



INFO 6245

Planning &

Managing

Information

Systems

Development

Module 10

Project Risk Management

Topics of Discussion

- Importance of Risk Management
- Planning Risk Management
- Sources of Risk
- Identifying Risks
- Qualitative Risk Analysis
- Quantitative Risk Analysis
- Risk Responses
- Monitoring Risks

Importance

Project risk management is the art and science of identifying, analyzing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives.

Risk management is often overlooked in projects, but it can help improve project success by helping select good projects, determining project scope, and developing realistic estimates.

Research shows a need to improve project risk management; Studies show that risk management has the lowest maturity rating of all knowledge areas.

A dictionary definition of risk is “the possibility of loss or injury”.

General definition of a project risk: an uncertainty that can have a negative or positive effect on meeting project objectives.

Managing negative risks involves many possible actions that project managers can take to avoid, lessen, change, or accept the potential effects of risks on their projects.

Positive risk management is like investing in opportunities.

Some organizations make the mistake of only addressing tactical and negative risks when performing project risk management.

David Hillson suggests overcoming this problem by widening the scope of risk management to encompass both strategic risks and upside opportunities, which he refers to as integrated risk management.

Risk Utility

- Risk utility is the amount of satisfaction or pleasure received from a potential payoff
- Utility rises at a decreasing rate for people who are **risk-averse**
- Those who are **risk-seeking** have a higher tolerance for risk and their satisfaction increases when more payoff is at stake
- **Risk-neutral** approach achieves a balance between risk and payoff

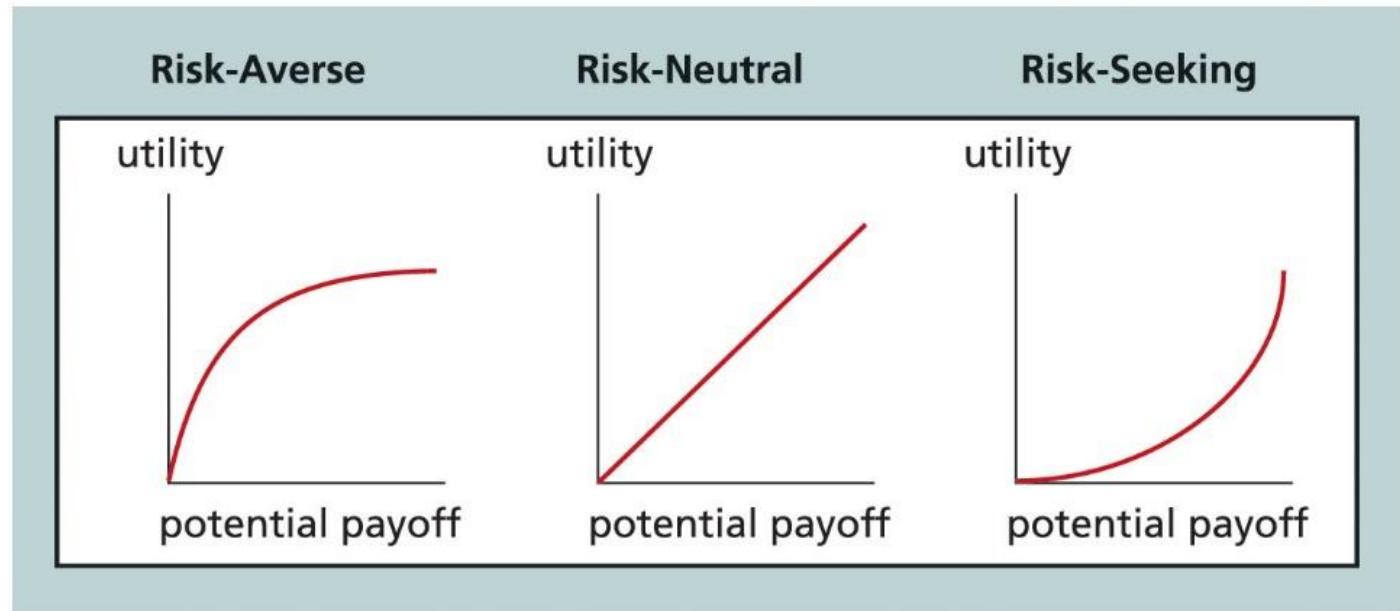
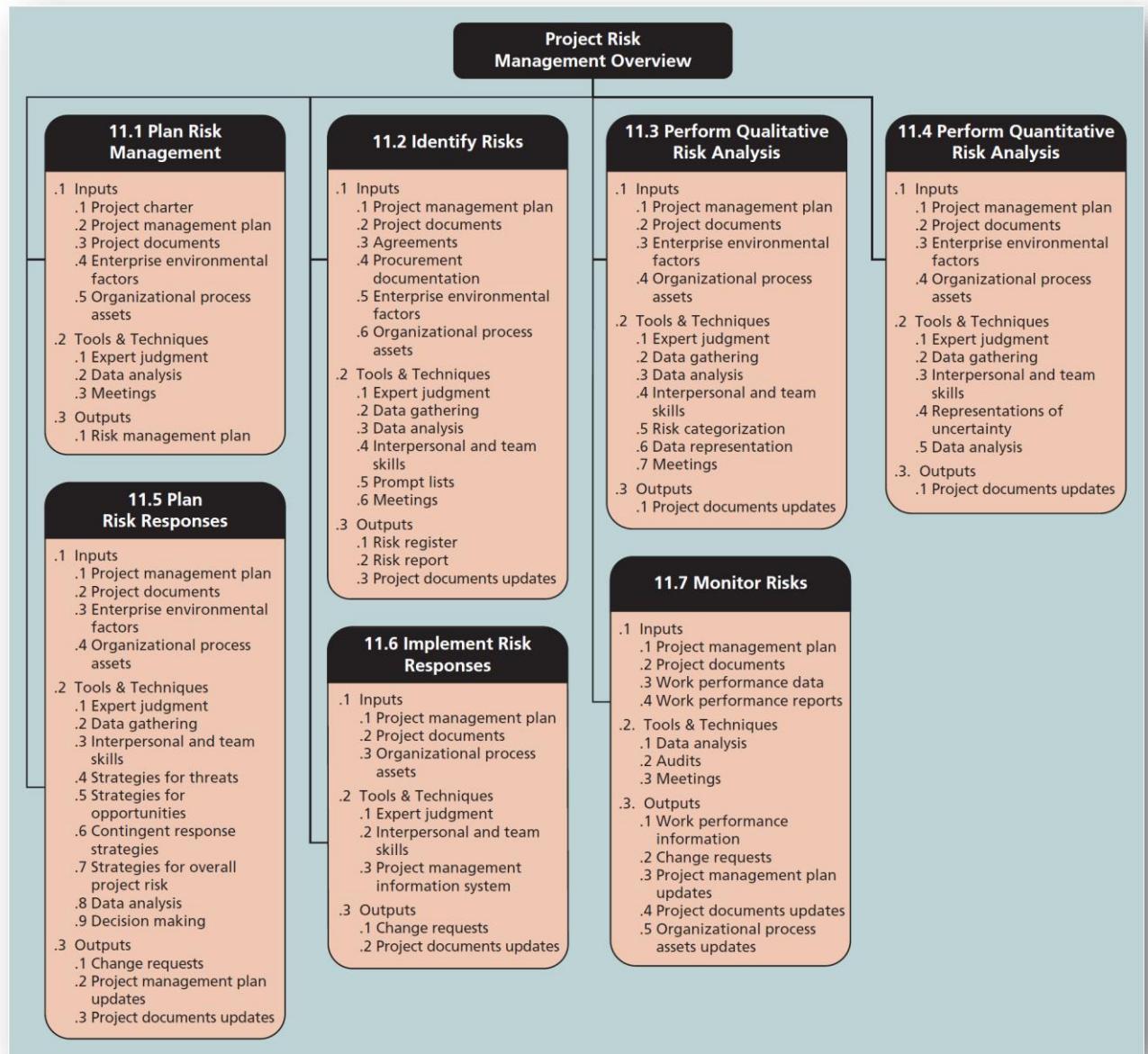


FIGURE 11-2 Risk utility function and risk preference

PMI Summary

- 1. Planning risk management:** deciding how to approach and plan the risk management activities for the project
- 2. Identifying risks:** determining which risks are likely to affect a project and documenting the characteristics of each
- 3. Performing qualitative risk analysis:** prioritizing risks based on their probability and impact of occurrence
- 4. Performing quantitative risk analysis:** numerically estimating the effects of risks on project objectives
- 5. Planning risk responses:** taking steps to enhance opportunities and reduce threats to meeting project objectives
- 6. Implementing risk responses:** implementing the risk response plans
- 7. Monitoring risk:** monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project



Risk Management Process





Planning Risk Management



Risk Management Plan

- A **risk management plan** documents the procedures for managing risk throughout a project
- The project team should review project documents as well as corporate risk management policies, risk categories, lessons-learned reports from past projects, and templates for creating a risk management plan
- It is also important to review the risk tolerances of various stakeholders

TABLE 11-2 Topics addressed in a risk management plan

Topic	Questions to Answer
Methodology	How will risk management be performed on this project? What tools and data sources are available and applicable?
Roles and responsibilities	Which people are responsible for implementing specific tasks and providing deliverables related to risk management?
Budget and schedule	What are the estimated costs and schedules for performing risk-related activities?
Risk categories	What are the main categories of risks that should be addressed on this project? Is there a risk breakdown structure for the project? (See the information on risk breakdown structures later in this chapter.)
Risk probability and impact	How will the probabilities and impacts of risk items be assessed? What scoring and interpretation methods will be used for the qualitative and quantitative analysis of risks? How will the probability and impact matrix be developed?
Revised stakeholders' tolerances	Have stakeholders' tolerances for risk changed? How will those changes affect the project?
Tracking	How will the team track risk management activities? How will lessons learned be documented and shared? How will risk management processes be audited?
Risk documentation	What reporting formats and processes will be used for risk management activities?

Additional Planning Documents



Contingency plans: predefined actions that the project team will take if an identified risk event occurs



Fallback plans: developed for risks that have a high impact on meeting project objectives, and are put into effect if attempts to reduce the risk are not effective



Contingency reserves or allowances: funds included in the cost baseline that can be used to mitigate cost or schedule overruns if known risks occur



Management reserves: funds held for unknown risks that are used for management control purposes



Sources of Risks

Sources of Risks on IT Projects

- Several studies show that IT projects share some common sources of risk
- The Standish Group developed an IT success potential scoring sheet based on potential risks
- McFarlan developed a risk questionnaire to help assess risk
- Other broad categories of risk help identify potential risks

Success Criterion	Relative Importance
User Involvement	19
Executive Management support	16
Clear Statement of Requirements	15
Proper Planning	11
Realistic Expectations	10
Smaller Project Milestones	9
Competent Staff	8
Ownership	6
Clear Visions and Objectives	3
Hard-Working, Focused Staff	3
Total	100

McFarlan's Risk Questionnaire

- | | | | |
|--|--|-------------------|------------------|
| 1. What is the project estimate in calendar (elapsed) time? | <input type="radio"/> 12 months or less | Low = 1 point | Elapsed Time |
| | <input type="radio"/> 13 months to 24 months | Medium = 2 points | |
| | <input type="radio"/> Over 24 months | High = 3 points | |
| 2. What is the estimated number of person days for the system? | <input type="radio"/> 12 to 375 | Low = 1 point | Effort in days |
| | <input type="radio"/> 375 to 1875 | Medium = 2 points | |
| | <input type="radio"/> 1875 to 3750 | Medium = 3 points | |
| | <input type="radio"/> Over 3750 | High = 4 points | |
| 3. Number of departments involved (excluding IT) | <input type="radio"/> One | Low = 1 point | # Business areas |
| | <input type="radio"/> Two | Medium = 2 points | |
| | <input type="radio"/> Three or more | High = 3 points | |
| 4. Is additional hardware required for the project? | <input type="radio"/> None | Low = 0 points | Extra hardware |
| | <input type="radio"/> Central processor type change | Low = 1 point | |
| | <input type="radio"/> Peripheral/storage device changes | Low = 1 | |
| | <input type="radio"/> Terminals | Med = 2 | |
| | <input type="radio"/> Change of platform, for example PCs replacing mainframes | High = 3 | |

Sources of Risk

Market risk:

If the IT project will create a new product or service, will it be useful to the organization or marketable to others? Will users accept and use the product or service? Will someone else create a better product or service faster, making the project a waste of time and money?

Financial risk:

Can the organization afford to undertake the project? How confident are stakeholders in the financial projections? Will the project meet NPV, ROI, and payback estimates? If not, can the organization afford to continue the project? Is this project the best way to use the organization's financial resources?

Technology risk:

Is the project technically feasible? Will it use mature, leading-edge, or bleeding-edge technologies? When will decisions be made on which tech to use? Will hardware, software, and networks function properly? Will the tech be available in time to meet objectives? Could the tech be obsolete before a useful product can be created? The tech risk category can be segregated to hardware, software, and network technology.

People risk:

Does the organization have, or can find, people with appropriate skills to complete the project successfully? Do people have the proper managerial and technical skills? Do they have enough experience? Does senior management support the project? Is there a project champion? Is the organization familiar, and have a good relationship, with the sponsor or customer for the project?

Structure/process risk:

What degree of change will the new project introduce into user areas and business procedures? How many distinct user groups does the project need to satisfy? With how many other systems does the new project or system need to interact? Does the organization have processes in place to complete the project successfully?

Risk Breakdown Structure

- A risk breakdown structure is a hierarchy of potential risk categories for a project.

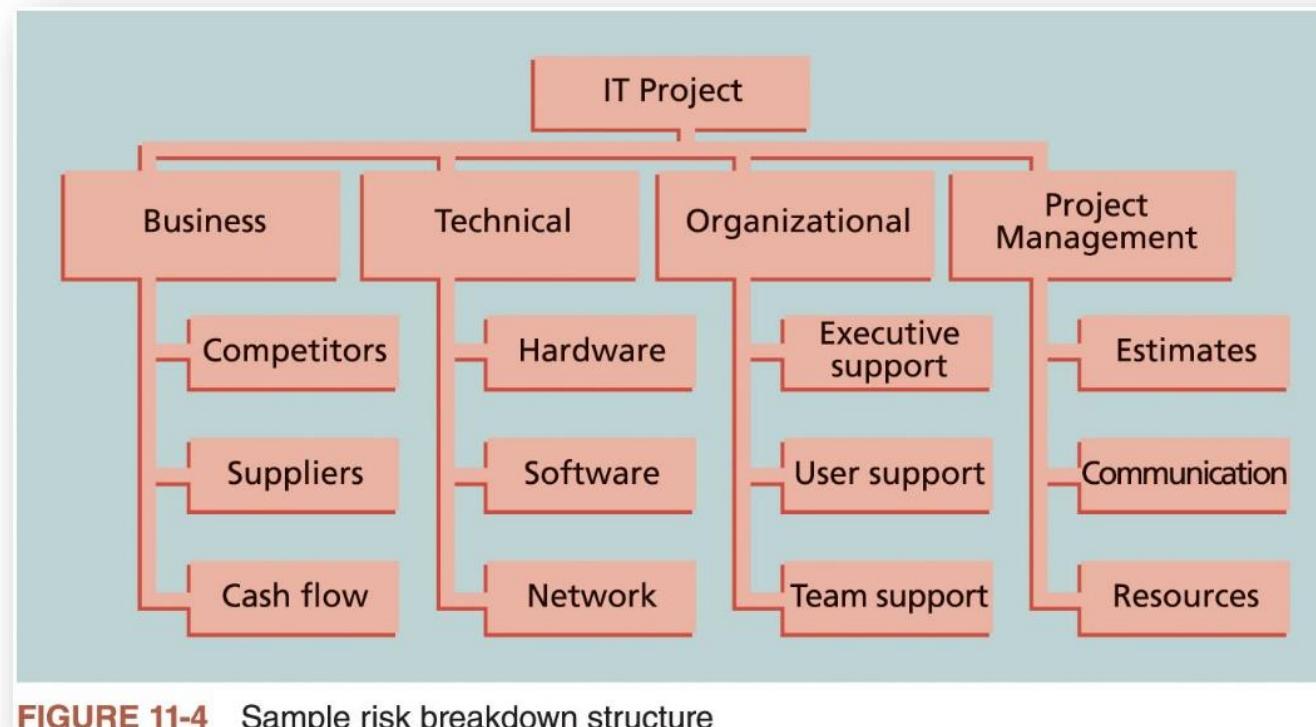


TABLE 11-3 Potential negative risk conditions associated with each knowledge area

