



# UNIT-10

## Risk Management

### Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Understand what project risk management is
- ✓ Discuss in detail the process of identifying project risks
- ✓ Outline the processes involved in project risk management

## Unit 10

### Risk Management

Risk is inherent in the activities we choose. From driving a car to parachuting, risk is everywhere. Within a project, risks are unplanned events or conditions that can have a positive or negative effect on its success. Not all risks are bad, but almost all are seen as a threat.

The risks that activities bring are an exchange for the benefits we receive from accepting those risks. When a person chooses to jump out of a perfectly good aeroplane for the thrill of the fall, the exhilaration of the parachute opening, and the view of earth rushing up to meet them, there is a risk that the parachute may not open—a risk that thrill-seekers are willing to accept.

If risks in a project come to fruition, they can cause total project failure, increased costs and extended project duration, among other things. Risk often has a negative connotation but, like the example of the parachutist, the acceptance of the risk can also offer a reward. For the parachutist, the risk is certain death—but the reward is the thrill of the activity. For project managers, risk can mean failure, but the reward can be time or cost savings, as well as other benefits.

Risk management is the process in which the project manager and project team identify project risks, analyze them and rank them. They then determine what actions, if any, need to be taken to avert these threats. The costs, time, and quality concerns of the project brought about by the solutions to those risks are associated with this process. In addition, the reactions to risks are analyzed for any secondary risks the solutions may have created.

Project Risk Management contains six processes: Risk Management Planning, Risk Identification, Qualitative Risk Analysis, Quantitative Risk Analysis, Risk Response Planning, and Risk Monitoring and Control.

These processes are concerned with identifying and planning for potential risks that may impact the project. Organizations will often combine several of these processes into one step.

For example, Risk Identification, Quantitative Risk Analysis, and Qualitative Risk Analysis might be performed at the same time. The important point is to strive to identify all the risks and develop responses to those with the greatest consequences for the project objectives.

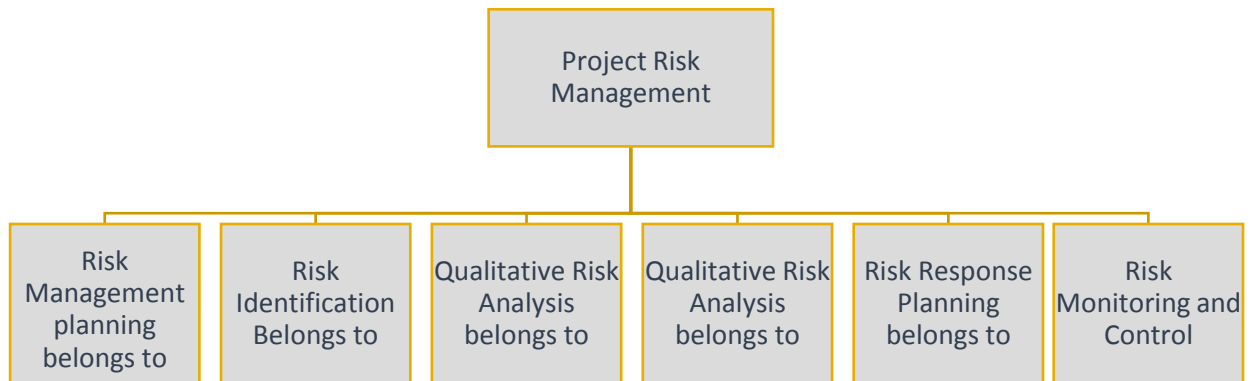


Fig: 10.1 Project Risk Management

## Planning for Risk Management

Risk management planning is about making decisions. The project manager, the project team, and other key stakeholders are involved in determining the risk management processes. The risk management process is related to the scope of the project, the impact of the project deliverables, and the priority of the project within the performing organization. In other words, a high-priority, complex project will not have the same level of risk planning as a simple, low-impact project.

## Referring to the Project Charter

The project charter is one of the first inputs to risk management. The project charter, as you may recall, formally authorizes the project and clearly identifies the project manager as the authority who will assign resources to the project. It is needed in risk management planning because it identifies the business need of the project and the overall product description.

Risks that may prevent the project from satisfying the business need of the project must be addressed. The product description must also be evaluated to determine what risks may be preventing the project work from obtaining the acceptable product description.

## Relying on Risk Management Policies

Organizations often have a predefined approach to risk management. The policies may define the activities to plan, initiate, and respond to risk. To conform to the organization's requirements, the project manager must map the project risk management onto these policies. The project manager must identify any component that may hinder the success of the project, while staying within the confines of the risk management policy.

