ABSTRACT
Software risks are responsible for the failure of the software development process in the future. This may lead to the loss and become the threat to the failure of the software in future. However, software risks indicates the failure which are about to occur in the future and early inform a software engineer about the coming failure in the software development process. Software engineering field is very vast field it comprises not only a single unit but it almost covers all the fields like Administration, Electronics, Medical, Education, Defence etc. It is very clear to sound that software engineering young and emerging field. The involvement of software engineering is increasing day by day so it is quite important to identify and resolve the risks at each and every module of the software. The software engineering phases like Requirement analysis and feasibility study, Planning, Design/Construction, implementation/Coding, Testing, Maintenance etc. The working of each phase depends on the coordination and the corporation of the other phase. For example- the Design phase cannot be completed until the Requirement analysis phase and planning phase is not completed. In this paper we will discuss the risks occurs in the various phases of the software development process also the methodology and the approach to tackle those risks that are pre-supposed or those that are impending.

Keywords: Software Development Process, Risk Management, Risk Resolution etc

Introduction
The term risk is defined as the prediction which may cause something wrong, threat and hampers the smooth working of a concerned process. The same is in the case of software development process. Here in software engineering the risk are quite likely to appear at any stage of software development. One of the main reasons for occurrence of the risks is that each and every phase of the software engineering is intertwined and affects the working of the whole process. This may lead to the failure of software project which results into the frustration among the whole team of software engineers who are involved with their full devotion and dedication in the development of the software. Risk pre informs the software development team about the upcoming short comes and the errors in the project. Software risks effects cost, scheduling and working of the software project. If the risk occurs in any phase then surely it delays the working of not only itself but also of the next phase of software development. Risk management is the process of handling and resolution of the risks. This process involves the identification and elimination of the risks. The software risk management helps the software development process to deliver the desired and satisfactory project to the customers. So, the particular software organization becomes reliable to the customer. This activity manages the project in such a way that the risk resolution and handling does not affect the software development process in a big way. “A possible future event that, if it occurs, will lead to an undesirable outcome’’ [1]

“Risk is a combination of an abnormal event or failure, and the consequence of that event or failure to a system’s operators, users, or environment. A risk can range from catastrophic (loss of an entire system, loss of life, or permanent disability) to negligible (no system damage or injury)” [2]

Software Risk Management
Software Risk Management (SRM) includes the managers, senior software developer/designers, programmers and various experts related to the software development. The manager discusses the issues related to the risk with his and decides steps to resolves the issues for the elimination of the risks. Risk and risk management are also important because IT projects (including software projects) can be vehicles of delivering IT-enabled organizational change, so achieving business objectives can be critically dependent upon their success [4]. Software risks involves two characteristics-

1. Uncertainty- The risk may or may not happen i.e. there are no 100 percent probable risks- and loss. (Pressman 745-46 [3])
2. Probability- The risk i.e. likely to happen at one time or the other during the process.

The software risks can be categorized depending upon the intensity of occurrence-

1. Minute or small
2. Average
3. Potential
Software Risk Management involves the activities of identifying, analyzing, and responding to the risk throughout the life of a project.

**Risk identification and resolution technique**

![Diagram of Risk Identification and Resolution Process]

The process of identification and resolution of the risks involves the following systematic approach.

**Analysis**: In software development process, each and every phase face many kinds of difficulties or risks like project, technical, business etc. The risk may lead to the failure of the project, so one can easily estimate the intensity of the risk. A software engineer must be capable of estimating the risks like minute, average or potential and report the same to the team leader to make aware of the future threat. Here, the intensity of risk is analyzed and it is ensured that whether the risk is potential or not so that further steps are to be taken for the resolution of the risks.

**Identification**: The process of identification involves the activities which deal with the exact location or the phase or module where the risk has occurred. Here, the software engineer may come to know about the kind of risks whether it is negligible or not.

**Planning**: After analyzing and identifying the risk, a proper planning is done to resolve the risk from the particular phase or module. The manager of the project is made aware of the issue about the occurrence of the risk in a particular module or phase. Such type of issues is discussed with the senior designer/developer and programmers to deal with particular problem.