Knowledge Area	Risk Conditions
<i>Integration</i>	Inadequate planning; poor resource allocation; poor integration management; lack of post-project review
<i>Scope</i>	Poor definition of scope or work packages; incomplete definition
<i>Time</i>	Errors in estimating time or resource availability; errors in determining the critical path; poor allocation and management of float; early release of competitive products
<i>Cost</i>	Estimating errors; inadequate productivity, cost, change, or contingency
<i>Quality</i>	Poor attitude toward quality; substandard design, materials, and workmanship; inadequate quality assurance program
<i>Human resource</i>	Poor conflict management; poor project organization and definition of responsibilities; absence of leadership
<i>Communications</i>	Carelessness in planning or communicating
<i>Risk</i>	Ignoring risk; unclear analysis of risk; poor insurance management
<i>Procurement</i>	Unenforceable conditions or contract clauses; adversarial relations
<i>Stakeholders</i>	Lack of consultation with key stakeholder; poor sponsor engagement

Common Project Management Risks



Identifying Risks

Risk Identification



The process of understanding what potential events might hurt or enhance a particular project



It is important to identify potential risks early, but must also continue to identify risks based on the changing project environment



Another consideration for identifying risks is the likelihood of advanced discovery through early high-level indicators that provide time to develop responses for high-impact risks.

Tools & Techniques

- **Brainstorming:** Group attempts facilitated by an experienced leader to generate ideas or find a solution for a specific problem by amassing ideas spontaneously and without judgment; Have to be careful not to overuse or misuse brainstorming, group effects often inhibit idea generation
- **Delphi Technique:** Used to derive a consensus among a panel of experts who make predictions about future developments through independent and anonymous inputs; Gathered by repeated rounds of questioning and written responses and avoids the biasing effects possible in oral methods
- **Interviewing Experts:** Fact-finding technique for collecting information in face-to-face, phone, e-mail, or virtual discussions by interviewing people with similar project experience
- **SWOT Analysis:** Helps identify the broad negative and positive risks that apply to a project by identifying the Strengths, Weaknesses, Opportunities, and Threats



Risk Register

TABLE 11-4 Sample risk register

No.	Rank	Risk	Description	Category	Root Cause	Potential Triggers	Potential Responses	Risk Owner	Probability	Impact	Status
R44	1										
R21	2										
R7	3										

A **Risk Register** contains the results of various risk management processes and is often displayed in a table or spreadsheet format containing a list of identified risks and other required information. It is a tool for documenting potential risk events and related information.

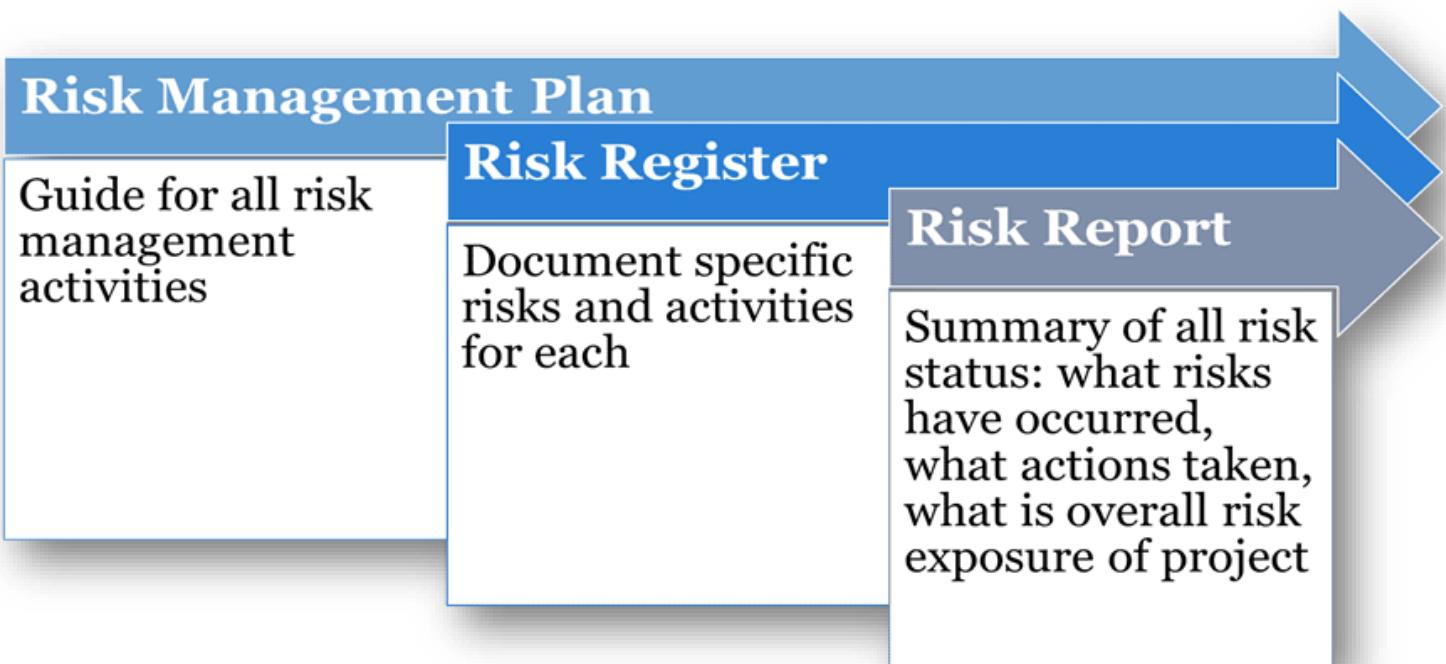
Risk events refer to specific, uncertain events that may occur to the detriment or enhancement of the project. Negative risk events might include product performance failure, schedule delays, cost overruns, supply shortages, litigations, and strikes. Positive risk events might include schedule slack, cost underruns, better supplier quality, good publicity, overall product success in the market, etc.

Triggers are indicators or symptoms of actual risk events. For example, cost overruns on early activities may be symptoms of poor cost estimates. Defective products may be symptoms of a low-quality supplier. Documenting potential risk symptoms for projects also helps the project team identify more potential risk events.