## Considering Roles and Responsibilities

In many organizations there are predefined roles and responsibilities that influence risk management planning, the involvement of the project participants, and the decisions relevant to the risks. To save time and avoid frustration, these roles and responsibilities—and the policies associated with working with these individuals—should be identified and considered early in the project process.

Additionally, the project manager should be fully cognizant of his/her power and autonomy over the project. For example, a project manager may want to create plans and formulate reactions to the risks within a project, but the policies of the performing organization may limit his/her power to make decisions on risk management. Knowledge of the limits of that power can help him/her to work with management or customers to successfully alleviate risk.

## Examining Stakeholder Tolerance

Stakeholders will have differing tolerances of risk, depending on the project, the conditions, and the potential for loss or reward. Stakeholders' risk tolerance may be known at the launch of the project, by their actions during the project, or through written policy statements.

Consider a project to install new medical equipment in a hospital: there is little room for acceptance of errors because life and death are on the line. No short-cuts or quick fixes are allowed. Now, consider a project to create a community garden. Not only are life and death not on the line in the garden project, but the acceptance of risk is also different.

The utility function is a person's willingness to accept risk. The time and money costs required to eliminate the chance of failure are in proportion to the stakeholders' tolerance of risk on the project. The cost of ensuring that there are no threats must be balanced with the confidence that the project can be completed without extraordinary costs.

## Using a Risk Management Plan Template

Templates may be relied on by the performing organization for the risk management plan. The template can guide the project manager and the project team through the planning processes, the risk identification, and the values that may trigger additional planning.

A risk management plan may grant the project manager decision-making abilities on risks below a certain threshold. Risks above a preset threshold will have to be referred to management for determination of their cost and impact on the project success.

## Revisiting the Work Breakdown Structure

The work breakdown structure (WBS) is needed to help the project manager and the project team identify the components of the project and what risks may be unique to a particular area of the project versus risks shared across the entire project. It serves as an input to the risk management planning processes. For example, a project to create a new building will have different components in the WBS:

framing, interior, foundation, finishing, and so on. Within each parent component in the WBS there may be a risk unique to that category of deliverables. However, there may also be risks that may, should they come to fruition, affect the entire project's success. For example, a risk in the foundation could affect the entire structure later in the project life cycle.

## Creating the Risk Management Plan

The risk management plan is created through planning meetings. The creation of the risk management plan is aided by risk management plan templates, performing organization policies, and the risk tolerance level of the stakeholders. Attendees should include:

- The project manager
- Project team leaders
- Personnel specific to risk management
- Key stakeholders
- Any other persons with authority or necessary input to the risk management processes



Fig. 10.1

## Examining the Risk Management Plan

The risk management plan does not detail the planned responses to individual risks within the project. The risk management plan is responsible for determining the following:

- How risks will be identified
- How qualitative analysis will be completed
- How risk response planning will be undertaken
- How quantitative analysis will be completed
- How on-going risk management activities will proceed throughout the project life cycle
- How risks will be monitored

## Methodology

The methodology is concerned with how the risk management processes will be carried out.

The methodology asks:

- What data sources might be accessed and used for risk management?
- What tools are available to use for risk management?
- What approaches are acceptable within the performing organization?
- How much flexibility is available for the project given the conditions, the timeframe, and the project budget?
- What approach is best for the project type and the phase of the project?
- Which is most appropriate given the conditions of the project?

## Roles and Responsibilities

The roles and responsibilities identify the groups and individuals who will participate in the leadership and the support available for each of the risk management activities within the project plan. In some instances, risk management teams outside the project team may have a more realistic, unbiased approach to the risk identification, impact, and overall risk management needs than the actual project team.

## Scheduling

The risk management process needs a schedule to determine how often and when risk management activities should take place throughout the project. If risk management is undertaken too late in the project, the project may be delayed because of the time needed to identify, assess and respond to the risks. A realistic schedule should be developed early in the project to accommodate risks, risk analysis and risk reaction.

## Budgeting

Based on the impact, size and priority of the project, a budget may need to be established for the project's risk management activities. A project with high priority and no budget allotment for risk management activities may face uncertain times ahead. If the project is to be successful, a realistic dollar amount is needed for risk management activities.

## Thresholds

Thresholds are preset factors showing when the project conditions trigger an action or when a response is required. Threshold determination will need to be determined, like the risks analysis scoring, as soon as possible within the project plan to avoid delays. The project team's ideal threshold may differ from the customer's. Establishing a preset value prior to the project implementation will save frustration, time, and additional costs and delays.

