Risk Workshop Overview

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CONTENTS:

1. Overview
2. ESUA
3. TPRA
4. Risk Item Identification and Management Process
Three Related Programs

1. Estimate and Schedule Uncertainty Analysis - documents the project planners’ and estimators’ degree of uncertainty with the estimate and schedule. This report also establishes a recommendation for Management Reserve at the 85% confidence level for the MOX Project Manager to mitigate cost and schedule issues during project execution that could not be precisely defined during the planning and estimated phase.

2. Technical and Programmatic Risk Analysis - evaluates potential project risks (both cost and schedule), factoring in the likelihood and consequence of each potential risk event, and suggests a contingency budget at the 85% confidence level.

3. Risk Management - manages identified Risk Events throughout the project lifecycle so that there is a minimal and acceptable impact on the cost, schedule, construction, engineering, and operational performance.
DCS Management Reserve for Estimate/Schedule Uncertainty

Impacts due to Uncertainties in Estimating/Scheduling Defined Work Scope

- Evaluation of uncertain issues effect on Integrated Project Schedule (IPS) & Option 1 Contract Budget Base (CBB) Estimate
  - Monte Carlo analysis of cumulative Cost Impact to CBB
  - Monte Carlo analysis of cumulative Schedule Impact to IPS
  - Uncertainty Impacts added to CBB Estimate and IPS to achieve 85% LOC in CBB/IPS

DOE Contingency Allowance for Technical & Programmatic Risk Analysis (T&PRA)

Impacts due to Potential Discrete Risk Events

- Evaluation of discrete risk events to determine individual Cost and Schedule Impact
  - Monte Carlo analysis of cumulative Cost impact to Total Project Costs (TPC)
  - Monte Carlo analysis of cumulative Schedule Impact to IPS
  - Recommendation to DOE on T&PRA Contingency Allowance to achieve 85% LOC in TPC/IPS

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• Control Accounts Created for WBS
  - Element Definitions
  - BOEs
• Uncertainty Categories Assigned
  - Justification Forms with BOEs
  - Standard Ranges
• Monte Carlo Cost Simulation
  - Converge at 85% Confidence
  - Record Cost Uncertainty
• Monte Carlo Simulation on Schedule Durations
  - Converge at 85%
  - Convert Duration Uncertainty to Hotel Load.
• Sum Cost Uncertainty and Hotel Load
  - Sum equals MR Recommendation
• Control Account Managers create the Element Definitions for the Control Account’s Scope of Work.

• Control Accounts may be further detailed to Work Packages if detail is required to clarify levels of uncertainty.
The Estimate of Cost and Duration is based on Historical Data, Documented Experience, Parametric Calculations, or Vendor Quotes.

Estimates must be well documented with assumptions to support validations.

Basis-of-Estimates are attached to the Element Definitions of Scope and are part of the controlled Baseline.
• Control Account Managers are responsible for establishing the Uncertainty Category for each Control Account or Work Package.

• Each Control Account is identified as a Definitive (D), Budget (B) or Conceptual (C) estimate. In some cases the uncertainty category may be assigned an “X” classification to allow the CAM to expand the range based on Vendor or supplier data.
• The Uncertainty Data from the Control Account ESUA Forms is analyzed in a Monte Carlo Simulation. Each Estimate categorized for its uncertainty is represented by a triangulated range and calculated to an 85% Confidence level.

• Uncertainty ranges input to the Simulation software are

(D) Definitive  -5% to + 15%
(B) Budget      -15% to + 30%
(C) Conceptual  -30% to + 50%
(X) User Defined (Range based on Vendor Quotes)
• The Schedule Monte Carlo analysis is loaded in PertMaster from the ESUA database.

• The uncertainties and the associated consequences are logically tied to the baseline activities creating a PertMaster modified model of the Project Schedule.

• The schedule slip is used to calculate the proposed MR for Schedule ESUA.
To establish the overall recommendation for MR value, the @Risk Monte Carlo Cost Value and the PertMaster Monte Carlo 85 % Level of Confidence Schedule Value are summed.
TPRA Analysis using the PertMaster
RISK MANAGEMENT PROCESS

- Schedule Review
  - Risk Ready State
  - Review for logic & errors
- Risk Identification
  - Estimate Uncertainty
  - Risk Events: Risk Register
- Develop Preliminary Risk Model
  - Enter Estimate Uncertainty
  - Map Risks to Activities
- Preliminary Analysis & Review
  - Impacted Risk Plan
  - Monte Carlo simulation
- Final Model & Report
  - Risk Event plan
  - Response planning

Based on: PMBOK Chapter 11
Schedule Check
- Checks for Schedule Best Practices
- Remember...”Not Everything has to be Perfect”
- Don’t delete Problem Activities...Defeats the Purpose!