**Resolution**: This is the final step taken by the SRM to deal with the risks occurred in the software development process. It can be further divided into two levels:

1. **Primary Resolution**
2. **Complete Resolution**

The primary resolution is involved in dealing with the issues or the risks that are of minute intensity i.e., they are not that much harmful for the software project. This kind of resolution is done by the software developer of that particular team under the active guidance of the team leader. This kind of resolution is done within the estimated time and the process of completion of the milestone does not exceed. Complete resolution is attained when the risk belongs to a higher or potential level and that may not only harm the particular module or phase but also be responsible for the failure of the whole project. The risks that cannot be avoided/overlooked are given due concentration by the project leader and members. These risks demand great concentration as they may hamper the quality of the project and are also a threat to the overall result of the software development process. The members of the team must be prepared to handle the risks of high intensity and must find effective solutions to resolve the issues/errors well in time so that the effect may not lead to any disaster.

**Impact of risk on software project**

The effect of the risk on the software development process depends upon the intensity of the risk. The risk can delay the process of the development of the software and also increases the efforts in person months, cost and time. This also leads to the frustration among the software development team so the team leader must be prepared for this issue and motivate its team members in such a way that they can boost up themselves and give their best to resolve the issue. The impact of the software risk not only affects the software development organization but also affects the customer. This also affects the reliability of the customer to the software development organization. The efficiency
of the team members may also decrease as a result of the occurrence of the risks time and again during the development cycle.

The myth and the reality

When software risk arises it awares the system about the future failure in the software development life cycle. Let us have an example- if a software development organization is working at the very last stage of the development and some of the developers quit the organization then it becomes very crucial to handle the development process. The myth is that the organization can assign some new developers to do that task and the task will get completed in the estimated time. But reality is that the time will increase because the new developers are not aware about the module i.e. for what purpose the module is being developed. A proper training will be given to the new developers and after that they will do their job with full confidence. This results into the increment in the time slot of the software development.

![Fig 1.2A Project Decline](image1.png) ![Fig 1.2B Project Success](image2.png)

In the above two figures i.e. 1.2A & 1.2B, it is very clear that if the risk increases in a software development process then the success rate of the project decreases and vice-versa. These two terms are interdependent as one affects the other in very sensitive manner. The project success decreases the demand of the efforts in person months and the cost is increases accordingly.

This can be explained in two ways-

A. If risk increases then the effort, cost and time increase resulting in the downfall of project success rate.

\[
\text{Risk} = E_{pm} \times C \times T
\]

B. If risk gets handled within the estimated time then the effort, cost and time can remain stable and results into desired success rate.

Here, \( E_{pm} \) = Efforts in person months
C = Cost
T = Time

Strategies for handling the risks in the software development process

- Every software organization must prepare for the different kind of risks which may or may not occur in the software development process.
- The SRM- Software Risk Management should prepare the documentation of the previously handled or resolved risks in various phases so that they can be again helpful if that kind of risk arises in the software development.
The risk monitoring process is done in such a way that the exact location of the software risk is defined easily and the identification of the software risk become easy.

The resolution of the risk is totally depends on the reporting of the risk. If risk is minute or small in nature then it can handled at team level or module level. If risk is potentially very high then the risk management is made aware by the different team leaders to highlight the issue within the time so that the risk management can take some necessary and immediate steps to recover those risks.

After the resolution of the risks the risk management should note down all the activities which are used in the risk mitigation.

Conclusion
Software risks are responsible for the future threat to the software development process. If risk can be analyzed at early stages then proper steps can be taken to remove those risks. If risk management process is place for each and every software development process then future problems or the threats can be minimized and resolved easily within the time. So the risk management team must be very well focused in this task for the benefit of both the customers and the organization. Every project will be successful if and only if all the errors and failure are procurement within the time. So that mitigation of the risks from the software development process is very necessary to achieve the goal and the reliability from the customer.

References: