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# Disquisition of an Automated Risk Identification tool for Software Development Process

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***Abstract:*** *Today as we are all working with the computers, it all depends upon the software which we are using for the interaction with the computers. It has become easy to develop software. The study of building software is known as Software Engineering. This is all about the production of software from the initial stage to the final stage. As the quality of the software is increasing day by day, it has become necessary to build good quality software. While developing software, there are number of risks involved. The risk management is all about to identify and manage those types of risks. Risk can be external or internal. Here we are designing a risk identifying tool which will identify the risks in the development process of software.*

***Keywords:*** *Risk Classification, Risk Management Process, Risk Indexing, Risk Assessment, Risk Factors, Risk Prioritization.*

## 1. INTRODUCTION

Software engineering is about the production of software product from its initial stage to its final stage. Computer science is related to the software engineering in many aspects. As computer science is used to provide the discipline that uses for the theory basis professions in software development process. At present the applications that are used to develop the software system are more complex, because in these applications GUI and client server architecture is used. Software are distributed among the various system, hence it can works in one or more than none processes. So with the change of time the need of software is also increase. To fulfill this need, the software engineering is required [4]. The concept of risk management is all about to identify and manage those risks. Number of risks can be involved during the software development projects. Many concepts of software risk management are there but the most important from them are risk index, risk assessment, risk analysis.

**Risk Index:** Risk indexing is the multiplication of occurrence of risk probability and its impact. The risk indexing is characterized as low, medium, or high. This characterization depends upon the multiplication of risk occurrence and the impact.

**Risk Analysis:** The analysis of the risk has been found to be the most important part in the software design phase to evaluate that how critical is the system is.

**Risk Assessment:** For the systems which are targeted, there should be correct explanation of the assessment of the risk and all the security features should be explained.

### 1.2 RISK MANAGEMENT PROCESS:

Whenever the management of the risk is established and the effective management techniques are used by all software projects then these projects is built up within an enterprise, a complete profile of the risks is constructed at the level of an enterprise.

The risk profile tells that how the enterprise behaves to manage all the risks which are occurred [7]. The projects which are using risk management built a model by feeding data to the profile and after that the model is techniques are used by all software projects analyzed. If the rate of the project failure is high, trends are established and after that the correct actions are taken. The most complicate risks which are creating the problem can be analyzed by the trend analysis.

### 1.3 RISK FACTORS:

These are the factors responsible for risk [7].

**Impact of the business:** Associated with constraints are imposed by the marketplace or the management.

**Size of the product:** Linked with the overall size of the software product.

**Characteristics of the customers**: These are the risks with the sophisticated behavior of the client and the developer's ability to communicate with the client in an appropriate way.

**Definition of the process:** Related to the software process which has been defined and are further identified in the organization.

**Built technology:** These risks are linked with the complexity of the system which is built.

**Experience of the employees**: These are the risks which are associated with the developers with the technical and project experience.

**Environment which is developed:** Linked with the tools which I available.

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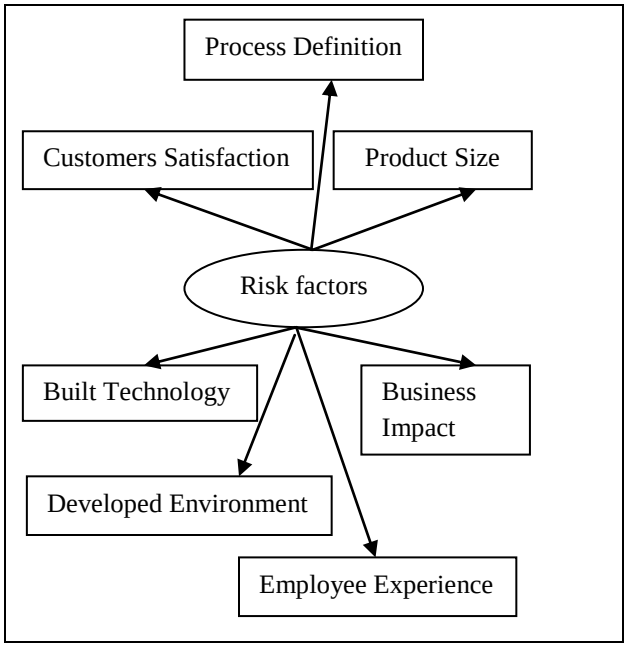



