3B DIFFERENT REQUIREMENTS GATHERING TECHNIQUES AND ISSUES

Abstract

Project management is now becoming a very important part of our software industry. To handle projects with success is a very big deal. In the software project management process there are some phases, first phase is requirement gathering. To get the correct requirement and to handle it, is most important for the complete project successfully. Requirement management is used to ensure that product or software meets the user's needs or expectations. Requirements are defined during the planning phase and then these requirements are used throughout the project. There are some techniques for gathering requirements. These techniques are interview, prototyping, use case analysis, JAD (Joint Application Design), brainstorming questionnaires, and storyboard. While gathering requirements, we faced many issues that are not capable of a successful project. This paper, there will be discussed these techniques and issues that are faced during requirement gathering and their solution.

Introduction

Requirements analysis is critical to the achievement of a development project. Requirements should be measurable, actionable, and testable and also should be related to the user's expectations. Requirement without any ambiguity fulfill the user's requirement make the project successful. While gathering requirements focused on "what" should be required rather than "how" it is required.

"Using peer reviews, scenarios, and walkthroughs to validate and verify requirements results in a more accurate, specification and higher customer satisfaction." It is estimated that 85% of defects are found in requirements during software development. Some techniques are used to gather requirements. Every technique is not used for every project. In these techniques some are useful and some are not but it depends on the project description.

Good requirement specifications are listed.

- Complete
- Verifiable
- Unambiguous
- Modifiable
- Traceable
- Usable during operations and maintenance

These requirements specifications produce a good project. There are some requirements types. Every project has some kind of requirements like:

- Functional requirements
- Non- Functional requirements
- Domain requirements
- Inverse requirements

During requirements elicitation, there may be many issues that have to face. That issue and its solutions will be discussed in this chapter. Different techniques and which one is best for which type of project will be discussed in this chapter.

Techniques of Requirements Gathering

In reality, there are hundreds of different techniques for requirement elicitation. In this paper, some commonly used techniques are mentioned. These are the following:

- Interview
- Questionnaires
- Brainstorming
- Storyboard
- Prototyping
- Use cases
- AD (Joint Application Development)

Interview

The interview is a common technique used for gathering data or information. In this technique, the interviewer conducts a meeting with the interviewee. Interviews questions should be according to the interviewee's level. Gather information according to his/her requirement. Questions should be open-ended however; the interviewee can provide a clear answer
of your question. There are three types of questions. These are structured, unstructured, and semi-structured. Structured interviews are conducted where the domain is specified. In this type-specific questions are asked and get to the point answer. In this way, all the questions are covered up in this type. The other is an unstructured interview in this type interviewer asks questions and requires a detailed answer to these questions. The interviewer applies only partial control over the way of discussion. In this way, some topics may be neglected [6]. Semi-structured is a combination of both. The semi-structured interview, where the elementary usual of the question is organized and used.

Questionnaires

The questionnaire is the best technique for gathering information. In this technique, questions are listed on paper. Questions are filled by the stakeholders and get the answer of these questions. In this technique, stakeholders cannot express their idea. No new dimension can be defined. The questionnaire type focused on the limited information eliminated unnecessary information.

Brainstorming

Brainstorming technique is a group discussion in which members share their ideas and find out the solution to the specific problem. Brainstorming generates or gathers new ideas rather than their quality. This technique is more popular because it is a group activity in which all the members share their idea. It is more productive for the reason that groups. When members generate ideas it is more value able as of group product and members enjoy the group activity. There is a method for conducting brainstorming tasks. These are:

- Subjects and design
- Procedure
- Results

- Discussion

It is not compulsory to manage brainstorming sessions to resolve major issues. The purpose of this technique is the introductory mission statement for a specific problem. The advantage of this technique is encouraging open-minded and free ideas or innovation on a particular predefined problem.

Storyboard

In this technique users, customers and developers draw a picture of what they want to develop software. Draw a picture of all requirements like toolbar, main window, dialogue boxes, etc. After drawing a full picture of all requirements, all members agreed upon it. It is just like paper prototyping [1]. Storyboarding is a very common technique for designing about which you want to get information for their project. Storyboarding is much more realistic for understanding software's structure for unknown persons who do not know about technical terms. There are some attributes or elements of storyboarding, which explain basic points for drawing storyboarding. These are:

- Level of details
- Inclusion of text
- Inclusion of people and emotions
- Number of frames
- Portrayal of time

The explanation is given below.

- Level of details
  The level of details describes the existence of actors and objects. It depends upon the designer how to draw a scene or describe only the detail of the interface.

- Inclusion of text
  In storyboarding text could be included in the design with each section. It may be possible designer will not use text.

- Inclusion of people and emotions
  During designing end-users should be in mind. Design should be according to end-user that affects the user or stakeholders.

- Number of frames
  Some frames should be in mind mostly 1 to 20 frames are included in each story. Each storyboard contains a different number of frames according to its requirement. Several features are contained in storyboards.

