

DHS Systems Engineering

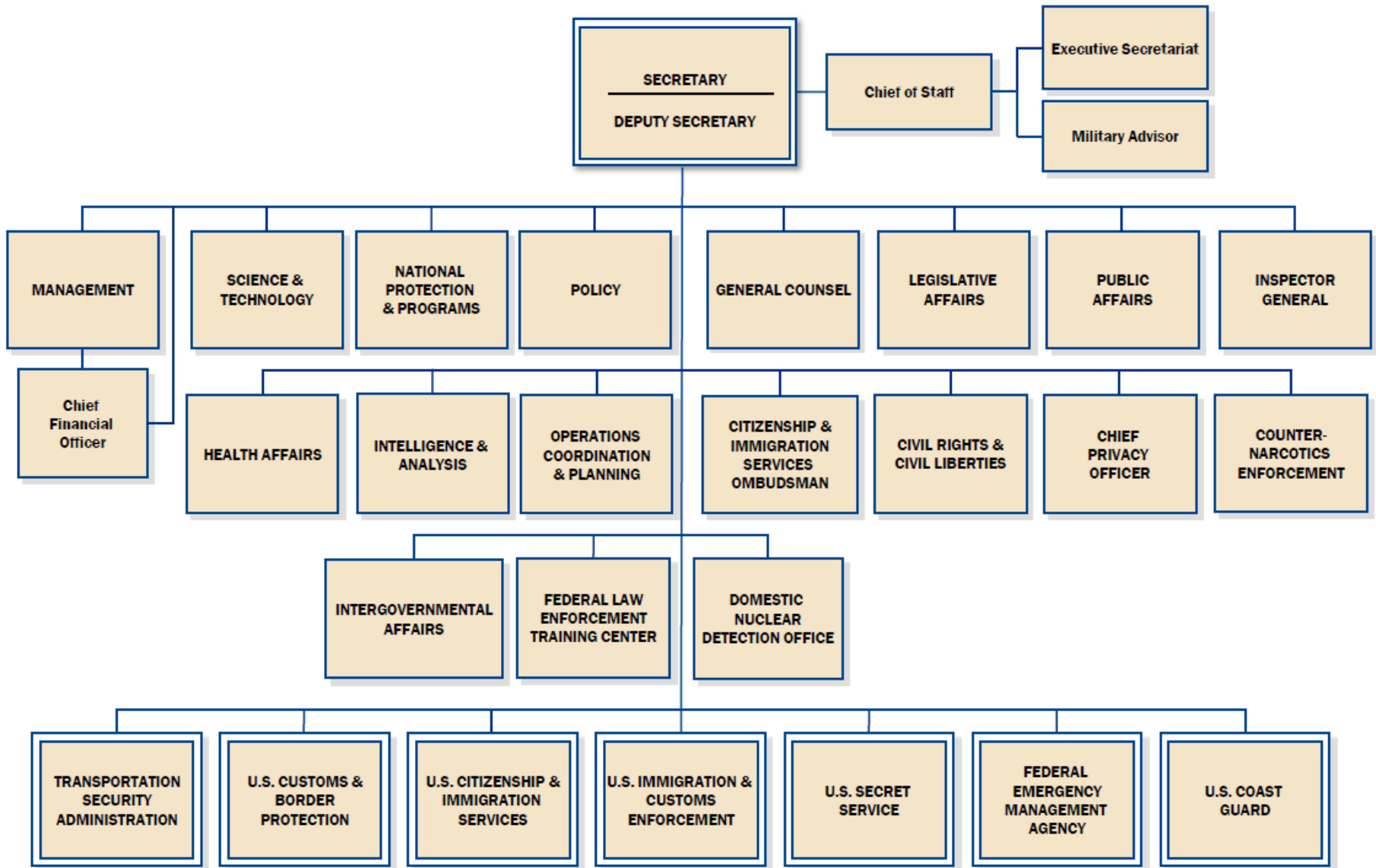
16th Annual Systems Engineering Conference

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Chief Systems Engineer
Science and Technology Directorate

29 October 2013



**Homeland
Security**



Who became part of DHS?

