



2015 Tactical Wheeled Vehicles Conference



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Outline

- Army Operating Concept
- Long Range Planning
- System Engineering





Army Operating Concept



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Concepts are about the Future



- **Concepts describe how commanders might employ future capabilities against anticipated threats to accomplish missions.**
- **Concepts establish the intellectual foundation for Army modernization.**
- **Concepts help Army leaders identify opportunities to improve future force capabilities.**
- **Concepts are NOT doctrine, but begin the process for delivering capabilities to future Army Forces**

“One of our most important duties as Army professionals is to think clearly about the problem of future armed conflict.”

- General David Perkins



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Concepts Guide Future Force Development.

Capstone Concept for Joint Operations



Army Capstone Concept



Army Operating Concept



Army Functional Concepts

Learn, Analyze, Assess...



Force 2025 Maneuvers



Solutions



- Doctrine
- Organization
- Training
- Materiel
- Leadership and education
- Personnel
- Facilities
- Policy

"The Army Operating Concept guides future force development through the identification of first order capabilities that the Army must possess to accomplish missions in support of policy goals and objectives."



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What the AOC does for the Army



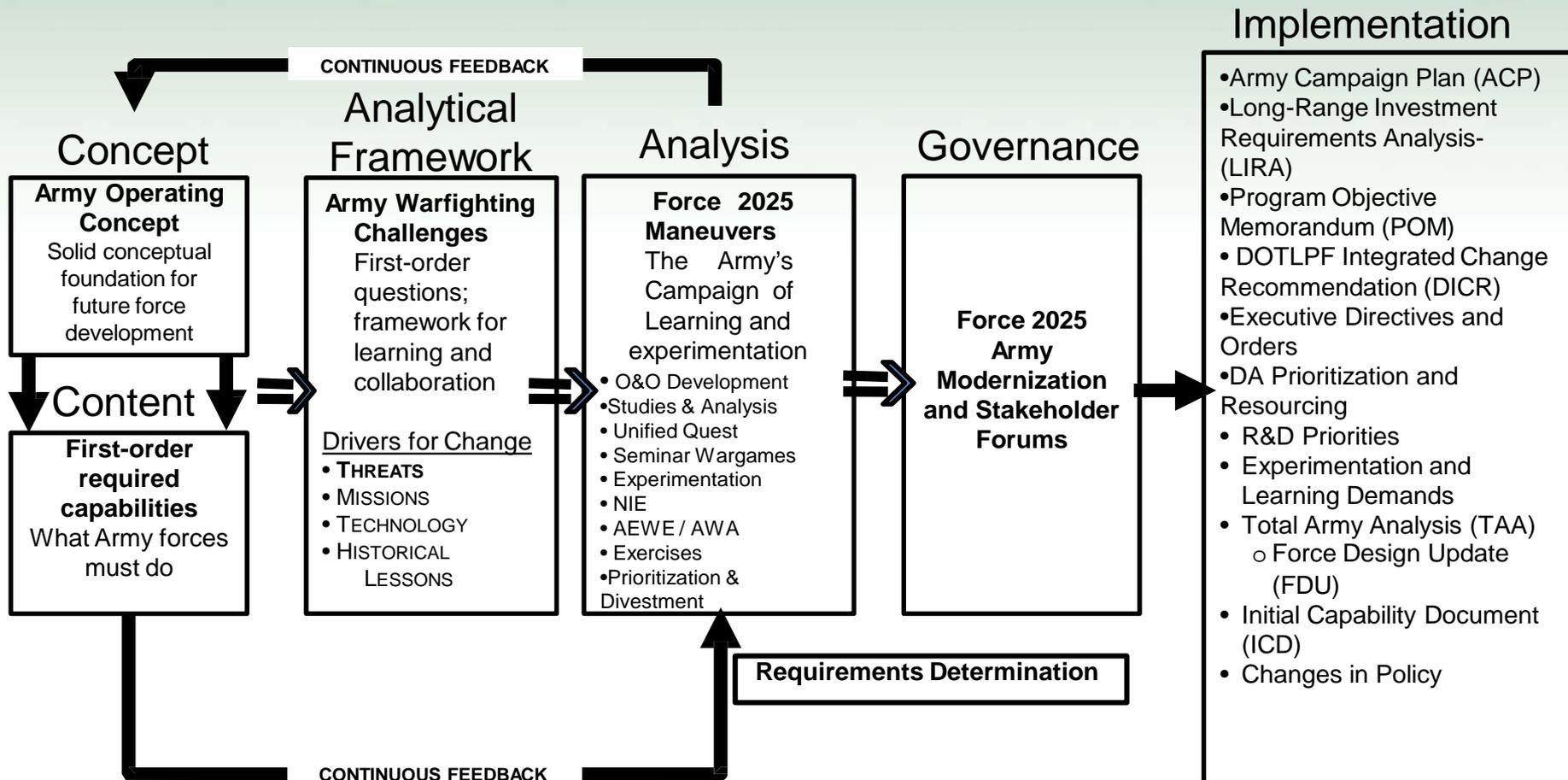
- Guides future force development through the identification of first order capabilities that the Army must possess to accomplish missions in support of policy goals and objectives.
- Describes how future Army forces, as part of joint, interorganizational, and multinational efforts, operate to accomplish campaign objectives and protect U.S. national interests.
- Describes how future Army forces:
 - ✓ Project power onto land and from land across the air, maritime, space, and cyberspace domains.
 - ✓ Provide foundational capabilities required by the Joint Force.