- Portrayal of time
  Time passing is included in storyboarding or used transitions.

Prototyping

Prototyping is a more significant technique for gathering requirements. Through prototyping, detailed requirements can be gathered if preliminary requirements are already collected [9]. Prototyping is much effective for gathering relevant information from users; users provide relevant information and also provide feedback. This technique is useful when users or stakeholders are not aware of technical terms in this way they deliver the right information and react to their requirements which are developed by designers or developers. Sometimes this technique is expensive in tenure of cost and time [6]. The prototype can be flat diagrams. It helps us to prevent misperception.

Use cases

Use case analysis is a document that defines the relationship between actor and system. Arrangement of actions a user uses a system to complete a procedure. Define how the system will behave in a particular situation. A use case can be used to represent business functionality [10]. An actor is used as interaction with the system how to discuss with the system or its environment. The use case will be successful when its goal is satisfied. Use case description also includes in use case analysis. Use case steps are written in an easy and understandable format of a use case diagram. The system is preserved such as black box, in which actor presents as whom, what will interact as system and purpose or goal for interaction with the system without knowing about the internal system. Here is the format of the use case description [11].

Template of Use Case

Use case No.	Goal name in verb phase
Goal	Longer detail of goal statement
Scope and level	What system is going to present, summary
Preconditions	What we expected is before now
Success end condition	Successful completion
Failed end condition	What will objective if goal aborted
Primary, secondary actors	Name of primary and secondary actors and their role
Trigger	Activities upon the system that start use case
Description	Description of all over the use case

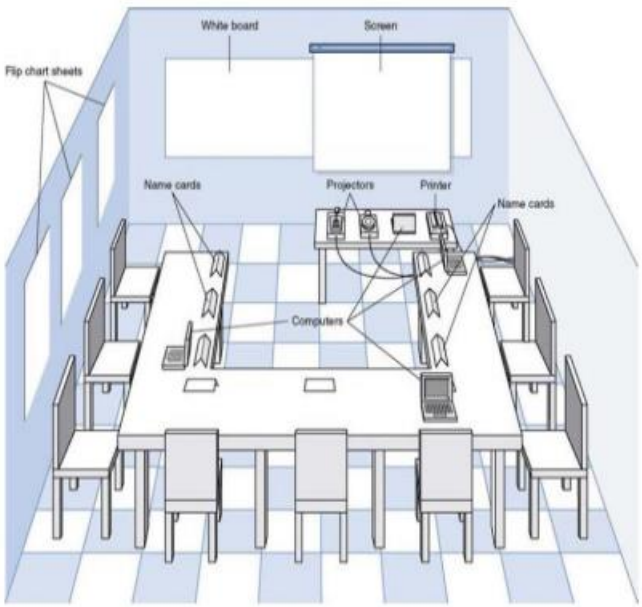
In table 1 there is given a template of use case description. Actors who will interact with the system, goal of use case description, precondition and if use case will not successful then failure condition all these points are mentioned in the use case description. Diagram of use case can present with an actor, use case, and system boundary through which actor interact with the use case. Diagram of use case presented as:

JAD (Joint Application Development)

In this technique, all stakeholders are included for the solution of the problem or for gathering information. With all parties, the decision can be made speedily. The main difference between JAD and brainstorming is that systems have previously been recognized before stakeholders take part. JAD session is well-maintained with defined phases and the role of actors. This type of technique is used to solve business issues rather than technical issues [6]. In the JAD session, a facilitator includes guideline of system requirement and help out users to resolve interview, provide information, and make decisions [12]. In the early JAD acronym was DESIGN, but now it become joint Application Development. JAD has five stages and their activities; a table of five stages is given below [13].

JAD Stages	Activities
Project Definition	✓ Define system goal, objective. ✓ Identify JAD team fellows. ✓ Establish project schedule.
Background Research	✓ Gather background knowledge of user requirement. ✓ Known about general issues that will discuss in JAD session.
Pre workshop Preparation	✓ Organize for session. ✓ Prepare all the documents and visual aids. ✓ Train the illuminator.
The Workshop	✓ Conclude solution within three to five day session. ✓ Finalize document meeting decision.
Final Documentation	✓ Prepare Closing document that contain final decision attained at through workshop.

JAD is useful due to some reasons like non-contributors are encouraged, dominance is reduced during the session, side discussions are included and true conflicts are under consideration in the JAD session. The meeting room of JAD is displayed below in figure 2 [4].



Issues in Gathering Requirements

When talking about requirement gathering or requirement elicitation then there may be many issues to gathering data from users or stakeholders. Here will be describing some issues and solutions of these issues [6].

- Scope
- Communication and understanding
- Quality of requirements
- Stakeholders
- Practice

The detail of issues and their solution are specified below.