## Risk Analysis Scoring

A clearly defined scoring system and interpretation of the scoring system must be in place prior to beginning quantitative and qualitative analysis. Altering the scoring process during risk analysis—or from analysis to analysis—can skew the seriousness of a risk, its impact, and the effect of the risk on the project. The project manager and the project team must have clearly defined scores that will be applied to the analysis to ensure consistency throughout the project.

## Reporting Formats

The reporting format requirements determine the type, detail and requirements of the risk response plan. This plan is concerned with how the outputs of the risk management processes will be documented, analyzed, and communicated to management, customers, the project team, and other stakeholders.

## Tracking

Risk management activities will need to be documented as soon as they are induced. The documented actions and their results will support on-going decisions within the current project (as well as future projects), and will serve as information for management, the project team, the customers, and other stakeholders. The tracking of these activities will be crucial should the performing organization choose to audit the risk management processes. The level of detail within the tracking and documentation of the risk management activities may vary depending on the scope and impact of the project.

## Preparing for Risk Identification

The risk management plan is one of the key inputs to the risk identification process. It describes how the risks will be identified, the overall management of the risk response process, and requirements for risk analysis. The risk management plan does not include the actual responses to the risks but, rather, the

approach to the management of the process. There are several other inputs to the risk identification process other than the risk management plan.

## Identifying Risks

After completing the risk management plan, it is time to start identifying the risks that may hinder the project's success. Risk identification is the process of identifying the risks and then documenting how their presence may affect the project. Risk identification is an iterative process and can be completed by the project manager, the project team, a risk management team, and even SMEs. In some instances, stakeholders and even people outside the project may complete additional waves of risk identification.

## Relying on Project Planning

An understanding of why the project exists is required for effective risk identification. Those carrying out the risk identification need to understand the project's purpose in order to recognize risks that could affect the project. These risk identifiers should understand the customer's objectives, expectations and intent.

Project planning outputs referenced here may include the following:

The project charter

The network diagram

The project schedule

Cost estimates

The work breakdown structure

Duration estimates

Quality plans

Assumptions

Constraints

Procurement issues

Communication requirements

The project budget

Resource requirements

The resource management plan

## Creating Risk Categories

Risks should be categorized after they have been identified within the project. Risk categories should be identified before risk identification begins. They should include common risks that are typical of the industry in which the project is proceeding.

Risk categories help rank, organize, and isolate risks within the project. There are four major categories of risks:

- **Project management risks:** These risks deal with faults in the management of the project: unsuccessful allocation of time, resources, and scheduling; unacceptable work results (low-quality work); and poor project management as a whole.
- **Organizational risks:** The performing organization may contribute to the project's risks through the following: unreasonable cost, time, and scope expectations; poor project prioritization; inadequate funding or the disruption of funding; competition with other projects for internal resources.
- **Technical, quality, or performance risks:** Technical risks are associated with new, unproven, or complex technology being used on the project. Changes to the technology during the project implementation may also be a risk. Quality risks are the levels set for expectations of impractical quality and performance. Changes to industry standards during the project can also be lumped into this category of risks.
- **External risks:** These risks are outside the project but directly affect it: legal issues, labour issues, a shift in project priorities, and weather. "Force majeure" risks can be frightening and usually call for disaster recovery rather than project management. These are risks caused by earthquakes, tornados, floods, civil unrest, and other disasters.

## Referring to Historical Information

Historical information is always an excellent source of information for risk identification. The historical information should be able to shed light on the risks identified early in the project if the performing organization has undertaken similar projects in the past. This also applies to risks identified throughout the project. Historical information provides information for the final project reports. In addition to the documentation, stakeholders of the original project may have information to offer based on their experience within the project. Historical information may also come from sources outside the organization. The project manager should consider consulting commercial databases, articles, studies, and other readily available material relevant to the project work.

## Identifying the Project Risks

Armed with the inputs to risk identification, the project manager and the project team are prepared to begin identifying risks. Risk identification should be a planned, methodical approach. Should risk

identification move in several different directions at once, some risks may be overlooked. A systematic, scientific approach is best.

- **Reviewing Project Documents**

One of the first steps the project team should take is to review the project documentation, which includes project plan, scope, and other project files. This structure review takes a very broad look at the project plan, the scope, and the activities defined within the project. Constraints and assumptions should be reviewed, considered, and analyzed for risks.

- **Brainstorming the Project**

The most common approach to risk identification is Brainstorming. This is usually completed by the project team as a whole to identify the risks within the project. A multidisciplinary team, hosted by a project facilitator, may also complete the brainstorming. This approach can include subject matter experts, project team members, customers, and other stakeholders in order to contribute to the risk identification process.

The risks are identified in broad terms and posted before their characteristics are detailed. The identified risks are categorized and will pass through qualitative and quantitative risk analysis later.

