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***TRADOC Pamphlet 525-66**

7 March 2008

Military Operations

FORCE OPERATING CAPABILITIES

FOR THE COMMANDER:

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History. This publication is a rapid action revision. The portions affected by this rapid action revision are listed in the summary of change.

Summary. U.S. Army Training and Doctrine Command (TRADOC) Pamphlet (Pam) 525-66 identifies capabilities necessary of the Army to fulfill warfighting concepts. TRADOC Pam 525-66 guides TRADOC and other Army commands who determine, document, or are otherwise involved in warfighting requirements and Army staff elements who are involved in determining, documenting, and processing requirements. The force operating capabilities (FOC) contained herein are structured statements of operational capabilities which, when achieved in aggregate, fulfill the vision articulated in the joint and Army Concepts as they apply to the future Modular Force. FOCs provide focus to the Army's Science and Technology Master Plan and warfighting experimentation.

Applicability. This pamphlet applies to Headquarters (HQ) TRADOC and its subordinate commands, centers, schools, and battlefield laboratories. It also guides other Army commands that determine, document, or are otherwise involved in warfighting requirements and Army staff elements who are involved in determining, documenting, and processing requirements. They apply to tomorrow's Army, conducting overmatching decisive operations on the information age battlefield, and beyond.

*This pamphlet supersedes TRADOC Pamphlet 525-66, dated 1 July 2005.

Proponent and exception authority. The proponent for this pamphlet is the Director, Army Capabilities Integration Center (ARCIC). The proponent has the authority to approve exceptions or waivers to this regulation that are consistent with controlling law and regulations.

Suggested improvements. Send comments and suggested improvements on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to Director, ARCIC, (ATFC-DS), 30 Ingalls Road, Fort Monroe, VA 23651-1046. Suggested improvements may also be submitted using DA Form 1045 (Army Ideas for Excellence Program Proposal).

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Summary of Change

TRADOC Pam 525-66
Force Operating Capabilities (FOC)

This rapid action revision, dated 7 March 2008.

o Adds information about the Joint Capabilities Integration and Development System process (para 1-2).

o Notes that FOC lead responsibilities are in the Army Concept and Capability Development Plan (para 1-2).

o Updates administrative revisions to include terms, subjects, text boxes, and references throughout the pamphlet.

o Updates concepts and terminology to the current standard throughout the publication.

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Chapter 1
Introduction

1-1. Purpose
This pamphlet describes force operating capabilities (FOC) desired for the Army near, mid and long term, encompassing the full spectrum of military operations, derived from analysis of joint concepts, future Modular Force concepts, and other documents developed in support of National Military Strategy, Strategic Planning Guidance, Army Strategic Planning Guidance, the Army Transformation Road Map, and the Army Campaign Plan. This pamphlet provides information about the Joint Capabilities Integration and Development System (JCIDS) process. FOC lead responsibilities are updated annually in the Army Concept and Capability Development Plan.

1-2. References
Required and related publications are listed in appendix A.

1-3. Explanation of abbreviations and terms
Abreviations and special terms used in this pamphlet are explained in the glossary.

1-4. FOC Process

a. FOCs are statements of operational capabilities required by the Army to develop the warfighting concepts approved by the Commanding General, U.S. Army Training and Doctrine (TRADOC). FOCs address specific warfighting capabilities not functions or operations. They describe those capabilities in operational terms, what must be done; not how to do it. The FOCs provide a stand alone description of the capability. FOCs are enduring; they apply to tomorrow's Army, but may be equally relevant to today's or yesterday's Army.

b. FOCs do not describe a deficiency or shortcoming. They do not provide or identify a system specification, specific technology, organization or time frame and they do not encompass an entire branch or functional concept. FOCs do not use relational or comparative words or phrases. FOC lead responsibilities are covered in the Army Concept and Capability Development Plan.

c. Applications.

(1) FOCs articulate required and desired capabilities which form the basis for determining warfighting requirements in doctrine, organizations, training, materiel, leadership, personnel and/or facilities (DOTMLPF) systems. FOCs will form the basis for conducting experimentation to define and refine requirements. FOCs state desired capabilities across the full dimension of operations.

(2) FOCs are used within the Army Science and Technology (S&T) Master Plan process to provide a warfighting focus to technology base funding.

(3) FOCs are employed in the Army technology objectives (ATO) process as the measure of warfighting merit. Candidate efforts selected as Army ATOs within this process are published

in the Army Science and Technology Master Plan as the most important S&T objectives for the Army Research and Development community. The ATO review provides the basis for the construct of Advanced Technology Demonstrations (ATD). Army ATOs receive senior Army leadership oversight and have priority for resourcing.

(4) ATDs address selected high priority FOCs and demonstrate a capability that does not currently exist. ATDs are resource intensive and provide the medium to conduct troop interaction with mature technologies. The ATD demonstration plan is jointly developed between TRADOC and the materiel developer with exit criteria established to execute the ATD. ATD management plans are briefed to a council of colonels and approved at the Army Science and Technology Workgroup (ASTWG).

1-5. Review
FOC Reviews.

a. FOCs may be updated at anytime given identification of new needs or opportunities for new capabilities.

b. At a minimum, ARCIC will review, update, and publish TRADOC Pam 525-66 on a biennial basis.

c. FOC elements to review and consider for updating include:

(1) TRADOC approved concepts.

(2) Operational lessons learned, including Center for Army Lessons Learned documents.

(3) CINC integrated priority lists.

(4) Opportunities from technology. TRADOC proponents will accrue awareness of opportunities from interaction with the S&T community throughout the course of the year. The intent of TRADOC proponents' interaction with technology should focus on understanding the potential battlefield capability benefits. In many cases, it will be TRADOC proponent personnel who see operational applications for technologies and/or research otherwise unforeseen by researchers/developers.

(5) It is incumbent upon both the combat developer and materiel developer personnel generate ideas of potential capability from nexus of technology opportunity and warfighting operational concepts.

d. Annual FOC review cycle. The following cycle is recommended:

(1) Year round: Combat developers accumulate inputs for FOC updates from sources listed above.

(2) Summer/Fall: Conduct internal FOC review.

e. August - September: FOC Leads review and update a list of detailed future capability needs using a task, condition, standard, and rationale formate. The focus for this work is 10 to 20 years in the future and all current joint and Army concepts documents should be used. The results will be consulted by the ARCIC's Science and Technology (S&T) Division, Advanced and Capabilities Development Directorate in the Warfighter Outcome Workbook.

f. September - November: Warfighter Outcome Analysis. During the Warfighter Outcome Analysis the ARCIC S&T Division will disseminate the draft updated information to the other FOC leads, combat and materiel developers to solicit comments and additional information. FOC leads and combat developers will review the draft FOC submissions for validity, overlap, duplication, omission, and potential for integration.

g. December - January: After the approval of the annual warfighter outcome analysis, ARCIC S&T Division will review the Warfighter Outcome Workbook to determine if an update of this publication is recommended.

Chapter 2
Background

2-1. Overview

a. Security Challenges. The scope of potential challenges is daunting. Traditional adversaries will continue to possess significant conventional land, sea, and air forces. In the face of United States (U.S.) overmatch conventional capabilities, some adversaries will adopt irregular, unconventional methods. Weapons of mass destruction (WMD) in the hands of traditional or irregular adversaries pose potentially catastrophic threats. The U.S. cannot, moreover, ignore the possibility of disruptive, breakthrough technologies that counter its capabilities or marginalize its power. The U.S. may indeed face all of these challenges, in one place. We cannot easily parse these threats, but rather must expect to encounter them in adaptive, seamless combinations.

b. FOC are developed through analysis of joint as well as Army concepts. The joint campaign framework provides the foundation for everything we do. Joint interdependence is the purposeful reliance on other Service and joint capabilities to maximize their complementary and reinforcing effects, while minimizing service vulnerabilities in order to achieve the mission requirements of the joint force commander (JFC).

c. The Army has conducted strategic mission analysis to identify aspects of the joint campaign for which land power contributions must be optimized. The result is a number of strategic objectives that collectively describe how we will increase our relevance to joint force (JF) and our readiness to prevail in a joint campaign. The strategic objectives fall into two basic categories relative to the JFC's campaign: those that contribute to particular operational requirements and those that are necessary functional enablers. The Army will work to improve its capability to conduct operations in support of homeland defense, civil support and stability operations, as well as improving its capabilities against irregular challenges. The Army will

pursue functional improvements that span all phases of the typical campaign; battle command, joint logistics and global posture. Underpinning all of these efforts, the Army will continue to implement modularity and ensure that it is balancing risk.

d. Tremendous strides have been made over the past year in the design of and conversion to the future Modular Force, including mid-term modular force initiatives, but there is more to do. We must follow through with the implementation of necessary joint and Army operating, integrating, and functional capabilities as established in joint and Army concepts. The joint operations concepts (JOC) framework consists of a capstone concept, operating concepts, integrating concepts, and functional concepts. The joint functional concepts include *Joint Battlespace Awareness, Force Application, Protection, Focused Logistics, Net-Centric Operating Environment, Joint Training, and Force Management*. The Army has developed a parallel and consistent concepts framework under the Army Concept Strategy (ACS) family of concepts consisting of a capstone, two operating, and six functional concepts. These concepts are supplemented by concept capability plans and other concepts as directed by the Commanding General, TRADOC, such as TRADOC Pam, 525-3-7-01. The Army functional concepts consist of TRADOC Pam 525-2-1, TRADOC Pam 525-2-2, TRADOC Pam 525-3-3, TRADOC Pam 525-3-4, TRADOC Pam 525-3-5, TRADOC Pam 525-3-6. Additionally, global posture, strategic responsiveness, and modularity related capabilities are required (see figure 2-1).

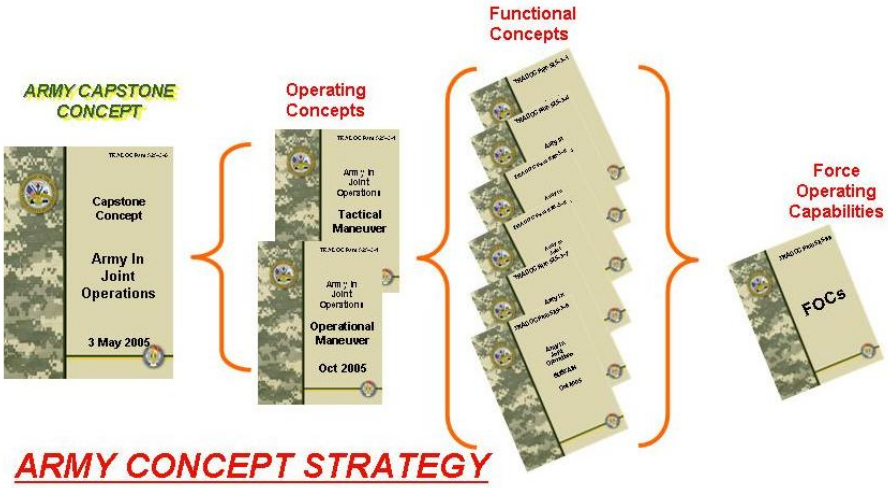

Figure 2-1. Army Concept Strategy

e. TRADOC Pam 525-3-0 is the overarching visualization of how the Army will support JFCs during the 2015 – 2024 timeframe. This document provides the vision of how the future Modular Force will participate in the joint operational environment (OE) described in the JOC to achieve full spectrum dominance across the range of military operations (ROMO).

f. The future Modular Force will be a strategically responsive, campaign quality force, dominant across the ROMO and fully integrated within the joint, interagency, and multinational (JIM) security framework. It will provide sustained land combat power to future joint operations, responding effectively and seamlessly to any conflict, regardless of character or scale. The full spectrum quality of the future Modular Force will address the diverse threats and

the volatile conditions expected to characterize the future operating environment through the adaptive combination of seven key operational ideas:

- Shaping and entry operations help seize the initiative, and set conditions for decisive maneuver throughout the campaign. Use of multiple entry points will help overcome enemy anti-access actions, enhance surprise, reduce predictability, and, through the conduct of immediate operations after arrival, will produce multiple dilemmas for the enemy.
- Operational maneuver from strategic distances to a crisis theater will enable the force to deter or promptly engage an enemy from positions of advantage. Employing advanced joint lift platforms not dependent on improved ports, the future Modular Force will deploy modular, scaleable, combined arms formations in mission-tailored force capability packages, along simultaneous force flows, to increase deployment momentum and close the gap between early entry and follow-on campaign forces.
- Intratheater operational maneuver by ground, sea, and air will extend the reach of the JFC, expand capability to exploit opportunities, and generate dislocating and disintegrating effects.
- Once the future Modular Force seizes the initiative, it combines its multidimensional capabilities in decisive maneuver to achieve campaign objectives:
  - Simultaneous, distributed operations within a noncontiguous battlefield framework enable the future Modular Force to act throughout the enemy's dispositions.
  - Continuous operations and controlled operational tempo (OPTEMPO) will overwhelm the enemy's capability to respond effectively, resulting in physical destruction and psychological exhaustion at a pace not achievable today.
  - Direct attack of key enemy capabilities and centers of gravity with strike and maneuver will accelerate the disintegration of the enemy operational integrity.
- Commanders are challenged by complex missions against asymmetric threats where lethal force is not the best or first option. Commanders must have the ability to accomplish nonlethal tasks with reduced risk of fatalities or serious casualties among noncombatants. Standoff capabilities are needed to nonlethally:
  - Deny area to personnel
  - Protect Forces/Resources
  - Affect crowd behavior/manage confrontations
  - Discriminate/determine intent
  - Render individuals or groups incapable of performing intended task
  - Control access to facilities
- The future Modular Force also conducts concurrent and subsequent stability operations, the former to secure and perpetuate the results of decisive maneuver during the campaign, and the latter to "Win the Peace," once enemy military forces are defeated, to ensure long-term resolution of the sources of conflict.
- Distributed support and sustainment will maintain freedom of action and provide continuous sustainment of committed forces in all phases of operations, throughout the OE, and with the smallest feasible deployed logistical footprint.

- Throughout the future campaign, network-enabled battle command will facilitate the situational understanding (SU) needed for the self-synchronization and effective application of joint and Army combat capabilities in any form of operation.

g. Modularity is essential as it increases Army lethality, full spectrum operation (FSO) capabilities and responsiveness. It also contributes fundamentally to the Army's requisite expeditionary quality. To provide combatant commanders with the relevant and ready land power needed to win the war on terrorism, the Army must ensure the complete and aggressive implementation of modularity in the active Army and reserve components. Resources are finite. The guiding principle is that the Army will not compromise the quality and capabilities required to field relevant and ready units.

2-2. FOC Definition
FOCs are groupings of advanced warfighting capabilities and required by the Army to fulfill future Modular Force concepts, described in relevant operational measurable terms, embedded in the future joint OE.

2-3. FOC Format
See appendix B.

2-4. FOC Organization and Concept Linkage
FOC are organized in the areas listed below. Each FOC write-up includes a linkage with the appropriate joint and Army concept areas, which are listed below. The FOC identify what is needed to transition the future Modular Force concept key ideas into force capabilities.

a. FOC areas: (See paragraphs 1-4 and 1-5).

- Battle command.
- Battlespace awareness (BA).
- Mounted/Dismounted maneuver.
- Air maneuver.
- Line of sight (LOS)/Beyond line of sight (BLOS)/Nonline of sight (NLOS) lethality.
- Maneuver support.
- Protection.
- Strategic responsiveness and deployability.
- Maneuver sustainment.
- Training, leader development, and education.
- Human dimension.

b. FOC Concept Linkage.

(1) Concepts define required capabilities. FOC are derived from both Joint and Army concepts. The joint concepts, beginning with the *Joint Capstone JOC* and including the joint operating concepts, joint functional concepts, and joint integrating concepts identify JF capabilities required to prosecute a certain type of operation or to bring about a certain effect.

Those required capabilities are then characterized with more clarity by the Services, in this case the Army, to create the force(s) required for joint, FSO.

(2) The FOCs themselves are also interdependent. For maneuver forces to operate, they must have integrated command and control (C2), BA, fires, protection, and sustainment. Sustainment forces must have force protection (FP) and may require maneuver forces, including aviation, and support from other sustainment forces to provide maneuver sustainment effectively. The nature of the joint operation requires interdependence of the JF; depending on another Service of the JF to provide a capability that may previously have been provided by the parent Service.

(3) FOC also reinforces the capabilities required by other Services to meet their Title X functions to support the Army. For the Army to provide the land component of a JF requires the U.S. Air Force and U.S. Navy to fulfill their Title X responsibilities to transport the Army to the joint operations area (JOA). To meet the requirement, the Air Force and Navy need to know what they will be transporting. The Air Force may find there is a requirement for a new airframe, as the existing fleet cannot accommodate the Army's future combat vehicle(s). At the present it may not be feasible to design a land combat vehicle with the desired level of armor protection which is light enough to be transported by Air Force tactical airlifters. The Army, in developing a future combat vehicle (that is inherently survivable), may identify the Air Force needs a new airlift capability or the Navy needs a better, faster sealift capability.

c. FOC joint functional concept linkage. Shown below is linkage between the joint functional concepts and the FOCs. The major bullets are the joint functional concept and the sub-bullets are the FOC. FOCs change every three to five years and are linked to JFCs (JCAs change every 12 to 18 months).

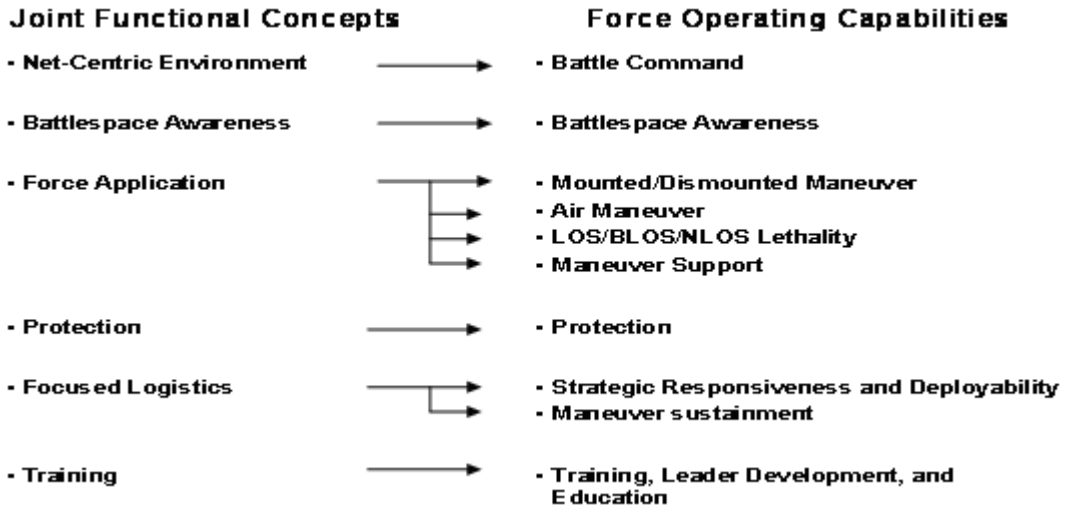

Figure 2-2. Joint Functional Concept/FOC Concept Board Linkage

d. Army concepts. Below is the ACS architecture approved as the implementation guidance for the concept development pathway of the Army Concept Development and

Experimentation Plan. The ACS approved concepts are valid conceptual underpinnings for FOCs. The ACS directed concepts under development are envisioned to enhance and clarify required capabilities established in the current suit of concepts. Consequently, the FOCs identified in this pamphlet provide a consistent developmental pathway toward the achievement of required future Modular Force capabilities.

(1) Operating concepts.

- TRADOC Pam 525-3-1.
- TRADOC Pam 525-2-2.

(2) Functional concepts.

- TRADOC Pam 525-2-1.
- TRADOC Pam 525-2-2.
- TRADOC Pam 525-3-3.
- TRADOC Pam 525-3-4.
- TRADOC Pam 525-3-5.
- TRADOC Pam 525-3-6.

2-5. Role of FOC in the JCIDS process

a. FOCs address the pursuit of advanced warfighting capabilities for FSOs and describe them in relevant operational terms. Capability shortfalls are identified separately through the capabilities needs assessment, JCIDS, and Army Capabilities Integration and Development System processes. Inherent in the future Modular Force operational concepts is a full consideration of the joint OE. Each FOC includes a detailed, stand-alone narrative of the capability's utility on the current and future battlefield.

b. In the JCIDS process, FOCs are linked to Functional Capabilities Boards. The Functional Capabilities Boards ensure the supporting analysis adequately leverages the expertise of the Department of Defense (DOD) components, in particular, the Services, combatant commands, agencies, DOD laboratories, science and technology community initiatives, experimentation initiatives, non-DOD agencies and industry to identify promising materiel and nonmateriel approaches. It also, in conjunction with the FOC, drives the development and acquisition of new military capabilities through changes in doctrine, organization, training, materiel, leadership development and education, personnel and facilities (DOTMLPF). The linkage between the FOC and the Functional Capabilities Boards is illustrated in figure 2-3.

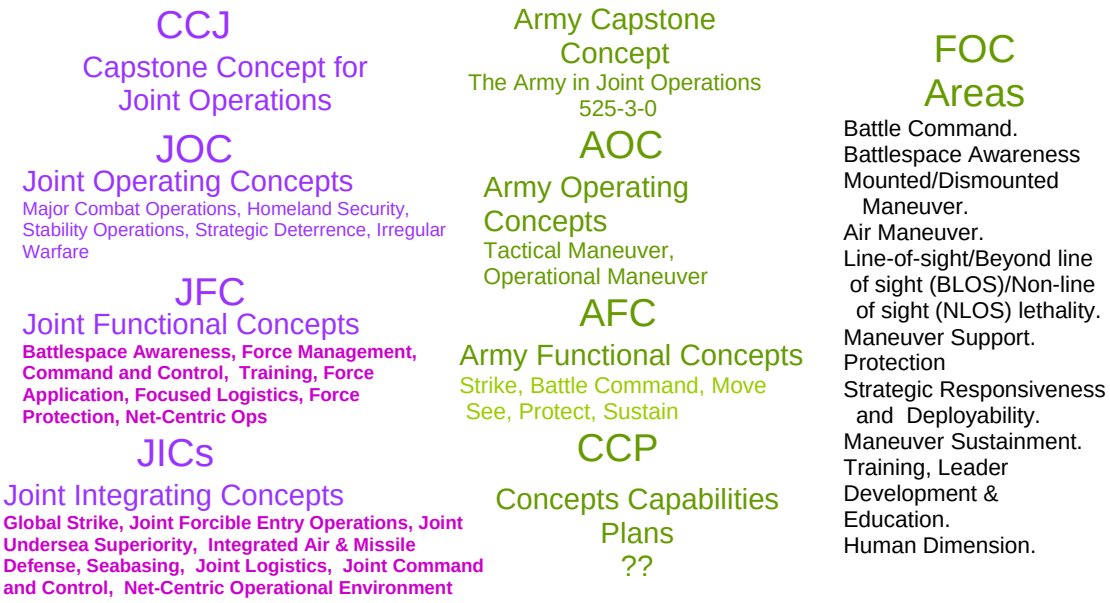

Figure 2-3. Concept FOC Functional Capabilities Boards Linkage

c. The JCIDS process will aid and support decisionmakers to ensure the validated capabilities needed for winning the current war and transforming the force are being addressed by appropriate materiel and nonmaterial approaches. It will also ensure multiple materiel approaches or concepts, across the spectrum of DOTMLPF and across DOD components are adequately considered to provide desired capabilities.

d. Applications.

(1) FOCs form the basis for analysis for concept-based future Modular Force requirements across the full ROMO required of the JFC.

(2) FOCs drive organizational and functional structure changes, through the force design update process, as the institution of the Army transforms to the future Modular Force.

(3) FOCs enable the achievement of future Modular Force capabilities into the current force as soon as practical. They will provide the basis for technological solutions in the near term and inform concept development and experimentation for the future Modular Force. FOCs encompass the full range of DOTMLPF solutions and assist in the development/integration of future to current, current to future, and current to current capabilities.

(4) FOCs validate requirements for the Army S&T Program to fulfill warfighting concepts. FOCs are employed by TRADOC in the conduct of S&T assessment reviews, special access program reviews, Army technology objective (ATO) candidate assessments, ATD candidate assessments, Army S&T work group processes, and the Army S&T advisory group process. FOCs assist in focusing the Army's S&T investment in support of future Modular Force overall development and Army transformation.

(5) Advanced technology demonstrations address selected high priority FOC, and demonstrate a capability that does not currently exist. They are resource intensive, and provide the medium to conduct troop interaction with mature technologies. The ATD Plan is jointly developed between the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology and TRADOC with measures of effectiveness established to successfully execute the ATD. ATD management plans are briefed to a council of colonels, and approved at the Army S&T group.

(6) All operational requirements described in the FOC are derived from joint and Army concepts and Army lessons learned. Analyses of all FOC are used to describe changes in the various DOTMLPF domains, as the Army seeks to achieve future Modular Force capabilities required to support the JFC during the next 15 to 20 years.

(7) Materiel developers and industry use FOCs as references, to maintain responsiveness and viability in independent research and development.

(8) FOCs are used in the Army S&T Master Plan process to provide warfighting influence upon technology base funding.