**Figure 1:** Risk factors

## 2. LITERATURE REVIEW

Arefeen, A. A (2011): Here the author has discussed that what can be the risks in software and also describe about the risk management. The risk management tells about the well-mannered environment where decision making can be easily assessed continually means what can be wrong or right which helps to determine that what risks are creating more problem than others having less probability of risks [1].

Sarigiannidis, Lazaros, and Prodromos D. Chatzoglou (2011): Here the author has discussed about the risk management in software projects. The main objective is to know or gain knowledge about the different approaches to manage the risks in the development of software process. The author has developed a framework which has two basic axes [8].

Mankad, Dishek (2012): In this paper the author has discussed about the risk management in software engineering process. Whenever we are creating a software product of high quality there are every time lots of lots of risks [6]. Whenever we are building a software product we always should know about the identification of the risk, analysing the risk and controlling them when they occur.

Bazaz, Yogini, et al. (2012): In this paper author discuss about the risk assessment model. There are several vulnerabilities which are to be handled which arises from the software's which are developed in the dynamic or static environment [3]. The uncertainties in the software can be handled and managed with the help of actions taken while managing the risks.

Avdoshin, Sergey M., and Elena Y. Pesotskaya. (2013): Here the author has discussed about the software risk management and how to overcome these types of risks. Whenever we are making any software product the managing of the risk starts from the very first stage of the development process to the last phase. The management of the risks can be more effective if the management is supported with the automated tool which integrates with the system engineering of a program and the processes of the program management [2].

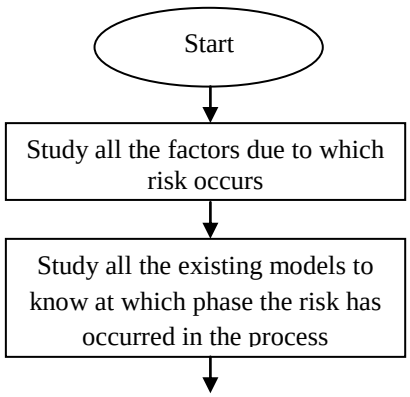
Sharma, M. M., et al. (2013): This paper is discussed about the risk removal tools that are presented in software engineering. Managing the risks in software is a figurative process. This process identifies the risk factors which are systematic, the risks which are assessed according to their categories and are mitigated [9].

Jr., J. M. (2013): Project management is very necessary while developing a project. For developing a project, the project manager faces the many difficulties related to project failure, risk assessment and so on [5].In software development environments the importance is recognized of process usage the techniques which are used and the different tools which are used for managing the risks. Management risk is a way or one of disciplines which are integrated to the management of the project and the rapid use of the software let grow the complexity and the size of the software.

## 3. PROPOSED WORK

Present risk identification tools do not clearly address where the risk is coming from and how the problems caused by the risks and what can be taken to the solution. Available Techniques do not provide automated software risk removal. Automated risk identification tool is novel method which gives different phases of risk identification. In present work lots of methods are used for risk identification. They starts from first phase of identification of software risks and its sources and after then they are identified and analyzed before going into next phase.

Once the risks are identified then it can be easily classified as the risk of low level, risk of medium level and the risk of high level.



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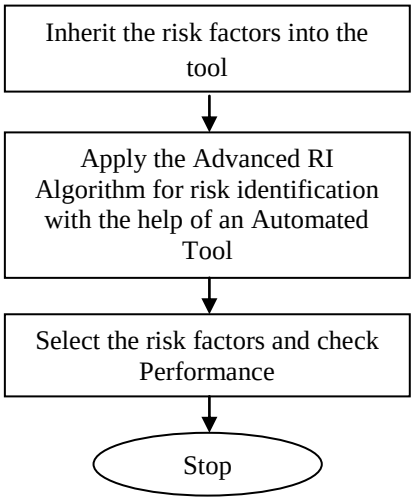


**Figure 2:** Flow chart of the proposed work

## 4. EXPERIMENTAL RESULTS

For estimating the effects of the risk factors which are selected for the research, an Advanced RI algorithm is proposed which is integrated in an Automated Risk Identification Tool. From the literature survey, numbers of factors are found which have direct or indirect impact on the project failure. The weights of all the dependent risk factors are calculated using the data set.

