

# A REVIEW PAPER ON ANALYSIS OF EFFICIENT SOFTWARE REQUIREMENT USING PRIORITIZATION TECHNIQUE

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<b>Abstract</b>	<i>Software engineering is very vast and difficult field. Being software engineer typical efficient software requirement analysis is more complicated and large. This paper specifically resolve the complexity of analysis problem with some priorities techniques using both formal (Functional) and informal (Non-functional Requirement) that helps to more efficient software requirement analysis. In this paper we conduct literature reviews about how can we make efficient requirements analysis. That helps to make more accurate software development to fulfill the user requirements. Efficient software requirement developments that overcome the time cost, and enhance objectivity major aspect of today's software industry. Due to this we use some prioritization techniques that further discuss in this paper.</i>
<b>Keywords</b>	<i>Software Requirement, Prioritization</i>

## INTRODUCTION

Requirement is the baseline of every project .Requirement is basically client statements. Requirements prioritization is always one of the biggest problems in software industry. With any project, it is challenging to build an efficient solution that fully satisfies the wishes of every stakeholder. When we are dealing with limited resources of time and money. So if you ask your stakeholders to prioritize their requirements at their own then you probably hear that everything is important. But the reality is not simply possible because in the beginning of any software project, clients or stakeholders have too much ambiguity in their minds about which requirements are the core requirements and which are not. Not all requirements delivers same value to the stakeholders that is why it's important to identify the requirements that deliver some values. So we have to make some hard decisions about what requirements gets included in the software. We have to prioritize the requirements which are mandatory according to the project and there are some requirements which are nice to have them if resources allow but not necessarily including in the software project. These type of requirements can be postponed. There are many ways to prioritize the requirements to improve efficiency of overall project. Requirements always associate with some strategic objectives. The very first one is goal of all requirement is, does they fulfill the requirement of a user need. Next thing is the requirements that you are going to prioritize, do they fulfill the business objective or not. Does it meet one of their stated goals or objectives? You can use different software models to improve the efficiency of the software which will depend upon the requirements criteria of your software e.g. waterfall model, agile methodology etc.

## LITERATURE VIEW

According to (Martin Maguire and Nigel Bevan. 2002) et.al [1] understanding the clients requirements in an integral section of information systems design. Requirement analysis is not a simple procedure. Many difficulties faced by the analyst are:

- Communication with many stakeholders
- Clients and developer thinking along the both traditional and current process systems
- Clients do not know advance system

- No time for users' needs analysis
- Present clients requirements in proper form

In this paper researcher describes that how to addressed these problems by selecting proper methods. Researcher defines four stages for used and solve such difficulties.

### 1. Information gathering

Firstly gather the background information about your client adopted following methods:

- User analysis: - it helps to known about the needs of all those involved in this process. Users groups, supervisors, maintainers etc.
- Market research: - it involves research published sources like research reports, article, and demographical information data. It gives a range of possible user in markets.
- Context of use analysis: - it is used when a product is developed.
- Task analysis: - it is represented that what a user required doing in terms of action and achieving a task. There are many ways to conduct it. Another way is a flow chart which is showing the sequence of human activities and the related inputs and outputs.
- Rich picture: - this technique creates a live of sketches to present that how people and systems interlink to each other. They may present people's activities, structure of power and communications etc.
- Field study and observational methods: - an investigator making a notes and task is recorded by the analysis team and watched at a later time.
- Diary keeping: - it provides a record of user behavior over a period of time.
- Video recording: - it can be used to get the information and placed a camera in clients working place or other location.

### 2. User needs identification

When a developer or analyst gathered the information then they can start to be identified a client / user needs. By adopted following methods:

- User survey: - questionnaire used as a sample population of users.it can help to understand the needs of users.
- Focus group: - a cross section of clients in a discussion group format.
- Interviewing: - interview for the client about knowing his needs and requirements.
- Scenarios and use cases: - this method can help identify use-ability targets and example of future use as an idea to understand.
- Future workshops:- in this segment design asked the questions for users such as ( what do you want to be 10 years from now )
- Evaluating: - measure of new systems effectiveness, efficiency and satisfaction baseline.