(9) FOCs are employed in the ATO process and serve as the building blocks that measure warfighting relevance. Candidate efforts selected as ATOs are published in the Army S&T Master Plan as the 200 most important S&T objectives for the Army research and development community. The ATO review provides the basis for the construct of ATD. The ATOs receive senior Army leadership oversight, and have priority for fiscal resourcing.

(10) Affordability is not specifically addressed by the FOC; however, affordability is inherently considered within the functional solution analysis of the JCIDS, and integral to eventual acquisition decisions.

Chapter 3
Joint Operational Environment Overview

3-1. Synopsis of the Expected Future Joint Operational Environment

The expected future OE for military forces will be extremely dynamic. Expanding webs of social, economic, political, military, and information systems (INFOSYS) will afford opportunity for some regional powers to compete on a broader scale and emerge on the global landscape with considerable influence. Increased globalization is bringing changes to the international strategic landscape based on a rise of new powers, population shifts, competition for natural resources, impacts on governance, a pervasive sense of global insecurity, and evolving coalitions, alliances, partnerships, and new actors (both national and transnational) that will continually appear and disappear from the scene. Urban environments and other complex terrain will increasingly characterize areas of operation that may include both humanitarian crisis conditions and combat operations. Adaptive and thinking adversaries will continually seek new capabilities and new employment methods to counter the military superiority of the U.S. and its allies. Traditional advantages enjoyed by global and some regional powers in employing military capabilities will

no longer be the norm. As new capabilities, or new methods of employing capabilities are developed and become more accessible to warfighters, the conduct of warfare and crisis resolution will change. While the nature of war will remain a violent clash of wills between states or armed groups pursuing advantageous political ends, the conduct of future warfare will include combinations of conventional and unconventional, lethal and nonlethal, and military and nonmilitary actions and operations, all of which add to the increasing complexity of the future security environment.

3-2. Potential Threats

a. The global nature, ever-changing variety and adaptability of multifaceted adversaries pose significant threats to our national interests. These threats include:

- **Transnational security threats**, including threats from networked ideologues elements, which may operate across the globe without regard to political boundaries and employing terrorism or other methods.
- **Regional, near-peer and emerging global competitors** with significant conventional forces, WMD or weapons of mass effect (WME), and long range delivery means, or niche capabilities with which they might gain an advantage against our forces.
- **Failing or failed states** that afford potential safe haven for terrorist or other criminal elements and which may be ripe for humanitarian or political crises that threaten stability and security in surrounding regions.

b. JFs will increasingly face nontraditional threats. We have historically addressed "adversaries" as combat forces and developed our capabilities accordingly. Future adversaries may not organize or engage U.S. forces as traditional military organizations, but more as "networks" that strive to generate the social and political power necessary to achieve their aims.

c. Whereas traditional militaries may focus on battlefield victories, these adversaries' goals may be to simply sustain ideas and their organizations until they win a level of political or social legitimacy. Contending with such adversaries will require success beyond the battlefield by all instruments of national power. Nontraditional threats pose unique operational challenges and may have no obvious centers of gravity. Countering such threats, whether they employ terrorism or insurgency, WMD/WME or breakthrough technologies, will require the JF to operate more coherently to resolve future conflicts and crises.

3-3. Emerging Adversarial Challenges

a. Future adversaries may challenge the U.S. and its multinational partners by adopting and employing asymmetric methods across selected domains against areas of perceived U.S. vulnerability. Many will act and operate without regard for the customary laws of war. The National Defense Strategy contains four mature and emerging challenges.

- **Catastrophic** challenges involve the acquisition, possession, and use of WMD/WME or methods producing WMD/WME-like effects.

- **Irregular** challenges come from those employing unconventional methods to counter the traditional advantages of stronger opponents.
- **Disruptive** challenges may come from adversaries who develop and use breakthrough technologies to negate current U.S. advantages in key operational domains.
- **Traditional** challenges are posed by states employing recognized military capabilities and forces in well-understood forms of military competition and conflict.

(1) Catastrophic. Opponents seeking catastrophic effects include rogue states or terrorist actors bent on using WMD/WME to paralyze U.S. power. Deterrence of these adversaries becomes more difficult due to proliferation of these weapons and the inability to effectively find, fix, track, and target them. Deterring these adversaries is difficult as they see benefit in violent action, have few overt high-value assets to hold at risk, and often perceive the continuation of the status quo as intolerably costly. Opponents will seek to exploit our weaknesses and obtain asymmetric advantages to impede our ability to dissuade their acquisition of catastrophic capabilities, to deter their use, and defeat them before these capabilities can be used against us. Particularly, their ability to proliferate WMD/WME technology and expertise makes our ability to prevent, and if necessary contend with catastrophic attacks, the highest priority.

(2) Irregular. An irregular opponent is typically a state or nonstate adversary who aims to erode our influence, patience, and will by adopting unconventional methods in the face of overmatching U.S. conventional capabilities. These adversaries view time as on their side which allows them to impose prohibitive costs in lives and other national resources with the intent of compelling us to a strategic retreat from a key region or course of action (COA). They seek to operate from relatively safe areas and at locations where they are indistinguishable from the populace. Extremist ideologies and an absence of effective governance provide fertile ground for their activities. Unclear and overlapping responsibilities of U.S. government agencies create challenges for taking protective action. While efforts to resolve these issues are ongoing, opponents may seek to exploit the seams between agencies to achieve their goals, such as exploiting the different responsibilities between law enforcement and the military. Insufficient cultural knowledge, including language capability, intensifies the difficulty in reacting to this challenge. These political and cultural divides make our ability to contend effectively with irregular challenges problematic, and highlight the need for an integrated response from multiple agencies (of a kind we do not currently possess) to best address this challenge.

(3) Disruptive. Some of our potential adversaries may seek to employ breakthrough technologies that can potentially negate U.S. military advantages in an operational domain and disrupt JF operations. Adversaries, who are able to acquire a technology or technology application breakthrough, or obtain an advantage, will pose a significant danger to JFs and to the security of the Nation. An example is an adversary who attains a breakthrough capability that threatens satellite communication systems essential to maintaining our dominance in the cyber domain. In military operations an adversary able to cause significant disruption to our global positioning satellites could dramatically reduce our precision strike advantage. If not refined, cumbersome and time consuming DOTMLPF change processes may not allow us to counter adversary breakthrough capabilities in time to make a difference.

(4) Traditional. The traditional opponent is a state adversary who will employ well-recognized forms of military force on force to challenge our power, as well as that of our partners. Currently, our conventional superiority, coupled with the costs of traditional military competition significantly nullifies the incentive of a potential opponent to compete with us, but even with no "peer competitor," the U.S. must still be prepared to deal with one or more regional traditional challenges. The problem we face is maintaining sufficient capability against this challenge while effectively addressing the other three challenge areas under fiscal and organizational constraints.

(5) These four challenges rarely occur individually and in fact overlap in construct and execution. By choice or from necessity, adversaries can be expected to employ combinations of these challenges commensurate with their own tendencies and means. Adversaries active in one challenge area are expected to reinforce their capabilities with ways and means drawn from the other areas. Future adversaries will seek the space between clearly combatant and clearly criminal to avoid our traditional military strengths. The most dangerous circumstances arise when we face a complex blending of multiple challenges within individual operations or combinations of operations. The problem the JF faces is providing and sustaining the capacity for simultaneously and effectively countering these challenges across the ROMO in multiple locations around the world (we can do many things simultaneously but not necessarily with equal effectiveness; and vice versa). Recognizing that we cannot cover the entire globe with forward postured military forces, overcoming time-distance and access challenges will remain key to effectively preventing and responding to crises. Moreover, capability combinations from other instruments of national power will help overcome these challenges.

3-4. Nonadversarial Crisis Response Operations

The JF must maintain an unsurpassed ability to fight and win the Nation's wars. However, it must recognize the national security implications of operations that do not necessarily include either adversaries or combat. Examples include peacekeeping, humanitarian relief operations, and support to civil authorities, both foreign and domestic. These operations can contribute to preventing conflict and may require different types of capabilities or different methods of employing those capabilities than traditionally used for warfighting.

3-5. Joint Issues Relevant to Both Adversarial Challenges and Nonadversarial Crisis Response Operations

Regardless of the type of operation, the future JF will require new capabilities and processes to help minimize the use of armed force and to most efficiently respond when necessary. This includes the need for engagement before and after warfighting/crisis response, the need for integrated involvement with interagency and multinational partners, and the need for multipurpose capabilities that can be applied across the ROMO. Listed below are the four Adversarial and Nonadversarial challenges:

a. Shaping Operations. Maintaining peace and preventing conflict/crises are as important as waging major combat operations. Consequently, in addition to crisis response, the future JF must be more involved in proactive engagement/crisis prevention. Peacetime shaping operations might be aimed at spreading democracy, creating an environment of peace, stability, and goodwill or even aimed at destabilizing a rogue regime. Shaping operations provide the JF

continuous opportunities to assess the structure and dynamics of potential adversaries and crisis locations to the extent practicable in anticipation of follow-on operations, should they be required. Continuous assessment is important because of the significant limits on precise "understanding" one might have of any adversary or situation. This implies the JF must actively train and be equipped to be full partners in proactive and robust peacetime interaction activities. The importance of assessment should also be reflected in military education and exchange programs and combatant commander theater security cooperation plans. Such activities complement JF basing and presence strategies, shaping the environment to establish conditions that enable rapid response should a crisis occur. Success in these activities relies heavily on active support and participation by other elements of national power.

b. Stability Operations. Winning in war requires achieving desired political aims. Achieving these aims requires resolving crises, winning conventional combat operations, and ensuring stability in affected areas. The JF must be capable of successfully conducting stability operations prior to, during, and after combat operations or as a stand-alone mission. Stability operations are inherently interagency operations. As a critical component of such integrated operations, the JF may be required to establish a secure environment and initiate reconstruction efforts to facilitate transition to civilian control. The JF may also be required to provide security, initial humanitarian assistance, limited governance, restoration of essential public services, and similar types of assistance typically required in reconstruction efforts.

c. Interagency, Multinational, and Other Partners. Leveraging capabilities of interagency and multinational partners to address security challenges is desirable and increasingly important. However, multiparticipant operations in the envisioned environment may exacerbate already significant interoperability challenges and complicate cooperation strategies. Additionally, future JF operations will likely require interaction with any number of private, nongovernmental organizations (NGO), regional, and international organizations. Each organization brings its own unique equipment and procedures and its own supporting or competing priorities, resulting in additional interoperability and operational integration challenges for the JF.

d. Success across the ROMO. The U.S. will remain continuously engaged across the globe in a continuum ranging from peace and stability (maintained by shaping and deterrent activities), through conflict to reconstruction, with a goal of maintaining or returning to a state of peace and stability in which U.S. National security interests are assured. The JFC's ability to integrate various operations in the right proportion is key to achieving desired strategic outcomes. The uncertain environment combined with the scope of different operations will demand capabilities that are adaptable and can be applied in multiple types of operations simultaneously. Resource constraints alone will prevent an indefinite number of simultaneous effective responses across the ROMO.

Chapter 4
Force Operating Capabilities

Section I – Battle Command

4-1. Battle Command Definition

Battle command is the art and science of visualizing, describing, directing, and leading forces in operations against a hostile, thinking, and adaptive enemy. Battle command applies leadership to translate decisions into actions—by synchronizing forces and warfighting functions in time, space, and purpose—to accomplish missions. Battle command is guided by professional judgment gained from experience, knowledge, education, intelligence, and intuition. Battle command is an art, underpinned and enabled by S&T. Commanders require strong character, competence in the art and science of sustained operations, and leader skills that enable them to meld the efforts of subordinates and colleagues into harmonious unified actions and operations to accomplish assigned missions. The functions of Battle Command are timeless. Commanders must anticipate, plan and execute operations and exploit or consolidate success. To do this they must visualize their situation and battlespace, and imagine a set of actions to use the resources at hand to achieve their desired ends. They must describ*e* the series of actions intended for subordinate elements and desired from separate agencies capable of contributing to effective efforts to achieve shared ends. Commanders must then direct subordinates and influence collateral actions, to harmonize efforts in execution so the greatest possible effectiveness results at the least cost. All the while, they must remain sensitive to their environment and anticipate possible challenges, opportunities and likely future missions.

4-2. Joint/Army Concepts Linkage

a. There is no joint battle command concept and single direct linkage from joint concepts to TRADOC Pam 525-3-3. Battle command is addressed in the *Joint Command and Control, Net-Centric, and Battlespace Awareness* concepts and are brought together in TRADOC Pam 525-3-0 and TRADOC Pam 525-3-3. The capstone concept for joint operations introduces high level capabilities and characteristics of future joint forces such as common understanding, decision superiority, rapid deployment, knowledge empowered, networked, interoperable, adaptive and tailorable, agile and resilient, and interagency and multinational. These high level concepts are expanded in the *Joint Command and Control and Net-Centric Operational and Integrating Concepts*.

b. TRADOC Pam 525-3-0 merges the *Joint Network* and *Net-Centric Command and Control* concepts into an Army concept/key idea called network-enabled battle command. Network-enabled battle command envisions the use of enhanced information and network technologies (the science portion) and the development of innovative leaders and staff members (the art portion) that will result in a compressed and accelerated planning, execution, and assessment process to support the future dynamic warfighting environment. Network-enabled battle command leverages the network effect, and the exponential increase in the value of a network as the number of those using it increases. It extends the interconnectedness of headquarters (HQ) to the individual Soldiers, weapons, sensors, and platforms. This extended connectivity will enable information superiority and allow the creation of a joint networked

multi-echelon collaborative C2 environment that will extend the benefits of decentralization - initiative, adaptability, and increased tempo - without sacrificing the coordination or unity of effort. Nonetheless, network-enabled battle command is commander-centric, vice network-centric. To achieve this vision of a network-enabled battle command capability the Army must:

- Develop a single Army Battle Command System (BCS) that is joint - interoperable and fully integrated from strategic to tactical levels via an overarching joint architecture.
- Enable Army operational HQ to serve as fully capable joint functional HQ.
- Develop a multiechelon collaborative information environment (CIE).
- Fuse sensors both horizontally and vertically within an interdependent joint network, relying on capabilities that provide persistent ISR.
- Integrate an agile, ubiquitous communications network from 'space to mud (ground).'
- Enable battle command on the move (BCOTM) without degradation.
- Improve interoperability with interagency and multinational components.
- Continue to explore effects-based planning as a means of improving the military decisionmaking process.

c. Distributing battle command capabilities among multiple distributed nodes from joint to tactical levels will eliminate much of the sequentiality in today's planning process and allow streamlining of the military decisionmaking process. Improved connectivity and information technologies will facilitate common situational understanding, the use of mission orders and expand span of control, thus enabling greater decentralization and simultaneity. Access to the CIE will enable subordinate commanders to self-synchronize their actions during operations and make incremental adjustments in response to changing conditions. Tactical commanders will be able to routinely employ joint effects at lower tactical levels to help conclude tactical actions more rapidly. The sum of these advances will enable commanders to anticipate more reliably and apply force more precisely and effectively, while simultaneously shaping the future battle and conducting current operations, across the spectrum of operations.

d. TRADOC Pam 525-3-3, expands upon the network-enabled battle command vision in TRADOC Pam 525-3-0. As stated in TRADOC Pam 525-3-0, the focus of battle command is the commander. The commander is responsible and accountable for all the forces under their command and must develop, maintain, and use the full range of human potential in their organizations to accomplish assigned missions. The function of battle command in the future Modular Force will not be significantly different from today. Battle command will continue to be a combination of art and science in which commanders use their experience, knowledge, and insights to plan and execute operations. Future Modular Force commanders must exercise the art of battle command using the best available information in an uncertain environment to make decisions. The commander must be the focal point of decisionmaking while the role of the staff and advanced technological aids is to support the commander in achieving SU, making decisions, disseminating directives, and tracking execution. Commanders apply their skilled judgment, and that of their staff, to interpret information in the context of the mission, the higher commanders' intent to visualize the end state of the mission. To take advantage of improved information availability, processing, and distribution, future leaders must improve both their technological capabilities and human processes. (See fig 4-1 below from TRADOC

Pam 525-3-3 that shows the role of the commander and where art and science apply.) Gaining and maintaining a common operational picture (COP) at all levels will facilitate mission orders and foster commanders capable of acting in consonance with the higher commander's intent. Developing graphic display aids and cognitive skills that enable commanders to visualize the operation and then describe it in terms of intent and guidance is central to the battle command concept. Future Modular Force commanders will operate and the future BCS will be implemented based on the following key ideas:

- Centrality of the commander.
- Role of the commander: framing, planning, preparing, executing, assessing, and reframing operations.
- Mission command.
- Self-synchronizing forces.
- Collaborative planning and accelerated and streamlined military decisionmaking process.
- Decision superiority: central, critical role of high SA, shared SA, SU, and the COP.
- Continuous battle assessment, incremental adjustment to operations during execution.
- Adaptive C2 processes and structures, expanding span of control, and virtual staff.
- Single, integrated Army BCS(s), joint capable at lower levels.
- The network.
- Interagency and multi-national interoperability and integration.
- Horizontal and vertical fusion.
- Ubiquitous, redundant, continuous communications network.

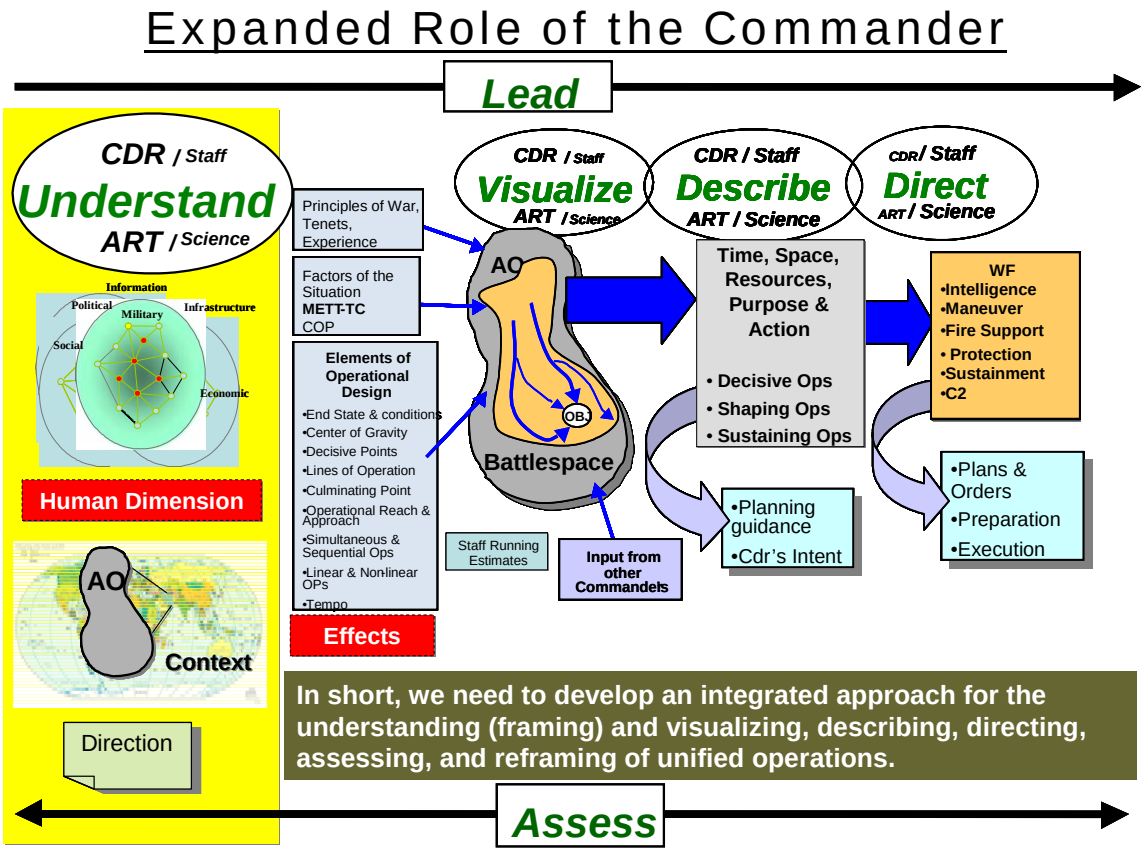

Figure 4-1. Expanded Role of the Commander

4-3. Desired Battle Command Capabilities

Synthesizing the concepts and key ideas from both the joint and Army concepts described above, battle command is grouped into the following six capability areas:

- Exercise C2.
- Information and decision superiority.
- Horizontal and vertical information fusion.
- Collaborative planning and execution.
- JIM interoperability.
- An agile ubiquitous network.

4-4. FOC-01-01: Exercise Command and Control (C2)

a. Capstone Capabilities.

(1) C2 is the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of a mission. C2 is fundamental to the art and science of Battle command. The focus of C2 is the commander. Through C2, commanders assess the situation; make decisions, direct action through a BCS, which consists of a combination of personnel, information management, procedures, equipment, and facilities. An

effective Battle command process and system helps commanders plan prepare, execute, and assess operations. This includes the ability to:

- Achieve and maintain situational understanding.
- Execute the decisionmaking process.
- Control forces and warfighting functions.
- Adapt to change.

(2) Command is the authority that a commander exercises over subordinates by virtue of rank or assignment. Command includes leadership, authority, and accountability as well as responsibility for unit readiness, health, welfare, morale, and discipline of assigned personnel. More importantly command carries the responsibility for effectively using available resources and planning the employment of assigned forces to accomplish assigned missions. Throughout history command has been and will continue to be an individual and personal function that is more art than science. The art of battle command requires understanding the complex relationships between friendly forces, adversaries and the environment. The better the understanding/knowledge of situation the better the commanders can visualize and describe their intent.

(3) Control is the regulation of forces and warfighting functions to accomplish the mission in accordance with the commander's intent. While command is a personal function, control is fundamental to directing operations and involves the entire force. Commanders exercise control over all forces in their AO. Control is more science than art in that it relies more on objectivity, facts, empirical methods, and analysis. The quantitative and analytic aspects of control include the physical capabilities of friendly and adversary organizations and systems in conjunction with time-distance and environmental factors required to initiate certain actions.

(4) Effective battle command is characterized by timely and effective decisions in which the commander combines his intuitive judgment with available information and analyzes. The staff gathers quality information and formulates potential solutions using the BCSs for the commander. The commander then applies his intuition based on his knowledge, judgment, experience, education, perception and character to formulate a decision. After commanders make decisions, they guide and track their forces through execution.

(5) Mission command is the Army's preferred method for executing battle command. Mission command is characterized by decentralized execution in which commanders conveys purpose without providing detailed direction on how to perform the task or mission. Mission command empowers subordinate initiative by emphasizing the higher commander's intent and requires an environment of trust and mutual understanding.

b. Narrative. The exercise of C2 and battle command, at all echelons within the future Modular Force requires the following capabilities:

- Army leaders that can perform effectively across the ROMO in a complex, uncertain, and dynamic operational environment.
- Subordinate leaders that can operate across all operational phases.

- The ability to continuously develop knowledge, skills, and abilities of individuals and teams.
- Staffs organized to align with the conditions of the mission environment, assign roles, and establish internal collaborative structures and processes.
- The ability to establish and/or refine the joint task force organization
- Establish and/or refine command relationships within the commander's operational control during all operational phases.
- Ensure missions and guidance is sent and received (for example, commander's intent, mission and guidance, including operational objectives, to subordinate echelons, and staff, and ensure it is understood).
- Communicate initial and updated intent and guidance to the subordinate echelons
- Communicate action and intent through mission-type orders to subordinate echelons and commanders.
- Future Modular Force commanders require solutions to improve their ability to perform the operations process of framing, planning, preparing, executing, assessing, and reframing operations in the JIM environment.
- Future Modular Force commanders at all levels require solutions for the employment of an evolving single, integrated Army BCS functional in all JIM environments from joint down to the Soldier level to support the conduct of complex operations in a coordinated and synchronized manner.
- Scalable battle command capabilities that support frequent mission tailoring, force responsiveness, and general adaptability to changing battlefield conditions.
- Provide improved strategic responsiveness and standardization
- Challenging live, virtual, and constructive exercises to train leaders through the practice and application of leadership. Leadership can be taught to a degree in institutional settings but needs to be enhanced through observation and emulation of successful commanders, as well as through self study.
- Trained and develop leaders skilled in reducing complexity into manageable appropriate actions, and to issue timely orders with emphasis on enhancing the cognition skills of decisionmaking and mission command.
- Commanders that are capable of operating effectively with degraded BCSs.
- Training programs and exercises that allow commanders to practice C2, be challenged to take risks, evaluated on how well they follow the higher commander's intent so as to understand the successful application of mission command.
- Training and leadership development programs that emphasizes higher order cognitive processes in complex full spectrum operations, to enable rapid decisionmaking and effective C2.
- Provide means for leaders to grow and develop trust through the extensive use of simulation, scenario-driven war games, experiments, and training exercises that challenge leaders and will reduce the need to learn "on the job" in actual combat operations.
- Improved officer and NCO career tracking systems to provide appropriate progressive opportunities for developing command and staff experience.
- Provide special education opportunities for officers selected for command to develop higher level cognition skills as part of their pre-command preparation.

