# Selection of Appropriate Requirement Prioritization Techniques for Various Software Domain's

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by

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# Abstract

Software is ending up dynamically progressively basic piece of everyday life. Building up the product that address stakeholders issue is a definitive objective in the present condition. As the intricacy of software increments so does the requirements. There are numerous requirements which ought to be satisfied in the given time term then again a few necessities ought to be viewed as first to diminish the dangers. Consequently, legitimate assembling and prioritizing requirements may prompt the progressive improvement of the product [1].

Requirement prioritization is regarded as one of the most essential tactics in the requirement engineering process. The weight on time-to-advertise and having the capacity to anticipate the progressive arrival of the product item has presented numerous difficulties to the software engineering process. Budgetary confinements and time-to-showcase due date regularly force stakeholders to mindfully prioritize requirements [2].

Requirement prioritization is used to define the ordering or scheduling for executing requirement primarily based on the priority or importance in accordance to the stakeholder's viewpoint.

Various researchers have led to many requirement prioritization strategies, and there is no single approach of requirement prioritization that can be used for all project types.

In this paper we provide an overview for selecting appropriate requirement prioritization technique for various software domain's. We also present the most famous strategies used to prioritize the software domain requirements and compare these strategies against each other.

# Contents

# Chapter 1

# 1. Introduction

## 1.1 Motivation

Requirement prioritization is considered one of the most significant activities in the process to construct software project and deliver the good system as the customer need. Most projects include a large number of software requirements which to be prioritized according to the limited resources in terms of time, budget and customer satisfaction which is the major purpose in software development. This demand in requirement prioritization has motivated us to integrate the right requirement prioritization technique for the given software domain.

## 1.2 Scope

Requirement prioritization is regarded as one of the most essential tactics in the requirement engineering process. The weight on time-to-advertise and having the capacity to anticipate the progressive arrival of the product item has presented numerous difficulties to the software engineering process. Budgetary confinements and time-to-showcase due date regularly force stakeholders to mindfully prioritize requirements. Requirement prioritization is used to define the ordering or scheduling for executing requirement primarily based on the priority or importance in accordance to the stakeholder's viewpoint.

## 1.3 Organization of Report

Chapter 1 - A brief introduction to the motivation behind choosing this topic and also our goals and objectives we wish to achieve by this venture and the scope of our project and applications.

Chapter 2 - Contains the literature survey.

Chapter 3 - A concise explanation of Requirement prioritization, types of requirements and the importance of stake holders in requirement prioritization.

Chapter 4 - - A concise explanation of Requirement prioritization techniques in detail.

Chapter 5 - Contains the use case, conclusion and bibliography.

# Chapter 2

# Literature Review

- Programming is ending up continuously increasingly necessary piece of everyday life. Building up the product that address partners' issue is a definitive objective in the present condition. As the multifaceted nature of programming increments so does the prerequisites. There are numerous prerequisites which ought to be satisfied in the given time length then again a few necessities ought to be viewed as first to diminish the dangers. Consequently, appropriate assembling and organizing prerequisites may prompt the progressive improvement of the product. In writing there are number of strategies which centre around prerequisite prioritization issue. This paper exhibits the relative investigation of different prerequisite prioritization methods [3].
- Requirement prioritization is considered as a standout amongst the most imperative exercises in the prerequisite building process. This paper gives an outline of the prerequisites prioritization exercises and procedures. It additionally introduces how information mining and machine learning strategies have been utilized to organize the product venture necessities. A correlation between these methods is additionally introduced [4].
- Requirement prioritization assumes an imperative job in the necessity building process, especially, concerning basic assignments like necessities transaction and programming discharge arranging. Choosing the correct arrangement of necessities for an item discharge to a great extent relies upon how effectively the prerequisite competitors are organized. There are distinctive prerequisite prioritization strategies accessible which are some more expounded than others. This paper investigates nine unique systems of prerequisite prioritization specifically Analytical Hierarchy Process (AHP), Hierarchy AHP, Minimal Spanning Tree, Bubble Sort, Binary Search Tree (BST), Priority Group, Planning Game (PG), 100 points technique and Planning Game joined with AHP (PGcAHP) and afterward placed them into a controlled analysis, so as to discover the best one. The assessment was done based on a few criteria like: convenience, sureness, precision of result, technique's capacity to scale up to a lot more necessities, required number of correlations, and expected time to settle on choice. Examination of the information from the test shows that the explanatory progressive system procedure to be a promising applicant, in spite of the fact that it might be dangerous to scale up.

