

Software Risk Management

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ABSTRACT: Software risk management begins with the notion that software risk is an issue that needs to be managed. Software risk at its core stems from problems within the software itself, i.e., the source code that is introduced during development. Software risk management must then address two Software types of Software failure and non-performance Project and program management and delivery.

Keywords: Mitigation, Risk Census, Agile Model, Risk Burn, Risk Board, Robust.

I. INTRODUCTION:

software risk management takes a proactive approach software risk by providing an approach and methodology to look for areas where a software defect impact the usability of the software for end users and business . software risk as an impact on project management , program management , or delivery is one in which software defect and complexity impact the ability to release software on time or within budget . the impact here is in delays and coast to the business that must be absorbed a defect found late in the development process could result in rework that takes days or weeks to correct thereby delaying a project . most software engineering projects are risky because of the range of serious potential problems that can arise. the primary benefit of risk management is to contain and mitigate threats to project success. you have to identify and plan, and then be ready to act when a risk arises—drawing upon the experience and knowledge of the entire team to minimize the

impact to the project. software risk management includes the identification and classification of technical, programmatic and process risks, which become part of a plan that links each to a mitigation strategy. the project manager monitors risk during the project

Types of the Risk : Software development is a multi stage approach of design, documentation, programming, prototyping, testing etc which follows a Software Development Life Cycle (SDLC) process. Different tasks are performed based on SDLC framework during software development. Developing and Maintaining software project involves risk in each step. Most enterprises rely on software and ignoring the risks associated with any phase needs to be identified and managed/solved otherwise it creates unforeseen challenges for business. Before analyzing different risks involved in software development, Let's first understand what is actually risk and why risk management is important for a business.

Risk and need of risk management : Risk is uncertain events associated with future events which have a probability of occurrence but it may or may not occur and if occurs it brings loss to the project. Risk identification and management are very important task during software project development because success and failure of any software project depends on it.



Figure1. types of the risk

Schedule Risk. The wrong schedule affects development almost immediately. If project tasks and schedules are not addressed properly, the likelihood of project failure is high. Hence, it is important to keep in mind the areas where schedule risk is highly probable:

- Time is not estimated properly for the project
- Staff, skills and systems are not tracked properly
- Functionalities for the software are not identified in a timely manner that results in affecting the time required for developing these functionalities
- Project scope expansions come up unexpectedly

Budget Risk. The finance distribution when done properly leads to reasonable use of finances and creates the grounds for project success. If the financial aspect of software development is mismanaged, there will be budget concerns. Fortunately, this is an easily avoidable risk once you know where it's rooted:

- Budget estimation is incorrect
- Cost overruns occur without realizing the need for reserved funds
- Project scope expansion

Operational or Management Risks mostly occur when team structure is not clear, and the work environment prone to be toxic. Under these conditions, a team member will not be able to pursue the project or achieve software development goals. Aside from that, the surfacing of external factors such as the improper process of implementation of failed system can also affect the project. In particular, these factors include:

- Failure in addressing priority conflicts
- Failure in resolving the responsibilities of each member of the team
- Insufficient resources for project or software development
- Skills for subject training are not aligned
- Resource planning is overlooked
- Lack of communication among team members

Technical Risks arise when only a part of developers' team is familiar with the software. Technical risks often root from the following:

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Endless changes of requirements for the software

- Existing technology required for the development is only in its initial stage with no advanced technology being available
- The project is too complex to implement
- Integration of modules turns out to be too much of a challenge within the project performance

External Risks are dangerous due to their unpredictability. Therefore, it is crucial that developers had the best business analyst in the area of their market to back-up ideas and eliminate the risks created by such external factors as:

- Limited funds for continuous development of the project
- Market's rapid development
- Inevitable changes in customer product strategy and priority
- Government rule changes

Risk management strategies : Risk Management strategies is an important part in project planning activities. It involves identifying and estimating the probability of risks with their order of impact on the project.

Risk Management Steps: There are some steps which need to be followed in order to reduce risk. These steps areas follows:

1. Risk Identification: Risk identification involves brainstorming activities. it also involves preparation of risk list. Brainstorming is a group discussion technique where all the stakeholders meet together. this technique produces new ideas and promote creative thinking. Preparation of risk list involves identification of risks that is occurring continuously in previous software projects.

