

### **Teaching Strategies**

- The two vignettes in this chapter reinforce the necessity of identifying, assessing, and managing risks in projects. **(See Premium Deck for Slides.)**
- The first vignette communicates how the perception of risk influences the prioritization of the risk.
- The second vignette examines how pharmaceutical companies want to have comparable risk management expertise to high-tech firms and NASA. The level of risk of a project needs to be assessed compared to the benefits. Some risks are too great and cause the project to be terminated.
- Risk assessment should be completed for every project. Have students identify risks associated with an activity of their choice. This could be a concert that want to attend, or some other weekend plans. Have students evaluate the likelihood of occurrence. Have other students offer techniques for managing the risk.
- Have students examine a project that has been presented recently in the news. Have them identify the risks that have caused the project to be delayed or to fail. Have students suggest how those risks could have been mitigated.

### **Optional Supplemental Activities**

- Have students read the real-world vignettes.
- Have them read the chapter and answer all of the Reinforce Your Learning questions and the questions at the end of the chapter. **(See Premium Deck for Slides.)**
- Have students research the lessons learned or any of the articles on the SPMN website then present their findings to the class.
- Have students contact an author of the materials on the SPMN website and present what they learned from the author.

## Chapter Concepts

- Identifying risks and their potential impact
- Assessing the likelihood of occurrence and degree of impact of risks
- Risk response planning
- Risk monitoring

### **Chapter Concepts**

- As mentioned in Chapter 1, one attribute of a project is that it involves a degree of uncertainty. Such uncertainty can impact the outcome of a project.
- Risk involves an uncertain event that, if it occurs, can jeopardize accomplishing the project objective.
- Risk management involves identifying, assessing, and responding to project risks in order to minimize the likelihood of occurrence and/or potential impact of adverse events on the accomplishment of the project objective. Addressing risks proactively will increase the chances of accomplishing the project objective. Waiting for unfavorable events to occur and then reacting to them can result in panic and costly responses. Managing risk includes taking action to prevent or minimize the likelihood of occurrence or the impact of unfavorable events.
- A project manager cannot be risk averse. He or she must accept that risk is a part of project management and has to address it head-on. Furthermore, the project manager needs to set the tone for encouraging open and timely discussion of risks among the project team.

Based on what they learn in this chapter, students will become familiar with:

- Identifying risks and their potential impact
- Assessing the likelihood of occurrence and degree of impact of risks
- Risk response planning
- Risk monitoring

