



UNIT-5

Managing Project Quality and Risk

Learning Outcomes

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

- ✓ Outline knowledge areas of project procurement management
- ✓ Understand what is project risk management
- ✓ Outline the processes involved in project risk management

Unit 5

Managing Project Quality and Risk

Introduction

Projects require procurements regularly. Projects need equipment, consultants, materials, training, and many other services and goods. The process of purchasing the products necessary for meeting the needs of the project scope is called project procurement management.

The processes involved with purchasing goods or services from external vendors, contractors, and suppliers are included in the Project Procurement Management knowledge area. When discussing the Procurement Management processes, it's assumed that the discussion is taking place from the perspective of the buyer. You would be the buyer purchasing the goods or services from a supplier or contractor as the project manager, so examine these processes should be from that perspective.

Following are the processes in the Project Procurement Management knowledge area: Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Administration, and Contract Closeout.



Fig: 5.1 Project Procurement Management

Planning for Procurement

The process of identifying which part of the project should be procured from resources outside of the organization is called Procurement planning. Usually, procurement decisions are made early on in the planning processes. Procurement planning has four major elements:

- Whether or not procurement is needed
- How much to procure
- When to procure
- What to procure

Referring to the Scope Statement

The process of making procurement decisions is input by the project's scope statement. Because the project scope statement defines the project work, and only the required work, to complete the project, it also defines the limitations of the project. Knowledge of these limits of what the project includes can help the project manager, other procurement professional or the contract specialists, determine what needs to be purchased and what does not.

Referring to the Product Description

The details and requirements for acceptance of the project are defined by the product description. This information also serves as valuable input to what needs to be procured— and to what does not. What the end result of the project will be is defined by the product description. The work to be procured must support the requirements of the project customer when dealing with vendors and procuring a portion of the project.

A statement of work (SOW) defines the work to be accomplished within the project, but it generally does not define the product description as a whole. However, if it occurs that the entire project is to be procured from a vendor, in that case the SOW and the product description become one and the same.

Evaluating the Market Conditions

Part of procurement management is determining what sources are available to provide the needed services or products for the project. To determine what products and services are available and from whom and on what terms and conditions they are available, requires an evaluation of the marketplace. While in most free market enterprise societies there are multiple vendors offering comparable products, there may be times when choices of vendors are limited. There are three specific terms to know for the PMP exam that you may encounter:

- **Sole source:** Only one qualified seller exists in the marketplace.
- **Single source:** The performing organization prefers to contract with a specific seller.
- **Oligopoly:** There are very few sellers and the actions of one seller will have a direct effect on the other seller's prices and the overall market condition.

Relying on Procurement Resources

Organizations often have resources for managing the procurement process, including negotiating and contracting on behalf of the project. However, if the performing organization has no such resources for the project manager to rely upon, then it is up to the project manager to supply the procurement management resources. This also includes capabilities for negotiating and for obtaining in a fiscally responsible way the right products or services for a fair price on behalf of the performing organization.

Evaluating Assumptions, Constraints, and Other Factors

The project assumptions and constraints can directly influence the procurement process. For example, if there is a time constraint to complete a project by a given deadline additional laborers will need to be procured to complete portions of the project work, so that the project can be completed as scheduled. Assumptions can also affect procurement decisions. Project's budget could be skewed by a false assumption like the installation of a piece of equipment was part of the quoted price. Assumptions must be eliminated as much as possible especially in procurement planning.

Other factors must also be considered to have effective procurement planning:

- Cost estimates
- Cash flow projections
- WBS components
- Schedule estimates
- Quality management requirements
- Staff acquisitions and development
- Risk management plans

Determining to Make or Buy

A fundamental aspect of management is the decision to make or buy a product. It is more cost effective to buy sometimes—while at times it makes more sense to create an in-house solution. The make-or-buy-analysis should be made in the initial scope definition. This determines if the entire project should be completed procured or in-house. Additional make-or-buy decisions are needed as the project evolves.

