Managing Risk

• Step 1: Risk Identification
  – Generate a list of possible risks through brainstorming, problem identification and risk profiling.
    • Macro risks first, then specific events

• Step 2: Risk Assessment
  – Scenario analysis for event probability and impact
  – Risk assessment matrix
  – Failure Mode and Effects Analysis (FMEA)
  – Probability analysis
    • Decision trees, NPV, and PERT
  – Semiquantitative scenario analysis
Partial Risk Profile for Product Development Project

Technical Requirements
Are the requirements stable?

Design
Does the design depend on unrealistic or optimistic assumptions?

Testing
Will testing equipment be available when needed?

Development
Is the development process supported by a compatible set of procedures, methods, and tools?

Schedule
Is the schedule dependent upon the completion of other projects?

Budget
How reliable are the cost estimates?

Quality
Are quality considerations built into the design?

Management
Do people know who has authority for what?

Work Environment
Do people work cooperatively across functional boundaries?

Staffing
Is staff inexperienced or understaffed?

Customer
Does the customer understand what it will take to complete the project?

Contractors
Are there any ambiguities in contractor task definitions?
## Risk Severity Matrix

### Failure Mode and Effects Analysis (FMEA)

Impact × Probability × Detection = Risk Value

<table>
<thead>
<tr>
<th>Impact</th>
<th>Probability</th>
<th>Detection</th>
<th>Risk Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Green zone (minor risk)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Yellow zone (moderate risk)</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Red zone (major risk)</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>Green zone (minor risk)</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>Red zone (major risk)</td>
</tr>
</tbody>
</table>
• Added work due to change orders.
• Changed job conditions (different weather, soil conditions, material lay-down areas).
• Incomplete drawings or specifications.
• Late project owner and designer decisions.
Unexpected Events That Result in Work Performed Under Adverse Conditions

- Overtime
- Learning curve
- Temperature, wind, humidity
- Start-stop-start-stop
- Double handling of material
- Morale problems