

Requirement Engineering Tasks

The broad spectrum of tasks and techniques that lead to an understanding of requirements is called requirements engineering. It is a major software engineering action that begins during the communication activity and continues into the modelling activity. It must be adapted to the needs of the process, the project, the product, and the people doing the work.

Requirements engineering builds a bridge to design and construction activities. Requirements engineering provides the appropriate mechanism for:

- understanding what the customer wants.
- analysing needs.
- assessing feasibility.
- negotiating a reasonable solution.
- specifying the solution unambiguously.
- validating the specification.
- managing the requirements.

To address the above said issues requirements engineering encompasses seven distinct tasks.

1. Inception
2. Elicitation
3. Elaboration
4. Negotiation
5. Specification
6. Validation
7. Management.

1. Inception

- It establishes the basic understanding of the problem and the nature of the solution desired
- Working description of project scope is identified.
- It provides effective communication and collaboration between stakeholders and other software team.
- As the information is subject to change, stakeholders must have sufficient discussion with software engineering organization.

During the inception task, the requirement engineer asks several sets of questions to customers and stakeholders.

- Who is behind the request for this work?
- Who will use the solution?
- What will be the economic benefit of a successful solution?
- Is there another source for the solution that you need?
- How would you characterize "good" output?
- What problem(s) will this solution address?
- Can you show me (or describe) the business environment in which the solution will be used?

With these set questions, the requirement engineer will gain better understanding of the problem.

2. Elicitation

In requirement engineering, requirements elicitation is the practice of researching and discovering the requirements of a system from users, customers, and other stakeholders.

But this process is not simple as there are number of problems encountered during elicitation.

Problem of scope: The boundary of the system is not properly identified as customers give unnecessary technical detail rather than clarity of the overall system objective.

Problem of understanding: customers are not sure of what is needed as they have poor understanding of the problem domain regarding various aspect of the project like capability, limitation of the computing environment. They have trouble communicating with system engineer, with that they specify conflict requirements or ambiguous requirements.

Problem of volatility: As requirements change from time to time and it is difficult while developing the project.

During elicitation we can identify the problem, propose elements of solution, and specify a preliminary set of solution requirements.

3. Elaboration

- The information obtained from the customer during inception and elicitation is expanded and is refined during elaboration.
- During this task requirement model is developed under various aspects of software functions, features and constraints.
- Create user scenarios that describe how the end user (and other actors) will interact with the system by providing various supplementary diagrams.

4. Negotiation

- Negotiation is the process of reconciling conflicts in requirements.
- Customers are asked to rank the requirements and then discuss conflicts in priority.
- Risks associated with each requirement are identified and analysed.
- Using an iterative approach, requirements are eliminated, combined and/or modified so that each party achieves some measure of satisfaction

5. Specification

- A specification can be a written document, a set of graphical models, a formal mathematical model, a collection of usage scenarios, a prototype, or any combination of these.
- Specification should follow standard template to present the requirements in consistent and understandable manner.
- In this task, the requirement engineer constructs a final work product.
- The work product is in the form of software requirement specification.

- It formalizes requirements of the proposed software in both a graphical and textual format.

Typical Contents of a Software Requirements Specification Requirements

- Software requirements grouped by capabilities.
- External interface requirements.
- Internal interface requirements.
- Software internal data requirements.
- Other software requirements such as safety, security, privacy, etc.
- Design and implementation constraints.

Qualification provisions to ensure each requirement has been met.

- Demonstration, test, analysis, inspection, etc.

6. Validation

- The quality of work product is assessed through the validation step.
- Requirements validation examines the specification to ensure that all software requirements have been stated unambiguously and that the work products conform to the standards established for the process, the project, and the product.
- The primary requirements validation mechanism is the technical review, where customers and software engineers verify the requirements to resolve errors.

7. Requirement management

- It is a set of activities that help the project team to identify, control and track the requirements and changes can be made to the requirements at any time of the ongoing project.
- Requirement management take care of changing nature of the requirement and ensures that specification is modifiable to incorporate changes in requirements.

Text Books:

1. Roger Pressman S., “Software Engineering: A Practitioner's Approach”, 7th Edition, McGraw Hill, 2010.
2. Sommerville, “Software Engineering”, Eighth Edition, Pearson Education, 2007

Web Links

1. <https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-355j-software-engineering-concepts-fall-2005/lecture-notes/cnotes2.pdf>
2. https://cdn.shopify.com/s/files/1/0457/4009/7694/files/software_engineering_pdf_pressman_7th_edition.pdf