The initial costs of the solution for the in-house or procured product must be considered, but so too must the ongoing expenses of the solutions. For example, if a company elects to lease a piece of equipment, the ongoing expenses of leasing the piece of equipment should be weighed against the expected ongoing expenses of purchasing the equipment and the monthly costs to insure, maintain, and manage the equipment.

Completing Procurement Planning

With certain exceptions, procurement planning should be done early in the planning processes. As needs arise, as project conditions change, or as other circumstances demand, procurement planning may be required throughout the project. Whenever procurement planning happens early in the project (preferred), or later in the project (needed), a logical approach to securing the proper resources is necessitated.

Using Expert Judgment

Procurement planning can rely on expert judgment. It may be beneficial to rely on the wisdom of others—those in the performing organization or subject matter experts—to determine the need for procurement. Expert judgment for procurement management planning can come from the following:

- Units or individuals within the performing organization
- Consultants and subject matter experts
- Professional, trade, or technical associations
- Industry groups

Determining the Contract Type

When it comes to procurement, there are multiple types of contracts. The project work, the nature of the purchase, and the market determine the contract type. Here are some general rules which project managers should know:

A contract is a formal agreement between the buyer and the seller. Contracts can be oral or written—though written is preferred.

- Contracts should clearly state all requirements for product acceptance.
- Any changes to the contract must be formally approved, controlled, and documented.
- The United States backs all contracts through the court system.
- A contract is not fulfilled until all of the requirements of the contract are met.
- Contracts can be used as a risk mitigation tool, as in transferring the risk.

All contracts have some level of risk; depending on the contract type. The risk can be transferred to the seller. If a risk response strategy is to transfer, risks associated with procurement are considered secondary risks and must go through the risk management process.

There are legal requirements governing contracts. In order for a contract to be valid, it must:

- Contain an offer
- Be for a legal purpose
- Be executed by someone with capacity and authority
- Have been accepted
- Provide for a consideration (payment)
- The terms and conditions of the contract should define breaches, copyrights, intellectual rights, and *force majeure*.

Fixed-Price Contracts

Fixed-price contracts are also known as firm-fixed-price and lump-sum contracts. They are agreements that define a total price for the product the seller is to provide and the requirements the vendor is to provide. These contracts may also provide incentives for meeting or exceeding contract requirements—such as meeting deadlines—and require the seller to assume the risk of cost overruns.

Time and Material Contracts

Sometimes called Unit Price Contracts, Time and Material (T&M) contracts are ideal for instances when an organization contract out a small projector. For instances when smaller amounts of work within a larger project are to be completed by a vendor. However, T&M contracts can grow dangerously out of control as more work is assigned to the seller.

Cost-Reimbursable Contracts

These contract types pay the seller for the product. In the payment to the seller there is a profit margin—the difference between the actual costs of the product and the sales amount. The actual costs of the product fall into two categories:

- **Direct costs:** These are costs that are incurred by the project in order for the project to exist. Examples include salaries of the project team, equipment needed to complete the project work, and other expenses tied directly to the project's existence.
- **Indirect costs:** These are costs that are attributed to the cost of doing business. Examples include utilities, office space, and other overhead costs.

The buyers are to assume the risk of cost overruns as required by cost-reimbursable contracts. There are three types of cost-reimbursable contracts:

- Cost plus incentive fee
- Cost plus fixed fee
- Cost plus percentage of costs

Procurement Planning

Procurement planning is a process that should happen early in the planning processes. The project manager and the project team can proceed with confidence in the procuring of products and services needed to successfully complete the project after the outputs of procurement planning are available. If it is determined early in the project that there is not a need for procurements then obviously the balance of the procurement processes is not necessary for the project.

Procurement Management Plan

The decisions made in the procurement planning processes are documented in this subsidiary project plan. How the remaining procurement activities will be managed is specified in it. The plan details the following:

- How vendors will be selected
- The process of independent estimating
- The relationship between the project team and the procurement office within the performing organization (if one exists).

