3.4 Risk Management

What is a Risk?

- Risk is an unwanted event that has negative consequences

- Distinguish risks from other project events
  - \textit{Risk impact}: the loss associated with the event
  - \textit{Risk probability}: the likelihood that the event will occur

- Quantify the effect of risks
  - \textit{Risk exposure} = (risk probability) \times (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

**Likelihood**
- High
- Medium
- Low

**Impact**
- Low
- Medium
- High

**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 control
    - Risk management planning
    - Risk element planning
    - Risk plan integration
  - Risk resolution
    - Risk mitigation
    - Risk monitoring and reporting
    - Risk reassessment
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 = (risk exposure before reduction – risk exposure after reduction) / (cost of risk reduction)

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?