- **Using the Delphi Technique**

The Delphi Technique is an anonymous method of querying experts about foreseeable risks within a project, phase, or component of a project. There may be several rounds of anonymous discussions using the Delphi Technique—without fear of backlash or offending other participants in the process. The results of the survey are analyzed by a third party, organized, and then circulated to the experts. The Delphi Technique is completely anonymous and the goal is to gain consensus on project risks within the project. The anonymous nature of the process ensures that no one expert's advice overtly influences the opinion of another participant.

- **Identifying Risks Through Interviews**

Interviewing project stakeholders and subject-matter experts is an excellent approach to Identifying risks. The people responsible for risk identifications share the overall purpose of the project and the project's WBS, and they probably have the same assumptions as the interviewee. Through questions and discussion, the interviewee shares his/her insights into what risks he/she perceives within the project. The goal of the process is to learn from the expert what risks may be hidden within the project, what insight the person has into the project work, and what risks this person has encountered on similar work.

## SWOT Analysis

SWOT analysis is the process of examining the project from the point of view of four characteristics. SWOT stands for strengths, weaknesses, opportunities, and threats. For example, a technology project may identify SWOT as follows:

- **Strengths:**The technology to be installed in the project has been installed by other large companies in our industry.
- **Weaknesses:**We have never installed this technology before.
- **Opportunities:**The new technology will allow us to reduce our cycle time for time-to-market on new products. Opportunities are things, conditions or events that allow an organization to differentiate itself from its competitors and improve its standing in the marketplace.
- **Threats:**The time required to complete the training and simulation may overlap with product updates, new versions and external changes to our technology portfolio.

## Using Checklists

Using a checklist of risks is a good approach if the current project is similar to projects completed in the past. The advantage of a checklist in identifying risks is that it is a simple and direct approach. Checklists, if they are used, should be used as a guide—not as a complete and final list of risk identification. This is because the disadvantage of using a checklist for risk identification is that the participants may limit their risk identification to only the risk categories on the checklists. It is virtually impossible to create a complete and usable checklist of risks for most projects. Risks that are not included on the checklists should be explored, documented, and planned for. Although checklists are an excellent tool, they often limit the project team's attempts to identify all of the risks relevant to the current project. At project closure the checklist must be revisited (if it has been used) to ensure that it is accurate and complete for future projects that may use the same checklist.

## Examining the Assumptions

Assumption analysis is the process of examining the assumptions to determine what risks may stem from false assumptions. All projects have assumptions. Examining assumptions is about finding their validity. For example, consider a project to install a new piece of software on every computer in an organization. The project team has made the assumption that all of the computers in the organization meet the minimum requirements for installing the software. Should this assumption be wrong, costs would increase and schedule delays would occur.

A review of assumptions across the whole project for consistency is also required when examining the assumptions. For example, consider a project with an assumption that a senior employee will be needed throughout the entire project work; the cost estimate, however, has been billed at the rate of a junior employee.

## Utilizing Diagramming Techniques

There are several diagramming techniques that can be utilized by the project team to identify risks:

- **Influence diagrams:** An influence diagram charts out a decision problem. It identifies all of the elements, variables, decisions and objectives—and how each factor may influence another.
- **Flow charts:** System or process flow charts show the relation between components and how the overall process works. These are useful for identifying risks between system components.
- **Ishikawa:** These cause-and-effect diagrams are also called fishbone diagrams. The goal is to identify and treat the root of the problem, not the symptom. These are excellent for root-cause analysis of the factors causing the risks in the project.

## Investigating the Results of Risk Identification

As the project progresses, and risk identification continues to take place, there are several outputs of risk identification:

- **Risks:** Of course, the most obvious output of risk identification is the risk that has been successfully identified. Any uncertain event or condition with the potential to have a positive or negative effect on the project's success is called a risk.
- **Triggers:** These are warning signs or symptoms that a risk has occurred or is about to occur. For example, should a vendor fail to complete their portion of the project as scheduled, the project completion may be delayed.
- **Inputs to other processes:** Risk identification can contribute to other processes. For example, the WBS may not be sufficiently decomposed to allow risk identification to continue.

## Using Qualitative Risk Analysis

Qualitative risk “qualifies” the risks that have been identified in the project. Qualitative risk analysis is a broad approach to ranking risks by priority, which then guides the risk reaction process. Specifically, qualitative risk analysis examines and prioritizes the risks based on their probability of occurring and the impact on the project should the risks occur.

Once risks have been identified and prioritized, qualitative risk analysis can lead to more in-depth quantitative risk analysis or move directly on to risk response planning.