**Steps of Advanced RI Algorithm:**

Start

1. Select the risk factors
2. Apply Genetic Algorithm
3. Calculate the risk probability according to the output factors
4. Risk classification(According to the Risk Severity level)

Priority based risk classification each risk is classified as:

- Low Risk
- Medium Risk
- High Risk

5. Plot the graph according to the output factors and the risk priority
6. Calculate the risk exposure of the calculated probability
7. Check the performance of the calculated probability and RE

End

**The input factors which are taken are:**

| Complexity |
|---|
| Omitting necessary task |
| Planning to catch up later |
| Coding like hell programming |
| Research base development |
| Undetermined motivation |
| Uncontrolled employee's problem |
| Lack of efficient management |
| Short change quality assurance |
| People don't get work according to expertise |
| More pressure of work |
| More influence of externally supplied components |
| Extra efforts |
| Adding people late to work |
| Lack of user support |

From the numbers of factors 15 input factors are selected and the impact of these all risk factors are shown in 4 output factors.

**The output factors are:**

| Probability of Poor Team |
|---|
| Probability of Technical Difficulties |
| Probability of Poor Software Quality |
| Probability of project Failure |

**Case 1:** If complexity, coding like hell programming, extra efforts, lack of user support, undetermined motivations are SELECTED, the tool will predict the outputs based upon the weights assign to each factor.

The following diagram shows the different SELECTED factors and the outputs panel shows the chances of probability of poor team will be 10.6064%, technical difficulties will be 19.26%, poor s/w quality will be 34.8445% and project failure will be 33.2189%.


**Figure 3:** Input data of case 1

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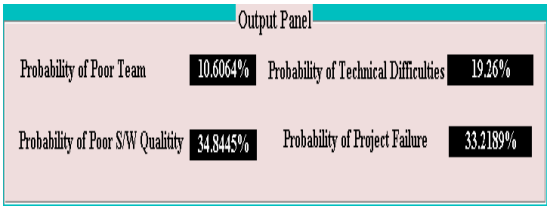


**Figure 4:** Output data of case 1

The probability of the risk occurred will be HIGH and the Graph will be plotted. The bar indicating red color means that the risk probability coming from those four factors is HIGH.


The bar graph plotted tells about the different level of probability from different four output factors.
The different bars in the graph are showing the percentage value of the calculated probability.

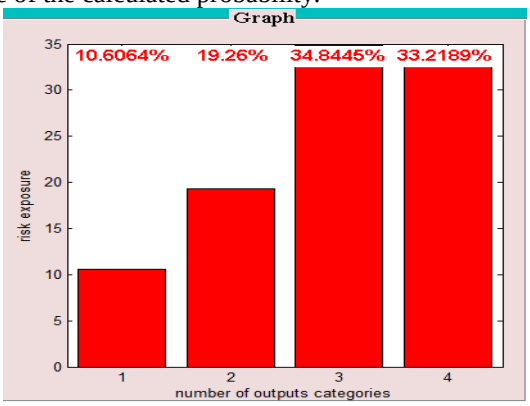


**Figure 5:** Plotted Graph and risk priority case 1

**Case 2:** If research based development, lack of efficient management, omitting necessary task, short change quality assurance are SELECTED then the tool predict the output based upon the weights assign to each factor.