Pre-Analysis Check
- Not all Schedule Issues will be identified by Schedule Check
- The Pre-Analysis Run will check Duration, Criticality and Relative Duration to Project
Estimate Uncertainties
- Identify “Risky” Areas of the Project
- Focus on the Critical Path and High Risk Activities.
- Decide if risk is based on Project Phase, Area of Work, Contractor.
- Document Assumptions, Corrective Actions, and Mitigations.

Create a Risk Register
- Document Risk and Modify as Necessary.
- Identify Risk Item Owners and a Tracking/Reporting System.
Developing a Risk Model requires an application of the data collected in the previous step run through a calculating tool.

Estimate Schedule Uncertainty Applied from ESUA in PertMaster
- Import Schedule Data.
- Review Task Detail and Correct if Necessary.
- Establish Correlation between Activities or Groups of Activities.

Update Risk Index
- For each Risk, Qualitatively Assess Probability, Schedule Impact, Cost Impact and Performance Impact.
- Map each Risk to specific tasks.
- Triangulate the Cost and Schedule Quantitative Impacts.
Build the Impacted Plan

- Each Risk Item is added to the Model as a “Task”
- Run the Analysis
- View the Results
- Re-work the Plan

Add Mitigation Plan from Risk Index to Model

- Re-run the plan
- Save the Pre- and Post-mitigation plans
Risk Reporting

Options Dependent on Customer

Schedule Comparison

Deterministic Bar

85% Probabilistic

S-Curves

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Monte Carlo

- Range forms an “Envelope”
- One Value each Iteration
- Random Simulation of Durations

Iterations

1  10 Days
2  9  Days
3  14 Days
4  17 Days
5  10 Days
6  14 Days
7  21 Days
8  13 Days
9  3  Days
10 7  Days
11 18 Days
12 20 Days
13 etc

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Monte Carlo Simulation

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Estimate Uncertainty (ESUA)

- Based on a model of “3-Point Estimate”
- Monte Carlo Simulation

Risk Events (TPRA)

- Creates a Registry of Risk Items
- Assign Probability and Impact Values in a Matrix

Risk Mitigation

- Action to reduce the impact of the Risk
- Establishes Contingency

Estimate Uncertainty + Risk Event - Mitigation = Total Risk Exposure
Technical and Programmatic Risk Management Process

- Identify Risk
  - Brainstorming Sessions with SMEs
  - Documenting Risk Items in Database

- Analyze Risk
  - Evaluate Potential of Risk Occurrence
  - Identify Impact Points in Schedule
  - Identify Owners and Stakeholders

- Qualify Risk (Low, Medium, High)
  - Establish Probability of Occurrence
  - Establish Cost and Schedule Impact Ranges
  - Load Risk into Registry and Calculate Risk Score

- Quantify Risk
  - Establish Potential Cost of Risk Impact (pre-Mitigation)
  - Establish Potential Schedule Impact (pre-mitigation)

- Decide Handling Strategy
  - Accept - Plan as part of PMB
  - Avoid - Plan action required an include in PMB
  - Mitigate (Reduce) - Decide when to take action and when to include action in PMB.
  - Transfer - Concurrency with new Owner
  - Re-Quantify Impacts based on Handling Cost and Actions (post-mitigation)

- Monitor and status
  - Update Quarterly or if action occurs
  - Use of Risk Item Change Form
  - Quarterly Reporting from IRMC
# MOX Services Brainstorming Form

<table>
<thead>
<tr>
<th>Date:</th>
<th>Organization:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of person identifying potential risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of risk:</th>
<th>external</th>
<th>commercial</th>
<th>technical</th>
<th>management</th>
<th>project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title of potential risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What is the normal situation for the element containing the risk? (How would the element function under normal circumstances?):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What could happen that would adversely or positively affect the normal situation? (What is the potential risk?):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What impact could the risk have on the normal element operating parameters?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What can be done to handle the potential risk?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If this brainstorm item should not be evaluated as a risk, please supply the justification below.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
## MOX Services Risk Assessment Form

Submit concurrently with Risk BCE Form PR-71

| Category | Name | Description | Technical | Management | Project | Planned Start | Planned End | Actual Start | Actual End | Impact | Probability | Impact | Risk Value | Score | Overall Risk Score |
|----------|------|-------------|-----------|------------|---------|--------------|-------------|-------------|-------------|-----------|-------|-------------|-------|-------------|-------|-------------------|
| Threat   |      |             |           |            |         |              |             |             |             |          |     | Low         | High | Medium Low | High | Medium High |
| Opportunity |   |             |           |            |         |              |             |             |             |          |     | High        | Low  | Medium High | High | Medium High |

