



# Homeland Security

Office of Program Accountability and Risk Management

## **Building a DHS Cost Estimating & Analysis Center of Excellence**

*2012 SCEA/ISPA Joint Annual Conference*

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June 26-29, 2012

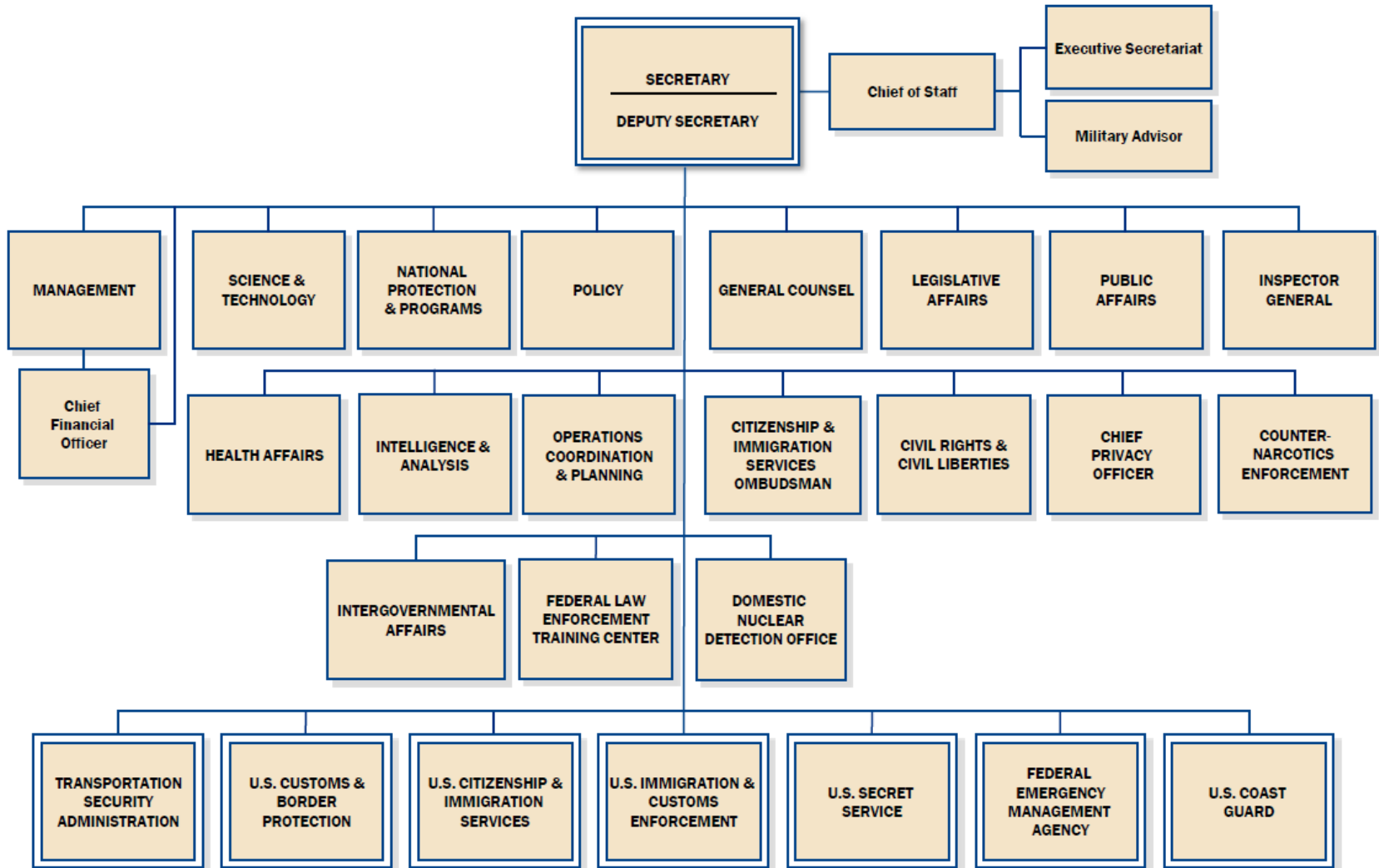
# Agenda

- Background
- Centers of Excellence (COE) Overview
- Cost Estimating & Analysis (CE&A) COE Objective Areas
  - Best Practices
  - Enterprise Tools
  - Expert Support
  - Evaluation Criteria
  - Workforce Development
- Information Technology Life Cycle Cost Work Breakdown Structure (IT LCC WBS)
- Life Cycle Cost Estimate (LCCE) Scorecard
- Summary

## Background

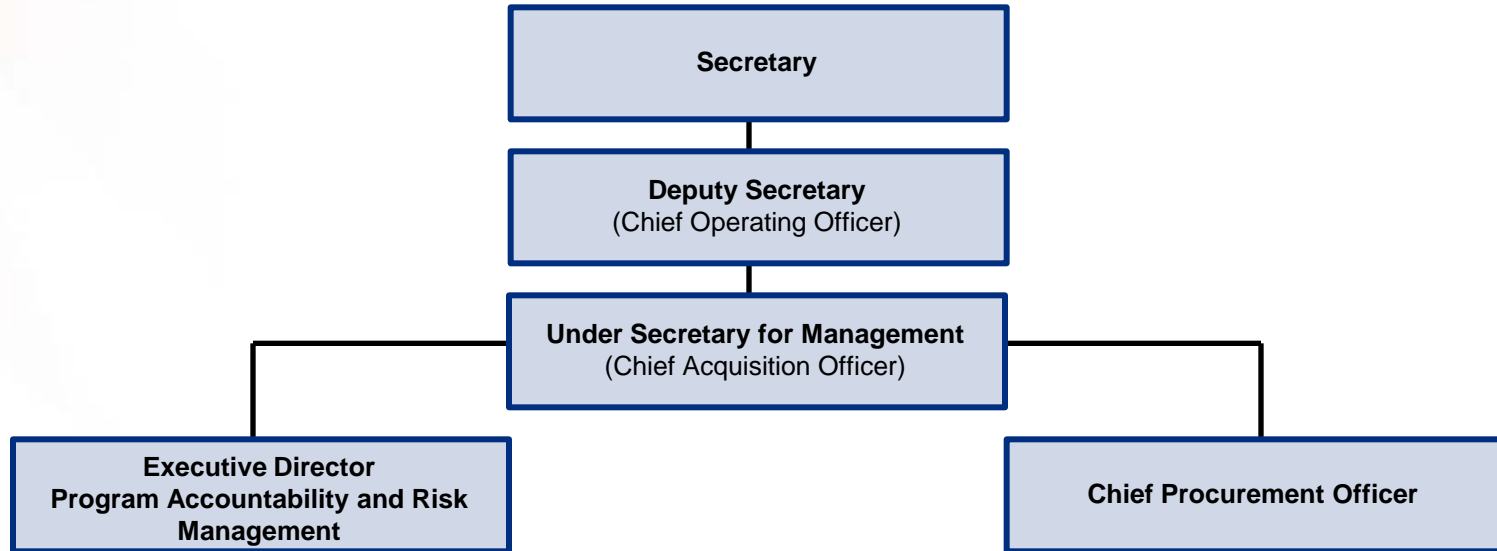
- **May 2007:** First cost analyst recruited for DHS Headquarters (HQ)
- **June 2008:** DHS established the Cost Analysis Division (CAD); located within the Office of the Chief Procurement Officer (OCPO)
  - Focal point for policy, process, and procedure regarding cost estimating at DHS
  - Responsibilities:
    - Validate Level 1 Life Cycle Cost Estimates (LCCEs)
    - Conduct Independent Cost Estimates (ICEs)
- **October 2011:** The Office of Program Accountability and Risk Management (PARM) was established
  - PARM incorporates functions and responsibilities previously performed by the Acquisition Program Management Division (APMD) and the CAD of the OCPO
  - PARM reports directly to the Under Secretary for Management (USM)