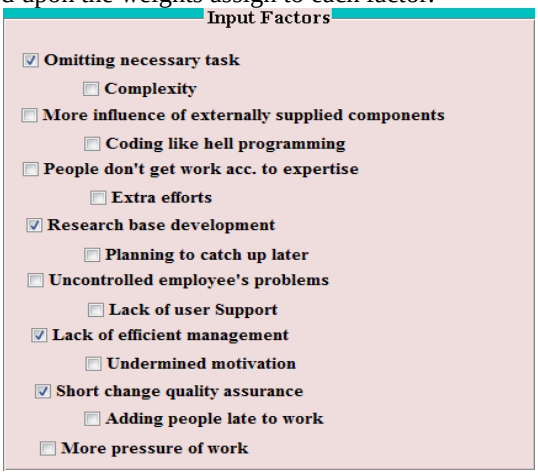


**Figure 6:** Input data of case 2

The following diagram shows the different SELECTED factors and the output panel shows the chances of poor team 11.4282%, technical difficulties 14.6116%, poor s/w quality 26.8482% and project failure 28.0245%.

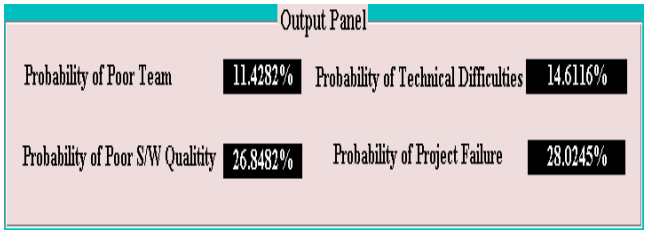


**Figure 7:** Output data of case 2

The probability of the risk occurred will be MEDIUM and the Graph will be plotted.


The bar graph plotted tells about the different level of probability from different four output factors.

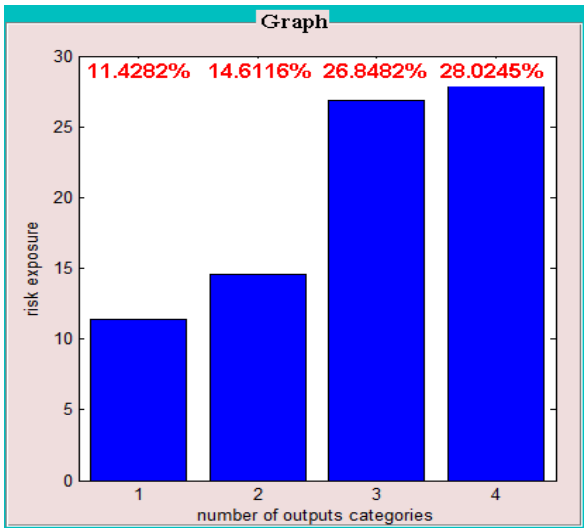


**Figure 8:** Plotted Graph and risk priority case 2

**The risk exposure of the proposed work is calculated by using the formula:**
Here RE is the Risk Exposure.
P is the Probability if the risk factors
PL is the Potential Loss
In the table which is given below, it shows the probability of the different risk factors which are selected.
It also shows the potential loss as well as the Risk exposure calculated. RE=p*PL

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**Table 1** Calculation of the proposed work

| Probability | Result |
|---|---|
| Poor Team | =16.8% |
| Technical difficulties | =40.9% |
| Poor s/w quality | = 46.3% |
| Project Failure | =37.4% |

The sum of the probability of the different risk factors is = 141.4

| L=25 | L=50 | L=75 | L=100 |
|---|---|---|---|
| 141.5*25= 3,535<br><br>3,535/100= **35.35** | 141.5*50= 7,070<br><br>7,070/100= **70.7** | 141.5*75= 10,605<br><br>10,605/100= **106.05** | 141.5*100= 14,140<br><br>14,140/100= **141.4** |

## 5. COMPARISON

**Table 2:** Comparison

| Potential Loss | L=25 | L=50 | L=75 | L=100 |
|---|---|---|---|---|
| Probability | | | | |
| P=0.25 | 6.25 | 12.5 | 18.75 | 25 |
| P=0.5 | 12.5 | 25 | 37.5 | 50 |
| P=0.75 | 18.75 | 37.5 | 56.25 | 75 |
| P=0.90 | 22.5 | 45 | 67.5 | 90 |
| Proposed Work | 35.35 | 70.7 | 106.05 | 141.4 |

