1. Introduction

Once project proposals are approved, the next step is to study users’ needs in more detail. A project proposal often contains requirements stated at a very abstract level, so requirements need to be further examined in order to ascertain a more precise understanding of the system, such as how the system will function and what the user interface will be like. Requirements need to be analysed before the design of a system. During the course of a project, requirements often change, so it is important to manage requirements during the entire project.

The presentation below illustrates how requirements analysis and management fit in the project management roadmap.

Requirements analysis and management is an activity that begins at project initiation, but which often stretches over project planning and project implementation and control.

Objectives: Project Analysis and Management

Upon completion of this topic, you should be able to

- plan the requirements engineering process on a project
- elicit user requirements using a variety of techniques

2. Requirements Engineering Process

Requirements analysis is part of a broader process known as requirements engineering. The following tab presentation lists several iterative and overlapping activities that the process involves and looks at each activity through the eyes of a member of an IS project.

The project involves a company contracted by the city police force to build and integrate hand-held devices for crime-scene reporting.
Identifying project stakeholders who have a say in the project. This includes 'owners' of requirements such as business managers and end users.

Our first job was to find out who has a say in the project so that we can involve them early on. A team of end-users, a representative from the commissioner's office, a technical team and representatives from each police branch such as homicide and traffic were identified as the stakeholders. These groups would include the key decision-makers and the people with whom we would have contact for the entire duration of the project.

**Eliciting requirements**

Capturing requirements from stakeholders. This usually takes place through interview sessions and often focuses on business goals and objectives. Requirements are typically captured in a textual document.

Next, we met with each group to make sure we had elicited all the requirements for the system we were building. This took a few months and the outcomes were recorded in a requirements document. In addition to sending a survey to hundreds of end-users, we spent most of our time in focus groups headed up by the different stakeholders. We also used pictures and diagrams to help elicit requirements.

**Requirements analysis and modelling**

Representing requirements in some meaningful way, such as in a data model and process model.

The next stage was to analyse the requirements. Our team synthesised the requirements from the previous stage and created a process model for the system, documenting how each part of the system was to work, who would use the system at different stages of the workflow and how the device would interface with the existing systems. As part of this process, we also created some prototypes to demonstrate how the system would appear to the users.

**Requirements validation**

Ensuring that the requirements accurately reflect the users' original intent. This is an opportunity to clarify any unresolved issues. Prototypes can be a useful tool for validating requirements and checking that the developer's view of the system matches that of the stakeholders'.

We sat down with the users and talked them through the prototypes we had created. We also submitted our requirements document that documented our detailed understanding of their needs. The users spent some time making sure we’d taken all their inputs and validating the prototypes we had created. We needed to be sure that our understanding of the system was consistent with theirs.

**Review and negotiation**

Reviewing requirements to identify any inconsistencies, incompleteness or areas which need further clarification. It is also here that some agreement is made as to what is achievable within the timescale, budget and other resource constraints.

In the review period that followed, we ended up fine-tuning some aspects of the system. For example, we were asked to add a feature to the requirements that would allow crime-scene investigators to screen identity card numbers against immigration records. This new requirement meant some changes in the timeline of the project and the original anticipated budget.
Requirements acceptance

The stakeholders accept the requirements and sign-off on them. This often forms the contractual basis between the clients and information systems (IS) provider.

The users signed off on the requirements document, signalling that they accepted that the system to be built would meet their expectations. This helps avoid the problem of building a system that the user didn't expect. The project could also be base-lined, with any further changes being considered as a change request.

Requirements change and evolution

Any subsequent changes to requirements are managed. This involves assessing the cost, time and system impact of requirement changes.

3 months into the project, the users decided to include a new feature in the system that would enable vehicle license checking. The new feature was considered a change request, and the impact of the new feature was assessed by the team. It was determined that the new feature would extend the project delivery date by two further months and add $5000 to the overall cost of the project.

3. Requirements Analysis

Alvarez (2002) reported research showing that the elicitation of user requirements was a critical activity in IS project success, but that the process was fraught with conflicting, inconsistent and competing viewpoints where users and analysts rarely share perspectives. This lack of shared perspective often was found to lead to disagreement about system requirements.

Requirements analysis identifies the data and information needed to automate some organisational task and to support achievement of organisational objectives. Many IS failures have been attributed to a lack of clear and specific IS requirements. Accurate identification of requirements early in the process has been reported to lead to more successful systems and lower costs for error correction.

The following graphic illustrates the four processes that constitute requirements analysis.

Click each stage below to learn more about the four processes.

Conceptual design

Conceptual design is the process of developing a model of what the system should do. Critical factors such as the implementation environment, organisation goals and policies, product and service flows and anticipated problems need to be identified.

