2015 Tactical Wheeled Vehicles Conference
Outline

- Army Operating Concept
- Long Range Planning
- System Engineering
Army Operating Concept
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
“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.”
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.
Concepts to Capabilities: Building the Future Force

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
First-order questions; framework for learning and collaboration

Drivers for Change
- Threats
- Missions
- Technology
- Historical Lessons

Analysis
Force 2025 Maneuvers
The Army’s Campaign of Learning and experimentation
- O&O Development
- Studies & Analysis
- Unified Quest
- Seminar Wargames
- Experimentation
- NIE
- AEWE / AWA
- Exercises
- Prioritization & Divestment

Governance
Force 2025 Army Modernization and Stakeholder Forums

Implementation
- Army Campaign Plan (ACP)
- Long-Range Investment Requirements Analysis (LIRA)
- Program Objective Memorandum (POM)
- DOTLPF Integrated Change Recommendation (DICR)
- Executive Directives and Orders
- DA Prioritization and Resourcing
- R&D Priorities
- Experimentation and Learning Demands
- Total Army Analysis (TAA)
  - Force Design Update (FDU)
  - Initial Capability Document (ICD)
  - Changes in Policy

Focused and Sustained Collaboration across the Army and Key Stakeholders

CONTINUOUS FEEDBACK

DESIGN • DEVELOP • DELIVER • DOMINATE
SOLDIERS AS THE DECISIVE EDGE
Army Warfighting Challenges (AWFC) Overview

Future Warfare Division
Army Capabilities Integration Center
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 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.
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:

**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

**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

**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 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

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

**UNCLASSIFIED**
CNA Purpose Overview

- 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)

Protect S&T To Ensure Next-Generation Of Breakthrough Technologies

Delay Some New Capability Development & Invest In Next Generation Of Capabilities

Incremental Upgrades To Increase Capabilities; Modernize Aging Systems

Enable Near-term Readiness For Contingencies

Reduce O&S Cost; Address Non-standard Equipment

O&S= Operations & Support
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
• Near-term focus on modernizing existing vehicles to counter current and future threats
• Assessing Trade Space in Next Generation IFV
Portfolio Impacts

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

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

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

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

C3I
Secure Comms-on-the-move; cyber/EW; sensors

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

Ground Maneuver
Combat/tactical ground platforms/survivability; unmanned ground systems; austere entry; power & energy
Systems Engineering Perspectives
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

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

Program Execution

- Structured thinker reflected in defined requirements and design
- Experience – designer to SE or lots of design related experience
- Technical education in highly related field
- Leader – technical personnel
- Assesses technical and work products including risks and issues
- Communicates and organizes personnel and work
- Critical thinking and approach
- Capable to cover requirements, design / implementation and test / integration

PM

- Direct leadership & management
- Timely application of resources
- Recognizing risks and applying appropriate mitigations
- Address issues using the proper level of resources
- Coordination of personnel and work products – schedule and organize
- Listen – use personal experience with technical inputs
- Communicates
- Gradual experience
- Test & integration experience

Many attributes of good PMs are also reflected by SEs

The SE must perform many technical tasks and display technical attributes but also a major cross section a program manager characteristics
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
Cyber Systems Engineering
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 mater 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
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
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
Questions