

NATIONAL RECONNAISSANCE OFFICE

Cost Estimation and Earned Value Integration

Presented to
2013 ICEAA EVM Track

New Orleans, LA



SUPRA ET ULTRA



NRO Acquisition Environment

- ✦ The National Reconnaissance Office (NRO) is the national program to meet the U.S. Government's intelligence needs through space borne reconnaissance

- ✦ Cost and Acquisition Assessment Group (CAAG):
 - ✦ Provides objective, credible cost analysis and information to enable sound acquisition decision making
 - ✦ Provides independent cost analysis and estimates for all major program milestones
 - ✦ Independently assesses and guides programs through NRO's internal acquisition planning and documentation activities
 - ✦ Houses the Earned Value Center of Excellence charged with establishing policy and providing oversight of NRO's earned value management
 - ✦ Participates in external acquisition planning and execution forums



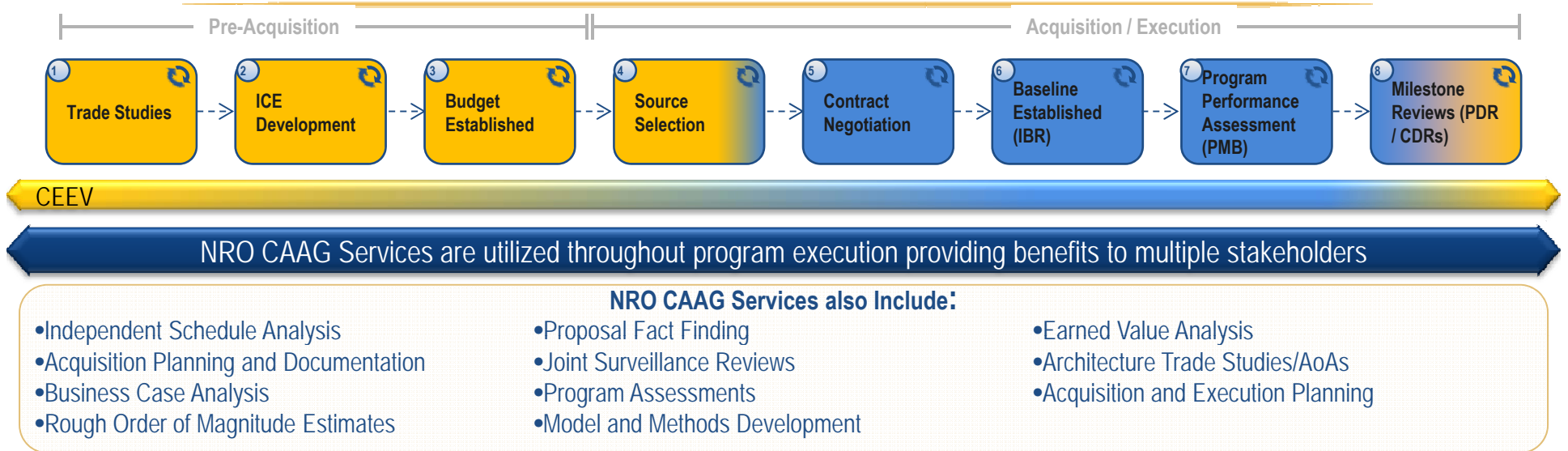


Agenda

- + Why Build Capability?
- + Traditional Approach Verses Integrated Approach
- + Integration Benefits
- + NRO CAAG CE / EV Integration Matrix
- + Successful Integration Outcomes
- + Integration Challenges
- + Reflections & Recommendations



Why Build Capability?



+ Cost Estimation (CE)

- + Provides a prediction of future costs through the process of estimating, budgeting, monitoring, analyzing, developing models and cost estimating relationships (CERs), and forecasting

+ Earned Value Management (EV)

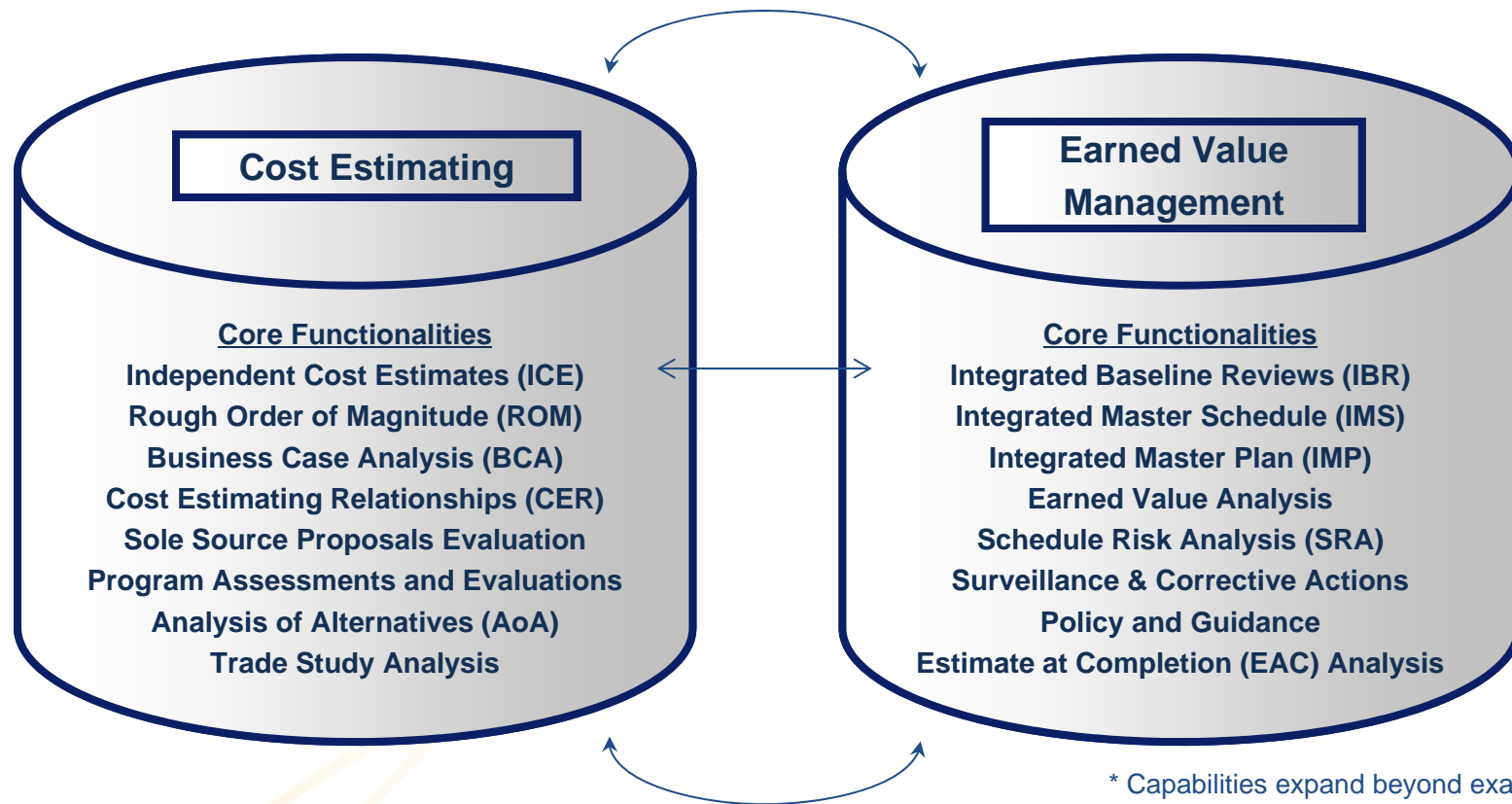
- + Enables the understanding of the program's past and present performance that monitors and influences final cost

- + The NRO CAAG sought out the integration of CE and EV teams to provide the enterprise with historical data-driven models and tools to support all phases of program execution, enhancing acquisition outcomes



CE and EV Management Core Competencies

Traditionally, CE and EV are separate functional disciplines that provide analysis involved at different stages of program lifecycle



... the standardization of the work breakdown structure is pivotal for integrating the two disciplines