- The type of contracts to be used
- The coordination between sellers and the project team and among project activities, project reporting, scheduling, business operations, and other project concerns.
- The procurement forms, such as contracts, the project team is required to use
- How multiple vendors will be managed to supply their contracted product.

Using the Statement of Work

The seller fully describes the work to be completed and/or the product to be supplied in the Statement of Work (SOW). The SOW becomes part of the contract between the seller and the buyer. The SOW is typically created as part of the procurement planning process, and it allows the seller to determine if it can meet the written requirements of the SOW. Particular industries have different assumptions about what an SOW is constituted of. What one industry calls a SOW may be a Statement of Objectives (SOO) in another. A SOO is a document which describes a problem to be solved by the seller.

Completing Solicitation Planning

Solicitation planning is the process of preparing to solicit sellers to provide products the project needs. It's a pretty straightforward business, as Figure 12-4 demonstrates. There are three inputs to solicitation planning.

- **Procurement Management Plan:** This subsidiary plan sets out the methodologies and expectations of procurement within the performing organization.
- **Statement of Work:** The SOW provides detailed information on what the seller will be providing for the performing organization. Recall that this document allows the seller to determine if it can provide the product and meet the requirements of the project team.
- **Other planning outputs:** Other details within the project plan, such as the schedules, estimates, constraints, and assumptions, are referenced as their values may have direct influence on the solicitation process.

Organizing Solicitation Materials

Solicitation planning depends on the outputs of procurement planning. The process will be guided by the Procurement Management Plan according to what the project team has planned, what the performing organization requires, or according to the guidance of a procurement office within the performing organization.

There are two primary tools used for solicitation planning:

- **Standard form:** There may be many different standardized forms for contracts, descriptions of procurement items, bid documents, and other procurement related documents within the performing organization,.

- **Expert judgment:** Expert judgment may be needed to review and help the project manager select the best source for the procured product.

Creating the Procurement Documents

Procurement documents are one of the primary outputs of solicitation planning. These documents guide the relationship between the buyer and seller. Communication that takes place between the buyer and the seller should always be specific as to the expectations and requirements of the seller. In initial communications, especially when requesting a price or proposal, the buyer should include the SOW, relevant specifications, and, if necessary, any non-disclosure agreements (NDA). When buyers make requests to sellers, they should be specific enough to give the seller a clear idea of what the buyer is requesting, but general enough to allow the seller to provide viable alternatives.

Creating Evaluation Criteria

Evaluation criteria are another output of solicitation planning. It is used to rate and score proposals from the sellers. In some instances, the evaluation criterion is focused just on the price the seller offers, for example in the case of a bid or a quote, in other instances, such as a proposal, the evaluation criteria can be multiple values: experience, certifications, references, and more.

Updating the Statement of Work

Updates to the Statement of Work are the final outputs of solicitation planning. As the requirements from the sellers during invitations for bids, request for quotes, or request for proposals, are being created by the project team, they may discover other elements needed in the SOW. Additionally, it is possible that the bids, quotes, and proposals may offer alternatives the project team has not considered. A new SOW might be created as a result. Changes to the SOW should be updated, documented, and recorded. This reflects the logic and reason behind the change.

Preparing for Solicitation

The actual process of solicitation can begin, once the solicitation planning has been completed. Fortunately, the sellers, not the buyers, perform most of the activity in solicitations. Usually there is no additional cost to the project for this, since the sellers are busy trying to win the business. There are two inputs to solicitations:

- **Qualified seller lists** are often maintained by performing organizations. These lists of qualified sellers (also preferred sellers or approved sellers) generally have history of past experience with the seller, contact information, and other pertinent information. There are many other resources to determine which sellers may qualify for the proposed work other than the internal qualified seller list. These include internet resources, industry directories, trade associations, and others.
- **Procurement documents** are created in solicitation planning. These are the Invitations for Bid, Request for Quote documents and Request for Proposal.