The **risk owner** is the person who will take responsibility for the risk and will oversee any related risk events and manage response strategies.

Risk Report

Contents of a risk report include sources of overall project risk, important drivers of overall project risk exposure, and summary information on risk events, such as number of risks, total risk exposure, distribution across risk categories, metrics, and trends.



Qualitative Risk Analysis



Probability & Impact Matrix

- Assess the likelihood and impact of identified risks to determine their magnitude and priority
- Maps out risks on a chart where probability of risk occurring is the Y-Axis, and the Impact of the Risk is the X-Axis.
- List the risks and then label each one as high, medium, or low in terms of its probability of occurrence and its impact if it did occur
- Calculates risk factors for the overall risk of specific events based on their probability of occurring and the consequences to the project if they do occur

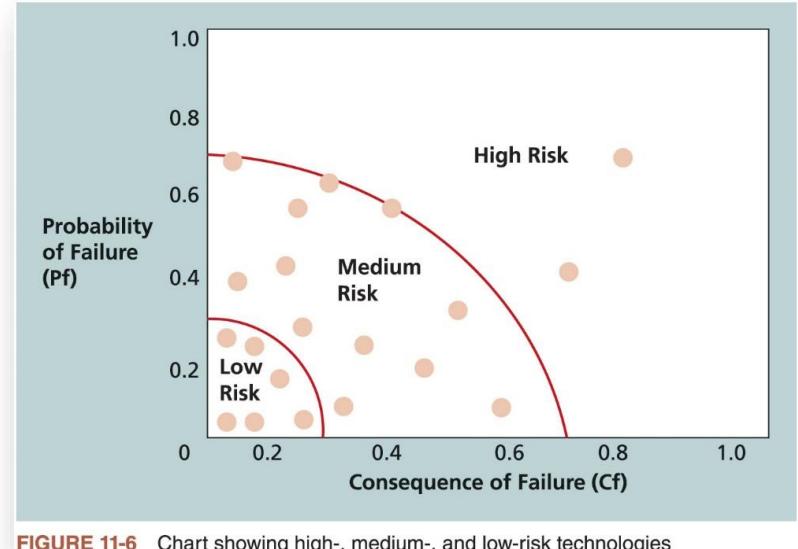


FIGURE 11-6 Chart showing high-, medium-, and low-risk technologies

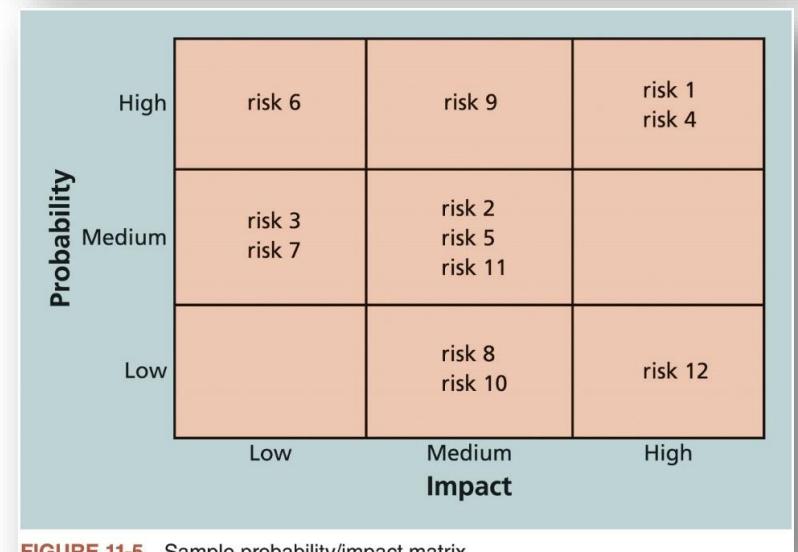


FIGURE 11-5 Sample probability/impact matrix

Top Ten Risk Item Tracking

- Qualitative risk analysis tool that helps to identify risks and maintain an awareness of risks throughout the life of a project
- Involves establishing a periodic review of the top ten project risk items
- Includes the current ranking, previous ranking, number of times the risk appears on the list over a period, and a summary of progress made in resolving the risk item
- A **watch list** is a list of risks that are low priority, but are still identified as potential risks
- Qualitative analysis can also identify risks that should be evaluated quantitatively

