Analysis Of Risk Management Through Qualitative Approach

Ravi Sri Abhigna, Vattipalli Sandeep, B. Chaitanya Krishna

Abstract: Risk management processes have always been a crucial part of software development. Risk Management process starts with risk identification. It contains risk identification, risk estimation, mitigation and monitoring. Risk Management system is complex. Risk Management system is challenging since During the system development we face many risks. They require careful processing, planning and execution. This study describes the risks arise during the implementation in risk management system along with an exhaustive list of risk factors. Consequently, this study aims to provide a critical analysis of Risk Management through Qualitative Approach. The methodology used in this project is case study method. The main aim of this research work is to calculate the risk explosure. To calculate this risk explosure here we go through some factors. We considered speed, light, weather, person as the factors of probability and safety, damage cost as the factors of impact. By applying combined probability rule probability and impact are determined. Based on the product of probability and impact here we are going to calculate the risk exposure in occurring accidents. Finally this risk exposure is categorized as low,medium,high. Here we are going to implement this analysis through java interface.

Index Terms: Probability,impact,risk exposure,qualitative analysis,combined probability.

I. INTRODUCTION

Risk management is the identification ,evaluation and prioritsization of risks followed by coordinated and economical application of resources to minimize, monitor and control the probability or impact of unfortunate events or to maximize the realization of opportunities.

Risks can come from various sources including uncertainity in financial markets , threats from project.

The risk management method on a project consists of 4 steps:

1. Risk identification

2. Risk categorization

3. Risk assessment

4. Risk monitoring and reporting

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A. Risk identification :

Risk identification is that the method of determinant risk that might potentially prevent the program, entreprise, or investment from achieving objectives. It includes documenting and communicating the stakeholders.

B. Risk Categorization :

Risk category provides a list of areas that are likely to occur risk events
1. Technical
Requirements,technology,interfaces, performance,quality
2. External
Customer,contract,market,supplier
3. Organizational
Project dependencies,logistics, resources,budget
4. Project management
Planning,schedule,estimation, controlling,communication

C. Risk analysis :

In software testing risk analysis play a major role. Once risks are known, they are analysed to spot the qualitative and quantitative impact on the project so applicable steps may be taken to mitigate them.
During this phase we identify and categorize the risk. When the categorization of the risk,the level probability and impact of the risk is analysed. Once examining the risk we identified what are the possibilities of risk to occur with regard to varied technical conditions.

D. Risk monitoring and control :

The entire process of identifying the risks and initiating a procedure of handling with these risks can be viewed as risk monitoring and control. This method raise to the process of describing and monitoring the recognized risks as well as tracking residual risks, also finding of any new risks that may occur in future
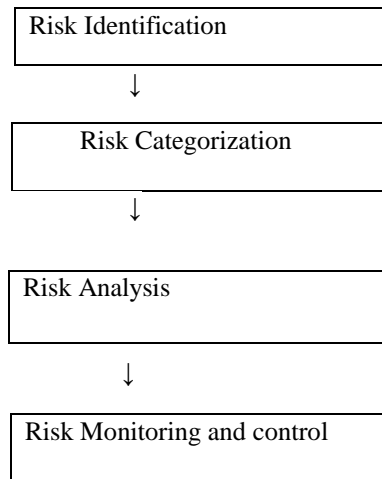
Risk Identification

↓

Risk Categorization

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Risk Analysis

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Risk Monitoring and control

Fig. 1. Risk assessment framework

II. RELATED WORKS

A. *Methods for the Measurement of risk in Risk Management*

Value at risk : value at risk the statistical measure used to measure the level of risk accompained with a company.

B. *Qualitative Research*

It is defined as a market research method that focuses on obtaining data through open ended and conversational communication. Use of non quantifiable methods to make decisions.

C. *Methods for qualitative analysis*

1. One-on-One Interview : personal interview
2. Focus groups : Expensive, useful when we research on new products and issues
3. Ethnograpie research : in-depth observational method. Grographical conditions can be an issue while gathering data. Challenging and time consuming
4. Case study research : Simplest way of performing a research and valuable quantitative research method.
5. Record keeping : This method makes use of already existing reliable data. This data can be used in new research.
6. Process of observation : it is the procedure of research that use subjective methodologies to collect the data.

D. *We are going to approach case study research*

Case study have been considered as a research scheme or plan, an estimation process and a detailing mode. The main aim in case study research is to interpret and view the extremities of the case and the convolutions. The aim of this research is to interpret the difficulty of a case in a proper way possible because of this reason, case study research uses various approaches for gathering the information and data.

