UNIVERSITY OF RAJSHAHI

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Course Code:

ICE-3251

Course Title :

Software Engineering

Analysis Principle and Risk Management

Analysis Principle and Risk Management

What is it?

- Risk analysis and management are a series of steps that help a software team to understand and manage uncertainty.
- Many problems can plague a software project.
- A risk is a potential problem—it might happen, it might not.
- But, regardless of the outcome, it's a really good idea to identify it, assess its probability of occurrence, estimate its impact, and establish a contingency plan should the problem actually occur.

Analysis Principle and Risk Management

Who does it?

- Everyone involved in the software process—
  - managers,
  - software engineers, and
  - other stakeholders—
    - participate in risk analysis and management.

Analysis Principle and Risk Management

Why it is important?

- During software development, there are many factors, which need to keep in mind.
- Every business comes with certain risks and it applies in the software industry as well.
- Being aware of the risk is not enough.
- A project manager must also be ready if certain critical situations arise.
- This is where risk management comes.
- Risk is something, which could happen and cause some loss or threaten the progress of the project.
- To avoid such loss “Risk Management” is important.

Analysis Principle and Risk Management

Why it is important?

•Precaution is better than cure.

•Knowing the risk in advance and having a contingency plan helps in preparing in advance.

•This helps in lower the impact on the progress of the project and the cost in the end.

• Consider a small example of the software industry. Today we all run on the internet.

•What if one fine day the lease line gets broke for any reason. What is the backup plan?

•How the day-to-day work is going to continue. As an organization, these are such issues, which you cannot control.

•For this kind of situation, you should have a backup plan.

Analysis Principle and Risk Management

Why it is important?

•Therefore, no internet is an identified risk. When you analyze it you will know that this is a "High" priority and a major risk.

•This will affect your business in terms of cost and productivity.

•Now, what are your steps to resolve the risk?

•Having a backup lease line? Good idea right? It is up to the organization how they want to recover from such a situation. In the end, it is all about reputation and money.

•If you cannot deliver, you cannot run in the market.

•Risk management is as important as project development. If the organization cannot prevent or handle the risk then it is highly likely to vanish.

Analysis Principle and Risk Management

What are the steps?

Analysis Principle and Risk Management

What are the steps?

•Risk Identification

•This is the first step in risk management.

•It is the process of identifying the risk in project development.

•It also includes documenting those risks along with the characteristics.

•The process is constant and carried throughout the project development.

•As the project evolves, we get to know it better.

•We can explore and identify more unvisited or hidden risks.

Analysis Principle and Risk Management

What are the steps?

Risk Identification

This phase helps in two types of risk:

- **Product Risk**: A risk, which may arise due to functionality or unable to meet user expectations.
- **Project Risk**: A risk, which involves any unexpected event which may occur and impact the progress of the project.

- The senior management like a business manager, project manager, test manager, and client, does this process.
- They collaborate and brainstorms the idea of project risk, and create the risk document.

Analysis Principle and Risk Management

What are the steps?

Risk Analysis

•The risks have been identified now it is time for the analysis process.

•In this stage, we analyze and prioritize the risk. I.e. what could be the outcome if any of the identified risks occur?

•Based on that those risks are get Categorized. What is the impact if any of the risks occur?

•Based on it the severity is identified.

•The severity could be “High”, “Medium”, or “Low”. This also helps in prioritizing the risks.

Analysis Principle and Risk Management

What are the steps?

Risk Control

•In this stage, we try to control and mitigate the risk based on their category and priority.

• This is divided into three parts:

- **Risk Management Planning:** It includes proper and effective planning to deal with identified risk.
- **Risk Resolution:** This involves removing or resolving the identified risk.
- **Risk Monitoring:** This involves monitoring the progress towards resolving issues and taking appropriate actions

Software Risks

- While defining software risk, there is general agreement that risk always involves two characteristics:
  - ***uncertainty***—the risk may or may not happen; that is, there are no 100 percent probable risks.
  - ***loss***—if the risk becomes a reality, unwanted consequences or losses will occur.
- When risks are analyzed, it is important to quantify the level of uncertainty and the degree of loss associated with each risk.