Nonetheless, the outcome plainly shows that the Planning Game (PG) yields exact outcome, can scale up, requires minimum measure of time, the most straightforward technique to utilize, etc. Consequently, finding of the examination is, the Planning Game (PG) technique should be the best strategy for organizing prerequisites [5].

# Chapter 3

# Requirement Prioritization

Requirement prioritization is regarded as one of the most essential tactics in the requirement engineering process. Requirement prioritization is used to define the ordering or scheduling for executing requirement primarily based on the priority or importance in accordance to the stakeholder's viewpoint. Various researchers have led to many requirement prioritization strategies, and there is no single approach of requirement prioritization that can be used for all project types. In this paper we provide an overview for selecting appropriate requirement prioritization technique for various software domain's. We also present the most famous strategies used to prioritize the software domain requirements and compare these strategies against each other.

## 3.1 Why prioritize in accordance to the stake holders?

As all the requirements related to more than release are based on customer needs the software engineers do not know which requirements have higher priority and which are not. Thus, various stakeholders are participated in the system development in order to prioritize the requirements in the right way according to their importance, therefore, that requirements can be ordered in execution.

## 3.2 Types of Requirement Prioritization

### 3.2.1 High priority requirements

High priority requirements may be processes that help the business increase revenue or mitigate risks

### 3.2.2 Lower priority requirements

Lower priority requirements are those that provide minimal impact to organisational outputs or end user experience.

## 3.3 What requirements to prioritize?

Start by prioritizing the business requirements or objectives of the project. Once that's done, you should be able to determine which stakeholder's requirement are most urgent, only the stakeholder's requirement that supports a business requirement should be in scope. The project team should address the other requirements in order or urgency. This will dictate the order of implementation and ensure that the product is valuable even if some requirements have to be left out due to time and money constraints.

# Chapter 4

# Requirement Prioritization Techniques

Software advancement or some other venture confronting different prerequisites, budgetary imperatives, and tight due dates frequently require the need to organize stakeholder's requirements. Sooner or later, it's generally important to settle on choices on which set of requirements should be executed first and which ones can be postponed till a later discharge. Various strategies on the most proficient method for requirement prioritization have been produced. While some work best on few prerequisites, others are more qualified to extremely complex activities with numerous chiefs and factors. This rundown of requirement prioritization systems gives a review of regular strategies that can be utilized in organizing necessities.

## 4.1 Ranking Technique

This one is the most popular among all other requirement prioritization techniques because it is simple to understand and deliver [6]. In this technique we fix some scale rule ranging from 1 to n and rank the importance of the software [7]. As '1' will be the most important, '2' being the second important and 'n' being the least important among all. This method is supposed to be working perfectly and best when we are dealing or managing with a single stakeholder or a solitary partner as it is very difficult to align the outlook of various stakeholders on what the need of prerequisite ought to be and hence taking the normal can in any case however, deliver the issue in some extent.

## 4.2 Numerical Assignment Technique

This method is also known as grouping technique. This technique is formed on gathering prerequisites into various prime concern categories with each gathering speaking to something which stakeholder can connect to [6]. Business analyst responsibility is to group the requirement in various prime concern or priority level groups with each group comprises what stakeholders connect to [7].

Requirements can be grouped into three categories: -

1. **Critical priority.**
2. **Moderate priority &**
3. **Optional priority.**

Thus the simple explanation of this three categories can be slated as follows: -

1. **Critical priority**

**a)** It is the most important or compulsory if we wish to describe their importance.

**b)** On scale of 1 to 10, we can give them as 10 in matter of importance.

2. **Moderate priority**

**a)** It is less important or has less priority what stakeholder could ask for.

**b)** On scale of 1 to 10, we can give them 5 or 6 in matter of importance.

3. **Optional priority**

**a)** Less or not important requirements comes under this optional priority.

**b)** Either present or not present does not affect to the business model.

## 4.3 MOSCOW Technique

The MoSCoW strategy is a prioritization system utilized in the board, business examination, venture the executives, and programming advancement to achieve a typical comprehension with partners on the significance they put on the conveyance of every necessity; it is otherwise called MoSCoW prioritization or MoSCoW investigation [8]. All necessities are critical, however they are organized to convey the best and quickest business benefits early. Engineers will at first endeavour to convey all the Must have, should have and Could have necessities however they Should and Could prerequisites will be the first to be expelled if the conveyance timescale looks undermined.

The classifications are ordinarily comprehended as:

**i.) Must have**

Necessities marked as Must have are basic to the present conveyance time box with the goal for it to be a triumph. Characterizes a necessity that must be fulfilled for the last answer for be satisfactory [9]. On the off chance that even one Must have prerequisite is excluded, the undertaking conveyance ought to be viewed as a disappointment (note: necessities can

be downsized from Must have, by concurrence with every pertinent partner; for instance, when new prerequisites are considered progressively essential). MUST can likewise be viewed as an abbreviation for the Minimum Usable Subset [8].