III. IMPLEMENTATION

CALCULATION OF RISK EXPOSURE IN OCCURING OF ACCIDENTS

Accidents are very big problem in society about 1 million are dying internationally every year because of accidents. Many governments collect accident records and make the data available publicly. Now we make use of this type of data like weather conditions, human conditions and road conditions etc., to predict the risk in accidents.In our country each and every minute major accidents are occuring and around 16 die on indian roads per hour. In this the risk scores are based on the risk occurring factors

A. *Risk factors for probability*
1. Speed
2. Light condition
3. Weather condition
4. Person condition

B. *Risk probability ranges*
There probability is classified in 3 ways
1. Low
2. Medium
3. High

C. *Risk Factors for impact*
1. Safety
2. Damage cost

D. *Risk impact ranges*
Impact is classified in 3 ways
1. Low
2. Medium
3. High

Probability :

The chances of occurring risk.

Impact :

The estimation of potential loss associated with the risk. Calculating impact can be problematic if there is not a common definition of what impact means. Risk impact can affect more than one object

Risk Exposure :

Risk exposure is the measure of potential future loss resulting from a specific activity or event.
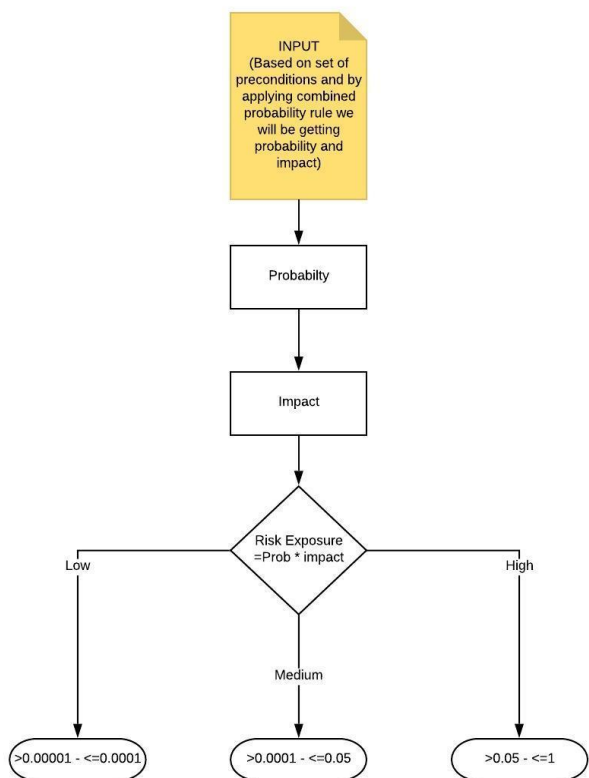
Risk Exposure = probability * impact

Fig.2. Flowchart for Risk exposure

Here we took speed,light,weather and light as input and these

S.no	Speed	Light	Weather	Person
1	80	Day	Cloudy	Drunk
2	60	Night	Cloudy	Normal
3	70	Day	Clear	Normal
4	30	Day	Cloudy	Drunk
5	50	Night	Clear	Normal

acts as the factors for probability.By using the combined probability theorem here we can determine the entire probability.Based on the results of probability damage cost and safety is determined and again by using the combined probability rule impact is calculated .after getting the probability and impact risk exposure is calculated.Risk exposure varies in 3 categories like low,medium,high

E. Methodology

1. Firstly all the factors both for probability and impact must be individual.

2. Since the factors are individual, combined probability rule is applied.

3. By applying combined probability rule for all the factors in probability we get the final probability for each individual event

4. Based on the result of probability for each individual event we predict the value of impact for each factor

5. By applying the combined probability rule for all the factors impact we get the final impact value for each individual event.

6. After getting the probability and impact values, risk exposure can be determined by this for each and every individual event.

Application

A. Probability

1. Speed :

If speed is <40 probability =0.1(Low)

If speed is 40 to 60 probability =

0.5(Medium)

If speed is >60 probability =1(High)

2. Light :

Day probability – 0.1

Night probability – 1

3. Weather

Clear probability – 0.1

Cloudy probability – 1

4. Person

Normal – 0.1

Drunk – 1

B. Probability ranges

$>=0.0001 – <=0.001$ (low)

$>0.001 - <=0.1$ (Medium)

$>0.1 –<= 1$ (High)

Table.1. Probability

Identifying the probability :

Calculating combined probability : multiplying the individual properties of two or more events together.

A. Impact

1. Damage cost

This damage cost is based on the probability result.

Low – 0.1

Medium – 0.5

High – 1

2. Safety

Not injured – 0.1 (low)

Requires medical attention

-0.5(Medium)

Injured - 1 (High)

B. Impact ranges

>=0.01 to <0.1 (low)

>0.1 to <=0.5 (medim)

>0.5 to <=1(high)

C. Risk exposure ranges

>0.00001 to <=0.0001 (Low)

>0.0001 to <=0.05   (Medium)

>0.05 to <=1   (High)

S.no	Damage cost	Safety
1	High	Injured
2	Medium	Requires medical attention
3	Low	Not injured
4	Medium	Requires medical attention
5	Medium	Requires medical attention

Table. 2. Impact

IV. EXPERIMENTAL RESULTS

Based on the product of probability and impact we are going to calculate the risk exposure.Depending on the pre conditions of probability and by applying combined probability rule , here we calculated the probability range.So based on the probability range we determined the impact range.

