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SCEA Conference 2011

Standardizing the Cost Technical Baseline

AFPEO Battle Management Directorate Cost Technical Baseline Template & Tutorial

ELECTRONIC SYSTEMS CENTER
BATTLE MANAGEMENT DIRECTORATE

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ESC/HB
Battle Management Directorate
3 Eglin Street, Hanscom AFB, MA

Presenters

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Contents

Introduction

Over the last four years, the DoD cost community has experienced changes in policies, regulations and implementation procedures that have directly impacted the program office “cost estimator”.

Just to name a few….

- OSD-ATL Memo for Acquisition Professionals (November 2010)
- AFI 63-101 Confidence Levels in AF Programs (March 2010)
- Air Force Acquisition Improvement Plan (May 2009)
- Weapon System Acquisition Reform Act (WSARA) (May 2009)
- Defense Acquisitions: Measuring the Value of DOD's Weapon Programs requires Starting with Realistic Baselines (GAO-09-543T) (April 2009)
- Cost Assessment Handbook (GAO-09-35P) (March 2009)
- AF Cost Uncertainty Risk Analysis Handbook (July 2007)
- ESC/CC, Improving Cost At ESC (June 2007)
- National Defense Authorization Act (2007)

The Cost Estimating Process

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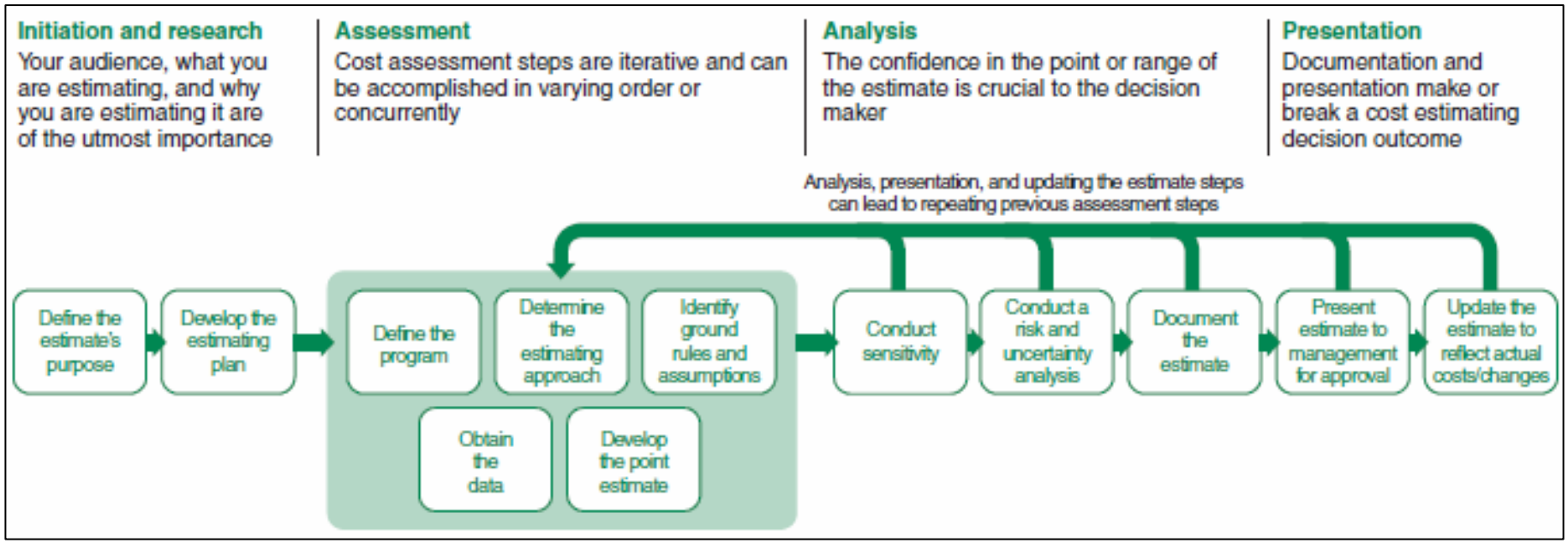
"The only thing constant in life is change"*



When variables change, the estimate changes.
One way to develop better cost estimates is to understand what changes, how to react to changes, and manage changes through the life cycle –

Cost analysts manage this through the Cost Technical Baseline.

Source: GAO-07-1134SP Cost Assessment Guide, March 2009, * François de la Rochefoucauld (1613-1680)

Battle Management Directorate Cost Improvement Initiatives

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In FY10, the Battle Management Directorate at Hanscom AFB kicked off a Cost Improvement Initiative Team in order to respond to changing DoD policies.

Team Goals:

- Standardization of the Directorate's Cost Estimating Process
- Improve Estimate Quality through Process and Product Improvements
- Provide Decision Makers Better Insight into Estimate Development
- Understand Changes in the POE through the Program's Life Cycle
- Improve Cost Management Skills through the Budget Cycle

The team started with the Standardization of the Cost Technical Baseline because it was fundamental to estimate quality and traceability.

Standardizing the Cost Technical Baseline

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- CARD guidance was limited to ACAT I programs; ACAT II/III programs did not have a template to follow.
- During sufficiency reviews, it was apparent that the cost technical baseline, was not standard across the estimators and key information was often missing; resulting in changes to the estimates.
- A joint Government-Contractor team met regularly for three months to develop a standardized cost technical baseline template and training materials for the Directorate.
- The template and training materials are now being used by over 30 estimators in the Directorate; 50% of which are junior analysts.

Purpose of the Template

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- Provides a practical approach to developing cost technical baselines.
- Provides examples of the type of information required and where to get the information.
- Allows customized for individual program requirements
- Track and Implements the latest cost estimating policy changes
- Improves project management skills of cost estimators/task leads
- Provides comprehensive training materials in the development of cost technical baselines for all programs, regardless of ACAT level

Provides a practical template and training tool that they can apply and customize for their organizations and estimates.

Other Reference Materials

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- 2009 SCEA/ISPA Cost Technical Baseline Briefing, Jason Dechorez (MCR)
- Cost Estimating Tracks (MCR SCS Junior Training Program), Tom Brotzki (MCR)
- GAO-07-1134SP Cost Assessment Guide, Best Practices for Estimating and Managing Program Costs, July 2007
- DoD 5000.02, Major Defense Acquisition Programs (MDAP)/Major Acquisition Information Systems (MAIS), Dec 08, Table 9
- DoD Directive 5000.4, "OSD Cost Analysis Improvement Group (CAIG)," (CARD), November 24, 1992
- DoD Instruction 7045.7,"Implementation of the Planning, Programming, and Budgeting System (PPBS)," May 23,1984
- Work Breakdown Structure for Defense Materiel Items
- AFMCI65-201: Policy for Documenting and Reviewing Cost Estimates
- AFI 65-508, Cost Analysis Guidance and Procedures
- ESC/FMC Sufficiency Review Questionnaire
- SAF/AQ ASP Template, Dec 10

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Program X

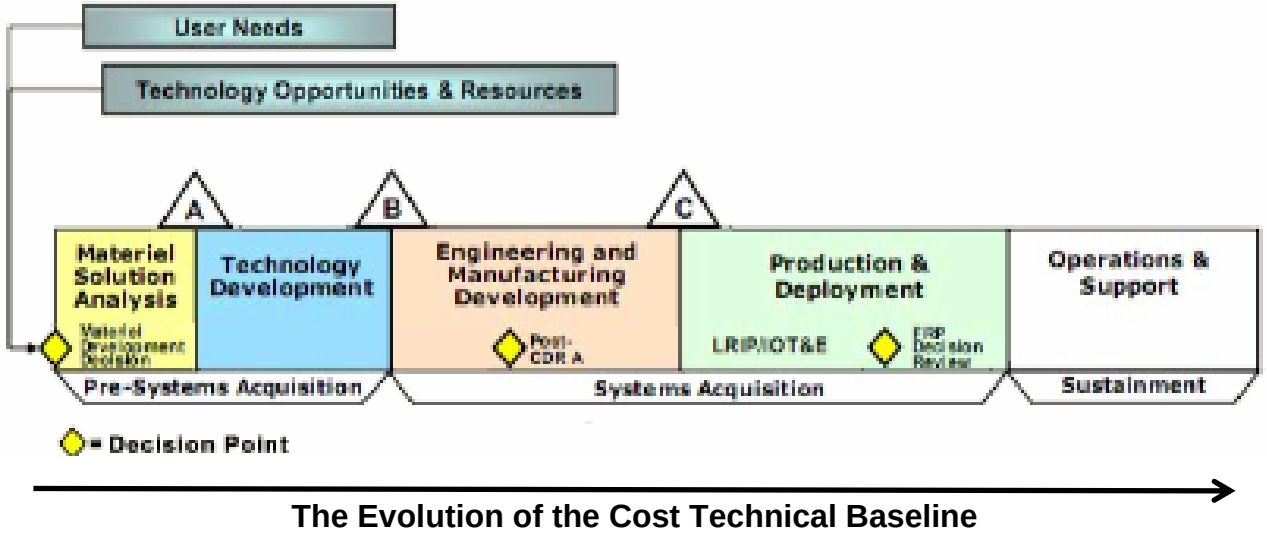
Program Office Estimate (POE)

Battle Management
Cost Technical Baseline
Template & Tutorial

Date

Organization
Address

What is a Cost Technical Baseline?



The Evolution of the Cost Technical Baseline

- Provides clear definition of project's scope and technical approach.
- Converts functional objectives and requirements into clear technical specifications.
- Contains significant technical milestones required to meet performance objectives.
- Provides updates through the acquisition process based on program maturity.