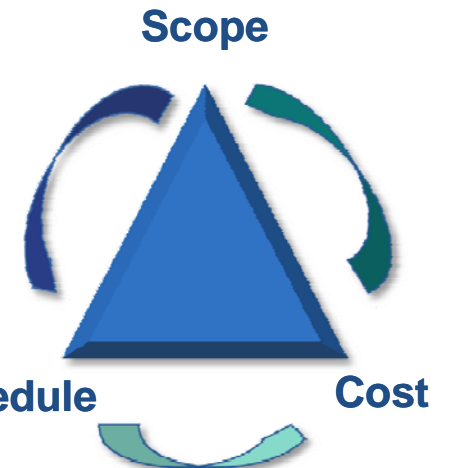
Integration Benefits

+ Space WBS Standardization Benefits

- + Consistent reporting throughout program planning and execution
- + Consistent insight and measurement of program performance across space portfolio
 - + “Apples-Apples” comparisons at various levels and stages
 - + Helps to identify systematic problems
- + Consistent evaluation of proposals and improved “realism” assessments
 - + Improved traceability of Basis of Estimates (BOEs) to historical data
- + Increases visibility into ICEs
 - + Enables reconciliation of estimates between industry and government

+ Cross-Team Benefits

- + Cross-pollinating disciplines creates integrated work-flow, enhances understanding of both core competencies, exposes analysts to relevant but unfamiliar tools and methodologies, and reveals new training opportunities
 - + Cross-functional resources
 - + CE/EV data tools are better equipped to support contract negotiations



Integrating the two capabilities is a rigorous process leading to integrated work products that better serve client needs and program analysis success



