Risk Management

Chapter 7
1. Define project risk.
2. Recognize four key stages in project risk management and the steps necessary to manage risk.
3. Understand five primary causes of project risk and four major approaches to risk identification.
4. Recognize four primary risk mitigation strategies.
5. Explain the Project Risk Analysis and Management (PRAM) process.
Risk

Project risk – Uncertain event or condition that, if it occurs, has a positive or negative effect on a project’s objectives —PMBOK® Guide

assurance

Risk management – the art and science of identifying, analyzing, and responding to risk factors throughout the life of a project and in the best interest of its objectives—begins.
Risk Management Planning

The process of deciding how to approach, plan, and execute risk management activities for a project.

—PMBOK® Guide

- **Inputs**
  - Enterprise environment factors
  - Project scope
  - Project plan

- **Tools and techniques**
  - Planning meetings for risk analysis

- **Outputs**
  - Risk management plan

- Should be completed early during project planning and reviewed throughout the project
Process of Risk Management

- Risks are threats or opportunities
- Risk planning is an integral part of project planning

Risk management consists of:

- Identify risk
- Perform qualitative risk analysis
- Perform quantitative risk analysis
- Plan risk response
- Monitor and control risks

Project Risk = (Probability of Event)(Consequences of Event) = (Probability)(Effect)

Source: PMBOK® Guide, p. 273
Risk vs. Amount at Stake

- **Phase 1**
  - Conceive (C)
  - Concept

- **Phase 2**
  - Develop (D)
  - Development

- **Phase 3**
  - Execute (E)
  - Implementation

- **Phase 4**
  - Finish (F)
  - Termination

**Total Project Life Cycle**

- **Plan**
- **Produce**

**Opportunity and risk**
- **Combined risk impact**
- **Increasing Risk**
- **Amount at stake**
- **Time**
- **$ Value**

**Period of highest risk impact**
Four Stages of Risk Management

1. Risk identification
2. Analysis of probability and consequences
3. Risk mitigation strategies
4. Control and documentation of lessons learned
Risk Identification

Risk classification clusters
- Financial
- Technical
- Contractual/Legal
- Commercial
- Execution
- Company Environment

Common risk types
- Absenteeism
- Resignation
- Staff pulled away
- Time overruns
- Skills unavailable
- Ineffective Training
- Specs incomplete
- Change orders

...etc., etc., .etc.
Risk Factor Identification Methods

- Brainstorming meetings
- Interview experts (experience)
- Past history (lessons learned)
- Multiple, team based, assessments
- Diagramming techniques
  - C&E diagram, flow charts, FMEA
- **Strength** **Weakness** **Opportunity** **Threats**
  - SWOT analysis
Qualitative Risk Management Assessment Matrix – 2 level

- Probability
  - Low
  - High
- Consequences
  - Low
  - High

- Do last
- Do second
- Do second
- Do first
Quantitative Risk Assessment Calculations

1. Use the project team's consensus to determine the scores for each Probability of Failure category: Maturity ($P_m$), Complexity ($P_c$), Dependency ($P_d$).

2. Calculate $P_f$ by adding the three categories and dividing by 3:

   $$ P_f = \frac{(P_m + P_c + P_d)}{3} $$

3. Use the project team's consensus to determine the scores for each Consequence of Failure category: Cost ($C_c$), Schedule ($C_s$), Reliability ($C_r$), Performance ($C_p$).

4. Calculate $C_f$ by adding the four categories and dividing by 4:

   $$ C_f = \frac{(C_c + C_s + C_r + C_p)}{4} $$

5. Calculate Overall Risk Factor for the project by using the formula:

   $$ RF = P_f + C_f - (P_f) (C_f) $$

**Rule of Thumb:**

- **Low Risk**  \( RF < .30 \)
- **Medium Risk**  \( RF = .30 \) to .70
- **High Risk**  \( RF > .70 \)
Quantitative Risk Assessment
Calculations