Scope

The big issue of requirement elicitation is scope. Sometimes users or stakeholders are not familiar with or know the scope of the project. They can not specify the goal of their project. When a scope issue occurs, then it creates an issue to gather information from users. The scope should be limited and clearly define. However, requirements can be gathered correctly according to the user's needs or according to the nature of the project. The scope is very essential for good software project management. It has seemed that some projects are very worthy but due to limited scope, these are not successful.

Communication and understanding

In communication and understanding issues mostly faced end users. During communication with stakeholders, some issues may be a language issues. Stakeholders may be possible they do not know the language or it may possible they are not familiar with your condition and terms. Another communication issue could be that, however, their language is different so their rules may be different. So they are not able to understand your terms and they are not able to specify their requirement. Communication issues have four dimensions of the framework. These dimensions show the performance during the activity of requirement gathering. These are [14]:

- Stakeholder participant and selection
- Stakeholder interaction
- Communication activities
- Techniques

Explanations of these dimensions are given that can help to solve communication issues.

- **Stakeholder participant and selection**

First select stakeholders for gathering information. Selection should be on the right bases and the right users. The selection of stakeholders should be based on domain knowledge, about which domain have to gather requirements. Sometimes it might be happened to select stakeholders based on their position rather than their knowledge.

- **Stakeholder interaction**

Stakeholder interaction includes getting information from them through the meeting. In interaction, political or cultural issues may arise. Different cultures have different languages so there should be a common language to understand each other. The meeting schedule should be managed to agree to both parties.

- **Communication activities**

Communication will possible when both parties cooperate and negotiate. Communication activities categorize into three ways. One is knowledge acquisition, acquiring knowledge. Second is knowledge negotiation, negotiation with other stakeholders for the share of knowledge and requirement needs. Third is stakeholder acceptance, these requirements

should be accepted by stakeholders.

Techniques

Techniques used for the link to a developer with a customer. To maintain the relationship between the two techniques are used, Group and traditional. In group focus, brainstorming and workshops are included. In the traditional questionnaire, interviews and analysis of existing documents are included.

Quality of requirements

During gathering information some users did not provide the right information they are not serious. Sometimes their environment at that time is not according to their needs so they are not able to provide the right information. Requirement elicitation is the first phase for initialing any project so information should be correct and complete but stakeholders or other users where have to get requirements that do not provide correct and complete information that affects the overall project. In the end, project quality does not get the best due to the quality of requirements. The solution is that carefully gets information according to their need and put a limited question and get to the point answer in this way quality of the requirement can be improved.

Stakeholders

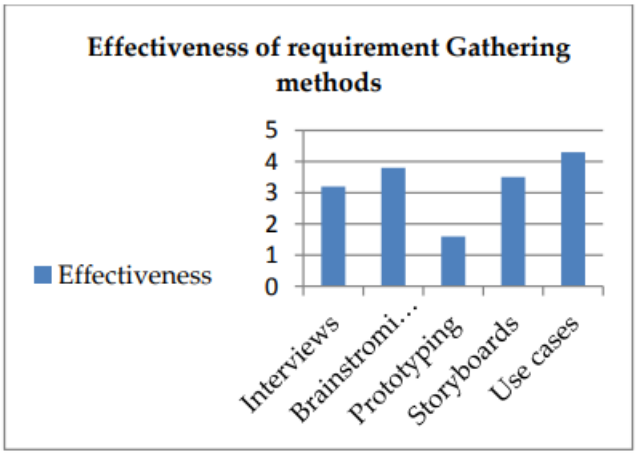
A stakeholder is one of the main issues during requirement gathering. Stakeholders do not know what they want and what their need is. They do not satisfy with one point because they do not know about technical terms. They have no idea about software working and system how it works. These are some conflicts that should be removed. This issue arose due to the unawareness of stakeholders They do not cooperate the whole time with project team members. On the other hand, they are not able to finalize the solution of the decision of any problem.

Practice

Generally, practice is a good factor in requirement elicitation. Sometimes not expert analysts are available for requirement gathering or there may be some gap between requirement theory and practice. Sometimes analysts repeat the mistake again and again. So, hire experience analysts for this purpose.

Effectiveness of Requirements Gathering Techniques

There is a graph that represents the overall effectiveness of different requirement techniques [15].



This graph shows the effectiveness of different techniques that are defined in this paper. Use cases are most effective because every use case presents a brief description of what will happen what are causes of that use case precondition, postcondition, other actors if are involved in it all these explanations is defined in use case scenario.

In any project main and the first phase is requirement elicitation. Correct information from stakeholders is significant for success and without any defective project. So, this paper is about different techniques of requirements elicitation. When talking about techniques then there are some issues. In requirement gathering, every technique is not used for every project. Some techniques have some issues that are cause techniques are used according to the project's nature. Every technique has some benefits and some drawbacks. Before using the technique check specifications of these techniques, which one is best or suitable for which type of project? At the end of this paper defined the result of techniques of requirement gathering, effectiveness of selected defined techniques.