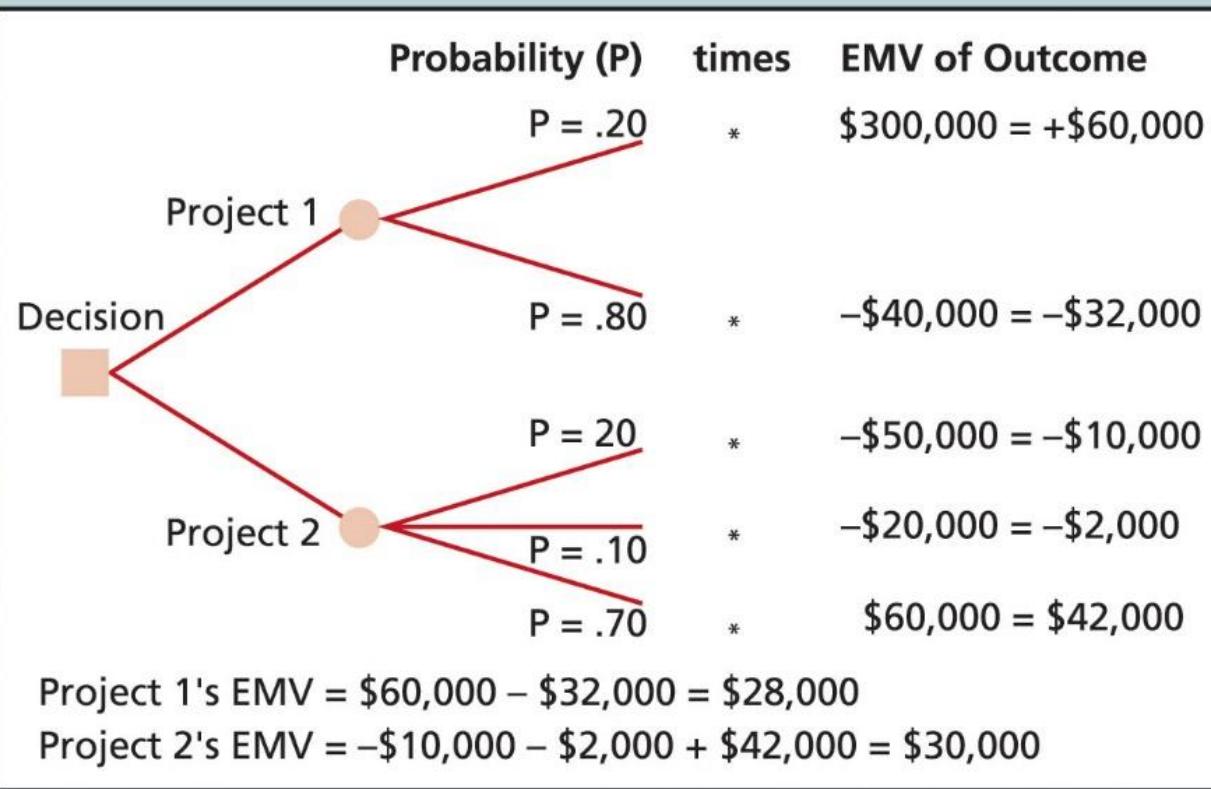
TABLE 11-5 Example of top ten risk item tracking

MONTHLY RANKING				
Risk Event	Rank This Month	Rank Last Month	Number of Months in Top Ten	Risk Resolution Progress
Inadequate planning	1	2	4	Working on revising the entire project management plan
Poor definition	2	3	3	Holding meetings with project customer and sponsor to clarify scope
Absence of leadership	3	1	2	Assigned a new project manager to lead the project after the previous one quit
Poor cost estimates	4	4	3	Revising cost estimates
Poor time estimates	5	5	3	Revising schedule estimates

Quantitative Risk Analysis



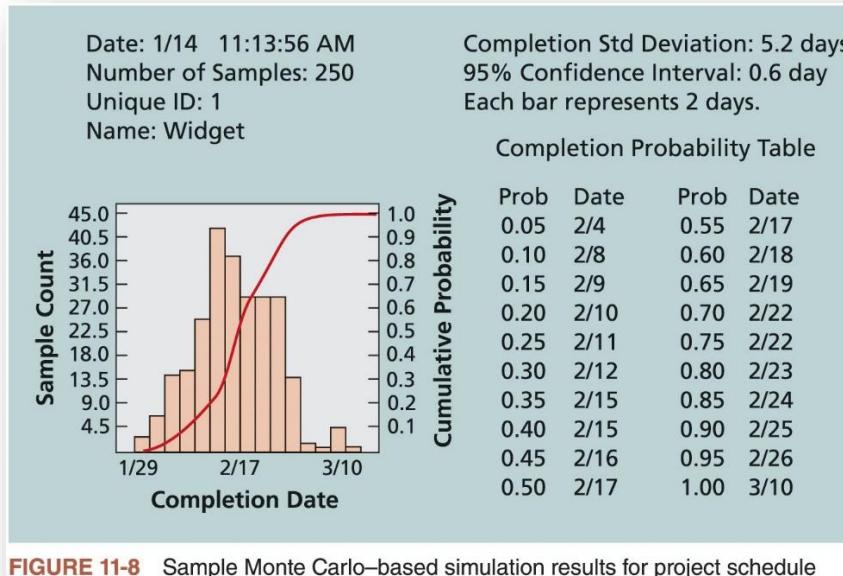
Decision Tree Analysis



- A decision tree is a diagramming analysis technique used to select the best course of action in situations where future outcomes are uncertain.
 - Estimated monetary value (EMV) is the product of a risk event probability and the event's monetary value and can be mapped using a decision tree.
 - Project 1:
 - Estimated Profit = \$300,000
 - Investment = \$40,000
 - Pwin = 20%; Ploss = 80%
 - $EMV = (0.2 * \$300,000) + (0.8 * -\$40,000) = \$28,000$
 - Project 2:
 - Chance of making a \$60,000 profit is 70%
 - Chance of losing \$20,000 is 10%
 - Chance of losing \$50,000 is 20%
 - $EMV = (0.7 * \$60,000) + (0.1 * -\$20,000) + (0.2 * -\$50,000) = \$30,000$

FIGURE 11-7 Expected monetary value (EMV) example

Monte-Carlo Simulation



- Uses a representation or model of a system to analyze the expected behavior or performance of the system.
- Monte Carlo analysis simulates a model's outcome many times to provide a statistical distribution of the calculated results.
- Predicts the probability of finishing by a certain date or the probability that the cost will be equal to or less than a certain value.
- Can be performed by using different types of distribution functions.
- Monte Carlo simulation can help reduce schedule risk on agile projects.
- **Basis Steps:**
 1. Collect the most likely, optimistic, and pessimistic estimates for the variables in the model
 2. Determine the probability distribution of each variable
 3. Select a random value based on the probability distribution for each variable
 4. Run a deterministic analysis or one pass through the model
 5. Repeat steps three and four many times to obtain the probability distribution of the model's results

Sensitivity Analysis

- Used to show the effects of changing one or more variables on an outcome.
- For example, many people use it to determine what the monthly payments for a loan will be given different interest rates or periods of the loan.
- Spreadsheet software, such as Microsoft Excel, is a common tool for performing sensitivity analysis.

