result in greater cost and failure of projects. There are frameworks which present three main categories that affect the requirement elicitation process. The first category is that of People that includes human factors such as the trust, knowledge, interpersonal skills etc. The second category is named as Process, it explains the starting and the process during elicitation. The final and last category is the product which reflects output after the elicitation performed with the help of effective communication [20]. We have seen that choosing a method of requirement elicitation is not just a choice, but different factors can affect this process. To mitigate the effect of these factors frameworks, play an important role in its selection.

2.5 Techniques for Requirement Elicitation

The selection of the requirement elicitation technique is very important, one of the reasons to select a good requirement elicitation technique is the experience of the analyst, the requirement engineers whose experience is less tend to select and elicitation technique which is known by them or they may think that this elicitation technique work for them last time so it will also work this time but this is not always true because requirement elicitation techniques differs from project to project and situation to situation, beside this greater experience in software projects can help in selecting a better requirement elicitation technique[21]. Furthermore,With the advancement of technology analysts have several elicitation options to consider but they are uncertain to be used as most of the times it is not known, how to select a specific type of technique for a situation [22] because the technique may vary depending on the situation [23]. On the other hand,It is not always the case that stakeholders are available at one place they may be distributed in some cases which impacts requirements elicitation regarding communication and coordination [24]. There are many techniques which can be used to elicit requirements,but it is useful to use, Question and Answer method, brainstorming and use cases when stakeholders are distributed[9] however some studies claim that instead of brainstorming technique storytelling technique can produce better results [25].

Besides the geographical distribution of the stakeholders there are other issues which needs to be considered for example Some clients are not good at conveying their message in a proper way, while eliciting requirements from such clients the requirement engineers face problems because they are unable to elicit requirements from such client, these clients could convey their requirements to the analyst till they see them visually and try some version of the product]. To provide them a visual structure of the system prototyping is a very good technique to use for

requirement elicitation process in such situations, a prototype is something visual either drawn or made with some computer program[26].

Besides using some technique to elicit requirements several communication skills are required for the successful elicitation. Elicitation should be different from just taking the notes, asking "WHY" question is very crucial and important but they should be asked in fine manner. Sometimes it is not suitable to ask a question starting directly with why, they can be asked in other words giving similar meanings. Secondly the analyst should be a very good listener. Listening is not only about hearing the second person but the understanding and comprehension of what he/she tries to deliver. A good question is the one that generates unexpected answers. Sometimes, a question might seem stupid to be asked but should be asked to clear the confusion [27]. Furthermore, it is important to understand that a single method is not enough to elicit requirements for example if we use only interview method It won't be effective because not so many people are involved in interview besides it is time consuming [28][29].

Requirement elicitation techniques are more collaborative these days. The active involvement of users/customers and stakeholders is very necessary for the success of the software project. Requirement elicitation see too many changes in the early stages which creates uncertainty, to overcome this several techniques can be used but prototyping is widely used. The elicitation process goes through stakeholders of heterogeneous backgrounds if it is not customer specific hence the collaboration of several techniques is required for the effective and desired results [30].

As the project can be highly volatile and there can be regular and numerous changes that's why flexible and elastic requirement elicitation techniquesmust be used together to overcome the challenges of volatility.

2.6 Challenges of Software Requirement Elicitation

Several studies have shown the common problems while gathering requirements one of the problems with requirement elicitation is the scope. Scope barriers are concerned with the boundary of the system to be developed scope barrier means that either the requirements are not sufficient, or the requirements are too much and out of scope or may be the requirements provided are out of the scope of the project. Problems with understanding of the requirement is another category mostly in this category there is poor understanding between the users and the developers, or there is poor understanding of requirements within the groups of software developers, the requirements are not fully understood by the users and are unaware of the full functionality of the system or may the requirement engineer be not aware of the domain knowledge which can cause poor elicitation of the requirements. Another problem related to the understanding of requirement is that the requirement engineer might speak different languages which can cause in the result of poor requirements [31].

Effective requirement elicitation rest on how the end user and the analyst communicate with each other because they both are involved to capture the processes and data which will make the actual system at the end. The following is a list of problems that could occur due to poor communication between human as well as due to the needs of organization which changes with time. This list covers problems that occur because communication between humans is fraught with difficulty, most people think that requirements are a stable set, and you must be smart enough to find them, but they ignore that the organizations are dynamic in nature and their needs change with time.
The following is a list of problems that can occur in requirement elicitation and can affect the requirement elicitation process [32].