## Preparing for Qualitative Risk Analysis

The first input to qualitative risk analysis is the risk management plan. The plan will dictate the process, the scoring model for identified risks, and the methodologies to be used. In addition to the risk management plan, the identified risks, obviously, will need to be analyzed. These are the risks that will be scored and ranked based on their probability and impact.

The status of the project will also affect the process of qualitative risk analysis.

The status of the project is linked to the time available for analyzing and studying the risks. There may be more time early in the project, while a looming deadline near the project's end may create a sense of urgency to find a solution for the newly identified risks.

Early in the project, there may be several risks that have not yet surfaced. Later in the project, new risks may become evident and will have to pass through qualitative analysis.

The project type also has some bearing on the process. A project that has never been done before, such as the installation of a new technology, has more uncertainty than projects that have been carried out many times within an organization. First-time projects have limited resources on which to build a risk hypothesis, while recurring projects can rely on historical information.

The accuracy and source of the data must be evaluated to determine the level of confidence in the identified risks. All risks are based upon some form of belief, proof and data. A hunch that an element is a risk is not as reliable as historical information, measured statistics, or expert knowledge that an element is a risk. The data precision is in proportion to the reality of the risk.

A predetermined scale of probability and impact must be in place before risk analysis is carried out. Multiple scales are available to a project manager, but generally these should be in alignment with the risk management plan. The scale identified by the performing organization should be used if the performing organization has a risk management model. Finally, the assumptions used in the project must be revisited. During the risk identification process, the project team identifies and documents the assumptions used within the project. These assumptions will be evaluated as risks to the project's success.

## Completing Qualitative Analysis

While some risks demand attention, not all risks are worth responding to. Qualitative analysis is a subjective approach to prioritizing and organizing risks. Through a methodical and logical approach, the identified risks are rated according to probability and potential impact.

The outcome of the ranking determines four things:

- It identifies those risks that are not critical, project-stopping risks, but that must still be documented.
- It identifies the risks that must be subjected immediately to risk response planning.
- It identifies the risks that require additional analysis through quantitative risk analysis.
- It prioritizes risks.

## Examining the Results of Qualitative Risk Analysis

Qualitative risk analysis takes place throughout the project. The project manager should route the risks through the qualitative risk analysis process as new risks become evident and identified. The end results of qualitative risk analysis are as follows:

- **Overall risk ranking of the project:** The overall risk ranking of the project allows the project manager, management, customers, and other interested stakeholders to comprehend the risk, the nature of the risk, and the condition between the risk score and the likelihood of success for a project. The risk score can be compared to other projects to determine allocation of talent to a project, prioritization, project selection, the creation of a benefit-cost ratio, or even the cancellation of a project because it is deemed too risky.
- **Prioritized risks:** The risks in the project can be prioritized by their score, their ranking of high, medium or low, or by their WBS components. Another way of categorizing risks is to distinguish those requiring an immediate response from those that can wait for a response.
- **Trends in qualitative analysis:** As the project progresses and risk analysis is repeated, trends in the ranking and analysis of the risk may become apparent. These trends can allow the project manager and other risk experts to respond to the root cause and predicted trends to eliminate or respond to the risks within the project.
- **Identification of risks requiring additional analysis:** The risks categorized as high will probably need additional analysis, such as quantitative analysis. Some risks may demand immediate risk management based on the nature of the risks and the status of the project.

## Preparing for Quantitative Risk Analysis

Quantitative risk analysis creates an overall risk score for the project. Quantitative risk analysis attempts to numerically assess the probability and impact of the identified risks. This is a more in-depth method than qualitative risk analysis and relies on several different tools to accomplish its goal.

All or a portion of the identified risks in qualitative risk analysis can be examined in the quantitative analysis. Qualitative risk analysis typically precedes quantitative analysis. The performing organization may have policies on the risk scores in qualitative analysis, which require the risks to advance to the quantitative analysis. The availability of time and budget may also be a factor in the determination of which risks should pass through quantitative analysis.