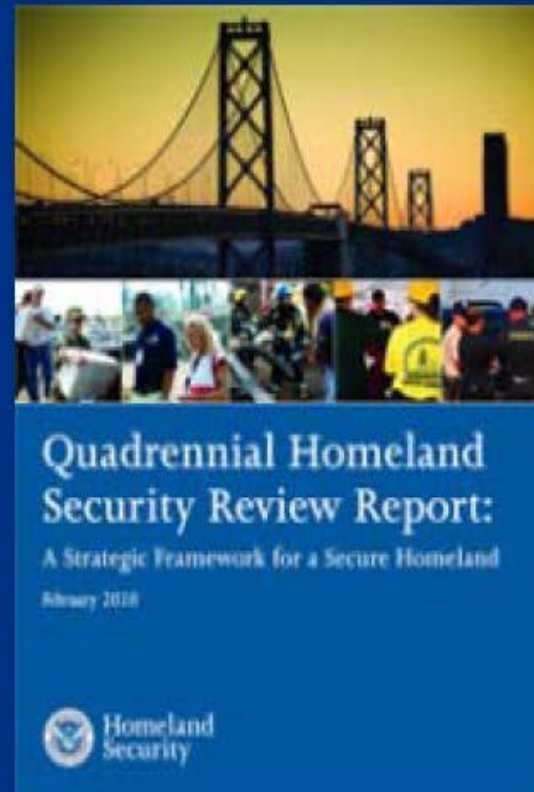
- U.S. Customs Service (Treasury)
- Immigration and Naturalization Service (Justice)
- Federal Protective Service
- Transportation Security Administration (Transportation)
- Federal Law Enforcement Training Center (Treasury)
- Animal and Plant Health Inspection Service (partial, Agriculture)
- Office for Domestic Preparedness (Justice)
- Federal Emergency Management Agency
- Strategic National Stockpile and the National Disaster Medical System (Health and Human Services)
- Nuclear Incident Response Team (Energy)
- Domestic Emergency Support Teams (Justice)
- National Domestic Preparedness Office (FBI)
- U.S. Secret Service (Treasury)
- U.S. Coast Guard (Transportation)



**Homeland
Security**

DHS Core Mission Areas

- Preventing Terrorism and Enhancing Security
- Securing and Managing our Borders
- Enforcing and Administering our Immigration Laws
- Safeguarding and Securing Cyberspace
- Ensuring Resilience to Disasters



**Homeland
Security**

The DHS Acquisition Portfolio

- 135 Major Programs representing > \$150B investment
- Significant Diversity (Products and Approaches)
 - Products include ships, aircraft, IT business systems, facilities, command and control, sensor/detectors,
 - Approaches include full development / production, Commercial Off the Shelf (COTS) integration, commodity purchase, and mission / mission support services.
- Acquisition is performed by DHS Operating Components and some HQ organizations
- Need for a more robust PPBE process



INTEGRATED INVESTMENT LIFE CYCLE MANAGEMENT

Strategy

- Component/Mission-driven
- Goal: rationalize investments

NEXUS Strategy → Operations

Program Implementation and Operations

PLANNING

PROGRAMMING

BUDGETING

EXECUTION

Strategy Phase

Articulates the Secretary's key priorities and proposed "end state"

Produces quantifiable strategic outcomes and measures

Informed by QHSR and high level Strategic Plans

Produces Integrated Planning Guidance (IPG) and Mission Strategies

Charters portfolio teams

Capabilities & Requirements Phase

Develops future target operational state

Identifies and prioritizes existing gaps and overlaps in the Department's capabilities

Determines alternative courses of action to address capability shortfalls

Programming & Budgeting Phase

Weighs strategic guidance (IPG) and capability requirements against available resources

Allocates resources to ensure a balanced and credible DHS budget and Future Year Homeland Security Program