- Mobile and fixed computer assisted modeling and simulation facilities to provide commanders and staffs the ability to exercise C2 across the full ROMO.
- An integrated standard collection of multifunctional and modular command post components (shelters, trailers, tents, large screen displays, electric power, local area network, and environmental conditioning) that are tailorable, light-weight, deployable, easy to emplace and displace, and scalable to mission requirements.
- A standard collection of Battle Command applications that adhere to basic human interface principles, provide cognitive user interfaces, and provide a common look and feel so as to reduce training requirements while at the same time achieving higher retention of system capabilities.

c. Linkage to Army Universal Task List (AUTL): Army Tactical Task (ART) 7.0 (The Command and Control Battlefield Operating System); ART 7.1 (Establish Command Post Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures); ART 7.4.6 (Provide Space Support). ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures).

d. Linkage to Universal Joint Task List (UJTL): Operational (OP) 5 (Provide Operational C2); Tactical (TA) 5 (Exercise C2). OP 5 (Provide Operational C2); TA 5; (Exercise C2).

e. Concept and Doctrinal Linkage: TRADOC Pam 525-3-3, Battle Command; TRADOC Pam 525-3-0, The Army in Joint Operations; and Command and Control Joint Integrating Concept.

4-5. FOC-01-02: Information Operation and Decision Superiority

a. Capstone Capabilities.

(1) Decision superiority, the ability to decide and direct action before an adversary can react, depends heavily on obtaining and maintaining SU and a common operational picture (COP). Obtaining, processing, and disseminating the information that enables SU and the COP or intelligence running estimate is addressed in TRADOC Pam 525-2-1. All staff sections and soldiers provide information that contributes to the COP and to improving SU.

(2) Enabling effective decisionmaking requires a continuous effort to obtain and maintain timely, high quality, and relevant information. Commanders will conduct routine command assessment using flexible processes, adaptive thinking, timely and clear guidance, and decisions that are relevant in a fast moving physical and dispersed environment. Battle command will focus on interoperability, the sharing and protection of data and information to generate desired effects through linking sensors, delivery systems, and effects across the JIM environment.

(3) Continuous battle assessment can result in incremental adjustment to operations during execution and is a subset of decision superiority. Adaptation to changing situations and

providing a continuous update to the COP will facilitate mission command. Commanders and their staffs must conduct a continuous assessment of the factors of mission, enemy, terrain, troops, time, civilians. This requires adaptive and predictive information flows, in which the commander and his staff have access to information relevant to the current mission goal and the operational impact of the changing environmental conditions.

(4) The contributors to information superiority are ISR, information management, knowledge management, and information operations. Army doctrine uses the joint definition of "information operations" as well as all of the capabilities that compose IO; however, Army doctrine categorizes IO capabilities differently from joint doctrine. (See fig 4-2 for how Army doctrine organizes and applies these Army IO capabilities.) Army doctrine describes Army IO capabilities in terms of five IO tasks:

- Five IO tasks:
  - Information engagement;
  - C2 warfare;
  - Military deception;
  - Operations security;
  - Information protection.
- Responsibilities for information operations tasks are as follows:
  - Military deception – plans cell.
  - Information engagement – information engagement cell.
  - C2 warfare – fires cell.
  - Information protection – C4OPS cell.
  - Operations security – protection cell.

Army IO Tasks	Army IO Capabilities*	Staff Responsibility	Functional Coordinating Cell	Intended Effects	Integrating Process
Military Deception	Military Deception	G-5	Plans	Exploit, Deceive	Operations Process
Information Engagement	PSYOP	PSYOP	Information Engagement	Influence and Inform	
	Combat Camera Defense Support to Public Diplomacy	G-7			
	Public Affairs	PAO		Inform	
Command and Control Warfare	Physical Attack Electronic Attack Computer Network Attack	G-3	Fire Support	Deceive, Disrupt, Deny, Degrade, Destroy	
	Electronic Warfare Support Computer Network Exploitation	G-2		Search, Intercept, Identify, Locate	
Information Protection	Information Assurance Computer Network Defense Electronic Protect	G-6	C4OPS	Detect, Protect, Defend	
Operations Security	Operations Security Physical Security	G-3	Protection	Secure, Deny	
	Counterintelligence	G-2		Protect	

* Civil Military Operations is *not* an Army IO Capability.

Figure 4-2. Information Operations Process

(5) Commanders will exercise effective C2 of dispersed non-contiguous forces using adaptive and flexible BCSs and structures and virtual tactical operations center that expand their span of control and their view of the operating environment. Staff structures have evolved over time to meet the needs of the commander. Staffs exist to support the organization, analysis, and presentation of vast amounts of information and to make it manageable for the commander. A disciplined and skilled staff improves the commander's ability to make the quick decisions, at the right time and control of subordinate units' execution of operations. In the future, commanders will be assisted by virtual staffs and knowledge centers. Teaming, coordination, and parallel planning with JIM and NGO will be routine.

(6) Finally, red teaming is also critical to affect decisionmaking. Staffs must use all available information to provide commanders an independent capability and fully explore alternatives in plans, operations, and capabilities from the perspectives of our partners, adversaries, and others. Red teaming assists the staff in validating assumptions and identifying unstated assumptions and reduces uncertainty by enabling better understanding and knowledge of supporting units, the environment, and the enemy. When time constrained and conducting an accelerated military decisionmaking process cycle, red teaming may prevent the development of a plan based on flawed assumptions, an unclear end state, and an inaccurate understanding of the operational environment.

b. Narrative. To achieve information and decision superiority in the future Modular Force requires the following capabilities:

- The ability to provide end-to-end protection, assurance, and validation of information and information systems.
- Oversee the rapid creation of data initialization and starting information.
- Continuously track, shift, reconfigure (for example, control) forces, equipment, sustainment and support, even en route.
- Access and integrate intelligence information and forecasts, including information on adversary, neutral, and non-combatant entities of interest.
- Distribute and update commander's intent and guidance to include commander's critical information requirements, and ensure it is understood
- Maintain a tailored, relevant, synthesized COP that presents actionable information to promote understanding.
- Provide automated decision aids, planning tools, advanced modeling and simulation, and in-transit visibility to the operational force.
- Assimilate and dispense knowledge.
- Perform mission analysis across the operational environment
- Progressive war games and exercises with realistic time constrained conditions that challenge and train commanders and staffs in the execution of effective battle command.
- Red teaming capabilities to rapidly test their plans in all environments and develop alternative approaches that are based on anticipated enemy reactions.
- Provide information delivery methods that are tailorable, scecure, and allow reprioritization based on mission requirements and available delivery methods.
- Battle command suites similar to today's command post of the future with expanded and updated visualization and information sharing capabilities.
- The ability to minimize communications dependencies via doctrinally appropriate processing and storage of critical/essential information locally, ensure dissemination of critical time sensitive survival information, and allow users to acquire needed information via intelligent searches.

c. Linkage to Army Universal Task List (AUTL): Army Tactical Task (ART) 7.0 (The Command and Control Battlefield Operating System); ART 7.1 (Establish Command Post Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures); ART 7.4.6 (Provide Space Support). ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures).

d. Linkage to Universal Joint Task List (UJTL): Operational (OP) 5 (Provide Operational C2); TA 5 (Exercise C2).

e. Concept and Doctrinal Linkage: TRADOC Pam 525-3-3, Battle Command; Command and Control Joint Integrating Concept.

4-6. FOC-01-03: Horizontal and Vertical Information Fusion

a. Capstone Capabilities.

(1) Horizontal and vertical fusion is the process of combining and relating data to produce information, improve SU, and increase knowledge. The future force will see a significant increase in the number and types of sensors and information systems that will fuse information as described in TRADOC Pam 525-2-1. The additional data available and generated by the force is processed and delivered to the commander based on his critical information requirements. Commanders and staff will also reach back to knowledge centers, other elements of the joint or coalition force, and non-military sources of information to enrich the available information generated locally thus enhancing the COP. This specialized knowledge and interpretation of information is essential to improving SU, planning, and execution, and reducing the fog of war.

(2) Battle command and rapid decisionmaking requires fused information that combines accurate knowledge of friendly forces/self, information on the environment, and projections of the enemy activities to plan, prepare, execute and frame/reframe operations. These knowledge areas are delivered to the COP, where they are fused and presented according to the needs of the commander.

(a) Knowledge of self includes JIM partners, locations, mission, future missions and activities, and capability as well as human factors such as endurance, confidence, fatigue, and morale. Commanders need accurate and timely information on friendly forces, international organizations, private volunteer organizations, and the complexities of the local population to plan, decide, and act rapidly with assurance.

(b) Knowledge of the environment includes terrain, air, CBRN, and space domains, in addition to weather. The Commanders' knowledge of the environment will continue to be critical in planning and executing operations and determining risks and identifying opportunities.

(c) Knowledge of the enemy is the most challenging and difficult information to obtain but is extremely critical to succeed. Opponents will attempt to avoid detection, implement deception, or a false information campaign to inhibit the future Modular Force's ability to develop accurate information and knowledge of their intentions. Enhanced red teaming is important component of ensuing an accurate understanding of the enemy.

b. Narrative. To achieve horizontal and vertical information fusion in the future Modular Force requires the following capabilities:

- Access to and the ability to integrate intelligence information and forecasts, including information on adversary, neutral, and non-combatant entities of interest.
- Access, produce, integrate and/or disseminate strategic/operational/tactical intelligence.
- Access to timely and integrate geospatial, weather, and environmental information and forecasts

- Collaboratively develop and share understanding of regional/local diplomatic, political, economic, and cultural factors.
- Possess and have network access to advanced sensors that generate, fuse, and share data in real time.
- The ability to reach-back for subject matter expertise and obtain products, services, and applications from organizations that are not forward deployed.
- Fuse and display Red/Gray information and moving target and targeting data in conjunction with geospatial, atmospheric, oceanographic, CBRN, and exo-atmospheric conditions and their effects.
- The ability to create integrated view of the operating environment, which combines accurate knowledge of self, knowledge of the environment, and knowledge of the enemy. This information must be delivered to the COP, where they are fused and presented according to the needs of the commander.
- The ability to link high altitude and space platforms and processors. Commanders and their staffs will be able to access information simultaneously from multiple non-contiguous locations and to provide timely, actionable, and relevant information in support of the planning, execution, and assessment operations of the JF and component commanders.
- Provide commander with real-time visibility of their units' combat and operational readiness and locations (self) to facilitate timely decisions.
- Provide logistics asset visibility that enables commanders to allocate resources at the point of main effort, maintain momentum, and retain the initiative.
- Fuse and display sensor information (surface, subsurface, air, and space) to support SA and decisionmaking
- Programs to assist in developing data, information, and knowledge management solutions that will reduce risks such as information overload.
- Tools to manage, sort, store, search, visualize, and graphically display the vast amounts of data produced by sensors.

c. Linkage to Army Universal Task List (AUTL): Army Tactical Task (ART) 7.0 (The Command and Control Battlefield Operating System); ART 7.1 (Establish Command Post Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures); ART 7.4.6 (Provide Space Support). ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures).

d. Linkage to Universal Joint Task List (UJTL): Operational (OP) 5 (Provide Operational C2); TA 5 (Exercise C2).

e. Concept and Doctrinal Linkage: TRADOC Pam 525-3-3, Battle Command; TRADOC Pam 525-2-1, Army Functional Concept for See; Command and Control Joint Integrating Concept.

4-7. FOC-01-04: Collaborative Planning and Execution

a. Capstone Capabilities.

(1) A CIE, which consists of distributed information management tools and software applications connected via a reliable network, will allow commanders and staffs to conduct both collaborative planning and track the execution of those plans from anywhere on the battlefield. A robust CIE will allow commanders to draw upon and work with other commanders, employ joint resources, leverage geospatial, terrain, and environmental effects and distributed information databases, home station operations centers, as well as live and virtual staffs. This ability to collaborate in developing and assessing courses of action, visualizing potential outcomes, making decisions, and developing and disseminating plans will enhance the speed of planning and execution. The CIE will also enhance the ability to control widely separated operations simultaneously.

(2) Collaborative multi-echelon planning will streamline and accelerate the classic military decisionmaking process and increase SU which will result in better and timelier decisions and improved synchronization of both plans and subsequent execution across the AO. Enabled by advanced decisionmaking tools, improved modeling and simulation tools, combined with more realistic training, practice, and experience will further accelerate planning and execution on the future battlefield. The commanders' intuition and application of operational art retains validity in the future, but is enhanced by the ability to simultaneously and virtually connect commanders, planners and staff subject matter experts from multiple echelons together to develop a viable course of actions (COAs) and then track execution. This increases the commander's SA and SU leading to more rapid selection of COAs and identifies anticipated branches or sequels to the plan. Via the CIE the commander's ability to know and understand the disposition, capabilities, and intent of other friendly forces, including joint and multi-national partners, and the projected enemy responses is greatly enhanced through the ability to quickly share information and knowledge.

(3) The future CIE will allow commanders to establish virtual TOCs and knowledge centers that will still provide the commander with access to the advice and expertise of his staff sections without requiring their physical presence in a traditional command post. Commanders, using the widely distributed and redundant network and information sharing tools, will be able to maximize the mobility of future Modular Force organizations and still provide redundant continuous C2. Early entry, deployable, and highly mobile command posts, mobile command groups, and efficient employment of deputy commanders and staff elements will all aid in achieving improved and adaptive planning and decisionmaking. Capabilities, such as BCOTM, en route mission planning, and rehearsal will become the norm in the highly fluid future operational environment.

(4) Red teaming assists the staff in determining alternative views of the objectives and potential courses of action of adversaries, partners, and others in the CIE. The CIE allows for enhanced and virtual red teaming that is not tied to the planning staff, and will assist in staff horizontal integration by identifying gaps, vulnerabilities, and opportunities not previously identified in the planning process.

(5) The CIE, an improved and reliable network, and information management tools help achieve self-synchronization. It starts with Soldiers, staff and subordinates exercising initiative guided by their improved understanding and knowledge of the commander's intent. The collaborative environment improves self-synchronization and allows effective exploitation of opportunities by subordinates without specific direction from higher HQ or their commander. Those higher HQ however can still track the actions of subordinates and inform other affected commanders or staff sections of their decisions and actions. This exercise of subordinates' initiative results in collaborative synchronization of the force.

b. Narrative. To achieve a collaborative planning and execution environment in the future Modular Force requires the following capabilities:

- Collaboratively develop and share understanding of global knowledge such as diplomatic, political, economic and cultural factors
- Collaboratively conduct comparative, multi-discipline assessment of adversary strengths and vulnerabilities versus our own capabilities
- Collaboratively conduct mission analysis and COA development
- Provide the necessary physical and logical network connectivity to operate within a collaborative information, planning, and execution environment.
- Collaboratively develop operational plans across the full ROMO, employing all appropriate joint capability areas.
- Assess effectiveness of plans and prepare for execution
- Form collaborative planning teams across components, mission, functions, and geographies, and with mission partners that build campaign plans and develop, analyze and select COAs, branches and sequels.
- Collaboratively perform Enroute Mission Planning and Rehearsal
- Manage and synchronize operations across time, space, and purpose to accomplish mission objectives.
- Continuously track, shift, reconfigure (for example, control) forces, equipment, sustainment and support, even en route.
- Manage National/Operational/Tactical Firepower to meet mission objectives.
- Validate targets prior to attack
- Employ multi-echelon strike capabilities (lethal and nonlethal) in accordance with appropriate rules of engagement
- A comprehensive doctrinal description of how to exercise collaborative planning, execution and acceleration of the current military decisionmaking process
- Realistically training tools, models, and simulations to practice the collaborative planning, decisionmaking, and execution processes.
- Exercise battle command on the move (BCOTM) and untether planning and decisionmaking from TOCs.
- Leaders able to identify collaboration and infrastructure requirements within their operational control
- Communicate and disseminate plans and orders to all echelons and to all appropriate stakeholders.
- Maintain asset visibility to ensure allocation of resources to all units.

- Conduct asymmetric/symmetric operations.
- Determine mission status based on when desired objective, end-state, or phase point is met
- Conduct continuous operations with few significant pauses.
- Rapidly reposition forces to maintain pressure and deny the enemy freedom of movement
- The means to practice and reinforce training of the collaborative planning and decisionmaking processes.

c. Linkage to Army Universal Task List (AUTL): Army Tactical Task (ART) 7.0 (The Command and Control Battlefield Operating System); ART 7.1 (Establish Command Post Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures); ART 7.4.6 (Provide Space Support). ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures).

d. Linkage to Universal Joint Task List (UJTL): Operational (OP) 5 (Provide Operational C2); TA 5 (Exercise C2).

e. Concept and Doctrinal Linkage: TRADOC Pam 525-3-3, Battle Command; TRADOC Pam 525-3-0, The Army in Joint Operations; Command and Control Joint Integrating Concept.

4-8. FOC-01-05: Joint, Interagency and Multinational Interoperability

a. Capstone Capabilities.

(1) Interagency and multi-national operations will be the norm in the future Modular Force. As such, joint and Army BCSs must take this into account in development of information systems, exercises, training, and doctrine. Future commanders must be able to extend beyond the classic use of liaison officers to virtual liaison officers (similar to virtual staffs), and improve information system interoperability that supports automated, secure, and timely exchange of information and knowledge between multi-national or interagency partners. Ideally allowing partners to plug into the network may be an optimal solution provided obstacles, such as training, language, and security can be overcome. The proven value of exchanging quality liaison personnel fully networked with their parent organizations will remain an enduring approach to interoperability for those partners not having robust information system capabilities or compatible networks.

(2) The joint nature of operations will increase in the future. Joint interdependencies will require fully integrated joint operations at lower tactical levels. Distributed operations will demand multiple mobile command posts equipped with advanced technological tools that acquire data, transform information, and provide knowledge and understanding about friendly forces, adversaries, and the environment to all partners. The future force requires a single, integrated Army BCS that is joint capable to lower levels and utilizes the network that makes up the backbone of the future Modular Force. A single system or set of capabilities will greatly

enhance the lethality, survivability, agility, and versatility of the force while at the same time simplifying and reducing training requirements, and improving the sustainability and maintainability of the entire force.

b. Narrative. To achieve Joint, Interagency and Multinational Interoperability in the future Modular Force requires the following capabilities:

- Be able to establish collaboration procedures (planning and execution) with all mission partners that at a minimum allow the sharing of COP and other critical survivability information.
- Army leaders trained in and for JIM operations.
- Army leaders trained in establishing and cultivating relations.
- Army leaders trained in gaining stakeholder commitments with mission partners.
- Future Modular Force operational HQs that can effectively operate with JIM organizations.
- Adaptable leaders trained to deal with multi-national and interagency partners. Selected leaders and staff should be trained either with government or industry to understand the diplomatic, information, military, cultural, and economic elements of national power.
- A fully-integrated BCS that is interoperable and can communicate with multi-national partners.
- Synchronize/self-synchronize operations within and among physical and functional domains across the full ROMO employing all appropriate joint capability areas.

c. Linkage to Army Universal Task List (AUTL): Army Tactical Task (ART) 7.0 (The Command and Control Battlefield Operating System); ART 7.1 (Establish Command Post Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures); ART 7.4.6 (Provide Space Support). ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures).

d. Linkage to Universal Joint Task List (UJTL): Operational (OP) 5 (Provide Operational C2); TA 5 (Exercise C2).

e. Concept and Doctrinal Linkage: TRADOC Pam 525-3-3, Battle Command; TRADOC Pam 525-3-0, The Army in Joint Operations; Command and Control Joint Integrating Concept.

4-9. FOC-01-06: An Agile, Ubiquitous Network

a. Capstone Capabilities.

(1) An agile, ubiquitous communications network consisting of an integrated mix of terrestrial and space-based systems is critical to all aspects of the battle command function. A robustly networked force can quickly share information, which in turn enables collaboration and self-synchronization, and enhances information and decisionmaking superiority. The network

will support the transport of information necessary for three dimensional displays, instantaneous messaging and alerts, distribution and sharing of COP and survivability information among multiple distributed nodes and enable multi-echelon collaborative planning. A robust network is will enable BCOTM and untether the commander from fixed command posts.

(2) A pervasive, extended range, intertheater, and intratheater beyond line-of-sight communications capability and broadcast services between non-contiguous forces at the halt, at the quick halt, and on the move in all operational environments and conditions will facilitate the timely exchange and sharing of data, voice, imagery, and video down to the lowest tactical levels to Army. The network provides the critical infrastructure that connects the JIM force along with key space-based systems and enabling access to the GIG. The GIG is the system that provides global access and allows all users to share the information they need, when they need it, in a form they can understand and act on with confidence and protects information from those who should not have it.

(3) The future network must support the concept and vision of Network Enabled Battle Command by providing the following:

- Information superiority-enabled operations that increase combat power by networking sensors, decisionmakers, and shooters to achieve shared awareness.
- Increased speed of command.
- Provide greater lethality.
- Increased survivability, and support self-synchronization.

(4) The future network will translate information superiority into combat power by effectively linking knowledgeable entities in the operating environment.

b. Narrative. To achieve an agile, ubiquitous network in the future Modular Force requires the following capabilities:

- The ability to establish network and nodal control used to send or receive strategic information (including space systems).
- Communications between all operational and tactical forces that are JIM interoperable
- Network connectivity and interoperability across all operational phases (for example strike, C2, sustainment, and joint intelligence, surveillance and reconnaissance).
- The ability to defend systems, data, information and networks from unauthorized access and attack
- An integrated mix of terrestrial and space-based systems that provide connectivity to operational and tactical users
- Information management tools and processes that will support prioritization and synchronization of battle command information. It is probable that not all levels of network capability will be adequate for all uses and users, at all times, therefore, commanders must be able to manage the network as combat power.
- A networked computing environment that provides the physical and logical connectivity among all the participants. It must include data management tools to ensure that data

collected in one part of the network is compatible and discoverable by the others in the network. Single data entry is critical.
- Solutions that will minimize or negate the consequences of an attack on the network
- Information systems that are part of a joint federated information network, which is interoperable with major JIM and NGO.
- A scalable, deployable and mobile networking capability that supports mission tailoring, force responsiveness and agility, ability to change missions without exchanging forces, and general adaptability to changing battlefield conditions
- Support the extensive use of live, virtual and/or distributed simulations, scenario-driven war games and experiments, and training exercises.
- A network that can operate in all potential environments, while on the move. It will be dynamically reconfigurable, allowing tailoring of networks for time-critical missions, ensuring uninterrupted communications during decisive and long-range operations.
- The ability to provide end-to-end assurance and validation of information and information systems.
- The network must have continuous connectivity, through multiple pathways, to provide unity of effort, and extend the commander's reach.
- Network management functions that monitor network performance and automatically adjusts, or reconfigures, to meet the demands of user systems.

c. Linkage to Army Universal Task List (AUTL): Army Tactical Task (ART) 7.0 (The Command and Control Battlefield Operating System); ART 7.1 (Establish Command Post Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures); ART 7.4.6 (Provide Space Support). ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures).

d. Linkage to Universal Joint Task List (UJTL): Operational (OP) 5 (Provide Operational C2); TA 5 (Exercise C2).

e. Concept and Doctrinal Linkage: TRADOC Pam 525-3-3, Battle Command; TRADOC Pam 525-3-0, The Army in Joint Operations; TRADOC LandWarNet CONOPS; Command and Control Joint Integrating Concept.

Section II – Battlespace Awareness (BA)

4-10. BA Functional Concept

The BA functional concept focuses on the ability of JFCs and all force elements to understand the environment in which they operate and the adversaries they face. In the future, efforts to create superior BA will involve a constellation of highly responsive sensors providing persistent coverage of adversary targets. A producer interactive network, continuously synchronized with operations, will enable users to subscribe to both real time and archived fused data. The capabilities needed to enable effective BA fall into the following areas:

- Processing, analysis and reporting of intelligence information.

- The ability to observe and collect information worldwide.
- The ability to collect and manage biometric data.
- The ability to manage knowledge.
- The ability to execute BA assets.
- The ability to model, simulate, and forecast.
- Fusion.

4-11. Joint/Army Concept Linkage

a. The BA joint functional concept addresses the ways and means whereby the JFC plans operations and exercises C2. BA is "the result of the processing and presentation of information comprehending the OE – the status and dispositions of friendly, adversary, and non-aligned actors; and the impacts of physical, cultural, social, political information, influence, and economic factors on military operations."

b. BA is an overarching, unifying concept mechanism to orchestrate and synchronize ISR/RSTA operations across echelons, services, agencies and coalition partners, by enhancing collaboration, adding new capabilities, and, in some cases, performing existing functions more efficiently and effectively.

c. BA provides commanders and force elements with the ability to make better decisions faster, by enabling a more thorough understanding of the physical, socio-cultural, political information, and economic environment in which they operate, relevant friendly force data, the adversaries they face and non-aligned actors that could aid in or detract from friendly force OE success. BA intends to bring to bear a constellation of highly responsive sensors (for example, unattended, human, intrusive, and remote) providing persistent, redundant and tailored coverage of the OE.

d. BA represents harnessing the power of the networked force and ensuring that commanders at all levels have the information they need to make decisions inside the adversary's decision cycle and within the construct of the socio-cultural in which they are deployed.