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Concepts to Capabilities: Building the Future Force



Focused and Sustained Collaboration across the Army and Key Stakeholders



Army Warfighting Challenges (AWFC) Overview

Future Warfare Division
Army Capabilities Integration Center



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AWFC Purpose



The Army Warfighting Challenges provide an analytical framework to integrate efforts across warfighting functions while collaborating with key stakeholders in learning activities, modernization, and future force design.

– **The US Army Operating Concept: Win in a Complex World,**
31 Oct 2014

The AWFCs provide a foundation for Army concept and capability development and **serves as the lens to evaluate the effectiveness** of all recommended changes to the current and future force. ARCIC uses the **AWFC Framework as the organizing construct** to lead future force development and integration efforts.



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AWFC Short Titles

Army Warfighting Challenges will:

- ❖ Focus concept and capability development
- ❖ Allow the Army to integrate near-term, mid-term, and far-term efforts
- ❖ Enable sustained collaboration across the community of practice (including Army Staff and Major Commands)

1. Develop Situational Understanding
2. Shape the Security Environment
3. Provide Security Force Assistance
4. Adapt the Institutional Army
5. Counter Weapons of Mass Destruction
6. Conduct Homeland Operations
7. Conduct Space and Cyber Electromagnetic Operations and Maintain Communication
8. Enhance Training
9. Improve Soldier, Leader, and Team Performance
10. Develop Agile and Adaptive Leaders
11. Conduct Air-Ground Reconnaissance
12. Conduct Joint Expeditionary Maneuver and Entry Operations
13. Conduct Wide Area Security
14. Ensure Interoperability and Operate in a Joint, Interorganizational, and Multinational Environment
15. Conduct Joint Combined Arms Maneuver
16. Set the Theater, Sustain Operations, and Maintain Freedom of Movement
17. Integrate Fires
18. Deliver Fires
19. Exercise Mission Command
20. Develop Capable Formations

Army Warfighting Challenges are enduring first-order problems, the solutions to which improve the combat effectiveness of the current and future force



Concepts to Capabilities:



AWFC methodology:

Problem Statement

Running Estimate

Learning Demands

Integrated Learning (and Analysis) Plan

Interim Solution Strategy

CONTINUOUS FEEDBACK

Concept

Army Operating Concept
Solid conceptual foundation for future force development

Content

First-order required capabilities
What Army forces must do

Analytical Framework

Army Warfighting Challenges
Enduring first-order problems; framework for learning and collaboration

Drivers for Change

- THREATS
- MISSIONS
- TECHNOLOGY
- HISTORICAL INSIGHTS/ LESSONS LEARNED
- NEW APPLICATIONS OF CURRENT CAPABILITIES

Analysis

Force 2025 Maneuvers
The Army's campaign of learning

- Studies and Analyses
- Unified Quest
- Joint and Service Title 10 Wargames
- Seminar Wargames
- Experimentation
- NIE
- AEWE
- AWA
- Exercises

Governance

Force 2025 and Beyond Army Modernization Forums

DOTMLPF interim solutions and recommendations to adapt, evolve, and innovate

- NEAR (TODAY-2020)
- MID (2020-2030)
- FAR (2030-2040)

Implementation

- The Army Plan (TAP)
 - Army Strategic Plan (ASP)
 - Army Planning Guidance (APG)
 - Army Programming Guidance Memo (APGM)
- Army Campaign Plan (ACP)
- Executive Directives and Orders
- DA Prioritization and Resourcing Decisions
- Long-Range Investment Requirements Analysis (LIRA)
- Program Objective Memorandum (POM)
- R&D Priorities
- Army Modernization Plan (AMP)
- Total Army Analysis (TAA)
 - Force Design Update (FDU)
- Initial Capability Document (ICD)
- DOT_LPF Integrated Change Recommendation (DICR)
- Changes in Policy

Requirements Determination

Capabilities Needs Analysis (Integrated CBA)
TRAC's F2025B Analytical Framework
Capability Development Scenario Strategy

CONTINUOUS FEEDBACK

TOTAL CAPABILITY VISIBILITY

FEEDBACK

CNA is a prioritization tool for ARCIC and TRADOC leadership to inform HQDA

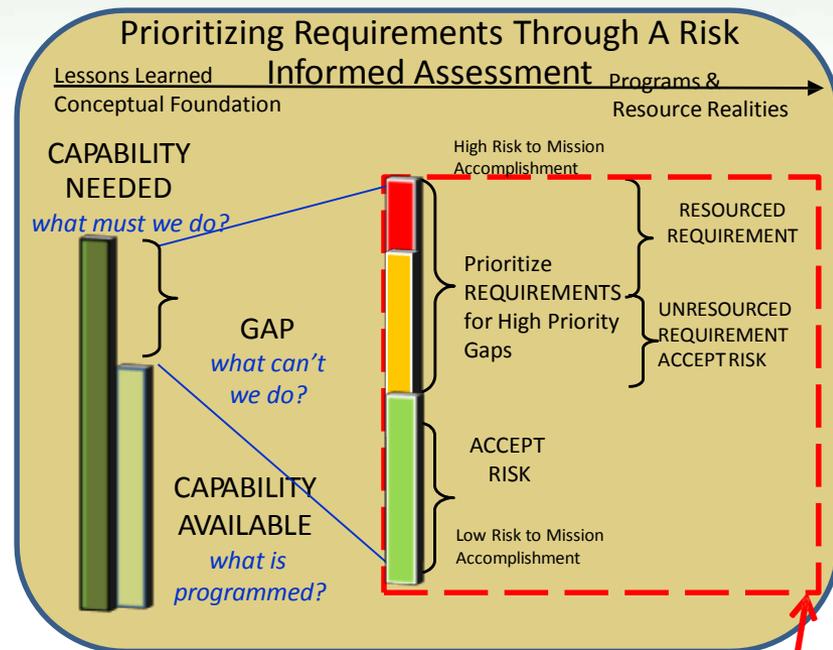
CNA Purpose Overview



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Informs prioritization of Army Capabilities Development and Resourcing to meet Joint Warfighting needs through a capabilities-based analysis across DOTMLPF given Strategic Guidance and results from other key capabilities development work.