# DHS Organizational Chart



# PARM Alignment

## DHS Procurement and Acquisition Structure



**The Under Secretary for Management elevated PARM to drive acquisition reform and guide programs to success**

## PARM Overview

- **Role:** Serve as the Management Directorate's executive office for program execution
- **Goals:** Effective and efficient governance process and program execution across all major investment programs
- **Areas of Responsibility:**
  - Oversee program governance and acquisition policy
  - Build acquisition and program management capabilities
  - Assess the health of major acquisitions and investments

## PARM Core Functions

- **Policy:** Develop program management policies and processes
- **Governance:** Coordinate/support executive governance bodies
- **Program Support:** Support programs with guidance and best practices
- **Risk Analysis:** Conduct program and portfolio analyses, and manage program reporting systems
- **Workforce Development:** Develop the Program Management Corps
- **Centers of Excellence (COE):** Manage the Management Directorate's COE initiative, and sponsor the Program Management COE and Cost Estimating & Analysis COE



## What are Centers of Excellence (COEs)?

- COEs are DHS communities formed by the Under Secretary for Management (USM) to build acquisition and program management (PM) capabilities
- COEs comprise leadership staff and subject matter experts
- COEs provide proven practices, guidance, and expert counsel, and facilitate collaboration within a given discipline across DHS
- The COE initiative is described in USM's Program Management & Execution Playbook (issued December 2011)
- COEs are part of the DHS strategy to address program management challenges
  - Shortage of sufficiently skilled government staff to fill key PM roles
  - Limited access to expert guidance and best practices
  - Limited PM resources



# CE&A COE Roles & Objectives



## CE&A Initiatives: Best Practices

Develop & provide best practice processes and guidance that support the development of cost estimates and cost analyses in the Department

- **CE&A Stakeholders Working Group (ongoing)**
  - Forum for cost professionals and champions of cost estimating and analysis to discuss ideas for improvement
  - Quarterly meetings to keep up to date on what is occurring related to cost estimating and analysis across the Department
- **Cost Policy**
  - Streamline / enhance policy to meet needs of HQ and Components regarding:
    - Cost reporting (ongoing)
    - Full funding / funding ties to LCCE (2 years)
    - Inflation indices (2 years)
    - Standards for contractor developed estimates (ongoing)
- **Standard Cost Estimating WBSs (ongoing)**
- **Best Practice Examples & Guidance (ongoing)**
  - WBS, Cost Estimating Baseline Document (CEBD) & LCCE Examples

## CE&A Initiatives: Enterprise Tools

Establish and support the use of best-in-class program management execution tools and standardize operating models for how to best use the tools

- **DHS-wide Cost Database (6 mos-1 year)**
  - Lessen difficulty of obtaining data to support LCCE development
  - Prototype data collection to support central database efforts
  - Database architecture planning and development
- **Facilitate availability and use of Cost Estimating tools (ongoing)**
  - Enterprise survey to determine preferred tools
  - Establish enterprise licenses for widely used cost estimating tools
- **Rough Order of Magnitude (ROM) Cost Tool (2-3 years)**
  - Provide quick turnaround ROM estimate to provide insight into affordability of alternatives
  - Used as cross checks for LCCEs

# CE&A Initiatives: Expert Support

Provide subject matter expertise to assist DHS Components and Program Managers with cost estimating and analysis

- **Outreach Series (ongoing)**
  - Reach a large, varied audience on best practices and techniques
  - Training on various cost estimating and analysis topics, including:
    - Cost Estimating Basics
    - Cost Estimating Techniques / Methodology
    - Cost Tool Training
    - Cost Estimating Baseline Documents (CEBD)
    - WBS / Cost Element Structure (CES)
    - Risk Analysis
- **Workshops (ongoing)**
  - Specialized training aimed at developing a program-specific product (e.g., WBS)
- **Document Review & Assistance (ongoing)**
  - Individual program support on CEBDs, LCCEs, etc.

