Intelligent Software Project Management (ISPM)

System Requirement Specification

Project ID: 16_098

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1.   Introduction

1.1   Purpose

The main intention of this Software Requirement Specification (SRS) is to put into words the functional and nonfunctional requirements of the proposed system Intelligent Software Project Management. Throughout this document it describes all the important information related with the research project. And also it describes the overall idea of the research in depth. In the SRS document it further addresses the user interfaces, and flow of the project and the internal functionalities of the software components, which are going to be implemented. In addition to that it outlines the background of the research topic, technical approach and significance of the system and the specific deliverables. It will also clearly state the constraints under which the application must operate and other factors necessary to provide a complete and comprehensive description of the requirements for the explained solution.

This document mainly focused the project supervisor, co-supervisor and the research team members. The document is written in a form that any person can read and understand the content. So it also useful to former researches and person who is interested to implementing this kind of applications.

The final product of this project will meet the requirements specified in this document. The targeted audience of this document is the end users of Software Project Management and also the developers who will be engaged in developing and maintaining this system in future.

1.2   Scope

This document briefly explain what our system is and what are the specific features of the system and also by going through this document users can get a clear idea of how the system look like.

Our system will cover up the areas of software project management in depth and the most important fact of this system is automating the whole process of software project management.

Typically there is a project manager in a software company to handle software projects. Then he or she has to manually handle all the steps in the project management process and actively manage each and every task properly. That is very much time consuming and not an effective way to get accurate results to come up with a standard successful project. Even though there are some software project management tools to ease the work of software project management there is no any automated tools. So we enhanced the scope of our system in order to achieve that task. That will help in an effective way to maintain the spm process. By implementing a web based automated spm system users will be able to work in a convenient way and there will be no need of a software project manager to guide them.

There is an ontology engine in this system and it will get the requirements as an input and decide what the possible and essential requirements for the project. Finally it will produce the finalized unambiguous unique requirements.

And also another important feature of this system is automated prediction generator. When considering with the current software projects making accurate predictions is a crucial task. Because it is mainly done before the start of a project and so that the project will depend on those predictions. If we are able to generate successful predictions then finally the project will be also get success.

Users can benefit many privileges by using this system as it increases performance, productivity and efficiency in a proper way without need of a project manager.

1.3 Definitions, Acronyms, and Abbreviation

ISPM	Intelligent Software Project Management
SPM	Software Project Management
JDK	Java development kit
MY SQL	MY structured query language
SPT	Software project team

Table 1 Definitions, Acronyms, and Abbreviation

1.4 Overview

1.4.1 Main Goal of the software

Managing software projects in a proper way is a critical task in every software organization. Somehow the projects should be tally with the timeline and end up within the allocated time period without any issues. Project managers must be well experienced, talented and skillful in order to handle any kind of a project. Based on their performance the projects will get success or fail. If a large project fail then that is a huge impact to the reputation of the organization. That is why there should be an effective way of managing the software projects. By developing this ISPM system we can achieve that.

Main goal of this system is to automate the most crucial tasks which are performed by a PM. Even though there are some tools related to SPM they do not cover the most important areas of SPM. That is why to overcome this issue we planned to automate the whole system in order to provide an easier environment to the user to work in a friendly manner. Users can achieve more benefits from an automated system rather than using a non-automated general software tool. System will automatically manage the progress of SPM itself until the project is completed. So then obviously there is no any hard work to the user and he can deal with the system easily.

1.4.2 Tasks

Big amount of past project's data is stored in the database in order to generate accurate predictions. When a new project is going to manage through the system finalized requirements which is

produced by the ontology engine will be given as an input to the system. Then the system analyzes those requirements with the past data and generate predictions such as success rate of the project, cost, suitable developers for the project, risk. At the same time it sends notifications for the allocated developers by mentioning his/her assigned task and also to the senior managers regarding the status of the project. So then they can manually add or remove developers for certain tasks or do any kind of modification to the project. Importance of making those predictions is because users can get an overall idea of the new project. Since it is a fresh one developers may also get confused and it is very helpful to get a clear view of the project at a glance.

