Risk: It’s More than Modeling

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All Decisions Have Risk

“Never confuse motion with action.” *Hemingway*

“Take calculated risks. That is quite different from being rash.” General George S. Patton, Jr.
Why Use Risk Analysis?

Post-Decision Support
- Reactive in nature
- Executes the decision
- Fixes the problem

Pre-Decision Support
- Proactive in nature
- Influences the decision
- Anticipates the problem

Putting out fires
Preventing fires

Risk analysis provides pre-decision support
Risk Agenda

- What Is It?
- Traditional Financial Risk
- Traditional Non-Financial Risk
- Risk in the 8 Step DM Process
- Other Risk Concepts
What is Risk Analysis?

Risk analysis is the process of assessing, communicating, and managing the potential consequences of unfavorable events.

We must understand uncertainty to fully understand risk.
Risk and Uncertainty

- They are not the same

- **Risk**
  - The chance of loss or injury
  - Bad outcomes only

- **Uncertainty**
  - The indefiniteness about the outcome of a situation
  - Good and bad outcomes
Sources of Uncertainty

- **Inputs**
  - Costs, weights, quantities

- **Programmatic changes**
  - Schedule, performance measures

- **External factors**
  - Inflation, labor rates, other programs

- **Unknown factors**
  - Strikes, accidents, world events

Studies will NOT capture ALL uncertainty
Sources of Uncertainty

Scenario: Where to house Military Families?
What can vary??

<table>
<thead>
<tr>
<th>Cost Related</th>
<th>Non-cost</th>
<th>Externalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Cost</td>
<td>Late for work</td>
<td>Local Crime</td>
</tr>
<tr>
<td>Off Base Rent</td>
<td>Asbestos</td>
<td>Housing Collapse</td>
</tr>
<tr>
<td>Utilities</td>
<td>Bad Local Roads</td>
<td>BRAC</td>
</tr>
<tr>
<td>Fuel for Commuting</td>
<td></td>
<td></td>
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</table>

More ???
Risk Agenda

- What Is It?
- Traditional Financial Risk
- Traditional Non-Financial Risk
- Risk in the 8 Step DM Process
- Other Risk Concepts
Most common risk is accuracy of costs

Are all costs known with reasonable accuracy?

Will “savings” be realized?

What happens if numbers vary?
  - Does it matter?
  - Different recommendation
  - Invalidates a particular alternative
All ranges are too narrow

- Fail to incorporate unknown but possible factors

In example, could Gas EVER be greater than $4.00?

Experts too optimistic

Fail to consider all possible changes

Must temper inputs with “reality”
Is it better to build housing or pay BAH

- 100 Homes
- 100 Families
- Average 95% occupancy
- 40 Year study
- BAH $10,000/year
- New construction $250,000/home
- Maint/Utilities $5,000/occupied home

<table>
<thead>
<tr>
<th></th>
<th>Const</th>
<th>Maint</th>
<th>BAH</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off Base</td>
<td></td>
<td></td>
<td>40,000,000</td>
<td>40,000,000</td>
</tr>
<tr>
<td>NC</td>
<td>25,000,000</td>
<td>19,000,000</td>
<td>2,000,000</td>
<td>46,000,000</td>
</tr>
</tbody>
</table>
If BAH Rates increase over $11,579, New Construction is the preferred alternative.
## Scenario Example

### If Housing Market collapses, New Construction is the preferred alternative

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Cost ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collapse</td>
<td>Off Base</td>
</tr>
<tr>
<td>Base Case</td>
<td>NC</td>
</tr>
<tr>
<td>Expand</td>
<td>NC</td>
</tr>
</tbody>
</table>

- Off Base: If the housing market collapses, the cost for expanding is higher than the cost for new construction. In the base case, the cost is lower than in the collapse scenario.
- NC: New Construction is always the preferred alternative when compared to the off base scenario.
Simulation Example

- **Expand** ($17,000K): 24%
- **Base Case** ($6,000K): 75%
- **Collapse** ($3,800K): 96%

Choose NC
Risk Agenda

- What Is It?
- Traditional Financial Risk
- Traditional Non-Financial Risk
- Risk in the 8 Step DM Process
- Other Risk Concepts
Not all Risks are Financial

- Lack of funding
- Change in mission
- Political constraints/obstacles

Multiple methods to portray non-financial risk
  - Narrative
  - Matrix
  - Probability/Severity table

These must also be incorporated into the analysis
Risk Narrative

- Sometimes a simple narrative is sufficient
- Discuss each risk/alternative

**Status Quo:** Status quo contains the most risk as it fails to address the current decay in the infrastructure. Without upgrade, electrical systems will continue to fail and the potential for injury will remain. Even with continued maintenance, catastrophic failure could occur directly impacting the ability to generate sorties.

