

Affordability Working Group

Status Report
14th Annual Systems Engineering
Conference
26 October 2011

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 - A working definition
 - Approach
- Findings and Recommendations – Implementation of an Affordability policy
 - Key tenets
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 - Reconciling competitive procurement, budgeting process and Responsibility, Accountability & Authority
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WG Background

- **WG Scope**
 - The WG will examine and develop a working definition of affordability and a preliminary description of a framework for assessing affordability in systems acquisition
 - Products will include several presentations at SE division meetings with a draft report slated for the August meeting
- **Membership**

Briton, Devon	Raytheon Company
Cline, Richard	The Boeing Company
Epps, Bob	Lockheed Martin
Gaydar, Michael	NAVAIR
Haimowitz, Jay	Lockheed Martin
Henry, Stephen	Northrop Grumman Information Systems
Jennings, William E.	The Boeing Company
Johnson , Anne E.C.	Raytheon Company
McLendon, Michael	OSD AT&L
Monje, Andrew	OSD AT&L
Paschall, John Col.	Air Force Institute of Technology
Price, Chris	Raytheon Company
Serna, Frank	Draper Laboratory
Vannucci, Sharon	OSD AT&L
Wittstruck, Richard	Army PEO IEW&S
Tomczykowski, Walter	OSD AT&L

- Working Definition
 - *Affordability is the practice of ensuring program success through the balancing of system performance (KPPs), Total Ownership cost, and schedule constraints while satisfying mission needs in concert with long-range investment, and force structure plans of the DoD*
- Building from emerging new policy
 - USD (AT&L) memos – Sept 14, 2010, Nov 3, 2010, and Aug 24, 2011
 - New programs to produce:
 - An affordability analysis pre MS A (including affordability element of AoA)
 - SE Tradeoff analysis pre MS B

•Should-Cost and Affordability, Aug 24, 2011

•Implementation Directive for Better Buying Power - Obtaining Greater Efficiency and Productivity in Defense Spending Nov 3, 2010

•Better Buying Power Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending, Sept 14, 2010

The gist of the working group approach was to focus on six topical items:

- A. A Framework for SE Tradeoff Analysis
- B. Identify (transparent readily available) empirical data sources for estimating cost and schedule, and recommend way ahead for use of empirical and study data in AoA
- C. Develop the timeline and method for establishing how KPPs, thresholds, affordability targets, and schedule relate to the DOD acquisition process
- D. Guidance and policy recommendations that balance pre-MDD affordability efforts with fair competition, including recommendations for using these insights to define the AoA study plan
- E. Identify the relationship of affordability targets and the budgeting process, and recommend policy improvements
- F. Program RAA (Responsibility Authority & Authority) across the life-cycle

SE Methods & Tools Policy & Management

RECOMMENDATIONS – IMPLEMENTATION OF AN AFFORDABILITY POLICY

- Affordability is the practice of ensuring program success through ***the balancing*** of system performance (KPPs), total ownership cost , and schedule constraints ***while satisfying mission needs*** in concert with long-range investment, and force structure plans of the DoD
- To meet these principles we are recommending guidance for *Affordability and SE Tradeoff Analyses* that ***yield visibility*** into the relationship among the life-cycle phases, the KPPs and mission effectiveness. Key issues to be resolved
 - Quality of empirical data for estimation
 - Ensuring compatibility of affordability principles with budget and competitive procurement policies and processes
 - Life-cycle RAA (responsibility, authority & accountability)

Findings – SE Methods & Tools: Content of Affordability and SE Tradeoff Analyses

- Affordability analysis
 - Impact on and from other programs → portfolio impact
 - Total ownership cost estimate → RDT&E, Procurement, Operations & Sustainment, Training, SoS impacts
 - Relationship of the three affordability targets, i.e., sensitivity of capability excursions to changes in KPPs, cost and schedule, i.e.,
 - $$S_a = \frac{\Delta (CE_1, \dots, CE_m)}{\Delta (KPP_1, \dots, KPP_n, Cost, Sched)}$$
 - O&S on par with Safety and Security
 - (Another team will need to address Affordability of Post MS C&D ECPs)
- SE Tradeoff Analysis
 - Identify key trades that drive mission success as a function of capability sensitivity and affordability drivers
 - Refine the affordability sensitivity matrix

