The Basics of Risk Management

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The Basics of Risk Management

- What
- Why
- When
- Who

- and How?
What is Risk?

Risk is the combination of

• the probability of an event

• and its consequences / impact
So what is Risk Management?
What is Risk Management?

- “Coordinated activities to direct & control an organization with regard to risk.”

- Simply identifying threats, and then doing something about them

- It’s a structured, transparent and documented process with open communication
Why have a Plan?

• Identifies major risks ahead of time
• Facilitates effective communication
• Commitment to common goals
• Thorough documentation
• Provide framework for making decisions
• Teamwork, with individual accountability
When should I do this?

... as early as possible.

Risk management is most effective – and cost-efficient – in the very early stages of your project / task.

• Basic information
• Your boss’s commitment
• Team resources
What is the Process?

- Fault tree
- HAZOP
- Monte Carlo simulation
- “What if”s
- Layer Protection analysis
Do I really need to do EVERYTHING?
What is the “Basic” Process?

- Project Scope/Strategy/Conditions
- Structuring
- Risk Management Planning
- Risk Identification
- Risk Management Implementation
- Risk Assessment
- Risk Analysis
How do I start?
How do I start?

1. Get buy-in from management
2. Assemble a team
3. Set limits
4. Define the risk criteria
5. Preliminary Hazard Analysis (PHA)
Set some limits

• What is your (project) task?
• Which method are you following?
• Within what physical area?
• Within what time frame?
• What is the intended use?
• Who will be the user (client)?
• What are your resources?
• What will (have to) be excluded?
Remember what “RISK” is

\[
\text{Probability} + \text{Impact} = \text{Risk}
\]
What is the Probability (Frequency)?

How often could this occur?

- **Very High** – likely to occur often
- **High** – several times in time period
- **Moderate** – at least once in period
- **Low** – unlikely but may possibly occur
- **Very Low** – practically impossible
What would be the Consequence?

Impact to personnel, schedule or cost

- Very High – death, > 6 mo delay, >$20M
- High – serious injury, > 3 mo delay, >$5M
- Moderate – injury, > 1 mo delay, $250K
- Low – mild injury, > 1 wk delay, $100K
- Very Low – practically no impact
Create a Risk Matrix

The image shows a Risk Matrix with axes for Probability (Very Low, Low, Moderate, High, Very High) and Consequence (Very Low, Low, Moderate, High, Very High). The cell corresponding to a very high probability and a high consequence is marked with an 'X'. This indicates a risk that is both highly probable and highly impactful.
Decide what’s Acceptable

<table>
<thead>
<tr>
<th>Probability</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
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<td>High</td>
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<td>Moderate</td>
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<td>Low</td>
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<td>Very Low</td>
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</tbody>
</table>

Consequence
Preliminary Hazard Analysis
Preliminary Hazard Analysis

How does a PHA work?

1. Identify your hazards (Risk Item Short List)
2. Analyze the hazards – Prob. & Conseq.
3. Evaluate them against what’s acceptable
4. List already implemented measures
5. Plan additional mitigation measures
6. Track of the status of your actions.
Preliminary Hazard Analysis

- May be several meetings
- 5-8 people in each
- Use an experienced Risk Manager
- Someone to take notes
- Brainstorming
Example Risks

1. Conflict with an unidentified utility  H/H
2. Traffic control  H/H
3. Lack of construction experience  M/M
4. Unidentified hazardous waste  L/L
5. Design / plan error  L/H
6. Construction cost exceeds budget  L/H
7. Potential settlements  VL/L
8. Groundwater contamination  VL/VL
Evaluate the Risk

<table>
<thead>
<tr>
<th>Probability</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td></td>
<td></td>
<td></td>
<td>1,2</td>
<td></td>
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<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
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<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>4</td>
<td></td>
<td>5,6</td>
<td></td>
</tr>
<tr>
<td>Very Low</td>
<td>8</td>
<td>7</td>
<td></td>
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</tbody>
</table>

Consequence
## What Are The Differences?

