Chapter 9

Risk Monitoring and Controlling

9

In This Chapter

- Risk Monitoring and Controlling
- Critical Success Factors
- Control Risks Process

Risk Monitoring and Controlling

Risk monitoring and controlling is an ongoing, iterative process conducted from project initiation to project completion. Multiple project participants are involved with risk monitoring and controlling, including the project manager, project sponsor, various stakeholders, subject matter experts, risk champion, risk response owners, and action owners. It is not feasible for the project manager to effectively control risks alone.

The project environment and progress is monitored for the occurrence of risk triggers. The watchlist is revisited to see if additional risk responses are needed, and the need to recommend corrective actions and change requests is considered. Corrective actions may need to be adjusted to align with the severity of the actual risk events.

Communication regarding risk status is a key component of risk control. This can include collecting and sharing risk status with team members, communicating with stakeholders about specific risks, and creating a database of risk data that may be used throughout the organization on other projects.

Risk processes are evaluated and audited. This includes monitoring residual risks, ensuring that the risk management plan is being executed and that it is effective, evaluating assumptions to ensure that they are still valid, and performing variance and trend analysis on the project performance data. The watchlist, the risk management and response plans, and the project management plan are updated to reflect the current and changed status of the project as necessary.

Contingency reserves are evaluated and monitored for application and changes based on the project progress. This reserve analysis technique has been mentioned previously.

As new risks are identified throughout project monitoring and controlling, the risk management planning processes is conducted iteratively, including qualitative and quantitative risk analysis and risk response planning.

This is also the process during which the need for workarounds is determined. A workaround is a response to a realized negative risk. Workarounds are completely reactive and are not planned in advance. While implementing workarounds is considered the least optimal situation, it is not possible to identify all possible project risks, and workarounds are often necessary.

Project Risk Reports

Monitoring and controlling risks for the project must include timely, efficient, and effective communication about the project risk management. The format, details, and frequency of risk reporting are documented within the project risk management plan, but if that communication appears to be ineffective at any time, it should be revisited.

Information to be communicated on a regular basis includes but is not limited to:

- Top risk list – A list of the highest-priority risks currently open
- Risks that have transitioned to issues – Threats that have occurred and are now classified as issues
- Risk outcomes – The results of risks that occurred, their impacts, the effect of any risk strategies or responses, etc.
- Risk response metrics – An analysis of responses that have been implemented, their cost and schedule impacts, and their effectiveness
- Risk reserve status – Reports of remaining contingency reserve and reserve that has been utilized

Quality Tools

There are seven basic quality tools that can also be applied to project risk management.