## CE&A Initiatives: Evaluation Criteria

Set the evaluation criteria for providing technical analyses and reviews as needed to ensure common practice and discipline throughout the lifecycle of a program

- **Criteria (ongoing)**
  - LCCE assessment criteria based on the best practices found in the GAO cost guide
  - “LCCE Scorecard” provided to PARM Risk Analysis Division to inform Go/No Go decision for Investment Review Boards
  - Provides transparency to the customer – “open book exam”
- **PM Checklist (ongoing)**
- **Standard LCCE Briefing Template for Management (ongoing)**

# CE&A Initiatives: Workforce Development

Support acquisition workforce development with the development of content for cost estimating and analysis training

- **Qualifications and Career Paths (6-9 mos)**
  - Ensure that Program Management Offices can obtain qualified cost estimators
    - Qualifications for hiring actions
    - Rotation plans
    - Institutionalize career paths
- **Training Development (9 mos)**
  - Develop DHS analogs to Defense Acquisition University (DAU) classes on cost estimating
  - Identify maintenance certification classes



# BEST PRACTICES **IT LCC WBS**

## Background

- Consistent cost estimating and reporting requires standardized work breakdown structures (WBSs)
- The structures are decompositions of cost elements, generally from a life cycle perspective, at the program level. They can be product, commodity, activity, or service-oriented, as appropriate. Their primary utility is for cost estimating.
  - Note: To distinguish from a WBS used within a schedule, we are using the term “Life Cycle Cost (LCC) WBS”
- We desire product-oriented WBS’s for life cycle cost estimating
- DHS commodity types can broadly be grouped into two categories:
  - IT Systems (68% of program inventory on FY 12 MAOL\*)
  - Non-IT Systems (32% of program inventory on FY 12 MAOL\*)
- The standard IT LCC WBS must be suitable for DHS-wide use, supporting:
  - Cost estimating
  - Cost reporting
  - Earned Value Management (EVM)
  - Scheduling

\*Major Acquisition Oversight List (MAOL)



## Why Product Orientation?

- A best practice, as documented in the GAO Cost Estimating and Assessment Guide and in numerous other authoritative sources
- Basis for credible cost estimates
  - Cost estimates required for products, capabilities, and end items
- Supports tradeoff studies
  - “Bang for the buck” comparisons much easier when clearly defined products are delineated under each scenario
- Facilitates direct comparison to other programs
  - Similar activities have different meanings when they support different products
- Helps “answer the mail” as to the underlying requirement/  
product/capability/deliverable for a given activity or process
  - Allows a PM to more precisely identify key cost, schedule, and resource drivers

## IT LCC WBS - Sources Used

- DHS Directive 102 Appendix B (Systems Engineering Life Cycle (SELC))
- Immigration and Customs Enforcement (ICE) Office of the Chief Information Officer (OCIO) WBS Handbook
- Coast Guard Logistics Information Management System (CG-LIMS) WBS
- Institute of Electrical and Electronics Engineers (IEEE) Standard 12207 (software life cycle processes)
- DoD AIS Economic Analysis (EA) Guide
- MIL-STD-881C Appendices B and K
- OSD O&S Cost Estimating Guide
- Federal Aviation Administration (FAA) Standard WBS
- Consulted WBS's/CES's used for other DHS programs (DHS: HSIN, NGN; USCIS: Transformation)

## Summary of Structure

- A program-centric, product-oriented life cycle cost work breakdown structure (LCC WBS) for use across DHS Information Technology (IT) systems
  - A “five in one” structure...
    - IT Applications Software Development and Integration
    - IT COTS/GOTS Software/Hardware
    - Integrated IT COTS/GOTS Integration
    - IT Services
    - IT Infrastructure
- **The Structure: Level 1**
  - 1.0 Investment
  - 2.0 Operations and Maintenance
  - 3.0 Disposition
  - 4.0 Legacy Phase Out (Optional)