Quantitative analysis is more expensive as it is a more time-consuming process. There are several goals of quantitative risk analysis:

- To determine the risk exposure for the project
- To determine the likely amount of the contingency reserve needed for the project
- To ascertain the likelihood of reaching project success

- To determine the risks with the largest impact on the project
- To ascertain the likelihood of reaching a particular project objective
- To determine realistic time, cost, and scope targets

## Considering the Inputs for Quantitative Analysis

The project manager may proceed to quantitative analysis based on the time and budget allotments for quantitative analysis, which are defined in the risk management plan. There are, however, seven inputs to quantitative risk analysis on which the project manager should rely:

- **Risk management plan** identifies the risk management methodology, the schedule, the allotted budget for risk analysis, and the risk scoring mechanics—among other attributes.
- **Identified risks** are those risks that have been identified and promoted to quantitative analysis as needed.
- **Prioritized risks** as ranked by weight, priority, or WBS component will need to be readily available. This information can offer significant information for the quantitative analysis of the risks, reveal trends among the risks, and show those risks that require the most attention.
- **List of risks marked for additional analysis:** Any risks with a high or moderate score need quantitative analysis. These risks require immediate attention since their presence may have detrimental effects on the project's success.
- **Expert judgement:** Individuals, subject matter experts, other project teams within the performing organizations, or other consultants may provide valuable experience and insight into the identified risks.
- **Historical information:** Similar projects will probably have similar risks. The history of how the risks were managed, mismanaged, or discovered during the project may provide crucial information about the current project. In addition, there may be historical information available through commercial databases or other sources.
- **Other planning outputs:** These include the cost and schedule estimates, scheduling information, documented logic of project decisions, and information on the technical attributes of the project.

## Interviewing Stakeholders and Experts

Interviews with subject matter experts and stakeholder scans may be among the first tools used to quantify the identified risks. The interview might focus on best-case, worst-case, and most likely scenarios if the goal of the quantitative analysis is to create a triangular distribution; most quantitative analysis, however, uses continuous probability distributions.

## Using a Decision Tree

A decision tree is a method to determine which of two decisions would be better. The decision tree model examines the cost and benefits of both decision outcomes and weighs the probability of success for the two decisions. For example, it may be used to determine lease-or-purchase equations, buy-versus-build scenarios, or whether to use in-house resources rather than outsourcing the project work.

The purpose of the decision tree is to make a decision, calculate the value of that decision, or determine which decision costs less.

## Applying Sensitivity Analysis

Each project risk is examined on its own merit by Sensitivity Analysis. All other risks in the project are set at a baseline value. Next, the individual risk is examined to determine how it may affect the success of the project. Determining which individual risks have the greatest impact on the project's success is the goal of sensitivity analysis, followed by escalating the risk management processes on these risk events.

## Examining the Results of Quantitative Risk Analysis

Quantitative risk analysis is completed throughout the project as risks are identified and passed through qualitative analysis, either as project conditions change or on a preset schedule. The end results of quantitative risk analysis include the following:

- **Probabilistic analysis:** The risks within the project allow the project manager or other experts to predict the likelihood of the project's success. The project may be altered by the response to certain risks, which may increase costs and delay the project completion date.
- **A prioritized list of risks:** This list of quantified risks demonstrates those risks with the highest potential for endangering the project's success. It includes the risks that have the greatest opportunities for the project. Each risk is identified along with its probability and impact.
- **Trends:**As the project moves towards completion, quantitative risk analysis may be repeated several times. In each round of analysis, trends in the identified risks may become visible. The trends in the risk can help the project team eliminate the root cause of the risks, reduce their probability, or control their impact.
- **Probability of costs and schedule objectives:**Based on the identified risks, their impact, the probability of them occurring, forecasts for the project schedule and the project costs are created. The more negative risks that occur within a project, the greater the chance of delays and increased costs.

## Planning for Risk Response

Risk response focuses on how to decrease the possibility of risks adversely affecting the project's objectives and how to increase the likelihood of positive risks that can aid the project. Risks will increase or decrease based on the effectiveness of risk response planning. Risk response planning assigns responsibilities to people and groups close to the risk event.

The responses to identified risks must be in balance with the risk itself. The cost and time invested in a risk must be met with the gains achieved from reducing the risk's impact and probability. In other words, a million-dollar solution for a hundred-dollar problem is unacceptable.

People assigned to the risk must have the authority to react to the project risk as planned. Usually, there will be several risk responses that may be viable for the risk; the best choice for the identified risk must be documented, agreed upon, and then followed through should the risk come to fruition.