1.4.3 Users

There are several parties which interact with this system such as senior managers, developers. Senior managers can login to the system and view the current status of the project and also they can manually do the modifications of the project such as adding new developers, extend time duration for a certain task etc... Developers can log in to the system and view the assigned tasks for them and due dates.

1.4.4 Organization of the SRS

In section 1,the purpose of the preparing the document is explained, the aspects of the application the document tends to cover , the scope of the software, Glossary and an overview of the software , it's main goals, tasks and users are described.

Section 2 describes Overall description of software is explained in a non-technical manner, It includes product perspective, product functions, user characteristics, constraints, assumptions, dependencies of requirements.

Section 3 describes the technical requirements of the software and contains functional requirements, non-functional requirements and design constraints.

Section 4 describes contains supporting information for the readers of this document.

2. Overall Descriptions
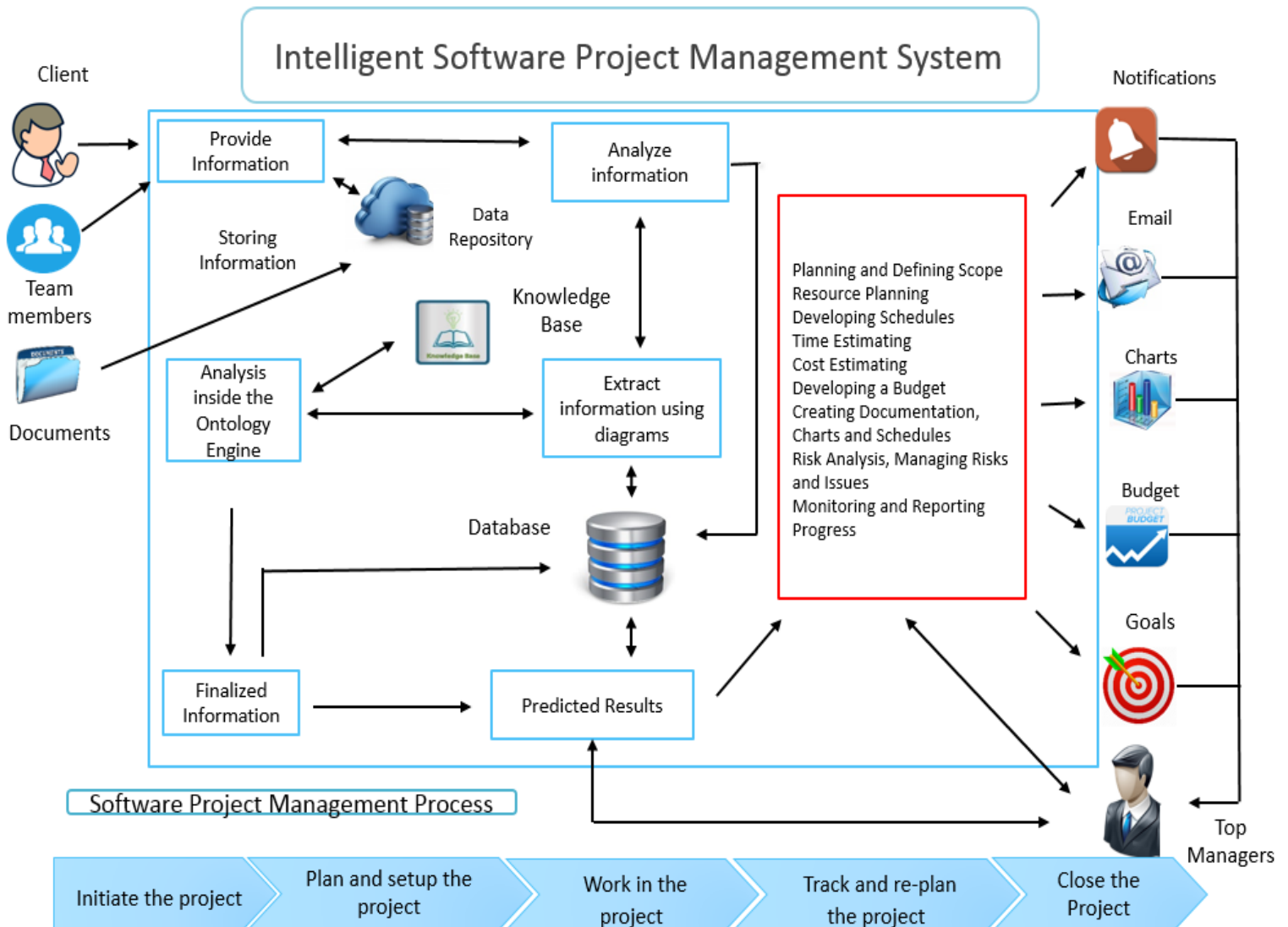
2.1 Product perspective

Figure 1 Structure of System

Different types of software companies use various types of software project management systems to increase the efficiency and accuracy of their software products. Most of the software project management systems are working in manual way. As the example 'Wrike'[1] , 'Huddle'[2] , 'Podio'[3] , 'goplan'[4] are the main software project management systems. Most of these are provide manual operation of software project management system. In a particular company run a set of software projects at a time and needs inputs from teams or group of individuals for a multilevel development plan. Hence a good automated project management system is needed.

Automated project management system represent a fast growing technology in IT field. With the involvement of users ,who utilize the project management applications helps to build, web based project management system enter a major role in a large number of companies .Therefore automated project management systems gives high quality web applications for customers and it will helps ensure the durability too. Developing a web based automated project management system helps users to handle projects in a convenient way without the help of any project manager. The reliability and the robustness of the automated web based project management system offers lots of advantages to the organization or user who is willing to use our product.