Completing Solicitation

Inviting sellers to solicit the business of the performing organization is the process called Solicitation. There are two primary tools needed to complete this process:

- **Advertising** Advertisements inviting bidders are expected in most circumstances. These advertisements can run in newspapers or trade journals specific to the industry of the organization. Some government agencies require advertisements inviting sellers to attend a bidder conference, solicit the project work, or present a proposal for the described work.
- **Bidder conferences.** A bidder conference, also called a vendor conference or contractor conference, is a meeting with prospective sellers to ensure that all sellers have a clear understanding of the product or service to be procured and are all on equal footing. Bidder conferences allow sellers to query the buyer on the details of the product. This helps ensure that the seller's proposal is adequate and appropriate for the proposed agreement. All sellers are considered equal at this point of the process,

Examining the Results of a Solicitation

As expected, the final result of a solicitation is a collection of proposals, bids, and quotations. These documents indicate the sellers' preparedness and ability to complete the project work. The stated expectations of the buyer should be aligned with the proposals, which may be presented orally, electronically, or in hard copy format. The relationship between the buyer and seller, and the type of information being shared, will determine which modality is the best choice of communication.

Determining Source Selection

The sellers present their proposals, bids, or quotes (depending on what the buyer requested of them). Once this is done, their documents are examined so that the project manager can select which sellers are the best choices for the project work. In many instances, price may be the predominant factor for choosing a particular seller—but not always.

Other factors besides price may also be taken into consideration:

- If an item cannot be delivered in a timely manner, it may not reflect the true cost to the performing organization. If a seller promises to have a product on site by a specific date and fails to do so, the project can be delayed, costing the organization large losses.
- Critical, high-priority projects may rely on multiple sellers to complete the project work. This redundancy can balance risk, cost, and opportunity among multiple vendors.
- Proposals can be separated into two categories: commercial and technical. The commercial category delves into the price to complete the project work. An evaluation takes both categories into consideration in order to determine the best choice for the project. The technical category describes the methodology and approach to complete the project work.

Preparing for Source Selection

Source selection evaluates and weighs the bids, proposals, and quotes for the procured portions of the project. A determination is then made as to which seller is the best for the project work. Source selection has three inputs to the decision-making process:

- **Organizational policies.** The performing organization is likely to have procedures and procurement policies which the project manager is expected to follow in regard to source selection. Before starting the source selection process, the organizational policies should be known. This is to avoid any discrepancies, conflicts of interest, or other breaches of the policies. For example, some organization's procurement policies do not allow project managers to accept any gifts beyond £15 in value.
- **Proposals.** Key inputs are the proposals, bids, and quotations provided by the sellers. The performing organization will evaluate these documents to determine which seller is the best provider for the project.
- **Evaluation criteria.** The evaluation criteria, such as samples of previous work, referrals, and references are considered. The evaluation criteria are evidence of the quality, depth, and experience of work the seller has performed in the past and, hopefully, is capable of performing on the current project. Evaluation criteria are developed in solicitation planning and applied in source selection.

Completing the Source Selection Process

There must first be eligible sellers before the performing organization can finalize the process of source selection. Assuming there is more than one seller that can satisfy the demands of the project, there are four tools and techniques the project manager can rely on:

- **Screening system** is a method to remove sellers from consideration who do not meet given conditions. For example, screening could require that sellers must have prior experience with the project technology, be certified by a specific organization, or meet other values. Sellers not meeting the requirements are removed from the selection process and their proposals are not considered.
- **Contract negotiation.** The performing organization creates an offer which the seller considers. The contract negotiation process creates a fair price for the work the seller is to complete. prior to signing the contract, the seller and The performing organization must be in agreement on the requirements, authorities, expectations, terms, technical and business management approaches, price and any other pertinent factors covered within and by the contract.
- **Weighting system** takes out the personal preferences of the decision-maker in the organization to ensure that the best seller is awarded the contract. A weighting system creates a matrix. Weights are assigned to the values of the proposals and each proposal is scored. Since the weights are

determined before reviewing the proposals, the process is guaranteed to be free of personal preferences and bias. The contract is awarded to the seller with the highest score.