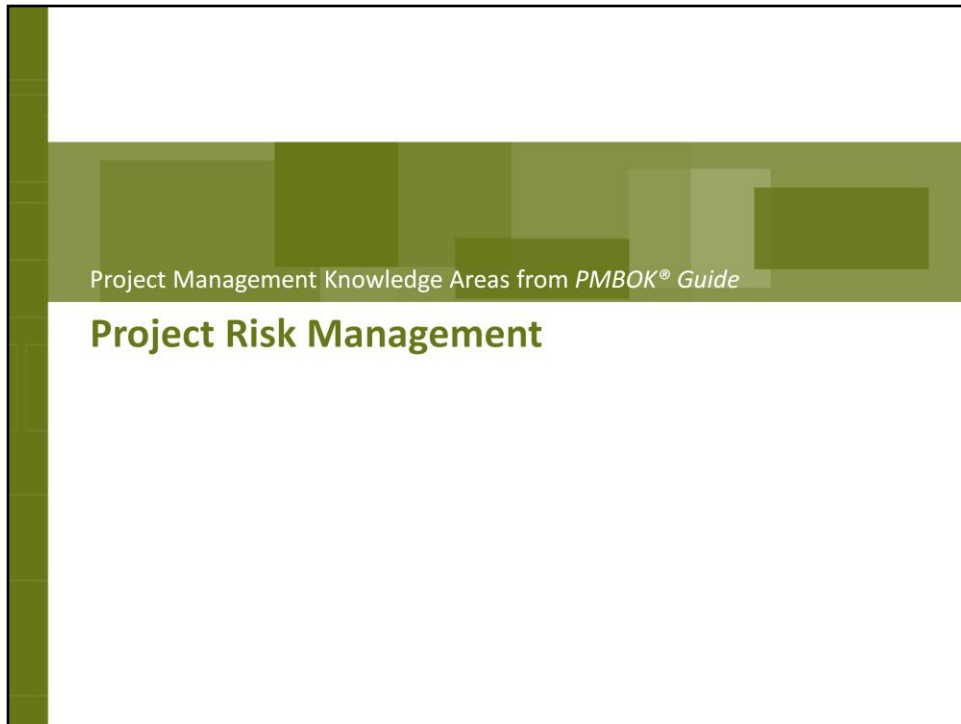
## Learning Outcomes

- Discuss what is involved in managing risks
- Identify and categorize risks
- Assess and prioritize risks
- Prepare a risk response plan
- Develop a risk assessment matrix
- Monitor risks

### **Learning Outcomes**

After studying this chapter, the student should be able to:

- Discuss what is involved in managing risks
- Identify and categorize risks
- Assess and prioritize risks
- Prepare a risk response plan
- Develop a risk assessment matrix
- Monitor risks



**Project Management Knowledge Areas from PMBOK® Guide**

Concepts in this chapter support the following Project Management Knowledge Areas of the *PMI Guide to the Project Management Body of Knowledge (PMBOK® Guide)*:  
Project Risk Management

## Risk in Privatized Water Supply Projects in Indonesia

- Government encouraging private investment in public infrastructure
- Together, government and private firms must manage risk

Risk Categories	Highest-Ranked Risks
■ Political	■ Non-availability of clean water
■ Macroeconomic	■ Entry of new competitors
■ Operational	■ Construction cost escalation
■ Business	■ Operation and maintenance cost escalation
■ Land and construction	■ Defective equipment resulting in interruption
■ Force majeure	

### **Vignette A: Risk in Privatized Water Supply Projects in Indonesia**

- More than one-third of the world's population does not have access to clean water. International conferences have been held to discuss the issues of water scarcity and misuse. Many less developed countries lack the financial resources to manage their water resources in an efficient and effective manner. For help, these countries have turned to private firms in public-private partnerships. The risk for project success is thereby transferred to the private firm through a contractual agreement. However, the governments pay a high price for this risk transfer.
- The government of Indonesia is working to encourage private investment in public projects to help with water supply infrastructure development.
- Risks to the success of the projects were organized in six categories:
  1. Political
  2. Macroeconomic
  3. Operational
  4. Business
  5. Land and construction
  6. Force majeure
- The five highest-ranked risks to successful completion of the project were:
  1. Non-availability of water
  2. Entry of new competitors
  3. Construction cost escalation
  4. Operation and maintenance cost escalation
  5. Equipment defect, resulting in project interruption
- The perspective of team members changes the perception of the level of risk.

- Decisions about optimal risk allocation were made by the government and the private firms. They decided to allow the group that is best able to assess, control, and manage the risk to take it on. The private firm has the best access to hedging instruments; has the greatest ability to diversify the risk; assumes the risk at the lowest cost.
- The private firms and the government must manage the risks by developing response plans to ensure the success of supplying water to the Indonesian population.



## Risk Management Framework for Pharmaceutical Research and Development Projects

- Modeling risk management strategies after software development firms
- Want disciplined techniques that practice analytical risk management

Aspects of Project Risk	Solutions
■ Financial	■ Use structured approach to identify risks
■ Technical	■ Work together to develop risk response plan
■ Managerial	■ Evaluate the life and death decisions and level of acceptance
■ Organizational	■ Use multivariate analysis of risks
	■ Apply a continuous risk assessment process

### **Vignette B: Risk Management Framework for Pharmaceutical Research and Development Projects**

- Risk management for some organizations is carried out during the planning phase as a requirement for the project plan approval. For others, the project managers account for only those risks that have commonly occurred in other projects and do not spend any time developing a response plan for the current project. Another group of organizations in the financial sector manages all aspects of project risk for their projects: financial, technical, managerial, and organizational.
- The pharmaceutical industry wants to model its risk management strategies on those strategies practiced by software development firms and high-tech firms, and not the questionable and undisciplined techniques of the sectors that do not practice analytical risk management.
- The innovative, research-based work of drug development has inherent risk due to each project's level of uncertainty and complexity.
- The structured approach necessary for a solution requires that members of the entire drug development project team work together to make a decision for the risk response plan, including the actions to be taken for the risk to be mitigated or accepted.
- Project decisions are life and death, where all risks must be brought down to an acceptable level before the project can proceed.
  - For example, failure of a clinical trial that results in loss of human life is not acceptable.
- A formal risk management process that evaluates an extensive list of risks through multivariate analysis avoids the common drawbacks of many projects related to rework and cost and schedule overruns for IT development and drug development projects.