- ❑ Identifies, assesses, orders and integrates *Army Warfighting Challenges and Required Capabilities with associated tasks* from Joint and Army Concepts based on Risk to Mission Accomplishment – ***what must we do?***
- ❑ Assesses, orders and integrates: Solutions across Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities associated with Army Required Capabilities – ***what is programmed?***
- ❑ Identifies, assesses and orders: *Capability Gaps* - ***what can't we do?***
- ❑ Identifies, assesses and orders: recommended capability solution approaches to solve critical capability gaps - ***where do we focus future investment?***
- ❑ Uses Prioritized Results to influence development of the Army Program Objectives and drive capabilities development activities



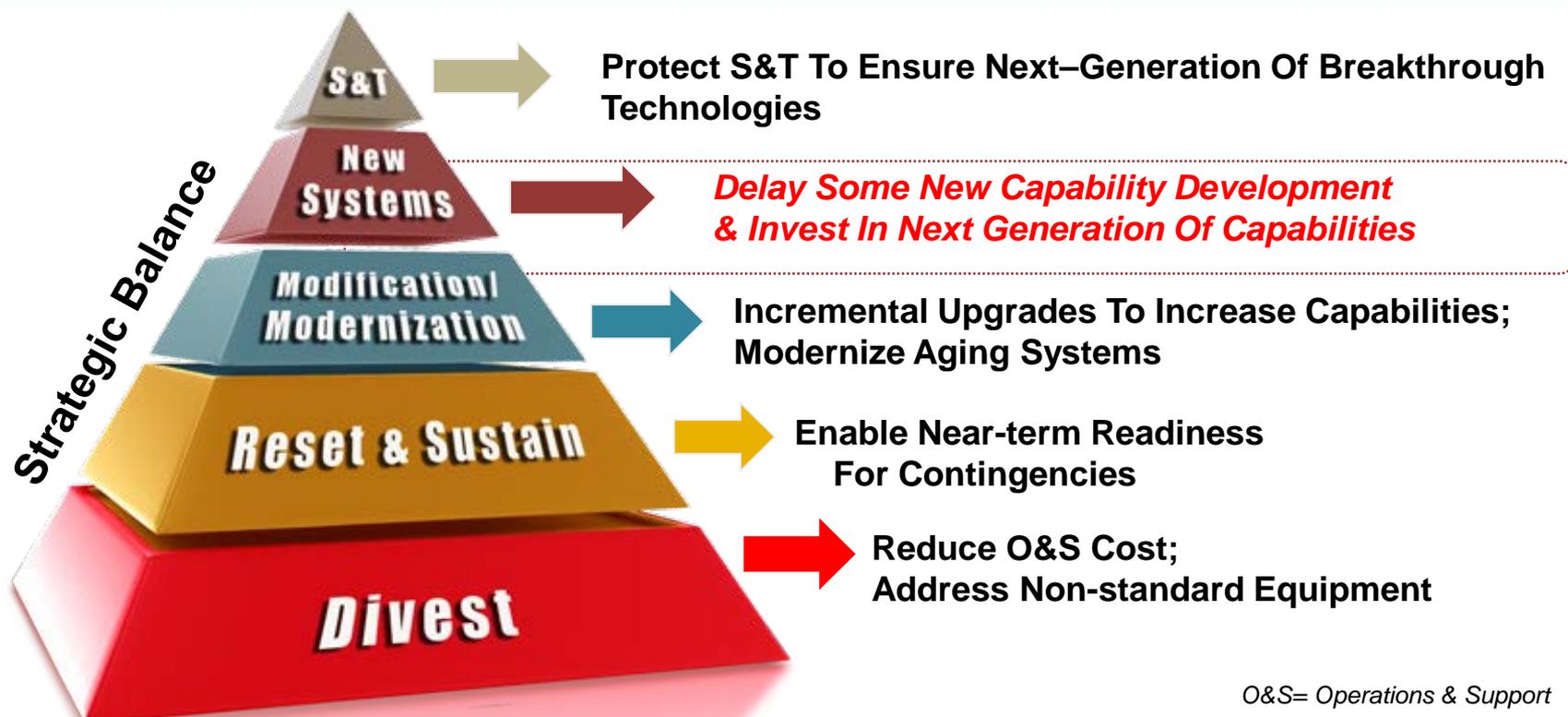
Enables Focusing Developments Efforts to Reduce Risk and Balance the Force



Modernization Strategy in a Fiscally Challenged Environment



- Reduce procurement quantities to match force structure reductions
- Gained efficiencies
 - Leveraging multi-year procurement (Black Hawk, Chinook)
 - Incorporate Better Buying Power initiatives (contracting, should-cost, competition)



