Systems Engineering in DoD

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The Problem and Root Causes

- Problem Statement: Defense Acquisition programs are experiencing significant problems:
  - over cost
  - behind schedule
  - not operationally suitable or effective
- Root Causes:
  - The Defense Acquisition workforce has experienced significant "peace dividend" and "baby boomer" losses in critical personnel
  - Implementation of Acquisition Reform went too far in terms of streamlining or reducing policies and processes
    - The Department lacks adequately defined and enforceable criteria to assess program maturity at milestones with direct linkage to technical reviews
  - Incomplete, ineffective and/or unrealistic acquisition strategies and plans have resulted in poor program performance
  - Poor or incomplete Requirements development process

Proposed Solutions

- Solutions:
  - Early / Enhanced Life Cycle Engagement in Systems Engineering
  - Human Capital Strategic Plan
  - Systems Engineering Research

Enhanced Systems Engineering

- Actions:
  - Fostered Enhanced Systems Engineering Policy in DoDI 5000.02
    - Refined SE content through out the Acquisition Life Cycle (Milestones / Mandatory Technical Reviews)
    - Detailed SE uniquely, in DoDI 5000.02 - Enclosure 12
  - Established new policy on key SE Design Considerations (Reliability, Availability, Maintainability (RAM))
  - Promulgated focused and expanded SE Guidance IAW Policy
    - Formalized design reviews and SE Processes for accountability
    - Authored sections of Defense Acquisition Guidebook update
    - Partnered in establishing RAM-C Guidebook and Contract Language
    - Continuing updates to Defense Acquisition Program Support methodology supporting Program Support Reviews

"Implement the right activities at the right time in the right way"

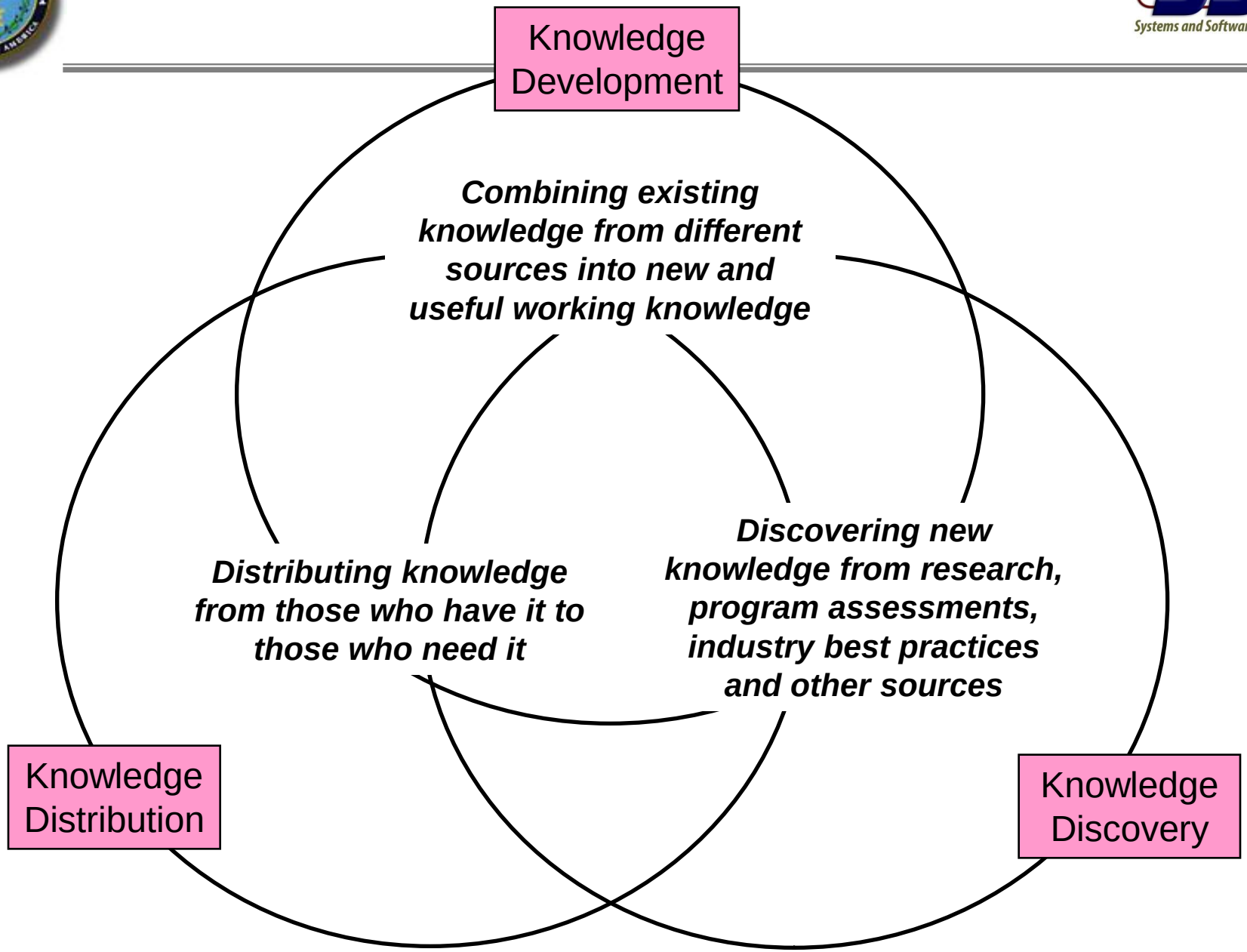
Human Capital Strategic Plan

- Actions:
  - Improving the Defense Acquisition Workforce by:
    - Recruiting and Hiring Qualified Personnel / Highly Qualified Experts
    - Training and Developing Defense Acquisition Personnel
    - Retaining and Recognizing Qualified Personnel
  - Evaluating and Improving SE Competencies through:
    - Education (Universities and associated Service Colleges)
    - Training (DAU)
    - Experience Opportunities (e.g., rotations, OJT)