- **Independent estimates** are often referred to as “should cost” estimates. It is created by the performing organization, or outside experts, to predict what the cost of the procured product should be. If there is a significant difference between what the sellers have proposed and what the organization has predicted, then we can say that either the sellers had misunderstood the requirements, or the Statement of Work was inadequate.

Examining the Results of Source Selection

Contract between the buyer and the seller is one output of source selection. A contract is a legally binding agreement between the buyer and seller. The seller is to provide the described product and the buyer is to pay for the product. Contracts are known by many names:

- Purchase order
- Memorandum of understanding
- Agreement
- Subcontract

A person with the power to authorize the requirements and payment specified in the contract signs the contracts. This role is called the delegation of procurement authority. It depends on the procurement policies of the performing organization, whether this person is the project manager or someone else.

All contracts flow through centralized contracting in some organizations. This requires that all contracts for all projects be approved through a central unit within the performing organization. Other organizations use a decentralized contracting approach. They assign a contract administrator or contract officer to the project.

Performing Contract Administration

The process of ensuring that the seller lives up to the agreements in the contract is called Contract administration. To ensure that the seller meets its obligations, the project manager and the contract administrator must work together. Legal remedies may ultimately be pursued if the seller does not fulfill its contractual requirements.

Another aspect of contract administration is the coordination between the contractors. This is especially important on larger projects with multiple sellers providing various products. The contract officer or project manager schedules and confirms the performance of the sellers to make sure that the deliverables, schedule, and performance of a contractor do not infringe or adversely affect the performance of another contractor.

There must be the terms for payment within the contract. Typically the progress of the contractor and performance is directly linked to payments it receives. The project manager must track quality and performance to approve or decline payment as needed.

Preparing for Contract Administration

The contract serves as a guide for effective contract administration. It dictates the requirements and expectations of the buyer and the seller. The obligations of both parties should be in alignment with the contract. If this is not the case, then disagreements, delays, and even work stoppage can ensue. There are three other inputs to contract administration other than the contract. These are:

- **Work results** The work results of the sellers must be completed according to the requirements of the contract. The seller must meet the expected schedule of completion and quality standards of the performing organization and stay within the anticipated costs and the specified range of variance. This is part of project plan execution.
- **Seller Invoices.** The terms for payment are specified within the contract. The terms for payment may stipulate under what conditions the seller will provide an invoice for the work completed. Additionally, the buyer may specify how and when the invoices are paid. “Net 30 days from receipt of the invoice” for instance.
- **On the job** In case the seller’s performance is unacceptable and a resolution to the problem cannot be found, then the performing organization may elect to cancel the contract. This termination of the contract is also handled as a change request within the Change Control System.
- **Change requests** contract administration can be complicated by Change requests. The performing organization’s Change Control System has to mesh, somehow, with the seller’s Change Control System. Changes to the project that affect the contracted work require changes to the contract, a new contract for the additional or changed work or addendums to the contract. The seller and the buyer may disagree about the cost of the changes in some cases. We can call these differences claims, disputes, or appeals. If not remedied, they can ultimately slow the project progress.
- **Completing Contract Administration**
Completing contract administration is a process which relies heavily on communication between the project manager, the seller and the contract officer. The communications plan may have considerations for what the purpose of the communication should be and how and when the communication between the buyer and seller should take place. There are three primary concerns, in addition to communication, within contract administration:
 - **Payment System** Sellers like to be paid when they have completed their obligations. The method of payment to the sellers is controlled by the payment system. This includes interaction of the project manager and the Accounts Payable department. There may be strict guidelines from performing organization for how payment requests are submitted and approved and how payments are completed. On larger projects, the project management team may have specific procedures for submitting the payment requests.
 - **Contract Change Control System** The procedures for how the contract may be changed are defined by the contract change control system. The process for changing the contract includes the forms, tracking, conditions within the project, business, documented communications, or marketplace that justify the needed the change, dispute resolution procedures, and the procedures for getting

the changes approved within the performing organization. The system is part of Integrated Change Control.