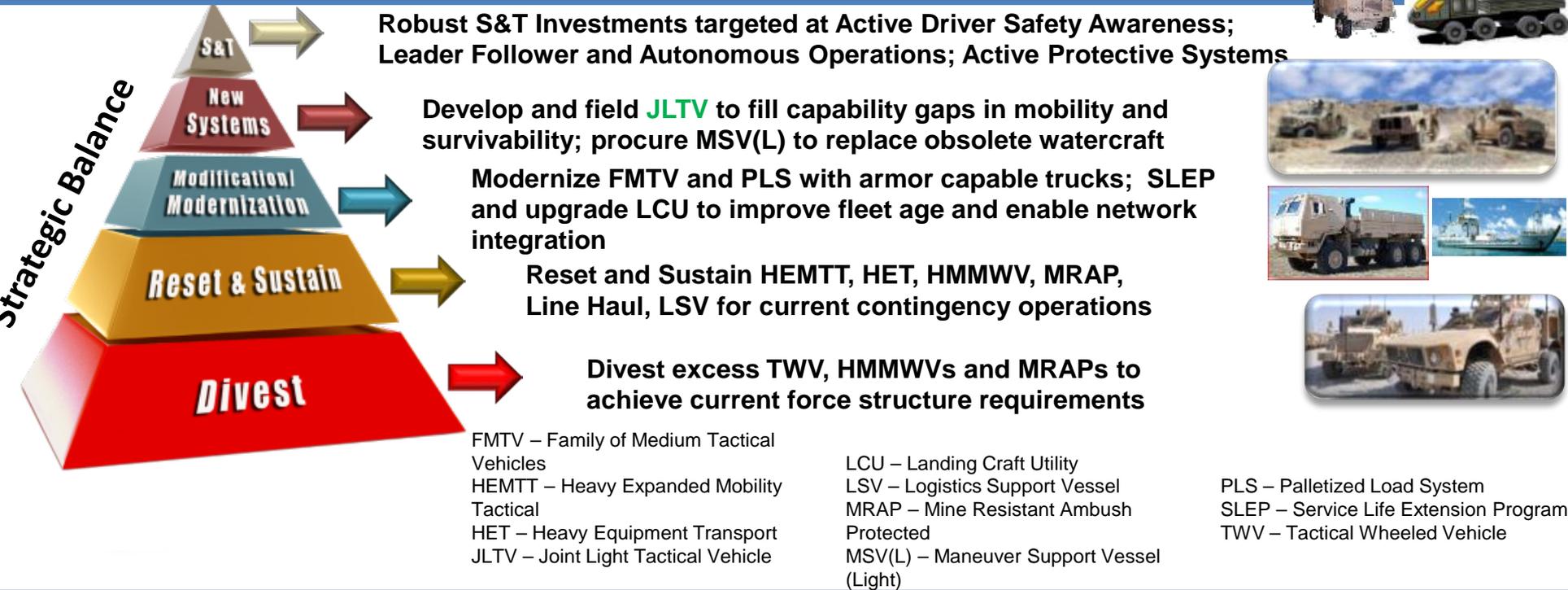
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Sustainment (Transportation)



The Army's objective is to maintain modern and capable TWV and watercraft fleets. The portfolio will meet the near term capability gaps in mobility, network integration, and survivability through the combination of new procurement, recapitalization, SLEP, and reset. The Army will divest excess vehicles to reduce sustainment and OPTEMPO costs.

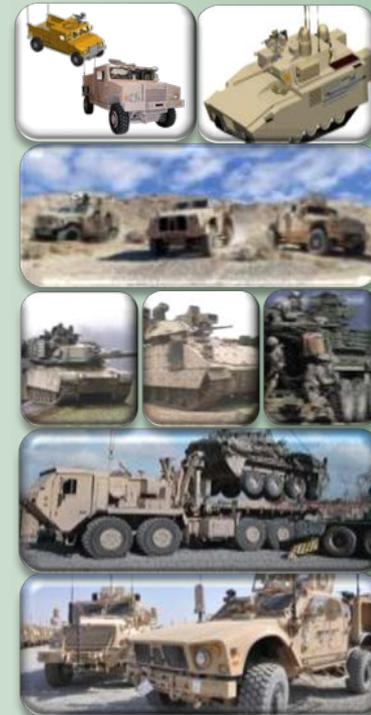
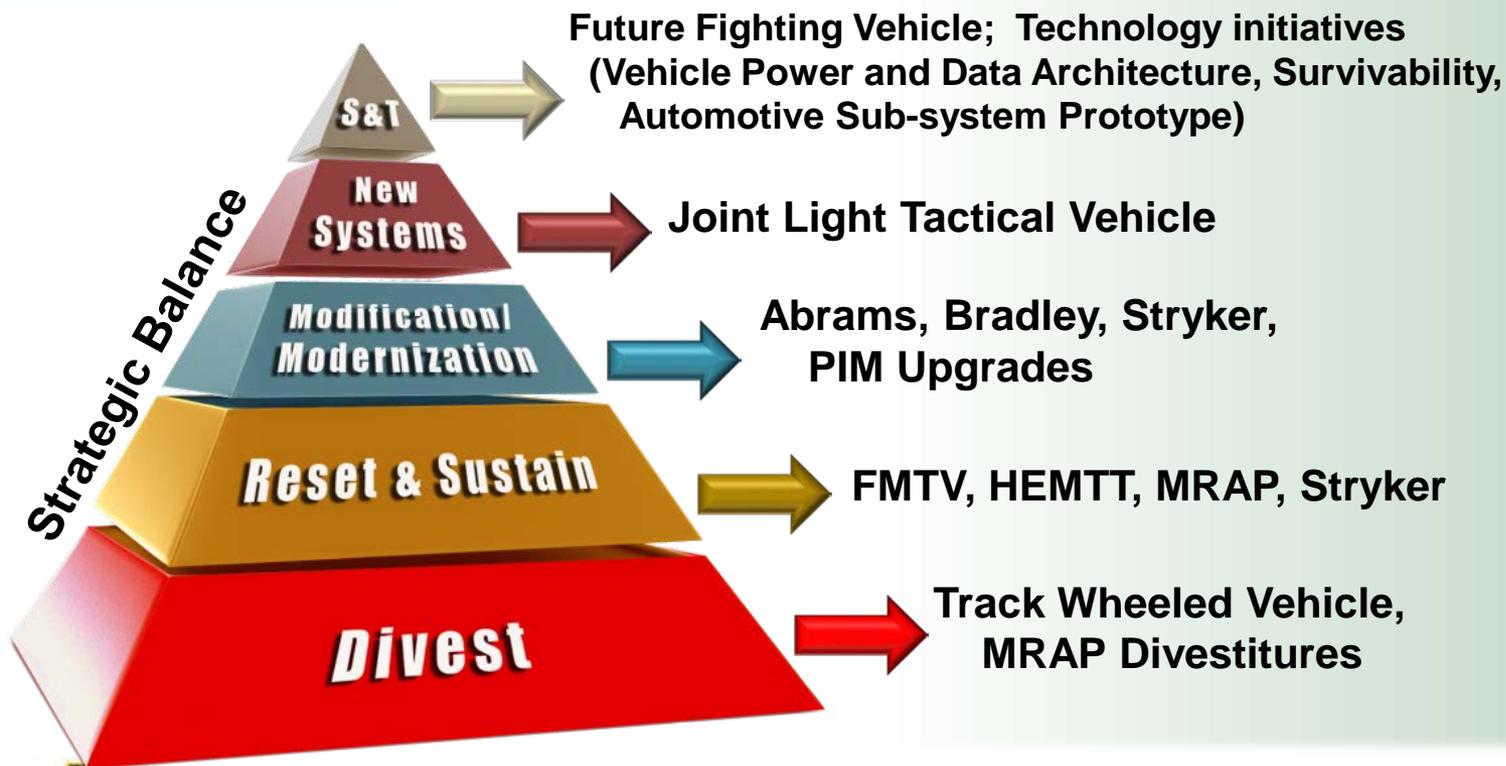