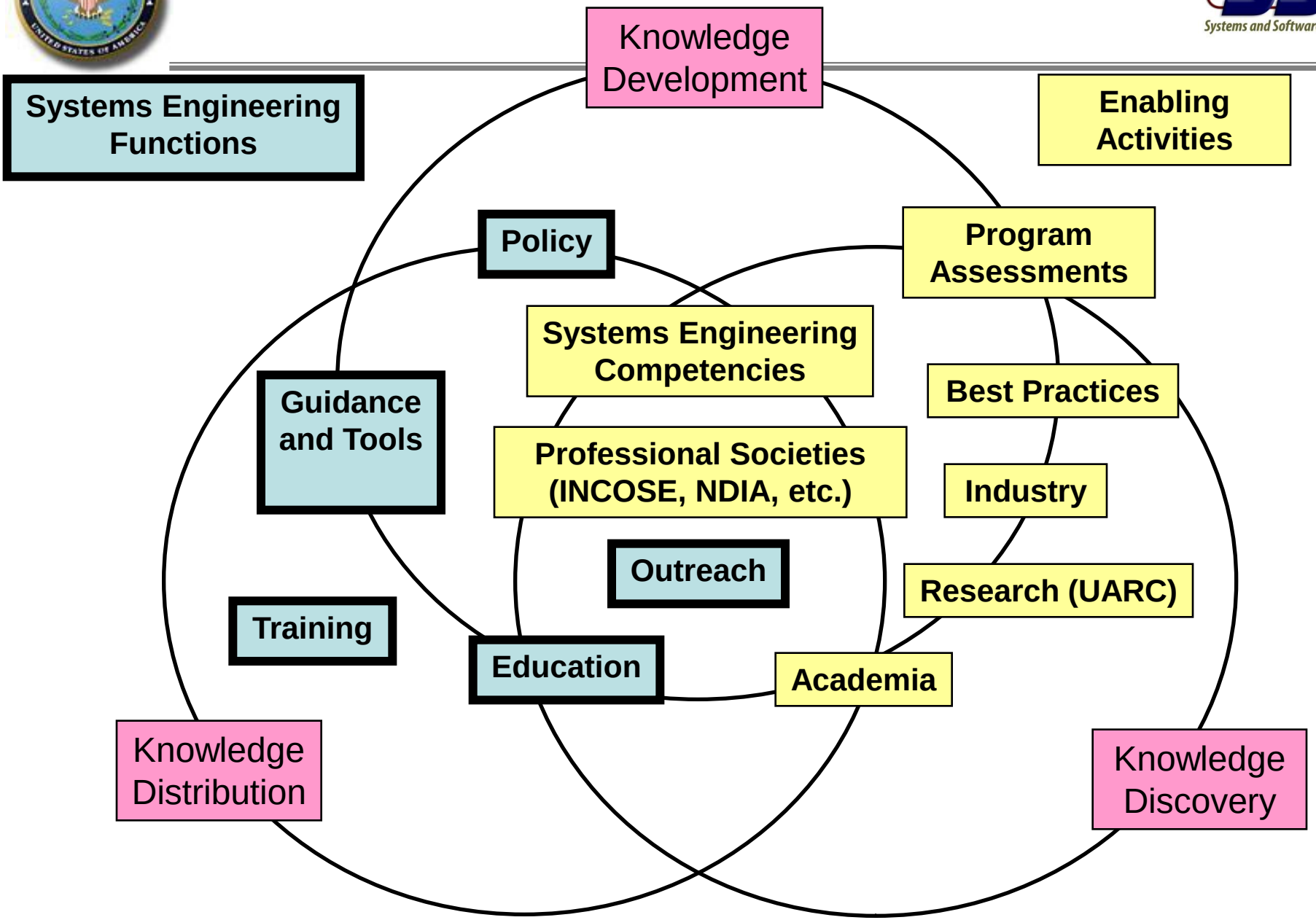
Systems Engineering Research

- Actions:
  - Systems Engineering Research
    - Established SE Research University Affiliated Research Center (UARC) at Stevens Institute of Technology
      - Technical Task Order-based research opportunities
        - » OSD / Components fund desired research
        - » Knowledge shared across all associated universities