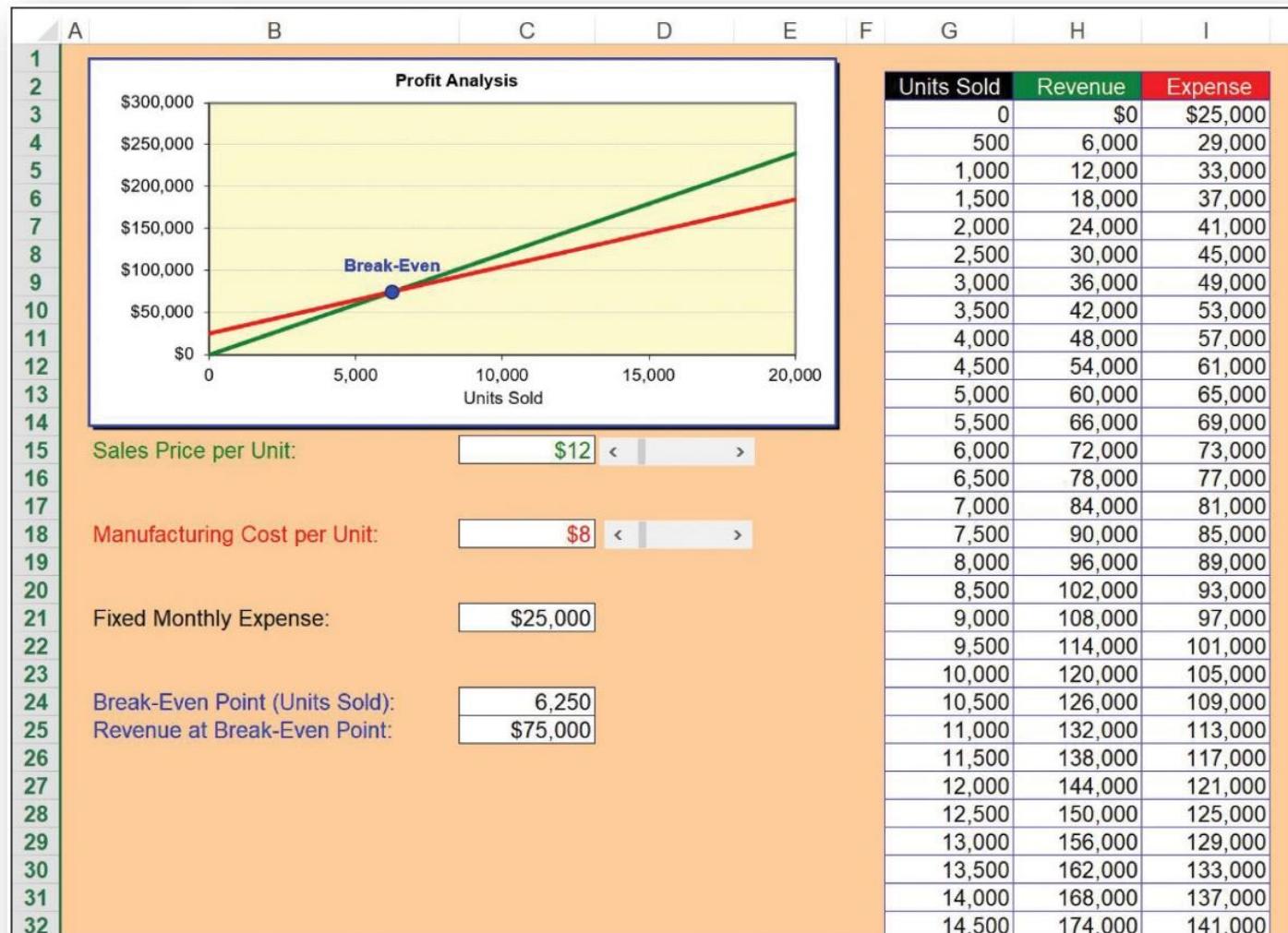


FIGURE 11-9 Sample sensitivity analysis for determining break-even point

Planning Risk Responses



Response Strategies for Negative Risks

Risk Response Strategies - Threats



ESCALATE



Take to a higher power.
Manage outside of the project

AVOID



Eliminate the root cause so it cannot occur

TRANSFER



Move to a group better handled to manage it.
Use insurance.

MITIGATE



Take actions to reduce risk probability or impact.

ACCEPT



Agree to take no action, but create a contingency reserve.

Response Strategies for Positive Risks

Risk Response Strategies - Opportunities



ESCALATE



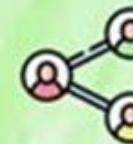
Take to a higher power.
Manage outside of the project

EXPLOIT



Ensure the opportunity is realized. Assign best talent and prioritize work.

SHARE



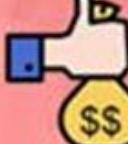
Transfer to a 3rd party or spin up group to ensure value captured.

ENHANCE



Increase probability or impact. E.G. Add resources to ensure.

ACCEPT



Agree to take no action, but promote and encourage.

General Risk Mitigation Strategies

- To mitigate project risks related to Technical Performance, Cost, & Schedule, there are a few strategies that should be generally applied on all projects.
- Increasing the frequency of project monitoring and using a WBS and Critical Path Method (CPM) are strategies for all three areas.
- Increasing the project manager's authority is a strategy for mitigating technical and cost risks, and selecting the most experienced project manager is recommended for reducing schedule risks.
- Improving communication is also an effective strategy for mitigating risks.
- Risk response strategies often include identification of residual and secondary risks as well as contingency plans and reserves
- **Residual risks:** Risks that remain after all the response strategies have been implemented.
- **Secondary risks:** Direct result of implementing a risk response.