Logical design

The logical design process is where strengths and weaknesses of the conceptual design are assessed. Organisational and technological factors both have to be considered. Organisational factors include resources required, organisational politics and priorities. Organisational factors are better understood by viewing projects as systems collecting interacting components with a common purpose. Technological
factors refer to existing systems capabilities, the availability of needed data and the availability of needed personnel. The logical design process is a system design considering the organisation’s strengths and weaknesses.

**Validation**

Validation is a process meant to ensure that a valid set of requirements has been developed. Features that need to be considered in the validation process include data entry methods, system outputs and other impacts of the proposed project on the overall system.

**Formal specification**

The formal specification is the result of requirements analysis. An ideal formal specification clearly specifies a complete set of information requirements, to include inputs and outputs and what these elements are to do.

**Project planning**

Project planning determines what work must be done. The effort, time, cost and resources needed to execute the project must be estimated. Planning is iterative, because many assumptions have to be made at the requirements analysis stage that will need to be modified.

Planning is often omitted, based on arguments that:
1. The quality of the system is all that matters for the project to be successful
2. The existing planning models are inaccurate and unreliable
3. There is usually limited time available and skipping the planning step can save valuable time

Chatzoglou and Macaulay (1996) disputed all three of these arguments. The success of an IS project has been found to rely as much on project management as on system quality. Although project planning is difficult and perfect planning is impossible, without a plan, progress cannot be monitored. It is better to create a rough plan and incrementally improve the plan as new information is received; a rough plan is better than no plan. Finally, the greater the time pressure, the greater the need for planning.

You will find out more about project planning later, which is the next phase of the project management roadmap.

**Use cases**

Use cases have become very popular as a way to discuss and extract requirements from users. Use cases are discussions between developers and users describing the process in question from the perspective of the user. The focus is on what the system does rather than how this is achieved. Use case diagrams are often used as formalised notations for modelling systems from the user perspective. The use case represents proposed system functionality. For more details on use cases, see Vidgen (2003).

**4. Methods to Elicit User requirements**

Most requirement elicitation methods applied in practice are not formal, but tend to be forms of human interaction that have worked in the past. Apart from some more structured methods, methodologies include meetings, interviews and brainstorming.
Technical aspects are co-ordinated in documentation reviews, workflow analysis and joint development workshops. For the initial stages of project development, where the focus is on clarifying the process to be supported and/or to generate solutions, more generic meetings can be useful. Group support technology can be useful tools to support these different forms of human interaction and more effectively focus on the requirements needed by users.

Group support systems (GSSs) come in a variety of forms, ranging from use of email to software to support meeting rooms, as well as extranet (to expedite communication with suppliers, vendors and customers) and intranet (to expedite communication within an organisation) systems. These systems have been given credit for saving tremendous amounts of organisational time. GSSs tend to be more effective in reaching consensus or saving time depending on a number of factors, such as the size of the group and the agreement of the group on goals.

**Reading: Requirements Analysis and Management**

You may wish to read the following articles:


**5. Self-Assessment**

Now, try the self-assessment questions to test your understanding of the topic. Click the following link to open the Self-Assessment in a new window.

[Self-Assessment](#)

Q1. During the requirements engineering process, which one of the following activities should you generally NOT be concerned with?
   1. Identifying stakeholders
   2. Eliciting requirements
   3. Designing the system
   4. Reviewing and negotiating requirements

Q2. Requirements validation is concerned with which one of the following statements?
   1. Ensuring the requirements accurately reflect the users' original intent
   2. Building prototypes and working models of the system
   3. Continuous interaction with the client
   4. Project scoping

Q3. Which one of the following is recommended when eliciting user requirements?
   1. Involve as few people as possible
   2. Only be done in a face-to-face fashion
   3. Be an interactive process with the client
   4. Be deferred to the later stage of a project

**6. Summary**

This topic covered the following main points:
- Managing requirements is critical to IS project success.
• Requirements engineering describes the end-to-end process of managing requirements, from identifying stakeholders through to requirements change and evolution.
• Requirements analysis is concerned with studying the needs of users and how they relate to the system.
• While system developers could design each project on their own, a common problem is that when users are not consulted, systems are often developed which the designers think are great, but users find useless or unusable.
• A key critical success factor in IS projects is the involvement of users, whose input is especially critical in the early stages of the project where system requirements are identified.
• Requirements analysis begins with conceptual understanding of what the system is to do, leading finally to formal specification of the project.
• Obtaining accurate input from users is challenging and the methods used to gather information include meetings, interviews and brainstorming.

References