Risk and Issue Management in Acquisition Programs:

Discussion of The Cognitive Bias

Marja Weaver
AFLCMC/AZE
DSN 785-5553
Comm 937-255-5553
Marja.Weaver@us.af.mil
Overview

Intro: SecDef Rumsfeld Understood Risk!

- 5 Dragons of Risk Management
- Slaying the Dragons
- 9 May 17 AFI 63-101/20-101 changes
- AFLCMC Risk & Issue Management Process Std
- Training Opportunities References and Links
  (Download this brief!)
Deconstructing Rumsfeld

• “...there are known knowns; there are things we know that we know”

Requirements; Issues

• There are known unknowns; that is to say, there are things that we now know we don't know.

  ... and some known unknowns are RISKS
  future event that although uncertain to occur, would cause an execution failure in the program

• But there are also unknown unknowns – there are things we do not know we don't know

  Add reasonable percentages to cost and schedule to account for unknown unknowns, not the known risks!

  ... there are better techniques to deal with them!

See AFPAM 63-128 Chap 12 for AF definitions of Risk, Issue and Concern
The DESIRED State:
Repeatable, standard process with a common lexicon, rating criteria, analysis capability and communication methods used across AF Acquisition portfolios

What We Have:
Process descriptions (AFI, Process Std, AFPAM, etc, AFI driven briefing requirements (communication)
AF definitions of risk, issue, concern (lexicon)
AFI directed rating criteria for likelihood & consequence (rating)
SAF provided unclassified risk tracking tool (comm/process)

What We are Lacking:
Sufficient analysis tools and analysis expertise
Broad base of skilled risk estimators/handlers… … the Risk Dragon Slayers!
Un-addressed Cognitive Bias

inherent tendency to favor a particular outcome

Question isn’t “Does bias exist” it’s “How do we manage it”

- Confirmation Bias
  - Searching for, filtering or interpreting information in a way that confirms existing beliefs Skews risk ID; affects rating*

- Anchoring or Focalism
  - Over-reliance on first piece of info Inhibits risk ID; affects rating*

- Availability Heuristic
  - Overestimating importance of events with greater memory ‘availability’ - Recent, unusual or emotional memories
  - Unverified “Lessons Learned” still influence risk ID and handling*

Blind-spot Bias: Failing to recognize your own cognitive bias, is a bias!

* Personal Observation
Systemic Overconfidence

• We under-estimate probability of bad things happening

• We believe we are/will be right more than we are
  • Average results of participants in 11 confidence studies*:
    • Presumed they were right 90% of time - Reality only 66%

• Most folks (even SMEs) don’t monitor their own past estimating performance or take action to improve*
  • Lack of feedback/mis-interpretation of feedback
  • No motivation to self monitor personal performance
  • No skin in the game – job rotations, group decision

True intuitive expertise is learned from prolonged experience with good feedback on mistakes. D. Kahneman

*The Failure of Risk Management, D. Hubbard
Illusions of Communication

- The same phrase mean different things to different people

  - Low Likelihood | Near Certainty
  - High Likelihood | Highly Likely
  - Likely | Nearly Impossible
  - Unlikely | Highly Unlikely
  - Not likely

- Risk Matrix - only a valid reporting tool if everyone understands the rating criteria for Consequence and “Likelihood”
  - AF Standard Criteria for a reason!*
  - Contractors often not required to use AF Std criteria
    - leads to mis-communication of risk likelihood or magnitude of impacts

- Without calibrated quantification of risk & subsequent analysis, matrix may present misleading view of risk

REMEMBER: Briefing a Risk Matrix doesn’t manage the risk!

* IAW AFI 63-101/20-101 9 May 17, use of the AF std rating criteria is an inspect-able item
Random Inconsistencies

- We’re not as consistent as we think we are
  - Only about 20% of people will respond consistently on identical questions/evaluations when repeated in a long list of questions

- We don’t have as good of a memory as we think we do
  - Tend to remember in anecdotes, not specifics

- Fatigue reduces concentration, increases inconsistencies

Caution! Consistency alone doesn’t improve accuracy! You can be inaccurate by a consistent amount
Bandwagon Effect

- **Bandwagon Effect**: The probability of one person adopting a belief increases based on the number already holding that belief...