## Preparing for Risk Response

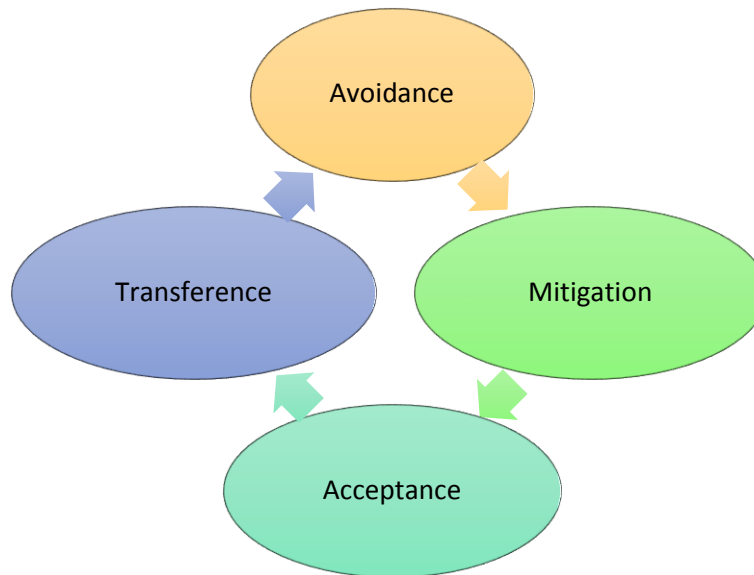
To successfully prepare for risk response, the project manager, project team, and appropriate stakeholders will rely on several inputs—many of which stem from qualitative and quantitative risk analysis—such as the following:

- The risk management plan
- Risk ranking
- A prioritized list of quantified risks
- A list of prioritized risks
- The list of potential responses decided upon when risks were first identified
- Any risk owners that have been identified, and a probabilistic analysis of the project
- The probability of the project meeting the cost and schedule goals
- Trends from qualitative and quantitative analysis
- A listing of common causes of risks to address multiple risks with an achievable solution.

## Creating Risk Responses

To respond to risks, the project team may employ several tools and techniques. To determine which category of risk response is most appropriate, each risk should be evaluated. When a category of risk response has been selected, the response must then be developed, documented, refined, and readied for use, if needed. Additionally, secondary responses may be selected for each risk. The purpose of risk response planning is to bring the overall risk of the project down to an acceptable level. Risk response planning must address any risks that have achieved an unacceptably high score.

There are four categories of risk response:



## Avoiding the Risk

Avoidance is simply avoiding the risk. This generally happens early in the project and can be accomplished in many different ways. Examples of avoidance include:

- Using a proven methodology rather than a new approach.
- Changing the project plan to eliminate the risk.
- Hiring additional project team members who have experience with the technology being employed by the project.
- Clarifying project requirements to avoid discrepancies.

## Mitigating the Risk

An effort to reduce the probability and/or impact of an identified risk in the project is called mitigating risks. Mitigation is carried out—based on the logic—before the risk occurs. Mitigation plans can be created in order that they might be implemented should an identified risk cross a given threshold. For example, a manufacturing project may have a mitigation plan to reduce the number of units created per hour should the equipment's temperature cross a given threshold.

The cost and time required to reduce or eliminate the risks is more cost-effective than repairing the damage caused by the risk. The risk event may still occur, but the cost and impact of the risk will both probably be very low.

The reduction is the number of units per hour that it may cost the project in time. Additionally, the cost of extra labour to run the equipment longer because the machine is now operating at a slower pace may

be attributed to the project. However, were the equipment to fail, the project would have to replace it and would be delayed for weeks while awaiting repairs.

Examples of mitigation include:

- Adding activities to the project to reduce the risk probability or impact
- Completing more tests on the project work before implementation
- Developing prototypes, simulations, and limited releases
- Simplifying the processes within the project

### Accepting the Risks

Risk acceptance is the process of simply accepting the risks because no other action is feasible, or the risks are deemed to be of small probability, impact, or both, and a formal response is not warranted. Active acceptance entails developing a contingency plan should the risk occur. Passive acceptance requires no action; the project team deals with the risks as they arise.

A contingency plan is a predefined set of actions to be taken by the project team should the risk event occur. A contingency plan has also been called “a worst-case scenario” plan. Most risk acceptance policies rely on a contingency allowance for the project. A contingency allowance is an amount of money the project will probably need in the contingency reserve based on the impact, probability, and expected monetary value of a risk event.

### Transferring the Risk

Transference is the process of transferring the risk (and the ownership of the risk) to a third party. The risk doesn’t disappear - it is simply someone else’s problem. Transference of a risk usually costs a premium for the third party to own and manage that risk. Common examples of risk transference include:

- Insurance
- Fixed-priced contracts
- Warrantees
- Guarantees
- Performance bonds

## Implementing Risk Monitoring and Control

Risks must be actively monitored. New risks must be responded to as they are discovered. The process of monitoring identified risks for signs that they may be occurring, controlling identified risks with the agreed responses, and looking for new risks that may creep into the project is called Risk Monitoring and Control. Risk monitoring and control is also concerned with the documentation of the success or failure of risk response plans, and keeping records of metrics which signal that risks are occurring, fading, or disappearing from the project.