<table>
<thead>
<tr>
<th>Preliminary Hazard Analysis</th>
<th>Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Quick overview</td>
<td>• Detailed analysis</td>
</tr>
<tr>
<td>• Intuitive &amp; Qualitative</td>
<td>• Quantitative analysis possible</td>
</tr>
<tr>
<td>• Fast results</td>
<td>• Comprehensive register</td>
</tr>
<tr>
<td>• Done by everyone</td>
<td>• Needs experience</td>
</tr>
<tr>
<td>• Cheap</td>
<td>• Takes time</td>
</tr>
<tr>
<td>• Fuzzy &amp; Superficial</td>
<td>• May become costly</td>
</tr>
<tr>
<td>• Incomplete register</td>
<td></td>
</tr>
</tbody>
</table>

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Evaluate the Risk

<table>
<thead>
<tr>
<th>Probability</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>8</td>
<td>7</td>
<td>3</td>
<td>1.2</td>
<td>5.6</td>
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<tr>
<td>High</td>
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<td>Moderate</td>
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<tr>
<td>Very Low</td>
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Consequence
How can I reduce the Risk?
Mitigation

• **S** – Substitution or rethink the System

• **T** – Technology (engineering controls)

• **O** – Organizational / Instructions

• **P** – Personal measures
Show Your Risks After Mitigation

Are your risks tolerable?
Use a Risk Map as a graphic decision tool.

<table>
<thead>
<tr>
<th>Frequency (hazard probability)</th>
<th>Risk Profile/Matrix ¹</th>
<th>after implemented project measures</th>
<th>Risk Profile/Matrix ¹</th>
<th>after additional measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8,10</td>
<td>7</td>
<td>1,5,9</td>
<td>1,9</td>
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<tr>
<td>B</td>
<td>6</td>
<td>2</td>
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<tr>
<td>C</td>
<td>3</td>
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<td>E</td>
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S Severity (hazard effect category)

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Residual Risks

Residual Risks may be tolerable if …..

• They are identified
• They are evaluated by an approved method
• They are minimized by a Safety System
• They are well known to everyone involved
• They are periodically reviewed
How Do I Track All Of My Risks?

Create a Risk Register

• Each risk has an Risk Owner

-- Each mitigation measure has:
  • a Task Owner
  • a way to follow-up
## Create a Risk Register

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</thead>
<tbody>
<tr>
<td>5</td>
<td>Self rescue/self evacuation</td>
<td>E</td>
<td>Spatial disorientation</td>
<td>Poisoning by (hazardous) smoke</td>
<td>5.1 Fire/smoke somewhere on TBM/Back-up</td>
<td>I A</td>
<td>Everyone can safely evacuate tunnel in time</td>
<td>5.1.1 Evacuation routes - defined - cleared of obstructions - emergency lighted - marked</td>
<td>Residual Risk Register</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>5.1.2 T Co AFFF Fire Fighting Stations along TBM/Back-up</td>
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<td></td>
<td></td>
<td>5.1.3 T Co Oxygen Self Rescuers</td>
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<td></td>
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<td>5.1.4 O/P Co Crew training - initial - recurrent</td>
<td></td>
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<td>5.1.5 T Co Water Sprays</td>
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<td>5.1.6 T Co Intercom</td>
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</table>
Where do I go from here?
Follow Through …..

Good Documentation
for Communication & Decision Making

• Give the Risk Assessment to people
& Periodic Updates

- Design milestones
- Begin construction
- New risks materialize
- Value Engineering
- Change Management
Risk Management is not rocket science and does not take a wizard!

All you really have to do is …

• Start as early on as possible.
• Select your team members with care.
• Use an experienced Risk Manager.
• Start with a Preliminary Hazard Analysis.
• Use a well known and accepted method.

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Resources

ISO 9000.2005, Quality Management Systems
  – Fundamentals and Vocabulary
ISO 9001.2008, Quality Management Systems
  – Requirements
ISO 31000.2009, Risk Management
  – Principles and Guidelines
ISO 31010.2009, Risk Management
  – Risk Assessment Techniques
Alfred Moergeli: http://www.moergeli.com
Thank you!

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