### Risk Details

- **Risk Description**: (Provide specific details of the risk)
- **Impact of the Key**: (Specify the impact of the risk)
- **Risk Start Date / Event**: (Enter the date or event)
- **Risk Mitigation / Strategy**: (Describe the steps taken to mitigate the risk)
- **Risk Mitigation Status**: (Check the status of the risk mitigation)
- **Risk Mitigation Schedule**: (Specify the mitigation schedule)

### Risk Rating

<table>
<thead>
<tr>
<th>Rating</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Value</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Overall Risk Score**: (Enter the overall risk score)

### Total Potential Cost Impact

**Total Potential Schedule Impact**

### Risk Response Plan

<table>
<thead>
<tr>
<th>Post / Response</th>
<th>Risk</th>
<th>Impact</th>
<th>Likelihood</th>
<th>Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Overall Risk Score**: (Enter the overall risk score)

### Expected Cost and Schedule Impact Post Response

<table>
<thead>
<tr>
<th>Best Case</th>
<th>Most Likely</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Schedule</td>
<td></td>
</tr>
</tbody>
</table>

- **Risk Value**: (Enter the risk value)

### Evaluation Comments

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<table>
<thead>
<tr>
<th>Risk Item Basis of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk ID:</strong></td>
</tr>
<tr>
<td><strong>Title:</strong></td>
</tr>
<tr>
<td><strong>Owner:</strong></td>
</tr>
<tr>
<td><strong>Date Prepared:</strong></td>
</tr>
</tbody>
</table>

**If no action is taken:**

<table>
<thead>
<tr>
<th><strong>Potential Cost Impact:</strong></th>
<th>(provide explanation/breakdown of potential cost impact)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Potential Schedule Impact:</strong></td>
<td>(provide explanation/breakdown of potential schedule impact)</td>
</tr>
</tbody>
</table>

**Risk Response Plan:**

(details)

<table>
<thead>
<tr>
<th><strong>Cost to implement plan:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schedule impact to implement plan:</strong></td>
</tr>
</tbody>
</table>

**After plan implementation:**

<table>
<thead>
<tr>
<th><strong>Expected Cost Impact:</strong></th>
<th>(provide explanation/breakdown of expected impact including best case, most likely and worst case)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected Schedule Impact:</strong></td>
<td>(provide explanation/breakdown of expected impact including best case, most likely and worst case)</td>
</tr>
</tbody>
</table>

## Risk Comparisons

<table>
<thead>
<tr>
<th>DOE Risks Characteristics</th>
<th>Non-DOE Risk Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identified During Planning Phase and through Implementation</td>
<td>Identified during Early Project Initiation and Definition Phase and through implementation</td>
</tr>
<tr>
<td>May include Threats and Opportunities</td>
<td>Only include Threats! Opportunities are BD responsibilities.</td>
</tr>
<tr>
<td>Impact must be qualified in pre-mitigation.</td>
<td>If impact is considered “low”, no further action required. Treated as an “Assumption”.</td>
</tr>
<tr>
<td>Handling strategies include avoidance, acceptance and mitigation.</td>
<td>Any handling of the risk is for mitigation. Acceptance is considered “paying to mitigate”.</td>
</tr>
<tr>
<td>Typical Risk Matrix is 3X3 or 5X5</td>
<td>Matrix may be 9X9 to include impacts on customers or public.</td>
</tr>
<tr>
<td>Risk Management is tied to Standard Guidelines.</td>
<td>Risk Programs are developed by the Project Steering Committee based on Project Complexity.</td>
</tr>
</tbody>
</table>
Non-DOE RI SK Process

1. Identify Potential Risks
2. List/Add Risk to Log
3. Is Risk High?
   - Add to Project Records and Status Monthly
   - Monitor and Review
4. Complete a Risk Form
   - Mitigation Requires new Project
   - Submit to Project Office
RISK Handling

Risk Identified as:

- Business (financial, legal, Market, Political)
- Process (Procedural)
- Project (technical)

Risks are Ranked by Probability and Impact (Qualified)

- Only High Scored Risks have Mitigation Plans
- All Risk are Periodically Reviewed for Score Changes

HIGH RISKS are Classified as “Unacceptable” and must be mitigated to lower score before Project can proceed

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RISK Impact

- Not Calculated against the schedule.
- Consequences not quantified unless they effect the business decision.
- Any Risk that becomes a reality must be mitigated.
- **Acceptance** is considered “mitigation” if it does not delay the project.
- Documented Risks are used to justify “Change Orders”.

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