- **Performance Reporting** Performance reporting is the communication between the project manager and management on how the seller is performing under the guidelines in the contract. Performance reporting is part of communications and should be documented within the Communications Management Plan.

Performing Contract Closeout

Its purpose of Contract closeout is to confirm the obligations of the contract were met as expected. It is analogous to administrative closure. The project manager, key stakeholders, the customer, and, in some cases, the seller may complete product verification together to confirm that the contract has been completed.

We can also link contract close out to administrative closure, because it is the process of confirming the work was completed. In instances when the contract was terminated, contract closeout is reviewed and is considered closed because of the termination. Updating of the project records is necessary as it reflects the contract closeout and the acceptance of the work or product.

Reviewing Contract Documentation

The details of the contract may need to be reviewed to successfully close out a contract. This review ensures that the product verification is complete and in accordance with the agreement and language in the contract. More than just the contract is actually considered in the review. The project manager should review and consider the following:

- Schedules of the procured work
- Contract change requests—approved and declined
- Documentation the seller has created and provided, if any
- Financial documents, invoices, payment records
- Results of contractual inspections

Auditing the Procurement Process

Through contract administration, the successes and failures within the procurement process of the project are reviewed from procurement planning stage. The audit's aim is to learn from what worked and what did not work during the procurement processes. Application of this knowledge to other areas within the current project and to other projects within the performing organization is then possible.

Completing Contract Closeout

A contract file is a complete indexed set of records of the procurement process. It is incorporated into the administrative closure process. These records include information on the performance and acceptance of the procured work as well as financial information. The contract can be closed as soon as it can be assumed that the procured work is acceptable and meets the requirements of the contract. The formal closure of a

project comes in a written notice from the contract officer to the seller. The seller is informed that its work is acceptable and that the contract is considered closed by this notice. The size of the project causes the formal closure process to vary accordingly. Contract closeout requirements should be documented within the contract.

Project 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 get from accepting that risk. If a person chooses to jump out of a perfectly good airplane for the thrill of the fall, the exhilaration of the parachute opening, and the view of earth rushing up, there is a risk that the chute 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 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 mean a 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 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 thing is that you should strive to identify all the risks and develop responses for those with the greatest consequences to the project objectives.



Fig: 5.2 Project Risk Management

Planning for Risk Management

Making decisions is what Risk management planning is about. The project manager, the project team, and other key stakeholders are involved to determine the risk management processes. The risk management process is in relation 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 won't 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 can prevent the project from satisfying the business need of the project must be addressed. Also, 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

Often, there is a pre-defined approach to risk management that Organizations have. The policies can 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 to these policies. The project manager must identify any component that can hinder the success of the project, while staying within the confines of the risk management policy.

Considering Roles and Responsibilities

There are predefined roles and responsibilities in many organizations that influence risk management planning, the involvement of the project participants, and the decisions relevant to the risks. To save time

and 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 have full knowledge of the power and autonomy he has on the project. For example, a project manager may want to create plans and reactions to the risks within a project, but the policies within the performing organization limit the amount of power the project manager has to make decisions regarding risk management. Knowledge of the limit of that power can help him work with management or customers to successfully alleviate risk.

Examining Stakeholder Tolerance

Stakeholders will have differing tolerances for 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's little room for acceptance of errors because life and death are on the line. No shortcuts 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 different as well.

Utility function is a person's willingness to accept risk. The time and money costs required to eliminate the chance of failure is in proportion to the stakeholders' tolerance of risk on the project. The cost of assuring 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 escalated 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 identifies the components of the project and what risks may be unique to a particular area of the project versus a risk 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 has different components in the WBS: framing, interior, foundation, finishing, and so on. Within each parent component in the WBS there may be risk unique to only that category of deliverables. However, there may also be risks that should they come to fruition could affect the entire project's success. An example is that 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 needed input to the risk management processes

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

- How risks will be identified
- How qualitative analysis will be completed
- How risk response planning will happen
- How quantitative analysis will be completed
- How ongoing risk management activities will happen throughout the project life cycle
- How risks will be monitored

Methodology

The methodology is concerned with how the risk management processes will take place.