When considering about the whole project in brief at the information sent by the client and team members will be stored in a repository precisely. Then documents will be analyzed and synchronized with ISPM system. Mentioned requirements will be extracted in the next process. Requirements will be captured from the diagrams and those diagrams can be identified using their unique shapes. Then the output mapped with the mentioned requirements. There is an ontology engine in our system in order to decide all the possible and essential requirements through the each and every diagrams without any duplications of the same requirements. As the output it will release the finalized unambiguous unique requirements according to the user priority. That is a major feature we can achieve because we can eliminate ambiguous or may be unnecessary requirements. After preparing the final requirements they will be analyzed and generate accurate predictions. So then users can get an idea of risk, cost, and suitable developers to the project likewise. And this generating predictions function will be explained more comprehensively under individual perspective.

Features	Current Applications	Our application
I. System runs without having a software project manager	**X**	✔
II. User can provide the requirements to the system easily.	**X**	✔
III. Scanning and extract user requirements.	**X**	✔
IV. Maintain the knowledge based system for extracting appropriate data.	**X**	✔
V. Identify and avoiding the similar user requirements. Finalize the unambiguous user requirements.	**X**	✔
VI. Estimate budget, risk analysis, duration to complete, success rate of the project.	**X**	✔
VII. Defining the milestones for each and every tasks and visualize the progress of each and every tasks.	**X**	✔
VIII. Sending emails, notifications to the users. Provide user friendly and attractive environment.	✔	✔
IX. Users (sponsors, client and developers) can access to the system and gain the progress of the each and every tasks.	✔	✔

Table 2 Differences between ISPM and other systems

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2.2   Individual perspective

The most famous research on prediction was done by Philip Tetlock of the University of Pennsylvania, and his seminal 2006 book Expert Political Judgment provides crucial background. [5] However several people has done researches on prediction and they came with absolute results. According to our research we are going to make predictions through the system itself. Normal scenario of making predictions in software project management is project manager will go through past completed projects and make decisions depend on them. It is more time consuming and not a realistic method. Even though there are some software project management tools there is no such a proper tool where we can get all kind of valuable predictions that we must know.

PMI's Pulse of the Profession™ research, which is consistent with other studies, shows that "less than two-thirds of projects meet their goals and business intent (success rates have been falling since 2008), and about 17 percent fail outright. Failed projects waste an organization's money: for every US$1 billion spent on a failed project, US$135 million is lost forever…unrecoverable." [6].We can clearly see that how making successful predictions are going to help to complete the project successfully and also keep the reputation of the company.