2. Risk Analysis and Prioritization: It is a process which consists of following steps:

- Identifying the problems causing risk in projects
- Identifying the probability of occurrence of problem
- Identifying the impact of problem
- Assigning values to step 2 and step 3 in the range of 1 to 10
- Calculate the risk exposure factor which is product of values of step 2 and step 3
- Prepare a table consisting of all the values and order risk on the basis of risk exposure factor

Risk No	Problem	Probability of occurrence of problem	of Impact of problem	of Risk exposure	Priority
R1	Issue of incorrect password	2	2	4	10
R2	Testing reveals lot of defects	1	9	9	7
R3	Design is not robust	2	7	14	5

Figure 2. required table for risk analysis and Prioritization

3. Risk Avoidance and Mitigation: The purpose of this technique is to altogether eliminate the occurrence of risks. so the method to avoid risks is to reduce the scope of projects by removing non-essential requirements.

4. Risk Monitoring: In this technique risk is monitored continuously by reevaluating the risks, the impact of risk and probability of occurrence of risk. This ensures that:

- Risk have been reduced
- New risk are discovered
- Impact and magnitude of risk are measured

How to manage risk using an agile : Risk management is a priority process across project management irrespective of it being agile or not. While project risk management is essential for all projects, it is more critical for agile projects owing to the risk factors involved in the prioritization process of agile project development. In order to control risk in agile project management, a cycle of four processes are majorly adopted. These four risk control steps involved in agile project management are identifying risks, making an assessment, considering responses and analyzing reviews.

Risk identification in Agile Risk Management: It is very essential to identify risk in projects in order to control them. There are different types of techniques that can be used in identifying risks. Few of the popular risk identification techniques used by agile practitioners are: exhaustive risk checklists, review of documents, analysis of

assumptions and constraints and so on. As the project manager encourages the entire agile team to identify the risks involve, he or she should also provide them the guidelines to be followed in risk identification in order to achieve the goal of controlling and minimizing risk. Below are the guidelines that need to be considered by the agile team members while identifying risk in agile risk management.

In the initial stage of agile project development, the agile team and the product manager discusses about the requirements and the cases that might arise while delivering them. At the time of analyzing the requirements, team members should start thinking about the risks involved in implementation of the requirements. In the estimation process of agile project development, team should estimate the size of stories. They should consider the granularity of the stories because the larger the stories, the bigger is the risks involved.

- The process of identifying risk starts since iteration planning itself. The agile team should be accepting work that they are confident for reducing the risk of failure.
- The agile team members should bring up issues having an impact in their work process during every stand-up meeting. Thereafter they should discuss further to take appropriate mitigating actions.
- Team members working on an agile project should discuss and clarify about risks with the stakeholders during every iteration review.

- The team must reflect on the state of the project, the experiences that they had during the iteration and find tune for the assessment of the risks involved.

Risk Assessment in Agile Risk Management:

The next step that comes after identification of risk in project risk management is risk assessment. In this process of risk assessment, acknowledging the broad risk categories can be helpful. A broad categorization can be business risk, technological risks and logistical risk. One of such popular categorization is called PESTLE.

PESTLE: Political Risks

PESTLE: Environmental Risks

PESTLE: Social Risks

PESTLE: Risks rising our of Technology

PESTLE: Risks arising of Legal standpoint

PESTLE: Economic Risks

Here are some effective risk assessment techniques used by agile practitioners in the process of agile project management.

1) Risk Census: risk census is a simple framework for analyzing the risk exposure of a project. For each risk, a probability and the impact out of the risk factors is determined. The impact can be either in terms of time or cost or both. Here the delay in the project process time due to risk is counted in terms of day. The risk exposure is then calculated by multiplying the probability and the impact and the overall risk is then tracked to assess the —riskl of a project.

2) Risk Board: Risk board is an information radiator that is used to make the risks on a project transparent to the team and the stakeholders. By using risk board, the identified risks are displayed along with the probabilities and impacts. This board should be reviewed by the agile team members and project manager on stand-up meetings on daily basis.