**ii.) Should have**

Prerequisites named as Should have are vital however redundant for conveyance in the present conveyance time box [8]. This is a high-need necessity that ought to be incorporated if conceivable, inside the conveyance time span [9]. While Should have prerequisites can be as imperative as Must have, they are frequently not as time-basic or there might be another approach to fulfil the necessity, so it tends to be kept down until a future conveyance time box.

**iii.) Could have**

This is an attractive or pleasant to-have prerequisite (time and assets allowing) yet the arrangement will at present be acknowledged whether the usefulness is excluded [9]. Prerequisites marked as Could have are attractive however a bit much, and could enhance client experience or consumer loyalty for little advancement cost. These will normally be incorporated if time and assets allow.

**iv.) Won’t have**

This speaks to a necessity that partners need to have, however have concurred won't be executed in the present rendition of the framework. Prerequisites marked as Won't have been concurred by partners as the slightest basic, most minimal restitution things, or not proper around then [8]. That is, they have chosen it will be put off till the following round of advancements [9]. Won't have prerequisites are either dropped or re-examined for consideration in a later time box. (Note: periodically the term Would get a kick out of the chance to have is utilized; in any case, that use

is mistaken, as this last need is plainly expressing something is outside the extent of conveyance).

**Use in new product development**

**a)** In new item advancement, especially those following lithe programming improvement approaches, there is in every case more to do than there is time or subsidizing to allow (consequently the requirement for prioritization).

**b)** For instance, should a group have an excessive number of potential legends (i.e., abnormal state stories) for the following arrival of their item, they could utilize the MoSCoW strategy to choose which sagas are Must have, which Should have, etc.; the base feasible item (or MVP) would be each one of those legends set apart as Must have.

## 4.4 Bubble Sort Technique

Bubble sort is a straightforward arranging calculation which over and again navigate through the rundown, thinks about the two numbers or information and change their requesting in the event that they are wrongly requested. Here, likewise we do a similar thing, that is on the off chance that we discover one necessity must be positioned higher than the other, we change their request or swap them as needs be.

The means required to organize prerequisites with bubble sort strategy are as follows:

1)Outline the requirements in a vertical column [7].

2) Look at the best two necessities from the segment with one another to figure out which is the most imperative. On the off chance that the lower prerequisite could easily compare to the best one, swap their positions [7].

3) Repeat this pairwise comparison and swapping for the second and third requirement, then third and fourth requirement and so on until the bottom of the column is reached [7].

4) If any of the prerequisites have been moved amid stages 2 and 3, rehash the procedure for the entire section beginning again from the main two necessities (stage 2). Continue rehashing this until the point when no necessities are swapped amid a total go through the section, which implies that the prerequisites are currently in need arrange [7].

Thus, the result of the procedure is a positioned segment of necessities where the most critical prerequisite is at the highest point of the section and the minimum essential one is at the base.

## 4.5 Hundred Dollar Technique

This straightforward technique is valuable anyplace various partners need to justly cast a ballot on which prerequisites are the most imperative [6]. All partners get a reasonable 100 dollars, which they can disperse among the necessities. All things considered, the partner may give each of the 100 dollars to a solitary necessity, or the individual may disperse the focuses all the more equally [6]. The higher the sum allotted to every necessity, the higher the need of the prerequisite. Toward the end, the all-out is checked and the prerequisites are arranged dependent on the quantity of focuses got [6].

This method should possibly be utilized when you have a little gathering of prerequisites to organize and when you have a similar arrangement of necessities to keep respondents from impacting their outcomes by allocating more dollars to their most loved necessity. With this system, in any case, it tends to be hard to monitor what amount has been allotted and what sum is left to discard.

# Chapter 5

# Selection of Appropriate Requirement Prioritization Techniques

The determination of a fitting prioritization technique from a given arrangement of different prioritization strategies {M1, M2…. Mn} is guided by contrasting their profile and particular characteristics {C1, C2…. Cn} against an ideal profile of an explicit programming application as far as given criteria. Here various prioritization methods {M1, M2 …. Mn} are the ones discussed above and characteristics {C1, C2 …. Cn} are size of the project, ease of implementation, speed, complexity, etc. [2],

- Convert fluffy qualities indicated to its comparing fresh qualities utilizing defuzzification strategy. This grid of every single fresh esteem can be named as: R = [rij] i.e.

