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# A walkthrough of Requirement Elicitation Techniques

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***Abstract*—**
**Collecting the stakeholder requirements starts at the early stages of requirement engineering. It is a continuous and is highly critical process. Eliciting requirements from users remains a major challenge for systems developers. This paper focuses on the different elicitation techniques that are widely used in requirement engineering.**

***Keywords*—** Requirement Elicitation, Introspection, Interviews, Surveys/questions, Focus group, Joint Application Development.

## I. INTRODUCTION

Many of the problems encountered during the development and maintenance of software systems is only because of the problems with requirements. Studies reveal that failure of the software projects can be traced to poor requirements of planning, poor requirements management and poor handling of requirements change.

Ian Sommerville and Pete Sawyer define "requirements" as follows.

Requirements are ……a specification of what should be implemented. They are descriptions of how the system should behave, or of a system property or attribute. They may be a constraint on the development process of the system.

To develop a large and complex system is a difficult process. So the software development life cycle is broken in to several phases of which Requirement Engineering is the first phase. Requirement Engineering is further divided into elicitation, analysis, specification, and verification. Much of the requirements is not documented anywhere, it resides in the minds of the stakeholders. In feedback that has yet to be obtained from end users, and from the study of flowcharts and surveys that have yet to be created. And so requirements must be elicitated, or drawn out, and the methodology in doing so must be logical and meticulous. As one scholarly article notes:"mistakes made in elicitation have been shown many times to be major causes of systems failure or abandonment and this has a very large cost either in the complete loss or the expense of fixing mistakes".[3]Since most practicing analysts have less experience ad are more journeyman than master ,it is no surprise that over half the products created by the software industry fail to satisfy user's needs.[22]

Elicitation is all about determining the needs of stakeholders and learning, uncovering, extracting and / or discovering needs of the users and other potential stakeholders [15]. Requirement team should also include representatives from the client since their background knowledge about the client would be very useful in the development process. Once a problem is defined, the plan to carry the project work is developed. The job of the requirements team is then initiated wherein the team starts to identify the properties of the system that are needed to solve the problem. Requirement team gathers the different kinds of requirements from suitable stakeholders. Requirement elicitation techniques are methods used by analyst to determine the needs of customers and users, so that systems can be built with high probability of satisfying those needs. This paper describes the techniques for requirement elicitation. Techniques include introspection, reading existing documents, interviews, surveys/questionnaires, focus groups and JAD.

### A. Introspection

Introspection is the first method applied by the analyst to understand the system properties that are needed to succeed. Introspection is the self – observation and reporting of conscious inner thoughts, desires and sensations. It is a conscious and purposive process relying on thinking, reasoning, and examining one's own thoughts, feelings. This method can be very useful, but it has the problem that the introspection of an expert n a different field, such as requirement engineering, is unlikely to reflect the experience of actual users [1].Experts tend to work from what they remember or imagine of themselves for user interface design, this experience can be very

far from the questions, assumptions and fears of actual users. . Here the requirement engineer needs to deal with naïve users. Here the word naïve users means users who are experts in their own field but are not knowledgeable about the new technology. It is very hard for the requirement engineers to introspect the work settings or the conditions under which the new technology will be learned. However introspection alone will not be enough for the requirement engineer to collect information as is suggested by many psychologists. It should be checked with other elicitation techniques mentioned below.

### *B. Reading existing documents*

The requirement engineers can get information from the company reports, organization charts, policy manuals, job descriptions, reports and documentation of existing systems. This needs lot of patience from requirement engineers and a fair more time would be needed to carefully read all these and take into account only which is necessary. The requirement engineers should know what are needed for his purpose and to leave off the unnecessary, failure of which leads to availability of very large amount of data or very less. So careful examination of the documents is necessary. Table 1 shows the examples of types of documentation

TABLE I
EXAMPLES OF TYPES OF DOCUMENTATION THAT SHOULD BE EXAMINED

| Purpose of documentation | Examples of useful resources |
|---|---|
| Describes problem and need of database | Internal memos'-mails and minutes of the meeting, employees, .customer complaints and documents that describe the problem.<br>Performance review/reports |
| Describes the part of the enterprise affected by problem | Organizational chart, mission statement, and strategic plan of the enterprise.<br>Objectives for the part of the enterprise being studied<br>Task/job descriptions.<br>Samples of completed manual forms and reports<br>Samples of completed computerized forms and reports |
| Describes current system | Various types of flowcharts and diagrams<br>Data Dictionary<br>Database application design<br>Program documentation<br>User/training manuals |

This type of elicitation is especially useful when the goal is to update an existing system or when the understanding of an existing system will enhance a new system [3]. This type of technique is considered as an analytic method and is usually carried out by the analyst. However this method of getting relevant information only by reading the document would not match up to the reality.

### *C. Interviews*

Interviews are normally most useful fact finding technique. It is usually a conversation between two people. But it is a conversation where one person – the interviewer is seeking responses for a particular purpose from the other person: the interviewee. The interviewers should have the ability to listen and should also be sound in interviewing tactics. Requirement engineer is expected to discuss with different group of people and build up an understanding of the requirements. This gives an opportunity to discuss in depth a stake holder's thoughts and get his or her perspective on the business need and the feasibility of potential solutions. The objectives of interview can vary. They can be finding out facts, verifying facts, clarifying facts, generating enthusiasm, getting end use involved, identifying requirements and gathering ideas and opinions. But the most essential part of it is that the requirement engineer should have good communication skills for dealing effectively with people who have different values priorities, opinions, motivations and personalities. Interview is of two types Unstructured and structured.