**Replacement:** Replacing the current system will virtually eliminate the risk of failure, but is contingent upon getting MILCON funding. This alternative also relies on new construction methods that while promising have little long term history to ensure their viability. In the short run, this alternative also requires the dislocation of personnel – potentially impacting current operations.
# Alternative Matrix

<table>
<thead>
<tr>
<th>Status Quo</th>
<th>Renovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod</td>
<td>Low</td>
</tr>
</tbody>
</table>

- **Status Quo**: Unresolved facility issues, Increasing stress on base budget, Low resident morale
- **Renovation**: Short term disruption during repair, May find additional problems

<table>
<thead>
<tr>
<th>New Construction</th>
<th>Off Base</th>
</tr>
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<tr>
<td>High</td>
<td>Mod</td>
</tr>
</tbody>
</table>

- **New Construction**: Requires MILCON, Improves location, Morale inequities between facilities
- **Off Base**: Increased response time during exercises, More interaction with civilian populace
RM Risk Development

- Not all risks are equal
  - Severity of impact
  - Likelihood of occurrence

- 26 risk tools mentioned in AFPAM 90-902

- Basic risk matrix is most common
## Risk Assessment Matrix

<table>
<thead>
<tr>
<th>SEVERITY</th>
<th>Frequent A</th>
<th>Likely B</th>
<th>Occasional C</th>
<th>Seldom D</th>
<th>Unlikely E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic 1</td>
<td>E</td>
<td>E</td>
<td>H</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Critical 2</td>
<td>E</td>
<td>H</td>
<td>H</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Marginal 3</td>
<td>H</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Negligible 4</td>
<td>M</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>
### Housing Risk Example

<table>
<thead>
<tr>
<th></th>
<th>Off-Base</th>
<th>New Construction</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Prob</td>
<td>Sever</td>
</tr>
<tr>
<td><strong>Housing Market Collapse</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td><strong>BAH Increase</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

#### Probability
- **A** - Frequent
- **B** - Likely
- **C** - Occasional
- **D** - Seldom
- **E** - Unlikely

#### Severity
- **1** - Catastrophic
- **2** - Critical
- **3** - Marginal
- **4** - Negligible

#### Risk Level
- Extremely High
- High
- Moderate
- Low

**Tell risk story**
## Housing Risk Example

<table>
<thead>
<tr>
<th>Housing Market Collapse</th>
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<td>Moderate</td>
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<th>Off-Base</th>
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Risk Agenda

- What Is It?
- Traditional Financial Risk
- Traditional Non-Financial Risk
- Risk in the 8 Step DM Process
- Other Risk Concepts
Risk is present in each of these steps!!
Step 1: Identify the Issue

- Objective statement
- Identify the decision maker
- Make sure everyone understands the problem
Risks in
Step 1: Identify the Issue

- Incorrect Objective Statement
  - Problem was misunderstood
  - Too narrow or too broad (wrong scope)
  - Analyzed symptoms vs. causes
  - Biased objective
  - Based on wrong assumptions
  - Did not understand leader’s intent

Causes incorrect alternatives, decision making or wasted time
Step 2: Analyze the Issue

- Gather background data
- Get different perspectives
- Determine facts and assumptions
- Determine evaluation criteria
Risks in
Step 2: Analyze the Issue

- Incorrect background data
  - Can lead to incorrect assumptions and alternatives
  - Ex: Required number of houses based on maximum number of families on waiting list over past two years

- Incorrect facts and assumptions
  - Can lead to incorrect alternatives
  - Ex: Only members required to live on base will be allowed too

- Determine evaluation criteria
  - Collects wrong information or from wrong sources
  - Ex: Lowest cost is goal when DM wants lowest risk
Step 3: Develop Alternatives

- Potential solutions for the problem
- Want a range of possibilities
- Get outsiders involved, experts and novices
Risks in
Step 3: Develop Alternatives

- **Inadequate solutions**
  - Are they exhaustive?
  - Are infeasible options dismissed upfront?