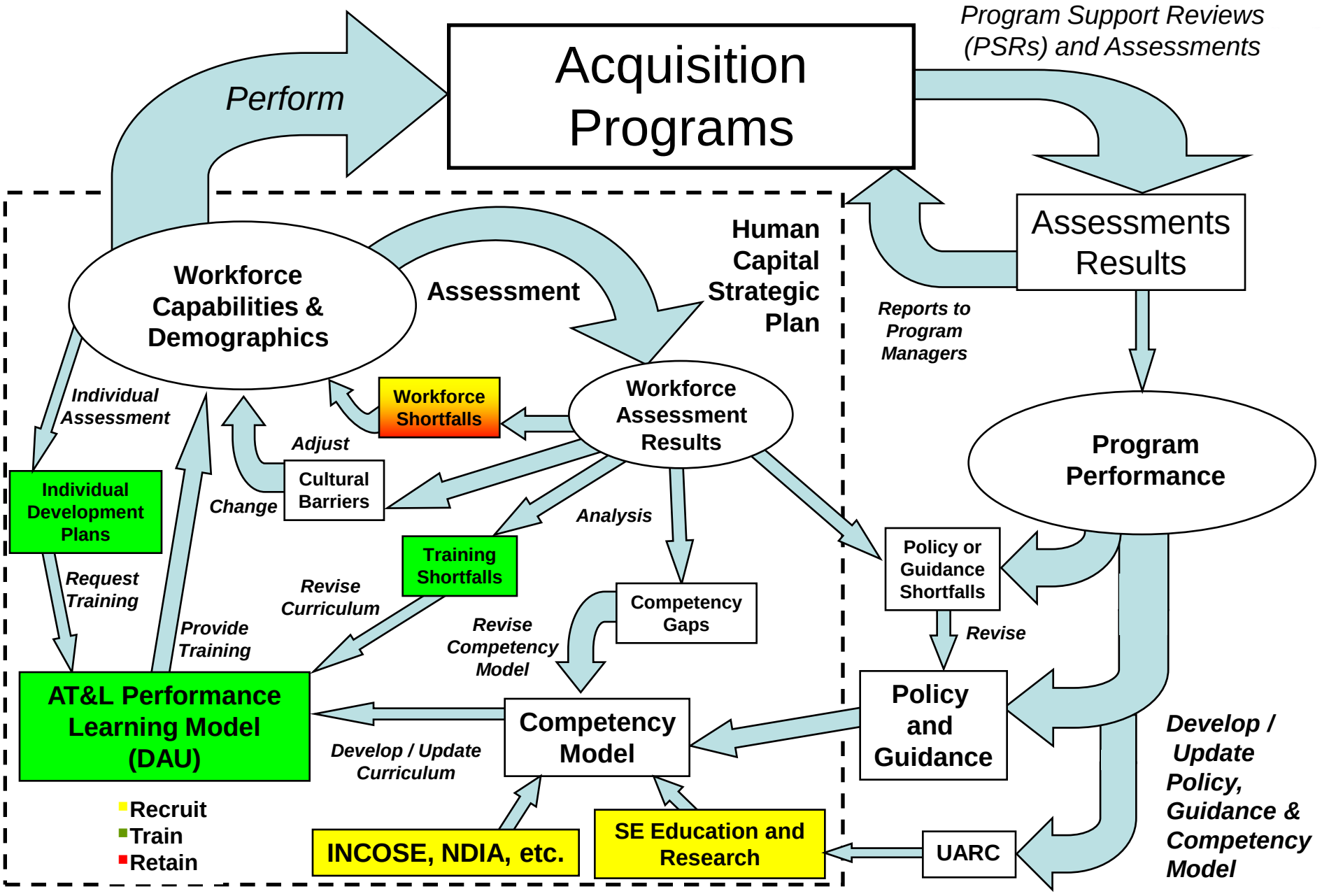
Systems Engineering Knowledge Map



Systems Engineering Knowledge Map



Systems Engineering Knowledge Flow



Systems Engineering Policy

- Draft OSD Acquisition Policy (DoDI 5000.02) is in for final signature ... substantial changes to the early acquisition process (in consonance with NRC Study), including
  - Mandatory Materiel Development Decision (MDD)
  - Mandatory competing prototypes before MS B
  - **Mandatory PDR and report to the MDA before MS B**
  - Configuration Steering Boards at Component level to review all requirements changes
  - Mandatory government control of Class I changes no later than CDR for Configuration Management
- Renewed emphasis on manufacturing during system development:
  - Re-titles SDD phase to EMDD with two sub phases: Integrated System Design and System Capability and Manufacturing Process Demonstration
  - Establishes consideration of manufacturing maturity at key decision points
- Mandatory system-level CDR with an initial product baseline followed by a Post-CDR Report to the MDA
- Post-CDR Assessment by the MDA between EMDD sub-phases

This includes explicit recognition of Systems Engineering in all phases, but especially early in the acquisition life cycle

Systems Engineering Guidance

- Plans are underway to complete the update of all Systems Engineering (SE) documentation based on the updated Policy:
  - Defense Acquisition Guidance (DAG) Chapter 4 (SE)
  - Systems Engineering Plan (SEP)
  - Integration of Systems Engineering into Contracts
  - Defense Acquisition Program Support (DAPS) methodology
- Impacting Requirements Generation earlier through Joint Staff recommendation for Capability Description Document early in the Technology Development phase to influence system design
- Published System of Systems Guide, Modeling & Simulation Guide, Test & Evaluation Contracts Guide
- Tools
  - Acquisition Guidance Model

Human Capital Initiatives (SE Education and Training)

- Re-coding of program level engineering specialty positions to Program Systems Engineer (PSE) is in progress across the Services.
  - Added additional training and experience requirements
    - Focus on enhancing SE in the early phases of acquisition
    - Broaden the competency set to include other career fields (e.g., PM, Logistics, Contracting)
    - Double the years of experience required for each DAWIA certification level
- Conducting Systems Engineering Competency Assessment in late 2008 / early 2009 (based on SME validation of competency model, to be completed in November 2008)
- Key contributors to DAU's "Requirements Manager" training curriculum for Joint Staff / Services personnel who develop and manage requirements
- Surveying SE Education curricula and programs for future leverage