Different Categories of Software Risk

- ***Project risks*** threaten the project plan. That is, if project risks become real, it is likely that the project schedule will slip and that costs will increase.
  - Project risks identify potential budgetary, schedule, personnel (staffing and organization), resource, stakeholder, and requirements problems and their impact on a software project.
- ***Technical risks*** threaten the quality and timeliness of the software to be produced. If a technical risk becomes a reality, implementation may become difficult or impossible.
  - Technical risks identify potential design, implementation, interface, verification, and maintenance problems.

Different Categories of Software Risk

- ***Business risks*** threaten the viability of the software to be built and often jeopardize (বিপদে ফেলা) the project or the product.
- **Candidates for the top five business risks are:**
  - (1) building an excellent product or system that no one really wants (***market risk***),
  - (2) building a product that no longer fits into the overall business strategy for the company (***strategic risk***),
  - (3) building a product that the sales force doesn't understand how to sell (***sales risk***),
  - (4) losing the support of senior management due to a change in focus or a change in people (***management risk***), and
  - (5) losing budgetary or personnel commitment (***budget risks***)

Seven Principles of Risk Management

- **Maintain a global perspective**—view software risks within the context of a system in which it is a component and the business problem that it is intended to solve.
- **Take a forward-looking view**—think about the risks that may arise in the future (e.g., due to changes in the software); establish contingency plans so that future events are manageable.
- **Encourage open communication**—if someone states a potential risk, don't discount it. If a risk is proposed in an informal manner, consider it. Encourage all stakeholders and users to suggest risks at any time.
- **Integrate**—a consideration of risk must be integrated into the software process

Seven Principles of Risk Management

- **Emphasize a continuous process**—the team must be vigilant throughout the software process, modifying identified risks as more information is known and adding new ones as better insight is achieved.
- **Develop a shared product vision**—if all stakeholders share the same vision of the software, it is likely that better risk identification and assessment will occur.
- **Encourage teamwork**—the talents, skills, and knowledge of all stakeholders should be pooled when risk management activities are conducted.

Software Risk Identification

- Risk identification is a systematic attempt to specify threats to the project plan (estimates, schedule, resource loading, etc.).
- By identifying known and predictable risks, the project manager takes a first step toward avoiding them when possible and controlling them when necessary.
- **There are two distinct types of risks:**
  - ***Generic risks***-a potential threat to every software project.
  - ***Product-specific risks***-that can be identified only by those with a clear understanding of the technology, the people, and the environment that is specific to the software that is to be built.

Risk Components

- The risk components are defined in the following manner:
  - ***Performance risk***—The degree of uncertainty that the product will meet its requirements and be fit for its intended use.
  - ***Cost risk***—The degree of uncertainty that the project budget will be maintained.
  - ***Support risk***—The degree of uncertainty that the resultant software will be easy to correct, adapt, and enhance.
  - ***Schedule risk***—The degree of uncertainty that the project schedule will be maintained and that the product will be delivered on time

Risk Projection

- Risk projection, also called risk estimation, attempts to rate each risk in two ways—

  (1) the likelihood or probability that the risk is real and will occur and

  (2) the consequences of the problems associated with the risk, should it occur.

Risk Projection Steps

- Establish a scale that reflects the perceived likelihood of a risk.
- Delineate the consequences of the risk.
- Estimate the impact of the risk on the project and the product.
- Assess the overall accuracy of the risk projection so that there will be no misunderstandings.

Risk Refinement

- During early stages of project planning, a risk may be stated quite generally.
- As time passes and more is learned about the project and the risk, it may be possible to refine the risk into a set of more detailed risks, each somewhat easier to mitigate, monitor, and manage.
- One way to do this is to represent the risk in ***condition-transition-consequence (CTC)*** format. That is, the risk is stated in the following form:

Given that <condition> then there is concern that (possibly) <consequence>.