- Easy to ignore outlier view when groupthink sets in
  - Outlier may have more information than “Group”

- Tendency to structure data to fit a preconception

- Tendency to drive to consensus too soon
  - Need to ensure all facts are on the table
Slaying the Dragons

Un-addressed Cognitive Bias

inherent tendency to favor a particular outcome

A few ways to manage bias in the risk management process

• Confirmation Bias
  • Intentionally list credible counter-arguments to prevailing POV

• Anchoring or Focalism
  • When determining risk ratings, first think of the credible best case and worse case probabilities and consequences,
    • then considering the most likely impact within the range...

• Availability Heuristic
  • Verify “lesson learned” had the intended result before repeating
Slaying the Dragons

Systemic Overconfidence

Counter Overconfidence by:

• Getting Calibrated!
  • Test your Confidence Bias
  • Practice your ability to estimate ranges
    • Even estimating trivia can lead to improvement*

• Monitor your own estimating performance
  • Take actions to improve, --- what caused the errors, how can you be more accurate in the future?

• Consider tracking your group’s estimating performance
  • Work together to improve estimating

*The Failure of Risk Management, D. Hubbard
Illusions of Communication

Banish the illusions and start to really communicate

- Understand your PM/PEO/MDA’s risk tolerance
  - Ensure risks are to objectives/rqmts not “desirements”
- Use “calibrated” estimators to quantify risk rating ranges
- Whenever possible, use Monte Carlo analysis on impacts
  - Ensure rating is consistent with analysis results!
- Use AF Standard Rating Criteria* to ensure rating consistency and control perception bias
- Communicate which risk(s) with level 5 consequence has highest impact… not always a High (Red) risk
- Don’t forget the importance of handling plans

* IAW AFI 63-101/20-101 9 May 17, use of the AF std rating criteria is an inspect-able item
Random Inconsistencies

Reduce Random Inconsistencies by:

- Following Standard processes such as:
  - Evaluate risk handling plans for effectiveness
    - Ensure activities support claimed risk reductions
  - Use Std rating criteria when rating estimates
    - No perception rating… “Oh, that’s a High risk!”
  - Avoid doing parts of the processes, requiring the most consistency at the end of a long meeting
    Ex. Risk rating in the 7th hr of an 8 hr workshop to “get it done!”

Caution! Consistency alone doesn’t improve accuracy!
You can be inaccurate AND consistent!
Bandwagon Effect

Counter Bandwagon effect by:

- Keeping the group at a manageable size
- Focus on risks that matter rather than trivial
- Engage diverse experiences; avoid “yes” people
- Avoid beginning with a desired outcome
- Accept conflict and devil’s advocacy as the norm, and understand why dissenters disagree
In God We Trust. All others must have supporting data.

VADM James H Webber
Chief Engineer of the Navy
1986
Using AF Rating Standards now Inspect-able Item

• No Change to AF Std Risk Matrix, Rating Criteria
  • Details relocated to attachment 3 of AFI 63-101/20-101
  • MDA may approve program tailored rating criteria
    • If PM determines Std risk criteria not appropriate for program
    • Documented criteria approved in Acquisition Strategy or ADM
    • Best Practice: Ensure brief recipients knows rating criteria used
    • Best Practice: Make magnitude of impacts compatible to AF Stds
      • Can Skew 5x5 matrix compared to AF Std criteria
  • More Areas to be covered/considered in Risk Mgmt Plan
    • Ex. Human-System Integration, IT, Acquisition Security, Threat
  • Also Inspect-able –
    • Mechanism to track/archive all risks & handling plans
      • See AFLCMC Risk & Issue Mgmt Process Std for tracking standard

Using AF Rating Criteria is an Inspect-able Item; Ensure any tailoring is supported by document approval trail
Standard processes are approved by the Standards & Process (S&P) Board and their use is mandatory; process guides are approved by process owners (normally functional directors) and, while not mandatory, should be used to ensure greater standardization across the Center.

Risk and Issue Management is Standard Process reference # A06
Ground Rules

• Does not cover non-Acquisition Risk Management (AFI 90-802) formerly known as Operational Risk Management

• Does not cover the identification and analysis of risk performed in Developmental Planning, Capability Determination or Analysis of Alternatives

• Honors previous AFLCMC and ASC Leadership decisions unless identified to S&P Board - Changes
  – PM review: was monthly, now quarterly & bi-annual deep dive
  – Enterprise Risk Management Service (ERMS) waiver process IAW prior AFLCMC/CV direction to allow “grandfathering”
    • SAF/AQ actions may drive revisit in future (ERMS for upward reports)
  – Covers Annual Integrated Risk Assessment in lieu of Memo
    • Quantification of risks, Monte Carlo of impacts to Schedule and Cost
    • Not required for Contractor logistic Support, Service Contracts, or similar
• AFLCMC Risk and Issue Management (RIM) in Acquisition Programs
  – Common acquisition process for all PEOs in AFLCMC