Unstructured interview are conducted with only a general objective in mind and with few, if any specific questions. The interviewer counts on the interviewee to provide a framework and direction to interview. This type of interview frequently loses focus and for this reason it often does not work well for database analysis and design.

In structured interviews, the interviewer has a specific set of questions to ask the interviewee. Depending on the interviewee's response, the interviewer will direct additional questions to obtain clarification or expansion.

Open ended questions allow the interview to respond in any way that is appropriate. An example might be 'Can you tell me why this been recorded?'. On the other hand Closed –ended questions restricts

answers to either specific choices or short, direct responses.

An example might be 'Are you satisfied with your report'?.

Table 2 gives us how the natural occurring conversation is at the unstructured extreme but still the approach will be organized. [4]

A successful interview includes selecting appropriate individuals to interview, preparing extensively for the interview and conduction the interview in an efficient and effective manner. Practicing interviewing is a skill which is very important. This practice phase is concerned with interviewing skill. An example of this might be Table [3] which the author [4] uses for his students.

| | |
|---|---|
| How did you come to take this course? | Motivation<br>Information<br>Research orientation |
| What were your expectations of it? | Level<br>Academic character<br>Work load |
| What difficulties has it presented you with | Workload<br>Organization of time<br>Unfamiliarity of material |
| What do you think you are getting out of it? | Personally<br>Conceptually<br>Career direction |
| What use do you think it is going to be to you? | Research direction<br>Jobs/career development<br>Changed perceptions. |

The merits of interview according to Kothari [5] are as follows:

- More information and that too in greater depth can be obtained
- Interviewer by his own skill can overcome the resistance, if any ,of the respondents; the interview method can be made to yield an almost perfect sample of the general population
- There is greater flexibility
- Personal information can be easily obtained
- Samples can be controlled very effectively as there can be no missing of returns. Non-response remains very low
- The interviewer can usually control which persons will answer the interview.

### *D. Surveys / questionnaires:*

In consumer psychology, a survey is a fixed list of questions administered to a selected sample of persons of the purpose of learning about consumer's attitudes, behaviours, opinions and/or behaviour with regard to the targets.

Surveys are useful in gathering data from a large group of participants. Surveys are usually an inexpensive way to gather objective input from customers or potential end users. As with selection stake holders, a successful survey or questionnaire must have well-chosen participants. [3].surveys can usually be administered. Focus groups may be seen to occupy a middle ground between participant observation and in-depth interviewing remotely. Surveys can be structured to offer a serried of finite choices of feedback or they can offer open ended input, depending on the needs of the project at hand. It is a good practice for an analyst to politely request That survey participants respond by a reasonable deadline. Online, telephone and mail surveys do not necessarily require personal contact between the requirement engineer and the respondent and may, in many instances, reduce the biases as face-to-face interaction tend to be more cost effective .

Online survey holds great potential due to easy access and feedback potential but has its limits as the requirement engineer also feel certain about of doubt about who the respondents actually are.

However the telephonic surveys tend more advantages, but the information obtained usually will be less and the respondents will feel the time factor and turn restless at times.

Mail survey is good when the survey questionnaire is long and is relatively less cost effective. Here the respondents don't feel shy and give information willingly in contrast to the telephonic survey. However mail survey has the disadvantages like possibility of no response, possibility of late. W.Lawerence Newman [6] tells about the variables measured, and hypothesis tested in a single survey in the following.

- Behaviour. How frequently do you brush your teeth?
- Attitudes/beliefs/opinions. What kind of job do you think the mayor is doing?
- Characteristics. Are you married?
- Expectations. Do you plan to buy a new car in next 12 months?
- Self classification. Do you consider yourself to be liberal, moderate and conservative?
- Knowledge. Who was elected as chief mayor in the last election?

### *E. Focus Group*

Focus group is small structured groups with selected participants, normally led by a moderator. They are set up in order to explore specific topics, and individual's views and experiences, through group

interaction. Focus groups are special groups in terms of purpose, size, composition and procedures. [8]. In view of Kruger [9] focus group is described as 'a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, non –threatening environment. Focus groups may be seen to occupy a middle ground between participant observation and in-depth interviewing [10].They present a more natural environment than an individual interview, as focus group participants 'are influencing and influenced by others- just as they are in real life' [9].This methodology is a form of group interviewing with a semi structured questioning approach which relies on participants' responses.

### *F. Joint Application Development (JAD)*

JAD is a method where a software development and clients all come together in workshop environment. It is not only used to create the ideas for new system but it also raised issues for the software development team [11]. The goal of JAD is to involve all stake holders in the design phase of the product via highly structured and focused meeting. Typical participants in the session include a facilitator, end users of the product, main developers and observers. In the preliminary phases of JAD, the requirements-engineering team is tasked with fact finding and information gathering. This output of this phase is applied to security requirements elicitation are security goals and *artifacts.* Goguen [1] has stated that "because participants may have different status within the organization, there is a danger that some will not feel free to say what they really think, specially if it is unpopular". JAD Sections [12] were used much more to solve conflicts than to gather knowledge about the domain. During these sections some or all the stakeholders are grouped trying to achieve some cooperation among them and the requirements engineering to jointly produce system's requirements. Some of the most detailed elicitation models describe collaborative requirements workshops such as Joint Application Development (JAD).

## II. CONCLUSION.

Various authors have discussed about the requirement elicitation techniques. [14, 15, 16]. In [1] author discusses about various elicitation techniques and the social issues related to it and also evaluates the choice of one method over the other. In addition to it we can find the methods to prioritize these requirements also [17, 18, 19, 20].This paper gives a detailed insight about the various requirement elicitation techniques and prioritizing the requirements can be learnt from various authors.

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