4-12. Desired Joint Functional Concept Capabilities

a. The BA Functional Concept focuses on the ability of JFCs and all force elements to understand the environment in which they operate and the adversaries they face. In the future, efforts to create superior BA will involve a constellation of highly responsive interoperable sensors providing persistent coverage of adversary targets and noncombatants in the operational area. A producer interactive network, continuously synchronized with operations, will enable users to subscribe to both real time and archived fused data and intelligence. Advanced fusion and assessment capabilities will help provide friendly forces with an understanding of the adversary's capabilities and his inhernent possible actions which will enable commanders to make operational decisions more efficiently by providing actual and predictive cognizance. Additionally, socio-cultural indicators, direct and indirect, of regional population dynamics will provide sentence important dimensions to our understanding of the OE.

b. There are six components that should be considered in BA. These are outlined in the joint concept as follows:

- Processing, analysis, and reporting of intelligence information.
- Observe and collect information worldwide.
- Collect and manage biometric data.
- Manage knowledge.
- Ability to execute BA.
- Model, simulate, and forecast.

c. Fusion in intelligence usage, is the process of examining all sources of intelligence and information to derive a complete assessment of activity. Fusion is the critical technology that underpins these components and in many circles has become synonymous with BA.

4-13. FOC-02-01: Processing, Analysis and Reporting of Intelligence Information

a. Capstone Capabilities. Capstone capabilities needed for analysis and reporting of intelligence information include:

- Extraction and processing of battlefield entities from observations and automated/aided object recognition from imagery electro-optical/infrared, synthetic aperture radar, multi-spectral/hyper-spectral, change detection video and human sources.
- Tracking of ground objects from moving target indicator, radar, and detection, and geospatial location of objects by acoustic, seismic, magnetic sensors and change detection.
- Identification and geospatial location of radio frequency emissions, other network communications media, biometric measurements of individuals, Soldier/observer field reporting, free text processing of reports and open source media.
- Hypothesize and assess potential current COAs, and future impacts to friendly operations. Provide analyst archiving, collaboration, mining, visualizing, and assessment tools.
- Develop decisionmaking tools to identify socio-cultural issues and needs in order to predict the perceptions and actions and reactions of indigenous population groups in relation to on-going or planned military operations.
- Military and nonmilitary organizations that routinely Interface with the indigenous population.
- Use competing hypoese and updated signatures to analyse intentions and possible actions.
- Reporting or internal communications within networks and RF communications.
- Information through human intelligence (includes some biomed operation, interogrations) media exploitations.
- Use forensics to report remotely and on site.

b. Narrative. Analysis of Intelligence Information is the ability to use open and protected methods to discern patterns, opportunities, and vulnerabilities, and characterize information concerning an adversary and the operating environment in order to facilitate superior

decisionmaking. This capability is a combination of both ability to conduct detailed, in-depth analysis of very specific phenomenology and the ability to fuse information from a wide variety of sources in order to create valuable insights and actionable, relevant information.

c. Linkage to AUTL: ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.3 (Conduct Tactical Reconnaissance); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting).

d. Linkage to UJTL: ST 2 (Conduct Theater Strategic Intelligence, Surveillance, and Reconnaissance); OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); TA 2 (Develop Intelligence).

e. Linkage to Concepts: TRADOC Pam 525-2-1, See.

4-14. FOC-02-02: The Ability to Observe and Collect Information Worldwide

a. Capstone Capabilities. Capstone capabilities for observing and collecting information worldwide include:

- Find, fix, track, target, and assess IEDs (and networks), weapons, munitions, and full spectrum chemical, biological, radiological, nuclear, and explosives (CBRNE) andWME.
- Detect, image, and characterize activity within urban structures and complex terrain.
- Detect, identify, and track in near real time, with precision friendly and enemy forces, neutrals, and other groups in close proximity at standoff distances. This capability includes individual leadership figures and high value targets, in a complex and chaotic urban environment.
- Detect, image, and characterize activity in sub-surface locations.
- Find, fix, classify, and track friendly, enemy, and neutral fixed and moving equipment and people.
- Display and record in the COP the successive positions of a moving contact.
- Observe, collect and characterize socio-cultural and institutional data and indicators including religious, ethnic, political, economic, information, criminal, and physical (infrastructure, natural resources) to predicatively assess the impact these spheres will have on planned or on-going military operations.
- All facilities, fixed and mobile (including those sub-surfaces and in urban areas).
- Independent events, of either human or natural source (riots, explosions, CBRN plumes, etc.).
- Organizations such as governmental/nongovernmental, cells, conclaves, etc.
- Assess and monitor the needs, perceptions, actions and reactions of indigenous population groups.
- Search for, intercept, identify, and locate or localize sources of radiated electromagnetic (EM) energy for immediate threat recognition, targeting, and planning.

b. Narrative. Observe and collect information worldwide is the ability to detect, identify, characterize, and track items, activities, conditions, and events worldwide of interest to commanders and decisionmakers. This capability includes persistent observation, reconnaissance, and information collection from both open and clandestine sources. The following contributing capabilities are critical for observation and collection: ready access by friendly forces, broad area surveillance, focus/stare on targets of interest, and measure and monitor environmental conditions.

c. Linkage to AUTL: ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.3 (Conduct Tactical Reconnaissance); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting).

d. Linkage to UJTL: ST 2 (Conduct Theater Strategic Intelligence, Surveillance, and Reconnaissance); OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); TA 2 (Develop Intelligence); OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance).

e. Linkage to Concepts: TRADOC Pam 525-2-1, See.

4-15. FOC-02-03: The Ability to Collect and Manage Biometric Data

a. Capstone Capabilities: Capstone capabilities for the ability to collect and manage biometric data include:

- Detect, identify, tag, mark, and track with precision enemy forces, neutrals, and other groups (uncooperative) at standoff distances, including individual leadership figures, in a complex and chaotic urban environment.
- Develop undetectable combat identification/tracking of friendly special operations forces and conventional forces located outside of blue force controlled areas.
- Develop biometric processing systems for rapid identification, coding, and tracking of adversaries, human sources, and cataloging of information concerning enemy prisoners of war (EPW), detainees, and civilians.

b. Narrative. Biometric data collection, processing, and analysis are rapidly becoming a critical element in fighting the global war on terrorism. Units require the ability to identify and track individuals at standoff distances. Identification techniques must be both near real time, accurate, and take into account uncooperative individuals. There is also a requirement to track and distinguish friendly personnel from a distance.

c. Linkage to AUTL: ART 1.1.2 (Perform Situation Development) ART 1.1.3 (Provide Intelligence Support to Force Protection; ART 1.1.4 (Conduct Police Intelligence Operations); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting).

d. Linkage to UJTL: ST2 (Conduct Theatre Strategic Intelligence, Surveillance and Reconnaissance); OP2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); TA2 (Develop Intelligence).

e. Linkage to Concepts: TRADOC Pam 525-2-1, See.

4-16. FOC-02-04: The Ability to Manage Knowledge

a. Capstone Capabilities. Managing knowledge is the ability to store, retrieve, filter, fuse, and display information from a variety of sources in context in order to ensure the right information reaches the right decisionmaker in an actionable format in order to support superior decisionmaking. Capstone capabilities needed for managing knowledge include:

- Domain specific date representations (shareable across multiple domains).
- Multi-level security.
- Intuitive man-machine interfaces.
- Perform sensor signature management to include: visual, acoustic, seismic, infrared, magnetic, chemical, olfactory, and thermal.
- Perform management of biometrics data.
- BA planning shared across JTF and BCT.
- Provide rapidly updated three-dimensional mapping, imagery, or other products to operate in urban and sub-surface terrain.

b. Narrative. Knowledge management includes horizontal and vertical integration of information from sensors, analytic centers, and decisionmakers. Given that the nature of information is both synergistic and contextual, it is critical that analysts and agents be able to access past information to derive maximum benefit from the current findings. Effective knowledge management is critical to understanding the OE to enhance maneuver support (MS). The following contributing capabilities are critical for knowledge management:

- Smart pull/push information.
- Shared plan visibility.
- Maintaining an open archive.

c. Linkage to AUTL: ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.3 (Conduct Tactical Reconnaissance); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting).

d. Linkage to UJTL: ST 2 (Conduct Theater Strategic Intelligence, Surveillance, and Reconnaissance); OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); TA 2 (Develop Intelligence).

e. Linkage to Concepts: TRADOC Pam 525-2-1, See (See para 5-2b(4) for advanced collection capabilities to generate and share data in near realtime).

4-17. FOC-02-05: The Ability to Execute BA Assets

a. Capstone Capabilities. Capstone capabilities for BA assets include:

- BA synchronization and display tools.
- Asset control and optimization tools.
- Priority intelligence requirements development, refinement, dissemination and integration.
- Planning and assessment tools.
- Distributed collaboration of manned/unmanned platforms.
- Perform sensor signature management to include: visual, acoustic, seismic, infrared, magnetic, EM, chemical, olfactory, and thermal.

b. Narrative. The commander must be able to execute BA assets worldwide under a range of conditions. The BA structure must be modular and tailorable in order to fit with a variety of organizations across the ROMO. Examples include the capability to synchronize BA with operations, task and dynamically re-task assets, monitor/track assets and their activities.

c. Linkage to AUTL: ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.3 (Conduct Tactical Reconnaissance); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting) ART 7.0 (The Command and Control Battlefield Operating System); ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.3 (Conduct Tactical Reconnaissance); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support Targeting); ART 1.4.2 (Provide Intelligence Support to Information Operations.

d. Linkage to UJTL: ST 2 (Conduct Theater Strategic Intelligence, Surveillance, and Reconnaissance); OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); TA 2 (Develop Intelligence).

e. Linkage to Concepts: TRADOC Pam 525-2-1, See (See para 5-2b(3) for managing collection activities).

4-18. FOC-02-06: The Ability to Model, Simulate, and Forecast

a. Capstone Capabilities. Capstone capabilities for modeling, simulation and forecast include:

- Three-dimensional/holographic visualization tools.
- Human intelligence and all source collection models.
- Sociocultural models of communications and influence.
- Adversary COA models.
- Technical collection models to predict and tailor future collection upon, based on environmental and sensor constraints and adversarial patterns of operations.

- Models to assess and prioritize reconstruction efforts in relation to the impact they will have on the adversary's decision cycle and indigenous population perceptions.

b. Narrative. Modeling, simulation and forecasting is the ability to utilize BA information to create an environment that allows for modeling, simulating, and forecasting in order to increase understanding, increase confidence, improve the planning (and execution) of COAs, and decrease risk for commanders and analysts. Modeling, simulation, and forecasting activities range from accurate and timely weather predictions through support of operational rehearsals, training exercises, and military education. The following contributing capabilities are critical for modeling, simulation, and forecasting: auto-populate models and simulations; identify enemy courses of action; and integrate cultural, social and other nonmilitary issues into predictive forecasts.

c. Linkage to AUTL: ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.3 (Conduct Tactical Reconnaissance); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting).

d. Linkage to UJTL: ST 2 (Conduct Theater Strategic Intelligence, Surveillance, and Reconnaissance); OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); TA 2 (Develop Intelligence).

e. Linkage to Concepts: TRADOC Pam 525-2-1, See (See para 5-3b(5) for assess).

4-19. FOC-02-07: Fusion

Fusion is the critical technology that underpins these components and in many circles has become synonymous with BA functions. Fusion, by definition, is a series of processes to transform observable data into more detailed and refined information, knowledge, and understanding. These processes, by their very nature, involve a mixture of automation and human cognition. All of the capstone capabilities required and outlined above have one or more aspects of fusion embedded within their constructs.

a. Capstone Capabilities.

(1) Just as the BA functional concept "begins and ends with the decisionmaker," so does the Army's development of OE awareness capabilities that provide actionable intelligence for commanders and decisionmakers at all echelons. Actionable intelligence provides commanders and Soldiers a high level of SA, delivered with the speed, accuracy, and timeliness necessary to operate at their highest potential and to conduct successful operations. To achieve actionable intelligence, the future Modular Force must bring to bear a constellation of highly responsive sensors (such as unattended, human, intrusive, and remote) providing persistent, redundant, and tailored coverage of the OE.

(2) Sources of collected data will interact over a network to provide all force elements with the highest quality fused data. Within this "producer interactive network," force elements will subscribe to products or data (including archival data). Software agents will broker data and

products, posting some unprocessed information. In this manner, all are provided access to common data, enabling joint, allied, and coalition warfighters to construct tailorable, relevant pictures.

(3) Commanders will maintain a deeper understanding of potential enemy COAs by integrating archived and real time data to auto-populate models and simulations, and by leveraging these models and simulations in training and operations to perform rapid and continuous alternative forecasting. By providing simultaneous current and forecasted future depictions of intelligence resources, and insight into their potential responsiveness, the commander will be able to quickly re-task multiple sensors to react to emerging operational situations.

(4) OE sensing (from manned aerial and ground platforms, unmanned aerial and ground vehicles or forces) will be incorporated into operations planning and execution. Environmental information (such as weather, terrain, and civil component) will be augmented with information from OE sensors. All sources of information will be integrated into modeling and simulation to facilitate an understanding of the potential impacts of various COAs.

b. Narrative.

(1) The commander establishes information requirements based on mission, enemy, terrain and weather, troops, time, and civil considerations. The fusion process, operating over integrated communications networks, includes accepting data from all BA sources, organic and external. Sensors include combat platforms and Soldiers, organic manned and unmanned reconnaissance and surveillance platforms, and external constellations. Fusion ensures that a correlated, non-duplicative set of information is available across the force and provides context to the information that has been acquired and enables SU. This requires that data and information be converted as quickly as possible into actionable intelligence.

(2) There are six levels of fusion (0-5). However, it is levels 1 through 3 that add progressively greater meaning and involves more analysis. Level 4 is continuous and occurs at all levels of fusion. The fusion levels are:

- Level 0: Organize (extracts battlefield entities).
- Level 1: Correlate, identify, and resolve (correlates battlefield entities).
- Level 2: Aggregate, determines, interprets, hypothesizes, and resolves (associates and aggregates entities, determines activity and current courses of action).
- Level 3: Interprets, determines, and predicts (assesses future red/blue courses of action).
- Level 4: Assesses, and reviews performance (serves as feedback of levels 1-3).
- Level 5: Visualize (provides user interface to collected and fused data).

c. Linkage to AUTL: ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.3.2 (Perform ISR Integration); ART 1.3.3 (Conduct Tactical Reconnaissance); ART 1.3.4 (Conduct Surveillance); ART 1.4.1 (Provide Intelligence Support to Targeting).

d. Linkage to UJTL: ST 2 (Conduct Theater Strategic Intelligence, Surveillance, and Reconnaissance); OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); TA 2 (Develop Intelligence).

e. Linkage to Concepts: TRADOC Pam 525-2-1, See (See para 5-3b(2) for a fuse statement).

Section III – Mounted/Dismounted Maneuver

4-20. Mounted/Dismounted Operations

In the future Modular Force, Soldiers will remain the cornerstone for force design and employment, as the Army requires their success to win wars. In future operations, decisive maneuver will be central to position Soldiers and equipment to enter the fight on our terms, seize and retain the initiative, and finish decisively and rapidly.

- Mounted/dismounted cmaneuver capabilities.
- Mobility.
- Operations in urban and complex terrain.

4-21. Joint/Army Concept Linkage

a. The force application joint functional concept describes capabilities and attributes necessary to successfully apply force in the future military environment as documented in the joint operations concepts and this pamphlet. Attributes are a means to assess capabilities in areas essential to force application. The joint operations concept force application attributes are: lethal, nonlethal, discriminating effects, predictive planning, streamlined C2, networked forces, tailorable forces, strategic agility, tactical agility, synchronized operations, and tactical dominance. These attributes focus on desirable qualities to be pursued when considering force application improvements.

b. Future Modular Force tactical units operating as part of the joint team will be required to win on the offensive, initiate combat on their terms, gain and retain the initiative, build momentum quickly, and win decisively while simultaneously conducting stability operations to achieve long-lasting effects and facilitate transition. They must be masters of transition. Although necessarily optimized for offensive operations in major theater war, the future Modular Force must be equally effective at every point on the spectrum of operations, able to execute missions from offense, defense, to stability and support operations across the full spectrum of conflict. They must be as comfortable and competent, in homeland security operations as they are in combat operations overseas.

c. A major goal of the future Modular Force is to go well beyond the inherent strengths of current forces, recognizing that evolving technical and geostrategic conditions require dramatically new responses. We must retain strengths of quality leaders and Soldiers; reliable sustainment; heavy force speed, firepower, and combined arms capability and survivability; in combination with light/medium force versatility, deployability, and skill, in dismounted close combat - all within a single force design and common mobility regime.

d. Future Modular Force leaders must be knowledgeable on military, paramilitary, political, and civic actions necessary to defeat counterinsurgency (COIN) and adjust their approach constantly, ensuring that their elements are ready each day to be greeted with a handshake or a hand grenade. Conducting a successful COIN campaign thus requires a flexible, adaptive force led by agile well-informed, culturally astute leaders. COIN, described in FM 3-24, is a combination of offensive, defensive, and stability operations. The proportion of effort devoted to offense, defense, and stability within COIN can change over time and vary geographically and by echelon. Future Modular Force leaders must understand the people of the host nation, the insurgents, and the host nation government. There are successful and unsuccessful practices to COIN.

(1) Successful practices include:

- Emphasize intelligence.
- Focus on the population, its needs and its security.
- Isolate insurgents from the populace.
- Provide amnesty and rehabilitation for those willing to support the new government.
- Place host nation police in the lead as soon as possible.
- Train military forces to conduct COIN operations.
- Deny sanctuary to insurgents.

(2) Unsuccessful practices include:

- Over-emphasize killing and capturing the enemy rather that securing and engaging the populace.
- Conduct large scale operations as the norm.
- Focus special operations forces primarily for raiding.
- Build and train host nation security forces in the U.S. military's image.

4-22. Desired Mounted/Dismounted Maneuver Capabilities

a. Similar to the operational level concepts for operational maneuver and tactical maneuver, this FOC area performs a function of integrating capabilities that enable maneuver. The capabilities needed to enable mounted/dismounted maneuver are essentially covered in the other FOC areas but like subordinate concepts, are essential to enabling effective mounted and dismounted maneuver. These capabilities are essential regardless of the condition: day, night, open terrain, complex terrain, urban, or desert environment.

(1) Battle command. An efficient, networked, streamlined and dependable battle command construct connected to both mounted and dismounted maneuver. Without it overall control and synchronization of effort is impossible. Chapter 4 lists the capabilities necessary for effective battle command.

(2) BA is inextricably tied to battle command and so provides BA to all dismounted Soldiers, as well as their mounted counterparts. Without it mounted/dismounted maneuver becomes virtually impossible. See chapter 4, section II for the capabilities for BA.

(3) Mounted/dismounted maneuvers are critical for successful moblitiy and operations regardless of terrain day, night, or environment. See chapter 4, section III for capabilities for mounted/dismounted manuvers.

(4) Air maneuver. The capabilities for air MS and enable mounted/dismounted maneuver, both operationally and tactically. See chapter 4, section IV for the capabilities for air maneuver.

(5) Fires. Fires are critical for successful mounted/dismounted maneuver. Capabilities for fires are discussed in chapter 4, section V.

(6) MS. MS is another key element necessary for mounted/dismounted maneuver. MS forces enable freedom of maneuver for mounted/dismounted forces, and deny freedom of maneuver for enemy forces. See chapter 4, section VI for the capabilities for mounted/dismounted maneuvers.

(7) Protection. Personnel, physical asset and information protection is essential to preserve the force to be able to conduct maneuver. Improved means to detect IEDs must be a priority. See chapter 4, section VII for the capabilities for protection.

(8) Strategic responsiveness and deployability. Strategic responsiveness and deployability is essential for mounted/dismounted maneuver. The future Modular Force must, within a joint context, be capable of rapidly deploying worldwide and arrive ready to fight or conduct other FSO immediately upon arrival. See chapter 4, section VIII for the capabilities for strategic responsiveness and deployability.

(9) Maneuver Sustainment. Future Modular Force cannot conduct maneuver without having the right sustainment, at the right place, in the right quantities, and at the right time. See chapter 4, section IX for the capabilities for maneuver sustainment.

(10) Training. Quality, realistic training is essential to ensure future Modular Force are adequately trained to conduct mounted/dismounted maneuver. Systems must have embedded training and mission rehearsal capabilities to enable Soldier training where facilities are lacking. See chapter 4, section X for the capabilities to enable quality training.

(11) Human Dimension. Human dimension ensures the systems future Modular Force Soldiers employ enhance Soldier task performance rather than detract from it. See chapter 4, section XI for the capabilities for human dimension.

(12) Stability. Additional capabilities envisioned to enable mounted/dismounted maneuver are identified in the following two areas of mobility and operations in urban and complex terrain.

4-23. FOC-03-01: Mobility

a. Capstone Capabilities. Future Modular Force units will possess superior tactical mobility. Platforms will negotiate the majority of surfaces, such as road, off-road, trails, CBRN contaminated terrain, water crossing, and narrow gaps. Units must possess superior capability to detect presence, identify disposition, and counter antitank and antipersonnel mines, above and below surface, and booby traps, such as side-charge and remote detonated mines. Units must possess superior capability to detect and identify CBRN hazards. Mounted units require the ability to conduct route reconnaissance with forward looking and off-road sensors, to clear at greatly improved speeds (at least 50 kilometers (km) per hour). Future Modular Force vehicles must have improved ride quality, comfort, and safety to reduce Soldier injury and ensure their fitness to fight upon arrival. future Modular Force, including dismounted Soldiers, must have standoff means for detection and defeat of obstacles, the ability to mark or perform in-stride counters to neutralize mines at a distance, and the ability to detect and locate other man-made obstacles. Future Modular Force operational architecture must enable real time dissemination of reported obstacles throughout the force; provide capability, organic to tactical units, to breach disrupting and fixing obstacles in-stride, and to simultaneously engage enemy forces conducting over-watch of the obstacles. The future Modular Force must provide organic capabilities to cross narrow gaps, such as streams and irrigation ditches, without loss in operational momentum, and enable dismounted assaults in urban terrain. Specific capabilities include:

- Multistory building entry through roofs and upper floor.
- Entry into, and through, subterranean complexes or collapsed structures.
- Wall breaching (50 inch x 70 inch holes, all types of construction).
- Enable protective countermobility and survivability position support available at transition to defensive operation.
- Incorporating full spectrum CBRN sensors, detectors, analyzers, and classification devices into ground and air vehicles.
- Provide near real time CBRN agent detection capability.
- Enable large scale personal, equipment, and area CBRN agent decontamination with a low- to non-aqueous decontamination agent standard throughout joint and coalition forces.
- Provide a decontamination agent capable of decontaminating sensitive and electronic gear without destroying it.
- Provide remotely controlled ground vehicles capable of decontaminating equipment and vehicles without human presence despite encapsulating material (for example, mud, ice, snow, etc.) covering the CBRN agent.

b. Narrative. Mobility must include the ability to perform deception operations, requiring the use of unmanned systems that are often equipped with acoustics, EM deception, employment of special operations forces and psychological operations or PSYOPS. PSYOPS are planned operations to convey selected information and indicators to audiences to influence their emotions, motives, objectives reasoning, and ultimately the behavior or organizations, groups and individuals. Used in all aspects of war, it is a weapon whose effectiveness is limited only by the ingenuity of the commander using it. A proven winner in combat and peacetime, PSYOP is

one of the oldest weapons in the arsenal of man. It is an important force protector/combat multiplier and a nonlethal weapons system.

(1) The success of employing PSYOP starts with knowing its capabilities:

- Project a favorable image of U.S. and allied forces.
- Inform target audiences in new or denied areas.
- Amplify the effects of a show of force.
- Assess attitudes and impressions.
- Give opponent audiences alternative courses of action.
- Humanitarian assistance.
- Noncombatant evacuation operations.

(2) PSYOPS can be conducted using several types of media-audio, visual and print. During combat operations, loudspeaker systems are the only medium that can achieve face to face communication providing immediate feedback from enemy forces. During loudspeaker broadcasts, the enemy becomes a captive audience unable to escape the message. As a result, tactical PSYOP rely heavily upon loudspeaker operations. The advantages of loudspeaker operations include: immediate feedback from the targer audience, flexibility, mobility, range of transmission, exploitation of targets of opportunity, effectiveness with illiterate audiences, and ability to pinpoint targets. The limitations include: vulnerability to enemy fire, distortion of messages over distance and time, and employment of enemy countermeasures. The mission of PSYOP is to provide the supported maneuver commander with the ability to communicate directly with the human element on the battlefield. PSYOP support at each level must integrate the needs of the maneuver commander with the CINC/JTF PSYOP campaign plan. This result in a PSYOP plan the supports each maneuver commander while ensuring consistent PSYOP themes and objective at all levels. PSYOP does have limitations such as:

- Tactical PSYOP teams require security
- Product approval process takes time
- Often must use supported unit's communications equipment
- All products developed must fall within a approved PSYOP campaign plan.

c. Linkage to AUTL: ART 2.2 (Conduct Tactical Maneuver); ART 2.3 (Conduct Tactical Troop Movements); ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2.2 (Conduct a Mobile Defense); ART 8.5 (Conduct Tactical Mission Tasks). ART 1.4.2.1 (Provide Intelligence Support to Military Deception); ART 3.3.2.1. (Conduct Military Deception); ART 1.4.2.1 (Provide Intelligence Support to Military Deception); ART 3.3.2.1 (Conduct Military Deception).

d. Linkage to UJTL: ST 1 (Deploy, Concentrate, and Maneuver Theater Forces); OP 1 (Conduct Operational Movement and Maneuver); TA 1 (Develop/Conduct Maneuver).

e. Linkage to Concepts: TRADOC Pam 525-3-90, Tactical Maneuver Operating Concept.