• AFLCMC RIM Process Std includes expanded implementation direction in selected areas:
  – Issue Management
    • 100% probability of occurring or realized risk
    • Uses “top row” of Risk Matrix to “rate” issues
    • Consequence ratings same as Risk
  – Requirement to use Std risk tracking tool, ERMS
  – Integrated Risk Assessment policy
  – More descriptive roles and responsibilities
RM training Opportunities

  - Quarterly Focus Week RIM training  WPAFB and DCO
  - RIM DCO in conjunction with  PM Boot Camp

- AFIT Life Cycle Risk Management Course, Web-based
- AFIT Life Cycle Risk Management Course, SYS 208
  - 3 day in residence class

- Program/ directorate tailored training, as available

- JIT Risk Workshop Training for Pre-award Teams
  - Contact your local  ACE
Recap: Slaying the Dragons

Un-addressed Cognitive Bias
- Be aware of bias in yourself, co-workers, groups
- Learn techniques to manage bias in your area of responsibility

Systemic Overconfidence
- Recognize bias toward under-estimating probability of risk
- Calibrate the estimators…Track yourself, learn from mistakes

Illusions of Communication
- Ensure AF Std Rating Criteria is used, if NOT, brief criteria used
- Quantify Risks – Don’t assume the 5X5 matrix tells the story

Random Inconsistencies
- Beware of the fatigue factor
- When Rating risk, constantly refer to the criteria

Placebo Effect of Rating
- Quantify Risks – Don’t assume the 5X5 matrix tells the story
- Use Monte Carlo Analysis of schedule and cost risk
Questions?

“An investment said to have an 80% chance of success sounds far more attractive than one with a 20% chance of failure. The mind can't easily recognize that they are the same.” D. Kahneman

“A reliable way to make people believe in falsehoods is frequent repetition, because familiarity is not easily distinguished from truth. Authoritarian institutions and marketers have always known this fact.” D. Kahneman

True intuitive expertise is learned from prolonged experience with good feedback on mistakes. D. Kahneman

A plan is only a scenario, and almost by definition, it is optimistic... As a result, scenario planning can lead to a serious underestimate of the risk of failure. D. Kahneman

The illusion that we understand the past fosters overconfidence in our ability to predict the future. D. Kahneman
“Most of us are systematically over confident and will tend to underestimate uncertainty and risks” D. Hubbard

“Part of the desire to include opportunities and benefits in risk analysis and risk management can be traced to lack familiarity with the field that already includes those things, Decision analysis (DA).” D. Hubbard
References

• DODI 5000.02, Operation of the Defense Acquisition System, 25 Nov 13
• Risk, Opportunity, Issue Management Guide for DOD Acquisition, Jun 15
• AFPAM 63-128, Integrated Life Cycle Management, 10 Jul 14
• AFLCMC Risk and Issue Management (RIM) in Acquisition Process Std, 17 Nov 2016
• DI-MGMT-81808, Contractor Risk Management Plans
• DI-MGMT-81809, Contractor Risk Management Status Reports
• MIL-STD 882E, System Safety, 11 May 12
ACE SharePoint Site

AFLCMC... Providing the Warfighter’s Edge

Acquisition Center of Excellence (ACE)

Mission
The ACE mission is to provide expert advice and hands-on assistance to the acquisition workforce and leadership to instill credibility, excellence and innovation in the Air Force Acquisition and Sustainment process.

Vision
The champions for innovating/accelerating acquisition.

ACE Tools
- EZ Source Electronic Source Selection Tool
- Probability/Consequence Screening (P/CS) Tool
- ACE Lessons Learned Library

New Information
- SAP - Acquisition Process Model (APM) Memo - 11 Sep 16
- Acquisition Process Model (APM) Familiarization Training
- CSAP Revision to AF 63-101/20-101
- Risks Selection Procedures/Updated AF Mandatory Procedures Briefing
- Life Cycle Sustainment Plan (LCSP) Process Overview - Jun 16
- PCC Delegation Memo - 14 Apr 16
- SVM Program Manager’s Desk Guide - 6 Mar 16
- Implementation Guide - 5 Feb 16
- Acquisition Authorities Matrix - Jan 16