Investment Oversight Phase

Ensures overall oversight of investment execution

Assesses investments against expected outcomes

Informs future strategies, capabilities and resource decisions

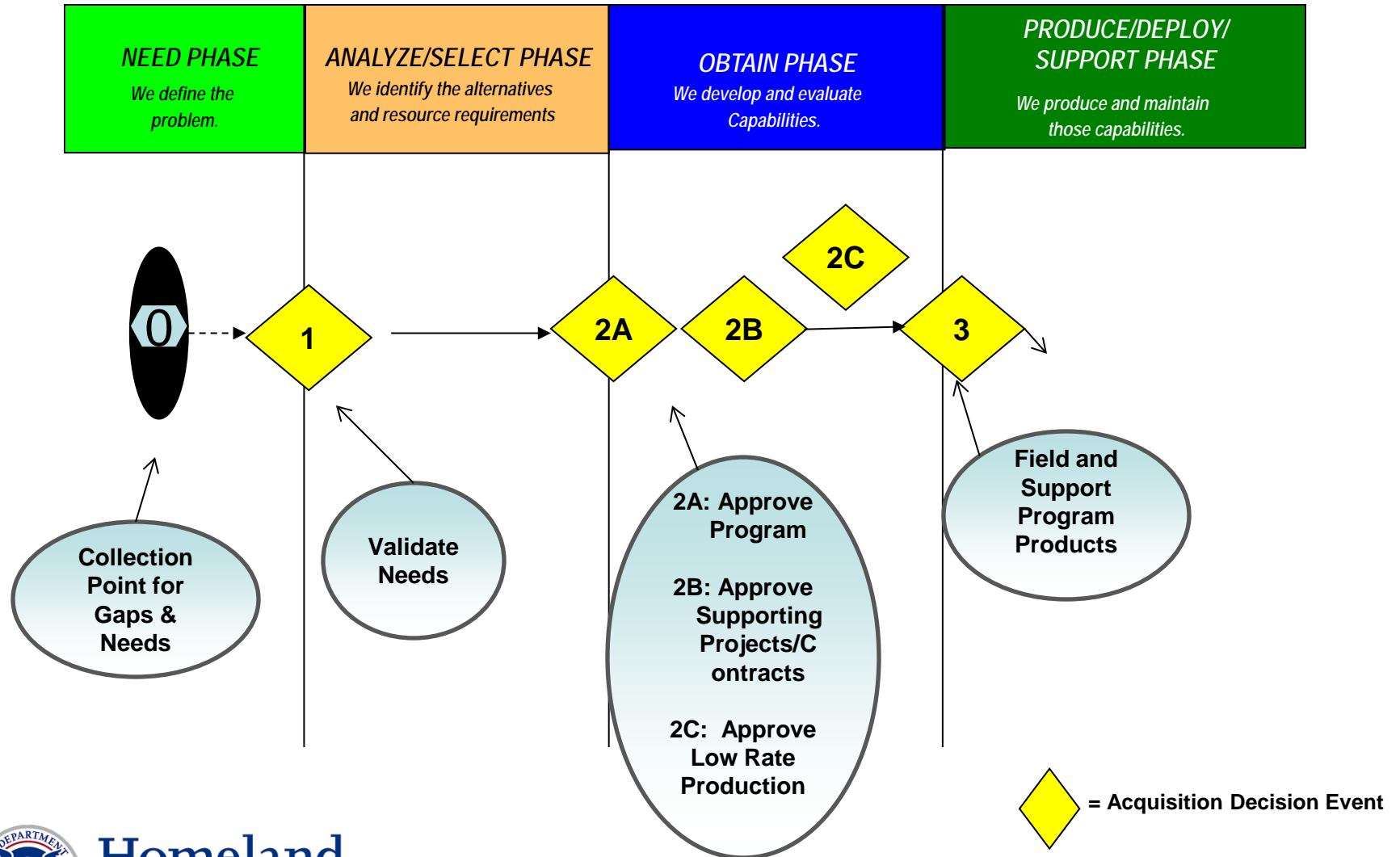
Mission and Function Portfolio Teams

Provide cross-Component expertise to perform analysis across IILCM phases
PILOT PORTFOLIOS: Bio-Defense, Screening & Vetting, Cyber Security