### 3. Envisioning and Evaluation

Client's feedback can be obtained in this section by the prototype to verify and refine the client's requirements.

- Brainstorm: - designers and task experts create new ideas, suggestions to meet user's needs.
- Card sorting: - this is also used for instance to work out the organization of a website.
- Affinity diagrams: - make diagrams, sticky notes and then organize these notes by grouping them.
- Story board: - a story board which contain a Manu images like menu, dialogue boxes and window etc.
- Prototypes: - designer create a paper software based of users interface elements like (menu button, icons, window etc.) And play this system and the response of user or comments are recorded.

- Allocation of function: - it's mean to allocate that which task performed by human and which performed by technology.
- Design instructions: - designers also designs the guidelines and standard for users.
- Requirements specification: the techniques and methods to support client's organizations requirements specification are following such as Task mapping: - specifies the system functions that each user will require for the different tasks that they perform.
- Requirement categories:- user requirement ( include a summary , descriptions of the system, task and functions that will support them)
- Usability requirement ( effectiveness , goals , efficiency and acceptability of system)
- Organizational requirement ( an understanding and support of management structure)
- Prioritization: - the method of DSDM development uses to control risks in the system and allow to meet the user needs more closely.
- Criteria setting: - it is a settled criteria which helps to decide whether the client needs and requirements have been achieved or not.
- According to (William Brace, Vincent cheutet., 2013) et.al [2] this paper presents a checklist oriented requirement CORA framework to analyzed and modifies the required prioritization . The checklist approach is very useful in finding the requirement prioritization analysis. CORA provide a systematic way as checklist ,collecting data , analyzing results and information .the complexity level increased of clients requirements due to increase in product complexity and development . There is a need to handle such complexities with more cost- effective way. To fulfilled clients and environment desire or needs. Here researcher discuss the existing concepts of requirements analysis:-
- General principles: - the process of R.S is just like the transformation of an input to a demanded output. The input is an informal expression in the other hand demanded output is a specific requirements. Many tools and process have been used for this transformation.
- R.A engineering design phase: - requirement engineering give a several number of techniques for analyzing requirements there are 2 phases. Researcher discussed for requirement engineering design.

In the first design, data is gathered and recorded. In the second step, generate special method for requirement specification .when measuring the qualities in the refinement process, requirements are presented with specifically qualitative and quantitative forms.

An alternative phase is a checklist based approach.

- R.A in other domain: - in this much pressure placed on functional and nonfunctional requirements. It has resulted in the tools development and support the procedure and methods of generating the requirements.
- R.A framework: - the document driven process in the engii design phase is checked more closely from a system perspective. Hard system and soft system are two alternative paradigms. That is existing for system thinking.

(Scenario) in the requirement analysis framework, firstly requirements presented in the requirement engineering .these are following as:-

- One line statement or short sentences.
- give a brief detail with text, picture or graphs etc.

An overview of the CORA framework and a closer look of it. CORA have including checklist, Requirement information management

- Specification drivers
- Functional and non-functional

#### - Criteria network and analysis

1. Checklist: - the checklist supports a structural analysis process and managing data.
2. Requirement information management: -checklist gives a structure which is used to save and managing information to support decision making. These information can be categorized into two sources.
  - Human: clients, stakeholders, designers etc.
  - Artifacts: design and user guidelines etc.

#### Specification drivers

The specification drivers is described as to be abstract representations of actual design available. The specification driver is a basic for negotiation and settlement of the context about the requirement and design phase in a very early stage.

#### 4. Functional and nonfunctional analysis

Checklist arranging sub functions on the basis of priority and analyzed this arrangement by logically. To explore functional requirement a FAST approach (function analysis system technique) is applied.

Mostly nonfunctional requirements are unbounded, they make relative statements which cannot be easily verified.

#### 5. Criteria network and analysis

Criteria are interlink with a network .this help to managing the criteria relationships and identify criterion. It can also present in several requirements.

Drawback of CORA: The framework of CORA can be applied rigidly and in ways that are improper and consumes company time and money.

According to phipipachimugu et.al [3] the aim of this study is to rank the requirements in their order of specific to general the implementation and analyzing the existing prioritization techniques software engineering is just like a programming. Prioritization is defined as a complicated decision making procedure for implementation the core requirements of clients. Challenges regarding with the development of a software makes the prioritization of requirements very important such as limited budget, lack of recourses, unskilled developers etc. prioritization requirements improves the software plan, time, cost, schedule or quality.Literature reviews categorized by in two parts which are following as: traditional literature review a systematic literature review. TLR is based on current research and SLR based on formulated research. In this synchronized selected studies the extracted data collected the both quantitative and qualitative method. From the literature review following finding were discovered such as: relative necessary prioritize requirements. Negotiation requirements, release or implementation, a rough financial schedule. The limitation of existing prioritization requirements defined as below: scalability requirements, practically more time consuming techniques, rank update prioritization requirements, communication gap between stakeholders and software developers, depended requirement, existing prioritization techniques me not enough, no implementation in real life. Thus it is proved that a lot of discoveries of prioritization techniques exist but still improvement are required.

According to Michael Lang et.al [4] communication is a tool for convey your message to others effective communication is caused for successful system otherwise misguidance or miscommunication faced the failure. Well managed communication with client and developers make a development process easier.[5]Researcher gathered a set of requirement tool for collaborating the software requirements management. The names of such requirement as mandatory, optional and desirable. Then researcher assess that which existing tools are available for `fulfilling the requirements. Tools that did not meet the requirements mandatory were rejected. Both the qualitative and quantitative techniques was used for collected the data of case

study. In collaborative development of a system there is a need to enable the developers to gain proper knowledge and understanding of users work and developers should have access the solutions whether the needs of user did not meet. Requirements of a tool for collaborative RM such as: maintain descriptions for requirements, define requirements, tractability, assignment validation for user requirement, support and cooperative, support comprehensive data, and maintain documents. In order to verify that which RM tool is valid to fulfilling the requirements it was applied in a software system development over a five months' time period and collect the user's feedback and opinions before or during and after the process. This research finds that to improve the communication between clients and developers bring a more advancement and improvement in productivity and quality.

However, collaborative tools cannot be capable alone to managing the complicated social process system so there is a need for a personal human intervention. [6]The aim of principles of requirement engineering or requirements management is to introduce the highest levels and the process or procedures which can effected the requirements engineering. Researcher shall also mention that how software tool can achieved the RE goals and objectives. It has been reported that the major reasons behind the failure of project such as improper understanding of users need non valid scope changing requirements the purpose of this paper is to define the three terms which is categorized as requirements. RE and RM: a way of gathering is requirements are focused groups, face to face discussion, and procedure analysis, verify the existing users at work, discussing between problem reporters and prospective users etc. To present a requirement expression there are two ways, firstly a simple way to use a UML diagram, secondly a typical set of users stories. Requirements decomposition and relationship among many to one, one too many and one to one. To managing the change configuration management (CM) tool is used. A single change can have a big impact on a system. Reuse of requirements are time saving money saving and less effort way. Six common RE problems such as avoid the scope, do more that is required, do not give the permission to user for scrutinizing the teams work, unidentified clients, RE administration role providing adequate framing.

**TECHNIQUES**

**ANALYTICAL HIERARCHY PROCESS**

Analytical hierarchy process technique is that in which we can rank and fix priority of each requirement.

