

Extracts of
Requirements Elicitation: A Survey of Techniques, Approaches, and Tools
Didar Zowghi and Chad Coulin

<http://xue.medellin.unal.edu.co/~cmzapata/cursos/requisitos/survey.pdf>

Requirements elicitation is the process of seeking, uncovering, acquiring, and elaborating requirements for computer based systems. It is generally understood that requirements are elicited rather than just captured or collected. This implies there are discovery, emergence, and development elements to the elicitation process. Requirements elicitation is a complex process involving many activities with a variety of available techniques, approaches, and tools for performing them. The relative strengths and weaknesses of these determine when each is appropriate depending on the context and situation.

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2.3 Techniques and Approaches for Requirements Elicitation

[..] In reality there are literally hundreds of different techniques and approaches from a variety of sources that can and have been employed for requirements elicitation. Below we present only some of those that are more widely used. Although not exhaustive, we believe this selection is representative of the range described in the literature and practiced in industry today.

Interviews

Interviews are probably the most traditional and commonly used technique for requirements elicitation. Because interviews are essentially human based social activities, they are inherently informal and their effectiveness depends greatly on the quality of interaction between the participants. Interviews provide an efficient way to collect large amounts of data quickly. The results of interviews, such as the use fullness of the information gathered, can vary significantly depending on the skill of the interviewer. There are fundamentally three types of interviews being unstructured, structured, and semi-structured, the latter generally representing a combination of the former two.

Unstructured interviews are conversational in nature where the interviewer enforces only limited control over the direction of discussions. Because they do not follow a predetermined agenda or list of questions, there is the risk that some topics may be completely neglected. It is also a common problem with unstructured interviews to focus in too much detail on some areas, and not enough in others. This type of interview is best applied for exploration when there is a limited understanding of the domain, or as a precursor to more focused and detailed structured interviews.

Structured interviews are conducted using a predetermined set of questions to gather specific information. The success of structured interviews depends on knowing what are the right questions to ask, when should they be asked and who should answer them. Templates that provide guidance on structured interviews for requirements elicitation can be used to support this technique. Although structured interviews tend to limit the investigation of new ideas, they are generally considered to be rigorous and effective.

Questionnaires

Questionnaires are mainly used during the early stages of requirements elicitation and may consist of open and/or closed questions. For them to be effective, the terms, concepts, and boundaries of the domain must be well established and understood by the participants and questionnaire designer. Questions must be focused to avoid gathering large amounts of

redundant and irrelevant information. They provide an efficient way to collect information from multiple stakeholders quickly, but are limited in the depth of knowledge they are able to elicit. Questionnaires lack the opportunity to delve further on a topic, or expand on new ideas. In the same way they provide no mechanism for the participants to request clarification or correct misunderstandings. Generally questionnaires are considered more useful as informal checklists to ensure fundamental elements are addressed early on, and to establish the foundation for subsequent elicitation activities.

Task Analysis

Task analysis employs a top-down approach where high-level tasks are decomposed into subtasks and eventually detailed sequences until all actions and events are described. The primary objectives of this technique is to construct a hierarchy of the tasks performed by the users and the system, and determine the knowledge used or required to carry them out. Task analysis provides information on the interactions of both the user and the system with respect to the tasks as well as a contextual description of the activities that take place. In most cases considerable effort is required to perform thorough task analysis, and it is important to establish what level of detail is required and when components of the tasks need to be explored further.

Domain Analysis

Examining the existing and related documentation and applications is a very useful way of gathering early requirements as well as understanding and capturing domain knowledge, and identification of reusable concepts and components. These types of investigations are particularly important when the project involves the replacement or enhancement of an existing legacy system. Types of documentation that may be useful for eliciting requirements include design documents and instruction manuals for existing systems, and hardcopy forms and files used in the current business processes. Application studies often also include looking at both upstream and downstream systems, as well as competitive or like solutions. In most cases these studies involve other elicitation techniques such as observing the existing system in use and interviewing the current users. Domain knowledge in the form of detailed descriptions and examples plays an important part in the process of requirements elicitation. Approaches based on this type of information are often used in conjunction with, and as the input to other elicitation techniques. For example analysts use previous experience in similar domains as a discussion template for facilitating group work and conducting interviews. Analogies and abstractions of existing problem domains can be used as baselines to acquire specific and detailed information, identify and describe possible solution systems, and assist in creating a common understanding between the analyst and stakeholders. These approaches also provide the opportunity to reuse specifications and validate new requirements against other domain instances.