DATA MART / BUSINESS INTELLIGENCE

Feedback Loop

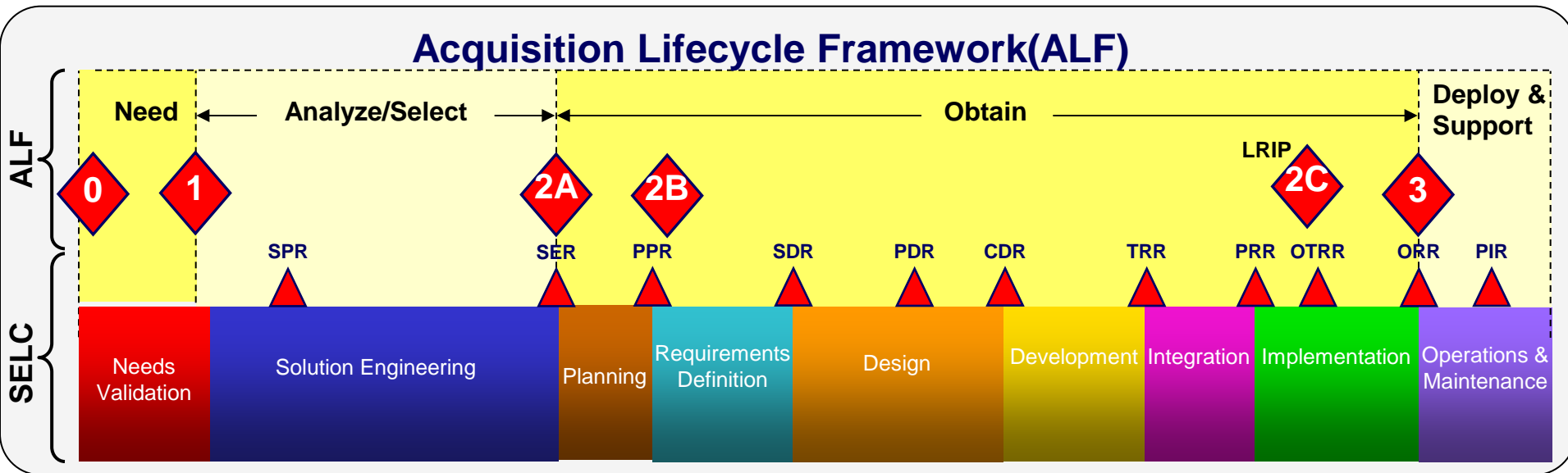
DHS Acquisition Life Cycle Framework (ALF)



Homeland Security

DHS Acquisition Lifecycle & SELC Framework

Purpose: Establish a common System Engineering Life Cycle Framework and ensure appropriate activities are planned and implemented to comply with Federal Acquisition Regulations (FAR), the Clinger-Cohen Act, and other Federal Laws.



Systems Engineering Lifecycle (SELC)

ALF Acquisition Decision Events

- 0: Collect Needs
- 1: Validate Needs
- 2A: Approve Program
- 2B: Approve Supporting Acquisitions
- 2C: Low Rate Initial Production (hardware)
- 3: Approve Produce/Deploy/Support

SELC Stage Reviews

- SPR: Study Plan Review
- SER: Solution Engineering Review
- PPR: Project Planning Review
- SDR: System Definition Review
- PDR: Preliminary Design Review
- CDR: Critical Design Review
- IRR: Integration Readiness Review
- PRR: Production Readiness Review
- OTRR: Operational Test Readiness Review
- ORR: Operational Readiness Review
- PIR: Post Implementation Review



Homeland Security

Updated SELC Guidebook Philosophy

- Developed to help identify appropriate SE activities are planned and implemented
- Incorporates “Best Practices” and guidance from DoD, NASA, INCOSE, DHS Component processes, and industry leaders
- Provides clear message that programs/projects need to engage in critical thinking
- No longer focuses on policy or mandates, but on actual SE activities to be performed
- Establishes requirement for development of a Systems Engineering Plan (SEP)
- Tailoring is expected
- Contributes to commitment to “one ALF” and “one SELC” across DHS
- Focus is on the Government PM in a role of overseeing when appropriate
- Provides cross-references to other Sections to show process linkages across activities
- Stresses early evaluation/development of advanced technology along with continuous Technology Maturation and Assessment
- Leverages annexes to provide more detailed information and examples



Updated SELC–Focus on Technical Execution

- Provides more detail on the steps and analysis necessary to execute a program
 - Extensive cross-referencing and links to Annexes, and applicable policies/procedures to minimize duplication and show the interrelationships of activities throughout the life cycle
- Consolidated Systems Engineering, supporting activities, and resulting artifacts from DHS and applicable statutes, regulations, and policies into an integrated usable Guidebook
 - Integrates critical compliance activities based on various federal laws/regulations and other SELC considerations throughout the SELC to provide a direct understanding of when and how they were to be applied to the program
 - Privacy, Security, Section 508 Accessibility, Human Systems Integration, EOSH, etc...