Source: DoD 5000

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Table of Contents

Required Acquisition Strategy Panel (ASP) Chart

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Purpose

- Describe the reasons why the estimate is being developed and provide a clear understanding of what the program estimate will accomplish.
- Milestone Decisions
- Program Objective Memorandum (POM)
- Analysis of Alternatives (AoA) /Economic Analysis (EA)
- Support Proposal Technical Evaluations
- Reconciliation with Contractor Estimates/Price & Availability Data
- Revisions to a previous estimate to reflect program change
- Design-to-Cost Analyses
- What-Ifs

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Background

- The program's background communicates essential chronological events/interest items which have/will impact the program execution. The result is to convey historically significant aspects of the program to cost team and other relevant sources.
  - History of program or project (objectives)
  - Requirements history
  - Identifies major cost & schedule drivers
  - Budgetary changes in funding and strategy
  - Program slips
  - Replacement of the system that is being replaced or augmented by the new acquisition

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Program Overview

- Provide a brief overview of the program, including a description of the capability, the operational requirements, the program status and funding, and the acquisition plan for procurement including contracting approach.
- A summary chart of a key aspects of the program is helpful.

Acquisition Approach	**Requirements**
■ACAT XXX, MDA-XXXX ■Sole Source, Competitive, etc ■Contract Type	■List key requirements documentation that helps support the estimate ■ Capstone Requirements Document (CRD) ■ Capability Development Document (CDD)- (ORD) ■ Capability Production Document (CPD) ■ Technical Requirements Document (TRD) ■ Test Evaluation Management Plan (TEMP)
Schedule	**Funding**
■Risk Reduction ■RFP/Contract Award ■PDR ■CDR ■FCA/PCA ■IOC, FOC	■Approved vs Required Chart ■Funding dependencies with other programs

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Team Composition

- Identify key cost estimator and program team members, their roles and responsibilities.
- Identify whether the team member is civilian, military, or contractor.

Name	Position	Office Symbol	Email	Phone

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Cost Estimating Schedule

- **Time is your enemy! Always make sure that there is enough time in the cost schedule to meet the acquisition schedule!**
  - Identify key tasks and milestones that need to be accomplished in order to complete a policy compliant estimate.
  - Focus on how long data collection will take and make adjustments.
  - Provide schedule target dates for each task and make sure that there is enough time to complete the tasks.
  - If an ACAT I program, make sure that the estimate can be delivered in compliance with the Cost Analysis Improvement Group (CAIG) Timetable in DoD 5000.4-M.

- A sample of key cost estimating tasks/milestones may include:
  A. Life Cycle Cost Estimate (LCCE)
  B. Risk Reduction Tasks
  C. Sufficiency Review Coordination
  D. RFP/Proposal Support
  E. Acquisition Documentation
  F. Earned Value Management (EVM)

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Cost Estimating Schedule

Sample Schedule

A. Life Cycle Cost Estimate (LCCE)

- List expected timelines for the cost deliverables to include WBS Dictionary, Cost Technical Baseline, ACE-IT/POST, Detailed Methodologies

B. Risk Reduction Tasks

- Timeline of key risk reduction tasks that are critical for the development of the cost estimate like SOW and TRD development

C. Sufficiency Review Coordination

- Sufficiency schedule with ESC/FMC, AFCAA, OSD CAIG, others, depending on the program's ACAT level
- Include timelines for coordination, fact-finding/data, reviews and final reports

D. RFP/Proposal Support

- Cost support required to help build an RFP
- Basis of estimate (BOE) analysis and fact finding
- Technical evaluation support

E. Acquisition Documentation

- Timeline of documents that required cost inputs such as Life Cycle Management Plans (LCMP), Acquisition Program Baseline (APB), Material Development Decision (MDD), Milestone Reviews (Heading Checks, Pre-ASP, ASP, MS B), OSSE Checklist, etc.

F. Earned Value Management (EVM)

- Review EVM CDRLS and tailor the cost DIDs as required
- Review IBR requirements and make sure they are reflected in the SOW

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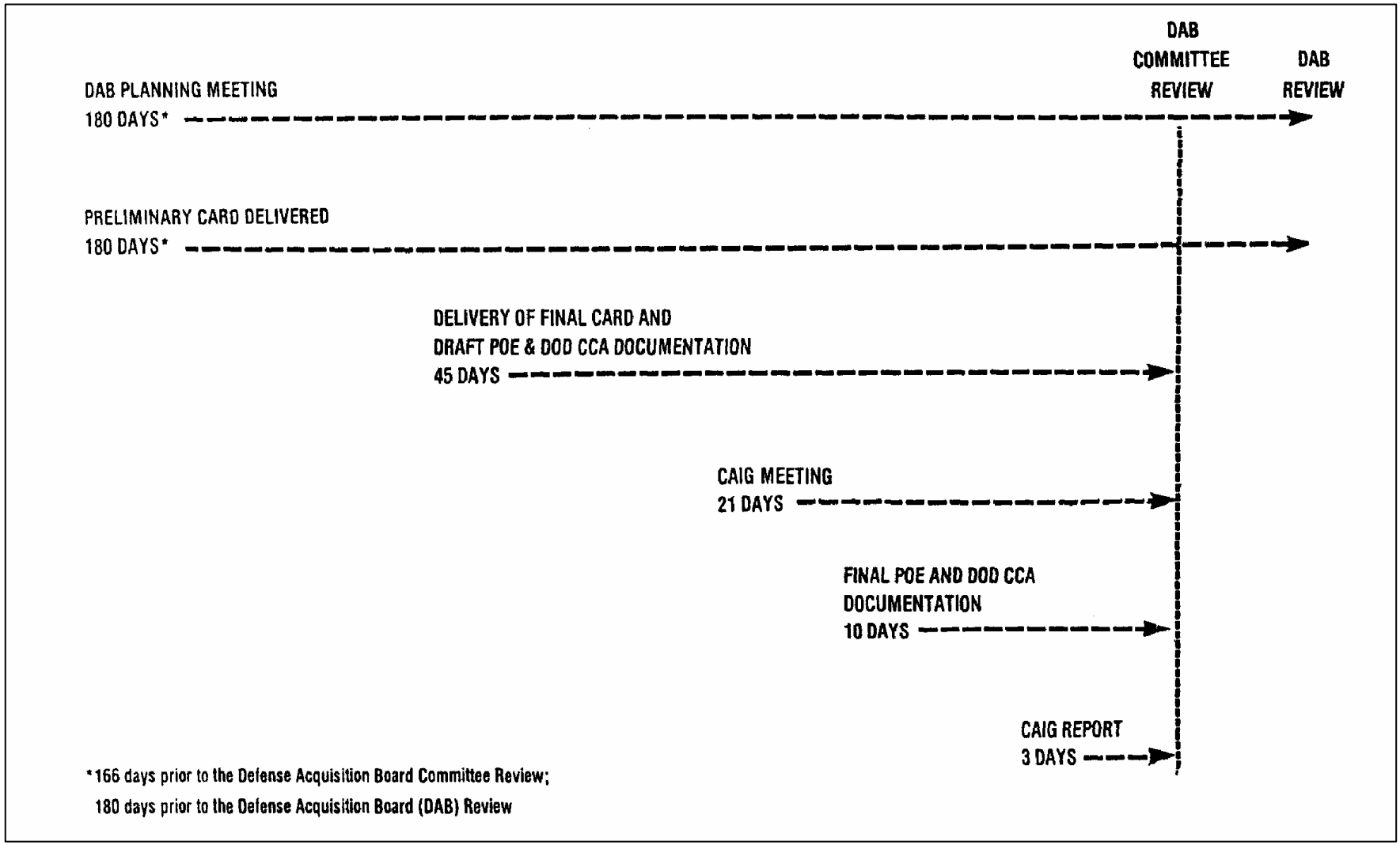
Cost Estimating Schedule

ACAT I CAIG Timeline



Source: Table C2.T1. Cost Analysis Improvement Group (CAIG) Timetable DoD 5000.4-M, December 1992

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Estimate Scope

- The estimate's scope needs to clearly state what **IS** and **IS NOT** included in the estimate in order to convey a solid top level knowledge of the estimate's content.
  - Identify the type of estimate: Acquisition (EMD & Production), Life Cycle (EMD, Production, & O&S), Cost Benefit Study, O&S Cost Analysis, etc.
  - Identify any major inclusions or exclusions
  - Make sure that the appropriate program phases are included: Concept Refinement (CR), Technology Demonstration (TD), Engineering, Manufacturing, and Design (EMD), low-rate initial production (LRIP), Production & Deployment, Operations and Support (O&S)?