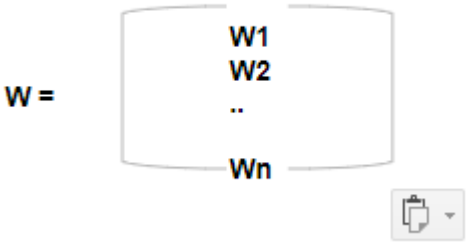
| | C1 | C2 | .. | .. | CN |
|---|---|---|---|---|---|
| P1 | r11 | r12 | .. | .. | r1n |
| P2 | r21 | .. | .. | .. | r2n |
| .. | .. | .. | .. | .. | .. |
| PM | rm1 | rm2 | .. | .. | rmn |

where all entries of this matrix R expresses degree to which characteristic Cj is satisfied by method Pi(i=1.m) and (j=1..n).

- Normalize the estimations of grid R by partitioning each estimation of this lattice by the most extreme estimation of the framework. All passages of this network are genuine numbers in [0,1].

  **N = R/MAX**

  where max is the most extreme estimation of the matrix.
- Recognize an application for which an appropriate technique is wanted. This application is limited by various criteria. Allot the fitting weight that ranges from 0 (not imperative or pertinent) to 5 (significant) to these criteria.




Normalize the estimations of framework W as done in stage 2.

- Multiply the Matrix R with Weight Network W to get Matrix S. The estimation of the resultant grid S will be utilized to choose the strategy that is most proper for the project.
- Arrange Matrix S in decreasing order to know the order of stability of the requirement techniques

# Chapter 5

# Case Study & Conclusion

## 5.1 Case Study

So as to outline the proposed system, a test investigation of the Travel Management Planning Website was performed. The point of the investigation was to choose the proper prioritization technique for the site. Five prioritization strategies to be specific Ranking Technique, Numerical Assignment Technique, MOSCOW Technique, Bubble Sort Technique and Hundred Dollar Method and five qualities, for example, Ease of utilization, Size of undertaking, Fuzziness, Multi-criteria and Multi-individual were chosen to improve the examination. Three area specialists were asked for to give their proposal about degree to which trademark Cj is controlled by technique Pi utilizing semantic terms. Defuzzification was utilized to change over the etymological terms to fresh qualities and results are appeared in network R [2].

R =

| | C1 | C1 | C3 | C4 | C5 |
|---|---|---|---|---|---|
| P1 | 4 | 2 | 0 | 0 | 4 |
| P2 | 4 | 3 | 0 | 5 | 0 |
| P3 | 3 | 3 | 5 | 5 | 4 |
| P4 | 3 | 3 | 0 | 5 | 2 |
| P5 | 2 | 5 | 0 | 5 | 2 |

To obtain Rn normalize the matrix R.

Rn =

| | C1 | C1 | C3 | C4 | C5 |
|---|---|---|---|---|---|
| P1 | 0.8 | 0.4 | 0 | 0 | 0.8 |
| P2 | 0.8 | 0.6 | 0 | 1 | 0 |
| P3 | 0.6 | 0.6 | 1 | 1 | 0.8 |
| P4 | 0.6 | 0.6 | 0 | 1 | 0.4 |
| P5 | 0.4 | 1 | 0 | 1 | 0.4 |

Three stakeholders including Project Manager, System Engineer and Website Maintainer were asked for to give their prerequisites for the site as wanted criteria. These criteria were appointed loads in the size of 0 to 5 to acquire the matrix W.

$$W = \begin{bmatrix} 3 \\ 3 \\ 2 \\ 4 \\ 5 \end{bmatrix}$$

To obtain the matrix Wn normalise the matrix W

$$Wn = \begin{bmatrix} 0.6 \\ 0.6 \\ 0.4 \\ 0.8 \\ 1 \end{bmatrix}$$

Multiply Rn and Wn to get the resultant matrix S.

$$S = \begin{bmatrix} 1.52 \\ 1.64 \\ 2.72 \\ 1.92 \\ 2.04 \end{bmatrix}$$

| Methods | Ranking | Numerical | MOSCOW | Bubble Sort | Hundred Dollar |
|---|---|---|---|---|---|
| Values | 1.52 | 1.64 | 2.72 | 1.92 | 2.04 |

It shows that MOSCOW Technique is found most suitable followed by Hundred Dollar, Bubble Sort and Numerical Assignment. Ranking Method was found least suitable for the website.

## 5.2 Conclusion

So, which prioritization technique is best? The one that fits your needs the most and accomplishes your goals in the least amount of time and with a minimal amount of resources. Once you have an idea of which techniques are applicable to your project, you can evaluate them in real life to see how well they perform.

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