- Incomplete requirements
- Incomplete domain knowledge
- Ill-defined system limitations
- Dual meaning requirements
- Unstable terms
- Inconsistent requirements
- Different views of users
- Changing requirements
- Continues acceptance of requirements from users
- Extreme requirements
- Miss understanding of system's purpose
- Unfixed requirements
- Incorrect requirements
- Poor user's association

Software industries in Pakistan do not follow the good practices of requirement elicitation process either it is followed incompletely or wrongly. The reasons that good practices are not followed by the practitioners in Pakistan are that the practitioners do not have enough knowledge about the process, or it require more cost. Some challenges identified in the elicitation process are listed below [33].

- Unavailability of the exact information from the customers and other stakeholders.
- Managerial problems.
- Poor knowledge about the domain
- Volatility in requirements
- Requires more time and cost
- Written mistakes in the documents
- Lack of resources

Beside these challenges a problem in the requirement elicitation is the professional training most fresh graduates have not practically implemented the practices of requirement elicitation which

makes it difficult for them to elicit the requirements properly, studies have shown that the requirement elicitation is not emphasized in courses of computer sciences and information systems, and practically fresh graduates are weak at requirement elicitation [34].

3. Research Methodology

In this paper a qualitative research Methodology is used. The feature of a qualitative research is that it is mostly suitable for samples which are small, while the results are not measurable. Which is the basic advantage of this method, which also makes it different from quantitative research. It offers a complete description of a research topic without limiting the scope of the research and the nature of the respondent's feedback [35]. To collect data, we have used survey and interview method. The survey method is considered appropriate because it allows large amounts of data to be gathered from a sizeable population in a highly economical manner (Saunders et al., 2009).

The interview method is useful because it allows information to be investigated more deeply than is possible using a quantitativemethod (Saunders et al., 2009). Moreover, interviews allow for guided conversations to beheld (Yin, 2003), and the deeper insight could help to open up new dimensions into reallife experiences (Saunders et al., 2009).

3.1 Participant selection criteria

The result of this study is a combination of information from existing literature, online survey, and face to face interviews from the experts who belongs to expert software development teams. The interviews are conducted with the people who are working in some software development team as a system developer, software engineers, or software project managers especially those people who are involved in the requirement elicitation process. The following key points are considered before the selection for interview.

- The participant should be currently working in some software development team.
- The participant should have done requirement elicitation for the projects.
- The participant should have experience of minimum 2 years in requirement elicitation and should have worked in large projects.

A description of the interviewed professionals is given in the following table with their experience and designation. As the interview had some question and answers which had political issues so it was promised with the interviewees that their identity will not be revealed so they are named as P1-P7

Expert	Designation	Experience
P1	System developer	11 years
P2	Senior MIS specialist	10 years
P3	MIS developer	7 years
P4	Senior Database Developer	5 years
P5	Software Requirement Engineer	2-3 years
P6	Senior Database Developer	5 years
P7	MIS head	5 Years

3.2 Research Questions

The following are the research questions which will be answered in this paper.

RQ1: what are the existing challenges of eliciting software requirements for software projects in Afghanistan?

RQ2: what requirement elicitation means are suitable to use for requirement elicitation in Afghanistan?

RQ3: How do these elicitation means help the requirement engineers and developers of Afghanistan in requirements gathering, assessment and integration?

4. Finding and Results

We have conducted 7 personal interviews from the experts who are working in different software development teams in different organizations (public and private). Beside this we have distributed an online questionnaire among 50 different professionals who are part of software development teams working as software developers, requirement engineers, system analysts etc. among these 50 professionals 39 responses were received through online survey. A range of means for requirement elicitation have been presented from the literature. Requirement elicitation process in Afghanistan was founded a bit different from what is presented in the literature. it was pointed out that the requirement elicitation is different in public and private sector. Proper elicitation process is not performed within governmental software development teams. Because there are different types of users of the system (top level, middle level, and lower-level users) and they all have different wish lists, so it becomes very hard to follow the proper requirement elicitation process and use the standard means. Besideconsidering the users and the stakeholders during the elicitation process it is also important to keep in mind the policies of the organization and according to the policy requirement elicitation process is performed. It was added that before developing any software project meetings with the stakeholders are fixed and take initial requirements are gathered from them and after that based on these requirements a system is built which is not fully functional and is presented to the stakeholder and based on this system the stakeholders provide further requirements. P1 respondent shared his experienced and added that once he builds the complete system without performing the proper requirement elicitation

process and at the end when the software project was presented it was not acceptable to the stakeholders. P2 respondent shared his experience that most of the time we can-not perform the requirement elicitation process from the stakeholders related to the project to be built then we must consider other stakeholders of the similar projects who are cooperative, and we elicit requirements from them using different methods of requirement elicitation. The following table shows the challenges in the requirement elicitation process in Afghanistan.