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WBS Structure

- Provide a summary of the scope of the estimate through the WBS Structure.
- Make sure the WBS is prepared in accordance with MIL-HDBK-881.
- Always include all cost elements in the WBS structure, even if they are not estimated.
  - Communicates that the cost element was not overlooked.
  - Explain why the cost is not included in the estimate through documentation in both the ground rules and cost methodology documentation.
- Provide a WBS dictionary that clearly defines what is included and not included in the WBS element.
  - Can be a separate document or included in the cost technical baseline.
- Explain the relationship between the POE's Work Breakdown Structure (WBS) and the Contract WBS structure and communicate whether the WBS can be easily mapped and reconciled.
- Sometimes a picture helps explain the structure and key WBS elements in an estimate

Source: MIL-STD-881B, Work Breakdown Structures (WBS) for Defense Materiel Items, July 1998

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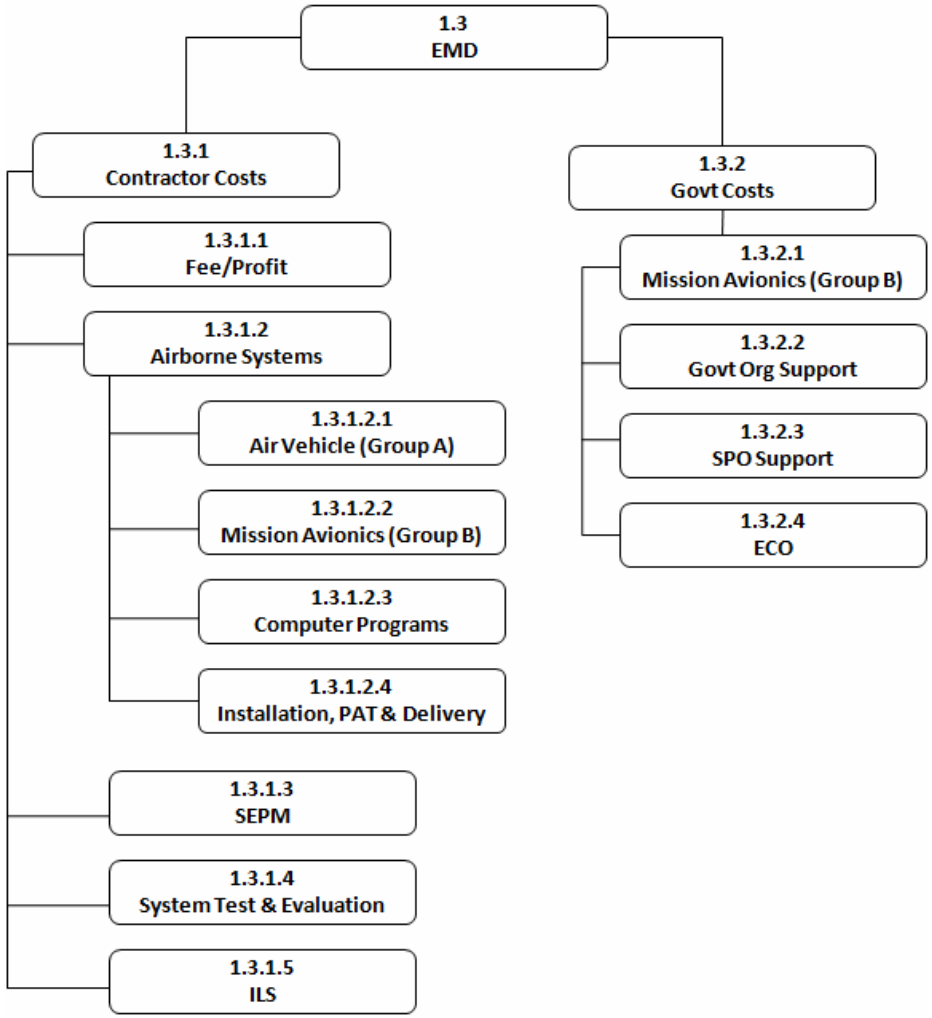
WBS Structure (cont)

1.3.1.2 Airborne Systems

This WBS element includes all contractor costs associated with airborne system costs (prime mission product). Costs include Group A non-recurring/recurring, Group B non-recurring/recurring, computer programs, installation, production acceptance test (PAT) and delivery, subcontractor material costs. Non-recurring costs are broken out in the estimate by subsystem Communications, Navigation, Surveillance, Safety Systems, Controls & Displays, Military Function, and System Level requirements.



Source: MIL-STD-881B, Work Breakdown Structures (WBS) for Defense Materiel Items, July 1998

Key Performance Parameters (KPP)

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- KPPs are attributes or characteristics of a system that are considered critical or essential to the development of an effective military capability.
- A KPP normally has a threshold (required value) and an objective (desired value) and are sometimes classified.
- The CDD may define multiple increments if there is sufficient definition of the performance attributes (key performance parameters, key system attributes, and other attributes) to allow approval of multiple increments
- Certain KPPs may be “mandatory” or “selectively applied,” depending on the system.
- The cost technical baseline should listing KPPs and how the threshold and objectives will be achieved through the system selected.

Source: Capability Development Document (CDD), Capability Production Document (CPD), Operational Requirement Document (ORD), Technical Requirement Document (TRD)

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Affordability Requirement (ASP Chart)

- Describe your approach to achieving your affordability target?
  - Do you have enough information to develop an affordability target?
  - Using both the average unit acquisition cost and average annual operating and support cost per unit what will you be able to present at MS A/B?
- Discuss strategy for achieving this KPP
  - Identify specific contract provisions
  - Identify changes to quantities such as EOQs that are necessary to achieve target
  - Identify schedule changes necessary to achieve target
- How has industry been involved?
  - Identify requirements Industry has indicated they can't meet either in the capability document or the affordability target
- Impact of procurement rate (EOQ) and schedule impact affordability target

See Dr Carter 3 November 2010 for details on the affordability requirement.
--The affordability target should be presented in the context of an analysis of the resources that are projected to be available in the portfolio(s) or mission area(s) associated with the program being considered for the MS A decision
--In order to meet this requirement, you will provide a quantitative analysis of the program's portfolio or mission area across the life cycle of all products in the portfolio or mission area, including acquisition and operating and support budget suitability to absorb the proposed new start as a content change

Source: Implementation Directive for Better Buying Power – Obtaining Greater Efficiency and Productivity in Defense Spending, Dr. Ashton Carter, Nov 10

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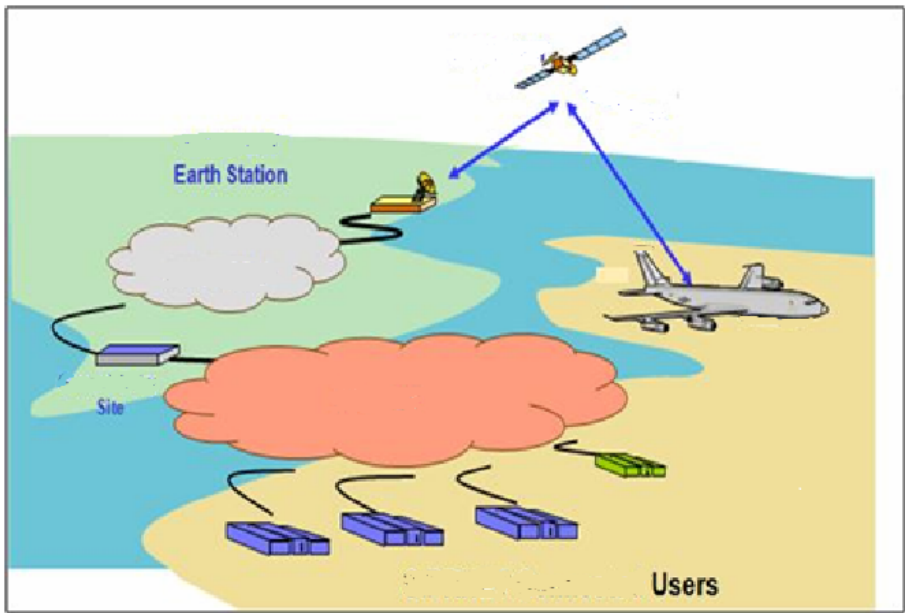
System Description

- Provides a general description of the system including the functions that the subsystems will perform and how the system will meet its key performance parameters.
- Discuss the basic attributes of the system - its configuration, the missions it will perform and threats it will counter, its relationship to other systems, and the major factors that will influence its cost.
- A diagram or picture of the system or capability, with the major parts and subsystems appropriately labeled should be included in order to describe the system.



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Acquisition Strategy

- The Acquisition Strategy is a comprehensive, integrated plan that identifies the acquisition approach, and describes the business, technical, and support strategies that management will follow to manage program risks and meet program objectives.
  - Clearly communicates how the program will procure goods and services.
  - May identify different acquisition strategies to procure the same capability.
  - Defines the relationship between the acquisition phases and work efforts.
  - Identifies key program events; decision points, reviews, contract awards, test activities, production lot/delivery quantities, and operational objectives.
  - Defines the contracting approach (sole source, competitive, small business, etc.)
  - Identifies the type of contract(s)/CLIN structure and the status of existing contracts.
  - Identifies potential vendors/suppliers.
  - Identifies any impacts/dependencies with multinational acquisitions (co-production, license fees, royalties, transportation costs, exchange rates)
  - Review the acquisition documentation: Acquisition Decision Memorandum (ADM), Acquisition Program Baseline (APB), Life Cycle Management Plan (LCMP), Previous Milestone Review Briefings

Source: Defense Acquisition Handbook, Chapter 2 Acquisition Program Baselines, Technology Development Strategies, and Acquisition Strategies, 2.3. Systems Acquisition: Acquisition Strategy

Contract Award Schedule

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- Provide a schedule of the major milestones that must take place in the program prior to contract award.
- Coordinate with PM and PK to understand the timeline of events up to the contract award and if the schedule is realistic.
- Cost estimate should model key events to quickly reflect changes in the program's schedule.

Make sure the POE is completed "ahead" to meet the acquisition milestones and adjust for changes!

