Risk Overview

Excerpted from Pfleeger and Atlee, 4e
(revised by B. Cheng and D. Phillips)
3.4 Risk Management
What is a Risk?

- Risk is an unwanted event that has negative consequences
- Distinguish risks from other project events
  - *Risk impact*: the loss associated with the event
  - *Risk probability*: the likelihood that the event will occur
- Quantify the effect of risks
  - *Risk exposure* = (risk probability) x (risk impact)
- Risk sources: generic and project-specific
3.4 Risk Management
Quantifying Risk Impact

• The impact risk (severity) is an estimate of the impact to technical performance, cost, and schedule if the risk occurs.

• Impact can be quantitized to low, medium, and high.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Performance</th>
<th>Schedule</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Minimal or no impact, unimportant</td>
<td>Minimal or no impact</td>
<td>Minimal or no impact</td>
</tr>
<tr>
<td>Medium</td>
<td>Acceptable with reduction in margin</td>
<td>Additional resources required, Minor slip in key milestones (&lt;20% slip in total schedule)</td>
<td>Cost estimates exceed budget by &lt;7%</td>
</tr>
<tr>
<td>High</td>
<td>Acceptable with no remaining margin; Unacceptable</td>
<td>Major slip in key milestones or Critical Path impacted (&gt;20% slip in total schedule)</td>
<td>Cost estimates exceed budget by &gt;7%</td>
</tr>
</tbody>
</table>
3.4 Risk Management
Quantifying Risk Probability

- Risk Probability – likelihood an event will occur
- Risk Probability can be quantized to low, medium, and high.

<table>
<thead>
<tr>
<th>Likelihood of Occurrence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0 – 30% change this risk will occur</td>
</tr>
<tr>
<td>Medium</td>
<td>30% - 80% chance this risk will occur</td>
</tr>
<tr>
<td>High</td>
<td>80% - 100% change this risk will occur</td>
</tr>
</tbody>
</table>
3.4 Risk Management

Prioritizing Risk

- Focus on those items with the highest risk level

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

Risk Level

- **HIGH** – unacceptable. Major disruptions to the project/program likely. Different approach dictated. Additional management attention required.

- **MEDIUM** – Some disruption to the project/program. Alternative approaches should be investigated to reduce risk. Additional management attention may be required.

- **LOW** – Minimum impact. Minimum oversight needed to ensure risk remains low.
3.4 Risk Management

Risk Management Activities

Risk assessment

- Risk identification
  - Checklist
  - Decomposition
  - Assumption analysis
  - Decision driver analysis

- Risk analysis
  - System dynamics
  - Performance models
  - Cost models
  - Network analysis
  - Decision analysis
  - Quality risk factor analysis

- Risk prioritization
  - Risk exposure
  - Compound risk reduction

Risk reduction

- Buying information
- Risk avoidance
- Risk transfer
- Risk reduction leverage
- Development process
- Risk element planning
- Risk plan integration

Risk control

- Risk management planning
  - Risk mitigation
  - Risk monitoring and reporting
  - Risk reassessment

Risk resolution
3.4 Risk Management
Risk Management Activities (continued)

• Three strategies for risk reduction
  ▪ *Avoiding the risk*: change requirements for performance or functionality
  ▪ *Transferring the risk*: transfer to other system, or buy insurance
  ▪ *Assuming the risk*: accept and control it

• Cost of reducing risk
  ▪ *Risk leverage* = \((\text{risk exposure before reduction} - \text{risk exposure after reduction}) / (\text{cost of risk reduction})\)
3.4 Risk Management
Sidebar 3.4 Boehm’s Top Ten Risk Items

• Personnel shortfalls
• Unrealistic schedules and budgets
• Developing the wrong functions
• Developing the wrong user interfaces
• Gold-plating
• Continuing stream of requirements changes
• Shortfalls in externally-performed tasks
• Shortfalls in externally-furnished components
• Real-time performance shortfalls
Risks for your Project

• What risks do you have?
• What risks have already occurred?
  ▪ Mitigation?
  ▪ Impact on project?
  ▪ Take home message?