Risk & Risk Management

Project Management Unit #5
Why manage risks?

• It is a fact of life that chance events will occur and affect the outcome of your project

• *Murphy’s Laws* codify this “knowledge”
  – If anything can go wrong, it will!
  – Of things that could go wrong, the one that causes the most damage will occur!

• Project risks are defined as the undesirable event, the chance this event might occur and the consequences of all possible outcomes

• Risk management attempts to identify such events, minimize their impact & provide a response if the event is detected
  – *The essence of Project Management is Risk Management!*
Risk during the project

• Risk and the associated cost to address the risk, varies over the project life cycle
  – For initial phase there is high chance of risk events, but low cost impact
  – For final phase there is low chance of risk events, but cost impact is high

• Identifying and managing risks will greatly affect project success

Figure from “Project Management” by Gray and Larson
Risk Management Steps

- There are four major steps to developing a risk management plan
  1. Identify all the possible risk events that could affect the project
  2. Assess each risk in terms of probability, impact severity and controllability
  3. Develop a strategy and/or contingency for responding to each risk
  4. Monitor and control risks dynamically

- A Risk Management Plan should be developed during the initial project phase and immediately implemented
- The plan should be reviewed and revised as needed during each project phase

Figure from “Project Management” by Gray and Larson
Identify the project risks

- Generate list of all possible risks by “brainstorming” among team members
- Do not attempt to assess risk probability; that is for a later step
- Focus on risk events, rather than risk consequences
  - For example, “instrument does not return correct data” is a consequence of events like poor circuit design, incorrect or failed components, poor software implementation
- First focus on overall project risks, then identify specific risks
- Use your WBS to help organize your risk identification process
- Seek input from sources from outside your group
- Emphasize critical thinking and remember Murphy’s Laws
Assessing the risk impact

- Not all risks need to be subject to monitoring and control
- Use a *Scenario Analysis* to assess the risk event impact
  - Determine all consequences and their severity if the event happens
  - Identify when, during the project, will the event likely happen
  - Estimate the probability that the risk event will occur
  - Determine how difficult it will be to detect the event occurrence

<table>
<thead>
<tr>
<th>Risk Event</th>
<th>Likelihood</th>
<th>Impact</th>
<th>Detention Difficulty</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface problems</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>Conversion</td>
</tr>
<tr>
<td>System freezing</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>Start-up</td>
</tr>
<tr>
<td>User backlash</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>Post-installation</td>
</tr>
<tr>
<td>Hardware malfunctioning</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>Installation</td>
</tr>
</tbody>
</table>

Figure from “Project Management” by Gray and Larson
Ranking the risk importance

- Rank risks from those that can be neglected to those that require elevated vigilance
- A *Risk Severity Matrix* can be helpful in prioritizing risks
  - Plot of event probability versus impact
- Red zone identifies the most important events
- Yellow zone lists risks that are moderately important
- Green zone events probably can be safely ignored
- Note that the zones are not symmetrical across the matrix
  - High impact low probability events much more important than likely low impact events
Risk response strategies

- **Mitigating risk**
  - Actions are taken during the project to either A) reduce the likelihood of a risk, or B) reduce the impact of the risk
  - For example, testing electrical components after receipt would reduce the likelihood that “bad” parts would be used in a circuit

- **Retaining risk**
  - Usually for events with low probability but high impact when no alternate strategy is feasible
  - Have a contingency plan ready in case event occurs

- **Sharing risk**
  - Multiple units associated with the project assume some portion of the risk

- **Transferring risk**
  - Risk is assumed and managed by a unit outside the immediate project
  - For example, risks associated with the balloon vehicle are transferred to the LA ACES Project management
Develop a response for risks

- A risk response plan identifies the primary components necessary for managing the risk
  - What response strategy will be used
  - How will the risk event be detected and the response triggered
  - What plan will be put in place in response to the event
  - Who will be responsible for monitoring and controlling the risk

<table>
<thead>
<tr>
<th>Risk Event</th>
<th>Response</th>
<th>Contingency Plan</th>
<th>Trigger</th>
<th>Who is Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface problems</td>
<td>Reduce</td>
<td>Work around until help comes</td>
<td>Not solved within 24 hours</td>
<td>Nils</td>
</tr>
<tr>
<td>System freezing</td>
<td>Reduce</td>
<td>Reinstall OS</td>
<td>Still frozen after 1 hour</td>
<td>Emmylou</td>
</tr>
<tr>
<td>User backlash</td>
<td>Reduce</td>
<td>Increase staff support</td>
<td>Call from top management</td>
<td>Eddie</td>
</tr>
<tr>
<td>Equipment malfunctions</td>
<td>Transfer</td>
<td>Order different brand</td>
<td>Replacement doesn't work</td>
<td>Jim</td>
</tr>
</tbody>
</table>

Figure from “Project Management” by Gray and Larson
Contingency Planning

- Risks associated with the technical aspects of a project can have the most severe outcomes
  - Can be *mitigated* by building and testing prototypes of critical components
  - Have available backup or alternate designs that have much lower risk
- Risks associated with the schedule usually require a trade-off
  - Manage “slack” time to provide resources for delayed components
  - Bring in more people (increase costs) or reduce performance
- Risks associated with costs usually result from estimate errors and omissions
  - Time & cost are related; trade-off schedule delays with lower cost
  - “Descope” options that remove components of the project, but still allow the primary mission to proceed
- All “budgets” (mass, power, schedule, cost) should include a reserve percentage that can be expended as risk events occur
Risk response process control

- The *Risk Management Plan* should specify the risks, risk responses, and mechanisms used to control the process
- Need to continuously monitor for risk triggers
  - Potential risk events should be identified early in a project and monitoring for such events immediately commence
- Each risk is assigned to a specific person
  - Has the expertise & authority to identify & response to an event
- Need environment where problems are readily reported, embraced & solved
- Changes in any aspect of the project need to be documented and communicated
  - Who will have the authority to approve a change
  - Use written form to track hardware, software & document changes
  - Who is notified of what changes when
References