## Introduction

Requirements identification is the first step of any software development project. Until the requirements of a client have been clearly identified, and verified, no other task (design, coding, testing) could begin. Usually business analysts having domain knowledge on the subject matter discuss with clients and decide what features are to be implemented.

In this experiment we will learn how to identify functional and non-functional requirements from a given problem statement. Functional and non-functional requirements are the primary components of a Software Requirements Specification.

Objectives

**After completing this experiment you will be able to:**

* Identify ambiguities, inconsistencies and incompleteness from a requirements specification
* Identify and state functional requirements
* Identify and state non-functional requirements

Time Required

Around **3.00** hours

Requirements

Sommerville defines "requirement" [[1]](http://vlabs.iitkgp.ernet.in/se/1/theory/%22/isad/isad/1/references/%22) as a specification of what should be implemented. Requirements specify how the target system should behave. It specifies what to do, but not how to do. Requirements engineering refers to the process of understanding what a customer expects from the system to be developed, and to document them in a standard and easily readable and understandable format. This documentation will serve as reference for the subsequent design, implementation and verification of the system.

It is necessary and important that before we start planning, design and implementation of the software system for our client, we are clear about it's requirements. If we don't have a clear vision of what is to be developed and what all features are expected, there would be serious problems, and customer dissatisfaction as well.

Characteristics of Requirements

Requirements gathered for any new system to be developed should exhibit the following three properties:

* **Unambiguity:** There should not be any ambiguity what a system to be developed should do. For example, consider you are developing a web application for your client. The client requires that enough number of people should be able to access the application simultaneously. What's the "enough number of people"? That could mean 10 to you, but, perhaps, 100 to the client. There's an ambiguity.
* **Consistency:** To illustrate this, consider the automation of a nuclear plant. Suppose one of the clients say that it the radiation level inside the plant exceeds R1, all reactors should be shut down. However, another person from the client side suggests that the threshold radiation level should be R2. Thus, there is an inconsistency between the two end users regarding what they consider as threshold level of radiation.
* **Completeness:** A particular requirement for a system should specify what the system should do and also what it should not. For example, consider a software to be developed for ATM. If a customer enters an amount greater than the maximum permissible withdrawal amount, the ATM should display an error message, and it should not dispense any cash.

Categorization of Requirements

Based on the target audience or subject matter, requirements can be classified into different types, as stated below:

* **User requirements:**They are written in natural language so that both customers can verify their requirements have been correctly identified
* **System requirements:**They are written involving technical terms and/or specifications, and are meant for the development or testing teams

Requirements can be classified into two groups based on what they describe:

* **Functional requirements (FRs):**These describe the functionality of a system -- how a system should react to a particular set of inputs and what should be the corresponding output.
* **Non-functional requirements (NFRs):**They are not directly related what functionalities are expected from the system. However, NFRs could typically define how the system should behave under certain situations. For example, a NFR could say that the system should work with 128MB RAM. Under such condition, a NFR could be more critical than a FR.

Non-functional requirements could be further classified into different types like:

* **Product requirements:** For example, a specification that the web application should use only plain HTML, and no frames
* **Performance requirements:** For example, the system should remain available 24x7
* **Organizational requirements:** The development process should comply to SEI CMM level 4

Functional Requirements

**Identifying Functional Requirements**

Given a problem statement, the functional requirements could be identified by focusing on the following points:

* Identify the high level functional requirements simply from the conceptual understanding of the problem. For example, a Library Management System, apart from anything else, should be able to issue and return books.
* Identify the cases where an end user gets some meaningful work done by using the system. For example, in a digital library a user might use the "Search Book" functionality to obtain information about the books of his interest.
* If we consider the system as a black box, there would be some inputs to it, and some output in return. This black box defines the functionalities of the system. For example, to search for a book, user gives title of the book as input and get the book details and location as the output.
* Any high level requirement identified could have different sub-requirements. For example, "Issue Book" module could behave differently for different class of users, or for a particular user who has issued the book thrice consecutively.

Preparing Software Requirements Specifications

Once all possible FRs and non-FRs have been identified, which are complete, consistent, and non-ambiguous, the Software Requirements Specification (SRS) is to be prepared. IEEE provides a template [[iv]](http://vlabs.iitkgp.ernet.in/se/1/theory/%22/isad/isad/1/references/%22), also available [here](http://vlabs.iitkgp.ernet.in/se/1/theory/%22http:/www.cse.msu.edu/~cse870/IEEEXplore-SRS-template.pdf%22), which could be used for this purpose. The SRS is prepared by the service provider, and verified by its client. This document serves as a legal agreement between the client and the service provider. Once the concerned system has been developed and deployed, and a proposed feature was not found to be present in the system, the client can point this out from the SRS. Also, if after delivery, the client says a new feature is required, which was not mentioned in the SRS, the service provider can again point to the SRS. The scope of the current experiment, however, doesn't cover writing a SRS.