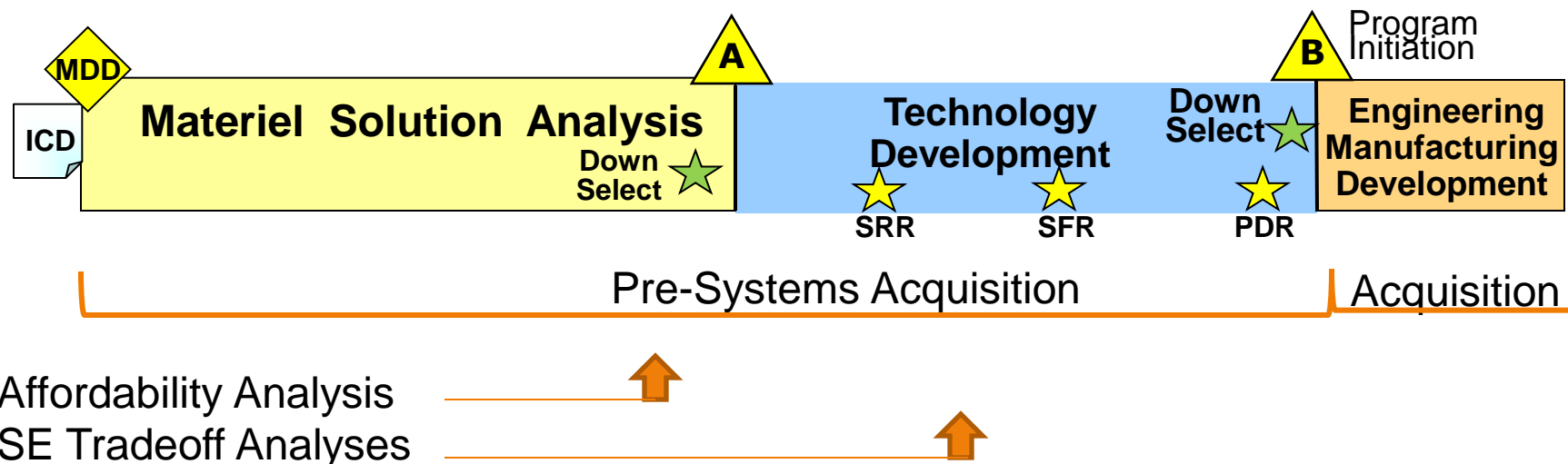
Findings – SE Methods & Tools: SE Tradeoff Analysis

- Establish framework to guide expected inputs and outputs
- Apply appropriate engineering development methods for each of the *intersections* of a problem solving activity and a solution type

Solution Type		Problem Solving Activity			
Category	Sub Category	Problem Characterization	Generation of Alternatives	Model Development & Evaluation	Decision Analysis
Technical System	System				
	Architecture				
	Parameter specification				
Economic System	Total Ownership Cost Estimate				
	Operations & Sustainment Strategy		e.g., design of experiments		e.g., sensitivity analysis
	Acquisition strategy				
Exogenous System	Programmatic Interoperability (SoS Impacts)				
	Capability Portfolio				

Findings – SE Methods and Tools: Timeline

- Quantitative Affordability and SE Tradeoff Analyses are feasible and should be refined multiple times after their initial submittal
- Given the prerequisite
 - Appropriate method applied to the solution type
 - Empirical Data is used to the maximum extent possible



Findings – Policy & Management:

Balance pre-MDD affordability ...

- Acquisition strategy has to include the contract measurable affordability targets for total ownership cost.
- Mandatory Ownership Cost Key System Attribute (KSA)
 - Life Cycle Sustainment Outcome Metrics March 10, 2007.
 - Joint Chiefs of Staff Manual (CJCSM) 3170.01C
 - The mandatory Ownership Cost KSA value should cover the planned lifecycle timeframe, consistent with the timeframe used in the Materiel Availability KPP.
 - The affordability determination is made as part of the cost assessment in the Capabilities-Based Assessment (CBA) Process.
 - The cost figure should be stated in terms of a threshold and objective capability to provide flexibility for program evolution and cost as an independent variable (CAIV) tradeoff studies.

Findings – Policy & Management: Affordability targets and budgeting ...