- A continuous risk assessment process is required for drug development projects.



## Managing Risk

- **Risk is an uncertain event that, if it occurs, can jeopardize accomplishing the project objective.**
  - Risk is part of project management.
  - Must be addressed **proactively**
- Risk management consists of four components:
  - Risk Identification
  - Risk Assessment
  - Risk Response Planning
  - Risk Monitoring

## Managing Risk (Cont.)

- Risk Identification consists of:
  - determining **which risks** may adversely affect the project objective
  - the **impact** of each risk
- Identify risks by:
  - Brainstorming
  - Risk categories
  - Historical information
- Progressively elaborate and identify new risks as more information becomes available

## Managing Risk (Cont.)

- Risk Assessment consists of:
  - determining the **likelihood** that the risk event will occur
  - Evaluate **degree of impact** on the project objective
- Prioritize based on:
  - Likelihood of occurrence
  - Degree of impact
  - Position relative to critical path
- Use a risk assessment matrix to organize risks. (See Figure 8.1)

# Risk Assessment Matrix

**FIGURE 8.1** Risk Assessment Matrix

RISK	IMPACT	LIKELIHOOD OF OCCURRENCE (L, M, H)	DEGREE OF IMPACT (L, M, H)	ACTION TRIGGER	RESPONSIBILITY	RESPONSE PLAN
Rain on Day of Event	<ul style="list-style-type: none"> <li>• Low attendance</li> <li>• Financial loss</li> </ul>	M	H	Weather forecast two days before event	Laura	<ul style="list-style-type: none"> <li>• Reserve indoor space now</li> <li>• Recruit extra volunteers to work around the clock to set up indoors</li> <li>• Develop detailed plan</li> </ul>
Road Construction	<ul style="list-style-type: none"> <li>• Reduced attendance</li> <li>• Reduced revenue</li> </ul>	H	H	Highway dept. publishes construction schedule	Allison	<ul style="list-style-type: none"> <li>• Identify alternate routes</li> <li>• Have signs made</li> <li>• Post signs along all routes</li> <li>• Announce in news media</li> </ul>

## Risk Assessment Matrix

- This figure depicts a risk assessment matrix, a tool for assessing and managing risks.
- It helps to:
  - List the impact of the risk
  - Evaluate the likelihood of occurrence
  - Determine the degree of impact
  - Identify the action trigger
  - Name a person responsible
  - Create a response plan to avoid, mitigate, or accept the risk

## Managing Risk (Cont.)

### ■ Risk Response Planning:

- Risk Response Plan is a set of actions to:
  - Prevent or reduce the likelihood of occurrence or the impact of a risk
  - Or to implement if the risk event occurs
- Assigns responsibility for implementation
- A **risk response plan** can be to:
  - avoid the risk, (stick with conventional technology vs advanced)
  - mitigate the risk, or (review many sample designs with customer)
  - accept the risk (deal with it when it happens)
    - Establish a trigger point for implementing an action
- Include a contingency fund to cover implementation cost

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## Managing Risk (Cont.)

### ■ Risk Monitoring

- Involves **regularly reviewing the risk management matrix throughout the project**
  - For each risk, look for:
    - Changes to the likelihood of occurrence
    - Potential impact
  - New risks may also be identified, and need to be added to the risk assessment matrix
- The agenda for project status review meetings should include risk assessment
- Particular attention should be given to the trigger points to determine if any risk response plans need to be implemented

## Managing Risks for Information Systems Development

### ■ Risks can be categorized into seven types

- Technological risk
    - Critical for HW & SW used in the project
    - Uses resources (people, HW, SW, data, network)
  - Human risk
  - Usability risk
  - Organizational risk
  - Strategic and political risk
  - Project team risk
  - Project risk
- > Associated with PM skills and  
IS knowledge and skills

### **Managing Risks for Information Systems Development**

- Risks for information systems (IS) development are inherent in all aspects of an IS project. The risks can be categorized into seven types:
  1. Technological risk
  2. Human risk
  3. Usability risk
  4. Project team risk
  5. Project risk
  6. Organizational risk
  7. Strategic and political risk
- These categories help to explain the risks associated with developing systems that accept data inputs, process those inputs, and produce information for users.
- Chapters 4, 5, 6, and 7 provided foundation information about the definition, scheduling, resources, and costs associated with IS development projects.