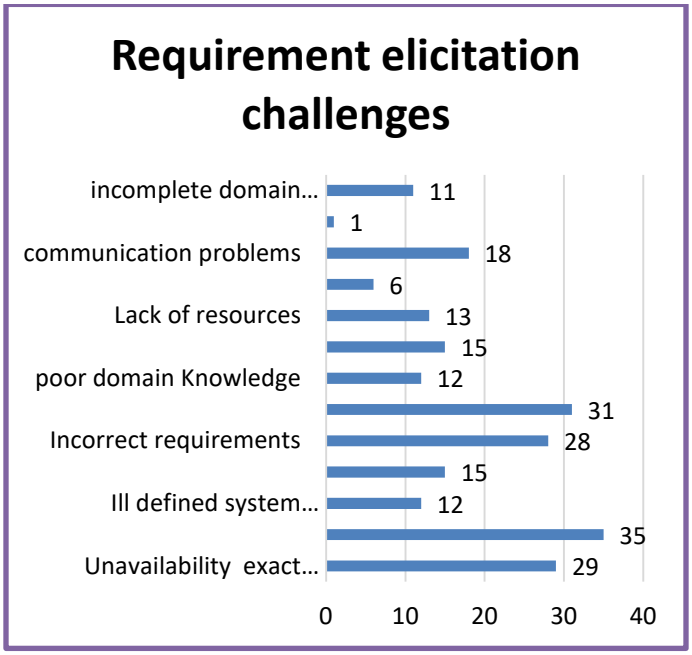

Figure 1

From the figure we can see that incomplete requirements, incorrect requirements and unavailability of the exact information and volatility are the most crucial among the available challenges in requirement elicitation. When it was asked from the experts in the interview session they also agreed on these challenges. Beside this they added that requirement elicitation differs from project to project and client to client. They also said that working in government software development team is different from working in some private company's software development team, because the stakeholders in government sector do not provide the requirements either because they do not want the system to be developed because it will stop corruption, or they do not have domain knowledge. Which means that building systems can prevent or decrease the rate of corruption, but unfortunately political influence in government sector is a major challenge in the process of requirement elicitation process. A large number of software development teams responded that mostly they work with web applications as shown in(**Figure2**) and they face

problems of wish lists from their stakeholders which is also a major challenge in requirement elicitation.

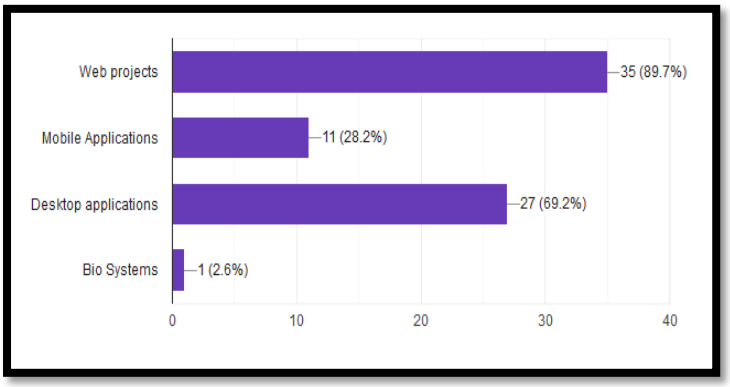

Figure 2

One of the respondents from the interview said that sometimes no requirements are provided by the stakeholders because they do not know what to build and how the system should work. And on of the challenges that he has faced was that when he developed the system it was rejected by the stakeholders as it was not the required system. Four respondents (P1, P2, P3, P5) arose the importance of volatility of software requirements and said that the clients are not familiar with their project at first and can-not deliver their message properly, when the projects starts and they see a prototype of the system they begun to change their requirements as per their need in the middle of the project which can cause time and cost to the completion of the project. To eliminate these problems and to find a better solution for these problems I asked more questions from the participants in the interview that how they deal with these different kinds of problems especially when most of the times the requirement are not available. All 7 respondents highlighted the studying of existing similar systems and observational methods. They also said that studying and observing the current workflow of the organization helps them to gather the initial requirements efficiently and these initial requirements helps them to conduct an interview with them for further requirements. (P1, P2, P7) claimed that sometime observing the client is not possible when face to face meeting is not possible so they use other techniques like email communication or Skype to get the initial background of how the system works. They also added that group discussion is very useful but sometimes it results in wish lists which results in unnecessary requirements.