- Modernize Tactical Wheeled Vehicle fleet to provide protected mobility and maintain a 15 yr average age
- Modernize Army Watercraft Systems to conduct expeditionary sustainment and movement of Joint Forces
- Divest excess vehicles to reduce sustainment and OPTEMPO costs



Ground Portfolio

- Near-term focus on modernizing existing vehicles to counter current and future threats
- Assessing Trade Space in Next Generation IFV



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Portfolio Impacts



From FY12 to FY15
Army TOA Declines 17%
Army RDA Declines 34%



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Army Investments by Portfolio BES16 - \$2.4B (FY16)



Soldier/Squad

Soldier survivability equipment; human dimension/systems; Soldier-borne power & energy; training



Air

Advanced air vehicles; unmanned aerial systems; manned/unmanned teaming



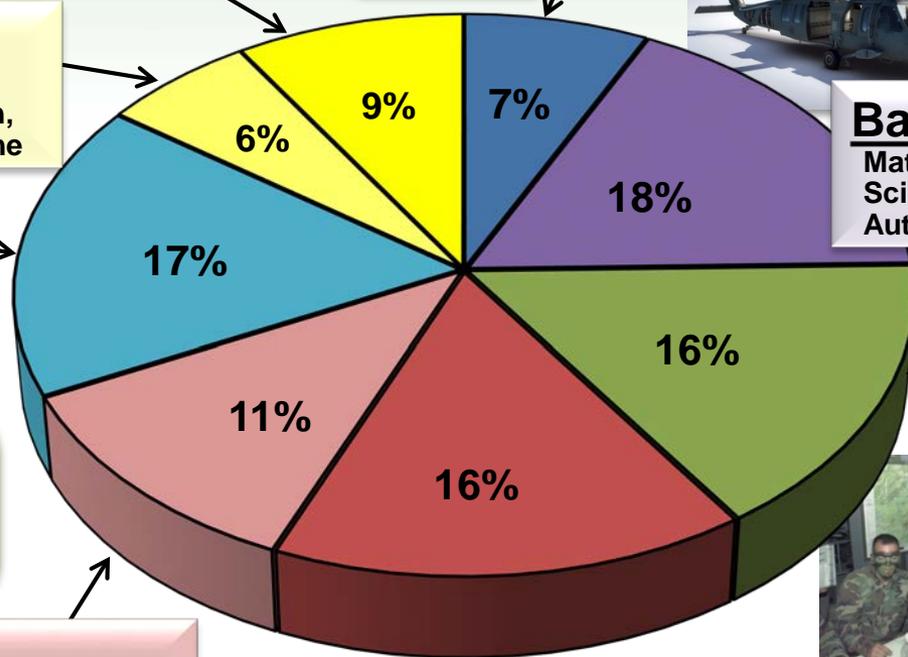
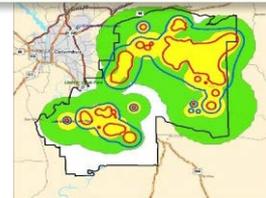
Basic Research

Materials Science; Medical/Life Sciences; Quantum/Info Science; Autonomy; Networks



C3I

Secure Comms-on-the-move; cyber/EW; sensors

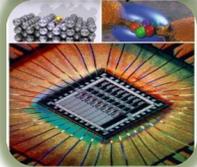


Medical

Combat Casualty Care, Infectious Disease mitigation, clinical/rehabilitative medicine

Innovation Enablers

High Performance Computing; Environmental Protection; Base Protection; Studies; Technical Maturation Initiatives; Procurement