So what happens here is important and useful predictions will be generated analyzing the new project's finalized requirements comparing with the historical project's data. User can view all the details of the project in a single interface and just by looking at it he can get an idea of the overall project. How each and every task goes with time, success rate of the project, risk analysis, developer efficiency etc. The system will send notifications when things run behind schedule, as well. Should a task not be completed on time, an email will be sent to all designated parties. Surprises are kept to a minimum, and problems can be resolved more quickly.

Few algorithms are going to use here in order to generate the predictions. For an example to calculate the developer efficiency;

$$\text{Developer efficiency} = \frac{\text{no of days given for task (n)}}{\text{no of days to complete task (c)}} \times 100\ \%$$

if c > n

Developer efficiency = -- $\left\{ \dfrac{\text{no of days given for task (n)}}{\text{no of days to complete task (c)}} \right\}$ x   100 %

To calculate risk;

Risk Quotient = (% of risk occurring) x (how many days/ weeks this could happen) x ($$$ impact)

Ex:

You think that there's an 80 percent chance of this happening within the next year . If this happens, it will cost your project an extra $500,000 over the next year.

$400,000 (Risk Value) = 0.80 (Probability of Event) x $500,000 (Cost of Event)

2.2.1   System interfaces

The proposed system will be run on java environment and it will connect with MySQL database. System uses python language for text mining part and information extraction from different diagrams and prediction will be implemented by using java language. Developing ontology use protégé platform which runs on the java environment. Java EE provide an advanced API for developing the system. This system has static database to improve the accuracy of the system, which is developed using MySQL. MySQL work bench will be used to do the modification in the above database.

2.2.2   User interfaces

In order to provide more user friendly environment to the user, attractive and simple interfaces will be created. Since it's going to handle the software projects at a glance users need to see the ongoing process and view the current status of the project. Hence the interfaces should be more sharp which provides a good understanding to the users.
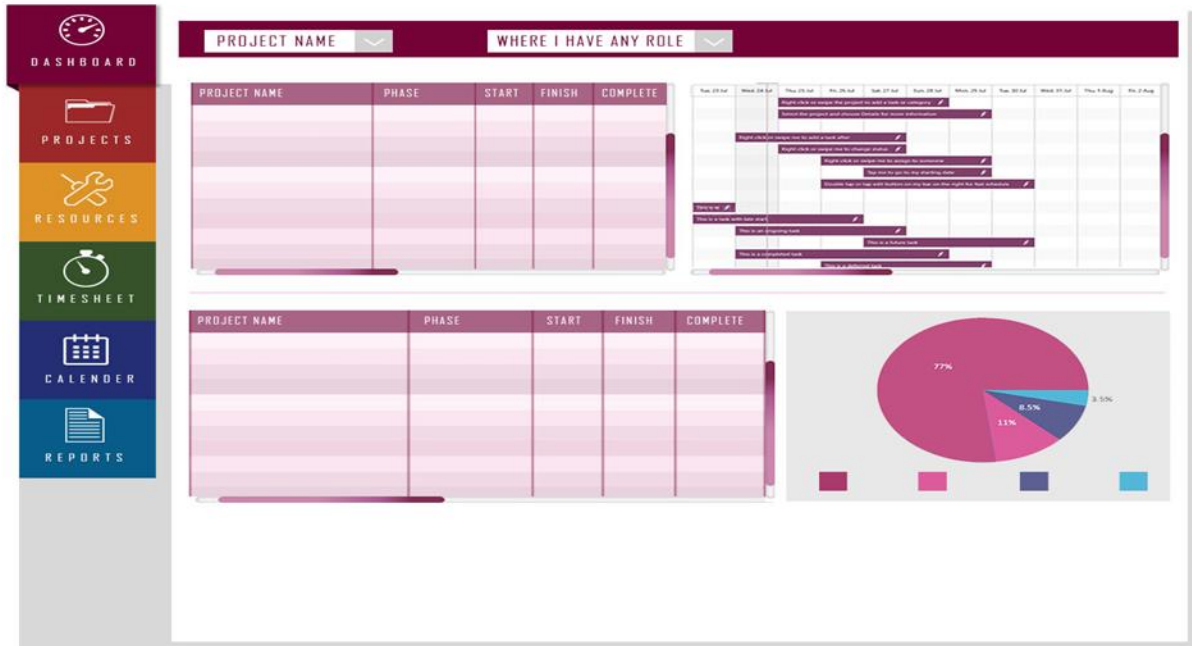