Most of the respondents stated that one method is not enough to eliminate these challenges. Besides studying the existing system applying the interview method together with brainstorming produces the best results. The noticeable methods for elicitation challenges which are determined from this interview are studying existing similar systems, interview prototyping and brainstorming. Most of the time these methods are used and according to the experts they said these methods work well in the development teams of Afghanistan.

Selecting the requirement elicitation method depends on the type of the project being developed. Developing some project in the existing domain has a high level of certainty of scope and the requirements are well specified. When I asked the experts in the interview, they stated that mostly they do not use similar method in all types of the projects. For example, if they are working in some domain in which they have already worked they may have only interview with the client to take the necessary requirements. Working in a new domain differs from the domain that they have already worked. They also added that sometime the domain may be the same, but the clients may be of different mentality so according to their clients they also change their methods of requirement elicitation. One of the respondents (P5) said that he has never experienced any problem in applying the same method in different situation and it works for him. The experts said that interview and brainstorming are efficient methods for the systems in existing domain. The interviewees anticipated that the ethnography, social analysis, and prototyping are appropriate methods for new domain. In new domain, the requirements are not well well-defined, and the users may not clarify their requirements accurately. So, applying ethnography, prototyping and social analysis the analyst can observer the behavior and extract relevant requirements. They also added that for a new domain generally they study the similar existing system and the documents of the current system if available after that they brainstorm the requirements and prepares an interview and after that the requirements are collected in the interview, they build initial system as a prototype and presents it to the stakeholders. After that the stakeholders pass their comments are necessary changes are made which they say is a very challenging thing to do as their stakeholders mostly do not give any input.

RQ1: what are the existing challenges in Afghanistan of eliciting software requirements for software projects?

While looking for the literature review, I could not find any study which explains the challenges for the requirement elicitation in Afghanistan. But generally, the literature review has shown us that some of the major challenges which are explained in section 3.8 of the thesis. After completing the online survey,which was conducted from professionals in the field, they highlighted that the most common challenges in Afghanistan relates to the problem of understandability which means that the stakeholders can-not convey their requirements accurately. Beside this some other problems do exist which are shown in (Figure **1**)in interviews we come to know that besides the mentioned problems some other problems do exists in the process of elicitation which are political influences, corruption problems, acceptance to change and technical abilities of the people working in the organizations.

Some other problems that I have collected from the interviews are that the stakeholders are from varied professions and may not understand the technical parts of the system development. On

the other hand, in case of the new domain the analyst may not understand the terms that are used by the stakeholders in the specific domain while explaining their needs.

Our interview results also present communication problems which occurs in three areas with-in the user, between users, and among users and analysts. Primarily, the problems within the users are linked to intellectual limitations of a user which means that a user may explain only those problems that occurred swiftly and may skip critical problems that occur rarely. So, in explaining the requirements, the crucial problems may be skipped due to this problem within the users. Secondly, the problems between the users; they are working in same organizational setting, and they may express their needs separately because of different designation and experience. And thirdly, the problems "Among" stakeholders which arise when there is a conflict among stakeholders about the jointly identified requirements or jointly defined a large system that can be over budgeted. So as a result, a choice of the subset of the requirements that will be implemented into a working system will involve compromises among the various identified user's needs. The possible solutions that are recognized from our study results are observational (ethnography) and synthetic (prototyping) methods because these methods deliver physical concept, which is an efficient way to improve the individual (group) cognitive limitations and resolve the conflicts. The ethnography helps the analysts to observe the environment and extract requirements when user habitually reserved in speaking. The prototyping is useful to resolve the conflicts among the stakeholders.

Another problem that I have acquired from the literature review and the interviews is the resistance. The resistance can be seen in the following forms according to the earlier literature review I have done.

- Time Resistance: the person never finds the time to meet you
- Overload Resistance: the burden of information is too much but it is never enough
- Silence resistance: the person does not respond to what is asked
- Compliance resistance: the person always agrees with you

The solution to these problems is that to study the similar kind of system if the stakeholders are not available some other communication tools can be used like emails and other tools for communication.

RQ2: what requirement elicitation means are suitable to use for requirement elicitation in Afghanistan?