1. Cause and effect diagram
2. Flowchart
3. Checksheet
4. Pareto chart
5. Histogram
6. Control chart
7. Scatter diagram

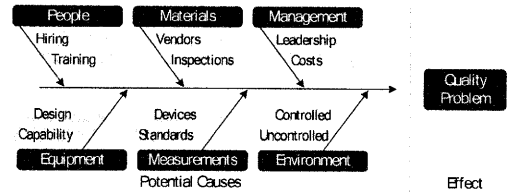
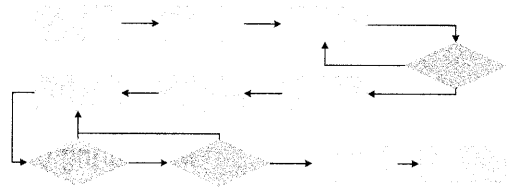
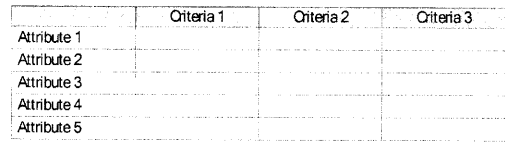
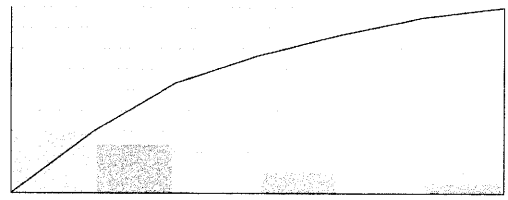
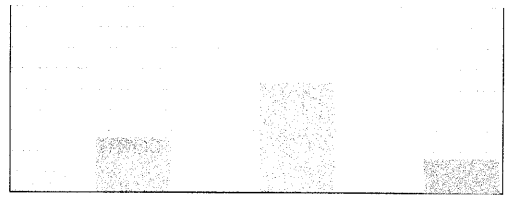
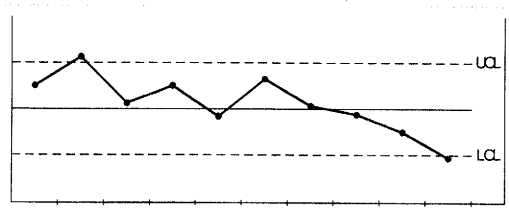
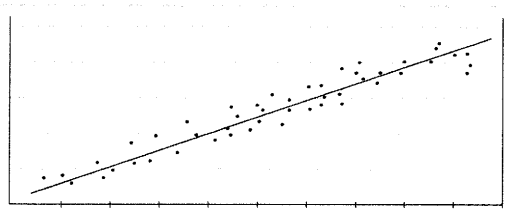
Tool	Description	Example
Cause and Effect Diagram	The cause and effect diagram is a tool that provides a visualization of how various factors are linked to potential problems or effects. This tool is used to identify root causes of project risks in order to be more efficient in planning appropriate responses. A cause and effect diagram is also known as a fishbone or Ishikawa diagram.	
Flowchart	A flowchart maps a process, showing activities, decision points, etc. in order to help a team anticipate potential quality problems and where they may occur.	
Checksheet	A checksheet is used to collect and organize data about a potential quality problem. The data captured in a checksheet can then be displayed in some of the other quality tools, such as a Pareto chart. A checksheet is also known as a tally sheet.	
Pareto Chart	A Pareto chart is a special type of histogram that ranks causes of poor quality or risks by overall influence in order to assist in developing appropriate approaches or responses. A Pareto chart reflects the 80/20 Pareto principle, the idea that 80% of problems or risks are due to 20% of causes. A Pareto chart, therefore, can be considered a prioritization tool, allowing the team to focus on those causes with the biggest impact. A Pareto chart has a cumulative percentage arc.	
Histogram	A histogram is a bar chart that shows the distribution of variables, where the height of the bar represents the frequency of that attribute or characteristic occurring.	
Control Chart	A control chart is used to measure stability or predictability in any type of output variable. This can be incredible helpful when evaluating project trending data for early indicators of risk on the project. A control chart includes an upper control limit (UCL) and a lower control limit (LCL). The control limits are typically calculated as three σ (standard deviations) from the mean. A process or data is considered out of control when one of the following is present: • Results fall outside of the control limits • Seven results in a row fall above the mean but below the UCL • Seven results in a row fall below the mean but above the LCL	
Scatter Diagram	A scatter diagram shows a relationship pattern between two variables. A scatter diagram uses a regression line to explain or to predict how a change in an independent variable will cause a change in a dependent variable. Scatter diagrams are also known as correlation charts.	

Figure 9-1: Seven Basic Quality Tools

PMBOK® Guide, page 239

Critical Success Factors

The critical success factors for risk monitoring and controlling include:

Integration with Overall Project Monitoring and Controlling

Risk management activities must be fully integrated with the project management activities associated with project monitoring and controlling, as the two are inextricably linked. This specifically includes integration between the cost, schedule, quality, and scope requirements and plans.

Monitoring of Risk Trigger Conditions

Trigger conditions dictate the need to enact the project risk responses and thus must be monitored in a consistent and ongoing manner.

Maintaining Risk Awareness

Risk management activities are considered a key part of project status meetings and should be a standing agenda item. In addition, risk management status and activities should be documented and communicated within the project status reports and dashboards.

Control Risks Process

The Control Risks process is an ongoing evaluation and analysis of the project and its risk status. It is considered an iterative process and occurs from project initiation to completion.

Control Risks: Inputs, Tools and Techniques, and Outputs

Inputs	Tools and Techniques	Outputs
1. Project management plan	1. Risk reassessment	1. Work performance information
2. Risk register	2. Risk audits	2. Change requests
3. Work performance data	3. Variance and trend analysis	3. Project management plan updates
4. Work performance reports	4. Technical performance measurement	4. Project documents updates
	5. Reserve analysis	5. Organizational Process Assets updates
	6. Meetings	

Figure 9-2: Control Risks ITTOs

PMBOK® Guide, page 349

Control Risks: Inputs

Project Management Plan

The project management plan provides details and instruction for the overall management of the project, including the project performance measurement baselines (scope, schedule, and cost) and the subsidiary plans.

As risk management cannot be separated from project management, the project management plan is a critical input. Baselines are used to evaluate any type of variance, indicating possible risks to the project. Subsidiary plans are used to ensure appropriate handling of the various aspects of the project from a risk perspective.

Risk Register

The risk register contains all of the individual risks, their triggers, analyses, selected responses, etc., which are used to control the risks.

Work Performance Data

Work performance data, an output of the Direct and Manage Project Work process, comprises the raw data and details of the project progress. This can include percentage of work complete, work progress, actual money spent, quality measurements, etc.

Work Performance Reports

Work performance reports, an output of the Monitor and Control Project Work process, are the status reports for the project. The work performance reports are used to evaluate the progress of the project and identify any variances and trends that may indicate uncertainty.