- 1 Apr 08: Heading Check
- 17 Dec 08: Quick PASS ← Complete/Update Estimate
- 15 Dec 09: Pre-ASP ← Lock Estimate (If you can!)
- 5 Feb 10: ASP ← Minor Changes from Pre-ASP
- Mar 10: EMD RFP Release
- Nov 10: MS B ← Final Estimate Before CA
- Dec 10: EMD Contract Award

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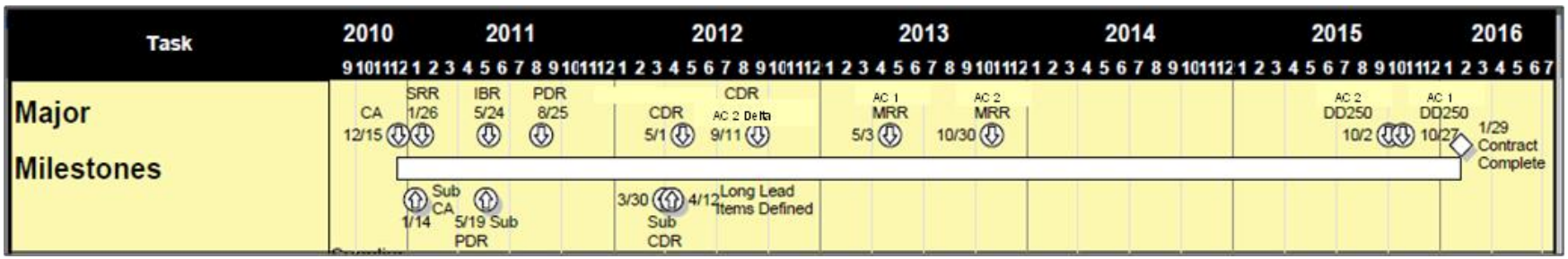
Program Schedule

- Provide an acquisition schedule for the program being estimated.
  - Provide/analyze an Integrated Master Plan/Schedule (IMP/IMS) if available.
  - If IMS is not available, identify the source for the schedule methodology.
  - Identify major milestones throughout the program phases.
    - Development (Preliminary Design Review, Critical Design Review, etc.)
    - Fielding/Deployment (Initial Operational Capability, Full Operational Capability)
  - Validate that the schedule events agree with program direction.
  - Identify key events that will effect estimate phasing and model them in the cost estimate



Source: Integrated Master Plan/Schedule (IMP/IMS) , Life Cycle Management Plans (LCMP), Acquisition Documentation, Risk Reduction tasks.

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System Architecture

- A system architecture is the conceptual design that defines the structure and/or behavior of a system
  - Provides a plan from which products can be procured and systems can be developed/integrated that will work together to satisfy a requirement.
  - Describes the structural, electrical, and mechanical properties of the system.
  - Defines the system or subsystem components at the lowest detail available.
  - Address the technical and risk issues associated with development and production of individual subsystems.
  - Provide a block diagram of system/subsystem that is being estimated.
    - Identify preferred configuration if alternatives are still being evaluated
    - Describe major elements and interrelationships
    - Describe the integration of hardware and software components
    - Physical configuration (weight, material type, SLOC, language type)
    - Performance characteristics (power, processing speed, # of simultaneous users)
    - Environmental conditions
    - Electromagnetic Interference (EMI)/Electromagnetic Compatibility (EMC) Impacts
    - Systems' physical security, information security, and operations security features
    - Operational characteristics (design life)
    - Limitations (operating temperature, vibration)
    - Expected condition: developed, COTS, GFI

Source: DoD Directive 5000.4, "OSD Cost Analysis Improvement Group (CAIG)," (CARD), November 24, 1992

System Architecture (cont)

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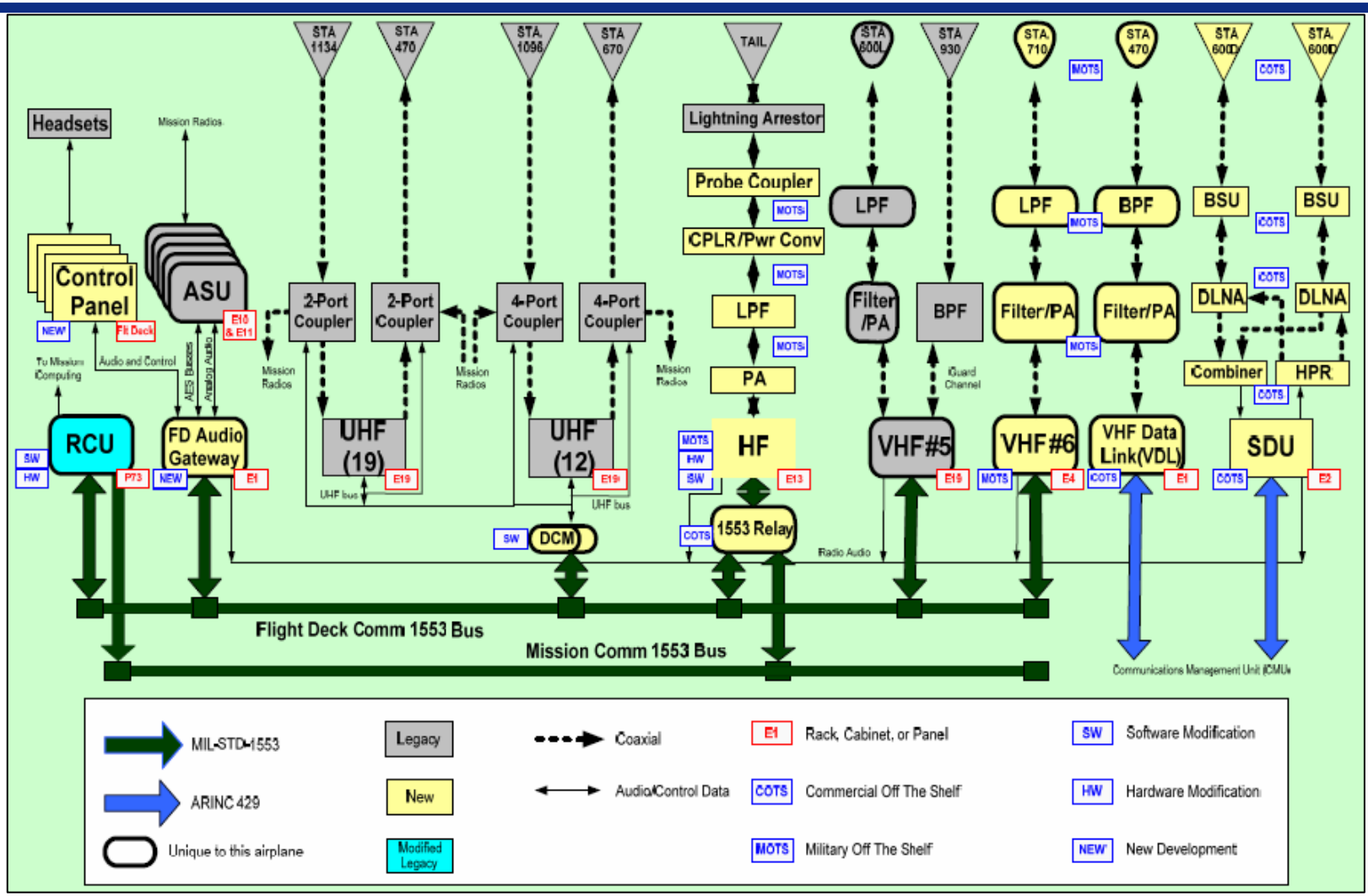

Source: Risk Reduction Tasks, Analogy to other programs, Preliminary Design Review (PDR), Critical Design Review (CDR)

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Hardware Configuration

- The hardware configuration provides a more detailed list of the line replacement units (LRU) or shop replacement units (SRU) that needs to be procured for the new system.
  - Identify if each LRU is commercial off-the-shelf (COTS) or development.
  - Buy versus build decisions that affect HW design costs.
  - Identify whether the equipment is new, replacing old equipment, or is being modified.
  - List quantities per end item (aircraft, ground station, spares, etc).
  - Provide an estimate of equipment lead times to ensure proper phasing.
  - Categorize each LRU based on its procurement strategy: Government-furnished equipment (GFE) or contractor furnished equipment (CFE).
  - Identify equipment that is dependent on other development efforts or procurement channels (GSA schedule, new technology development, etc.).
  - Identify if any additional co-site equipment will be required (filters, high power amps, etc).
  - Identify if any additional information assurance (IA) equipment is required to maintain security of the system and whether IA can be maintained through hardware.
  - Identify if any analogy to digital conversion equipment needs to be provided.

Source: Risk Reduction Tasks, Analogy to other programs, Preliminary Design Review (PDR), Critical Design Review (CDR)

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Software Architecture

- There are three types of software that may need to be estimated.
  - Operational/System: Software designed for a specific computer system or family of computer systems to facilitate the operation and maintenance of the computer system and associated programs.
  - Application software: Software specifically produced for the functional use of a computer system.
  - Support software: Off-line software (development and diagnostic tools, simulation and/or training, maintenance, site support, delivered test software, report generators)
- Identify all potential software impacts in the estimate so that key software efforts are not omitted.
- Identify which software items must be developed and which can be acquired off-the-shelf.
- Describes the design and intended uses of system software through the identification and descriptions of key CSCIs
- Discuss the complexity and level of effort of software requirements.
- Provide a list of the GFE/CFE COTS software requirements.
- Discuss the certification requirements for the software code.

Source: Risk Reduction Tasks, Analogy to other programs, Preliminary Design Review (PDR), Critical Design Review (CDR)

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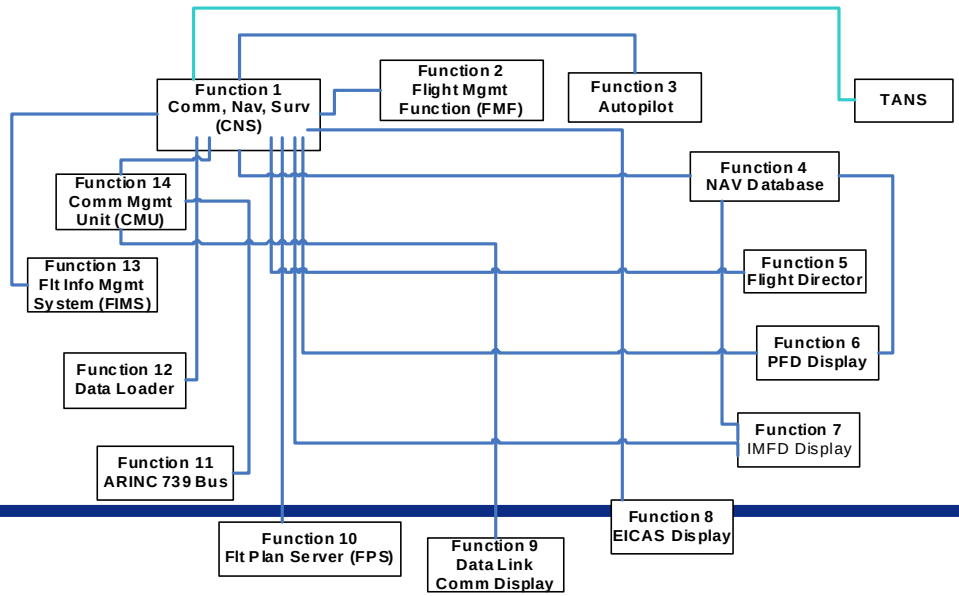
Software Architecture (cont)

- Identify estimating parameters for software sizing and validate the reliability of the data.
  - Parameters: source lines of code (SLOC), use case points, tables, databases, web services, interfaces, windows, or screens.
  - Identify on a chart new, pre-existing parameters, or re-used (i.e. SLOC) identified.
  - Identify if a parametric model is being used to estimate size.
- Develop an estimating range (low, likely and high) for the software sizing to support sensitivity and risk analysis and validate the reliability of the data.
- Identify if any productivity factors are used to estimate software level of effort and explain the reliability of the data or if the model is estimating productivity.