The key formula for identifying risk exposure is

Risk Exposure = probability * impact

1)Risk=0.1*1=0.1

2)Risk=0.1*1=0.1

3)Risk=0.001*0.25=0.00025

4)Risk=0.01*0.25=0.0025

5)Risk=0.005*0.25=0.00125

The results obtained are achieved through JAVA implementation.

If we consider the Fig.3 ,in this case speed is given as 80 which indicates that the probability is high.We will attain the cummulative probability from all the

preconditions(light,weather,person).From the probability obtained damage cost and impact will be determined.From the probability and impact obtained we can determine the risk exposure.

```
Enter Speed:80
Enter Light Condition:day
Enter Weather Condition:cloudy
Enter Person Condition:drunk
Cummulative probabilty:0.10000
Probability:HIGH
Damage Cost:HIGH
Safety:Not Injured
Impact:HIGH
Risk Exposure=0.10000


...Program finished with exit code 0
Press ENTER to exit console.
```

Fig.3 Experimental Result 1

```
Enter Speed:60
Enter Light Condition:night
Enter Weather Condition:cloudy
Enter Person Condition:normal
Cummulative probabilty:0.10000
Probability:HIGH
Damage Cost:HIGH
Safety:Not Injured
Impact:HIGH
Risk Exposure=0.10000


...Program finished with exit code 0
Press ENTER to exit console.
```

Fig.4 Experimental Result 2

```
Enter Speed:70
Enter Light Condition:day
Enter Weather Condition:clear
Enter Person Condition:normal
Cummulative probabilty:0.00100
Probability:MEDIUM
Damage Cost:MEDIUM
Safety:Require Medical Attention
Impact:MEDIUM
Risk Exposure=0.00025


...Program finished with exit code 0
Press ENTER to exit console.
```

Fig.5 Experimental Result 3

```
Enter Speed:30
Enter Light Condition:day
Enter Weather Condition:cloudy
Enter Person Condition:drunk
Cummulative probabilty:0.01000
Probability:MEDIUM
Damage Cost:MEDIUM
Safety:Require Medical Attention
Impact:MEDIUM
Risk Exposure=0.00250


...Program finished with exit code 0
Press ENTER to exit console.
```

Fig.6 Experimental Result 4

```
Enter Speed:50
Enter Light Condition:night
Enter Weather Condition:clear
Enter Person Condition:normal
Cummulative probabilty:0.00500
Probability:MEDIUM
Damage Cost:MEDIUM
Safety:Require Medical Attention
Impact:MEDIUM
Risk Exposure=0.00125


...Program finished with exit code 0
Press ENTER to exit console.
```

Fig.7 Experimental Result 5

Fig.8 Risk Matrix

V. CONCLUSION

Risk management is one of the important task in any software organization. It is very tough to predict what are the risks that we face in the due course of time. It is very uncertain to perform the task without prediction of risk. So, risk management plays a crucial role in any software life cycle. In this topic we have explained the risk management through qualitative approach. and here we have predicted the factors for probability and impact to calculate the risk. Through this factors and by applying combined probability rule on this individual factors we are able to find out the probability and impact. And this probability and impact gives us the risk exposure This cannot remove the risk, it only predicts the risk exposure based on the probability and impact. This is not the end point for this study of risk management. It is a continuous learning process and evolves based on our experience.

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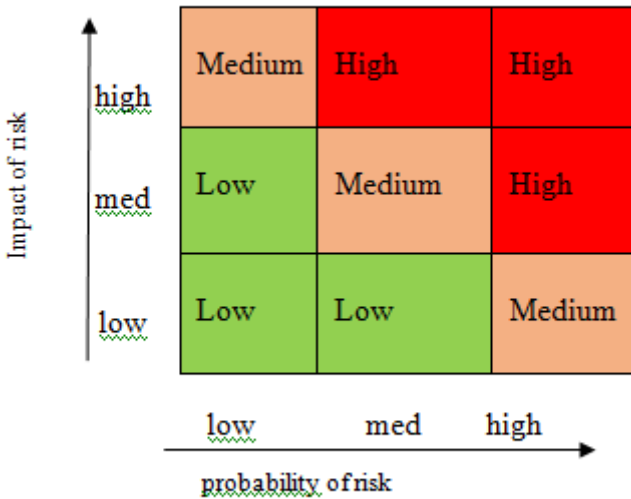
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