Emphasizes Critical Thinking and Planning

- Emphasizes the need for **Critical Thinking** and early comprehensive planning needed to enable successful system development
- Fundamentally changed the SELC from a **Stage** and **Document** focused process to an **Activity** focused process
 - Recognized that SELC activities are often iterative or concurrent in nature and not strictly performed in a stepwise or sequential manor
 - Enable the program to focus on execution of the activities that will ultimately lead to a delivered capability vice focusing on development of documents
 - Artifacts and reviews are still critical elements of the SELC, but are the result of the activities to document and assess progress
- Integrates the evaluation or development of advanced science and technology into the **early phases of program definition** and provides a constant drumbeat on Technology Maturation and Assessment



Emphasizes Tailoring

Provides detailed guidance so a Program can develop their specific “Tailored plan” based on the unique characteristics of the Program regardless of program type and size

- Encourages, almost demands, tailoring the SELC for every program
 - Proper selection of a development methodology and logical tailoring of the SELC activities, artifacts, and reviews based on the specific characteristic of a program and the program team
- Stresses the important of Program Team to really engage to understand the program, its users/stakeholders, scope and technical challenges to plan to do the “right” work
- Enables executers and oversight to really know what the program will do and what should be expected and when
 - Gets Programs and Oversight on the same page early



Enables Logical Tailoring of Program Activities

Guidebook points to a SELC Tailoring Example Annex that provides examples of how the SELC is tailored for various type of programs

- Demonstrates the level of detail and amount of critical thinking a Program should engage in to properly plan the effort for a specific program
- Includes examples tailoring approaches for:
 - Small/less complex development programs
 - COTS/GOTS/NDI programs
 - IT Infrastructure and Services programs
 - Stand Alone Service programs
 - Facilities and Construction Programs
 - Programs utilizing Agile development methods (IT systems)
- Can serve as a starting point and be referenced to minimize the size/content of the SELC Tailoring Plan while still requiring the critical thinking and justification
- Is a living artifact that can grow and change based on actual experience to provide better guidance to future programs



SE Technical Management Processes

Instilling Systems Engineering Methods and Processes through adoption of “Industry Standard” Technical Management Processes

- These processes include:
 - Requirements Engineering
 - Technical Planning
 - Technical Risk Management
 - Technical Configuration and Change Management
 - Interface Management
 - Decision Analysis
 - Technical Assessment
 - Technical Data Management
- Technical Management Processes are integrated into initial Planning activities once the Program is officially designated a Program of Record
- These processes are then applied throughout SELC activities and the Technical Review process evaluates the program use of and adherence to these processes
- Documented in a newly implemented Systems Engineering Plan (SEP)



Recognizes the impact of “Embedded IT” in new systems

The New SELC Guidebook recognizes and accounts for the proliferation of IT elements within new systems/capabilities

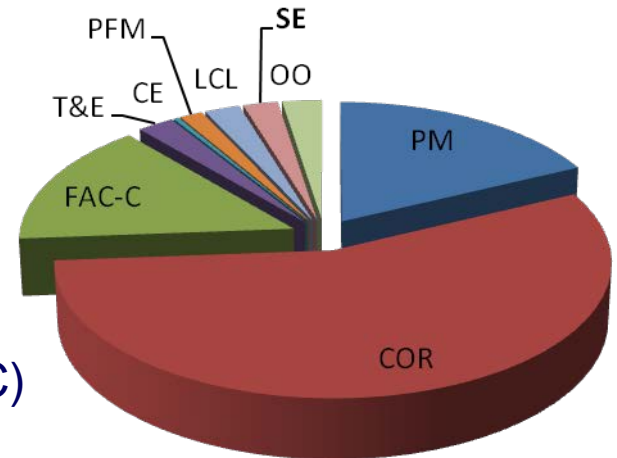
- Defined “Embedded IT” to describe the IT elements within non-IT systems that enable the system to perform its primary function
 - Many systems such as detectors use embedded IT to enable or enhance their primary function and may even transmit that detection information across networks
 - Non-IT Programs must now consider many IT related activities until it is determined that these activities are not necessary
 - Security Assessment and Accreditation
 - Privacy
 - Section 508 Accessibility
 - Technology Insertion



Acquisition Career Management

Robust Certification Programs

- Cost Estimating
- Life Cycle Logistics
- Test and Evaluation
- Program Management
- Program Financial Manager
- Federal Acquisition Certification, Contracting(FAC-C)
- Federal Acquisition Certification-Contracting Officer Representative (FAC-COR)
- Ordering Official
- Warrant Program
- **Systems Engineering** →



6 April 2012, DHS Acquisition Workforce Division issued an Acquisition Certification Policy for Systems Engineering

Establish a professional certification program to train and develop our current workforce and provide mandatory education, training, and experience requirements for each specific acquisition position and specialty