NRO CAAG CE / EV Integration Matrix

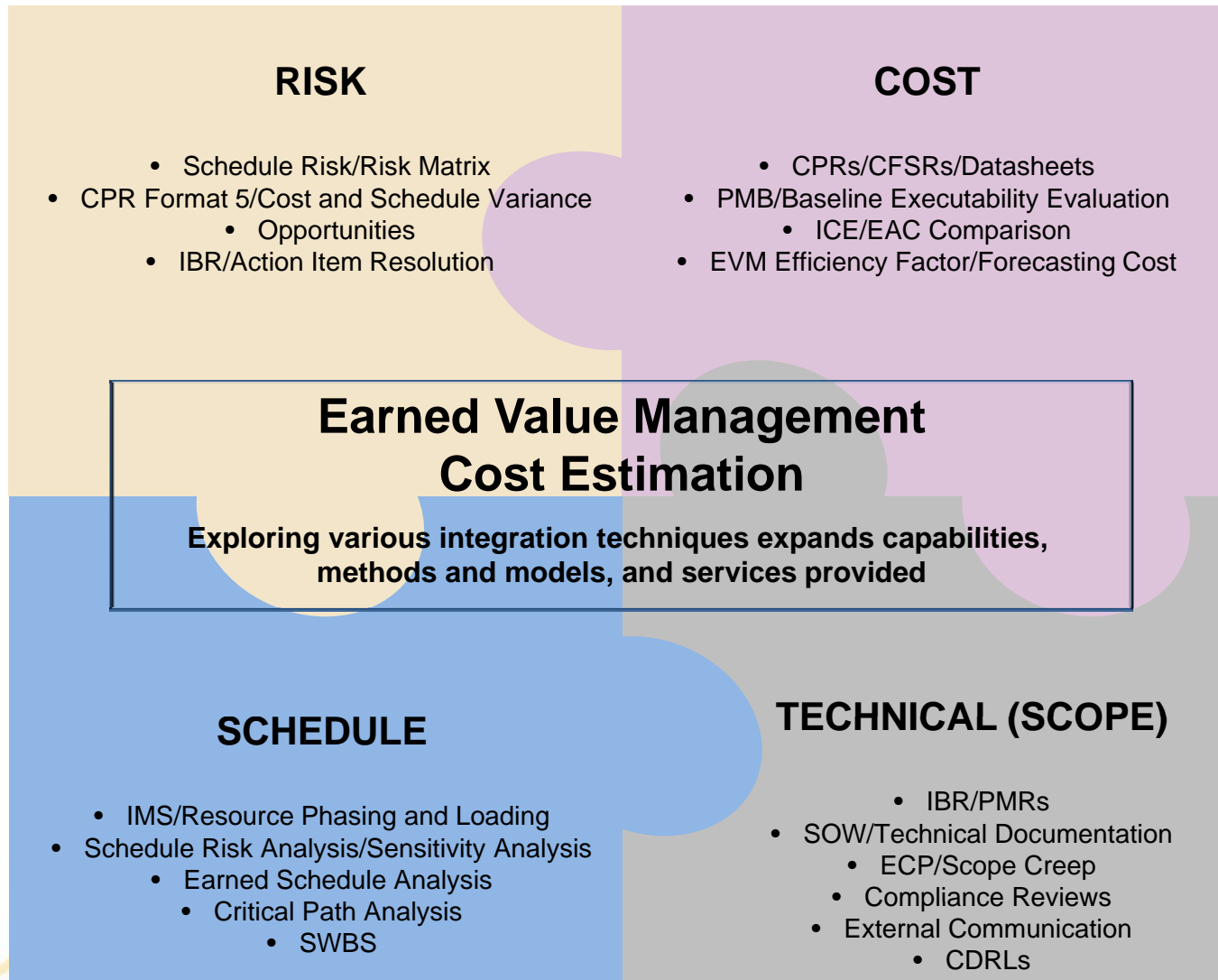
	Earned Value Management	Core Functional Activities	Pre-Acquisition Support (RFP prep)	Post-Award Acquisition Support (e.g. IBR facilitation)	Portfolio Management	Ad Hoc Training	Compliance Evaluation and Surveillance	Schedule Analysis	Baseline Executability Evaluation	Outreach and External Communications	Tool Dev, Maint, and Training	Commercial (w/insight, Risk+, SharePoint, etc.)	Custom (CR, NPAD, Schedule Wizard, Data Validity, etc.)	Data	EVM (CPR, CFR, IMS, IMP, WBS)	Governance	Policy and Guidance
Cost Estimation & Analysis																	
Core Functional Activities																	
Independent Cost Estimates / Agency Cost Positions									✓	✓		✓	✓				
Budget Closure																✓	
Milestone Decisions									✓	✓							
Define Scope and Requirements	✓																
Risk Analysis									✓	✓						✓	
Schedule Analysis									✓	✓						✓	
Rough Order of Magnitude Estimates																	
Business Case Analysis									✓	✓						✓	
Analysis of Alternatives									✓	✓						✓	
Budget Sufficiency Review									✓	✓						✓	
Engineering Change Proposals	✓	✓							✓	✓						✓	
Architecture Trade Studies																	
Proposal & Sole Source Eval Support	✓								✓	✓						✓	
Quarterly Program Reviews									✓	✓						✓	
GEAC Analysis									✓	✓						✓	
External Communications	✓																✓
Methods, Models and Tools																	
CER Development																✓	
Model & Toolkit Development																✓	
SCATTR																✓	
Research and Studies									✓	✓						✓	
Data																	
Ensure contractual requirements included	✓																✓
Data Collection & Normalization																✓	
CIPT Meetings																	
NPAD																	
CTDR (Cost and Technical Data Report) and technical documentation									✓	✓						✓	
ICBD (Intelligence Capability Baseline Description)									✓	✓							
Governance																	
ICE Policy	✓																
Waiver Review																	✓
Pre-award coordination of Cost CDRL/SWBS	✓																✓

✓ CE EV Integration Effort
 ✓ Idea for further integration

The white space does not mean that there are no potential integration opportunities, but more so that there is not as much synergy between the two functional disciplines.



Without Integration, the Opportunity for More Data and Enhanced Analysis is Missed...