- Constraints to affordability Total Ownership Cost (TOC) Perspective
 - Distinct methods of budgeting for fund type (RDT&E, Procurement, O&S), and distinct processes for implementing by each service
 - Acquisition Program Manager's focus is on achieving unit cost, not TOC.
 - Better Buying Power Memo Sep 14, 2010 no mention of TOC - Specifically, at Milestone A the Acquisition Decision Memorandum (ADM) approving formal commencement of the program will contain an affordability target to be treated by the program manager (PM) like a KPP – Covers Should Cost and Will Cost only.
 - Unit cost reporting is required by 10 USC §2433. A "Nunn-McCurdy" unit cost breach occurs when a Major Defense Acquisition Program (MDAP) experiences an increase of at least 15% in Program Acquisition Unit Cost (PAUC) or Average Procurement Unit Cost (APUC) above the unit costs in the Acquisition Program Baseline.
 - No incentive (or accountability) before MS-B (APB)
 - Sustainment Program Managers not accountable until after IOC (no input on design that influences TOC)

Findings – Policy & Management:

Affordability targets and budgeting ...

- Statute has established **three mandated cost estimates** to which the MDA must certify:
 - The “projected cost of the program” . . . “to develop and procure” at Milestone A for §2366a certification
 - The “product development and production” cost estimate for §2366b certification at Milestone B
 - Program Acquisition Unit Cost or Average Procurement Unit Cost for Nunn-McCurdy breeches per §2433
- **Additionally, policy has established two affordability metrics:**
 - “Affordability target” to be treated by the PM like a KPP (AT&L memo of 3 Nov 10) at Milestone A
 - This was further defined as “quantified goals for unit production cost and sustainment costs” (AT&L memo of 24 Aug 11)
 - Mandatory Ownership Cost KSA (CJCSM 3170.01) which specifies O&S cost elements to be used to support the KSA

None of these five estimates and metrics contain full life-cycle costs

Thus, there is no incentive for a PM to manage to a TOC number; this encourages trade off decisions to remain within baseline tolerances

Findings – Policy & Management: Affordability targets and budgeting ...

- DTM 10-015 – Requirements for Life Cycle Management and Product Support – Product Support Manager (PSM)
 - ...assigns a PSM within every ACAT I and ACAT II program, prior to but no later than program initiation.
 - No clear discussion on responsibility for a TOC target, however PSM would be only person with oversight throughout the lifecycle (assuming PSM moves with program during transition from production to sustainment)
 - PSM could track the Affordability KPP and Ownership Cost KSA
 - Both metrics must be defined and be measurable
 - Would PSM be objective and unbiased given his reporting chain to the PM

No independent acquisition entity has responsibility to monitor either Affordability or Ownership Cost.

CLOSING REMARKS

- Findings
 - Including an Ownership Cost KSA in the development and/or production contract cannot be actually measured until after IOC or FOC
 - PM does NOT budget beyond the POM and not for O&M
 - PSM has no authority to prevent program trades that degrade probable O&S costs
 - No person or organization is either accountable for or oversees the Ownership Cost KSA
 - There is no oversight of O&S cost growth or achievement of the Ownership Cost KSA; not “testable” in OT&E as are other KSAs
 - There is no oversight of the Affordability “KPP”

- Recommendations
 - Policy is needed to clearly define responsibility, authority, and accountability for the “mandatory” Ownership Cost KSA throughout the lifecycle
 - AT&L needs to identify an independent affordability advocate to monitor and report on MDAP and MAIS Affordability “KPP” beginning at Milestone A and the products of the SE trade-off analysis and Ownership Cost KSA beginning at Milestone B

- Findings
 - Treating affordability as a KPP requires an assessment of the sensitivity of affordability to changes in KPPs, costs and schedule
 - Although there is significant uncertainty in the sensitivity analysis at pre MS A, an estimate with bounds can be produced
- Recommendations
 - Develop a sensitivity matrix during affordability analysis to identify affordability drivers
 - $$S_a = \frac{\Delta (CE_1, \dots, CE_m)}{\Delta (KPP_1, \dots, KPP_n, Cost, Sched)}$$
 - Continuously refine the sensitivity matrix
 - At SE Tradeoff analysis and latter phases to guide affordability decisions
 - Refinement occurs as uncertainty in the estimate is decreased
 - Tradeoff analysis to include Technical, Economic and Exogenous System analyses

- Final recommendations
 - Further revise within Affordability WG
 - Review with other NDIA and related groups, e.g., INCOSE Affordability WG
 - Capture in final report

- Schedule
 - Complete draft report and secure SE Division approval at December 2011 strategy meeting