## The Structure: Level 2

- 1.0 Investment
  - 1.i (i=1..n) System # 1..n+1
- 2.0 Operations and Maintenance
  - 2.i (i=1..n) System # 1..n+1
- 3.0 Disposition
  - 3.i (i=1..n) System # 1..n+1
- 4.0 Legacy Phase Out (Optional)
  - 4.i (i=1..n) System # 1..n+1

Product orientation at level 2 ensures that, within each phase, all costs “roll up” to the products they support. For IT programs, the product is generally the IT “system,” but the structure accounts for multiple systems (where n is the number of systems). For program-level integration of multiple projects or subsystems, or “system of systems” (SoS) types of efforts, the (n+1)<sup>st</sup> sub-element captures parent-level common elements. For example, Program Management, Systems Engineering, System Test and Evaluation, etc. are mapped to discrete products wherever possible (i = 1..n), and mapped to the SoS level otherwise (i=n+1).

## The Structure: Level 3 (1.0 Element)

- 1.0 Investment
  - 1.i (i=1..n+1) System # 1..n+1
    - 1.i.1 Program/Project Management
    - 1.i.2 Systems Engineering (or Systems Analysis)
    - 1.i.3 Business Process Re-engineering (BPR) / Change Management
    - 1.i.4 System Development
    - 1.i.5 System Procurement
    - 1.i.6 Central Data Center Investment
    - 1.i.7 System Level Integration & Test
    - 1.i.8 System Deployment / Implementation
    - 1.i.9 System Documentation & Related Data
    - 1.i.10 Other Investment

Data dictionary defines each element and specifies scope. Sub-elements are available down to the 6th level.

## The Structure: Level 3 (2.0 Element)

- 2.0 Operations and Maintenance
  - 2.i (i=1..n+1) System # 1..n+1
    - 2.i.1 Program/Project Management
    - 2.i.2 Systems Engineering (or Systems Analysis)
    - 2.i.3 Business Process Re-engineering (BPR) / Change Management
    - 2.i.4 Help Desk / Service Desk Support
    - 2.i.5 Annual Operations Procurement and Leasing
    - 2.i.6 Central Data Center Operating Support
    - 2.i.7 Technology Refresh/Upgrade
    - 2.i.8 System Maintenance
    - 2.i.9 System Documentation & Related Data
    - 2.i.10 System Data Maintenance
    - 2.i.11 Site Operations
    - 2.i.12 Other Operations and Maintenance

## The Structure: Level 3 (3.0 and 4.0 Elements)

- 3.0 Disposition
  - 3.i (i=1..n+1) System # 1..n+1
    - 3.i.1 Program/Project Management
    - 3.i.2 Capital Recoupment
    - 3.i.3 Retirement/Equipment Disposal
    - 3.i.4 Environmental/Hazardous Equipment Disposal
    - 3.i.5 Site Restoration/Closeout
    - 3.i.6 Other Disposition
- 4.0 Legacy System Phase Out (Optional)
  - 4.i (i=1..n+1) System # 1..n+1

The structure contains the products and activities most common to IT systems. It can be mapped (both ways) to MIL STD 881-C, OMB Exhibit 300, and the WBS's used to create the LCCE's of many DHS programs.