**Plotted graph of the comparison:**

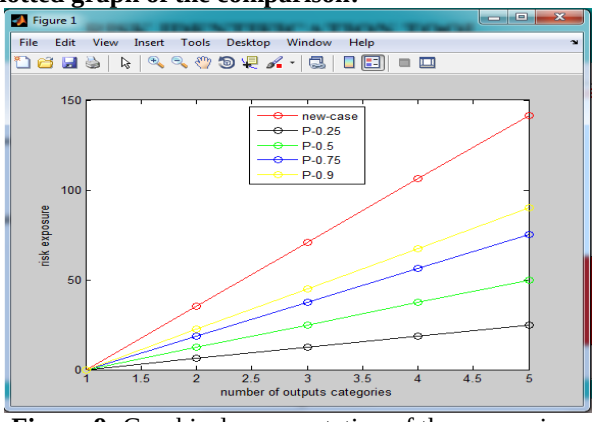


**Figure 9:** Graphical representation of the comparison

## 6. ENHANCED RESULTS

The proposed work results in good performance. The work is compared with the already work done before. After the calculation is done it has been observed that the Risk exposure calculated is more than that of old results.

**The probabilities of different cases are:**

**Table 3** Results of different Probabilities

| | |
|---|---|
| Old case 1 | 0.25 |
| Old case 2 | 0.50 |
| Old case 3 | 0.75 |
| Old case 4 | 0.9 |
| New case | 1.41 |

Here four old cases have been taken like 0.25, 0.50, 0.75, and 0.9 which are the old results.
The probability of the proposed work is calculated 1.41 which shows the enhancement in the results.
This enhancement in the results depicts that the performance of the proposed is increased.

**The performance increased is shown in the shape of a graph:**

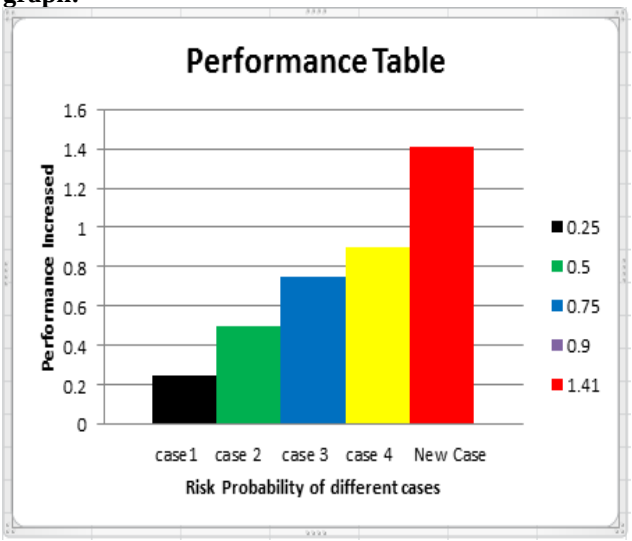


**Figure 10:** Graph of performance

Here red bar shows that probability of the new case is increased and as the risk probability increases the chances of project failure decreases.
Increase in performance makes the project more efficient to work and also makes it more reliable due to less number of error occurred.

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**Increased percentage of probability:**

**Table 4** Increased Results

| Cases | Probability | Performance Increased Probability |
|---|---|---|
| Old case 1 | 0.25 | By 1.16% |
| Old case 2 | 0.50 | By 0.91% |
| Old case 3 | 0.75 | By 0.66% |
| Old case 4 | 0.9 | By 0.51% |
| New Case | 1.41 | Increased |

It can be calculated by:
Probability of New case-Probability of RI of old case

## 7. CONCLUSION AND FUTURE WORK

In this it has been concluded that by developing a new automated tool it has become easy and more efficient to find more results than other previous tools. Here a new Advanced RI genetic algorithm is developed which is based on the past experiences of the experts. According to the output factors which are taken in the proposed work, the probability of risk factors is being calculated which is based on each risk factor which is taken as an input.

The future work can be the enhancement of the performance of the tool by taking different more risk factors. By taking more risk factors which are occurring in the software development process the analysis of the risk identification can be done more precisely and effectively.

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