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Software Architecture (cont)

Build a chart to communicate the inputs to the software estimate

- Product and Development Environment
  - Application type
  - Primary/Secondary Application Types
  - Type of development environment (Spiral, Iterative, RAD, Waterfall)
  - Develop name & CMMI
  - Primary language
  - List COTS planned or used
- Product Size
  - Number of requirements
  - Number of external interface requirements
  - Uncommented SLOC (New, Modified and Reused
- Resource & Schedule Data
  - Start and End dates
  - Total hours
  - Peak staff/month

Foundation Number	Function	Flight Mgmt System Baseline		Estimated Size		Application Type	Acquisition Method	Development Method 2/	Equivalent Development Standard 3/
		Total	New/Modified	Pre-Exisiting: A+(.5*B)-C	New/Modified Most Likely				
		A	B		C				
1	CNS	210,000	15,000	206,700	10,800	FLIGHT	Modification	OOD-OOP	DO178BLevelB
2	FMF*	0	0	0	0	FLIGHT	MOD-MIN	OOD-OOP	DO178BLevelB
3	Autopilot	50,000	0	37,500	12,500	FLIGHT	Modification	OOD-OOP	DO178BLevelA
4	NAV Database	29,000	-	26,825	2,175	DATABASE	MOD-MIN	OOD-OOP	DO178BLevelB
5	Flight Director *	0	0	0	0	FLIGHT	MOD-MAJ	OOD-OOP	DO178BLevelB
6	PFD Display	29,000	2,200	28,516	1,584	GUI	MOD-MIN	OOD-OOP	DO178BLevelB
7	IMFD Display	73,000	3,500	72,230	2,520	GUI	MOD-MIN	OOD-OOP	DO178BLevelB
8	EICAS Display	20,000	2,500	19,450	1,800	GUI	Modification	OOD-OOP	DO178BLevelB
9	Data Link Comm	27,000	2,500	26,450	1,800	GUI	MOD-MIN	OOD-OOP	DO178BLevelB
10	FPS*	0	0	0	0	MISSPLAN	MOD-MAJ	OOD-OOP	DO178BLevelB
11	ARINC 739 Bus	10,000	200	9,956	144	UTILITY	MOD-MIN	OOD-OOP	DO178BLevelC
12	Data Loader	31,000	300	30,934	216	UTILITY	Modification	OOD-OOP	DO178BLevelC
13	FIMS	1,500	1,500	1,170	1,080	UTILITY	~NEW	OOD-OOP	DO178BLevelC
14	CMU	253,000	700	252,846	504	COMMUNIC	MOD-MIN	OOD-OOP	DO178BLevelB
	Total	733,500	28,400	712,577	35,123				

Source: Risk Reduction Tasks, Analogy to other programs, Preliminary Design Review (PDR), Critical Design Review (CDR)

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System Test & Evaluation

- Describes all the testing that must be accomplished during the development program and any follow on production checkout requirements.
  - Describe the use of labs and system level testing.
  - Identify the organizations that will conduct the test program.
  - Define the basis for estimated duration of test activities and if it is sufficient.
  - Identify the number, type, location, and expected duration of tests (ground, airborne, etc.)
  - Review Performance Assessment Matrices (PAM)
  - Contractor and Government-conducted tests should be separately identified.
  - Testing facilities and equipment (airworthiness/ECS, other test assets).
  - Certification requirements.
  - Existing facilities that can be modified and/or utilized.
  - Describe the size and design characteristics of the respective facilities.
  - Identify any impacts of hazardous, toxic, or radiological materials used or generated during system tests or production.

Source: Risk Reduction Tasks, Analogy to other programs, Test & Evaluation Management Plan (TEMP), Performance Assessment Matrices (PAM)

System Test & Evaluation (cont)

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Config	Test Type	AC1	AC2	Total	Comments
Common	AFS	30	0		Auto-Pilot, Flt Dir, Throttle Dir
	FMSS / FMC	6	0		Displays/Controls, EICAS, ESIS, Flt planning
	Comm	3	0		INMARSAT, CMF/FANS 1A, ACARS
	Navigation	2	0		NAV modes, RNP, NAV Aids, RVSM
	Surveillance	2	0		TCAS, ADS-B
	Safety	2	0		WRx/RWS/PWS, FDR/CVR
	Military Functions	2	0		DAFIF, JMPS, EMCON, TACAN
	Commonality Accept/Regression	0	5		Selected points from AC1 common testing
	Common Subtotal:	**47**	**5**	**52**	
Unique	FCF	1	1		
	Legacy Regression	4	3		Requires Mission Systems
	Disturbed Systems	1	1		Requires Mission Systems
	EMC ETE	2	2		Requires Mission Systems, remote ground test w/Radar
	EMC Qual	1	1		Requires Mission Systems
	ECS	1	1		Requires Mission Systems
	Power Quality	1	1		Requires Mission Systems
	FMSS	1	1		I/F with different equipment
	Comm	3	2		VDL-2, CPDLC, BIT control, w/Mission Comm
	Navigation	1	0		EGIs, INU only mode (N)
	Surveillance	1	1		Different IFF Xponders
	Safety	1	0		TAWS (includes RWS)
	Military Functions	1	1		Mode 4/5 integ, PME I/F, EMCON-VDL-2 (N)
	Unique Subtotal:	**19**	**15**	**34**	
	Total Test Flights:	**66**	**20**	**86**	
Training	DT&E (P-sortie, JTF crew)	4	0		DT&E Test Crews
	Type 1 Training	9	3		Operational Test Crews
	Total Training Flights:	**13**	**3**	**16**	

Source: Risk Reduction Tasks, Analogy to other programs, Test & Evaluation Management Plan (TEMP)

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Installation Concept

- Provide an analysis of the installation concept.
  - Trial install, Kit Proof, LRIP and full rate production.
  - Location of mod and any additional depot/contractor activation, facility or security requirements.
  - Understand the relationship between who is installing the hardware and who will manage the mod, they are not the same.
- Provide an estimate of hours to install for both direct touch labor and oversight support.
- Provide the location of the hardware installation across the weapons system.
- Identify any learning curve assumptions.

Source: Risk Reduction Tasks, Analogy to other programs, Preliminary Design Review (PDR), Critical Design Review (CDR), TCTOs.

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Logistics Concept

- Logistics ensure that the new weapon system will be maintained at the highest level of reliability, availability, and maintainability as defined by the program.
  - Hardware/software support concepts; planned upgrades; technology insertions.
  - Organic versus contractor.
  - Peculiar or common support equipment.
  - Training source materials and other training aids (operators, pilots, maintenance).
  - Training device requirements (computer simulation/mock-ups).
  - Identify organizations that will conduct the training.
  - Environment impacts and disposal.
  - Production startup requirements.
  - Operational/Site/Depot Activation costs.
  - Interim Contractor Support (ICS) / Contractor Logistics Support (CLS).
  - Identify the number and type of spares required (i.e. engines, avionics, etc.)
  - Military construction requirements.
  - Identify whether the system is currently fielded in the supply system.
  - Provide reliability projections.
  - Identify any special security requirements.
  - Addition operation and support personnel requirement.
  - Industrial Facilities.

Source: Risk Reduction Tasks, Analogy to other programs, Integrated Logistics Support Plan (ILSP), SORAPS

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Operations & Support

- Operations & Support includes all direct and indirect costs to support a weapon system.
  - Unit Level Consumption (consumables, including expendable training stores, and fuel)
  - Depot Maintenance,
  - Sustaining Investment
  - System and Inventory Management Control
  - Indirect O&S costs
- Identify operating locations (geographical and/or host platforms)
- Provide manpower requirements (quantity by year, skill sets, grades) and if the modification changes the manpower requirements
- Provide detailed information on how this program will be sustained
- Show the type of funding required for sustainment
- Identify any special support requirements (new capability, existing capability)
- Coordinated O&S requirements with the program's depot or contractor (CLS)
- Identify the expected life of the system to develop a sustainment estimate (i.e. 10 yrs, 20 yrs, etc)

Source: MIL-STD-881B, Work Breakdown Structures (WBS) for Defense Materiel Items, July 1998, AFCAIG O&S WBS structure.