Figure 2 Dashboard

2.2.3 Hardware interfaces

Scanner – to scan the documents which contains the details of the project

Printer – if users need any hard copies of reports

2.2.4 Software interfaces

Hadoop

It is a free, Java-based programming framework that supports the processing of large data sets in a distributed computing environment. It is part of the Apache project sponsored by the Apache Software Foundation.

Java development Platform

Because of its platform neutrality, threaded and dynamic programming features. Java provided with high performance and it is interpreted.

Latest JDK version is used (JDK 8.1)

JCR API

Jackrabbit is a complete, and fully compliant implementation of the Content Repository API for Java Technology (JCR) and therefore its primary API is defined by JCR. For a developer this means that most operations required are defined by the JCR API. The classes and interfaces within Apache Jackrabbit are only needed when accessing functionality that is not specified in JCR.

MySQL

MySQL is the database we are going to use to store the images, information etc.

2.2.5 Communication interfaces

Not applicable.

2.2.6 Memory constraints

For the centralized server which will store the knowledge base and web application, 10GB will be required.

2.2.7 Operations

The process of generating predictions can be described as follows. There won't be any user interaction to generate predictions. After giving the final requirements as an input to the system it will make the predictions itself.

Operation 01 - Analyze current and past project's details

- Current project's data will be compared with the past projects to generate predictions. Big amount of past done project's details will be stored in a database and through them we can get predictions for the present handling projects.

Operation 02 - Generate predictions

- After analyzing the requirements system will generate accurate predictions such as success rate of the project, risk analysis, suitable developers for the project etc... In a well-organized interface it's going to display the generated predictions. After that system will automatically start to manage the project.

Operation 03 – Send notifications

- After generating the predictions system will send notifications for the senior managers, developers. Senior managers will be notified regarding the current predicted details such as assigned developers for tasks and their due dates etc... Developers get notified with their assigned tasks.
- And also when the middle of managing the project system will alert the developers periodically mentioning their remaining time period for the assigned task and so that they can work more efficiently to successfully meet the deadlines.

Operation 04 – Store the details

- At the end of the project, details regarding to the project will be stored in the database so that they can be used for making future predictions.

2.2.8 Site adaptation requirements

Pre requirements packages will provide better result to the ISPM. Therefore it contains JAVA JDK, MYSQL, HADOOP, etc...

NetBeans IDE

- Open the URL https://netbeans.org/downloads/
- Select java EE
- Select windows 32|64
- Download it
- Then install it in the PC

Install MySQL, follow these steps,

- Go to http://dev.mysql.com/downloads/mysql/
- Click MySQL Community Server (GPL)
- Download Windows (x86, 64-bit), ZIP Archive
- Install it