Introspection

The technique of introspection requires the analyst to develop requirements based on what he or she believes the users and other stakeholders want and need from the system. Despite being employed by most analysts to some extent, this technique is mainly used only as a starting point for other requirements elicitation efforts. Introspection is only really effective when the analyst is not only very familiar with the domain and goals of the system, but also expert in the business processes performed by the users. In cases where the analyst is forced to use this technique more, for example when the users have little or no previous experience with software systems in their work environment, a type of facilitation introspection should take place via other elicitation techniques such as interviews and protocol analysis.

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Group Work

Group work such as collaborative meetings is a very common and often default technique for requirements elicitation. Groups are particularly effective because they involve and commit the stakeholders directly and promote cooperation. These types of sessions can be difficult to organize due to the number of different stakeholders that may be involved in the project. Managing these sessions effectively requires both expertise and experience to ensure that individual personalities do not dominate the discussions. Key factors in the success of group work are the makeup of participants and the cohesion within the group. Stakeholders must feel comfortable and confident in speaking openly and honestly, and it is for this reason that group work is less effective in highly political situations.

Brainstorming

Brainstorming is a process where participants from different stakeholder groups engage in informal discussion to rapidly generate as many ideas as possible without focusing on any one in particular. It is important when conducting this type of group work to avoid exploring or critiquing ideas in great detail. It is not usually the intended purpose of brainstorming sessions to resolve major issues or make key decisions. This technique is often used to develop the preliminary mission statement for the project and target system. One of the advantages in using brainstorming is that it promotes freethinking and expression, and allows the discovery of new and innovative solutions to existing problems.

Joint Application Development (JAD)

Joint Application Development (JAD) involves all the available stakeholders investigating through general discussion both the problems to be solved, and the available solutions to those problems. With all parties represented, decisions can be made rapidly and issues resolved quickly. A major difference between JAD and brainstorming is that typically the main goals of the system have already been established before the stakeholders participate. Also JAD sessions are typically well structured with defined steps, actions, and roles for participants (including a specialist facilitator). The focus of this type of meeting tends to often be on the needs and desires of the business and users rather than technical issues.

Requirements Workshops

Requirements workshop is a generic term given to a number of different types of group meetings where the emphasis is on developing and discovering requirements for a software system. There are many different forms of requirements workshops including cross functional which involves different types of stakeholders from various areas of the business [..].

Ethnography

Ethnography being the study of people in their natural setting involves the analyst actively or passively participating in the normal activities of the users over an extended period of time whilst collecting information on the operations being performed. These techniques are especially useful when addressing contextual factors such as usability, and when investigating collaborative work settings where the understanding of interactions between different users with the system is paramount. In practice, ethnography is particularly effective when the need for a new system is a result of existing problems with processes and procedures, and in identifying social patterns and complex relationships between human stakeholders.

Observation

Observation is one of the more widely used ethnographic techniques. As the name suggests the analyst observes the actual execution of existing processes by the users without direct interference. This technique is often used in conjunction with others such as interviews and task analysis. As a general rule ethnographic techniques such as observation are very expensive to perform and require significant skill and effort on the part of the analyst to interpret and understand the actions being performed. The effectiveness of observation and other ethnographic techniques can vary as users have a tendency to adjust the way they perform tasks when knowingly being watched.

Protocol Analysis

Protocol analysis is where participants perform an activity or task whilst talking it through aloud, describing the actions being conducted and the thought process behind them. This technique can provide the analyst with specific information on and rationale for the processes the target system must support. In most cases however talking through an operation is not the normal way of performing the task, and as a result may not necessarily represent the true process completely or correctly. Likewise minor steps performed frequently and repetitively are often taken for granted by the users, and may not be explained and subsequently recorded as part of the process.

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Prototyping

Providing stakeholders with prototypes of the system to support the investigation of possible solutions is an effective way to gather detailed information and relevant feedback. It is common that prototypes are used in conjunction with other elicitation techniques such as interviews and JAD. Prototypes are typically developed using preliminary requirements or existing examples of similar systems. This technique is particularly useful when developing human-computer interfaces, or where the stakeholders are unfamiliar with the available solutions. There are a number of different methods for prototyping systems such as storyboards, executable, throwaway and evolutionary, with varying levels of effort required. In many cases prototypes are expensive to produce in terms of time and cost. However, an advantage of using prototypes is that they encourage stakeholders, and more specifically the users, to play an active role in developing the requirements. One of the potential hazards when using prototypes for requirements elicitation is that users may become attached to them, and therefore become resistant to alternative solutions from then on. Despite this the technique is extremely helpful when developing new systems for entirely new applications.

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Scenarios

Scenarios are widely used in requirements elicitation and as the name suggests are narrative and specific descriptions of current and future processes including actions and interactions between the users and the system. Like use cases, scenarios do not typically consider the internal structure of the system, and require an incremental and interactive approach to their development. Naturally it is important when using scenarios to collect all the potential exceptions for each step. [..].