The methodology asks

- What data sources can 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, the phase of the project, and
- Which is most appropriate given the conditions of the project?

Roles and Responsibilities

The roles and responsibilities identify the groups and individuals that will participate in the leadership and support for each of the risk management activities within the project plan. In some instances, risk management teams outside of 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 happen throughout the project. If risk management happens too late in the project, then the project could 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 to show when the project conditions cross 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 ongoing 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 is crucial if the performing organization choose to audit the

risk management processes. The level of detail within the tracking and documentation of the risk management activities can vary based 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's time to get to work identifying risks that can hinder the project's success. Risk identification is the process of identifying the risks and then documenting how their presence can 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 of the project can complete additional waves of risk identification.

Relying on Project Planning

Understanding of why the project exists is required for effective risk identification. The people doing the risk identification have 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 can include

- 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 in the industry where the project is occurring.

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 lousy project management as a whole.
- **Organizational risks** the performing organization can contribute to the project's risks through: unreasonable cost, time, and scope expectations; poor project prioritization; inadequate funding or the disruption of funding; the 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 can 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 of the project but directly affect it: legal issues, labor issues, a shift in project priorities, and weather. "Force majeure" risks can be scary 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 done similar projects in the past. This also applies to risks identified throughout the project. Historical information provides information in 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 can also come from sources outside of the organization. The project manager should consider referencing 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 then some risks may be overlooked. A systematic, scientific approach is best.

1. 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.

2. Brainstorming the Project

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

The risks are identified in broad terms, posted, and then the risks' characteristics are detailed. The identified risks are categorized and will pass through qualitative and quantitative risk analysis later.

3. Using the Delphi Technique

The Delphi Technique is an anonymous method to query experts about foreseeable risks within a project, phase, or component of a project. There can be several rounds of anonymous discussion with 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.

4. 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, the project's WBS, and likely the same assumptions as the interviewee. Through questions and discussion, the interview shares his insight on what risks he 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 each of the characteristic's point of view. SWOT means strengths, weaknesses, opportunities, and threats. For example, a technology project may identify SWOT as:

- **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 competitors and improve its standing in the marketplace.
- **Threats** The time 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's 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's virtually impossible to create a complete and useable 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 in identifying all of the risks relevant to the current project. At project closure the checklist must be revisited (if it was used) to ensure the list is accurate and complete for future projects that may use the same checklists.

Examining the Assumptions

Assumption analysis is the process of examining the assumptions to see what risks may stem from false assumptions. All projects have assumptions. Examining assumptions is about finding the validity of the assumptions. For example, consider a project to install a new piece of software on every computer within an organization. The project team has made the assumption that all of the computers within the organization meet the minimum requirements to install the software. If this assumption were wrong, then cost increases and schedule delays would occur.

A review of assumptions across the whole project for consistency is also required for 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 great for root cause analysis of what factors are causing the risks within the project.

Investigating the Results of Risk Identification

As the project progresses, and risk identification continues to happen, 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 that possesses 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 if the risks did occur.

Once risks have been identified and prioritized, qualitative risk analysis can lead to more in-depth quantitative risk analysis, or move directly into 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 be needed to perform an analysis. 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 available time needed to analyze and study 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 need to pass through qualitative analysis.

The project type also has some bearing in 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 done over and

over within an organization. First-time projects have limited resources to build a risk hypothesis upon, while recurring projects have historical information to rely on.

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 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 pre-determined scale of probability and impact must be in place before risk analysis is carried out. There are multiple scales a project manager can elect to use, 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 success.