AFLCMC Standard Processes
- Acquisition Strategy and RFP Development (7 Mar 2016)
- Contractor Bill (Source Selection) (17 Apr 2015)
- Contract Award (Cost Source) (26 Feb 2015)
- Risk and Issue Management (RIM) in Acquisition Programs (17 Nov 2016)
- Should Cost Initiatives (1 Mar 2016)

AFLCMC Process Guides
- Schedule Management Fundamentals (17 Feb 2016)
- Schedule Analysis Basics (28 Feb 2016)
- Program Sufficiency Review (PSR) (9 Mar 2016)

Risk Information

ACE Training Catalog

ACE CONOPS

Competitive Gameboard

Sole Source Gameboard

Risk Information
Pre-Award Risk Management

• Pre-Award risk ID and handling should:
  – Shape you RFP
  – Influence the contract type
  – Help establish business practices
  – Influence source selection process
    • Lead you to “discriminators”

• Goal of pre-award risk assessment is NOT:
  – Creating a risk matrix for the ASP briefing
  – Identifying just risks to getting on contract

Pre-Award Risk ID and handling are elements of long-range planning
Post-Award Risk Management

- Post-Award assessments ID emerging risks
  - Systematically and continuously
  - Technical and program reviews
  - Relevant to upcoming program phases
- Integrated Risk Assessment
  - IDs emerging risks and re-assesses current risks
  - Collect sufficient data for statistical analyses
  - Analyze impacts of risks on Schedule and Costs
    - Monte Carlo analysis provides “confidence levels”
    - Potentially impacts program cost/schedule allocations
### Probability & Consequence

**Probability** of each risk occurring defined in levels, percentage bands and/or likelihood

- Assess the “IF” phrase

<table>
<thead>
<tr>
<th>Level</th>
<th>Probability of Occurrence</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>81 – 99 %</td>
<td>Near Certainty</td>
</tr>
<tr>
<td>4</td>
<td>61 – 80 %</td>
<td>Highly Likely</td>
</tr>
<tr>
<td>3</td>
<td>41 – 60 %</td>
<td>Likely</td>
</tr>
<tr>
<td>2</td>
<td>21 – 40 %</td>
<td>Low Likelihood</td>
</tr>
<tr>
<td>1</td>
<td>5 – 20 %</td>
<td>Not Likely</td>
</tr>
</tbody>
</table>

**Consequence:** Effect on program if risk becomes a reality
- Rate Impact of “then” phrase.
- Each risk assessed for impact in performance, cost, and/or schedule according to the AF Stds

### AF Stds for Probability, Consequence Rating of Performance, Cost, & Schedule*

* IAW AFI 63-101/20-101, May 17, para 4.6.1.1 and Attachment 3. See back-up slides for AF Std acquisition program criteria rating.
<table>
<thead>
<tr>
<th>Level</th>
<th>Standard AF Consequence - Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Minimal consequence to technical performance or supportability but no overall impact to the program success. A successful outcome is not dependent on this issue; the technical performance goals or technical design margins will still be met.</td>
</tr>
<tr>
<td>2</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td>Minor reduction in technical performance or supportability, can be tolerated with little impact on program success. Technical performance will be below the goal or technical design margins will be reduced, but within acceptable limits.</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate shortfall in technical performance or supportability with limited impact on program success. Technical performance will be below the goal, but approaching unacceptable limits; or, technical design margins are significantly reduced and jeopardize achieving the system performance threshold values.</td>
</tr>
<tr>
<td>4</td>
<td>Serious</td>
</tr>
<tr>
<td></td>
<td>Significant degradation in technical performance or major shortfall in supportability with a moderate impact on program success. Technical performance is unacceptably below the goal; or, no technical design margins available and system performance will be below threshold values.</td>
</tr>
<tr>
<td>5</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>Severe degradation in technical performance or supportability; will jeopardize program success; or will cause one of the triggers listed below (Note 1 – next slide)</td>
</tr>
</tbody>
</table>
Note 1: Any root cause that, when evaluated by the cross-functional team, has a likelihood of generating one of the following consequences is rated at Consequence Level 5 in Performance:

- Will not meet Key Performance Parameter (KPP) Threshold
- Critical Technology Element (CTE) will not be at Technology Readiness Level (TRL) 4 at MS/ A
- CTE will not be at TRL 6 at MS/ B
- CTE will not be at TRL 7 at MS/ C
- CTE will not be at TRL 8 at the Full-rate Production Decision point
- Manufacturing Readiness Level (MRL)* will not be at 8 by MS C
- MRL* will not be at 9 by Full-rate Production Decision point
- System availability threshold will not be met