Lethality

Offensive/Defensive kinetic (guns, missiles), Soldier Weapons, Directed Energy (HEL) weapons



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Ground Maneuver

Combat/tactical ground platforms/survivability; unmanned ground systems; austere entry; power & energy



Systems Engineering Perspectives



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What Does *IT* Take to be an Good Systems Engineer

- ***Related education*** – technical knowledge (design) and experience (different applications)
- ***Design*** – a thorough understanding of different design areas; approaches and implementations
- ***Leadership*** – management skills and the ability to communicate clearly and concisely on technical complex subjects and work areas
- ***Top to bottom perspective*** – a understanding of all levels of design, systems structures and associated execution / technical details
- ***Integration and test*** – the systems engineer must have experience and a good understanding of integration and test for a variety of IT system implementations
- ***Experience, experience, experience*** – on many different systems

- 
- ***Every PEO has some excellent systems engineers – but how best to apply these key resources***
 - ***How to leverage DoD available systems engineering expertise across numerous IT programs***
 - ***Likely, augmentation of available resources is needed while an overall systems engineering talent development is implemented***



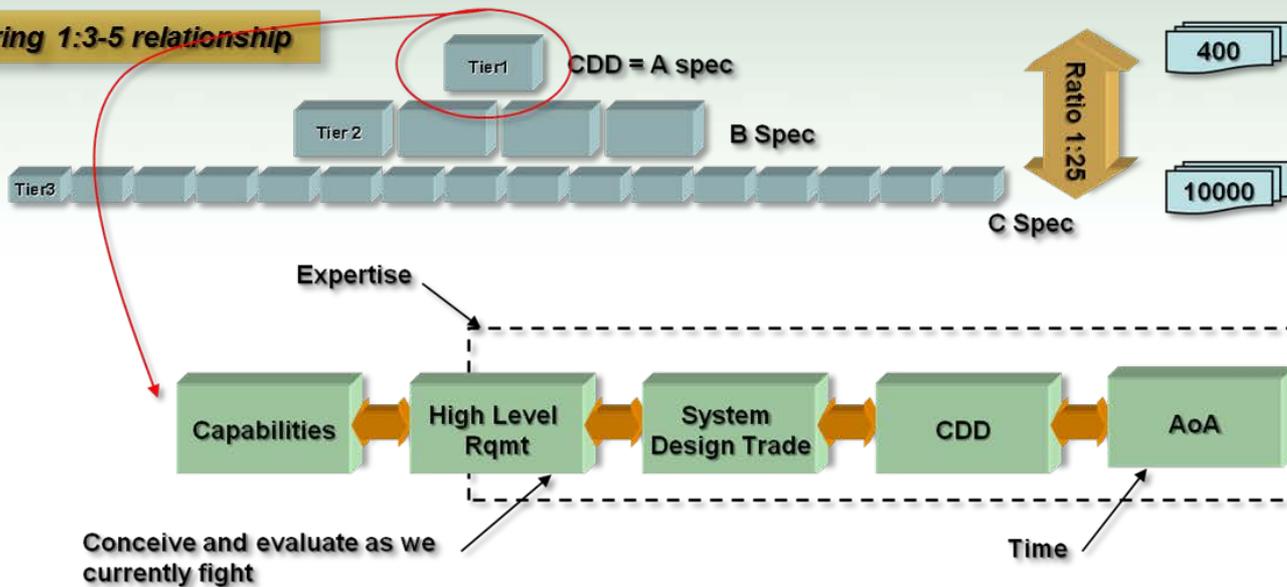


The Time Prior to Acquisition

Better Buying Power

Requirements depth dramatically affects the program schedule and cost

Engineering 1:3-5 relationship



- **Critical SE time before the acquisition period – JCIDS**
 - Too detailed documents lead to over defined requirements and significantly increased cost
- **Applying the right SE resources / expertise is critical**
 - How the system design is evaluated and the extensive time to do AoAs

◦ The application of program SE's during the requirements generation to determine the right system definition depth is critical to the end cost

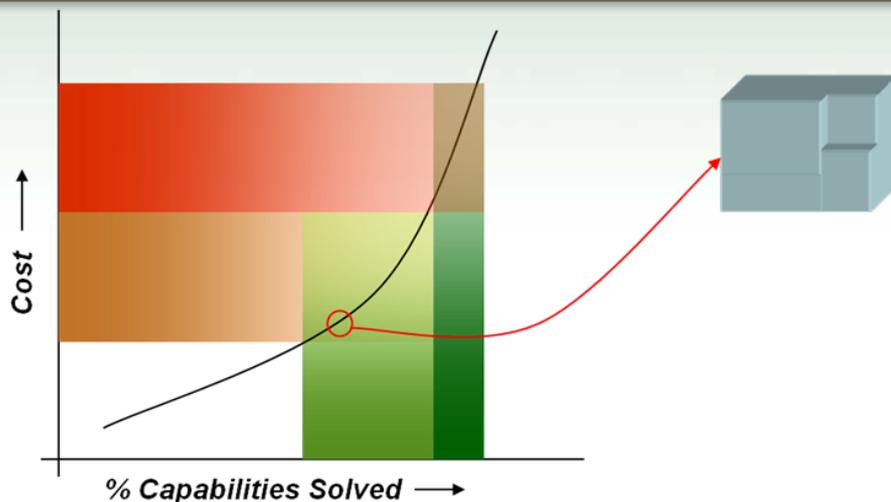
◦ Programs more often than not do not enter into the requirements definition phase – an error