4-24. FOC-03-02: Operations in Urban and Complex Terrain

a. Capstone Capabilities.

(1) The U.S. military structure, organization, doctrine, and technical capabilities are subjects of study by most nations of the world. These nations understand how our forces will fight, and what type of environments our forces are best suited. Using this knowledge, future opponents will seek to avoid operations in environments for which our forces are optimized. Thus, our adversaries will seek cover and concealment in complex terrain and urban environments, to offset standoff of U.S. forces, and exploit the reduced inter-visibility ranges, to negate technological overmatch of standoff reconnaissance, surveillance, and target acquisition (RSTA) and lethal effects.

(2) Today we can win in a complex terrain or urban fight, but with a high price, in terms of casualties and infrastructure damage. The Army does not currently dominate the complex terrain/urban OE. Our forces have limited ability to see into it, have limited ability to communicate and move within it, and because of the requirement to limit noncombatant casualties and physical damage, have limited means to shoot into it. The future Modular Force must be able to overcome these limitations, across the entire spectrum of operations, and dominate combat in urban and complex terrain; to the same degree present day U.S. forces dominate the open maneuver battle. This includes operations from stability and support, to small-scale contingencies, and urban operations in a major combat operation. Future Modular Force must be capable of rapidly transitioning across FSOs, and transitioning, without pause, between open and rolling to urban and complex terrain.

b. Narrative.

(1) There are several characteristics that define complex terrain and urban operations, and make them far different than operations on less restrictive terrain. These differences include short ranges of inter-visibility, presence of man-made structures, multidimensional OE, difficult target identification in limited engagement areas, restrictive maneuver space, toxic industrial material (TIM), and the presence of noncombatants. Additionally, some complex terrain is densely vegetated, providing numerous positions for enemy concealment. Urban operations are made even more difficult due to the restrictive rules of engagement (ROE). Urban battles of the future will continue to challenge the JFC and staff to avoid excessive collateral damage, and limit the number of noncombatant casualties. Future Modular Force combat systems must provide the capability to support dismounted Soldiers to entering into, and moving through, subterranean complexes and collapsed structures to conduct squad and larger unit assault and clearing operations. Future Modular Force weapons must be able to switch from lethal to nonlethal fires to minimize noncombatant casualties. Operations in urban and complex terrain require the future Modular Force to aggressively accomplish a multitude of complex warfighting tasks. The first, and quite possibly the most difficult, operational challenge for the future Modular Force will be the collection of intelligence and civil and cultural information. (See FOC-02-01, para 4-11, for Analysis and Reporting of Intelligence Information.) The second operational challenge for the future Modular Force is the ability to move undetected to the AO. The assembling of a large force can send signals of possible invasion to an enemy (or their allies)

that possesses advanced intelligence collection capability. Positioning is further complicated if the target areas (critical nodes and key terrain) are located deep within the city core. To enable the future Modular Force to conduct movement operations will require several enabling technologies and capabilities, which include:

- The ability to interdict enemy intelligence collection capabilities. The force must have the ability to move, without the threat of enemy long-range detection and interdiction. This capability must serve the future Modular Force from the point of departure, to within the objective area.
- The ability to perform deception operations, requiring the use of unmanned systems (often equipped with acoustics), PSYOP, and the employment of special operations forces.
- Obscurant delivery systems that are capable of rapidly covering large areas, and maintaining effects for extended periods.
- The ability of the force to move under limited visibility conditions. This will require the development of advanced optical capabilities, which will allow future Modular Force to move under all weather and light conditions, regardless of ambient lighting conditions. These systems must have the ability to adjust rapidly to changes in lighting conditions, negating 'white out' effects normally experienced during close quarter urban operations.
- Systems must have the ability to move rapidly across open areas, and be highly maneuverable within the confines of the urban operational environment. Systems must have the ability to rapidly negotiate rubble, and reduce/negotiate obstacles, while on the move, and provide in-stride or rapid detection and protection against TIM in the operational environment.
- Vertical takeoff and landing capability will be critical for the insertion and extraction of forces in the urban environment. Individual Soldiers will benefit from individual lift systems, which will allow them to rapidly ascend structures, overcome barriers, and bypass hazardous areas. While individual lift systems will never substitute for larger air delivery platforms, they will provide the force (or a section of the force) with a mobility advantage in the vertical plane during special missions, and under unique battlefield conditions, as required.

(2) The third operational challenge for the future Modular Force is the isolation of the urban objective(s). Isolation can involve an entire urban area, a specific point within the urban environment, or multiple points within the built-up area. Isolation requirements include both physical and information isolation. Once isolation is obtained, it remains a critical task throughout the conduct of the operation. Total isolation may diminish to entry/exit control, as the mission transitions from warfighting to peace operations. Actions during isolation operations will also serve to 'set conditions' for successful decisive operations. To enable the force to conduct isolation operations, several enabling technologies and capabilities are essential. They include:

- Unmanned aerial, ground, and space platforms to assist with area isolation.
- A wide array of sensors to 'fill gaps' during large urban area operations.

- Large area nonlethal effects employed utilizing long-range precision fires and unmanned systems, to facilitate area denial, or to force the enemy into less restrictive engagement areas.
- The ability to effect resource denial to enemy forces occupying the urban area, without completely destroying both the natural and built resource infrastructure.
- The ability to perform surgical personnel and equipment engagements, counter sniper operations, intelligence and civil and cultural information collection, target interdiction, and movement denial operations, both on the periphery, and within the urban core, make snipers a tremendous asset during full spectrum urban operations.
- Snipers will significantly impact isolation operations during the urban fight as a whole. Snipers also have a significant psychological effect on enemy forces. Key capabilities required by snipers are:
- State-of-the-art optical devices allowing operation in all light and weather conditions.
- Optical systems utilized by 'Sniper Spotters' linked to a computer database, providing the sniper team with immediate notification, once priority targets have been selected.
- A wide array of deployed sensors and unmanned systems to provide security for sniper teams.
- Chameleon-like camouflage equipment, lightweight, easily transportable, and deployable to allow the sniper to quickly adapt to any environment and remain undetected.
- Weapons systems with low signature (acoustic and visual) systems that will provide all terrain/target/weather engagement capability.
- A computerized database linked to weapons to allow a sniper to 'insert' their personal data into any sniper weapons system, and the system will automatically adjust (zero) to the individual. This allows the sniper to rapidly calibrate or recalibrate any system, at any time, on the battlefield.
- Sensors within the weapons system to automatically adjust the point of aim based on distance, windage, target data, deflection, and other individual shooter input, allowing for rapid target engagement and transition.

(3) The fourth operational challenge for the future Modular Force will be the conduct of decisiva operations to destroy or remove enemy forces, secure the safety of U.S. citizens or interests, and enforce or maintain peace. Additionally, decisive operations may further deny the enemy resources and decisive terrains, deceive or divert the enemy, further develop intelligence, or simply fix the enemy in position. The end state for this phase of the operation is to set the conditions for successful offensive operations, and impose the will of the commander on the enemy. The future Modular Force will have the ability to enter the urban OE and conduct FSO; however, it must be capable of transitioning rapidly across this spectrum, and operating at the various interim levels simultaneously. The future Modular Force must be capable of fighting in close quarters, as a member of a joint, multinational, combined arms team, during urban and complex terrain operations. To enable the force to conduct decisive operations, the future Modular Force will require several enabling technologies and capabilities, which include:

- The ability to conduct decisive operations, under all weather and light conditions. All systems and capabilities within the future Modular Force must be capable of

functioning at full potential, without degradation resulting from environmental effects.

- Superior command, control, and communications capabilities. Decisive operations require the ability to communicate effectively in real time, across the entire force, regardless of terrain, environmental conditions, organization, or operational distance.
- The option to employ precision lethal and nonlethal systems, while avoiding excessive collateral damage and negative effects on noncombatants. Precision effects munitions must have the ability to penetrate deep within structures and subterranean OE, to destroy or incapacitate enemy forces, without causing over-pressurization or other undesired effects to adjacent structures.
- Aerial launched and high angle fires to engage targets, while overcoming the restrictive nature of the terrain. These systems will employ brilliant munitions to achieve precision effects.
- Dominant SU in urban combat for the future Modular Force. See BA for specific capabilities, paragraph 4-9
- Standoff breaching and obstacle reduction that will enable the force to maintain operational momentum, and rapidly transition through the OE, with minimal exposure to enemy fires.
- A variety of robotic platforms, UAS, and UGV, which will assist with clearing operations allow for greater Soldier standoff, provide early threat and hazard detection, conduct breaching operations, assist in reconnaissance, perform high-risk clearing operations and employ a wide variety of nonlethal effects.
- Unmanned systems, assisting Soldiers and other systems by carrying additional equipment and supplies that are mission essential but not immediately required, perform resupply operations during high-risk operational periods.
- Weapons systems that have the ability to perform within the constraints of urban and complex terrain, without sacrificing their effectiveness on less restrictive terrain. Mounted weapons systems must have the ability to elevate sufficiently to engage enemy positions on upper-levels of structures, as well as at ground level. Some munitions utilized during urban operations will require adjustable settings, to compensate for limited ranges of engagement. Weapons systems will have significantly reduced over-pressurization effects that will allow them to be fired from structures. Minimum safe distances will be significantly reduced, which allow for employment of effects within close proximity to dismounted forces.

(4) The future Modular Force will have the ability to physically mark TIM, CBRN contaminated, mined, cleared, and restricted (safe) areas. These standardized marking systems will be visible under all weather and lighting conditions. Forces will be capable of 'uploading' newly marked areas to the higher HQ' database and 'downloading' the same. These capabilities will allow for improved battlefield SU, and the avoidance of friendly force casualties.

(5) See FOC-09-06, paragraph 4-60, for health service support capabilities.

(6) The transition from offensive (decisive) urban operations to defensive operations will be a significant challenge. Units will continue to conduct FP activities; however, the shift from offensive actions to defense will most likely impact the ROE, placing even more restrictions

upon the force. Additionally, there may be an attempt by the noncombatant population to immediately return to their residences once hostilities have subsided. Noncombatants that were hiding during the hostilities will reemerge, adding confusion and congestion to the battlefield. Those enemy forces and sympathizers, that have yet to be identified, will certainly try to 'blend' into the civilian population.

(7) Successful transition from decisive operations to defensive operations will require the future Modular Force:

- Employ a significant number of sensors and unmanned systems within the urban core, and on the periphery, to monitor noncombatant activities, and provide early warning against enemy activities. Unmanned systems and sensors, equipped with explosive and gunpowder detection capability will assist in identifying enemy forces trying to 'blend' with the noncombatant population. Sensors that can monitor more than one dimension/media simultaneously will assist the JFC in monitoring significantly more of the OE, while allowing the majority of the maneuver force to continue mission preparation, and other essential tasks.
- Communicate with, and control, the returning noncombatant population. Translation devices will allow the force to effectively communicate with the populace. Unmanned systems can be deployed to meet returning noncombatants and guide them to 'control' areas, minimizing mass reentry chaos and confusion.
- Repair critical infrastructure to support the returning population. Limiting collateral damage during decisive operations will assist with this mission requirement. The identification of noncombatants, with the skills to assist with repairs, will expedite the rebuilding process; the ability to tap in to the urban database will assist with this identification process and the identification of infrastructure control grids.

c. Linkage to AUTL: ART 2.2 (Conduct Tactical Maneuver); ART 2.3 (Conduct Tactical Troop Movements); ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2.2 (Conduct a Mobile Defense); ART 8.5 (Conduct Tactical Mission Tasks).

d. Linkage to UJTL: ST 1 (Deploy, Concentrate, and Maneuver Theater Forces); OP 1 (Conduct Operational Movement and Maneuver); TA 1 (Develop/Conduct Maneuver).

e. Linkage to Concepts: TRADOC Pam 525-3-90, Tactical Maneuver Operating Concept.

Section IV – Air Maneuver

4-25. Air Maneuver Operations

Army aviation and joint tactical air support must be closely integrated into ground maneuver operations. Army Aviation plays a major role in the future Modular Force operations. Traditional aviation roles of attack, reconnaissance, lift and cargo transport continue to be vital in the future Modular Force. Key air maneuver missions envisioned for future Modular Force are: close combat attack, interdiction attack, reconnaissance, security, vertical maneuvering, and air

movement. Force operating capabilities envisioned to enable future Modular Force air maneuver concepts are:

- Responsive and sustainable aviation support.
- Effective aviation operations in the contemporary operating environment.
- RSTA and attack operations.
- Assured and timely connectivity with the supported force.
- Vertical maneuver (mounted or dismounted) and air movement.

4-26. Joint/Army Concept Linkage

The synchronized employment of land, air, sea, space, and special operations forces provides the commander with the widest range of strategic, operational, and tactical options. Army aviation plays a crucial role in supporting FSO as envisioned in the joint operating concepts (*Major Combat Operations, Stability Operations, and Homeland Security*) and joint functional concepts (*Joint Command and Control, Operational Environment Awareness, Force Application, Focused Logistics, and Protection*). Aviation, both manned and unmanned, is an integral member of the joint/combined arms team in that it conducts maneuver, MS, and maneuver sustainment operations across the spectrum of conflict.

a. During deployment and early entry operations, Army aviation will perform vital reconnaissance and security operations, air movement of critical personnel and equipment throughout the AOs, battle command, and control support, and crucial logistical support (afloat and/or ashore) until ground lines of communication (LOC) can be established.

b. Through execution of its core competencies, aviation is instrumental to the future Modular Force in simultaneous, distributed and continuous, combined arms air/ground operations, urban operations, day and night, in open, close, and complex terrain throughout the OE. It is a major contributor in establishing ground force dominance, wresting the initiative from the enemy, forcing them onto the defensive, and defeating them in detail. Future Modular Force aviation units are designed to operate at a tempo that affords the enemy no rest or relief and no means of responding effectively. Aviation units develop situations while the ground force is out of contact, maneuver to positions of advantage, engage enemy forces beyond the range of their weapons, destroy them with precision fires, and provide close support to the tactical assault at the time and place of the JFC's choosing. The use of critical, dedicated aero medical evacuation assets permits combat casualties to be rapidly evacuated through the Army health system for appropriate medical care. In addition, support of homeland security operations will likely involve significant Army aviation assets, both rotary wing and fixed wing aircraft. Homeland security will also improve aviation survivability against EA threats (counter radio frequency jamming, infrared, directed energy, expendables, chaff, flare, decoys).

4-27. Desired Air Maneuver Capabilities

The required capabilities envisioned to fulfill the joint and Army concepts for air maneuver are:

- Responsive and sustainable aviation support.
- Effective aviation operations in the contemporary operating environment.
- RSTA and attack operations.

- Assured and timely connectivity with the supported force.
- Mounted vertical maneuver.

4-28. FOC-04-01: Responsive and Sustainable Aviation Support

a. Capstone Capabilities.

- Conduct airspace and air traffic management, aviation maintenance and sustainment in support of aviation missions worldwide.
- Maintain a 90 percent operational readiness rate with reduced operation and support burden.
- Enable graceful function degradation to minimize mission aborts.
- Implement condition-based maintenance and diagnostics/prognostic systems to support a common logistical operating environment.
- Reduce rearm/refuel times.
- Deployable air and ship transportable aviation systems compatible with transport vehicles and timelines (self-deployable where applicable).

b. Narrative. Responsiveness is measured in terms of time, distance, and sustained momentum. It capitalizes on the positioning of forward deployed forces and supplies (ground based sustainment/sea-based sustainment), as well as strategic lift. The future Modular Force will need support from the other services to achieve the required levels of deployability. It demands close, continuous coordination between Army component commanders, and joint and interagency decisionmaking agencies to insert air and ground combat units into austere theaters through multiple unimproved entry points without relying on fixed ports and staging bases. Improvements in operational availability, mission reliability, and logistics systems will enhance aviation responsiveness, mission effectiveness and affordability. Future operations emphasize maximum mission utilization of deployed systems and minimization of the logistics footprint. Aviation will conduct operations worldwide in areas with austere infrastructure and harsh environmental conditions (for example, extreme temperatures, sand and dust, arid and humid climates, maritime conditions, high altitudes etc). Operations will take place in complex terrain, at high wartime flying hour mission usage rates, over long periods of time and an extended discontinuous OE. Army forces must be deployable and capable of rapidly concentrating combat power in an operational area. Aviation units must comply with the future Modular Force goal of deploying a BCT anywhere in the world within 4 to 7 days, a three BCT division in 10 days, nine BCTs in 20 days, and up to fifteen BCTs within 30 days. BCTs are required to sustain high intensity operations for 3 days without external resupply and support. This will require enhanced systems and capabilities. Systems must be transportable, logistics must be focused and flexible, and a culture must reside within the Army that accepts deployment readiness as a way of life. Aviation must significantly reduce the maintenance man-hours per flight hour, minimize the launch/recover/launch cycle time, and be able to rapidly reconfigure systems to meet changing mission needs. Aviation units must achieve and maintain a 90% operationally ready rate at wartime flying hour rate usage generated by mission demand. Aviation will need anticipatory maintenance systems based on component condition established by embedded diagnostics/prognostics with data logging and remote data transmission rather than current systems based on operating hours. Aviation needs an “on condition” based, two-level

maintenance process and the ability to automate the maintenance process to work with a "just in time" parts delivery concept. Platform operating costs must be reduced. Systems must achieve improved reliability and exhibit graceful degradation of function during mission execution to minimize mission aborts. To maintain OPTEMPO, flight and ground crews need the ability to rearm and refuel aircraft up to a basic combat load in less than15 minutes, and achieve a mean time to repair of less than 2 hours for field level maintenance. Sustainment systems must develop intelligent logistical programs and interfaces that deliver the correct parts "just in time" and minimize procurement of excess repair parts. The Army's Airspace and Air Traffic Management (Air Traffic Services) future systems must meet or exceed the future Modular Force maintainability, deployability, supportability, and interoperability requirements to ensure safe airspace and air traffic operations, accurate air picture updates, and the ability to conduct joint interoperable, sustained and simultaneous operations. Army forces must be sustainable across the spectrum of conflict in a JIM environment. Sustainability requirements reflect the continuous, uninterrupted provision of sustainment replenishment to Army forces.

c. Linkage to AUTL: ART 2.3 (Conduct Tactical Troop Movements); ART 6.1 (Provide Supplies); ART 6.2 (Provide Maintenance); ART 6.5.2 (Provide Medical Evacuation); ART 7.6.1.7 (Control Tactical Airspace); ART 8.3 (Conduct Stability Operations); ART 8.4 (Conduct Support Operations); ART 8.5.29 (Conduct Combat Search and Rescue); ART 5.3. (Conduct Survivability Operations).

d. Linkage to UJTL: OP 1.1 (Conduct Operational Movement); OP 4.4.3.2 (Manage Flow of Casualties in the Joint Operations Area); OP 4.3 (Provide for Maintenance of Equipment in the Joint Operations Area); OP 4.5.2 (Supply Operational Forces); TA 6 (Protect the Force).

e. Linkage to Concepts: TRADOC Pam 525-3-90, Tactical Maneuver Operating Concept.

4-29. FOC-04-02: Effective Aviation Operations in the Contemporary Operating Environment

a. Capstone Capabilities.

- Conduct survivable missions against threats that include unconventional and hard to detect opponents who may use cover, concealment, camouflage, denial and deception tactics, including operations in close proximity to noncombatants and civilian structures.
- Survivable aircraft that counter threat offensive systems, survive weapons' lethal effects (to include CBRNE), and prevent/limit crew and passenger injuries, and system damage in crashes.
- Conduct safe, worldwide, aviation operations (manned and unmanned systems in a degraded visual environment and complex terrain), including flight path and landing zone obstacles (wire, trees, poles, towers, vehicles, etc.), by crewmembers in high task loaded environments.
- Aircraft performance (range/lift/endurance/fuel efficiency) to execute missions in various worldwide environments (high, hot, dusty, wet, etc.) over extended operational environment distances.

- Enhanced crew mission performance through management of cockpit workload to allow the crew to maintain better external SA and SU.
- Enable self-deployable systems capable of conducting shipboard operations in the theater.

b. Narrative. Unlike previous operating environments, optimized for mass, momentum, and attrition warfare against a single well defined opponent, Army Aviation must fight and win across a wide range of conflict situations against various opponents with differing capabilities, from high to low ends of the operational spectrum, from major combat operations to peacetime military engagement, and under a more expansive framework employing all elements of National power. Current aircraft systems do not enable optimally safe operations across the range of expected mission conditions. Aviation must be able to operate worldwide during day andnight and in reduced visibility conditions due to adverse weather and environmental obscurants (blowing dust, blowing snow, blowing debris, etc.). Effective aviation operations are also limited by high crew workload, ability to manage and control UAS, conducting operations in CBRNE or other adverse environmental conditions, and extended duration missions. Workload intensive operations degrade crewmember and operator ability to focus on the most mission critical tasks, reduce safety, and increase risk of errors. Anticipated mission complexity is driven by requirements to safely operate the aircraft, manage multiple inputs, control onboard and off-board sensors, communicate, manage, and control UAS, and react to threat systems. This imposes high cognitive and physiological loads on crewmembers. Aviation survivability and reaction time are insufficient against unpredictable and hard to detect threats. Manned and unmanned aviation systems often operate against unpredictable threats and within the range of small arms fire, rocket propelled grenades, man portable air defense systems, antihelicopter mines, and natural or emplaced flight path obstacles. Ground and air platforms that employ the best combinations of low observability, ballistic protection, long-range acquisition and targeting, early attack, and high probability of first round hit and kill technologies will be required to ensure the desired degrees of survivability.

c. Linkage to AUTL: ART 1.3.3 (Conduct Tactical Reconnaissance); ART 2.2.10 (Navigate from One Point to Another); ART 3.1 (Decide Surface Targets to Attack); ART 3.2 (Detect and Locate Surface Targets): ART 3.3 (Employ Fires); ART 5.3 (Conduct Survivability Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.5 (Prepare for Tactical Operations); ART 7.6 (Execute Tactical Operations); ART 8.0 (Conduct Tactical Mission Tasks and Operations).

d. Linkage to UJTL: OP 2.2 (Collect and Share Operational Information); OP 2.3 (Process and Exploit Collected Operational Information); TA 6 (Protect the Force); TA 7.1 (Conduct Mission Operations in a CBRNE Environment).

e. Linkage to Concepts: TRADOC Pam 525-3-90, Tactical Maneuver Operating Concept.

4-30. FOC-04-03: Reconnaissance, Surveillance, and Target Acquisition (RSTA) and Attack Operations

a. Capstone Capabilities.

- Conduct RSTA missions in worldwide conditions, day and night in adverse weather to locate targets.
- Aviation attack assets that can rapidly and precisely engage and destroy/neutralize threats. Threats include fixed and mobile infantryman up to heavy armor and structural targets, such as bunkers or buildings.

b. Narrative. Responsive focused RSTA and target engagement is required worldwide in day, night, adverse weather, obscured visibility, high levels of background clutter, complex terrain environments, and in the presence of cover, concealment, camouflage, denial and deception. Targets may have low or indistinct signatures/emissions (personnel, small UAS & UGV, IEDs, mines, CBRNE agents, etc.). Targets may be highly mobile with short exposure times and may be intermingled with noncombatant civilian populations and infrastructure in urban environments so collateral damage and fratricide must be minimized. Standoff must be maximized to enhance survivability. Aviation systems must be able to search areas of operations within times and at ranges consistent with survivable operations. Systems must overcome enemy use of countermeasures. Systems must enable detection, classification, recognition, identification, affiliation, and determination of target location with the accuracy needed for tracking, precision targeting, and reporting/handover to conduct target acquisition and identification is required at or beyond the range of the tactically preferred weapon system. Aviation requires the capability for a persistent aerial presence at altitude for extended periods of time. Data must be processed, confirmed, integrated into COP-compatible reports and disseminated in a time consistent with planning, responsive and survivable engagements or reporting, and OPTEMPO requirements. It must achieve first round destruction/neutralization of targets with minimal collateral damage and no fratricide. Capability should include nonlethal options and scalability up to lethal level. Damage to target should be sufficiently detectable and assessable to enable accurate and reliable battle damage assessment (BDA). The effectiveness of aviation RSTA and attack operations is limited by our inability to detect and identify targets with low or indistinct signatures/emissions and by the excessive timelines to report information and acquire targets. Aviation weapon systems require sufficient range, lethality, accuracy, and flexibility to engage diverse target sets in the future OE at survivable ranges. Lethal Army forces can combine the elements of combat power to provide overwhelming and decisive force at the right time, at the right place, and for the right purpose.

c. Linkage to AUTL: ART 1.3 (Conduct Intelligence, Surveillance, Reconnaissance); ART 2.2 (Conduct Tactical Maneuver); ART 2.4 (Conduct Direct Fires); ART 3.1 (Decide Surface Targets to Attack); ART 3.2 (Detect and Locate Surface Targets); ART 3.3.1 (Conduct Lethal Fire Support); ART 5.3.5 (Conduct Security Operations); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.5 (Prepare for Tactical Operations); ART 7.6 (Execute Tactical Operations); ART 8.0 (Conduct Tactical Mission Tasks and Operations).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 2 (Provide Operational ISR); OP 3 (Employ Operational Firepower); TA 2.4 (Disseminate Tactical Warning Information and Attack Assessment); TA 3 (Employ Firepower); TA 6 (Protect the Force).

e. Linkage to Concepts: TRADOC Pam 525-3-90, Tactical Maneuver Operating Concept.