- **Assuming Status Quo is infeasible**
  - If it’s working now, it’s feasible
  - Needs to be used for a baseline

- **Choice overload**
  - Cannot analyze them all
Step 4: Evaluate Alternatives

- Gather necessary data
- Look at the alternatives from different angles
- Perform analysis
- Use evaluation criteria determined in Step 2
Risks in Step 4: Evaluate Alternatives

- Irrelevant data
  - Filter through the clutter

- Limited perspectives addressed
  - Should be developed collaboratively
  - Wrong or inappropriate stakeholders involved

- Incorrect or unclear evaluation criteria
  - Improper benefit categories, double counting benefits, biases

- Didn’t account for 2nd/3rd order effects
  - What happens if the housing market expands?
Step 5: Make a Recommendation

Choose

Alternative 1
Alternative 2
Alternative 3
Alternative 4

Explain & Support
Risks in

Step 5: Make a Recommendation

Choose

Alternative 1
Alternative 2
Alternative 3
Alternative 4

Must be unbiased

Explain & Support

Not always based on cost or cost/benefit
Identify risks involved
Identify costs upfront
No emotions

Must. Be. Justified.
Step 6: Make Decision

I agree with the recommendation, go ahead and start implementation.

I like Alternative 4. Update the implementation plan for this alternative and let me review before pressing forward.
Risks in
Step 6: Make Decision

- Selective perception/biases
- Lack of clear purpose
- Relying on past experience
- Politically motivated
- Mismanaged resources
- Doesn’t see opportunity
- Avoids conflict
- Emotionally driven
Step 7: Implement

- Actions that need to be taken
  - Risk mitigation
  - Communication
  - Training
  - Funding plan
  - Schedule

- Captured throughout the analysis

How to get from A to B
Risks in Step 7: Implement

- Actions were not captured

- No risks identified or plan to mitigate
- Strategy wasn’t communicated clearly
- No Cost-overrun what-ifs
- No training resources established
- Behind schedule

No plan on how to get from A to B
Step 8: Evaluate

- Determine if issue was fixed/improved
- Evaluate during and after implementation
- Create performance metrics
Risks in Step 8: Evaluate

- No data available to determine if issue was fixed/improved
- Incorrect performance metrics
- Not communicating how things are going
- No follow-up

How else do we know when/where to adjust?
Risk Agenda

- What Is It?
- Traditional Financial Risk
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- Other Risk Concepts
Risk Adverse vs. Risk Seeking

Which is your decision maker?

Risk Seeking
- Motivated by potential
- Offers opportunity

Risk Adverse
- Prevention focused
- Perfectionism
- Motivated by security
- Offers safety

Perfectionism
- Fear of failure
- Results in inability to move forward
Risk is not the Same for Everyone

- **Individual Risk Tolerance**

  Consider the following...

  - Option A: You will receive $2M for sure.
  - Option B: You have a 50% chance you will receive nothing and a 50% chance you will receive $10M.

  Which would you choose?

- **Preference/Aversion to specific risk**
  - Death
  - My budget/unit’s budget/AF budget
  - Mission accomplishment
  - Promotion
Making Risk Relevant to Decision Maker

- Find out what’s important to them
  - Background, life experiences, career paths

- Must adapt to their preferences
  - Display in a manner they can interpret
  - May use non-traditional methods

- Identify trade-offs
  - The result of one decision could impact other projects
What to Do With Risk?

- Some are only associated with a particular alternative
- Some can be mitigated
- Some require outside assistance
- Some are just absorbed
- Some invalidate the preferred alternative

How to handle/respond/mitigate risks should be discussed in the analysis
Risk Mitigation Narrative

Risk – Housing Market Collapse

Mitigation – Limit number of new units built

Communicate plan to base personnel

Risk – BAH Increase

Mitigation – Require Airmen to live on base

Don’t worry about it it’s paid by big AF
Many methods of risk analysis exist

Must analyze financial and non-financial risk

Determine method best suited for issue

Some risk remains after alternative selected

Consider DMs risk tolerance and preferences
QUESTIONs?

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