The Almost Existing Solution to Rapid Adaptability

Understanding the level of completion translates into both schedule and cost



- Cost impact for capabilities – which capabilities
- Not all requirements are the same
- Cyclic assessment / design approach
- Where is the issue – distributed?
- Accuracy of the capability solution vs. cost analysis

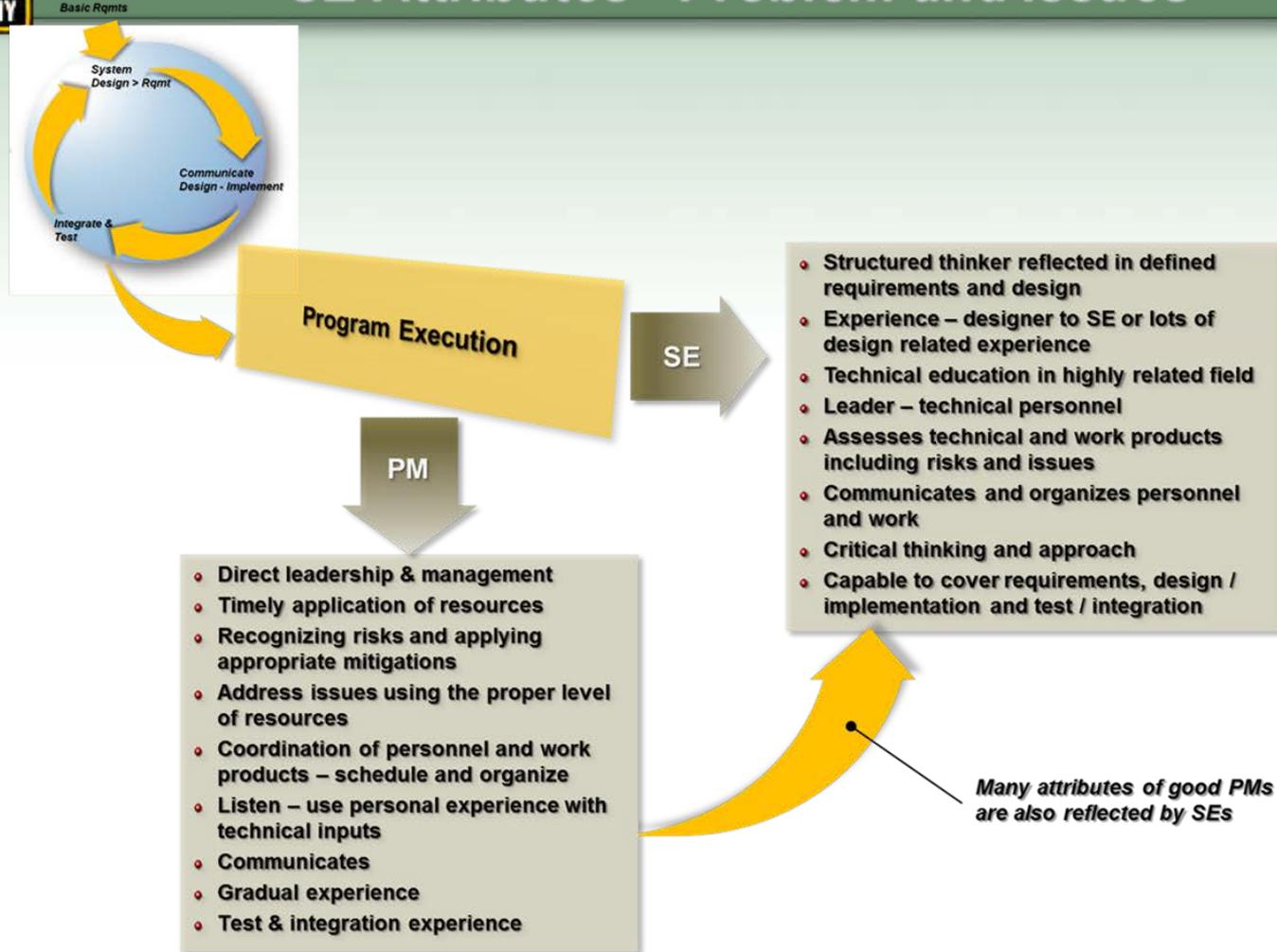
• SE's spanning both the requirements definition (actually the initial design) and the implementation phases should understand what capabilities can be partially solved

• This approach offers significant insight into the point of maximum return for the investment injected investment level





SE Attributes - Problem and Issues

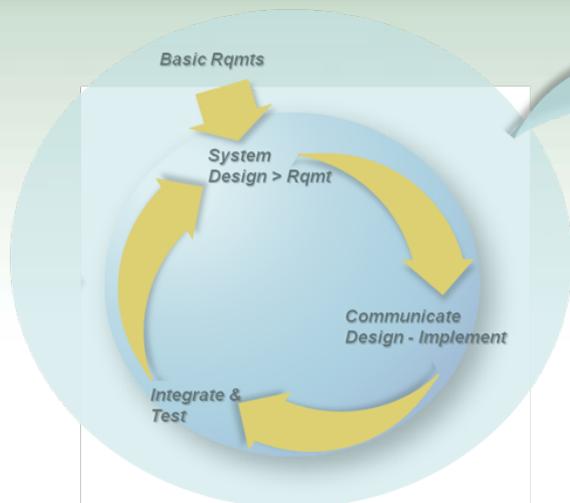


The SE must perform many technical tasks and display technical attributes but also a major cross section a program manager characteristics





System Engineering Perspectives



- Many programs are missing key Systems Engineering at all phases
- Contractors are also missing many of the needed SE actions and leadership aspects
- The results are surfacing as execution issues and transforming these into cost, schedule and technical performance problems