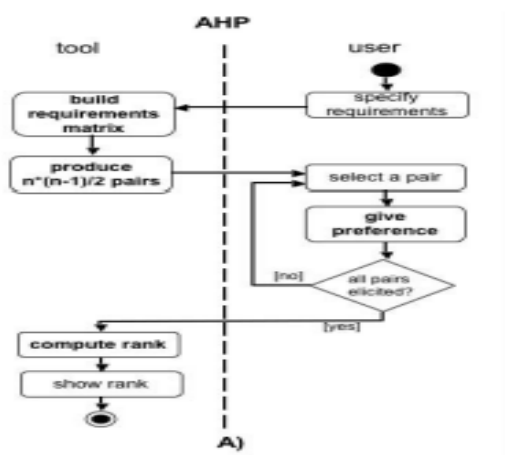


Table 1. Scale for Pairwise Comparison in AHP [16]

Intensity	DEFINITION	Explanation
1	of equal value	Two requirements are of equal value
2	Slightly more value	Experience slightly favors one requirement over another
5	Essential or strong value	Experience strongly favors one requirement over another
7	Very strong value	A requirement is strongly favored and its dominance is demonstrated in practice
9	Extreme value	The evidence favoring one over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values between adjacent judgments	When compromise is needed

AHP follow process that take requirement from different stakeholder (user, developer, software owner), assign each requirement a certain number according to its intensity/ importance .These number are use to form complexity metric for software requirement priority.

It's just like the rank base system. The ranking system maybe in ratio scale, number system, and other ranking scale can also use for this purpose.

**RESEARCH METHOD**

**Numeral Assignment Technique**

In numeral assignment technique we assign some number to our requirement from 1-5 scale to indicate their importance. Number carries following meaning

1. Does not matter
2. Not important
3. Rather important
4. Very important
5. Mandatory

Every stakeholder prioritize the requirement and in result average result will be taken out.

**Planning Game**

In planning game, we prioritize the user stories based upon their features. In this technique, there will be 3 major divisions. First one is "those without which the system will not function". Second one is "those that are less essential but provide significant business value" and the last one is "those that would be nice to have".

**100-Point Method**

It is a voting technique that is used in favor for stakeholder to prioritize the particular requirement. 100 points will be given to every stakeholders. Suppose there are 5 requirements which stake holder wants to prioritize then he can assign 20 20 to each requirement or he can assign his total 100 points to only 1 requirement. By giving total points to only one requirement means that particular requirement is the most important requirement for the particular stake holder so that they can give high priority to the particular requirement.

**Pair sampling**

Pair sampling is used for ranking of requirement from all stakeholders to maintain priority list of software requirement .This priority list maintained according to current list of requirement.

Characteristics Of AHP Prioritization Method Using Scale(Table below)

Evaluation Criteria	Simple Ranking	MoScow	100 dollar	AHP
Ratio Scale Information			Yes	Yes
High Confidence from User	Yes	Yes	Yes	
Consistent	Yes	Yes	Yes	Yes
Low difficulty	Yes	Yes	Yes	
Low effort	Yes	Yes	Yes	
Able to handle large number of alternatives		Yes		

**RESULTS AND CONCLUSIONS**

Suppose every single requirement is prioritized but software still not working efficient. Following are the factors defining this particular issue.

Team efficiency: We can improve team efficiency by removing their barriers. There will be some sort of habits in team members that is resulting as a barrier. Or there will be need of some sort of lack of training or

experience so you may need to support them to overcome the barrier. Second one is reward team members. Its helping those to do dependent task complete on time. Third thing is set specific dates and follow up. By following up with your team members, you can look for and listen for areas where they may be getting stuck. If there is any sort of barrier in between the clarification of any requirement then engage the client by doing interviews to get clear picture of the requirement.

When we use these prioritization techniques ambiguities that occur with help of these techniques we can overcome the ambiguity. All stakeholders are in one pace and stakeholders

know that the will be desired output as well as he knows that most important requirements. Due to we prioritization the rules of prioritization we can follow that helps to make the efficient analysis of requirements that helps us to make software effect. The major result is that when we prioritize the requirements accurately the mismanagement resolves completely and the documents and prototype that seen by the stakeholders.

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