Completing Qualitative Analysis

While others 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 risks that are not critical, project-stopping risks, but that still must be documented.
- It identifies the risks that may proceed directly 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 happens 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

- **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 risks, 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 placement 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 rank of high, medium, or low, or by their WBS components. Another way of categorizing risks is by their urgency for an immediate response versus those risks 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 likely 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 method is more in-depth 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 can move into 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 the project manager should rely on:

- **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 is 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 can ensure detrimental effects on the project's success.
- **Expert judgment** 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 likely have similar risks. The history of how the risks were managed, mismanaged, or discovered during the project can provide crucial information regarding 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 stake holder scan be one of the first tools to quantify the identified risks. The interview can 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 the best to make is. The decision tree model examines the cost and benefits of both decision outcomes and weighs the probability of success for each of the decisions. For example, it can 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 to determine which decision costs the least.

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 see 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, as project conditions change, or on a preset schedule. The end result of quantitative risk analysis include

- **Probabilistic analysis** the risks within the project allow the project manager or other experts to predict the likelihood of the project success. The project may be altered by the response to certain risks, which can increase cost 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 opportunity for the project. Each risk is identified with its probability and impact.
- **Trends** As the project moves towards completion, quantitative risk analysis may be repeated over and over. 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 risk, reduce their probability, or control their impact.
- **Probability of costs and schedule objectives** Based on the identified risks, their impact, and probability of 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 from adversely affecting the project's objectives. Also 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 from reducing the risk's impact and probability. In other words, a million-dollar solution for a hundred-dollar problem is unacceptable.

People that are 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 risk management plan
- Risk ranking
- A prioritized list of quantified risk
- A list of prioritized risks
- The list of potential responses decided upon when risks were first identified
- Any risk owners that have been identified 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 cause risks to address multiple risks with an achievable solution.

Creating Risk Responses

To respond to risks, there are several tools and techniques that the project team can employ. 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 are scored unacceptably high.

There are four categories of risk response:

- Avoidance
- Mitigation
- Acceptance
- Transference

Avoiding the Risk

Avoidance is simply avoiding the risk. This generally happens early in the project and can be accomplished 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 that have experience with the technology that the project deals with.
- 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 done—based on the logic—before the risk happens. Mitigation plans can be created so they are 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 to reduce or eliminate the risks is more cost effective than repairing the damage caused by the risk. The risk event may still happen, but hopefully the cost and impact of the risk will both 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 labor to run the equipment longer because the machine is now operating at a slower pace may be attributed to the project. However, should the equipment fail, the project would have to replace the equipment and 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 that 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 happen.

A contingency plan is a predefined set of actions the project team will take 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 likely 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’s just 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 also is concerned with the documentation of the success or failure of risk response plans, and keeping records of metrics that signal risks are occurring, fading, or disappearing from the project.

Risk monitoring and control is an active process that requires participation from 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 to risk monitoring and control:

- To confirm risk responses are implemented as planned
- To determine the validity of the project assumptions
- To determine if risk responses are effective or if new responses are needed
- To monitor risk triggers
- To monitor the project for new risks
- To confirm policies and procedures happen as planned
- To determine if 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 the project team and the project manager must rely on to effectively monitor and control risks, such as:

- **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 project work can 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 could affect the project objectives, as well as any new risks the increased scope presents.

Completing Risk Monitoring and Control

Risk monitoring and risk control is not a solitary activity that is completed once and never revisited. It happens 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 of the risk owner in implementing the risk response. The audits happen 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, based 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 most likely become evident during the project implementation. The project team, key stakeholders, and project manager that discover the risks should communicate the risk. 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. Work around 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 can

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 for the risks that do not occur as well.
- **Checklist updates** Checklists of identified risks will help future projects recognize and manage identified risks.

Further Reading:

- ✓ *Quentin W. Fleming, (2003), Project Procurement Management: Contracting, Subcontracting, Teaming*
- ✓ *Denise Bower, (2003), Management of Procurement*
- ✓ *Stephen Guth, (2009), Project Procurement Management: A Guide to Structured Procurements*
- ✓ *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*