Calculating Likely Risks and Planning Responses

<table>
<thead>
<tr>
<th>Probability of Failure ($P_i$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Score</strong></td>
</tr>
<tr>
<td>Low (0.1)</td>
</tr>
<tr>
<td>Minor (0.3)</td>
</tr>
<tr>
<td>Moderate (0.5)</td>
</tr>
<tr>
<td>Significant (0.7)</td>
</tr>
<tr>
<td>Major (0.9)</td>
</tr>
</tbody>
</table>
### Consequence of Failure ($C_f$)

<table>
<thead>
<tr>
<th>Score</th>
<th>Cost</th>
<th>Schedule</th>
<th>Reliability</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Budget est. not exceeded</td>
<td>Negligible impact on program. No impact on critical path</td>
<td>Minimal or no reliability consequence</td>
<td>Minimal or no performance consequence</td>
</tr>
<tr>
<td>(0.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>Cost est. exceed budget by $&lt; 5%$</td>
<td>Minor slip in schedule (less than 5 percent)</td>
<td>Small reduction in reliability</td>
<td>Small reduction in system performance</td>
</tr>
<tr>
<td>(0.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Cost est. exceed budget by $&lt; 15%$</td>
<td>Small slip in schedule starting to impact on critical path</td>
<td>Some reduction in reliability performance</td>
<td>Some reduction in system performance. May require moderate debugging</td>
</tr>
<tr>
<td>(0.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant</td>
<td>Cost est. exceed budget by $&lt; 30%$</td>
<td>Development time slips in excess of one month. Requires readjustment of critical path</td>
<td>Significant degradation in reliability performance</td>
<td>Significant degradation in system performance. Guarantees are at risk. Serious debugging</td>
</tr>
<tr>
<td>(0.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>Cost est. exceed budget by $&gt; 50%$</td>
<td>Large schedule slips ensure the system will miss client timeframe</td>
<td>Reliability goals cannot be achieved under current plan</td>
<td>Performance goals cannot be achieved. Results may not be usable</td>
</tr>
<tr>
<td>(0.9)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
General Project Risk Scoring

1. Identify factors and assess the probability \( (P_f) \) and consequences \( (C_f) \) of failure
2. Calculate overall probability & consequence

\[
P_f = \frac{\sum P_i}{n}
\]

\[
C_f = \frac{\sum C_i}{m}
\]

3. Calculate overall risk factor

\[
RF = P_f + C_f - (P_f)(C_f)
\]
Risk Mitigation Strategies

- Accept the risk
- Minimize through planning
- Share risk with others
- Transfer to another more responsible group
- Insurance
- Contingency Reserves (safety factor)
  - Financial, task, and managerial contingency
- Mentoring new project managers
- Cross training team personnel
- Change management system
Strategies for

- Avoid
- Mitigate
- Transfer
- Accept

- Exploit
- Share
- Enhance
- Accept

Negative Risks

Positive Risk
Control & Documentation

- Used to catalog and for future reference in a lessons learned database

- Helps managers
  - Classify and codify risks the firm faces
  - Respond to these risk
  - Record outcomes of the response strategies

- Change management reporting system answers
  - What? – the source of the risk
  - Who? – what team member is directly responsible
  - When? – a clear time frame
  - Why? – root cause
  - How? – corrective action plan

See UPMM_IIL_Project Change Request Form.doc
Establish processes, rules, and responsibilities for submitting change.
Change request received, logged and reviewed by team.
Determine if there are alternative courses of action.
Change approved or rejected, or alternative solution recommended.
Perform variance analysis.
Re-plan the work updating the Project Management Plan including reporting the effect on the project.
Create a new baseline(s).
## Change Control Request

**Change Request:** (brief four to five word description)

**Activity Description:** (work breakdown structure activity(s))

**Description of Change Request:** (detailed description of the change being requested.)

**Reason for Change:** (reason why the change is being requested.)

### IMPACT OF CHANGE

**Impact on Schedule:** (Impact on time and resources. For Example, no impact; 1 additional day is needed for the printing.)