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Other Government Costs

- Defines all government costs or requirements to support the program that is being estimating.
  - Government Furnished Property (GFP), Government Furnished Data (GFD), Government Furnished Equipment (GFE).
    - Identify the requirement and if it has a cost.
    - Identify any requirements that need to be funded in the program, but are being acquired by other organizations (i.e. equipment in a catalog, JMPS software, etc.
  - A&AS contractor support costs (labor/travel).
    - Include the contracting organization and any other organizations.
  - MITRE program costs
  - Other Government Travel Costs
  - Air Force Operational Test Evaluation Center (AFOTEC) Requirements
  - Base Support Activation Costs (if organic)
  - Installation costs (if organic)
  - HQ Assessments
  - Government ECO/MR

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Program Dependencies

- Identify if this program is dependent on other programs (to include other program elements), existing fielded services or capability that is currently being fielded.
  - Define the impact if the service is not provided to the capability being fielded.
- List any other programs that impact this program and explain the relationship.
- List any funding dependencies with other program elements (PE).
  - Make sure other funding sources are identified on the Approved versus Required chart.
  - Identify funding dependencies when doing offset drills/inquires.
- Identify any programs that are dependent on the program being estimated.
- Internal dependencies with other modification programs.
- Identify any external dependencies with other technologies (technology transfers, information (data) flow, etc.)

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Ground Rules & Assumptions

- Ground rules and assumptions (G&A) are **CRITICAL** to the cost estimate and communicate the program parameters from which the estimate is based.
- Normally broken down between general and specific assumptions: Technical, Programmatic, Schedule, Risk
- Provides a detailed set of parameters that should be evaluated over time because they will change.
- Make every effort to validate the realism of each ground rule and understand the impact to the estimate as they change.
- Identify whether omitted cost elements are included in another program estimate and verify that this is the case. (Then track it!)
- Identify and document any estimating constraints.
- Identify additional tasks required for the program that are not currently addressed in the cost estimate.

Review Ground Rules and Assumptions during all phases of the estimate development, through contract award and beyond. They change a lot and can have big cost impacts!

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Buy/Install/Fielding Schedules

- Identify EMD prototypes, test aircraft, engineering test hardware, and STE equipment.
- Provide a matrix of buy and install quantities by fiscal year.
- Provide an estimate of equipment lead times to ensure proper phasing.
- Identify and model contract options clearly in the estimate.
- Identify any dependencies with other programs to the buy or installation timeline.
- Hours to install assumptions.

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Identified Program Risks

- Collect data that identifies the major risks in the program baseline.
  - Review the program manager's assessment of the program.
  - Identify the measures being taken or plans to reduce/mitigate risks.
  - Discussions with technical specialists during the estimating process will start to identify uncertainty in the estimate.
- Relevant sources of risk include: design concept, technology development, test requirements, schedule, acquisition strategy, funding availability, contract stability, or any other aspect that might cause a significant deviation from the planned program.
- Any related external technology programs (planned or on-going) should be identified, their potential contribution to the program described, and their funding prospects and potential for success assessed.
- Identify as many risks for each acquisition phase through O&S.
- Describe the contractor's reputation and process for risk mitigation and how this translates to schedule, technical, and cost impacts to the program
- Try to identify how these risks are translated and mapped into risk dollars and potential cost growth in the POE.

Source: Pre-ASP, ASP, Risk Mitigation Tasks, Program Risk Analysis Tools (Contractor/Government)

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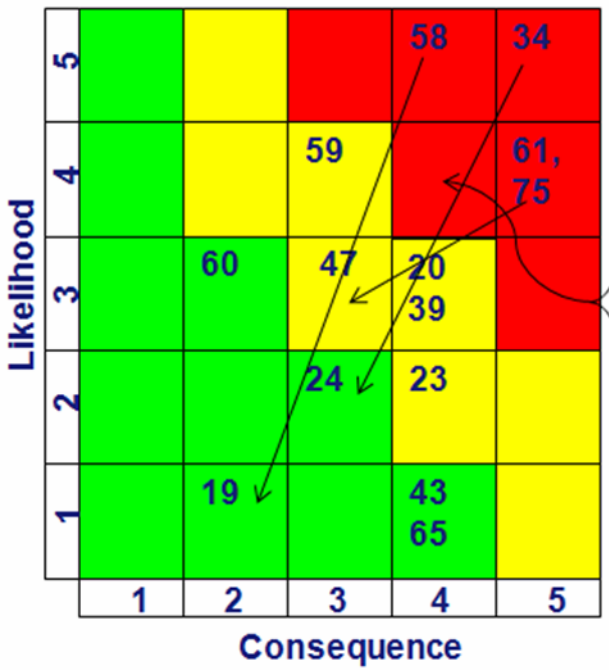
Identified Program Risks (cont)



Consequence Type
T – Technical
C – Cost
S – Schedule

ID#		Title	L*C 12/08	6/09	12/09
34*	C	Redesign of Current Antenna Locations and Combined Functionality	5x5		2X3
58*	C	Digital Audio System (DAS) Support of 3-Man Flight Crew	5x4		1X2
61	C	IP Commitment	4x5		
75		**Commercial Sustainment Concept**		4X5	3X3
11*	S	Use of COTS and Civil Transport Equipment	4x4		1X1
14	S	NACSIM and NONSTOP/NACSEM Performance Requirements	4x4		
40*	S	Certification Data Not Completely Identified And Contracted	4x4		1X1
76		VCRM		4X4	3X3
20		Requirements Flow-Down	3x4		
39		Software Metrics Not Defined And Implemented	3x4		
47*	S	EMD Prices Significantly Exceeds ROM Budget Estimate	4x4	3X3	
23		TAA/Export Licensing Flow Times	2x4		
24		Systems Integration of Subsystems From Multiple Suppliers	3x2		
60	C	Common Installation Location for Equipment	4x4	3X2	
65		Identification of Test Aircraft Before EMD	1x4		
19*	T	Requirements Definition and Quality	3x3	1X2	

Source: Pre-ASP, ASP, Risk Mitigation Tasks, Program Risk Analysis Tools (Contractor/Gov't)

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Identified Program Risks (cont)

Issue # 58

20 → 2

Issue: IF the existing Communications Functional Group does not support a CNS/ATM capable flight deck in accordance with TRD requirements; THEN the Departure Baseline Intercom may need to be redesigned or some elements of the Intercom may need to be modified.

Mitigation Plan:	ECD	L	C
• Baseline Risk Assessment	12/08	5	4
• Compare TRD req. to "as is" Legacy ADS	8/14/09	4	4
• Identify gap in current capabilities compared to TRD requirements	8/21/09	4	4
• Generate gap analysis report	10/14/09	4	3
• Conduct industry research and develop potential solution approaches to address requirement gaps	10/30/09	3	3
• Develop feasible options	11/15/09	2	2
• Generate feasibility studies with recommended options	11/15/09	1	2

Source: Pre-ASP, ASP, Risk Mitigation Tasks, Program Risk Analysis Tools (Contractor/Gov't)

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Cost Assessment of Risks

- Be able to evaluate, understand, and discuss how much risk is in the estimate and how sensitive the estimate is to **change**.
  - Program: Differences between OSD inflation rates and anticipated contractor labor rate increases, acquisition strategy changes, etc.
  - Technical: Unclear requirements definition, changes in performance characteristics, delays in software development or re-work, buy versus build changes that effect design and integration costs, vendor/supplier changes, logistics support concept changes.
  - Schedule: Contract award slips, delays in test program, buy and install lead time changes, number of aircraft down at one time.
  - Realism and sensitivity of ground rules.
  - Other items/issues that require resolution, but have not yet been identified.

- Anticipate change and model ACE-IT to provide sensitivity/“what-if” analysis on key program input parameters either through toggles, if statements, and cases.

- Communicate through S-Curves/Histograms.

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Estimate Health Chart

- Include the Cost Estimate Health Chart before the cost summaries section of the cost technical baseline and review with the CFO/Cost Chief.
  - Provides leadership with a standard wing tool to communicate the quality /status of program cost estimates for funded and high visibility POM programs.
  - Identifies areas of improvement that would increase cost estimate fidelity and confidence.
  - Develops a get well plan if estimate “health” is not fully compliant with cost policy or reflect current program conditions.
  - Identifies a standard list of key cost estimating elements associated with a healthy estimate and provide a guide for FM assessment.
  - Establishes a periodic review cycle by the Cost Chief and IPT for cost estimates in conjunction with the budget cycle twice a year.
  - Identifies the latest funding, estimate update and EVM status dates.
  - Identifies the sufficiency review authority and MDA confidence level approval.

Estimate Health Chart (cont)

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Cost Estimate Status (Date)
Program X

Program Overview

Sample

Estimate Health

Cost Model	
Technical Baseline	
Methodologies	
Risk Analysis	
Phasing	
Documentation	

	Fully Compliant & Auditable
	Work in Progress/Needs Updates
	Non Existent or Noncompliant

Financial Status

FY$M	Prior	2010	2011	2012	2013	2014	2015	TC	Total
Approved									
3600									
3010									
RP11									
RP18									
3400									
Required									
3600									
3010									
RP11									
RP18									
3400									
Delta									
3600									
3010									
RP11									
RP18									
3400									

Budget Update: Date of the last funding update
POE Update: Date of the last released estimate update
EVM: Provide EVM metrics by contract, XXXX SPI, XXXX CPI

Estimate Status

- List of tasks or actions going on in the development or management of the program cost estimate

Get Well Plan: List of actions that have to take place to get the estimate health element back to fully compliant

Estimate Health Chart (cont)

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	Qualities of a Health Estimate
Cost Model	Dynamic ACE-IT Model to answer Program What-Ifs Variables are well defined and easy to locate Summaries (Appr vs Reqt, PDOC Map, WBS Summary) are modeled and linked to Post Post File for S-Curves/Summaries
Technical Baseline	Defined Acquisition Strategy Clearly defined purpose and scope Ground Rules & Assumptions Requirements Documentation System Description/Technical Capabilities HW & SW Architectures Prime and Sub Relationships are Defined Contract Type Defined Work Breakdown Structure Dependencies on other programs/technologies
Methodologies	Cost data is appropriate to for the capability being estimated Detailed Methodologies w/supporting data Secondary Methodologies for cost drivers Uses latest contractor rates Proper estimate of loading factors across prime/subs Validation of parametric models
Risk Analysis	Use of appropriate distribution for methodology being used. Risk Inputs well defined by functional specialists at the input variable level. Compliance with AFCAA Risk Analysis Handbook Generate S-Curves via Post
Phasing	Appropriate phasing by cost element Availabilty of program schedules Understand estimate impact when scheduled change
Documentation	Compliance AF Instruction 65-508: Cost Analysis Guidance and Procedures Compliance with AFMC instruction 65-201: Cost Estimate Documentation Availability of source data Understandable, traceable, and replicatable documentation to ACE-IT File Cost Tracks are well documented and deltas explained