## Benefits & Intended Uses of the Structure

- “Five in one” structure
- Life cycle orientation to support LCCEs
- Cost reporting (includes reports themselves and associated structure of the centralized database or data repository)<sup>1</sup>
- EVM reporting (at product-oriented levels)<sup>2</sup>
- A standard LCC WBS implements best practices identified in:
  - GAO Cost Estimating and Assessment Guide on use of product-oriented WBS
  - Comparative analyses (including economic and alternatives analyses to comply with Clinger-Cohen Act)
  - 25 Point Implementation Plan To Reform Federal IT Management (“Identify IT acquisition best practices and adopt government-wide”); requires clear elements of capability to be delivered at certain milestones<sup>3</sup>
- A key program management tool

1. *Cost, Resource, and EVM Reporting at DHS: Initial Recommendations*

2. Currently, this is level 2 of the structure.

3. <http://www.cio.gov/documents/25-point-implementation-plan-to-reform-federal%20it.pdf>



EVALUATION CRITERIA

# **LCCE SCORECARD**

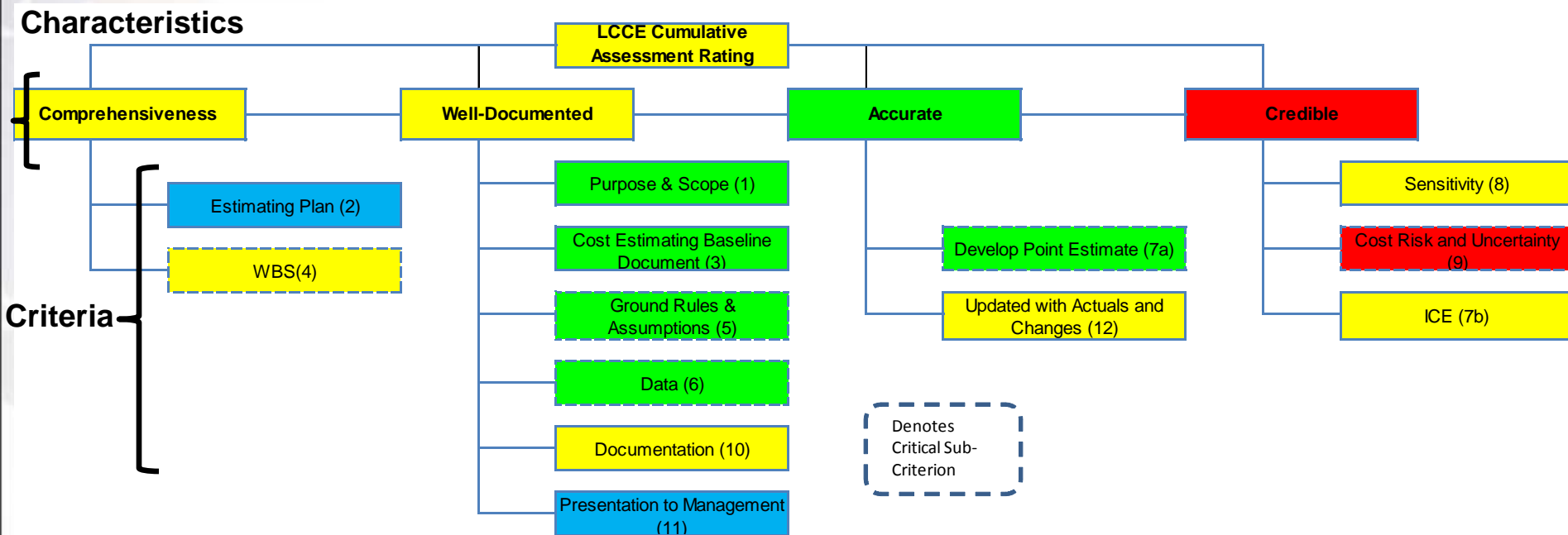
## LCCE Scorecard

- Based on industry-recognized criteria and best practices published by GAO (The GAO Cost Estimating and Assessment Guide)
- Assessment rating based on evaluation of four key characteristics:
  - **Comprehensiveness**: Does the LCCE have all the required elements?
  - **Well-Documented**: How complete has the basis of estimate been documented?
  - **Accurate**: Has the estimate been calculated using appropriate methods?
  - **Credible**: Is the LCCE accompanied by supporting analysis such as sensitivity and risk analysis that add context and credibility?
- Criteria and sub-criteria for each characteristic provide linkage to the GAO Guide and provide specific guidelines on how to assess an LCCE
- Provides transparency to the customer – “open book exam”
- Scorecard results are used within IRB reviews