3) Risk Burn down Chart: Risk burn down chart is a simple graphical indicator of the trends present in the risks of the project. This chart displays the exposure of the risk and its impact and response. Along with time progress the status of the risk factors is updated thus letting the agile team members know how much is achieved and how much is yet to achieve in controlling risks.

Risk Response in Agile Risk Management: After identifying and assessing the risks in a project, the next step is to consider the risk responses. In broad

terms, there are four types of response actions that are possible on the risks.

Avoid: In this cases, if a particular story is risky, the avoid strategy could be used to remove the story from the backlog. This is however not possible in all cases as it depends on the importance of the story in the project.

Mitigate: Using mitigate strategy, agile team tries to reduce either the impact or probability of the risks or both. Suppose a team is aware about their —velocityl, then they can predict the amount of work that can be done in iteration. This mitigates the risk of over-committing or under-committing during the iteration planning.

Transfer: Using transfer strategy, the risk is transferred to another party. A commonly employed transfer strategy is —outsourcingl where you assign work to a third party. However transferring risks does not completely eliminate the risk. This is called residual risk which also should be dealt with.

Accept: Using accept strategy, one consciously accept the risk and with the risk as it arises. This strategy is usually used for risks that have either a lower probability or impact.

Risk Review in Agile Project Management: Risk review is the name of forum or meeting where risks of a project are reviewed. During the review, the probability and impact of the risks is re-assessed for better and also new risks if arising are identified. Daily standup meeting, planning meetings, Scrum-of-scrums etc too can serve a platform for risk review in agile project management. To know more about risk management and agile practices

Risk mitigation : Risk mitigation planning is the process of developing options and actions to enhance opportunities and reduce threats to project objectives . Risk mitigation implementation is the process of executing risk mitigation actions. Risk mitigation progress monitoring includes tracking identified risks, identifying new risks, and evaluating risk process effectiveness throughout the project Risk mitigation planning, implementation, and progress monitoring are depicted in Figure 3. As part of an iterative process, the risk tracking tool is used to record the results of risk prioritization analysis (step 3) that provides input to both risk mitigation (step 4) and risk impact assessment (step2)

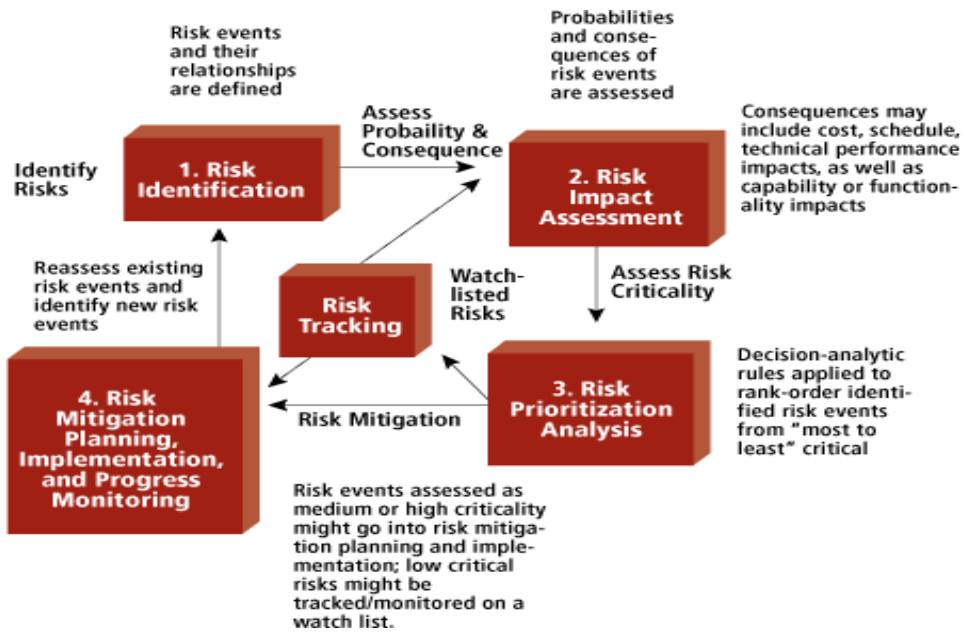


Figure 3. Risk Mitigation Handling Options

the risk mitigation step involves development of mitigation plans designed to manage, eliminate, or reduce risk to an acceptable level. once a plan is implemented, it is continuously monitored to assess its efficiency with the intent of revising the course of action if needed.