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Program Cost Estimate/Funding (ASP Chart)

- Identify your cost estimate and methodology
  - Identify the Confidence level (55-80%)*
  - Include LCC estimate (product support %)
- Identify if it is a Program Office/Service Cost Estimate
- Address any AFCAA/OSD CAPE issues that may exist
- Specifically address funding shortfalls
  - Explain your budget plans
  - RDT&E plan for executing obligation and expenditure
  - Explain what MAJCOM commitment exists to cover shortfall as applicable (EMA)
- Provide an overall funding chart
  - Required by FY/color
  - Actual by FY/color

See Notes section

Source: SAF/AQ ASP Template, Dec 10

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Program Cost Estimate/Funding (cont)

(ASP Chart)

Investment Program Funding											
($ in Millions / Then Year)	Prior	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY08-14	To Comp	Prog Total
RDT&E											
Prior $ (BES w/PB05 Cong Marks)									0		
Current $ (PB)									0		
Delta $ (Current - Prior)	0	0	0	0	0	0	0	0	0		
Required Block 0									0		0
Required Block 10									0		0
Total Required $	0	0	0	0	0	0	0	0	0	0	0
Delta $ (Current - Required)	0	0	0	0	0	0	0	0	0	0	0
PROCUREMENT											
Prior $ (BES w/PB05 Cong Marks)									0		
Current $ (PB)									0		0
Delta $ (Current - Prior)	0	0	0	0	0	0	0	0	0		
Required $									0		0
Delta $ (Current - Required)	0	0	0	0	0	0	0	0	0	0	0
O&M											
Prior $ (BES w/PB05 Cong Marks)									0		
Current $ (PB)									0		0
Delta $ (Current - Prior)	0	0	0	0	0	0	0	0	0		
Required $									0		0
Delta $ (Current - Required)	0	0	0	0	0	0	0	0	0	0	0
Milcon											
Prior $ (BES w/PB05 Cong Marks)									0		
Current $ (PB)									0		0
Delta $ (Current - Prior)	0	0	0	0	0	0	0	0	0		
Required $									0		0
Delta $ (Current - Required)	0	0	0	0	0	0	0	0	0	0	0
TOTAL											
Prior $ (BES w/PB05 Cong Marks)	0	0	0	0	0	0	0	0	0		
Current $ (PB)	0	0	0	0	0	0	0	0	0	0	0
Delta $ (Current - Prior)	0	0	0	0	0	0	0	0	0		
Required $											0
Delta $ (Current - Required)	0	0	0	0	0	0	0	0	0	0	0
QUANTITIES											
Required Qty									0		0
Required Installations									0		0

Source: SAF/AQ ASP Template, Dec 10

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Approved versus Required

- The Approved versus Required chart (1537) provides time phasing cost information that maps the budget track (PB, PBR, POM) to the requirements track (cost estimate).
- Make sure that the latest Future Year Defense Program (FYDP) years are shown on the chart.
- Identify funding disconnects by appropriation, by year.
- Identify the confidence level reflected in the requirement funding lines.
- Explain disconnects/unfunded requirements and how they affect effects the program's executeability.
- Identify additional sources of funds for the program if those funds are not part of the program's budget authority (BA).
- Model 1537 in ACE-IT so the numbers automatically update after estimate changes.
- Work closely with the budget team to identify changes in current and future funding.
- Be prepared to be able to track budget and requirement changes from one budget cycle to the next.

The program needs this information to defend the program's funds and requirements through the budget cycle!

Source: DoD Instruction 7045.7, "Implementation of the Planning, Programming, and Budgeting System (PPBS)," May 23,1984

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Approved versus Required (cont)

TY$M	Prior	2010	2011	2012	2013	2014	2015	TC	Total
Approved									
3600									
3010									
BP11									
BP16									
3400									
Required									
3600									
3010									
BP11									
BP16									
3400									
Delta									
3600									
3010									
BP11									
BP16									
3400									

Source: DoD Instruction 7045.7, "Implementation of the Planning, Programming, and Budgeting System (PPBS)," May 23,1984

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Cost Summaries by WBS

- Cost summaries provide time phasing cost information by WBS for all years of the acquisition.
- Need cost summaries by WBS in both Base Year and Then Year; may need them for multiple confidence levels.
- Develop cost summaries that help answer program what-ifs and questions.
  - Contract CLIN Value
  - Acquisition Program Baseline (APB) Cost Breakouts
    - Research, development, test, and evaluation costs
    - Procurement costs
    - Operations and support (O&S) costs
    - Average Procurement Unit Cost (APUC): total procurement cost divided by total procurement quantity
    - Program Acquisition Unit Cost (PAUC) : total of all acquisition-related appropriations divided by the total quantity of fully configured end items
  - Contractor versus Government Costs
  - Any other program specific summaries
- Model cost summaries in ACE-IT so the numbers automatically update after estimate changes.

Source: Defense Acquisition Guidebook, Chapter 2, Section 2.1.1. The Acquisition Program Baseline (APB) - DoD Instruction 5000.02

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Detailed Cost Methodologies

- Detailed cost methodologies communicate to the program manager and technical team the methods used to estimate each cost element.
- Heavy reliance on parametric, as well as analog and engineering methods, for Milestone A/B estimates, while projections of cost actuals will be predominantly used for preparing estimates for Milestone C and subsequent reviews.
- Explain the WBS element estimate for each line of the cost estimate.
- Validate the data source for each methodology and supporting documentation.
- Understand the relationship between the prime contractors and subcontractors and make sure they are represented correctly in the estimate.
- Provide a thorough understanding of how risk is implemented in the estimate.
- Understand the cost drivers of the cost estimate; identify and substantiate in the estimates.
- The use of graphs to present both the basic data and resulting CERs is helpful in explaining the basis of estimates.
- Cross-check major cost drivers with multiple methodologies.
- Do confidence checks with other data sources to confirm the primary methodologies.

Detailed Cost Methodologies (cont)

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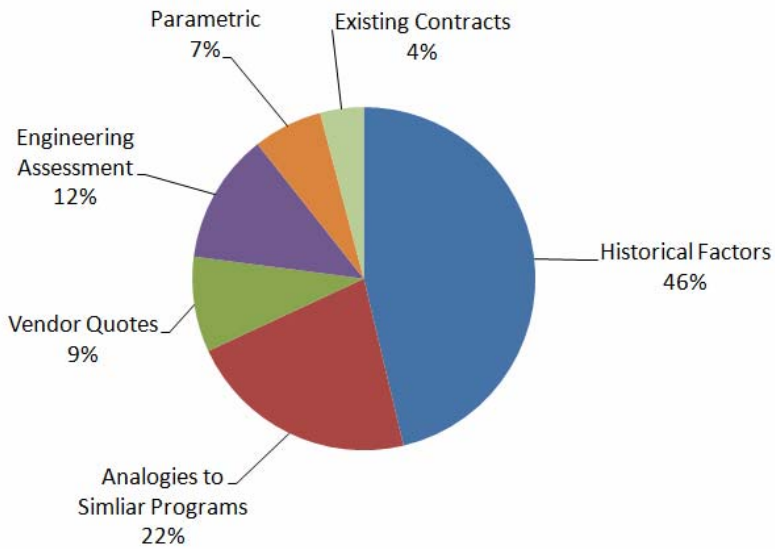
Methodology Summary	Methodology Type	Cost	TY$M	% of Cost
Proposal Prep	Historical Factor	Prime	$ 14.99	2.8%
Proposal Prep	Historical Factor	Sub & Materials	$ 5.00	0.9%
Incentive Fee/Profit	Historical Factor	Prime	$ 52.81	10.0%
Air Vehicle (Group A)-NRE	Analogies to Simliar Programs	Prime	$ 24.15	4.6%
Air Vehicle (Group A)-NRE	Vendor Quotes	Prime	$ 8.05	1.5%
Air Vehicle (Group A)-NRE	Engineering Assessment	Prime	$ 8.05	1.5%
Air Vehicle (Group A)-REC	Historical Factor	Major Subs/Suppliers	$ 5.29	1.0%
Mission Avionics (Group B)-NRE	Analogies to Simliar Programs	Prime	$ 16.66	3.2%
Mission Avionics (Group B)-NRE	Vendor Quotes	Prime	$ 5.55	1.1%
Mission Avionics (Group B)-NRE	Engineering Assessment	Prime	$ 5.55	1.1%
Mission Avionics (Group B)-NRE	Analogies to Simliar Programs	Major Subs/Suppliers	$ 27.59	5.2%
Mission Avionics (Group B)-NRE	Vendor Quotes	Major Subs/Suppliers	$ 9.20	1.7%
Mission Avionics (Group B)-NRE	Engineering Assessment	Major Subs/Suppliers	$ 9.20	1.7%
Mission Avionics (Group B)-REC	Vendor Quotes	Major Subs/Suppliers	$ 10.75	2.0%
Computer Programs	Analogies to Simliar Programs	Prime	$ 19.67	3.7%
Computer Programs	Analogies to Simliar Programs	Major Subs/Suppliers	$ 14.85	2.8%
Installation, PAT & Delivery	Analogies to Simliar Programs	Prime	$ 41.41	7.8%
Installation, PAT & Delivery	Analogies to Simliar Programs	Major Subs/Suppliers	$ 1.54	0.3%
System Engineering/Program Management	Historical Factor	Prime	$ 51.66	9.8%
Lab Facilities-NRE	Historical Factor	Prime	$ 8.63	1.6%
Lab Facilities-NRE	Historical Factor	Major Subs/Suppliers	$ 2.09	0.4%
Lab Facilities-REC	Vendor Quotes	Prime	$ 8.32	1.6%
Lab Facilities-REC	Vendor Quotes	Major Subs/Suppliers	$ 5.62	1.1%
Ground Test Support	Engineering Assessment	Prime	$ 2.66	0.5%
Ground Test Support	Engineering Assessment	Major Subs/Suppliers	$ 1.92	0.4%
DT&E Flight Test Support	Engineering Assessment	Prime	$ 25.82	4.9%
DT&E Flight Test Support	Engineering Assessment	Major Subs/Suppliers	$ 0.27	0.1%
OT&E Support	Analogies to Simliar Programs	Prime	$ 2.13	0.4%
OT&E Support	Analogies to Simliar Programs	Major Subs/Suppliers	$ 1.72	0.3%
Technical Pubs/Data	Historical Factor	Prime	$ 13.33	2.5%
Logistics Support Analysis (LSA)	Historical Factor	Prime	$ 3.68	0.7%
I&CO/Test Spares	Historical Factor	Prime	$ 4.46	0.8%
Training	Historical Factor	Prime	$ 9.29	1.8%
Support Equipment	Historical Factor	Prime	$ 2.70	0.5%
DMS Monitoring	Engineering Assessment	Prime	$ 0.47	0.1%
Govt Organizational Support	Engineering Assessment	Government Cost	$ 11.08	2.1%
SPO Support	Existing Contracts	Government Cost	$ 21.73	4.1%
ECO	Historical Factor	Government Cost	$ 44.70	8.5%
Withholds	Historical Factor	Government Cost	$ 26.04	4.9%
TOTAL CONTRACT COST+OGC+PP+FEE			**$ 528.61**	**100.0%**