Risk monitoring and control is an active process that requires participation by the project manager, risk owners within the project, the project team, and key stakeholders. As the project progresses, risk conditions may change and require new responses, additional planning, or the implementation of a contingency plan. There are several goals of risk monitoring and control:

- To confirm that risk responses are implemented as planned
- To determine the validity of the project assumptions
- To determine whether risk responses are effective or whether new responses are needed
- To monitor risk triggers
- To monitor the project for new risks
- To confirm that policies and procedures are carried out as planned
- To determine whether risk exposure has changed, evolved, or declined due to trends in the project progression

## Preparing for Risk Monitoring and Control

Risk monitoring and control is an active process. There are several inputs on which the project team and the project manager must rely to effectively monitor and control risks, such as the following:

- **The risk management plan**
- **The risk response plan**
- **New risk identification:** Throughout the project life cycle, new risks may surface that the project team and the project manager have not considered. These risks should be fed into the risk management process to identify valid responses.
- **Project communications:** The results of the project work may inform the project manager and the project team of new and pending risks. In addition, project team members may create reports to monitor or document risks. These reports are known as issue logs, action-items, jeopardy warnings, and escalation notices.
- **Scope changes:** Change requests should be analyzed for their impact on the project—and for any risks in the change that may affect the project objectives, as well as any new risks presented by the increased scope.

## Completing Risk Monitoring and Control

Risk monitoring and risk control is not a solitary activity that is completed once and never revisited. It takes place throughout the project. Risk monitoring and control is a recurring activity that requires input from all project participants.

The project manager and the project team must actively monitor risks, respond with the agreed actions, and scan the horizon for risks that have not been addressed. There are several tools available to implement risk monitoring and control, as the following sections discuss.

## Completing Risk Response Audits

A risk response audit examines the planned risk response, how well the planned actions work, and the effectiveness demonstrated by the risk owner in implementing the risk response. The audits take place throughout the project to measure the effectiveness of transferring, mitigating, and avoiding risks. The risk response audit should measure the effectiveness of the decision and its impact on time and cost.

## Completing Periodic Risk Reviews

At every project team meeting, project risk should be on the agenda. The periodic risk review is a regularly scheduled discussion throughout the project to ascertain the level of foreseeable risks, the success of risk responses in the project to date, and a review of pending risks. Risk rankings and prioritization may fluctuate, depending on circumstances within the project. Changes to the project scope, team, or conditions may require qualitative and quantitative analysis.

## Completing Additional Risk Planning

New risks will probably become evident during the project implementation. The project team, key stakeholders, and project manager who discovered the risk should communicate it. The risk must then be acknowledged, analyzed, documented, and planned for. The project team must be encouraged to communicate the discovery of new risks.

## Measuring Technical Performance

The project team's technical competence with the technology being used in the project should increase throughout the project. The level of technical achievement should be in proportion to the expected level of technical performance within the project. The project may suffer additional risks due to the discrepancy if the project team is not performing at a level of expected technical expertise. The success of completing activities throughout the project or through project phases is a measure of technical performance.

## Examining the Results of Risk Monitoring and Control

Risk monitoring and control helps the project become more successful. Risk monitoring and control measures the planned responses to risks and creates reactions to unplanned risks. The outputs of risk monitoring and control also aim to help the project reach its objectives. There are six outputs of the process:

- **Workaround plans:** Workarounds are unplanned reactions to risks that were not identified or that were accepted. Workarounds are documented in the project plan and the risk response plan.
- **Corrective actions:** Corrective actions are needed to bypass the risk as risks come to fruition. The two types of corrective action are workarounds and contingency plans. Corrective actions are actions taken to bring the project back into compliance with the project plan.
- **Change requests:** Changes to the project plan are required as workarounds and contingency plans are used. The changes to the project plan due to the risks are completed through integrated change control. The changes are approved, documented, and incorporated into the project plan.
- **Risk database:** A database of recognized risks, the outcome of the risk, and the planned response should be documented and recorded in an organization-wide risk database. This risk database may serve other project managers as historical information. The risk database can become a 'risk-lessons-learned' program over time.
- **Risk response plan updates:** The responses to those risks should be documented and updated in the risk response plan as risks occur. Should risk rankings change during the project, the change in ranking, the logic behind the change, and the results of the risk rank change should be documented in the risk response plan. The risks should be documented and considered closed in the risk response plan, including those risks that do not occur.
- **Checklist updates:** Checklists of identified risks will help future projects recognize and manage identified risks.

### Further Reading:

- ✓ *Paul S. Royer, (2002), Project Risk Management: A Proactive Approach*
- ✓ *Tom KENDRICK, (2009), Identifying and Managing Project Risk*
- ✓ *Dr David Hillson, (2009), Managing Risk in Projects*