## IS Example: Risk Assessment Matrix

**FIGURE 8.2** Risk Assessment Matrix for Web-based Reporting System Project

RISK	IMPACT	LIKELIHOOD OF OCCURRENCE (L, M, H)	DEGREE OF IMPACT (L, M, H)	ACTION TRIGGER	RESPONSIBILITY	RESPONSE PLAN
Lack of cooperation and commitment from users	Incorrect sales records in reporting system	M	H	Sales staff have difficulty using system during training	Jim	Have additional training materials to describe how to use
High number of ad hoc queries	Systems design not completed on time	L	H	More queries to be answered than time remaining to complete	Jeff	Have assigned staff work longer on tasks; staff have at least seven days slack
Testing reveals design problems	Rework the design and development	M	H	Evaluation reveals problems	Cathy	Examine for design flaws during Evaluation task
Customized software has integration problem	System not working and no information recorded	L	H	Study of existing system identifies potential problems	Steve	Develop system with compatible programming, possibly not latest technology
Changes in membership of the project team	Lack of proper skills and knowledge to do task	L	M	Resignation statement by staff member	Beth	Assign another project team member to learn task during notice period

### IS Example: Internet Applications Development for ABC Office Designs

- This is a continuation of the web-based reporting system project that we have used as an example in previous chapters.
- Beth wants to prepare for potential project risks so that the team can address them early enough that they do not impact the delivery date for the system.
- Beth planned for the team to determine the impact of the risk, the likelihood of occurrence, the degree of impact if it does occur, the action trigger that will serve as a warning flag for the risk, who is responsible for the risk, and the response plan to avoid, mitigate, or accept the risk.
- Beth reviewed the lessons learned from other projects to make sure that the project team discussed the risks from the other projects.
- This figure depicts the Risk Assessment Matrix for Web-based Reporting System Project.

## Critical Success Factors

- **Identify risks** and their **potential impacts** before the project starts.
- **Involve** the **project team** or experts in assessing risks.
- **Assign high priority** to managing risks that have a high likelihood of occurrence and a high potential impact on the project outcome.
- **Develop response plans** for addressing high priority risks.

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- *Develop response plans* for addressing high priority risks.

## Summary

- Risk is an uncertain event that, if it occurs, can jeopardize accomplishing the project objective.
- Risk management involves identifying, assessing, and responding to project risks in order to minimize the likelihood of occurrence and/or potential impact of adverse events on the accomplishment of the project objective.
- Risk identification includes determining which risks may adversely affect the project objective and estimating what the potential impacts of each risk might be if it occurs.
- Assessing each risk involves determining the likelihood that the risk event will occur and the degree of impact the event will have on the project objective, and then prioritizing the risks.
- A risk response plan is a defined set of actions to prevent or reduce the likelihood of occurrence or the impact of a risk, or to implement if the risk event occurs.
- Regularly review and evaluate all risks to determine if there are any changes to the likelihood of occurrence or the potential impact of any of the risks, or if any new risks have been identified.

### Summary

- Risk is an uncertain event that, if it occurs, can *jeopardize* accomplishing the *project objective*.
- Risk management involves *identifying, assessing, and responding* to project risks in order to minimize the likelihood of occurrence and/or potential impact of adverse events on the accomplishment of the project objective.
- Risk identification includes *determining* which risks may adversely affect the project objective and *estimating* what the potential impacts of each risk might be if it occurs.
- Assessing each risk involves determining the *likelihood* that the risk event will occur and the *degree of impact* the event will have on the project objective, and then *prioritizing* the risks.
- A risk response plan is a defined set of actions to *prevent or reduce* the likelihood of occurrence or the impact of a risk, or to implement if the risk event occurs.
- *Regularly review and evaluate* all risks to determine if there are any changes to the likelihood of occurrence or the potential impact of any of the risks, or if any new risks have been identified.