## Scorecard Evaluation Criteria

- Each sub-criterion, criterion and characteristic are evaluated and assigned one of the following ratings:
  - **Met:** The LCCE provides complete evidence that satisfies the entire criterion.
  - **Substantially Met:** The LCCE provides evidence that satisfies more than one-half of the criterion.
  - **Partially Met:** The LCCE provides evidence that satisfies about one-half of the criterion.
  - **Minimally Met:** The LCCE provides evidence that satisfies less than one-half of the criterion.
  - **Not Met:** The LCCE provides no evidence that satisfies any portion of the criterion.
  - **No Data:** There is not enough data to support a rating, or the criterion is not applicable.
- In order for an LCCE to be approved, it must meet at least one-half of the criteria (i.e., must be Partially Met or higher)

# Scorecard Demonstration: One Page Summary View (i.e. the “Scorecard”)



- Color rating assigned based on the following rules:
  - **Green:** Criterion is Met or Substantially Met
  - **Yellow:** Partially Met
  - **Red:** Minimally Met or Not Met
  - **Blue:** No data
- Numbers next to each criteria show linkage to the GAO 12 step process

# Scorecard Demonstration: Sub-Criteria View

Criterion (GAO Step)	Sub-Criterion Description	Practice Met?	Status	Justification	Page Number
<b>Cost Estimating Baseline Document (3)</b> Were program characteristics described?	<b>Cost Estimating Baseline Document.</b> Critical to developing a reliable cost estimate is having an adequate understanding of the program's key characteristics, preferably presented in a Cost Estimating Baseline Document (CEBD). The less such information is known, the more assumptions must be made, thus increasing the risk associated with the estimate. Specifically, the program should:	Met	Green		
<b>Characteristic:</b> Well-Documented	<b>Sub-Criteria</b> <ul style="list-style-type: none"> <li>(a) Have a technical baseline, contained in a single document (e.g., a CEBD), that is signed by the PM;</li> <li>(b) The technical baseline document should include descriptions of the following: requirements, purpose, technical characteristics, development plan, acquisition strategy, operational plan, and risk; and</li> <li>(c) Explain the scope of the work in a manner consistent with the approved program of record as defined in the MNS, ORD, AP, APB, IMS, TEMP, ILSP.</li> </ul>	Substantially Met	Green		
		Met	Green		
		Met	Green		
<b>WBS (4)</b> Was the estimating structure determined?	A Product-Oriented WBS is the cornerstone of every program. It defines the detailed work elements needed to accomplish the program's objectives and the logical relationship among these elements, and it provides systematic and standardized way for collecting data across the program. Thus, it is an essential part of developing a program's life cycle cost estimate. As such, a WBS should	Partially Met	Yellow		
<b>Characteristic:</b> Comprehensive	<ul style="list-style-type: none"> <li>(a) Be product-oriented at the parent-level and decomposed to an appropriate level of detail (at least three levels of decomposition) to ensure that cost elements are neither omitted nor double counted;</li> <li>(a.1) For Non-IT Programs the WBS should show costs for: PMP, SE/PM, System Test &amp; Evaluation, Platform Integration, Training, Data, PSE, CSE, Operation/Site Activation, Facilities, Spares, GFE/GFI, Unit/Intermediate/Depot Level Maintenance, Govt Spt personnel (all phases), Contractor Spt personnel (all phases), Hardware and Software Refresh, Surveillance of the system after fielding, Disposal</li> </ul>	Met	Green		
		Partially Met	Yellow		

- Sub-criteria give specific examples of what the assessment analyst should look for within the LCCE and supporting documentation
- Sub-criteria are assessed first and support the criteria ratings