2.3   Product functions

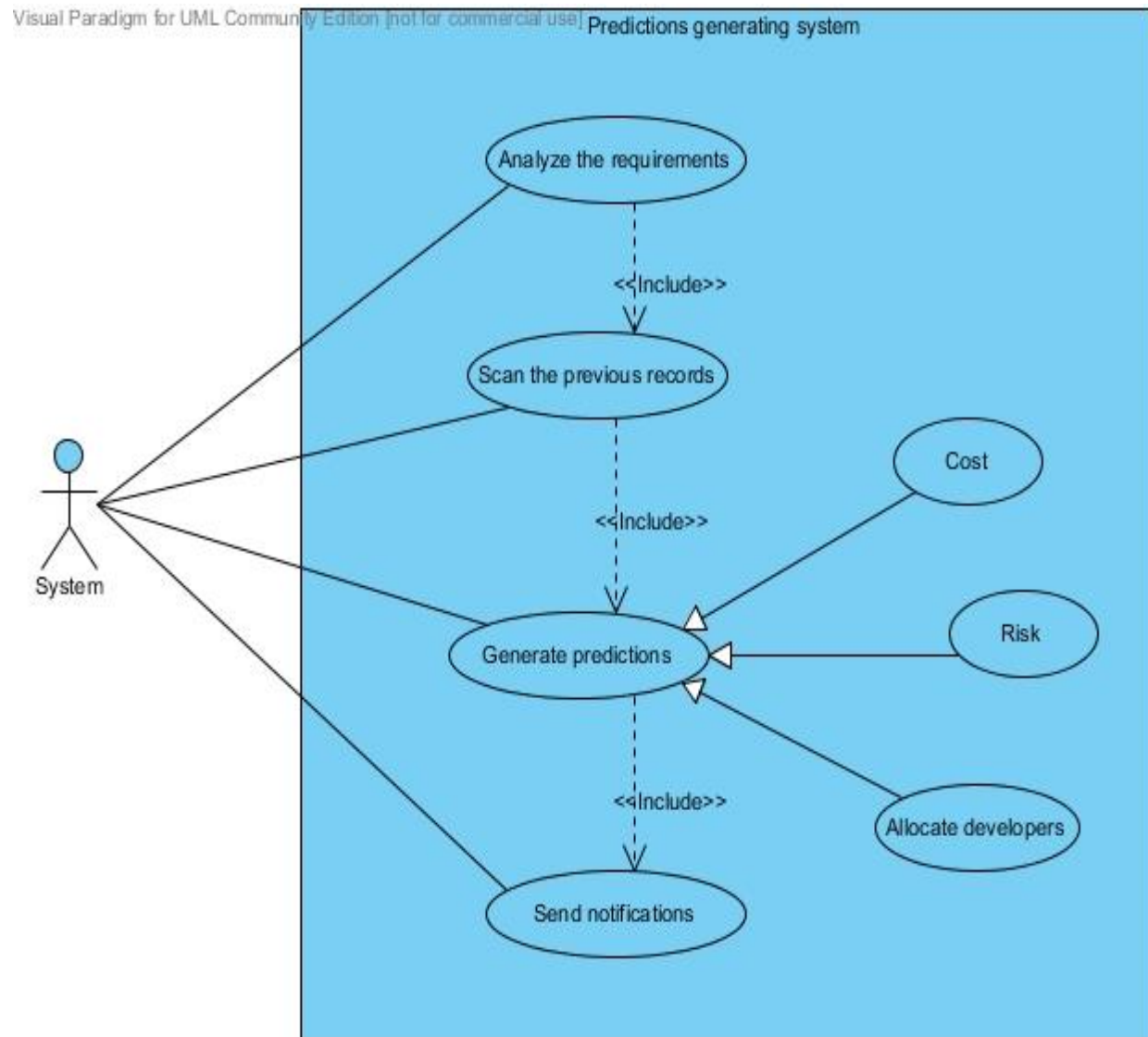*Figure 3 Use case diagram of Generating Predictions*

Analyze the requirements:

Use case Name	Analyze the requirements
ID	UC01
Description	Finalized requirements will be given as a input to the system and they will be analyzed
Actors	Developer
Pre-Conditions	Finalized requirements should be given as a input to the system
Success scenario	All the requirements will be scanned
Extensions	If the system didn't get the final requirements to the system it will generate an error message

Table 3 - Use case scenario 01

Scan the previous records:

Use case Name	Scan the previous records
ID	UC02
Description	Scan the past data and see whether if there are any similar kind of projects to the current project
Actors	Developer
Pre-Conditions	Previous data should be available
Success scenario	1.Analyze the past data 2.Check whether if there are any similar kind of projects
Extensions	If there are no data stored in the db to be scanned then it displays an error message

Table 4 - Use case scenario 02

Generate predictions:

Use case Name	Generate predictions
ID	UC03
Description	Analyzing current requirements and past data system will generate useful predictions
Actors	Developer
Pre-Conditions	Finalized requirements should be there in the system Past project's data must be stored in the database
Success scenario	1. Analyze current project's requirements 2. Scan past project's data 3. Generate predictions for cost, risk, suitable developers etc. using those analyzed past data and using the prediction algorithms 4. Allocate developers for the tasks of project
Extensions	If requirements not identified properly system will generate an error message

Table 5 Use case scenario 03

Send notifications:

Use case Name	Send notifications
ID	UC04
Description	System will automatically send notifications for the allocated developers and senior managers
Actors	System
Pre-Conditions	Predictions should be successfully generated without any issues Reliable network connectivity
Success scenario	1. Predictions will be generated before start of the project 2. System send notifications to the selected developers for the project 3. Send notifications for the senior managers regarding the status of the project 4. Automatically start managing the project
Extensions	If notifications fail to send due to a network error or something system will give an error message

Table 6 Use case scenario 04

2.4   User characteristics

There are basically three users who are accessing the system.

1.   SPT.

2.   Client

3.   Senior Management.

To increase the User friendliness and simplicity. System interfaces provide less user interaction since our system is an automated one while providing advance internal system functionalities.

This final product is really intended for the software development companies which are willing to develop and manage a software project without having a Software Project Manager. That is the main task of this product. Client and SPT can access to this system. Client can visualize each and every tasks which is completed by developers, milestone, time periods which are allocated for each and every task, notification and emails. Not only that and client, software project team can visualize the progress of the development. Project team can identify each and every tasks that they have to complete and allocated time duration.

2.5   Constraint

System shall run on Windows 7 or above edition with a minimum of 2.4 GHz. Java will be the implantation language and NetBeans 8.0.2 will be the developing IDE.

2.6   Assumption and Dependencies

We assume the user has a sufficient knowledge of using the computers and also a sufficient knowledge in using common internet services such as email.

2.7   Apportioning of requirement

The requirements described in sections 1 and 2 of this system requirement specification are referred to as primary specifications. Those in section 3 are referred to as functional requirement specifications. The two levels of requirements are intended to be consistent. Inconsistencies are to be logged as defects. In the event that a requirement is stated within both primary and functional specifications, the application will be built from functional specification since it is more detailed. The requirements declared in section 3 are to be implemented for this ISPM system. Desirable requirements are to be implemented in this release if possible, but are not committed to by the developers.