Successful Integration Outcomes

Recommended EAC Adjustment Factor

Formulas for remaining cost growth on Space Programs

Remaining Cost Growth = $a \cdot (\text{time index}^{b-1}) \cdot (\% \text{ND Spacecraft})^c$

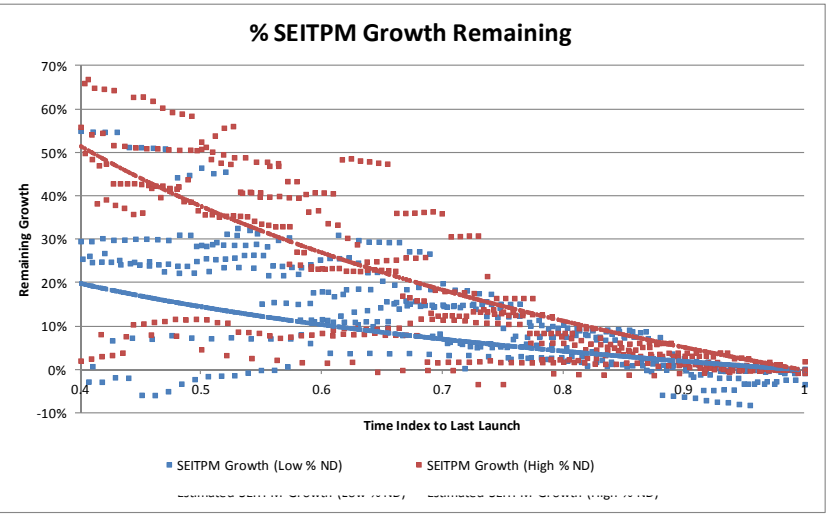
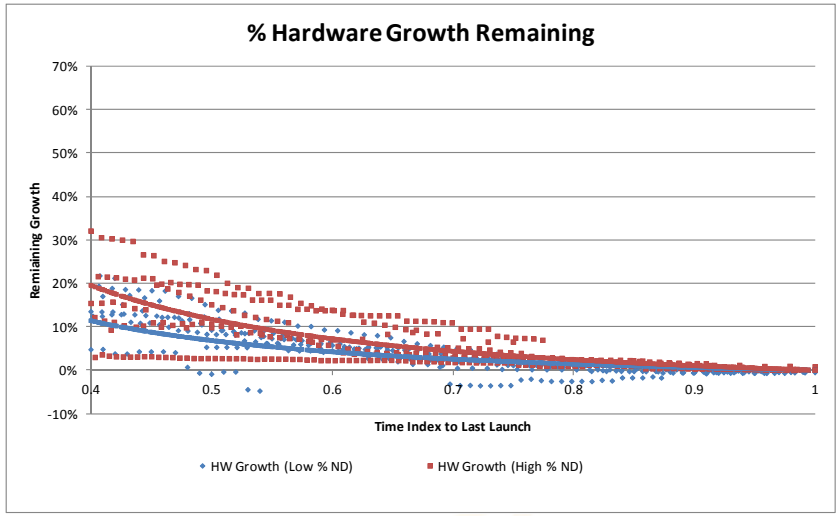
a = 0.0534
 b = -1.694
 c = 0.162

Time index is between 0.00 (ATP) and 1.00 (Last Launch)
 % New Design is between 0.00 (clone) and 1.00 (no heritage)

Remaining Cost Growth = $a \cdot (\text{time index}^{b-1}) \cdot (\% \text{ND Spacecraft})^c$

a = 1.749
 b = -0.294
 c = 0.284

Time index is between 0.00 (ATP) and 1.00 (Last Launch)
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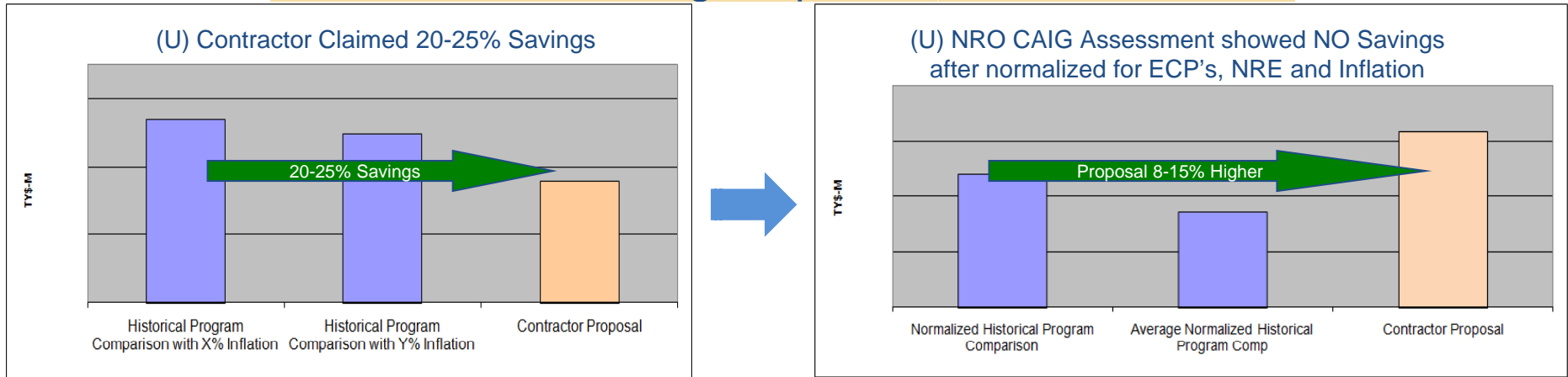