Risk Mitigation

- All the risk analysis activities presented to this point have a single goal—to assist the project team in developing a strategy for dealing with risk.
- An effective strategy must consider three issues:
    - risk avoidance,
    - risk monitoring, and
    - risk management and contingency planning.
- If a software team adopts a proactive approach to risk, avoidance is always the best strategy.
- This is achieved by developing a plan for risk mitigation.

Risk Monitoring

- As the project proceeds, risk-monitoring activities commence.
- The project manager monitors factors that may provide an indication of whether the risk is becoming more or less likely.
- In the case of high staff turnover, the general attitude of team members based on project pressures, the degree to which the team has jelled, interpersonal relationships among team members, potential problems with compensation and benefits, and the availability of jobs within the company and outside it are all monitored.

The RMMM Plan

- A risk management technique is usually seen in the software Project plan.
- This can be divided into ***Risk Mitigation, Monitoring, and Management Plan*** (RMMM).
- In this plan, all works are done as part of risk analysis.
- As part of the overall project plan, project manager generally uses this RMMM plan.

The RMMM Plan

•In some software development teams, risk is documented with the help of a Risk Information Sheet (RIS).

•This RIS is controlled by using a database system for easier management of information i.e creation, priority ordering, searching, and other analysis.

•After documentation of RMMM and start of a project, risk mitigation and monitoring steps will start.

The RMMM Plan

Risk Mitigation:

•It is an activity used to avoid problems (Risk Avoidance). Steps for mitigating the risks as follows.

- •Finding out the risk.
- •Removing causes that are the reason for risk creation.
- •Controlling the corresponding documents from time to time.
- •Conducting timely reviews to speed up the work.

Risk Monitoring :

• It is an activity used for project tracking. It has the following primary objectives as follows.

- •To check if predicted risks occur or not.
- •To ensure proper application of risk aversion steps defined for risk.
- •To collect data for future risk analysis.
- •To allocate what problems are caused by which risks throughout the project.

The RMMM Plan

Risk Management and planning :

• It assumes that the mitigation activity failed and the risk is a reality.

•This task is done by Project manager when risk becomes reality and causes severe problems.

•If the project manager effectively uses project mitigation to remove risks successfully then it is easier to manage the risks.

• This shows that the response that will be taken for each risk by a manager.

•The main objective of the risk management plan is the risk register.

•This risk register describes and focuses on the predicted threats to a software project.

The RMMM Plan

•Let us understand RMMM with the help of an example of high staff turnover.

Risk Mitigation:

To mitigate this risk, project management must develop a strategy for reducing turnover. The possible steps to be taken are:

- *Meet the current staff to determine causes for turnover (e.g., poor working conditions, low pay, competitive job market).*
- *Mitigate those causes that are under control before the project starts.*
- *Once the project commences, assume turnover will occur and develop techniques to ensure continuity when people leave.*
- *Organize project teams so that information about each development activity is widely dispersed.*
- *Define documentation standards and establish mechanisms to ensure that documents are developed in a timely manner.*
- *Assign a backup staff member for every critical technologist.*

The RMMM Plan

- **Let us understand RMMM with the help of an example of high staff turnover.**

Risk Monitoring:

In the case of high staff turnover, the following factors can be monitored:

- *General attitude of team members based on project pressures.*
- *Interpersonal relationships among team members.*
- *Potential problems with compensation and benefits.*
- *The availability of jobs within the company and outside it.*

The RMMM Plan

•Let us understand RMMM with the help of an example of high staff turnover.

Risk Management:

- *Risk management and contingency planning assumes that mitigation efforts have failed and that the risk has become a reality.*
- *Continuing the example, the project is well underway, and a number of people announce that they will be leaving.*
- *If the mitigation strategy has been followed, backup is available, information is documented, and knowledge has been dispersed across the team.*
- *In addition, the project manager may temporarily refocus resources (and readjust the project schedule) to those functions that are fully staffed, enabling newcomers who must be added to the team to "get up to the speed".*

The RMMM Plan

Drawbacks of RMMM:

- It incurs additional project costs.
- It takes additional time.
- For larger projects, implementing an RMMM may itself turn out to be another tedious project.
- RMMM does not guarantee a risk-free project, infact, risks may also come up after the project is delivered.