Risk mitigation strategies: general guide line for applying risk mitigation handling option are shown in Figure 4. These option are based on the assessed combination of the probability of occurrence and severity of the consequence for an identify risk . these guidelines are appropriate for many, but not all, projects and programs

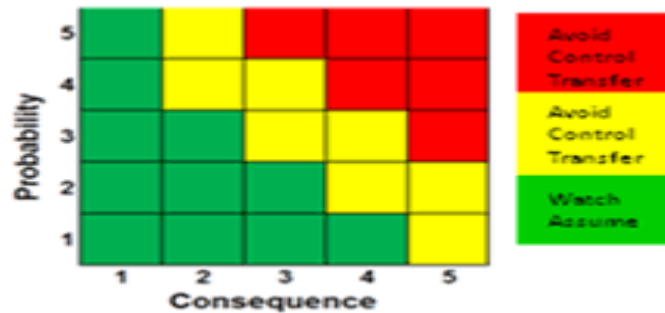


Figure 4. Risk Mitigation Handling Options

Risk mitigation handling options include:

Assume/Accept: Acknowledge the existence of a particular risk, and make a deliberate decision to accept it without engaging in special efforts to control it. Approval of project or program leaders is required.

Avoid: Adjust program requirements or constraints to eliminate or reduce the risk. This adjustment could be

accommodated by a change in funding, schedule, or technical requirements.

Control: Implement actions to minimize the impact or likelihood of the risk.

Transfer: Reassign organizational accountability, responsibility, and authority to another stakeholder willing to accept the risk

Watch/Monitor: Monitor the environment for changes that affect the nature and/or the impact of the risk.

Each of these options requires developing a plan that is implemented and monitored for effectiveness. More

information on handling options is discussed under best practices and lessons learned below.

From a systems engineering perspective, common methods of risk reduction or mitigation with identified

program risks include the following, listed in order of increasing seriousness of the risk .

1. Intensified technical and management reviews of the engineering process
2. Special oversight of designated component engineering
3. Special analysis and testing of critical design items
4. Rapid prototyping and test feedback
5. Consideration of relieving critical design requirements
6. Initiation of fallback parallel developments

Challenges in Implementing Risk Management Software

Risk management is an important function of any businesses. In order to manage risk, companies are relying on risk management software. It plays a vital role in the growth of the company by minimizing business risk. Utilizing statistical and analytical methods, risk software provides insight into a company's liability. Implemented a risk management system (RMS) is not without challenges, below are five potential issues you may face: Integration costs: Risk management software can impose additional expenses on your business. The price of software can range drastically depending on how the contract is structured. Generally speaking \$2,000 per user, excluding maintenance or support costs is expected. Costs can rise well beyond that if additional features outside the scope are requested. Despite that, these extra costs should not be dismissed. Due to each businesses unique requirements, these modules or features potentially could satisfy the needs of the organization and further limit liability.

Apart from aforementioned expenditure, additional expenses may be incurred. Implementation costs such as; training, data importation, and hardware improvements would all add to the price. These costs, of course, are borne only at the initial stages of usage. During the lifecycle of a contract costs will arise such as;

yearly maintenance, bugs fixes, and system updates. Keep in mind this will vary depending on how your vendor has structured the deal.

II. CONCLUSION :

In general, proper risk management helps you concentrate on working on your product. with proper risk management, more resources are focused on creating better functionality and higher quality products instead of overcoming the consequences of risks. developers who perform risk management can work more on what they love, and business owners who perform risk management get happier clients, a better reputation, and more place for creativity. Still curious about how to manage risks in your particular business? we can help if you're concerned about the risks in your software projects, the proper analysis, assessment and application of risk management can prevent whatever impact it may cause in project development, most especially in development. it can also significantly improve the quality of a product and have it developed at moderate cost-minimizing risk factors within the development process. Apparently, with high regard to knowledge and orientation to detail, project development software risks can be avoided.

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