

# Software Engineering

#### Agendas

- Requirements
- Types of Requirements
- Requirement Engineering
- Steps involved in Requirement Engineering

#### Requirement

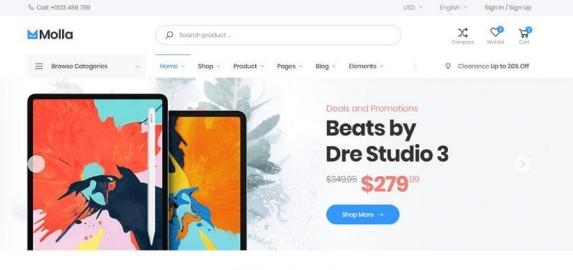
- According to IEEE standards 729, a requirement is defined as:
  - O A condition or capability needed by a user to solve a problem or achieve an objective
  - O A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification or other formally imposed documents
  - O A documented representation of a condition or capability as in 1 and 2

#### Requirement

- Description of features and functionalities of the target system.
- Convey the expectations of users from the software product
- Can be obvious or hidden, known or unknown, expected or unexpected from client's point of view

#### Requirement - Example

 Let's say you're undertaking a project to build an e-commerce application for your client Steve



#### **Explore Popular Categories**



Computer & Laptop



Digital Cameras



Smart Phones



Televisions



Audio



Smart Watches

#### Requirement - Example

- You need to remember "The project belongs to the client and you are only responsible for delivering it"
- Before carrying out the project, you must be clear about the
  - O Functionalities that Steve wants in the application
  - O The performance criteria and quality expectations of the application

## Types of Requirements

- Functional Requirements
- Non-functional Requirements

#### **Functional Requirements**

 Requirements that the end user specifically demands as basic facilities that the system should offer

- Need to be necessarily incorporated into the system as a part of the contract
- Represented or stated in the form of input to be given to the system, the operation performed and the output expected
- Requirements stated by the user which one can see directly in the final product

#### Functional Requirements - Example

- Steve might say
  - O The customer should be able to search for the products according to the category
  - O The system should facilitate membership to the customers
  - O The system should provide a platform to pay online or on delivery

#### Non-Functional Requirements

Quality constraints that the system must satisfy according to the project contract

 The priority or extent to which these factors are implemented varies from one project to other

Non-behavioral requirements.

### Non-Functional Requirements

- They basically deal with issues like:
  - O Compatibility
  - O Security
  - O Maintainability
  - O Reliability
  - O Scalability
  - O Performance
  - O Reusability
  - O Flexibility

#### Non-Functional Requirements - Example

- Steve might say
  - O The process time for each request should not be more than 6 seconds
  - O User request to access data must be verified first
  - O User layman is needed for the layman users

#### Requirement Understanding

- Understanding the requirements of problem is one of the most challenging tasks that Software
  Engineers have to face
- As there is a saying on "Effective Requirement Practices" by Ralph Young: This happens most of the time when customers come to you and say: "I know you think you understand what I said, but what you don't understand is what I said is not what I meant" This means that what the customers means and what you understand might not always be the same

#### What's the Solution?

A proper emphasis has to be given to while understanding requirements

REQUIREMENT ENGINEERING

### Requirement Engineering

The process to **gather** the software requirements from client, **analyze** and **document** them

 Goal - Develop and maintain sophisticated and descriptive 'System Requirements Specification' document



## Inception

Understanding the problem

Main focus - carrying out *feasibility study* 

#### Feasibility Study

Decides whether or not the proposed system is worthwhile

- A short focused study that checks:
  - O If the system contributes to the organizational goals
  - O If the system can be engineered using current technology and within budget
  - O If the system can be integrated with other systems that are used

#### Elicitation

Involves working with the customer/end users to gather requirements,
 performance and hardware constraints

 Process to find out the requirements for an intended software system by communicating with client, end users, system users and others who have stake in software development

#### **Elicitation - Process**

- Requirement Discovery
  - O Interacting with stakeholders to discover their requirements

- Requirement Classification and Organization
  - O Organizing the unstructured requirements and grouping them in terms of related requirements

#### **Elicitation - Process**

- Requirement Prioritization and Negotiation
  - O Meeting the stakeholders to prioritize requirement and resolve conflicts if there are any

- Requirement Specification
  - O Documenting the requirements

#### Interview

O Requirements are derived from formal and informal interactions with the system stakeholders

- Interview
  - O 2 Types:
    - Open Interview
      - No predefined agenda
      - Things become clearer after exploring the issues with the stakeholders

- Closed Interview
  - Predefined questions

- Interview
  - O Advantage
    - Clearer idea of what stakeholders do and interact with the new system

- O Disadvantage
  - Might not be helpful in understanding the requirements from the application domain

#### Questionnaires

O A document with predefined set of objective questions and respective options is handed over to all stakeholder to answer, which are collected and compiled

- Questionnaires
  - O Advantage
    - Very effective and easy to compile the feedback and results

- O Disadvantage
  - If the questions or options fail to represent the issue, the issue might be left out

#### Observation

- O **Team of experts** visit the client's organization
- O Observe actual working environment
- O Observe workflow at client's end and how execution problems are dealt
- O Team draws **conclusions** which **aids to form requirements** expected from the software

- Observation
  - O Advantage
    - First hand information gained by the requirement team or engineers

- O Disadvantage
  - People might behave differently when they know they are being observed

- Studying existing documentation
- Scenarios
- Prototyping

#### Elaboration

The information gathered from Inception and Elicitation are refined and expanded

Creating of user scenarios on how they interact with the system

#### Negotiation

 Customers always try to ask more for the given resources and there might be conflicting requirements coming from different users

Negotiate to resolve those conflicts

#### Negotiation

Prioritizing the requirements, assessing the cost and risk

Requirements are combined, modified or eliminated

#### THERE SHOULD BE NO WINNER OR

LOSER IN AN EFFECTIVE NEGOTIATION

#### Specification

- All requirements are documented i.e.
  - O Functional requirements
  - O Non-functional requirements

This document is known as Software Requirements Specification (SRS)
 Document

### Software Requirement Specification

Description of a software system to be developed

- Contains
  - O All requirements that reduce the development time and cost
  - O All requirements that minimizes the risk
  - O All functional and non-functional requirements

## Software Requirement Specification - Template

- Introduction
- Overall Description
- System Features
- External Interface Requirements
- Other Non-functional Requirements
- Other Requirements

#### Validation

- Examination of specification to ensure
  - O All requirements have been stated
  - O All inconsistencies, omissions and errors have been detected and corrected

 A technical review is carried out involving review team, customers, endusers and other stakeholders

#### Requirements Management

- Ensure product development goals are successfully met
- Technique for documenting, analyzing, prioritizing, and agreeing on requirements - engineering teams can have current and approved requirements

 Avoid errors by tracking changes in requirements and fostering communication with stakeholders from the start to the end

# THANK YOU!