4-31. FOC-04-04: Assured and Timely Connectivity with the Supported Force

a. Capstone Capabilities.

- Communicate in the combined/joint worldwide environment. Manage and synchronize manned/unmanned aerial platforms and airborne munitions within the joint operational tactical environment.
- Aviation systems connectivity to future Modular Force elements compatible with battle command construct requirements.
- Communication system must have assured real time capability at extended ranges and NLOS conditions common to aviation missions.
- Communication system must have sufficient bandwidth to handle analog and digital voice and data message traffic.
- Communication system must not be susceptible to jamming and adverse environmental interference.
- Air traffic services must provide real time airspace synchronization to ensure safe and efficient mission execution along with threat warning.

b. Narrative. Communications are required during all flight nodes and conditions (LOS and NLOS) air to air, air to ground and in the presence of jamming and other countermeasures. Aircraft and air traffic services systems must have joint, combined arms, and multinational force interoperable communications (voice, data, and imagery) during all flight modes and aviation operations. Onboard/on-system LOS/NLOS communications must be secure and reliable, possess a low probability of intercept, provide a jam resistant capability, and be hardened against virtually any source of electronic countermeasures, and operate in both secure and unsecure modes. Use of the communications system must not significantly increase aircrew workload nor degrade or interfere with their ability to maintain SA or fly the aircraft and execute the mission. Communications system must be compatible with future Modular Force BCS requirements. Transmitted signal must minimize the risk of detection and location of the transmitter. Communications systems must be high efficiency, lightweight, multi-spectral, and not interfere with other onboard systems to enable over the horizon control and information transfer for UAS and RSTA missions through airborne, high altitude, and satellite links. Systems must provide sufficient bandwidth and speed to maintain level IV control of UAS. Air traffic services operations control must be accomplished in day/night/adverse weather/obscured visibility conditions. Airspace environment will include friendly, threat, and noncombatant aerial systems, as well as airborne munitions (artillery, rockets, missiles, etc.). Air traffic control system must be capable of providing effective and responsive airspace management and air traffic services in a complex, rapidly changing, evolving, and crowded airspace. Systems must be integrated within the joint and integrated air picture utilizing systems reducing the logistics burden of

deployment and sustained operations. All JIM users of airspace must be accounted for, managed, and synchronized.

c. Linkage to AUTL: ART 1.1 (Support to Situational Understanding); ART 1.3 (Conduct ISR); ART 7.2 (Manage Tactical Information); ART 7.3 (Assess Tactical Situation and Operations); ART 7.4 (Plan Tactical Operations); ART 7.5 (Prepare for Tactical Operations); ART 7.6 (Execute Tactical Operations); ART 7.8 (Conduct Continuous Operations); ART 8.0 (Conduct Tactical Mission Tasks and Execution); ART 7.6.1.7 (Control Tactical Airspace).

d. Linkage to UJTL: OP 2 (Provide Operational ISR); OP 5.1 (Acquire and Communicate Operational Level Info and Maintain Status); OP 6.1.3 (Provide Airspace Control); TA 2.4 (Disseminate Tactical Warning Information and Attack Assessment).

e. Linkage to Concepts: TRADOC Pam 525-3-90, Tactical Maneuver Operating Concept.

4-32. FOC-04-05: Mounted Vertical Maneuver

a. Capstone Capabilities. Mounted vertical maneuver capabilities should include:

- Vertically lift, maneuver to extended distances and vertically emplace future combat system (FCS) vehicle sized loads and Stryker class vehicles and their crewmembers in close proximity to their AOs.
- Repositioning of Stryker and FCS equipped forces indepth over operational distances to within striking distances of enemy forces.
- Maneuvers must be conducted in worldwide environmental conditions that include high altitudes (up to 6000 foot pressure altitude) and high temperatures (up to 95°F), and in day, night, and obscured visibility conditions using unprepared landing surfaces and shipboard operations.
- Vertically emplace other future Modular Force systems, materiel, personnel and self-deployable system capable of conducting shipboard operations in the theater.

b. Narrative. With manned and unmanned air maneuver assets, the future Modular Force will possess the capability to conduct vertical maneuver (mounted or dismounted) during tactical and operational maneuver. When executed rapidly, vertical maneuver gains positional advantage, exposes enemy capabilities to destruction across the joint operations area (JOA), and dislocates enemy forces. The inability to conduct vertical maneuver with FCS sized loads (up to 25+ tons), and current heavy lift fixed wing transport aircraft's reliance on prepared landing surfaces reduces the flexibility and responsiveness of the FCS. The future Modular Force must be capable of vertically lifting, maneuvering and transporting over combat radius distances of up to 500+ km, and emplacing FCS and Stryker class vehicles, personnel, and other future Modular Force materiel in close proximity to the AO using unprepared landing zones, and of repositioning Stryker and FCS equipped forces indepth from operational distances to within tactical striking distance (within 1 to 2 terrain features, no more than 25 km) of the enemy. Utility and cargo aircraft must provide the lift, range, and endurance necessary to support assault, battle command, and maneuver sustainment operations.

c. Linkage to AUTL: ART 2.2 (Conduct Tactical Maneuver); ART 2.3 (Conduct Tactical Troop Movements); ART 6.1 (Provide Supplies); ART 6.0 (Combat Service Support Battlefield Operating System).

d. Linkage to UJTL: OP 1.1 (Conduct Operational Movement); OP 1.2 (Conduct Operational Maneuver and Force Positioning); OP 1.3 (Provide Operational Mobility); OP 4.4.4 (Reconstitute Forces); TA 1.1.1 (Conduct Tactical Airlift); TA 1.2.1 (Conduct Air Assault Operations); TA 4.2 (Distribute Supplies and Provide Transport Services).

e. **Linkage to Concepts**: TRADOC Pam 525-3-90, Tactical Maneuver Operating Concept.

Section V – Line of Sight (LOS)/Beyond Line of Sight (BLOS)/Nonline of Sight (NLOS) Lethality for Mounted/Dismounted Operations

4-33. LOS/BLOS/NLOS Lethality

Fires are categorized as LOS, BLOS, or NLOS capabilities encompassing the full spectrum of effects envisioned in how the future Modular Force will integrate fires or strike. Engagement range is not directly tied to the definitions of LOS, BLOS, and NLOS fires. The method used determines the type of engagement. Future Modular Force fire control and distribution requires networked responsive fires on demand, engaging complex and simultaneous target sets, executed as preplanned or opportunity engagements. Capabilities envisioned for fires in joint and Army concepts are:

- LOS/BLOS lethality that provides the future Modular Force networked, responsive fires of extended range and precision munitions, to destroy and neutralize the adversary and their capabilities, at any time, and in any place, while minimizing fratricide and noncombatant casualties.
- NLOS lethality for fires and effects that extend seamlessly, from tactical to operational distances, with no gaps in coverage, or loss of timeliness; with advanced, automated fire control and distribution means to sort out high payoff and most dangerous targets rapidly in depth.
- LOS/BLOS/NLOS lethality also embraces advances in warfighting technology that enable the future Modular Force to employ electronic attack in the full spectrum of conflict.

4-34. Joint/Army Concept Linkage

The *Force Application* Joint Functional Concept and TRADOC Pam 525-4-1 (formerly the *Army Fires and Effects Functional Concept*) emphasize that Army and the JFs must be able to operate at will within all domains in order to enable engagements across the depth and breadth of the OE. Forces must possess combinations of stealth, speed, IS, connectivity, protection, and lethality to enable maneuver. They must also have the use of lethal and nonlethal means to generate the desired lethal and nonlethal effects that are scaleable or tailorable to target types and that control effects when mitigation of collateral damage may be a significant operational or tactical concern. The LOS/BLOS/NLOS FOCs identify required capabilities envisioned in joint and Army concepts.

4-35. Desired LOS/BLOS/NLOS Capabilities

Capabilities envisioned for fires in joint and Army concepts fall into the following areas:

- LOS/BLOS lethality.
- NLOS lethality.

4-36. FOC-05-01: LOS/BLOS Lethality

a. Capstone Capabilities.

(1) Fires are categorized as LOS, BLOS, or NLOS. Engagement range is not directly tied to the definitions of LOS, BLOS, and NLOS fires. Thus, the method used, rather than the range, determines the type of engagement. However, as a general guideline, LOS engagements occur at a maximum range of 5 km, BLOS engagements occur up to 16 km. Some future Modular Force combat systems may have the ability for more than one method (such as LOS and BLOS). Fire control and distribution requires responsiveness with fires on demand to engage complex and simultaneous target sets executed as preplanned or opportunity engagements. Future Modular Force combat systems must be capable of automated precision engagements, with automated fire control, and distribution and clearance procedures with a manual backup. Future Modular Force combat systems must be capable of precision, cooperative, and autonomous/designate LOS and BLOS; and be able to defeat helicopters and UAS.

(2) The future Modular Force must possess the capability to destroy and/or neutralize the adversary and their capabilities, at any time, and in any place, while minimizing fratricide and noncombatant casualties. At the BCT level, the lethality capabilities must provide for extended range lethality overmatch. These capabilities will be centered on direct LOS and BLOS fires, aided by joint and fused fire support multieffects, to include nonlethal. The future Modular Force seeks not only to attain decisive weapon system of systems lethality overmatch, but also to achieve comprehensive operational advantages in battle command, tactical maneuver and mobility, maneuver sustainment, MS, and FP. These advantages permit the application of precision engagement and dominant maneuver. Aggressive, adaptive, situationally aware leaders, highly trained, multifunctional Soldiers, coupled with the massing of lethal fires and precision effects, are fundamental to obtaining and maintaining this full spectrum overmatch. Every element in the warfighting formation must be capable of contributing to the long-range projection of dominant combat power, throughout the depth of the OE, as prescribed by the maneuver commander. Extended range lethality LOS/BLOS overmatch with improved fire control is a key component required for all potentially hostile operations, and provides the means to achieve decisive operations, freedom of maneuver, and FP in highly volatile, distributed environments.

(3) LOS Fires are direct fires from mounted, dismounted, air-ground and unmanned SOS optimized for the offense. LOS is the traditional form of fire used by assaulting elements, as they conduct fire and movement to close with and destroy an enemy. The target in a direct LOS engagement is not masked from the Soldier manning the weapon. The sensor, shooter, and decider are all resident with the combat system engaging the enemy target. LOS fires characterize most dismounted weapons, and weapons employed by elements in the assault; they

have the advantage of point and shoot immediacy against targets that can be directly seen, or sensed, from the combat platform. Point and shoot is a subset of cooperative engagement, and allows a Soldier or platform to designate a target for engagement by another platform in the same echelon. Point and shoot implies the immediacy of effects, and occurs within the same echelon. Immediate in this construct denotes highly responsive (5 seconds or less) first round effects against the target. Mounted and dismounted elements possess point and shoot capability to designate targets they cannot engage with organic weapon systems. This capability is networked such that a sensor-to-shooter relationship results in responsive and precise fires. The masking effects of terrain, however, limit both the range and fields of fire available for LOS engagements. LOS fires are specially designed to support fire and maneuver, tactical assault, and actions on contact. Key required capabilities are rapid gun firing capability with high rate of fire; to quickly kill multiple moving and stationary targets with increased accuracy and stowed kills; overmatch at extended ranges; hunter-killer relationships between systems; and ability to fire first, with improved first round kill.

(4) BLOS fires are fired over the horizon from systems optimized for LOS, and will be employed at extended ranges, out to 12-16 km for ground, and 16-20 km for aerial engagements. BLOS is an extension of the traditional direct fire. Direct fire BLOS enables standoff engagements at greater ranges, and also opens up fields of fire previously denied to elements, due to the restrictions of intervening terrain. BLOS fires permit BCTs to conduct mutual support and cooperative engagements between platoons, companies, and battalions. To achieve direct fire BLOS, the Soldier or crew exploits mobile or other sensors, organic to their echelon, to extend their direct vision of the OE. Advanced sensor capabilities networked to Soldiers and crews enable target acquisition, identification, and engagement, without LOS visual confirmation. This allows the direct fire method to be employed, with munitions that fly over interveining terrain. The extension of direct vision, combined with weapons capable of firing both LOS and BLOS, permits the Soldier or crew to close with the enemy. Furthermore, it permits engaging targets in the offense, at greater standoff range. Maneuvering platforms possess the capability to exploit targeting information, generated from external sensors, and available on the COP of the battlefield, to further enable direct LOS and BLOS engagements. BLOS fires allow the BCTs and systems to use terrain masking for protection. Acquisition, delivery, and control are done organically in small tactical units, and fires are delivered by ground or air systems. Since BLOS fires are a backup to NLOS systems, they attack most dangerous or high payoff targets, and provide mutual support and over watching fires. BLOS fires must be capable of high angle fire, to overcome the restrictive nature of complex and urban terrain. Future Modular Force lethality capabilities will include reactive counterfire, conducted by BCTs equipped with organic, networked, target acquisition for immediate response. The dismounted platoon will have a BLOS capability able to kill an armored vehicle with explosive reactive armor.

(5) Electronic warfare (EW) includes any military action involving the use of electronic measures (EM) and directed energy (DE) to control the EM spectrum or attack an enemy. There are three major categories of EW: electronic attack, electronic support, and electronic protection. Military operations are executed in an increasingly complex EM environment. EW provides scalable lethality as a key component to fires that has been largely missing and is now required for all potentially hostile operations. EW provides the means to achieve decisive operations,

freedom of maneuver, and FP in highly volatile, distributed environments without the politically unacceptable repercussions often tied to more lethal options. EA is the use of EM energy, directed energy, or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability and is considered a form of fires. Thus, EA adds both lethal and nonlethal capabilities to LOS/BLOS fires. Aerial EW platforms provide the best EA capability with the best delivery options.

(6) Future Modular Force combat systems must be capable of automated precision EA engagements, with automated fire control, and distribution and clearance procedures, including EM spectrum deconfliction. Future Modular Force combat systems must be capable of cooperative and autonomous EA fires, where a combination of EA and kinetic fires is required. Future Modular Force combat systems will rely on networked, synchronized EA fires. The effects coordination centers at operational and tactical levels will monitor and coordinate fires as appropriate. The EW coordination cell will coordinate clearance of fires for EA engagements and leverage space-based capabilities for EA targeting and engagement. Networked fires may select EA as the most appropriate fires for a target. Another advantage of EA is that it requires no consumption of Class V (ammunition), a major contributor to the logistics footprint. The electronic warfare support (EWS) is a required element for EA targeting and engagement.

(7) Every element in the warfighting formation must be capable of contributing to the long-range projection of dominant combat power, throughout the depth of the OE, as prescribed by the maneuver commander. The operational level future Modular Force will orchestrate continuous shaping operations, with selected air-ground maneuver operations, and the full range of joint and Army capabilities, including joint EW and space control capabilities. The process of shaping will set conditions for follow-on tactical engagements or battles. Among the most critical shaping tasks will be achieving favorable force ratios to enable tactical maneuver. The operational level future Modular Force isolates the battlefield, by employing fires to eliminate an enemy's ability to synchronize action, by attacking mobile reserves, or by blinding the enemy through the disablement of their C2 capabilities. These actions will also include denial of adversary access to space based C2 capabilities, such as communications and position navigation. Shielding fires include the capability to eliminate the enemy's long-range precision fires. To accomplish these tasks, the operational level future Modular Force requires 'reach' to joint sensors and fires, which include substantial EW capabilities and precise sensors. Of particular importance is the ability to effect the enemy's long-range ballistic and cruise missiles, rockets, artillery, mortars, UAS, and command systems by employment of advanced space control technologies, such as change detection imagery, space-based radar, space-based SIGINT, space-based jamming for communication, and ISR systems. The future Modular Force will have capabilities to conduct long-range strike or temporarily influence operations within the corps and above operational areas. Future Modular Force fires elements, located with the operational level, will provide a broad array of lethal and nonlethal capabilities to directly shape the future fight.

(8) EA includes special munitions, such as obscurants, illumination, and obstacles, in a fully networked architecture. The future Modular Force must have an unprecedented capability to fully integrate fires and maneuver. The tactical level future Modular Force employs responsive and effective fires to enable maneuver, to rapidly move to positions of advantage. From positions of tactical advantage, the tactical level future Modular Force employs destructive

fires, with great precision at extended ranges, against high payoff targets (HPTs), in order to eliminate enemy combat capabilities at decisive points, or centers of gravity. Once contact occurs, fires will remain fully integrated with maneuver. To enable this, fires must be continuously available on demand, tailored to mission requirements, and scaleable to achieve the desired effects. Fires will continue to be employed against HPTs. At the tactical level the future Modular Force has significantly improved it's ability to respond with fires, to those enemy forces and systems that present themselves as 'most dangerous' targets, demand an immediate response, or face unacceptable risk at the lowest tactical echelon. When required, the tactical level future Modular Force conducts tactical assault, while leveraging all combined arms fires, to achieve scalable effects that lead to decisive military and political outcomes.

(9) LOS/BLOS protective and suppressive fires may be lethal or nonlethal fires in close support of tactical maneuver. These include suppression, to fix or isolate an enemy, and prevent them from emplacing accurate lethal fires on the formation; by using obscuration or screening smoke to preclude observation by enemy; by using smart mines to protect friendly flanks; and by using defensive or offensive EAs that screen friendly forces from enemy sensor acquisition or degrade and disrupt enemy C2 capabilities. Protective fires may be lethal or nonlethal, and are oriented on the friendly force in order to facilitate our ability to maneuver. Suppressive fires also protect friendly forces, but are oriented on proactively attacking targets, such as enemy indirect fires or air defenses. Suppressive fires may be employed to facilitate ground maneuver, and the employment of Army or joint aviation assets. Inaccurate or unconfirmed target identification or locations may dictate the employment of suppressive or nonlethal fires.

(10) LOS/BLOS special purpose fires add to full spectrum capability. These fires may include munitions that provide obscurants, multiple means of illumination, countermobility capabilities, thermobaric effects, counter C2 fires, incapacitation, and capabilities that blind, disrupt, or destroy enemy acquisition, observation, and reporting systems.

(11) Teaming capability by BA and EA fire systems, dispersed throughout the OE, is critical. A system of systems framework will achieve the requirements for such a capability. It is critical that an enabling, integrated networked fires functional component within the BCS of systems leveraging a wider set of capabilities, including sensors, C2, and attack means from Army, joint and multinational forces will provide the operational capability. Protective EA fires can also support maneuver by suppressing enemy air defenses, degrading, disrupting, or destroying enemy sensors and C2, countering the fires from enemy indirect fire systems and disrupting enemy access to critical space based capabilities with space control capabilities.

(12) Future Modular Force EW capabilities will enable strike operations by more than just the ability to deliver disruptive, degrading, and destructive fires in quanity and duration, directed at personnel, equipment, or facilities; in both the protective or suppressive role. Examples of EA mission capabilities related to strike capabilities are:

- Ability to plan, synchronize and coordinate nonlethal fires through the use of EW planning and execution tools (hardware and software) integrated with the BCS of systems. (BN to ARFOR and Joint Force Land Component Command (JFLCC)).

- Ability to conduct offensive space control negation operations; ability to plan and execute space control operations in a timely manner; ability to execute space control operations in support of a coordinated IO campaign.
- Ability to rapidly identify and locate friendly and enemy sources of radiated energy and to transfer this information in real time to strike planners and executers. (Soldier platform through ARFOR and Coalition Joint Forces Land Component Command (CJFLCC)).
- Ability to rapidly fuse and analyze ES data to provide threat recognition, targeting, and planning information in support of strike operations via the BCS of systems. (BCT to ARFOR and CJFLCC level).
- Ability to provide counter enemy EW effects aimed at interfering with strike operations. (Soldier platform through ARFOR and CJFLCC).
- Ability to integrate non organic nonlethal fires in support of strike operations. (BCT to ARFOR and CJFLCC).
- Ability to provide nonlethal fires in order to disrupt, degrade and/or destroy adversary personnel, equipment and facilities. (Soldier platform to ARFOR and CJFLCC levels).
- Ability to provide a continuously updated EW COP in support of strike operations to include: ES planning and targeting information, joint and organic EW asset availability, non lethal fires Combat Assessments, and EW threat warning. (BCT to ARFOR and CJFLCC level).
- Ability to provide on demand access to ES data, EW asset availability, and EW threat warning information in all operational environments and conditions. (BCT to ARFOR and CJFLCC level).
- Facilitate immediate BDA and reattack as required. (BCT to ARFOR and CJFLCC).
- Ability to provide improved real time, or near real time space based ES with on-board sensor processing and direct down link to supported ground systems. Ability to dynamically task and re-task space based and unmanned aerial EW systems in support of strike operations. (BCT to ARFOR and CJFLCC).
- Ability to support nonlethal strike operations with extended range EW aviation platforms (manned and unmanned) capable of secure over the horizon and BLOS communications and control data links to provide: threat location and identification, nonlethal fires (jamming of adversary C2 and EW systems), and lethal EW fires (directed energy, pre-detonation, EM pulse). (Soldier platform through ARFOR and CJFLCC).
- Ability to conduct over the horizon and BLOS autonomous UAS and aviation EW nonlethal and lethal strike missions. (BCT through ARFOR and CJFLCC).
- Ability to leverage space-based EA against enemy C2 and EW weapon systems and space-based ES to detect, locate and ID enemy radiated expected EM environment in support of strike operations. (Division to ARFOR and CJFLCC levels).
- Ability to use nonlethal strike to deny, disrupt, or degrade adversary access to space-based systems. (Division to ARFOR and CJFLCC levels).
- Ability to provide protection of strike systems and platforms from enemy EW effects. (Soldier platform to ARFOR and CJFLCC levels).
- Ability to employ EW in support of IO and Electronic deception. (BCT to ARFOR and CJFLCC).

b. Narrative.

(1) The future Modular Force must generate dominant lethality overmatch across FSOs, particularly in urban and complex terrain environments. The future Modular Force will harness a balance of organic direct fires, LOS and BLOS, and joint and Army fire support capabilities, to ensure the success of early entry, forced entry (opposed/unopposed), shaping, decisive offense/defense, and stability and support operations. By orchestrating and synchronizing in real time this diverse and versatile mix of fires and integrated effects capabilities, the future Modular Force can rapidly set the conditions to overwhelmingly defeat enemy conventional forces, and asymmetrical threats in all environments.

(2) The future Modular Force will have the required direct fire capabilities to dominate and extend the close combat battle to BLOS. These capabilities will include real time target detection and identification, together with the ability to conduct a first strike/kill beyond the range of threat direct fire systems. Future Modular Force combat systems will also have a predictive and standoff detection capability against dismounted enemy forces. This requires employment of intelligent system throughout the force that are able to quickly correlate, and employ, artificial intelligence based learning algorithms to compare new data to a historical repository for pattern and predictive profiling.

(3) Combat maneuver systems in the future Modular Force will have onboard weapons, equally effective in immediate LOS and BLOS point engagements. In order to exploit these weapons, the crews onboard these system of systems will extend their direct vision to BLOS by linking to the GIG, as well as by employing their own organic sensors. As a result, the future Modular Force's maneuver systems will initiate the direct close combat fight from BLOS, by exploiting the suppression effects from the force's organic fire support systems and joint fires. They will then seamlessly transition into LOS engagements to bring about the defeat of an enemy force and seize the objective. Manned and unmanned system technologies will also permit the future Modular Force to maintain its lethality overmatch/standoff advantage in urban operations.

(4) The future Modular Force will possess a wide range of organic and highly deployable fire support systems that are able to deliver advanced and fused fire support effects out to operational distances. Together with joint fires, these organic fire support capabilities will generate an efficient and dominant suppression umbrella of multiple effects (such as nonlethal, EW, fire support, counter IO, etc.) that maneuver elements can exploit to gain positional advantage. This fusion of fire support effects will permit the future Modular Force to conduct decisive maneuver, and cause the rapid disintegration and destruction of enemy forces of significantly larger size, without having to employ attrition techniques. These same advanced fire support capabilities will have the range, versatility, and flexibility to protect the future Modular Force throughout the depth of the extended and non-linear OE, to include protection from enemy long-range precision missiles.

(5) The future Modular Force will dominate the Electromagnetic (EM) spectrum. EM spectrum dominance is central to achieving the full spectrum dominance envisioned in the joint and Army concepts. EM spectrum dominance will greatly depend upon the interdependence of

Service, joint, and National capabilities. At the strategic and operational levels, the future Modular Force will rely heavily upon echelons above corp, joint, and National EW capabilities to support the overall EM spectrum dominance effort. The future Modular Force requires an organic EW capability that will allow the force to operate freely across the EM spectrum, while controlling adversarial use of the spectrum. These organic EW capabilities, when applied across the warfighting functions in support of FSO, will enable the future Modular Force to address the broadening set of EW targets and maintain EM spectrum dominance within the force's OE.