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Detailed Cost Methodology Template

WBS Description: This WBS element includes all contractor costs associated with ….

Basis of Estimate:

Phasing:

Risk:

Can paste into ACE-IT files or briefing to PM

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Detailed Cost Methodology Template (Example)

WBS Description: This WBS element includes all contractor costs associated with the design and integration of common Group A requirements. Group A non-recurring design efforts include system configuration, determination of equipment locations and drawing changes. The engineering installation and testing of CNS/ATM modification will ensure it meets standards/expectations and that system design integrity is not adversely affected.

Basis of Estimate: Analogy to Similar CNS/ATM and AF Programs with Vendor Quotes for Subcontractor/Supplier efforts

See NRE Matrix: USN and AF actuals. Vendor quotes for subcontractor efforts.

Sum of Group A NRE costs by TRD, normalized for BY10$ - $51.5 M for all requirements

Phasing: Beta Curve, Notional Program Schedule (Basis of Budgetary Estimate), Nov 2009

Phasing is beta curve with a start date of contract award and end date based 41.5 months of development effort.

Risk: Triangular, PE-Mode

Risk ranges are applied on this assessment factor. For Group A the range is 25% to 35%. For Group B the range is 20% to 25%.

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Confidence Level Considerations
S-Curve (ASP Chart)

- The selection of the appropriate program cost estimate CL is at the discretion of the MDA, however, an ACAT I and II program budget shall not be established at a CL lower than the mean of the program cost estimate distribution (typically 55-65% CL)…."
  - Document the MDA's CL decision at each milestone decision.
- The selection of the CL shall consider program-specific requirements, schedule, and technical maturity issues, as well as interrelationships with other programs and program increments, and any other relevant environmental considerations.
  - Provide justification for selecting a specific confidence level.
  - Identify the confidence level in all funding/cost estimate charts.
- Review the risk analysis to make sure the estimate is compliance with the AFCAA Cost Uncertainty and Risk Analysis Handbook.
- Provide S-Curve and/or histogram of the cost estimate at the mean and 50% through 80% confidence levels.
- Provide a cost estimator assessment of whether this estimate: low, medium, high and provide backup documentation (spread, coefficient of variance, etc.).

Source: AFI 63-101: Confidence Level Selection for Air Force Acquisition Programs

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CL Considerations that Might Warrant CL Higher Than Mean (ASP Chart)

"…consider a program's requirements, cost and schedule, interfaces or criticality to other programs, and technical and programmatic maturity."

- **Requirements**
  - G — AF UONs/ JUON
  - Y — Prevention of Class A type incidents (Safety Issues)
  - G/Y — Warfighter requirements vs. business system requirements
  - G — Air Force specific requirements (importance of joint requirements would likely be accompanied by a funding mandate)
  - Y — Increment delivering multiple KPPs
  - G — Major risk areas from CRRA
  - G — Tier I Weapons Systems
  - G — Low level of detail with respect to granularity of requirements
  - G — Incremental strategy of providing capability
  - G — Sufficient test article and T&E infrastructure
- **Interfaces/Nature of Increment Relative to Other Increments**
  - G — Several other programs dependent on the program in question
  - G — Foundational increment (e.g. platform)
- **Schedule/Cost**
  - G — Time critical delivery (schedule urgency)
  - G — Degree to which schedule and cost uncertainties are integrated, and time-phasing of budget
  - G — Low confidence in quality/completeness of cost estimate
  - G — Development Test/Production schedule phase concurrency
- **Programmatic**
  - Significant functional groups (e.g. contracting, systems engineering, logistics) believe level of acquisition strategy detail is appropriate
  - G — Developmental Planning (Pre MS A)
  - G — Between MS A & MS B (Technology Development Phase)
  - G — Post Milestone B
  - G — Technology Readiness and Manufacturing Readiness Levels are appropriate for Milestone events
  - Y — History of like/similar program execution problems due to risk realization
  - G — Cost type strategy

Legend: G Y R

Source: AFI 63-101: Confidence Level Selection for Air Force Acquisition Programs

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Cost Tracks

- A cost track provides a estimate configuration log of what has changed in the program estimate from one point-in-time to another point-in-time.
  - Days, months or years
  - Major estimate changes
  - Major Milestones (MS-A to MS-C)
  - Changes in funding
  - Changes in APB Values
  - Differences between cost positions (OSD, Service, SPO, etc)
- A cost track is shown in in constant “base year” dollars, though then year dollars are also recommended.
- Documentation must support the credibility of the estimate
  - Provide a cost track showing the history of why costs change (requirements, schedule, G&A, risk, funding, etc).
  - Provide justification for the changes.
  - Enable a reviewer to replicate the cost estimate.
  - Provide a data base for future estimates.
  - Keep configuration control of prior estimates and track the current POE track back to them.

Source: AFMCI65-201: Policy for Documenting and Reviewing Cost Estimates, AFI 65-508, Cost Analysis Guidance and Procedures

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Cost Tracks (cont)

- Develop a cost track methodology for the cost estimate
  - Estimate backup information in – excel, spiral notebook, ACEIT, file versions, etc.
  - Develop a change log and manage file versions of the estimates.
  - Develop a spreadsheet rollup of PB and cost estimates.
  - Update every time there is a major estimate/funding change.

Program X Cost Track Log				
			TY$M	BY$M
Date	Estimate File Name	Cost Change Description	cost impact	cost impact
2/5/2008	ProgX Estimate 2008 v5	Updated estimate to new buy schedule, moved 1 kit from FY10 to FY11 and 2 kits from FY13 to FY14 and FY15	$455.30	$421.02
4/1/2008	ProgX Estimate 2008 v7	New inflation indices	$453.00	$423.22
10/20/2008	ProgX Estimate 2008 v15	Program funding cut, moved 2 installs - 1 from FY11 to FY12 and 1 from FY13 to FY14	$463.70	$432.42
3/3/2009	ProgX Estimate 2009 v4	Increase ICS requirement for 2 additional years	$463.90	$436.90
5/17/2009	ProgX Estimate 2009 v7	Major program rebaseline: - new buy and install schedule - old buy schedule 1,2,2,3,3,5,5,5,5,1 to new buy 1,1,2,2,2,3,3,4,4,4,4,2, - old install schedule 1,2,2,3,3,4,4,4,4,4,1 to new install 1,1,2,2,2,2,2,3,3,4,4,4,2 - Increase cost for computer DMS engineering and DMS monitoring - Increase SW deficiency fixes - SDD contract overrun - increase estimate to complete - increase training equipment and support equipment	$519.10	$483.20
9/15/2009	ProgX Estimate 2009 v12	Funding increase in FY12 & FY13 - moved 2 kit buys forward	$513.70	$478.60

Source: AFMCI65-201: Policy for Documenting and Reviewing Cost Estimates, AFI 65-508, Cost Analysis Guidance and Procedures; Cost Estimate Track Training, MCR Federal, Tom Brotzki, 2009

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Impact of Funding Cuts

- 10% Funding Cut
- 20% Funding Cut
- 30% Funding Cut

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References

- Collect as many documents as available to understand the requirements of the cost estimate and develop the cost technical baseline.
- Documentation maturity is dependent on the phase of the program.
- Sample of types of documents:
  - OSD/Congressional Mandates
  - Urgent Operational Need (UON)
  - Acquisition Briefings (Heading Check, Pre-ASP, ASP)
  - Program Management Directive (PMD)
  - Mission Need Statement (MNS)
  - Acquisition Decision Memorandum (ADM)
  - Capstone Requirements Document (CRD)
  - Cost Analysis Requirements Description (CARD)
  - Capability Development Document (CDD)
  - Operational Requirements Document (ORD)
  - Capability Production Document (CPD)
  - Statement of Work (SOW)
  - System Engineering Plan (SEP)
  - Technical Requirements Document (TRD)
  - Test Evaluation Management Plan (TEMP)
  - SORAPS