

# Software Engineering | Requirements Engineering Process

Requirement Engineering is the process of **defining, documenting and maintaining the requirements.**

It is a process of gathering and defining service provided by the system.

**Requirements Engineering Process consists of the following main activities:**

- Requirements elicitation
- Requirements specification
- Requirements verification and validation

- Requirements management

### **Requirements Elicitation:**

It is related to the various ways used to gain knowledge about the project domain and requirements.

- The various sources of domain knowledge include customers, business manuals, the existing software of same type, standards and other stakeholders of the project.
- The techniques used for requirements elicitation include interviews, brainstorming, task analysis, Delphi technique, prototyping, etc.
- The Delphi method is a process used to arrive at a group opinion or decision by surveying a panel of experts. Experts respond to several

rounds of questionnaires, and the responses are aggregated and shared with the group after each round.

- Some of these are discussed [here](#). **Elicitation** does not produce formal models of the requirements understood.

Instead, it widens the domain knowledge of the analyst and thus helps in providing input to the next stage.

- **Requirements elicitation** is perhaps the most difficult, most error-prone and most communication intensive software development. It can be successful only through an effective customer-developer partnership. It is needed to know what the users really need.
- **Requirements elicitation Activities:**

Requirements elicitation includes the subsequent activities.

Few of them are listed below –

- Knowledge of the overall area where the systems is applied.
- The details of the precise customer problem where the system are going to be applied must be understood.
- Interaction of system with external requirements.
- Detailed investigation of user needs.
- Define the constraints for system development.

## Requirements elicitation Methods

There are a number of requirements elicitation methods. Few of them are listed below –

- Interviews
- Brainstorming Sessions
- Facilitated Application Specification Technique (FAST)
- Quality Function Deployment (QFD)
- Use Case Approach

The success of an elicitation technique used depends on the maturity of the analyst, developers, users, and the customer involved.

## 1. Interviews

Objective of conducting an interview is to understand the customer's expectations from the software.

It is impossible to interview every stakeholder hence representatives from groups are selected based on their expertise and credibility.

Interviews maybe be open-ended or structured.

- In open-ended interviews there is no pre-set agenda. Context free questions may be asked to understand the problem.
- In structured interview, agenda of fairly open questions is prepared. Sometimes a proper questionnaire is designed for the interview.

## 2. Brainstorming Sessions:

- It is a group technique
- It is intended to generate lots of new ideas hence providing a platform to share views
- A highly trained facilitator is required to handle group bias and group conflicts.
- Every idea is documented so that everyone can see it.
- Finally, a document is prepared which consists of the list of requirements and their priority if possible.

## 3. Facilitated Application Specification Technique:

It's objective is to bridge the expectation gap – difference between what the developers think they are supposed to build and what customers think they are going to get.

- A team oriented approach is developed for requirements gathering.

Each attendee is asked to make a list of objects that

- are-
- Part of the environment that surrounds the system
  - Produced by the system
  - Used by the system

Contd.,



- Each participant prepares his/her list, different lists are then combined, redundant entries are eliminated, team is divided into smaller sub-teams to develop mini-specifications and finally a draft of specifications is written down using all the inputs from the meeting.

#### 4. Quality Function Deployment:

In this technique customer satisfaction is of prime concern, hence it emphasizes on the requirements which are valuable to the customer.

3 types of requirements are identified –

**Normal requirements –**

In this the objective and goals of the proposed software are discussed with the customer. Example – normal requirements for a result management system may be entry of marks, calculation of results, etc.,

Contd.,

- **Expected requirements –**

These requirements are so obvious that the customer need not explicitly state them. Example – protection from unauthorized access.

- **Exciting requirements –**

It includes features that are beyond customer's expectations and prove to be very satisfying when present. Example – when unauthorized access is detected, it should backup and shutdown all processes.

**The major steps involved in this procedure are –**

- Identify all the stakeholders, eg. Users, developers, customers etc
- List out all requirements from customer.
- A value indicating degree of importance is assigned to each requirement.
- In the end the final list of requirements is categorized as

- • It is possible to achieve
- It should be deferred and the reason for it
- It is impossible to achieve and should be dropped off

## 5. Use Case Approach:

- This technique combines text and pictures to provide a better understanding of the requirements.
- The use cases describe the ‘what’, of a system and not ‘how’. Hence, they only give a functional view of the system.

The components of the use case design includes three major things – Actor, Use cases, use case diagram.

### **Requirements specification:**

- This activity is used to produce formal software requirement models.
- All the requirements including the functional as well as the non-functional requirements and the constraints are specified by these models in totality.
- During specification, more knowledge about the problem may be required which can again trigger the elicitation process. • The

models used at this stage include ER diagrams, data flow diagrams(DFDs), function decomposition diagrams(FDDs), data dictionaries, etc.

### **Requirements verification and validation:**

**Verification:** It refers to the set of tasks that ensures that the software correctly implements a specific function. **Validation:**

It refers to a different set of tasks that ensures that the software that has been built is traceable to customer requirements.

If requirements are not validated, errors in the requirement definitions would propagate to the successive stages resulting in

a lot of modification and rework.

**The main steps for this process include:**

- The requirements should be consistent with all the other requirements i.e no two requirements should conflict with each other.
  - The requirements should be complete in every sense. •
  - The requirements should be practically achievable. •
- Reviews, buddy checks, making test cases, etc. are some of the methods used for this.

**Requirements management:**

- Requirement management is the process of analyzing, documenting, tracking, prioritizing and agreeing on the requirement and controlling the communication to relevant stakeholders.
- This stage takes care of the changing nature of requirements. It should be ensured that the SRS is as modifiable as possible so as to incorporate changes in requirements specified by the end users at later stages too.
- Being able to modify the software as per requirements in a systematic and controlled manner is an extremely important part of the requirements engineering process.