Control Risks: Tools and Techniques

The *PMBOK® Guide* techniques that the project manager and project team may use while monitoring and controlling the project risks include:

- Risk reassessment
- Risk audits
- Variance and trend analysis
- Technical performance measurement
- Reserve analysis
- Status meetings

In addition, the *Practice Standard for Project Risk Management* offers two additional techniques:

- Critical chain project management (CCPM)
- Workarounds

Risk Reassessment

Monitoring project risks often results in the identification of new risks, the reassessment of current risks, and the closing of risks that are outdated. Project risk reassessments should be regularly scheduled. The amount of repetition and level of detail that is appropriate depends on how the project progresses relative to its objectives. Typically, the risk owner is responsible for ensuring that these risk reassessments occur on an appropriate basis.

Risk Audits

Risk audits examine and document the effectiveness of risk responses in dealing with identified risks and their root causes, as well as the effectiveness of the overall risk management process. The project manager is responsible for ensuring that risk audits are performed at an appropriate frequency as defined in the project's risk management plan.

Risk audits may be included during routine project review meetings, or separate risk audit meetings may be held. The format and objectives of each audit should be clearly defined before the audit is conducted. The risk audit results in the identification of lessons learned for the project and for future projects in the organization.

As the project manager, it is important to be sensitive to team members' perceptions of the risk audits. Some team members may feel that a risk audit is judgmental and/or a waste of time. Setting expectations proactively on the project regarding risk audits can help alleviate any anxiety surrounding the audits.

Variance and Trend Analysis

Trends in the project's execution are reviewed using the work performance data, earned value analysis, and other statistical information and reports. Deviations from the baselines may indicate the potential impact of threats or opportunities and can help forecast the degree of success in achieving the project's scope. Variance and trend analysis may expose the degree of technical risk faced by the project.

An earned value analysis, as presented in Chapter 7, is used to track project performance over time, capturing variance and trend information. Data such as the schedule performance index (SPI) or cost performance index (CPI) can be published in a control chart to determine stability or predictability.

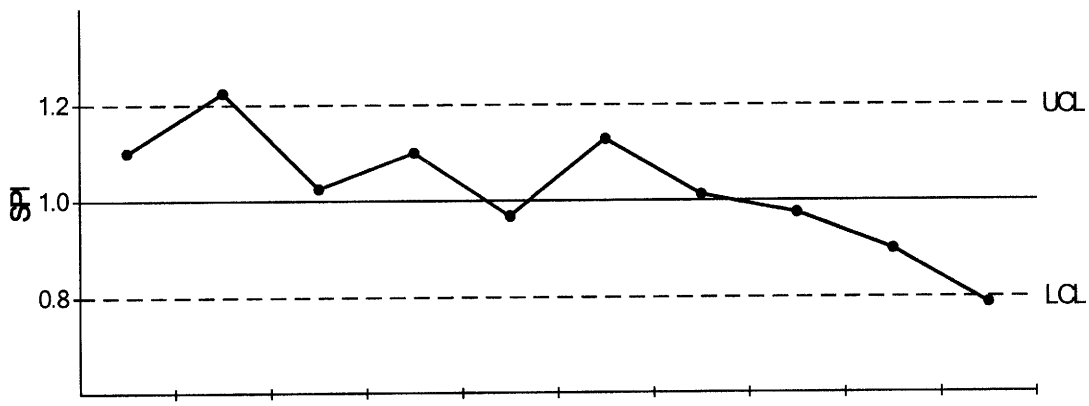


Figure 9-3: Control Chart

PMBOK® Guide, page 239

As described earlier in this chapter, a control chart plots results over time with defined control limits, typically three standard deviations from the mean. Results are considered to be unstable if there are results that fall outside the control limits or if there are seven results in a row below or above the mean.

When there is an assessment of schedule risk, such as the potential for further delays or slippage or in a situation in which the schedule has been previously delayed due to a realized risk, there are two techniques often used to compress the project schedule while maintaining the scope: fast-tracking and crashing.

For schedule compression, fast-tracking is employed first, as it comes with no additional cost. Activities that were planned to occur sequentially are shifted to be completed in full or partial parallel. The same concept as a lead, acceleration of a successor activity, fast-tracking can only be used in activities with finish-to-start discretionary relationships. While the costs will not increase, there may be some additional risk from performing the activities simultaneously versus sequentially.

If fast-tracking does not yield the necessary compression, another option that is considered is crashing. In crashing, the scope remains the same, but money is spent to get the work done more quickly. This could be done by adding more resources, paying overtime, outsourcing the work, paying extra fees, etc.

For both fast-tracking and crashing, activities on the critical path are the primary targets. Compressing non-critical activities only results in more float, which does not affect the overall timeline for delivery.