**Impact on Cost:** (Impact on the cost, For Example, increase of $500; decrease of $100.)

**Impact on Scope:** (Impact on the scope requirements/deliverables. For Example, better quality brochure.)

### APPROVAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Role</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Project Manager</td>
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<tr>
<td>Activity Owner</td>
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<tr>
<td>Project Champion</td>
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</tr>
</tbody>
</table>

Any other people who need to approve the change request. This is based on your change control procedures.
# Change Control Log

<table>
<thead>
<tr>
<th>Change Request Number</th>
<th>Change Request Date</th>
<th>Description of Change</th>
<th>Impact on Schedule, Cost, and Scope (optional)</th>
<th>Approved/Rejected Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<td>3</td>
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<tr>
<td>4</td>
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<tr>
<td>5</td>
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</tr>
</tbody>
</table>
Risk Brainstorming Template

<table>
<thead>
<tr>
<th>Identified Risks</th>
<th>Probability of Occurrence</th>
<th>Potential Impact</th>
<th>Proposed Actions</th>
<th>Person who Identified Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
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<td>2</td>
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</tr>
<tr>
<td>5</td>
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</tr>
</tbody>
</table>
### Contingency Document for Adjustments to Project Plan

<table>
<thead>
<tr>
<th>Probable Event</th>
<th>Adjustment to Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absenteeism</td>
<td></td>
</tr>
<tr>
<td>Resignation</td>
<td></td>
</tr>
<tr>
<td>Pull-aways</td>
<td></td>
</tr>
<tr>
<td>Unavailable staff/skills</td>
<td></td>
</tr>
<tr>
<td>Spec change</td>
<td></td>
</tr>
<tr>
<td>Added work</td>
<td></td>
</tr>
<tr>
<td>Need more training</td>
<td></td>
</tr>
<tr>
<td>Vendors late</td>
<td></td>
</tr>
</tbody>
</table>
Project Risk Analysis & Management
PRAM

- An integrated program of risk management extended over the project’s life cycle.
- Offers a step-by-step logical approach for analyzing and addressing project risk.

**Key Features of PRAM**
- Recognition that risk management follows a life cycle
- Risk management strategy changes over the project life cycle
- *Synthesized, coherent* approach to apply risk management tools as needed
Nine Phases of Risk Assessment

1. Define
2. Focus
3. Identify
4. Structure
5. Clarify ownership of risks
6. Estimate
7. Evaluate
8. Plan
9. Manage

Make sure the project is well defined. Monitor the progress, respond to problems and continue planning. Plan the risk management process. Assess the sources of risk. Determine how you will prioritize the risk. Determine who is responsible for the risk. Determine a reasonable cost impact to the project. Prioritize risk and the team response. Produce a proactive risk management plan with risk mitigation strategies.
Discussion Questions

1. Do you agree with the following statement: “With proper planning it is possible to eliminate most/all risks from a project.” Why or why not?

2. In evaluating projects across industries, it is sometimes possible to detect patterns in terms of the more common types of risks they routinely face. Consider the development of a new software product and compare it to coordinating an event, such as a school dance. What likely forms of risk would your project team face in either of these circumstances?

3. Analyze Figure 7.2 (degree of risk over the project life cycle). What is the practical significance of this model? What implications does it suggest for managing risk?

4. What are the benefits and drawbacks of using the various forms of risk identification mentioned in the chapter (e.g., brainstorming meetings, expert opinion, etc.)?

5. What are the benefits and drawbacks of using a qualitative risk assessment matrix for classifying the various types of project risk?
6. What are the benefits and drawbacks of using a quantitative risk assessment tool such as the one shown in the chapter?

7. Give some examples of projects using each of the risk mitigation strategies (accept, minimize, share, or transfer). How successful were these strategies? In hindsight, would another approach have been better?

8. Explain the difference between managerial contingency and task contingency?

9. What are the advantages of developing and using a systematic risk management approach, such as PRAMs methodology? Do you perceive any disadvantages with this approach?

10. Consider the following statement: “The problem with risk analysis is that it is possible to imagine virtually anything going wrong on a project. Where do you draw the line; in other words, how far do you take risk analysis before it becomes overkill?” How would you respond to this observation?