This analysis strengthens our estimates and methodologies by providing cost growth factors to apply to historical data and/or new estimates that are based on a contractor's EAC

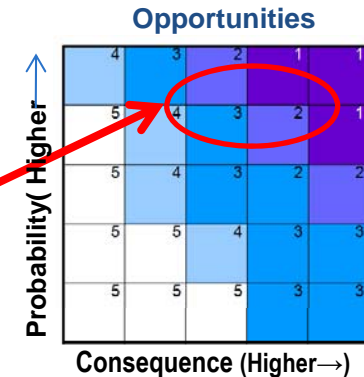
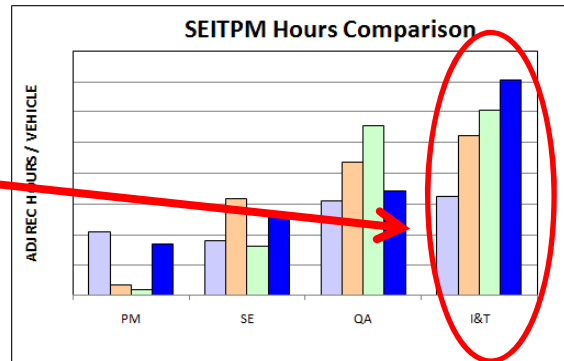
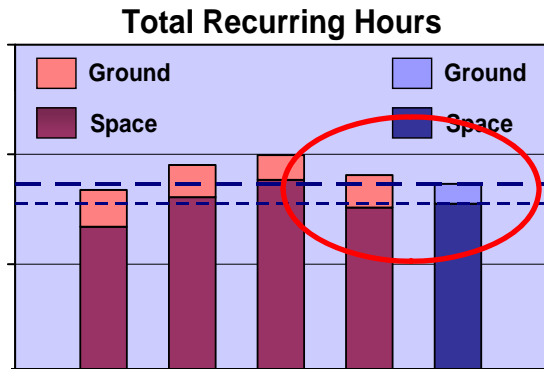


Successful Integration Outcomes

Fact Finding/Proposal Evaluation



✦ Evaluated stated savings during proposal evaluation and found NO savings



✦ NRO CAAG isolated recurring costs as the issue in comparison to historical data

✦ Contractor determined that I&T was not based on history, but was evaluated as what was 'needed'