Technical Performance Measurement

Technical performance measurement compares technical accomplishments during project execution to the project management plan's schedule of technical achievement.

Reserve Analysis

It is the project manager's role to manage the contingency reserve and ensure that it is used only for the identified risks. A reserve analysis evaluates the amount of reserves allocated and remaining compared to the amount of uncertainty remaining on the project.

Typically, a project is considered a risk-declining model, meaning that as the project progresses, the uncertainty or risk should decrease and the understanding of the project should increase. Because of this, the amount of contingency allocated at the beginning of the project may become unnecessary as the project becomes more defined.

It is the project manager's professional responsibility to evaluate the reserve versus the risk. If there is an excess amount of contingency, that excess should be reallocated back to the organization. There is an opportunity cost associated with holding that funding for no purpose, as the organization could benefit from reinvesting it into other needs.

From an opposite perspective, the environment may become more complex and risky over the course of the project. The original allocation of contingency may not be sufficient, and the project manager may need to request additional reserve.

Status Meetings

The most effective setting for monitoring and controlling risks is the project status or team meeting. Risk should be a major topic at all status meetings so the team remains attentive to existing risks, continues to identify new risks, and makes sure plans remain appropriate.

Agenda items should include:

- A review of the highest-priority risks
- Risk or trigger conditions that have occurred
- Risk responses taken during the last period
- An evaluation of effectiveness and additional requirements
- Risks closed during the last period and the associated impacts
- Lessons learned

Critical Chain Project Management (CCPM)

As discussed in Chapter 7, critical chain project management focuses on resource constraints and critical path buffers. In controlling risk, CCPM evaluates the use of buffer penetration to trigger actions adjusted to the relative priority of the activities.

Workarounds

Workarounds are originally unplanned responses developed to deal with the occurrence of unanticipated risk events. Workarounds, unlike contingency responses, are not developed in advance. The use of workarounds may cause distrust of the project manager or the project, as they are very reactive in nature. Often, costly workarounds may be taken due to a lack in planning.

Control Risks: Outputs

Work Performance Information

Work performance information, an output of most of the monitoring and controlling processes, is analyzed work performance data. Whereas work performance data (the input) is raw, work performance information is that same data analyzed and applied to the current status of the project.

Change Requests

As the project progresses and project risks are monitored and controlled, there may be a need to submit various types of change requests. There are four types of change requests: scope changes, corrective actions, preventive actions, and defect repairs. Any of these may result from risk exposure, realized risks, the implementation of risk responses, etc.

Scope Changes

Scope changes are requests to add, remove, or modify the scope or work of the project. For example, if a risk of rain is identified during an outdoor celebration, a scope change may be generated to add a tent to the work of setting up the function.

Corrective Actions

Corrective actions are reactive requests typically related to the budget or schedule. For example, if there is a need to purchase insurance as a risk response and the purchase will exceed the budget, a change request could be generated to downscale the cabinetry to a less expensive model to capture cost savings that can be applied to the insurance purchase.

Preventive Actions

Preventive actions are proactive requests typically related to the budget or schedule and based on trending information. For example, if a project is not yet behind schedule but it is trending in a negative direction, with the latest work activities taking longer to accomplish than originally projected, a preventive action may be submitted to outsource a segment or portion of the work.

Defect Repairs

Defect repairs are change requests related to identified quality issues. For example, if a team that is inexperienced with producing a new type of product were to make a development error that would need to be corrected, a defect repair change request would be generated.

Project Management Plan Updates

As after the Plan Risk Responses process, the project management plan, the baselines, and the subsidiary plans are updated to reflect any changes related to project risk management.

Project Document Updates

As after the other risk processes, the risk register is updated based on the information gathered from risk monitoring and controlling.

Updates can include outcomes of the risk reassessments and risk audits, updates to previous risk management processes, notes on the closing of risks that are no longer applicable, details of what happened when risks occurred, and records of any lessons learned.

Organizational Process Assets Updates

Organizational process assets include any procedures, guidelines, and templates, as well as the project historical data, including lessons learned, post-project reviews, etc. As the risk is monitored and controlled on the project, those organizational process assets may need to be changed or updated.

The final action of risk control is to record the actual, concrete data for the organization's future use. The objective is to ensure that the risk data documented and archived is significant and robust enough to lend to future project risk management.

For all identified risks, it should be documented whether, when, and how often the risk occurred, along with its impact, the effectiveness of the response, and any other effects of the risk. A response analysis should be included, documenting the effectiveness of the risk strategies used (avoidance, mitigation, transference, exploitation, sharing, and enhancement). In addition, any unexpected or undocumented risks should be recorded, along with their associated impacts.

Upon closing the project, the risk checklist should also be groomed and updated, and any redundancies should be removed.