(6) EW provides added capabilities to LOS/BLOS lethality through EA and EWS capabilities. In addition to the EA fires in support of the maneuver function, EA capabilities can include pulsed energy effects such as high powered microwave weapons to impact hard and deeply buried targets and WMD. Similar EA capabilities can be used to attack power generation and infrastructure targets. The option to use lethal or nonlethal EA fires provides the future Modular Force with enhanced flexibility in weapon/target matching, and will allow them to better engage targets constrained by collateral damage concerns.

(7) EWS capabilities provide the force with EW and BA assets to collect, intercept, identify, and locate sources radiating expected electromagnetic environment. This information can then be used for threat recognition; planning; and targeting for the conduct of EA fires in support of operations.

(8) The future Modular Force must apply an underlying knowledge of the culture extant in the OE. In determining effects of applied fires, the enduring impact of those fires on the society and the likely behavior that will result must be considered.

c. Linkage to AUTL: ART 1.1.2 (Perform Situation Development); ART 1.1.3 (Provide Intelligence Support to Force Protection); ART 1.2.1 (Perform Indications and Warnings); ART 1.3.4 (Conduct Surveillance); ART 1.4 (Provide Intelligence Support to Effects); ART 2.4 (Conduct Direct Fires); ART 3.1 (Decide Surface Targets to Attack); ART 3.2 (Detect and Locate Surface Targets); ART 3.2 (Detect and Locate Surface Targets); ART 3.3 (Employ Fires to Influence the Will and Destroy, Neutralize, or Suppress Enemy Forces); ART 3.3.1 (Conduct Lethal Fire Support); ART 3.3.2 (Conduct Nonlethal Fire Support-Offensive IO); ART 5.1.2 (Enhance Movement and Maneuver); ART 5.3.1 (Protect Against Enemy hazards within the Area of Operations); ART 7.3.3 (Provide Combat Assessment); ART 7.4.1 (Conduct the Military Decision Making Process); ART 7.4.2 (Integrate Requirements and Capabilities); ART 7.4.4 (Establish Target Priorities); ART 7.6.4 (Synchronize Actions to Produce Maximum Effective Applications of Military Power); ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2 (Conduct Defensive Operations); ART 8.5 (Conduct Tactical Mission Tasks); ART 8.5.1 (Attack By Fire an Enemy Force/Position); ART 8.5.2 (Block an Enemy Force); ART 8.5.3 (Breach Enemy Defensive Positions); ART 8.5.5 (Canalize Enemy Movement); ART 8.5.10 (Defeat an Enemy Force); ART 8.5.11 (Destroy a Designated Enemy Force/Position).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 3 (Employ Operational Firepower); TA 3 (Employ Firepower).

4-37. FOC-05-02: NLOS Lethality

a. Capstone Capabilities.

(1) Extended range NLOS lethality overmatch is a key component required for all potentially hostile operations, and provides the means to achieve decisive operations, freedom of maneuver, and FP in highly volatile, distributed environments. Capabilities for NLOS fires and effects must extend seamlessly, from tactical to operational levels, with no gaps in coverage, or loss of timeliness. Advanced, automated fire control and distribution means must sort out HPTs and the most dangerous targets rapidly in depth, amongst the vast array of threat intelligence. Aerial platforms add an accurate and immediate third-dimensional sensor and shooter capability to the building fight.

(2) Future Modular Force combat systems must be capable of automated precision engagements, with automated fire control, and distribution and clearance procedures, with a manual backup. Future Modular Force combat systems must be capable of precision, cooperative, and autonomous NLOS fires. Future Modular Force combat system sensor-to-shooter linkages enable lethal overmatch, by engaging enemy target sets, near instantaneously in seconds, using automated, semiautomated, or manual fire control and distribution procedures; and provide automated target identification, to reduce latency in providing effects. Structurally, and throughout the network, sensor-to-shooter relationships begin at the Soldier, squad, and platoon level to direct effects from internal tactical level elements, supporting operational level forces, and joint assets, with unprecedented speed and accuracy. Networked fires facilitate clearance of fires, and discern static or moving HPTs and the most dangerous targets rapidly, and thoroughly, and direct the most appropriate fires to destroy them. Timely, accurate BDA is required to ensure intent of the fires has been achieved, and to reduce the consumption of Class V (ammunition), a major contributor to logistics footprint. Ground based, long-range precision engagement is required to complement joint counter precision and counter anti-access capabilities, and is particularly important for entry operations, and to shape the OE.

(3) The maneuver commander prescribes every element in the warfighting formation tot be capable of contributing to the long-range projection of dominant combat power, throughout the depth of the OE. The operational level future Modular Force will be the focal point for the continuous integration of networked NLOS fires. The operational level future Modular Force will orchestrate continuous shaping operations, with extended-range precision fires, selected air-ground maneuver operations, and the full range of joint and Army capabilities. The process of shaping will set conditions for follow-on tactical engagements or battles. Among the most critical shaping tasks will be achieving favorable force ratios to enable tactical maneuver. The operational level future Modular Force isolates the battlefield, by employing fires to eliminate an enemy's ability to synchronize action, by attacking mobile reserves, or by blinding the enemy through the disablement of their C2 capabilities. Shielding fires include the capability to eliminate the enemy's long-range precision fires. To accomplish these tasks, the operational level future Modular Force requires 'reach' to joint sensors and fires, and organic precision, extended range fires capabilities, linked to precise sensors. The future Modular Force echelons must be provided with capabilities for long range shaping and interdiction. Of particular importance is the ability to destroy the enemy's long-range ballistic and cruise missiles, rockets,

artillery, mortars, UAS, and command systems. Future Modular Force will have organic capabilities to conduct long-range strike, or temporarily influence operations within the division or corps operational area. Future Modular force fires elements, located with the operational level, will provide a broad array of advanced, scalable, lethal, and nonlethal precision munitions, with ranges out to 40 km for artillery and out to 299 km for rockets and missiles.

(4) Future Modular Force must have an organic ability to deliver destructive fires, point and area, protective and suppressive fires, in quantity and duration, and special munitions, such as obscurants, illumination, and obstacles, in a fully networked architecture. The future Modular Force at tactical level has an unprecedented capability to fully integrate fires and maneuver. The tactical level future Modular Force employs responsive and effective fires to enable maneuver, to rapidly move to positions of advantage. From positions of tactical advantage, the tactical level future Modular Force employs destructive fires, with great precision at extended ranges, against HPTs, in order to eliminate enemy combat capabilities at decisive points, or centers of gravity. The increased long-range killing capability of fires will be employed, to fix and destroy the enemy. By achieving greater destruction at standoff, fires ensure freedom of action and maneuver. Fires will dislocate, disintegrate, or destroy the enemy, creating the opportunity for maneuver to transition to exploitation, or move to other positions of advantage. Once contact occurs, fires will remain fully integrated with maneuver. To enable this, fires must be continuously available on demand, tailored to mission requirements, and scalable to achieve the desired effects. Fires will continue to be employed against HPTs. However, the tactical level future Modular Force has significantly improved ability to respond with fires, to those enemy forces and systems that present themselves as the ‘most dangerous’ targets, demand an immediate response, or face unacceptable risk at the lowest tactical echelon. If required, the tactical level future Modular Force conducts tactical assault, while leveraging all combined arms fires, to achieve the destructive effects that lead to decisive outcomes.

(5) Fires must be reliable, timely, and accurate, with the ability to sustain rates of fire and rates of kill continuously in all weather and terrain conditions. Future Modular Force organic fires must be able to deliver effects, at extended ranges beyond 40 km, to deny sanctuary in the OE. The future Modular Force must be able to provide mutual support from dispersed locations, rapidly shift striking power across the battlefield, and apply the full range of effects to assure mission end state. Fire support must be agile to support forces in contact. Fires must provide greater target location, and weapon delivery accuracy and rates of fire, to complete the mission faster using smaller firing teamsd with less exposure; as well as rapidly deliver scalable munitions effects to destroy, disintegrate, or dislocate enemy forces. Fire support must have the ability to shift fires and mission types quickly. Fires are categorized as destructive, protective and suppressive, and special purpose.

(6) Destructive fires are employed to enable tactical maneuver. These include precise or area long-range fires, joint and Army, to deliver killing blows on enemy capabilities, such as mobile frameworks, indirect fire, and air defense assets, C4ISR, support systems, etc. Destructive fires may also be employed in combination with maneuver, to gain synergistic effects, and present the enemy with multiple, lethal problems to enable tactical maneuver.

(7) Protective and suppressive indirect fires may be lethal or nonlethal fires in close support of tactical maneuver. These include suppression, to fix or isolate an enemy, and prevent them from emplacing accurate lethal fires on the formation; by using obscuration or screening smoke to preclude observation by enemy, by using smart mines to protect friendly flanks. Protective fires may be lethal or nonlethal, and are oriented on the friendly force in order to facilitate our ability to maneuver. Ultimately, protective fires may include danger close missions and final protective fires. Suppressive fires also protect friendly forces, but are oriented on proactively attacking targets, such as enemy indirect fires or air defenses. Suppressive fires may be employed to facilitate ground maneuver, and the employment of Army or joint aviation assets. Inaccurate or unconfirmed target locations may dictate the employment of suppressive fires.

(8) Special purpose fires add to full spectrum capability. These fires may include munitions that provide obscurants, multiple means of illumination, countermobility capabilities, thermobaric effects, incapacitation, and munitions that blind or disable enemy acquisition and observation. With the advances in technology, future Modular Force Fires may also include EA, which incorporates the use of EM energy, directed energy, or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability. Future Modular Force combat systems must be capable of automated precision EA engagements and clearance procedures. Future Modular Force combat systems must be capable of cooperative and autonomous EA fires, where a combination of EA and kinetic fires is more effective. EA may be the most appropriate fires for a target, based on many variables including ROE, possible collateral damage, and target priorities.

(9) Networked fires change the dynamics of indirect fire support. Networked fires are the triad of relevant sensors, effects capabilities, and battle command that enables dynamic application of lethal and nonlethal destructive and suppressive effects, to achieve the commander's tactical and operational abjectives. Networked fires are a component of the battle command construct, and supporting communications architecture. The JFC intent for the employment of fires and effects at the time and place of their choosing is enabled by the dynamic application of networked fires. Networked Fires are fully integrated from theater to platform, allowing it to rapidly establish, alter, and terminate linkages to all relevant sensors and LOS, BLOS and NLOS, external and joint systems, with a wide set of lethal and nonlethal effects. The network allows the JFC to dynamically tailor guidance, and refocus and task sensors and effects capabilities, to position, cue, cross-cue, task and dynamically retask netted layers of redundant space, air, and surface sensors and relays to meet the requirements of changing situations. Networked Fires will provide JFCs a real time capability to apply full dimension effects solutions, across the OE. It is fully integrated and interdependent with Army, joint, multinational, and interagency sensors, effects-generating systems and capabilities, and IT systems. Networked fires is a purpose oriented, execution focused, networked capability optimized to provide a broad range of lethal and nonlethal effects, against enemy decisive points and centers of gravity, in concert with maneuver and support operations and enables the JFC to dynamically apply fires and effects on demand, to any echelon, in support of combined arms and joint operations in any operating environment.

(10) With all elements fully networked, the future Modular Force can achieve virtual teaming, mutual support, and the ability to rapidly mass effects when required, without massing

forces. Networked fires enable detection, delivery, and assessment, in near real time, with every platform and Soldier having the ability to be a sensor. The network is capable of rapid fusion of sensor inputs to produce executable and protected target data. It is also capable of routing and rerouting of targeting data to sensors or shooters, when established sensor-to-shooter linkages become inappropriate. Networked fires balance the need for responsiveness against producing tactical solutions, with the most effective application of systems and munitions. It facilitates rapid clearance of fires and airspace coordination. NLOS/BLOS fire sensors should be linked to full spectrum CBRN sensors to increase sensitivity and intelligence gathering capabilities.

(11) It is critical that an enabling, integrated networked fires functional solution, leveraging a wider set of capabilities, including air, ground and space sensors, C2, and attack means from joint, Army, and multinational forces, be applied to achieve the operational capability required today and in the future. These capabilities will leverage the precision and persistence that space-based and high altitude systems bring to targeting and surveillance functions. Protective fires can also support maneuver by suppressing enemy air defenses, and countering the fires from enemy indirect fire systems. Close support may involve danger close missions and final protective fires that are designed to bring fires especially close to maneuver formations for ultimate protection.

(12) Special purpose fires include artillery raids, illumination of enemy positions, and neutralization of minefields with NLOS delivered thermobaric effects, as well as lethal and nonlethal attack capabilities. Future Modular Force NLOS lethality capabilities will include:

- Centralized planning of fires and effects that integrates sensors, effects capabilities, and battle command.
- Automated coordination and deconfliction in all dimensions.
- Capability to mass fires, without having to mass the units themselves.
- Sensors providing target acquisition, at extended ranges and sufficient target location accuracy, permitting the networked fires system to rapidly optimize target-weapon pairing and rapid delivery of effects.
- Advanced fire direction, extended ranges, and position locating and orientation capabilities, to enable firing systems to be highly dispersed, and permit the conduct of fire missions by single platforms.
- All-weather, all-terrain fires, enabled by pervasive, redundant target acquisition and ISR means:
- High-angle fires to engage targets, while overcoming the restrictive nature of terrain.
- Brilliant and precision munitions.
- Improved nonlethal effects.
- Preemptive counterfire.

(13) The traditional roles of indirect fire, such as strike, close supporting fires, and special fires, remain relevant for future Modular Force NLOS lethality. These roles require 24/7, adverse weather, all terrain, all ROE availability, volume, and rate of fires for:

- Suppression of enemy activities for extended duration, as ground maneuver force conducts movements to positions of advantage, and conducts final decisive assault.

- Isolation of the battlefield once forces are joined, by eliminating an enemy's ability to synchronize actions, and by attacking mobile reserves, or C2.
- Shielding critical assets or population centers from enemy long-range fires.
- Simultaneous, multi-target set engagement.
- Continuous integration of fires and maneuver, by providing precise or area fires before forces are joined, obscuring enemy observation capabilities, protecting friendly flanks, suppressing enemy air defenses, and countering enemy indirect fire systems.
- Obscuration effects over wide areas, for extended periods, to support ground maneuver.
- Close support of ground maneuver force in contact with the enemy, including danger-close missions, and final protective fires.
- Special tasks of illumination during night operations, emplacing minefields, attacking and neutralizing enemy networks and C4ISR systems, and other nonlethal effects.

(14) The future Modular Force must have the capability to provide networked, extended-range fires for precision attack of point and area targets, in support of the future Modular Force BCT, with a suite of munitions that include special purpose capabilities, including precision munitions with course correction capabilities. The capability must provide sustained fires, both in quantity and duration, for close support and destructive fires for tactical standoff engagement. These fires must readily available 24 hours a day, in all terrain, and under all weather conditions. The system's primary purpose will be to provide responsive fires in support of combined arms battalions and their subordinate units, in concert with other LOS, BLOS, NLOS, external, and joint capabilities. The system provides flexible support through the ability to change the effects round by round, and mission by mission. These capabilities, combined with rapid response to calls for fire and rate of fire, provide a variety of effects on demand. Indirect fires systems will be capable of dispersed platoon or lower level operations. Cannons offer a wide range of trajectory options, from direct fire to high angle, to support the diversity of the operating environment. Additionally, accelerated development of precision munitions, with course correction capabilities, will ensure their timely incorporation into future Modular Force cannon munitions, future Modular Force mortars, and NLOS launch system.

(15) The future Modular Force must have the capability provided by launch systems that execute networked, extended-range targeting and precision attack of armored, lightly armored and other stationary and moving targets during day, night, obscured, and adverse weather conditions. The system's primary purpose is to provide responsive, precision attack of HPTs in support of the tactical level future Modular Force, in concert with other future Modular Force NLOS, external, and joint capabilities. The system also provides 'discriminating' capability via aided/automatic target recognition, and limited BDA. The launch system will permit the future Modular Force to shape and isolate the battle space by destroying enemy forces out of contact. It provides precision destructive and protective/suppressive fires, while avoiding noncombatant casualties, and minimizing collateral damage. It provides close supporting fires for friendly forces joined in contact, enabling freedom of action, while denying options to the enemy. It also provides a counterair capability, to accurately destroy low and slow moving enemy aircraft and enemy UAS through the use of onboard munitions.

(16) Future Modular Force mortars, with precision munitions, must provide added capability to attack targets precisely in support of the close fight. Mortars provide responsive, sustained fires in support of the combined arms battalion and subordinate companies. These fires provide complementary capabilities to the other future Modular Force NLOS systems. Mortars provide the ability for continuous operations, in all weather and terrain conditions. They also provide destructive fires that complement maneuver, by destroying targets of opportunity with precision-guided fires. Mortars provide responsiveness, with on demand fires to engage complex and simultaneous target sets; protective fires for overwatch, screen and final protective fires; suppressive fires for suppression and obscuration; special fires that provide illumination (white and infrared) and nonlethal. The destructive, protective, suppressive, and special fires are for close support of maneuver units. Guided long-range rocket munitions must be accelerated to enable engagement at the upper end of NLOS range requirements. Networked fires must be accelerated in concept and development; and networking links to Army aviation and other joint fires platforms are required. Development and procurement of new nonlethal effects must be accelerated. Finally, reconnaissance and surveillance assets, including joint assets and UAS, must provide acceptable target location accuracy. All these capabilities must be nested in the networked architecture that allows future Modular Force to rapidly pair joint and Army sensors, delivery systems, and munitions to the needs of the moment, and the demands of the supported force.

b. Narrative.

(1) Army forces dominate land operations by employing fires and maneuver, during combat operations, to accomplish the task of controlling the ground environment, its populations, and enemy centers of gravity. For the JFC to achieve maximum effectiveness there must be a symbiotic relationship between fires and maneuver, as fires enable maneuver, and maneuver enables fire. This relationship demands synchronization and integration. NLOS fires will play an ever-increasing role in support of maneuver, as the Army transitions to the future Modular Force. New enhanced capabilities will provide the ability to routinely destroy and disorganize enemy formations at extended ranges, before forces become engaged in close combat. NLOS indirect fires are higher trajectory fires, that emanate from both inside the maneuver commander's formations (mortars, cannons, some rockets), and from supporting elements (cannons, rockets, missiles, attack helicopters, high performance fixed wing aircraft, etc.). It is the ground maneuver commander's responsibility to synchronize the maneuver elements with all available direct, indirect, organic, and joint fires. To set the maneuver conditions, commanders must be able to employ destructive, suppressive (area suppression missions against imprecise or fleeting targets, to fix them, and keep them from maneuvering), and protective (smoke, artillery delivered mines, illumination for night operations) fires to facilitate maneuver in the close battle. NLOS fires must provide responsive fire support; immediately available on demand, timely, continuous, unhampered by terrain, 24 hours a day, all weather. These fires must be agile and flexible enough to fire on multiple, disparate, disconnected, point, and area targets, simultaneously. Networked fires must facilitate interdependence among Army, joint, and multinational fires.

(2) NLOS fires must provide mutual support, by virtually teaming dispersed systems to mass effects, as needed, and be agile enough to shift quickly over an expanded battle space.

Fires must be tailorable to meet the demands of mission and effects, whether destruction at depth, or support of the assault. In either case, missions must be achieved under a widely varying set of environmental and threat conditions. To achieve the requisite effects, fire support must provide accurate target locations and munitions that are delivered responsively and accurately. The ultimate lethality of fires is a function of munitions effects, discrete or volume of fires, target location and weapon delivery accuracy and response time, from target detection to assessment of effects. While the roles of NLOS fires have evolved over time, there have been some constants. Today, there are three major roles that NLOS fires routinely provide, in support of maneuver brigades at the tactical level. Each of these roles is critical in enabling and retaining freedom of maneuver, through suppression or destruction of enemy forces, or protection of U.S. Forces. These enduring functions are:

(a) First, to strike the enemy with killing blows prior to forces being joined in contact. This includes gaining the synergistic effects of combining BLOS and NLOS fires to present the enemy with multiple, lethal problems to enable tactical maneuver. Efforts are predominantly preemptive, to attack the enemy's total strike system of systems, including their mobile framework, indirect fire and air defense artillery, C4ISR, support systems, and logistics support areas.

(b) Second is close supporting fires, to protect U.S. Forces through such means as suppression or obscuration of enemy forces and air defenses, isolate the current close fight, or counter fires to defeat enemy indirect fire systems. This provides U.S. Forces freedom of action, while denying options to the enemy, which is absolutely critical to gaining and maintaining the initiative in any battle, to allow U.S. Forces to close with, and destroy, an enemy through assault. Danger close missions, and final protective fires, are designed to bring fires especially close to maneuver formations for ultimate protection.

(c) Third are special tasks, such as employing illumination during night operations, or emplacing minefields, and the use of other nonlethal effects.

(d) These functions will not only endure, based on future Modular Force operational concepts, their importance will increase. The future Modular Force will have freedom of maneuver, and the ability to deliver killing blows, without having to become decisively engaged. Based upon SA, and the connectivity of networked fires in support of tactical maneuver, the future Modular Force will be capable of greater destruction at standoff. In some cases, formations will be able to destroy the enemy, without having to execute tactical assault; however, the BCT will be exceptionally capable in the tactical assault supported by networked fires, when required to conduct tactical assault to achieve decision.

(3) The most demanding role for NLOS fires is support for the close fight, where forces are in immediate contact with the enemy, and the fighting between the committed forces and readily available tactical reserves of both combatants is occurring. The dynamic nature of the close fight demands very responsive and agile fires, to ensure maneuver and fires remain synchronized. Cannons, in direct support of maneuver, provide the ability to scale (through massing and number of rounds delivered) and tailor (through munitions selection) effects, to those required by the supported maneuver force. Additionally, cannons can most easily

overcome changes in target environment conditions (minimization of collateral damage, target latency, target location accuracy, weather, terrain), by adjustment of fires, if required.

(4) The future Modular Force must orchestrate and synchronize a diverse and versatile mix of fires and fused effects capabilities in real time. It must rapidly set the conditions to overwhelmingly defeat enemy conventional forces and asymmetrical threats, in all environments and dimensions, including austere theaters of operations.

(5) The future Modular Force must apply an underlying knowledge of the culture extant in the OE. In determining effects of applied fires, the enduring impact of those fires on the society and the likely behavior that will result must be considered.

c. Linkage to AUTL: ART 3.0 (The Fire Support Battlefield Operating System); ART 3.1 (Decide Surface Targets to Attack); ART 3.2 (Detect and Locate Surface Targets); ART 3.3 (Employ Fires to Influence the Will and Destroy, Neutralize, or Suppress Enemy Forces); ART 7.2 (Manage Tactical Information); ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2 (Conduct Defensive Operations); ART 8.5.1 (Attack By Fire an Enemy Force/Position); ART 8.5.2 (Block an Enemy Force); ART 8.5.5 (Canalize Enemy Movement); ART 8.5.10 (Defeat an Enemy Force); ART 8.5.11 (Destroy a Designated Enemy Force/Position).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 3 (Employ Operational Firepower); TA 3 (Employ Firepower).

Section VI – Maneuver Support

4-38. Maneuver Support Focuses. MS forces focus on ensuring future Modular Force freedom of maneuver and protection throughout the theater of operation. MS capabilities are applied within operating areas, fully integrated within combined arms teams, to ensure continued friendly freedom of action and denial of enemy freedom of action. On a noncontiguous, three-dimensional battlefield, the idea of maneuvering fires, sensor networks, and distribution based sustainment and communications networks broadens the applications of MS capabilities. MS provides a wide range of integrated actions, both proactive and defensive, that support uninterrupted momentum, allow maneuver forces to preserve combat power so that it may be best applied at decisive points and times, and foster rapid transitions in operations. Capabilities to enable MS concepts are:

- Enable freedom of maneuver.
- Deny enemy freedom of action.
- Engage and control populations.
- Employ nonlethal weapons and munitions.
- Neutralize hazards and restore the environmental.
- Understand the OE.

4-39. Joint/Army Concept Linkage

a. MS concentrates on two interrelated components: freedom of maneuver and protection. For a maneuver based force, there is significant overlap and synergy between these two functions, with MS assets, systems, and Soldiers capable of supporting both simultaneously.

b. MS takes on added dimensions and significance with the increasing emphasis on battlefield frameworks that encompass extended, dispersed, distributed, noncontiguous, and three-dimensional OE and non-linear operations, to include forcible and early entry operations and operational maneuver. In addition, the Army's vision of the OE recognizes that adversaries will apply a wide array of conventional and unconventional or asymmetric means to deny access to and movement of friendly forces, starting with their strategic deployment platforms and continuing within the theater of operations and tactical environment. The physical environment can affect the ground force, sometimes more than enemy actions, this includes the terrain, infrastructure, weather, hazards, and the presence and dynamics of the local populace.

c. All of these factors create major challenges to the freedom of action and protection of the force. Without the proper MS enablers, critical combat power must be diverted to facilitate and protect the movement of forces and sustainment elements to the operating areas where they will fight. MS capabilities are also applied within operating areas, fully integrated within combined arms teams, to ensure continued friendly freedom of action and denial of enemy freedom of action. On a noncontiguous, three-dimensional battlefield, the idea of "maneuvering" fires, sensor networks, and communications networks broadens the applications of MS capabilities. MS provides a wide range of integrated actions, both proactive and defensive, that support uninterrupted momentum, allow maneuver forces to preserve combat power so that it may be best applied at decisive points and times, and foster rapid transitions in operations. When applying MS in military operations, commanders must consider the inherent economy of force offered by MS, as well as unique risk mitigation features. MS enablers range from embedded capabilities to reach operations that include National assets. MS assets may include maneuver and sustainment elements as well.