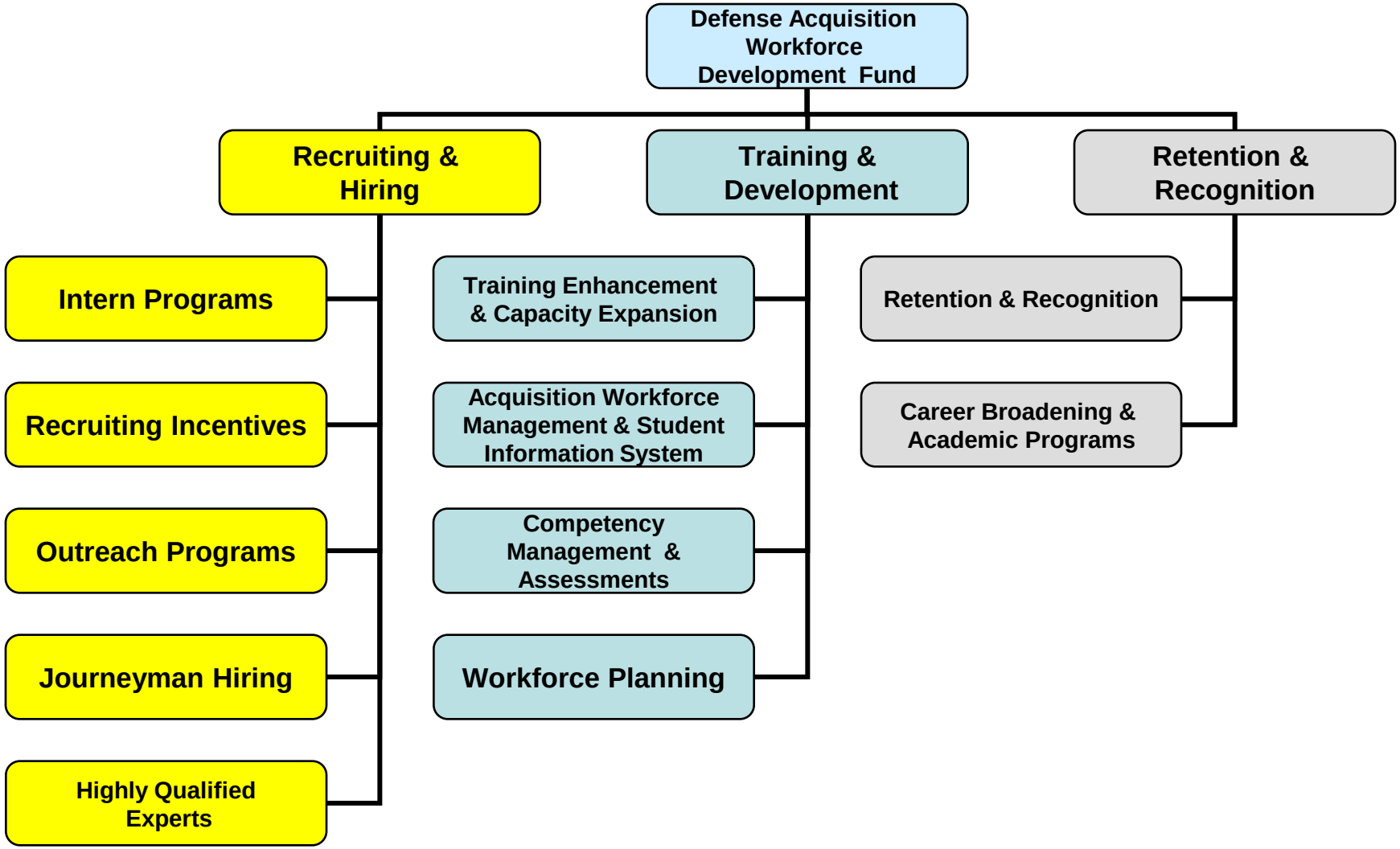
Human Capital Initiatives (SE Education and Training)

Defense Acquisition Workforce Development Fund (based on NDAA Section 852, Defense Acquisition Workforce Development Act)

- Recruiting and Hiring:
  - Intern Programs.
  - Recruiting Incentives.
  - Outreach Programs.
  - Journeyman Hiring Programs.
  - Hiring Expert Knowledge – Highly Qualified Experts (HQE).
- Training and Development:
  - Training Enhancement and Capacity Expansion.
  - Comprehensive Acquisition Workforce and Student Information System.
  - Competency Management and Assessments.
  - Workforce Planning Pilot Program.
- Retention and Recognition:
  - Retention and Recognition Incentives.
  - Career Broadening and Academic Programs.

Human Capital Initiatives

(Defense Acquisition Workforce Development Fund [1])



[1] Based on NDAA Section 852, Defense Acquisition Workforce Development Act

Examples of SSE Outreach (1)

- Conducted cross-Service / OSD PDR Workshop, examining the impact of the movement of PDR prior to Milestone B decision point.
  - Developed updates / improvements to the draft Guidance based on the results
- Defense Acquisition Program Support (DAPS) methodology used by SSE for Program Support Reviews is being shared with the Services
- Best Practices Clearinghouse - focused effort to leverage this Defense Acquisition University asset to provide an accessible repository of lessons learned and best practices across DoD and other agencies (e.g., NASA)
- Co-Chair of NDIA SE Division Education and Training Committee

Examples of SSE Outreach (2)

- Assisted INCOSE (International Council on Systems Engineering) in development of a certification program for Systems Engineers who work on DoD Acquisition programs, based directly on the Defense Acquisition Guidance (DAG). The designation is "CSEP - Acq"
  - Approval for DAU SYS-101 and -202 equivalency in work
- Working with Naval Postgraduate School SE Department and Air Force Institute of Technology / Center for Systems Engineering to help align their SE curriculum with Service and OSD policy and to facilitate equivalency with similar DAU SE courses
- Lead for 2009 Singapore-US Exchange Forum on Systems Engineering; focus will be on international SE competencies