Affordable Readiness Model
(formerly Lifecycle Management Cost Optimizer)

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Agenda

• The Cost Modeling Challenge
• ARM model Methodology
• F-22 Supply Chain Comparative Analysis Example
• Summary
The Challenge

• DoD’s increasing emphasis on sustainment costs
• DoD lacks key information and cost visibility necessary to produce life-cycle O&S cost estimates and baselines
  – GAO-10-717: O&S Cost Analysis Inadequate
  – CAPE Report to Congress August 2010 re O&S baselines
• Weakness of the static point estimate approach
  – Reliant on bounded ground rules and assumptions; easily biased
  – Generates unrealistic expectations
• Need for dynamic capability reflecting range estimates and impact on operational performance
What will be the Life Cycle Cost of the X-45B Tactical Fighter Aircraft?

Which estimate would be a more accurate early planning and decision support foundation?

This?

EXACTLY $15.875B

Or This?

$16.935 Billion

80% Confidence Level

$13.220 Billion

Sensitivity Factors

- Life span
- Peacetime vs. Contingency use
- Mission profile
- OPTEMPO
- Technology change
- Funding availability
ARM Example Application

F-22 Supply Chain Comparative Assessment

1. FASTeR Partnership (*Follow-on Agile Sustainment for the Raptor*)
   - Lockheed Martin managed supply chain
   - Government hands-on depot MRO

2. Government managed Supply Chain
   - Government-managed supply chain
   - Government hands-on depot MRO
The Analytic Methodology

1. Identify & Define the Relevant Operational Outcomes
2. Identify & Define the Factors that Influence the Outcomes
3. Develop Representative Decision Support Interface
4. Create a Map of Processes That Impact Outcomes
5. Develop Discrete Event Simulation Populated With Distributions
6. Run the Simulation Multiple Times Across the Range of Input Factors to Capture Uncertainty Ranges
7. Validate the Simulation Outputs
8. Populate Decision Support Interface enabling comparison of alternatives against operational outcomes under various user defined ranges of input factors.
## Input Factors

### Critical Driving Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Mean Flight Time Between Critical Failure</td>
<td>4 hours</td>
</tr>
<tr>
<td>Sortie Time</td>
<td>90 minutes</td>
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<tr>
<td>Ground Turn Around Time</td>
<td>3 hours</td>
</tr>
<tr>
<td>Steady State Monthly Flight Hours</td>
<td>3500</td>
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<tr>
<td>Years of Program</td>
<td>25</td>
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<tr>
<td>FASTeR Reliability Improvement Toggle</td>
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<table>
<thead>
<tr>
<th>Factor</th>
<th>FASTeR Partnership</th>
<th>Government</th>
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<tbody>
<tr>
<td>DLR Repair Total Cycle Time (days)</td>
<td>55</td>
<td>120</td>
</tr>
<tr>
<td>Initial Inventory Investment (Billions $)</td>
<td>1.4</td>
<td>1.4</td>
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<table>
<thead>
<tr>
<th>Factor</th>
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<tbody>
<tr>
<td>NMCS Engine Parts (%)</td>
<td>1</td>
</tr>
<tr>
<td>NMCS DLA Parts (%)</td>
<td>1</td>
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<table>
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<tbody>
<tr>
<td>Depot Status (%)</td>
<td>8</td>
</tr>
<tr>
<td>Unit Possessed/Not Reported Status (%)</td>
<td>6</td>
</tr>
<tr>
<td>Maintenance Duration (days)</td>
<td>2</td>
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</table>
Outcomes

Critical Outcomes

NOTE: Outcomes are portrayed as range vice point values; the tighter the range, the higher the confidence level around the values.
Scenario 1: Equal Inventory Investment

FASTeR RTAT of 55 days vs. Govt. RTAT of 120 days...
results in a higher probability of achieving desired Operational Availability
Scenario 2: Add’l Inventory Investment

Raising Government Inventory investment to $2.9B achieves ~comparable Operational Availability outcomes.
Scenario 3: Reliability Growth

The F-22 “Program of Record” includes a reliability growth program to reduce MFHBME from ~7 hours to ~4 hours.
Scenario 2: Reliability Improvement Toggle

Reliability Improvement program achieves 70.6% target Ao
Summary

- Dynamic decision support capability
- Shows impact on operational and cost outcomes
- Enables interactive sensitivity analysis for “what if” scenarios
- Accommodates “real world” potential scenarios
- A critical tool in the analysis toolbox
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