The software systems that are being built in Afghanistan are mostly web applications as we have seen in our online survey. Besides in interviews it was cleared as well that mostly the development teams work with web applications. As in the literature it is presented that there are different means for requirement elicitation like methods, frameworks, models, tools and techniques. These means vary from project to project. For example, in the literature it is said that online tools can be

used for requirement elicitation when the stakeholders are scattered geographically. However, in Afghanistan mostly these tools, frameworks and models are not considered and only the methods mean is used for requirement elicitation. Different elicitation methods are found in the literature and are different from one another in terms of simplicity, time, and cost. These methods also vary from project to project like application domain, type of the system being developed and the current stage of the development. The answer to this research question is based on the results from the literature review, online surveys, and the interviews.

The methods that are mostly applicable in the development teams of Afghanistan are studying the documentation of the existing system to gather the initial requirements or to study some other similar systems in the working domain. Besides this interviews and brainstorming are well suited and prototyping method is noticeable. Focus groups are not considered to be good methods because they lead to large amount of wish lists. Interviews are mostly used because it can gather huge number of requirements from users and with this brainstorming helps in achieving deeper knowledge of problem domain. The prototyping is an activemethod to develop the understanding and communication in the stakeholders by giving a real appearance of future system that is going to be developed. These methods are leading except in few circumstances in which conversational may be less effective than observational like communication difficulties. In condition, when a user is usually reticent an interview method may not be effective in this case, with the help of ethnography analyst can detect the requirements of the user. Nevertheless, ethnography can only be practical when stakeholders are not dispersed geographically, and project has inadequate time to apply this method. The general conclusion about the methods for software development teams in Afghanistan is that mixture of multiple methods can be applied because no single method guarantees the best assessment of requirements.

RQ3: How do these elicitation means help the requirement engineers and developers in requirements gathering, assessment and integration?

Requirement elicitation is an active process of dealing with the data gathering and adding them together in order to get the group of requirements for probable solutions of a software system. All other phases in requirement engineering could only be realistic if the preliminary requirements are accurately known and steady. It is the job of the requirement engineers to add up the collected information about requirements which can help the software developers in the wanted software system development. Software requirements can be assessed and integrated by looking at the previous documentation of system and mapping it to the new needs to organize them. However, this can be possible while working with the current domain and system already has previous requirement documents. For the completion of a fruitful elicitation process the validation of the requirement is necessary and it is achieved by involving all the affected groups and agreeing them on a mutual point. The clashes and the wish lists between the stakeholders can be solved by

making them contribute to the discussion to speak about the shortages, irregularities, and doubts in requirements. Since these combined and confirmed requirement will be used among the requirement engineers and developers in the coming phases of the project development. Third research question of my research has been talked in section 4.3. Numerous elicitation methods can help the requirement analyst in different task of the requirement gathering. Some methods like interviews and brainstorming for example can help the requirement engineer in the identification and collection of requirements from different sources of the requirements. The sources of requirements are already addressed in my thesis in section 1.4. as per the result of the interviews once requirements are collected from different sources it might be a big wish list so these methods can minimize the requirements and helps in prioritization and integration of the requirements.

5. A Comparaison of the outcome of Literature and Survey/Interview

The goal of this comparison of is to check the outcomes which are attained from the literature and from the interview/Survey. I have analyzed both the literature and the interviews/Survey to check the elicitation process and the means of the elicitation process and their applicability of these means in the development teams of Afghanistan. As in the literature I didn't find any study which could possibly tell the execution of the elicitation process and the coherent problems with the process. This study highlights the process of elicitation and the problems and communication obstacles in this process within the software development teams of Afghanistan. As I have presented different elicitation means in section 2.4. But the interview results and the result from the survey shows us that the means that are mentioned in the literature are not used mostly and they cannot be applied due to different constraints which are discussed in the earlier sections of this thesis. The process of requirement elicitation as per the results of the interview and survey is not executed as it should be executed, and which is mentioned in the literature. The interview showed me that no proper documentation is done for the process of requirement elicitation on the other hand the literature shows that requirement elicitation process uses models, and it is properly documented.

The problems that we have seen in the literature in section 2.5 have similarities with the problems that exists in software development teams in Afghanistan the problems in software development teams are discussed in section 4.2. Besides these problems the studies have found some other problems that are related to the communication obstacles, and it can affect the reliability of the elicitation process. These problems are describing the limits of the system which relate to what the system should do? The unclear boundaries of the system lie under scope problems that occur on prior phases of requirement elicitation. The scope of the system usually defined by the stakeholders and absence of domain knowledge will produce this issue. Another problem is the understandability between the client and the developers due to time constraints. And the gap

between the mind sets. Also, the conflicts occur due to the variety of stakeholders. Third problem is the change in the requirements in later phases of system development. Different means are available in the literature to deal with these problems and the studies have suggested methods, tools, and models to find solution for the problems.