# Scorecard Demonstration: Criteria View

Characteristics

Characteristics			Current Status	Description of Characteristics
<b>LCCE Cumulative Assessment Rating</b>			Yellow	
Comprehensiveness (2,4)			Yellow	The estimate's level of detail ensures that cost elements are neither omitted nor double-counted. The estimate is thoroughly documented, including source data and significance, clearly detailed calculations and results and explanations for choosing a particular method or reference.
Well-Documented (1,3,5,6,10,11)			Yellow	
Accurate (7,12)			Green	The estimate is quantitatively unbiased, is neither overly conservative nor overly optimistic, and is based on an assessment of most likely costs.
Credible (8,9,7)			Red	Discusses any limitations of the analysis from uncertainty or biases surrounding data or assumptions.

## Section 1

Criteria

Comprehensiveness	Importance	Practice Met?	Current Status	Justification for Current Status
<i>Justification for Current Status</i>				
Estimating Plan (2)	Non-critical	No Data	Blue	
WBS(4)	Critical	Partially Met	Yellow	

- Sub-criteria ratings and justification are used to inform the criteria ratings, which are used to inform the characteristic ratings
- Justification clearly identifying what was met and what was not met
- If any of the characteristics are rated blue, then the LCCE cumulative assessment rating is blue. Otherwise, based on analyst assessment.

# SUMMARY

## CE&A COE Summary

- CE&A COE provides support to DHS with proven tools, processes, standards, and expert support
- Training sessions offered through the CE&A COE:
  - Cost Estimating Basics
  - Cost Estimating Techniques / Methodology
  - Cost Tool Training
  - Cost Estimating Baseline Documents (CEBD)
  - WBS / Cost Element Structure (CES)
  - Application of Risk to Cost Estimates
  - Others?

**Developing DHS curriculum to reflect state-of-the-art cost estimating best practices**



## CE&A COE Contacts

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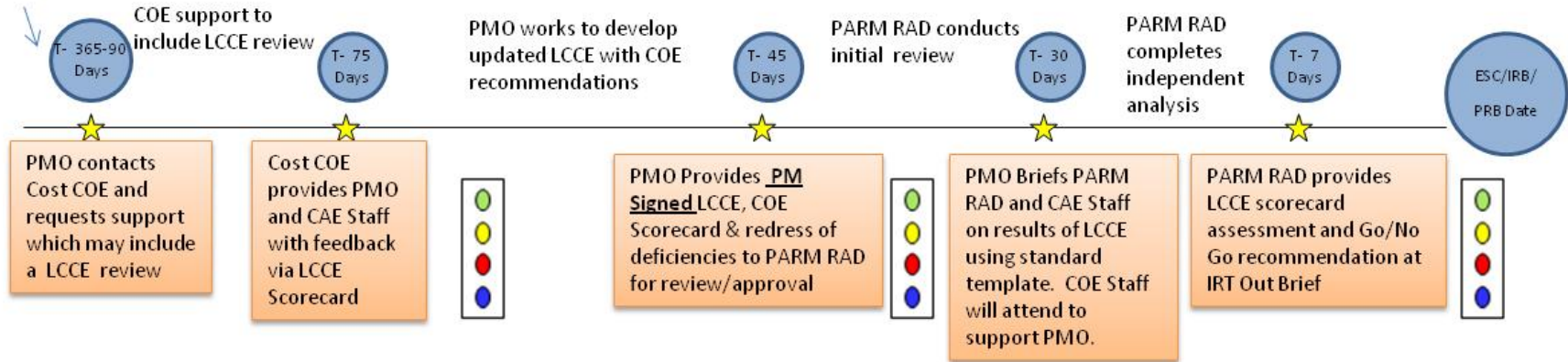
\* *Lead for the COE*

# BACKUP

# COE Engagement - Notional Timeline

90 days represents the minimum time in which the PMO should engage the COE

## COE Works with PMO prior to ESC/IRB/PRB



90 days represents the minimum time in which the PMO should engage the COE

## COE Works with PMO in result of ADM Action Item (to include LCCE and APB update)