TABLE 11-6 General risk mitigation strategies for technical, cost, and schedule risks

Technical Risks	Cost Risks	Schedule Risks
Emphasize team support and avoid stand-alone project structure	Increase the frequency of project monitoring	Increase the frequency of project monitoring
Increase project manager authority	Use WBS and CPM	Use WBS and CPM
Improve problem handling and communication	Improve communication, understanding of project goals, and team support	Select the most experienced project manager
Increase the frequency of project monitoring	Increase project manager authority	
Use WBS and CPM		

Implementing Risk Responses



Implementing Risk Responses

The main executing process performed as part of project risk management is implementing risk responses as defined in the process to plan risk responses.

Key outputs include change requests and project documents updates (i.e., issue log, lessons-learned register, project team assignments, risk register, and risk report).

Goal is to be proactive in identifying risks and take actions to prevent any negative events from happening by implementing their risk responses.

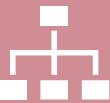


Monitoring Risks

Monitoring Risks



Involves ensuring the appropriate risk responses are performed, tracking identified risks, identifying and analyzing new risk, and evaluating effectiveness of risk management throughout the entire project.



Project risk management does not stop with the initial risk analysis.



Carrying out individual risk management plans involves monitoring risks based on defined milestones and making decisions regarding risks and their response strategies.



Project teams sometimes use workarounds—unplanned responses to risk events—when they do not have contingency plans in place.

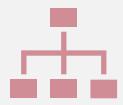
Summary



Risk is an uncertainty that can have a negative or positive effect on meeting project objectives.

Many organizations do a poor job of project risk management, if they do any at all.

Successful organizations realize the value of good project risk management.



Risk management is an investment.

Costs are associated with identifying risks, analyzing them, and establishing plans to address them.



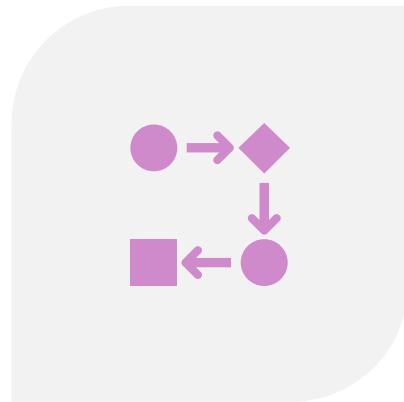
Implementing risk responses involves putting the appropriate risk response plans into action.

Monitoring risks involves monitoring implementation of risk response plans, tracking identified risks, identifying and analyzing new risks, and evaluating effectiveness of risk management throughout the entire project.

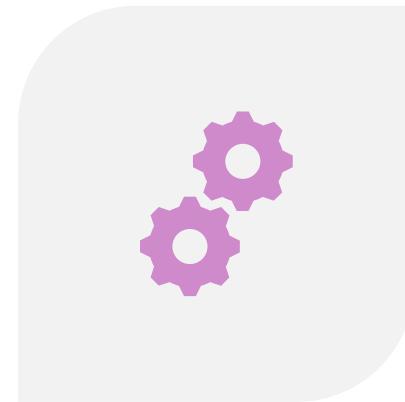
Risk Management for Agile Projects



ALL TYPES OF PROJECTS SHOULD SHARE KNOWLEDGE RELATED TO RISKS AS QUICKLY AS POSSIBLE AND KEEP DOCUMENTS UP TO DATE



RISK IS CONSIDERED DURING EACH ITERATION FOR AGILE/ADAPTIVE PROJECTS, WHICH DOES ELEVATE ITS IMPORTANCE



CHANGING PRIORITIES CAN BE ADDRESSED MORE EASILY BY CHANGING THE PRODUCT BACKLOG FOR EACH ITERATION

In-Class Group Exercise



SWOT Analysis

- Use the template provided in the discussion board
- Brainstorm with your team the things that are well (Strengths), and things not done well (Weaknesses).
- Next, note the Threats you will need to mitigate and the Opportunities you may wish to exploit.
- Use the questions listed in the template as part of your brainstorming exercise.
- Identify 5 key actions that can help improve your project's risk posture (Row 23)



SWOT Analysis			
Organisation or Team:			
Internal		External	
S	Strengths	O	Opportunities
1	What resources do we have available?	1	What is missing in our market?
2	What do we do best?	2	What could we create or do better than a competitor?
3	What do our customers love most?	3	What changes are occurring in our market or industry?
4	What are we more efficient at?	4	Are there changes in technology that could threaten our success?
5	What makes us stand out?	5	What new trends are occurring?
W	Weaknesses	T	Threats
1	What could we improve?	1	Which of our weaknesses could prevent us from meeting our goals?
2	What disadvantages do we have?	2	What obstacles do we face?
3	Where do we lack efficiency?	3	What social changes or trends could threaten us?
4	Where are we wasting money?	4	Are there any policies or legislation changing that might threaten our success?
5	Where are we wasting time and resources?	5	
6	What do our competitors do better?	6	
7	What customer complaints have we had about our service?	7	

Assignment



ASSN#9

- Chapter 11, Exercise 4, Page 500
- Suppose that your organization is deciding which of four projects to bid on, as summarized in the following table. Assume that all up-front investments are not recovered, so they are shown as negative profits. Draw a diagram and calculate the EMV for each project. Write a few paragraphs explaining which projects you would bid on. Be sure to use the EMV information and your personal risk tolerance to justify your answer.

Project	Chance of Outcome	Estimated Profits
Project 1	50 percent	\$120,000
	50 percent	-\$50,000
Project 2	30 percent	\$100,000
	40 percent	\$ 50,000
	30 percent	-\$60,000
Project 3	70 percent	\$ 20,000
	30 percent	-\$ 5,000
Project 4	30 percent	\$ 40,000
	30 percent	\$ 30,000
	20 percent	\$ 20,000
	20 percent	-\$50,000