**Consider the problem statement for an "Online Auction System" to be developed:**

New users can register to the system through an online process. By registering a user agrees to abide by different pre-defined terms and conditions as specified by the system. Any registered user can access the different features of the system authorized to him / her, after he authenticates himself through the login screen. An authenticated user can put items in the system for auction. Authenticated users users can place bid for an item. Once the auction is over, the item will be sold to the user placing the maximum bid. Payments are to be made by third party payment services, which, of course, is guaranteed to be secure. The user selling the item will be responsible for it's shipping. If the seller thinks he's getting a good price, he can, however, sell the item at any point of time to the maximum bidder available.

**Learning Objectives:**

1. Learn about the three different aspects that have to be taken care of while writing requirements specification

**Limitations:**

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Following are the ambiguities

 None

 There's no specification when an auction gets over http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 It doesn't say who are registered users

 No mention about what technology to be used for developing the application

Following are the inconsistencies

 None

 An item is said to be sold to the max bidder after auction is over; it can also be sold before the auction is over http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 A registered user seems could be both buyer and seller

The problem statement is incomplete because

 None

 No mention of how a new user registers http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 No mention of any dispute regarding the sold product

 No mention of what kind of products could be put on auction

**Consider the problem statement for an "Online Auction System" to be developed:**

New users can register to the system through an online process. By registering a user agrees to abide by different pre-defined terms and conditions as specified by the system. Any registered user can access the different features of the system authorized to him / her, after he authenticates himself through the login screen. An authenticated user can put items in the system for auction. Authenticated users users can place bid for an item. Once the auction is over, the item will be sold to the user placing the maximum bid. Payments are to be made by third party payment services, which, of course, is guaranteed to be secure. The user selling the item will be responsible for it's shipping. If the seller thinks he's getting a good price, he can, however, sell the item at any point of time to the maximum bidder available.

**Learning Objectives:**

1. Identifying different functionaries to be obtained from a system

**Limitations:** This list is in no way complete; exercise #4 would address this again

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Following functional requirements could be obtained from the requirements specifications

 Registration: New users have to register themselves online with the site and accept its terms & conditions http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 User Login: A user has to login into the site using his correct user ID & password http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Upload Item for Auction: An authenticated user can upload an item into the site, which is to be put on auction subsequently http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Auction Item: User puts an item already uploaded by him ino the site on auction http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Balance Check: Bidder should have enough bank balance to bid

 Bid for Item: Any registered & authenticated user of the system could place a bid for an item on auction http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Win Auction: After the auction is over, the maximum bidder for the item owns the item post payment http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Ship Item: Seller of the item ships the item to the auction owner after he (seller) receives the payment http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Availability: The system should remain up & running before, during and after an auction

 Remove item: Owner removes an item after uploading it, and doesn't put on auction http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Remove auctioned item: System automatically removes an item from its inventory after it has been successfully auctioned http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Site Support: Customer care for the website should provide 24x7 help over phone



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Result

***Excellent!***

Decrease font sizeIncrease font sizeList of experiments

Tophttp://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/new/footer-curve.jpg[A Django powered site.](http://www.djangoproject.com/)

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[SHARES](http://vlabs.iitkgp.ernet.in/se/1/exercise/)

**Consider the problem statement for an "Online Auction System" to be developed:**

New users can register to the system through an online process. By registering a user agrees to abide by different predefined terms and conditions as specified by the system. Any registered user can access the different features of the system authorized to him / her, after he authenticates himself through the login screen. An authenticated user can put items in the system for auction. Authenticated users users can place bid for an item. Once the auction is over, the item will be sold to the user placing the maximum bid. Payments are to be made by third party payment services, which, of course, is guaranteed to be secure. The user selling the item will be responsible for it's shipping. If the seller thinks he's getting a good price, he can, however, sell the item at any point of time to the maximum bidder available.

**Learning Objectives:**

1. Identifying characteristics that a system should have, but not done by the system itself

**Limitations:**

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Following possible non-functional requirements could be identified from the requirements specifications

 The system provides option for online registration of new users

 The system should remain up & running throughout it's working hours http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 System automatially removes an item from its database after it has been successfully auctioned

 Sessions of different users must not affect each other http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Customer care for the website should provide 24x7 help over phone

 System should maintain privacy of their users and should not leak their information to third parties http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 System should be able to service 100 users simultaneously http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 System could remain unavailable for upto 2 hours for maintenance once in a quarter with 36 hour prior notice http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png



Bottom of Form

Result

***Excellent!***

## 1. When is feasibility study done?

 After requirements specifications have been finalized

 During the period when requirements specifications are prepared

 Before the final requirements specifications are done http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Could be done at eny time

## 2. A good requirement specification is one, which is

 Consistent

 Complete

 Unambiguous

 All of the above http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

## 3. Requirement specification is done

 After requirements are determined http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Before requirements are determined

 Simultaneously with requirements determination

 Independent of requirements determination

## 4. Functional requirements of a system are related to

 Using the system (by users) to get some meaningful work done http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 How the system functions under different constraints

 Whether they adhere to the organization policies

## 5. SRS refers to

 Software Requirements Specification http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 System Resources Statement

 Statement of Reliability of System

 Standard Requirements Statement

## 6. The main objective behind preparing a SRS is to

 Let client and developers agree that they understand each other http://vlabs.iitkgp.ernet.in/se/isad_static/isad/images/accept.png

 Formally note down the requirements

 Estimate the cost of development

 To judge whether the project could be undertaken

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