- **Requirements** – the allocation of critical or right performance metrics and parameters are lacking in clarity and importance to the deliverable
 - Hierarchy of requirements and the cost/execution within the implementation are lacking
 - The identification and attention to driving requirements is definitely missing
- **Execution** – the execution phase is missing considerable details and SE leadership
 - Block diagrams are general and lack detailed information critical to the implementation
 - Technical risk and issues identified, allocated and addressed is lacking
 - Execution schedules and associated key technical aspects are missing
 - A thorough understanding of the technical aspects – solution approach, off ramps, risks, alternate means, critical driving SE item, focus of key SE/designers, etc. are missing
- **Integration and Test** – in general, the systems engineers seem to be missing
 - Integration approach and sub-system testing
 - Identification of issues and the immediate application of technical expertise





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Cyber Systems Engineering



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Resilience Consideration and Approach

- The normal cyber defensive discussion centers on a perimeter defense
 - The defense virtually always goes to the network defense and the need to have security stacks, firewalls and network management
 - While this perimeter defense discussion is constructive, it is incomplete
 - The missing element is within the perimeter of subnet attachment points
 - It must be recognized that the threat will obtain entry through the perimeter defensive structure
 - The structures considered are those network defense points of attack – entrance
- There are two types of resilience in cyber defensive structures – the connectivity fabric and the internal functional performance with the associated product
 - Network resilience is:
 - Satellite, airborne, space, LOS, sea, etc.
 - To insure information is transferred from a network origin node to a destination node now matter disruption occurs on a network media or path
 - Internal functional defense is much more difficult and complex
 - Deals with the threat entrance into the functional system perimeter as well as the functional subsystem attachment points
 - Detection of the threat, isolation of the threat, and identification of the damage

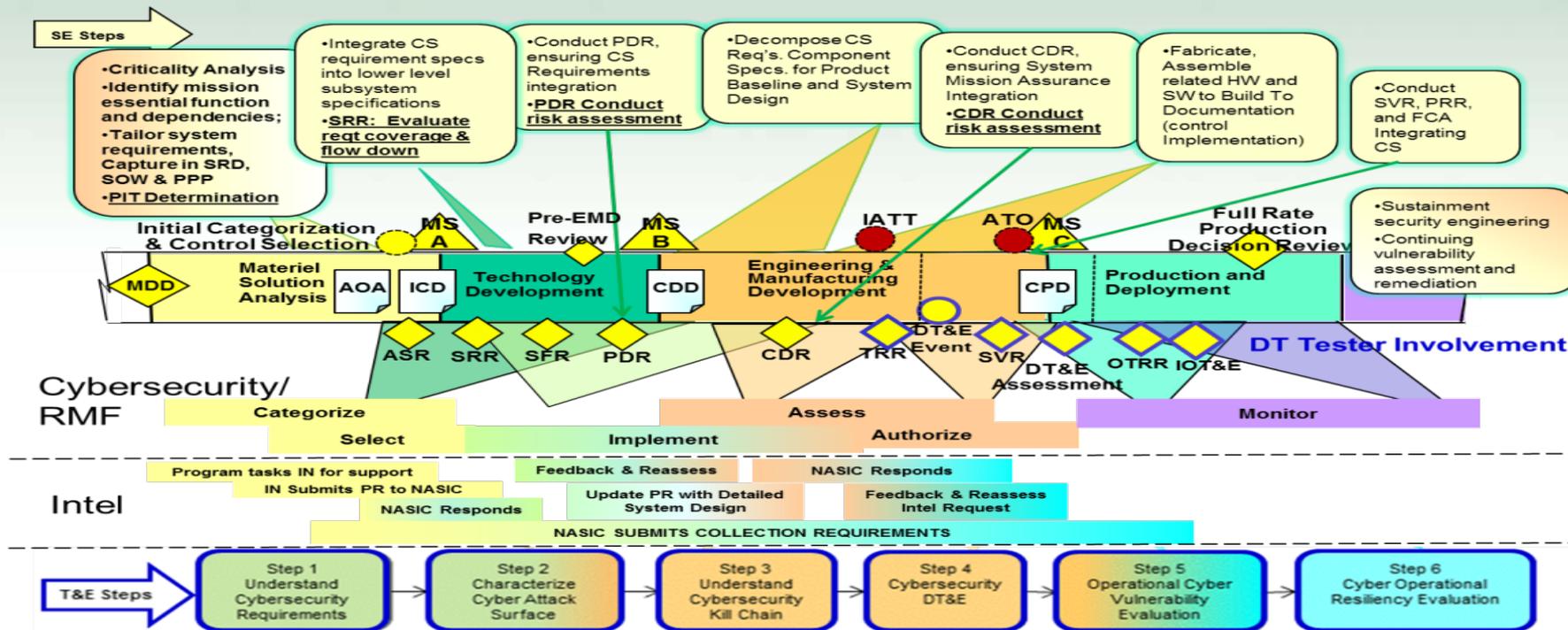
Internal functional resilience is considerably more difficult to achieve than a perimeter defense



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Systems Approach – Both Development and Sustainment Programs



- Across the acquisition process the demand on engineering resource will increase both during development and in sustainment
 - System security engineering, development and operational testing, software assurance
 - For completed systems there is a new requirement but few cyber rich system engineers

Lead Systems Engineers with Cyber Experience are in Short Supply



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Summary



- Know the Army's Operating Concept and Process
- Pay Attention to the Long Range Investment Planning
- Good System Engineering is key to Program Success





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Questions



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