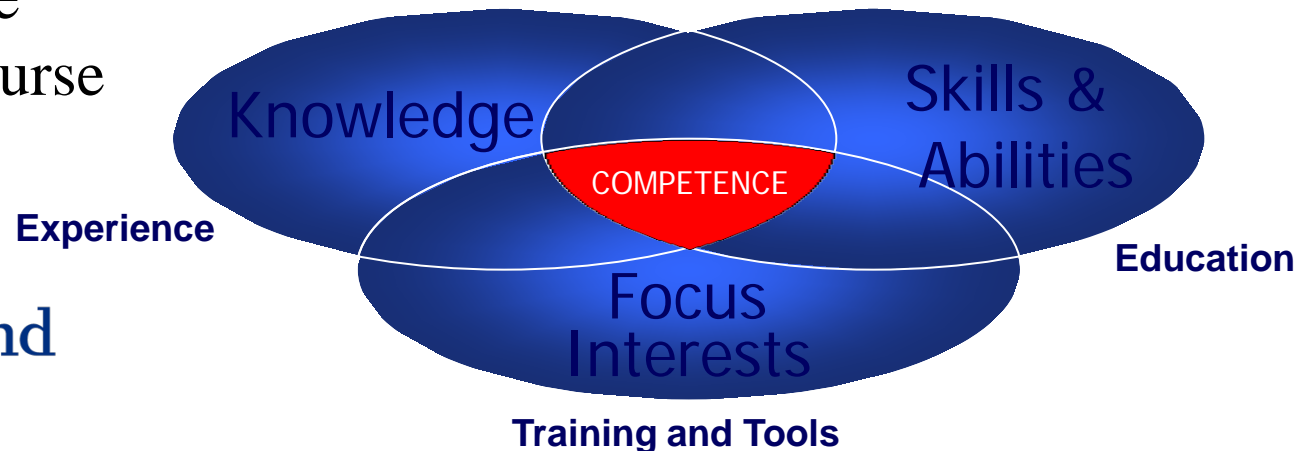


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System Engineering Acquisition Certification

- Develop Core Competencies
- Draft SE Certification Policy
 - Certification Policy defines requirements for Core Competencies
 - Education, Experience and Training
- Develop DHS specific courses to meet Core Competencies
 - Establish which Core Competencies will met with training
 - Develop Learning Objectives and Course Outlines
 - Develop Course
 - Pilot Course
 - Finalize Course

Level I: Remembering & Understanding
Level II: Applying & Analyzing
Level III: Evaluating & Creating (Synergizing)

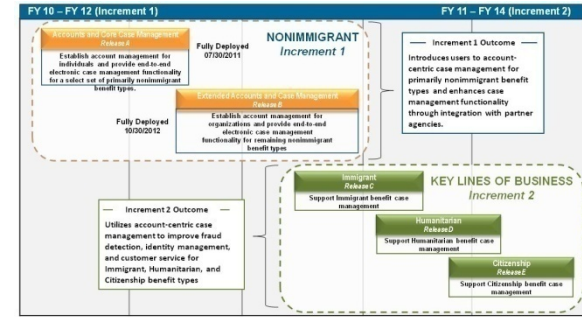


DHS Systems Engineering FFRDC



HS SEDI

Homeland Security Systems Engineering and Development Institute



Systems Engineering

- ▶ Architecture development
- ▶ Independent technical assessments
- ▶ Risk and opportunity analysis
- ▶ Software systems engineering
- ▶ Modeling and simulation
- ▶ Test and evaluation
- ▶ Enterprise Systems Engineering
- ▶ Requirements Engineering

Acquisition SE Support

- ▶ Program/Project Management
- ▶ RFP development & source selection support
- ▶ Cost, schedule, performance, risk trades
- ▶ System concept development
- ▶ Requirements analysis
- ▶ Analysis of Alternatives
- ▶ Review/analysis of design, design alternatives
- ▶ Organizational Change Management

Integration & Interoperability

- Proof-of-Concept
- System of systems integration
- Experimentation
- Standards development



Homeland Security

Creating mission capability working through needs, opportunities and constraints

Summary

- DHS enterprise is much larger than the DHS and has a wide range of mission areas
- DHS has a civilian / law enforcement culture
- Acquisition still somewhat synonymous with procurement
- DHS realizes Systems Engineering needs to be institutionalized
- Stand-up Level I, II, & III SE certification program
- Updated SELC Guidance based on best practices across the Federal government and Industry
- Developing and refining new Integrated Investment Life Cycle Management (IILCM) process
- Looking to continue collaboration with other government agencies





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