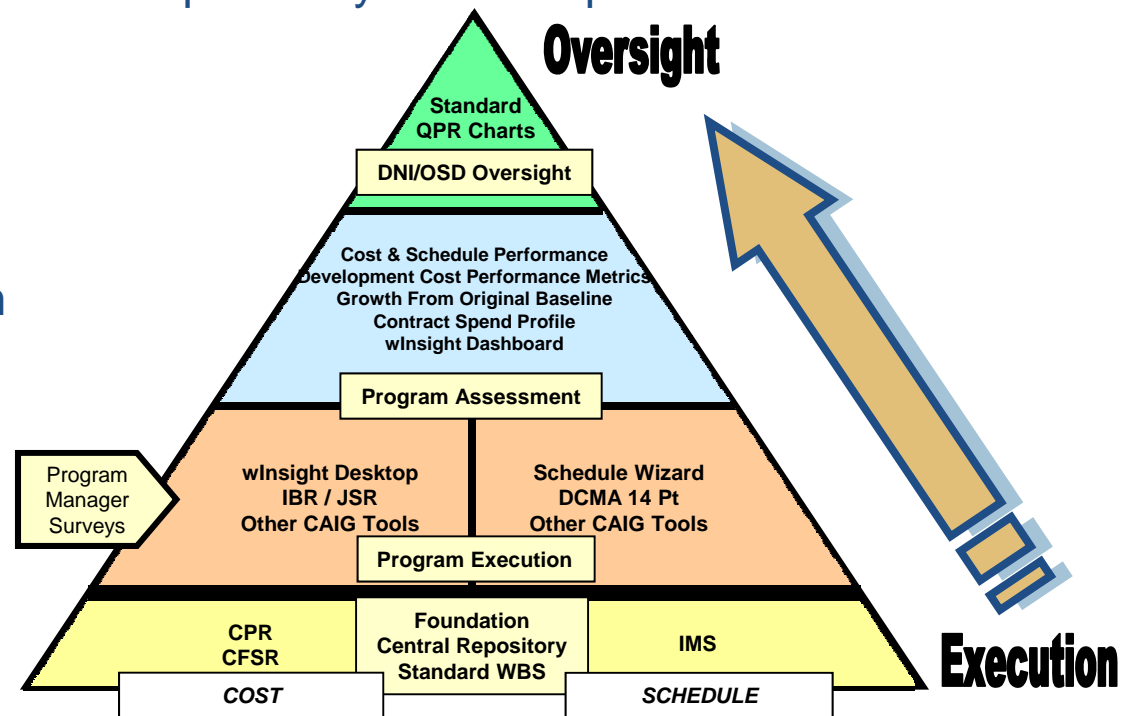
Evaluation added realism to the baseline and lead to the identification of opportunities



Successful Integration Outcomes

NRO Program Assessment Dashboard (NPAD)

- + NPAD provides a custom web tool to automate the business process
 - + “Real-time” dashboard views of program performance for Executives
 - + Automated data upload, document posting and retrieval, and program analytics for Program Management
 - + Cross program/portfolio analysis at various levels of detail
- + NPAD will integrate data at all levels across the life cycle of a program allowing for more efficient and in-depth analyses and updated status of program health over time
- + Combined EV and CE metrics and analyses establish a foundation, which allows NRO program managers and senior leadership to access and review program performance cost and EV data





Integration Recommendations

- + Train respective analysts to understand the core competencies of each discipline prior to using data and performing analyses to ensure consistency and effectiveness
- + EV analysts provide CE analysts with monthly EV analyses, to include written explanation of variance reports, CPR analysis, and the reconciliation of CFSR and CPR reports for each program so that the cost estimators gain insight into program performance; this compliments the data collection prior to an ICE
- + CE analysts can offer their technical expertise to help EV analysts with filling in gaps in the IMS and can help them understand the linkage between predecessors and successors, the critical path, and milestone dates
- + Establish schedule realism and strengthen quality of the program baseline execution with schedule analysis
- + Request for proposals (RFPs) need to be communicated through appropriate channels to raise awareness and ensure consistency of CDRLs being placed on contract; for example, WBS tailoring for new contracts, EVM reports, milestone cost deliveries

Integration Promotes Collaboration & Starts at Project Inception



Increase Capability by Adding CE or EV

- + Exploring various integration techniques expands capabilities, methods and sophisticated modeling and services provided
- + Integrating capabilities establishes a foundation that allows leadership to have insight into program performance, cost, trends, efficiencies, risks, and historical and schedule analysis
- + Current status of information at the work package level allows leadership to be proactive instead of retro-active; this protects cost estimators from being blindsided and provides additional insight in strengthening an ICE
- + The incorporation of EV analysts provides the CE team with monthly EVM analyses for program performance to supplement and compliment client analyses and cost deliverables
- + Additional capability leads to cost effective and competitive proposals in fiscally constrained environments
- + Program budgets need additional functional expertise, especially during budget cut drills
 - + Integration supports milestone decisions
 - + Integration supports the President's Budget development process

**Program analysis success requires a full range of integrated capabilities!
What information is missing without integration?**



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