* MRLs will be calculated in accordance with the DoD Manufacturing Readiness Assessment Deskbook.
<table>
<thead>
<tr>
<th>Level</th>
<th>Standard AF Consequence - Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Negligible program or project schedule slip</td>
</tr>
</tbody>
</table>
| **2** | Schedule slip, but:  
Able to meet milestone dates (e.g. A, B, and C) and other key dates (e.g. CDR, FRP, FOC);  
Does not significantly decrease program total float and  
Does not impact the critical path to program or project completion date |
| **3** | Schedule slip that requires closely monitoring the schedule due to the following:  
Impacting the ability, but still able to meet milestone dates (e.g. A, B, and C) and/or other key dates (e.g. CDR, FRP, FOC)  
Significantly decreasing program total float  
Impacting the critical path to program or project completion date |
| **4** | Schedule slip that requires schedule changes due to the following:*  
Significantly impacting the ability to meet milestone dates (e.g. A, B, and C) and/or other key dates (e.g. CDR, FRP, FOC)  
Significantly impacting the ability to meet the program or project completion date. |
| **5** | Schedule slip that requires a major schedule re-baselining due to the following:*  
Failing to meet milestone dates (e.g. A, B, & C) and/or other key dates (e.g. CDR, FRP, FOC)  
Failing to meet the program or project completion date. |

* Exhibit awareness to exceeding Nunn-McCurdy threshold breach for schedule.  
**Note:** Impact varies based on 1) The schedule slip relative to the remaining duration in the program or major milestones; amount of remaining time to work-around the impact; 2) The impact of the slip with respect to key resources.
<table>
<thead>
<tr>
<th>Level</th>
<th>Standard AF Consequence - Cost (A-B refers to MS/KDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Negligible</strong></td>
</tr>
<tr>
<td></td>
<td><strong>For A-B Programs</strong>: &lt;1% increase from MS A or last approved Development or Production cost estimate.**</td>
</tr>
<tr>
<td></td>
<td><strong>For Post-B &amp; Other Programs</strong>: &lt;1% increase from MS A or last approved Development or Production cost estimate.**</td>
</tr>
<tr>
<td>2</td>
<td><strong>Minor</strong></td>
</tr>
<tr>
<td></td>
<td><strong>For A-B Programs</strong>: 1% to &lt;3% increase from MS A or last approved Development or Production cost estimate.**</td>
</tr>
<tr>
<td></td>
<td><strong>For Post-B &amp; Other Programs</strong>: 1% to &lt;3% increase from MS A or last approved Development or Production cost estimate.**</td>
</tr>
<tr>
<td>3</td>
<td><strong>Moderate</strong></td>
</tr>
<tr>
<td></td>
<td><strong>For A-B Programs</strong>: 3% to &lt;5% increase from MS A or last approved Development or Production cost estimate.**</td>
</tr>
<tr>
<td></td>
<td><strong>For Post-B &amp; Other Programs</strong>: 3% to &lt;5% increase in Development or &gt;1.5% increase to Program Acquisition Unit Cost (PAUC) or Average Unit Procurement Cost (APUC) from last approved baseline estimate or &gt;3% increase to PAUC or APUC from original baseline. (1/10 of Nunn-McCurdy ‘significant’ breach).**</td>
</tr>
<tr>
<td>4</td>
<td><strong>Serious</strong></td>
</tr>
<tr>
<td></td>
<td><strong>For A-B Programs</strong>: 5% to &lt;10% increase from MS A or last approved Development or Production cost estimate.**</td>
</tr>
<tr>
<td></td>
<td><strong>For Post-B &amp; Other Programs</strong>: 5% to &lt;10% increase in Development or &gt;3% increase to PAUC or APUC from last approved baseline estimate or &gt;6% increase to PAUC or APUC from original baseline. (1/5 of Nunn-McCurdy ‘significant’ breach).**</td>
</tr>
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<td><strong>Critical</strong></td>
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</tr>
</tbody>
</table>
MIL-STD-882E Identified Risks

Must be included in your risk management and reporting

- Per AFI 63-101/20-101, Risks identified using MIL-STD-882E system safety methodology shall be translated to the standard 5X5 matrix

MIL-STD-882E now has environmental risk mgmt tasks and tighter ESOH integration. Contact AFLCMC/WNVV for more information.