6. Discussion and conclusion

After result evaluation of industry and literature, we are persuaded that there is surely a gap between the theoretical viewpoints of requirement engineering when observed from industrial viewpoint. The most seeming concern is that best practices suggested in the literature most often seem to overlook aspects such as resources within an organization whereas from the industrial standpoint resources are matter eventually influencing the entire development process. Some factors are identified in industries that differ from theoretical perspectives although some general discussion is found in literature of below mentioned points. Literature shows the problems but do not prioritize these obstacles. We found in industry that understandability problems are root cause of all other problems, so we presented these problems according to their severity in development. In our study an inside operation of elicitation activity is presented (as elicitation process consists of several steps) and multiple elicitation methods applicability is also seen in industry. We found in interview results development teams do not depend on single method or technique, they apply methods as they can to reach at sufficient quality within resource constraints. An impact of elicitation methods on remainder development phases is drawn from industrial interviews. The motivation of this paper was to find out the challenges in requirement elicitation process and to find out how requirement elicitation is performed in software development teams in Afghanistan. Along with identification of methods that can assist the requirement engineer in gathering requirements and find solution to the problems. With the help of literature review, online survey and interviews results we have come to know that the standard elicitation process is not performed within the software development teams in Afghanistan. The things that are suggested in the literature are not kept in mind while eliciting requirements as they may not be applicable in practical environment. Besides this we have identified some problems that occurs while eliciting requirements and these are problems of scope, understandability and volatility that faced by analysts in requirement elicitation process. The communication problems come under understandability. It is found that lack of understandability is the root cause of all other problems, and poor communication is first step toward project failure. These problems are curial because they connected to stakeholders and stakeholders have intellectual limitations while stating their wants. Communication obstacles can be risen due to problems within individual user, between two users or among group of stakeholders. These problems produce the consequential requirements in shape of unclear, disagreed, uncertain and inconsistent. That can lead to enormous loss in the form of project

failure because of poor requirements. So, analysts apply elicitation methods to reduce the effect of communication problems in their requirement elicitation process. Methods that are helpful in overcoming these barriers are ethnography and prototyping. The ethnography extracts users, need by observing them in their working circumstances. Analyst perceives the working environment and depicts the points from where conflicts are arisen. Prototyping gives a pictorial hint to the users to better understand the design of the system. This study also discovers that applicability of method or set of methods depends on several factors (domain nature, budget, time, stakeholder's availability) of the project. The advantage point of multiple methods implication is that it decreases the chance of important requirements omission. If one method skips any significant requirement, then other will cover it. However, multiple methods implication does not guarantee the project success. The methods that help the analyst for effective and quality requirement gathering are interview, brainstorming and prototyping methods. Because conversational methods collect large number of needs from users, so analysts have enough data for requirement extraction from these needs and prototyping proves helpful to collect a set of requirements from users by providing them visual picture of the system. The rest of the development process depends on the requirement elicitation activity. If the requirements are well gathered in this phase the requirement engineer will be able to analyze, prioritize and integrate them later. If not, the analyst has to repeat the elicitation process which will cause the consumption of project resources. It is important to mention that the methods suggest for requirement elicitation in this thesis are based on the supposition that the requirement engineers and stakeholders are cooperative and sincere in the process of elicitation. The users are keen to share knowledge with the analysts and the analysts are fully prepared before execution an elicitation session. The analysts should also have the interpersonal skills to help build agreement between varied groups of stakeholders. Such social skills are as important as the methods used in the elicitation process.

7. Limitation and future work

There are several aspects of our study that can be addressed in future research. The interview and online survey were conducted on small scale and results were addressed the problems related to all types of software development. In future it could be possible to increase the sample size of population for more generalization of results and issues in conventional software and small systems can be addressed with context to requirement elicitation. Since our study was a positive, that compares the finding of literature study and interview results. In this thesis, only issues in elicitation process were focused, it could also be possible to deal with other adjacent activities like requirement analysis, specification, documentation, and validation in future.

The limitations of this study result are given.

- The study results are based on small sample of professionals‟ opinions, generalizing these results on overall population may not be valid.
- Dissimilarity may possible between what these professionals say they do, and what they practically do?

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