3.   Specific Requirements

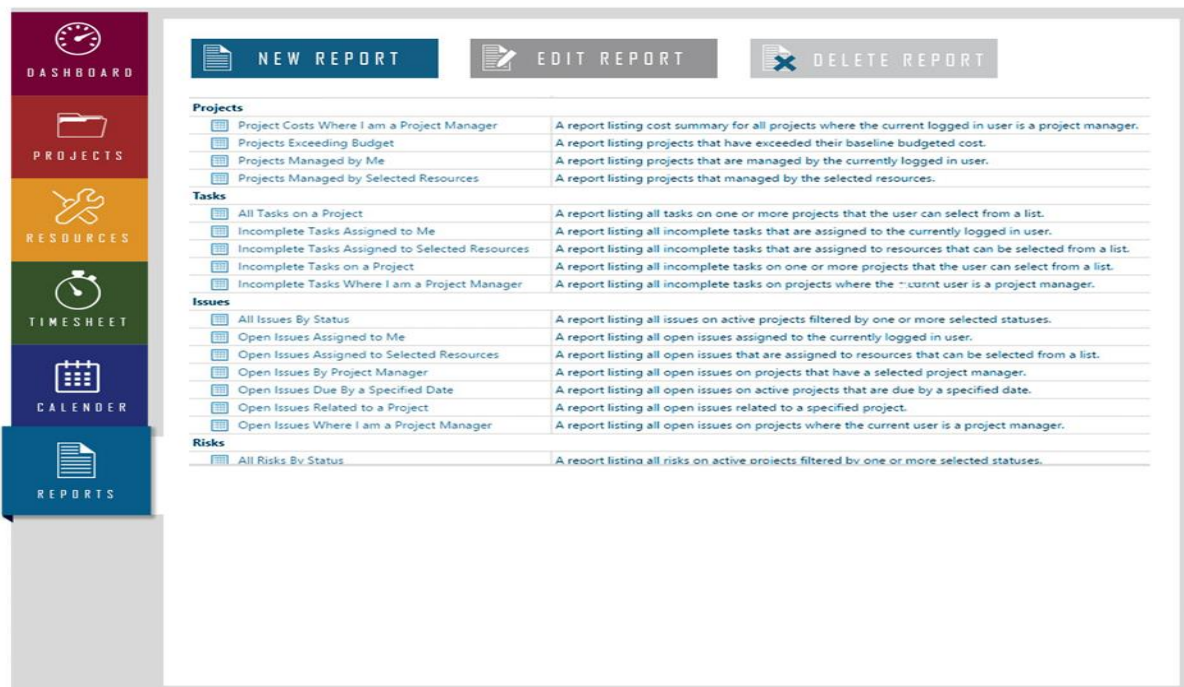## 3.1   External Interface Requirements

3.1.1 User Interface

Figure 4 User Interface

3.1.2 Hardware Interfaces

➢ 60-inch TV screen

3.1.3 Software Interfaces

➢ NetBeans 8.0.2
➢ Java JDK 8.1

3.2 Software System Attributes

3.2.1 Reliability

Reliability is the probability that an application will accurately perform its specified task under stated environmental conditions. Simply, that is how much a user can depend on the system. The propose application is developing to provide a reliable and efficient service to manage software projects in an effective way. This system is not like other systems, because this system will deal with the lot of employees and reliability should more high and advanced when dealing with the system. As people are aware of the results occur due to outputs of the system, it should maintain and build a trustful relationship with the user.

3.2.2 Availability

System should be available every time to fulfil user requirements. It will be available with a 24*7 up running server for users to access the system any time. Clients should be able to provide their project's details to the system anytime because sometimes they will add up new or missed requirements of the projects at any time. So the system should be available for fulfill that need. And also ISPM system is available for the developers any time giving them the opportunity to see their efficiencies and current status of the project.

3.2.3   Security

System should be secure and it uses logging mechanism to prevent unauthorized access to the system to prevent consequential data. Users are not able to access or view or manipulate the knowledge base area. Because it act as a data bank. It contain more sensitive data and if anything goes wrong, finalizing the user requirements, future predictions will be totally wrong. We use highly secured encryption and decryption methods to secure the data such as user passwords. Since there are sensitive data like details of employees they should be protected properly and so that system will be secured without causing unauthorized access.

3.2.4   Maintainability

This system easy to maintain because each four part are couple from each other. Future developers can add new components or remove existing components from the system. Since the system develops by using java environment, it is very easy to maintain the system. Anyone can understand and adapt to the system easily because of the system and structure of the ontology. System will be maintained by research team and new releases released with updates and new functionalities. Periodically it will be checked and assure the guarantee of maintenance.

4. References

[1] "Online Project Management Software & Collaboration Tools", Redbooth, 2016. [Online]. Available: https://redbooth.com/. [Accessed: 07- Mar- 2016].

[2] "Mavenlink - Online Project Management Software", Mavenlink.com, 2016. [Online]. Available: https://www.mavenlink.com/. [Accessed: 07- Mar- 2016].

[3] "Huddle | Team Collaboration & Project Management Software", Huddle.com, 2006. [Online]. Available: https://www.huddle.com/. [Accessed: 07- Mar- 2016].

[4] "GoPlan | Cloud-Based Tools for the Department of Finance", Goplan.com, 2016. [Online]. Available: http://goplan.com/. [Accessed: 07- Mar- 2016].

[5] Ondiappan Arivazhagan, "Ari", Honors graduate in Civil / Structural Engineering from University of Madras.He is a certified PMP, PMI-SP, PMI-RMP from PMI, USA. 26 March, 2015 , http://blog.minitab.com/blog/statistics-in-the-field/making-better-estimates-of-project-duration-using-monte-carlo-analysis

[6] Brian Jackson , August 11th 2014 , http://www.itbusiness.ca/blog/5-ways-to-more-accurately-forecast-with-project-management-software/50306