4-40. Desired Maneuver Support Capabilities

Capabilities to fulfill the vision for MS articulated in joint and Army concepts are identified in the following areas:

- Enable Freedom of Maneuver.
- Deny Enemy Freedom of Action.
- Engage and Control Populations.
- Neutralize Hazards and Restore the Environment.
- Understand the Operational Environment.

4-41. FOC-06-01: Enable Freedom of Maneuver

a. Capstone Capabilities.

(1) Enabling freedom of maneuver includes all those actions that guarantee the JFC the ability to deploy, move, and maneuver, by ground or vertical means, where and when desired, without interruption or delay, to achieve the intent. The countermine and counter booby trap missions are both critical aspects of enable freedom of maneuver. The fundamentals of assured mobility are: predict, detect, prevent, avoid, neutralize, and protect. These six fundamentals represent overlapping and concurrent tasks that must be accomplished, allowing the JFC to mitigate impediments to mobility from standoff, and greatly reduce the likelihood of traditional breaching or neutralization requirements. The application of the fundamentals leads to:

- COP for mobility.
- Means to rapidly 'breach ahead' in open, restricted, and urban terrain.
- Means to rapidly cross wet and dry gaps.
- Embedded, standoff, forward- and side-looking remote detection, and neutralization of hazards such as mines, booby traps, and IEDs.
- Route security and clearance (route reconnaissance and surveillance, LOC/main supply route regulation enforcement; river and obstacle crossings, and passage of lines) to include control and maintenance of LOC to, and within, the AO.
- Circulation/traffic control measures. Area/route clearance at operating speeds.
- Ability to differentiate between IED explosive fillers and CBRN fillers at standoff distances. Ability to deploy and detect full spectrum CBRN markers during daylight, darkness, and adverse weather conditions.
- Ability to provide obscuration support to integrated joint and coalition operations.

(2) Capabilities to enable freedom of maneuver include:

- COP for Mobility.
- Means to rapidly 'breach ahead' in open, restricted, and urban terrain.
- Means to rapidly cross wet and dry gaps.
- Embedded, standoff, forward- and side-looking remote detection, and neutralization of hazards such as mines, booby traps, and IEDs.
- Route security and clearance (route reconnaissance and surveillance, LOC/main supply route regulation enforcement; river and obstacle crossings, and passage of lines) to include control and maintenance of LOC to, and within, the AO.
- Circulation/traffic control measures. Area/route clearance at operating speeds.
- Ability to differentiate between IED explosive fillers and CBRN fillers at standoff distances. Ability to deploy and detect full spectrum CBRN markers during daylight, darkness, and adverse weather conditions.
- Ability to provide obscuration support to integrated Joint and Coalition operations.

b. Narrative. The mobility of the future Modular Force is critical, to maintain the high tempo, and operate over the extended distances dictated by this concept. Enabling freedom of maneuver is one of several key MS enablers of the future Modular Force, and must be developed to its full potential. Enabling freedom of maneuver extends the concept of air corridor suppression of enemy air defense, to ground mobility routes, or corridors. A blanket of sensor coverage will encompass the selected COA, allowing assured route mobility. Sensors will maintain current, updated SU, and sensor-effects links will preclude the enemy from modifying the current mobility situation. The current operational pictures will be fed continuously to JFCs, and area denial systems will prevent enemy alteration. Future requirements for the ISR system include sensors that can distinguish between friendly, enemy, and civilian activities; integration of battlefield sensors; mobility decision aids; and denying enemy forces the opportunity to apply countermobility and surveillance measures.

c. Linkage to AUTL: ART 5.0 (The Mobility/Countermobility/Survivability Battlefield Operating System); ART 5.1 (Conduct Mobility Operations); ART 5.1.1 (Overcome Barriers/Obstacles/Mines); ART 5.1.1.1 (Conduct Breaching Operations); ART 5.1.1.2 (Clear Obstacles); ART 5.1.1.2.1 (Conduct Area Clearance); ART 5.1.1.2.2 (Conduct Route Clearance); ART 5.1.1.3 (Conduct River Crossing Operations); ART 5.1.2 (Enhance Movement and Maneuver); ART 5.1.2.1 (Construct/Maintain Combat Roads and Trails); ART 5.1.2.2 (Construct/Maintain Forward Airfields and Landing Zones); ART 5.2. (Conduct Countermobility Operations); ART 5.2.1 (Site Obstacles); ART 5.2.2 (Construct, Emplace, or Detonate Obstacles); ART 5.2.3 (Mark, Report, and Record Obstacles); ART 5.2.4 (Maintain Obstacle Integration); ART 5.3.5 (Conduct Security Operations); ART 6.3.1.3 (Conduct Maneuver and Mobility Support Operations); ART 8.5.4 (Bypass Enemy Obstacles/Forces/Positions).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 1.3.1 (Overcome Operationally Significant Barriers, Obstacles, and Mines); OP 1.3.2. (Enhance Movement of Operational Forces); OP 1.4 (Provide Operational Countermobility); OP 6.2.13 (Conduct Countermine Activities); ST 1 (Deploy, Concentrate, and Maneuver Theater Forces); TA 1 (Develop/Conduct Maneuver); TA 1.3 (Conduct Countermine Operations); TA 1.4 (Conduct Mine Operations).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Major Combat Operations Joint Operating Concept; Force Application Joint Functional Concept; Global Strike Joint Integrating Concept; Joint Forcible Entry Operations Joint Integrating Concept; TRADOC Pam 525-3-0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-92, Operational Maneuver; TRADOC Pam 525-3-90, Tactical Maneuver; TRADOC Pam 525-3-5, Protect; TRADOC Pam 525-3-6, Move.

4-42. FOC-06-02: Deny Enemy Freedom of Action

a. Capstone Capabilities.

(1) Key to the success of the future Modular Force will be its ability to maintain an unprecedented level of freedom of maneuver at the strategic, operational, and tactical levels, in all environments. Equally as critical, is denying the enemy the freedom of action. Denying the

enemy freedom of action includes proactive measures to leverage the physical environment to isolate enemy forces, deny key terrain, and deny, impede, or canalize enemy movement, in order to protect friendly forces and their freedom of action, and to place enemy forces in positions of disadvantage.

(2) Required capabilities include:

- Countermobility means to reinforce friendly fires (intelligent sensor/munitions fields, and the means to employ them).
- Terrain modification/obstacle emplacement capability, to fix enemy forces, or disrupt enemy operations.
- Effective isolation during military operations in urban terrain, and operations in complex terrain, to shield friendly forces, or fix enemy forces.
- Sensor/effects packages, to deny access to critical points.
- Autonomous minefield/mine emplacement and/or recovery.
- Dynamic, self-healing minefields, and other 'obstacles on demand'.
- Nonlethal capabilities for point and area denial, trafficability, and traction reduction and countermateriel.
- Unmanned sensors capable of detecting full spectrum CBRN agents.
- Ability to selectively obscure portions of the EM spectrum on demand.
- Ability to positively influence the attitudes, opinions, and behavior of specific populations to effect isolation of adversaries from popular support.

b. Narrative.

(1) This aspect of MS focuses on enabling our maneuver commanders, and formations, to seize the initiative in achieving a position of decisive advantage, from the very outset, and sustaining the initiative throughout a campaign, operation, or engagement. However, the JFC will almost always face a threat that is empowered by the 'home court' advantage. The enemy's intimate knowledge of the OE, and its effects (advantages and disadvantages), will give them the upper hand in maintaining freedom of maneuver, at least initially. The home court mobility advantage will be the centerpiece of the enemy's adaptive strategies, to draw tactical formations into dangerous close combat situations where they have the opportunity to mass, attack, and then quickly disperse. The enemy's offensive tactical actions will be opportunistic. Surprise, combined with asymmetric capabilities, will frequently be a central theme in the design of the threat's tactical operations. To succeed, enemy forces at all levels must maintain freedom of mounted, and dismounted maneuver, throughout the OE, particularly in urban and complex terrain, where the standoff/long-range precision fires of the future Modular Force may be degraded.

(2) At the strategic and operational level, denying enemy freedom of action is an integral part of shaping operations, with a chief aim of creating and/or sustaining opportunities for subordinate formations to achieve a position of advantage. At the tactical level, denying enemy freedom of action is more directly tied to shaping tactical engagements. Denying enemy freedom of action focuses on the employment of MS organizations and assets, to achieve any combination of five specific effects: deny use of facilities/areas, fix enemy forces, disrupt enemy

operations, shield friendly forces, and reinforce fires. At all levels the Future Force must deny adversaries freedom of action by isolating them from popular support. From the strategic to the tactical level nonlethal fires positively affect public opinion and support for indigenous populations and institutions and future Modular Force actions.

(3) The ability to couple large area, nonlethal effects, with precision delivery from LOS, BLOS, and NLOS systems, will provide the future Modular Force with an improved range of options for precise and measured control of target effects, to avoid attrition warfare, and reduce noncombatant casualties. The future Modular Force will employ nonlethal capabilities, to attack, influence, isolate, co-opt, and/or neutralize the enemy's networks and C4ISR capabilities, prevent their ability to interfere with maneuver elements, provide for area and air space denial, and degrade the enemy's night fighting systems. Nonlethal capabilities are required to cause enemy hiding in defilade, cover, and concealment; or hiding amid the nonbelligerent populace, to have to move from hiding, and thereby be exposed to lethal effects.

c. Linkage to AUTL: ART 2.4.2 (Conduct Nonlethal Direct Fire Against a Surface Target); ART 3.0 (The Fire Support Battlefield Operating System); ART 3.1 (Decide Surface Targets to Attack); ART 3.2 (Detect and Locate Surface Targets); ART 3.3 (Employ Fires to Influence the Will and Destroy, Neutralize, or Suppress Enemy Forces); ART 5.3.5 (Conduct Security Operations); ART 5.3.5.7 (Employ Obscurants); ART 8.5 (Conduct Tactical Mission Tasks); ART 8.5.2 (Block an Enemy Force); ART 8.5.3 (Breach Enemy Defensive Positions); ART 8.5.5. (Canalize Enemy Movement); ART 8.5.8 (Contain an Enemy Force); ART 8.5.9 (Control an Area); ART 8.5.13 (Disrupt a Designated Enemy Force's Formation/Tempo/ Timetable); ART 8.5.15 (Fix an Enemy Force); ART 8.5.18 (Interdict an Area/Route to Prevent/Disrupt/Delay its Use by an Enemy Force); ART 8.5.19 (Isolate an Enemy Force); ART 8.5.20 (Neutralize an Enemy Force); ART 8.5.21 (Occupy an Area); ART 8.5.28 (Turn an Enemy Force).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 3 (Employ Operational Firepower); TA 3 (Employ Firepower).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Major Combat Operations Joint Operating Concept; Force Application Joint Functional Concept; Global Strike Joint Integrating Concept; TRADOC Pam 525-3-0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-1, Operational Maneuver; TRADOC Pam 525-3-5, Protect; TRADOC Pam 525-4-1.

4-43. FOC-06-03: Engage and Control Populations

a. Capstone Capabilities.

(1) Population engagement is the ability to proactively provide the necessary control, over demographically diverse populations, to ensure maneuver, MS, and maneuver sustainment forces are unencumbered in the conduct of their respective operations. Populations are most often classified as EPW, civilian internees, detainees, internal displaced persons, refugees, stateless persons, war victims, evacuees, resident stay-put populations, or mass transiting civilian

populations. They can also include indigenous populations and institutions and key leadership (legitimate or otherwise).

(2) Capabilities must facilitate the JFC's ability to conduct rapid and decisive combat operations; deter, mitigate, and defeat threats to populations that may result in conflict; reverse conditions of human suffering; and build the capacity of a foreign government to effectively care for, and govern, its population. This includes capabilities to conduct full spectrum shaping operations to mitigate and defeat the underlying conditions for conflict and counter the core motivations that result in support to terrorist, insurgent, and other destabilizing groups.

(3) Required capabilities include:

- Population movement, collection, evacuation, and resettlement controls.
- Means to shelter, sustain, guard, protect, and account for EPW, CIs, retained personnel, and other detainees.
- General engineering support to construct, maintain, and repair camps, facilities, and/or (necessary or essential) infrastructure for varying populations.
- Means to assist civil authorities to restore basic services, and critical infrastructure (such as security, safety, utilities, etc.).
- Means to detect, track, and group populations into four broad categories, for identification and subsequent disposition: EPW, civilian internees, and detainees; resident populations, refugees, displaced persons, stateless persons, war victims, and evacuees; insurgent groups and organized crime syndicates; and governmental, law enforcement, political, informational, military, economic, religious, and social leaders (legitimate or otherwise).
- Means to mitigate and defeat threats to civil society that may result in conflict; and establish civilian-military operations center operations.
- Means to generate and deliver PSYOP and counterpropaganda products at targeted populations.
- Universal language translation capabilities.
- Biometrics for positive identification, detection, database recall, and intelligence fusion.
- Analytical tools linked to C2 and ISR systems and processes for pattern analysis, to support PSYOP and civil-military operations, and police/criminal intelligence efforts.

b. Narrative.

(1) Population dynamics are among the most destabilizing forces in the world today. In light of persistent armed conflict, and social turmoil throughout our multipolar world, the effects on populations remain a compelling issue. Many cities are overwhelmed by a growing citizenry and the presence of rural refugees. The potential for instability in the largest cities is undeniable. The world population will increase, from 6 billion to 9 billion, in the next two decades, with 95 percent of the growth occurring in the developing world. By 2020, 60 percent of the world's population will live in urban areas. Coexisting demographically, and ethnically diverse societies will aggressively compete for limited resources, such as individual freedoms, employment,

economic benefits, clean water, productive soils, desirable living conditions, mature infrastructure, political autonomy, and natural resources. Typically, overpopulated third world societies suffer from a lack of legitimate and effective enforcement mechanisms, which is generally accepted as one of the cornerstones of a stable society. Stability within population eliminates the need for military intervention. The goal of the military conducting populace and resources control is to provide stability within the population, its institutions, and its infrastructure. Only in the most advanced societies, where supporting governments make a genuine attempt to care for all of their diverse population groups, will the competition be less than chaotic. In this rapidly changing and dynamic OE, U.S. Forces will compete with local populations for the same space, routes, and resources. As displaced noncombatant populations create an increased demand for humanitarian assistance resources, the control of their movement and activity is expected to exceed the means of foreign nations, international organizations, NGOs, and other governmental agencies. The likelihood for uncontrolled populations to impede U.S. military operations is always present, and can overwhelm an advancing force. Ultimately, the swelling number of competing groups creates an environment conducive to interference with maneuver, manueuver support, and maneuver sustainment forces. The future Modular Force's ability to positively influence and shape the opinions, attitudes, and behaviors of select populations is critical to tactical, operational, and strategic success.

(2) An adaptive enemy will manipulate populations, hostile to our intent, by instigating mass civil disobedience, directing criminal activity, masking their operations in urban and complex terrain, maintaining an indistinguishable presence through cultural anonymity, and actively seeking the traditional sanctuary of protected areas, as defined by the rules of land warfare. Such actions will facilitate dispersal of threat forces, negate technological overmatches, and degrade our targeting opportunities. Therefore, employment concepts will include leveraging technology to influence and control populations, maximizing use of ISR sensors and combat identification of friend, foe, or neutral to differentiate between combatants and noncombatants, and friendly forces from threat forces, evacuating and resettling EPW and civilian internees, and conclusively transitioning humanitarian assistance operations to other functional agencies. The BCT commander can mitigate, or defeat, threats to civil society, by conducting cooperative operations with multinational organizations, international organizations, NGO, other governmental agencies, and indigenous populations and institutions. These represent the aggregate of the people, organizations, and structures that comprise an operational area's governmental, political, informational, military, economic, religious, and social systems. The operational benefits are realized by employing MS enablers to set the conditions that unburden the JFC, prevent uncontrolled population movement or action from influencing the commander's maneuver, and enabling an unconstrained attack, without fear of friendly or noncombatant interference.

(3) Cultural awareness will enable the JFC to plan (and the Soldier to operate) in a manner designed to minimize the friction that results from the interaction of differing societies and cultures. The ability to understand and adapt to the cultural norms of the population in the OE is a necessary component of OE. Appropriate consideration of culture can facilitate maneuver throughout the OE, while the opposite will almost certainly have a negative impact of the future Modular Force's freedom of maneuver and FP.

c. Linkage to AUTL: ART 2.4.2 (Conduct Nonlethal Direct Fire Against a Surface Target); ART 6.10.3 (Provide Engineer Construction Support); ART 6.13 (Conduct Internment and Resettlement Activities); ART 6.13.1 (Perform Enemy Prisoners of War/Civilian Internment); ART 6.13.2 (Conduct Populace and Resource Control); ART 6.14 (Conduct Civil-Military Operations); ART 6.14.1 (Provide Interface/Liaison Between U.S. Military Forces and Local Authorities/Nongovernmental Organizations); ART 6.14.2 (Locate and Identify Population Centers); ART 6.14.3 (Identify Local Resources/Facilities/Support); ART 6.14.4 (Advise Commanders of Obligations to Civilian Population); ART 6.14.5 (Resettle Refugees and Displaced Civilians); ART 6.14.6 (Establish Temporary Civil Administration (Friendly, Allied, and Occupied Enemy Territory)); ART 6.14.6.7 (Provide Public Safety Support).

d. Linkage to UJTL: OP 4.6.4 (Provide Law Enforcement and Prisoner Control); Strategic National tasks (SN) 8.1.10 (Coordinate Actions to Combat Terrorism); ST 4.4.3 (Coordinate Law Enforcement and Prisoner Control); ST 6.2.6.3 (Establish and Coordinate Protection of Theater Air, Land, and Sea Lines of Communications); ST 6.2.6.4 (Establish and Coordinate Theater-Wide Counterintelligence Requirements); ST 8.4.1 (Advise and Support Counterdrug Operations in Theater); ST 8.4.2 (Assist in Combating Terrorism); TA 1.2.4 (Conduct Counterdrug Operations); TA 6.3 (Conduct Rear Area Security).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Military Support to Stabilization, Security, Transition, and Reconstruction Operations Joint Operating Concept; Deterrence Operations Joint Operating Concept; Protection Joint Functional Concept; TRADOC Pam 525-3-0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-1, Operational Maneuver; TRADOC Pam 525-3-5, Protect.

4-44. FOC-06-04: Employ Nonlethal Weapons and Munitions

a. Capstone Capabilities.

(1) Nonlethal weapons are explicitly designed and primarily employed so as to temporarily incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment. Unlike conventional lethal weapons that destroy their targets through blast, penetration, and fragmentation, nonlethal weapons employ means other than gross physical destruction to prevent the target from functioning. Nonlethal weapons are intended to have one, or both, of the following characteristics:

(a) Relatively reversible effects on personnel or material.

(b) Affect personnel and materiel differently within their area of influence.

(2) The Joint Mission Area Analysis for Nonlethal Weapons (https://www.jnlwp.com/research.asp) outlines required nonlethal capabilities in three core requirements: counterpersonnel, countermateriel, and countercapabilities. Nonlethal weapons should enhance the capability of U.S. forces to accomplish the following objectives:

(a) Discourage, delay, or prevent hostile actions.

(b) Limit escalation.

(c) Take military action in situations where the use of lethal force is either not the preferred option, or is not permitted under the established ROE.

(d) Better protect our forces.

(e) Disable equipment, facilities, and enemy personnel.

(f) Engage and control people through civil affairs operations and PSYOP.

(g) Dislodge enemy from positions without causing extensive collateral damage.

(h) Separate combatants from noncombatants.

(i) Deny terrain to the enemy.

(3) The future Modular Force, specifically, must be provided with organic nonlethal capabilities to disrupt, dislocate, disorganize, disintegrate, fix, isolate, suppress, and destroy enemy functions. JFCs, furthermore, must be provided with multifunctional/multirole lethality options in integrated multipurpose system configurations. This will require the development of nonlethal weapons that are revolutionary in their capability to achieve scalable effects against targets, from mere discomfort to severe pain.

(4) The future Modular Force Soldier must have the ability to employ a wide array of lethal and nonlethal munitions based upon mission need and FP. Nonlethal munitions may include antimaterial, malodorants, EM, directed energy, thermal, marking, acoustic, incapacitating electric, kinetic, and optical. These nonlethal capabilities will be essential for improved FP, limiting collateral damage and reducing noncombatant and friendly force casualties, especially during operations in urban and complex terrain. Commanders must also be able to execute real time BDA of the nonlethal weapons' or systems' affect on target, especially when employing nonlethal weapons systems at standoff ranges.

b. Narrative. While the Army must remain optimized for major combat operation, smaller-scale contingencies will occur much more often, presenting unique challenges. Historically, smaller scale contingencies have occurred in regions with weak infrastructure, complex terrain, and diverse weather patterns. Threats typically have included mid- to low-end industrial forces, to include heavy forces equipped with early generation tanks and some mechanized, motorized, or light infantry. The typically pervasive presence of guerilla, paramilitary, and other unconventional forces further complicates operations and broadens concerns about FP. It is this pervasive environment coupled with the presence of an actively supportive civilian populace that has caused the employment of nonlethal weapons. The major combat operation focus, coupled with the increasing likelihood of smaller-scale contingencies, clearly establishes the need for a full spectrum force. This force must be able to: execute FSOs; minimize noncombatant

fatalities, permanent injury, and undesired damage to property and environment; maintain FP, reinforcing deterrence; and expand the range of options available to JFCs. All of these imperatives demonstrate a clear need for nonlethal weapons, even in conjunction with lethal weapons, to achieve a decisive outcome.

c. Linkage to AUTL: ART 1.4.1 (Provide Intel Support to Targeting); ART 2.4 (Conduct Direct Fires); ART 2.4.2 (Conduct NL Direct Fire Against a Surface Target); ART 3.0 (The Fire Support BOS); ART 3.3.2 (Conduct NL Fire Support/Offensive Info Operations); ART 5.3.1.9 (Conduct Suppression of Enemy Air Defense); ART 5.3.8.1 (Counter the Threat); ART 7.3.3.1 (Conduct Battle Damage Assessment); ART 7.4.2.3 (Degrade Enemy Decisions); ART 8.1.2.1 (Conduct an Ambush).

d. Linkage to UJTL: SN 3.2 (Manage National Strategic Firepower); SN 3.3.4 (Apply National Nonlethal Capabilities); SN 3.2.6 (Develop National Strategic Attack Policy); SN 3.3 (Employ National Strategic Firepower); SN 3.3.2 (Synchronize Strategic Attack); SN 3.3.4 (Employ National Nonlethal Capabilities); SN 3.4.1 (Provide Strategic Air Defense); SN 3.4.4 (Safeguard National Strategic Capabilities); SN 9.1 (Deter the Use of CBRNE Weapons by Threat of Force); ST 3.2.2; ST 1.6; ST 3; ST 3.1; ST 3.2; ST 3.2.2; ST 3.2.3; ST 9.2; OP 2.4.2.4 (Provide Target Intel for the Joint Operational Area); OP 3 (Employ Operational Firepower); OP 3.1 (Conduct Joint Force Targeting); OP 3.1.6.1 (Assess Battle Damage on Operational Targets); OP 3.2.2 (Conduct Attack on Operational Targets Using NL Means); OP 3.2.2.4 (Conduct NL Attack on Personnel, Equipment & Installations Using NL Means); OP 3.2.7 (Synchronize Operational Firepower); OP 7.1 (Coordinate Counterforce Operations in the Joint Operations Area); TA 3 (Employ Firepower); TA 3.2.6 (Conduct Attacks Using Nonlethal Means).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Military Support to Stabilization, Security, Transition, and Reconstruction Operations Joint Operating Concept; Deterrence Operations Joint Operating Concept; Protection Joint Functional Concept; TRADOC Pam 525-3-0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-1, Operational Maneuver; TRADOC Pam 525-3-5, Protect; TRADOC Pam 525-4-1, Strike; TRADOC Pam 525-73, Concept for Nonlethal Capabilities in Army Operations.

4-45. FOC-06-05: Neutralize Hazards and Restore the Environment

a. Capstone Capabilities.

(1) Neutralize hazards and restore the environment includes those efforts to reduce, or eliminate, the operational impact and effects of a full range of environment-based hazards, through avoidance, mitigation, neutralization and, when necessary, restoration of the environment to acceptable safety levels IAW Status of Forces Agreement (http://www.globalsecurity.org/military/facility/sofa.htm) criteria . Capabilities and enablers must exist to avoid, mitigate effects, and neutralize hazards of all types, including industrial hazards, and WME.

(2) Required capabilities include:

- Means to perform environmental risk assessment, including establishment of the environmental baseline.
- Means to conduct consequence management, when hazards cannot be avoided, or when hazards result from interception (such as reachback for consequence management experts).
- Be able to decontaminate vehicles on the move or at a minimum provide a deployable thorough decontamination capability far forward on the battlefield (automation).
- Be able to "see" contamination and only decontaminate those specific areas to reduce time, manpower, and logistics.
- Reduction or elimination of manpower requirements during decontamination operations. (Can be accomplished through automation/robotics and composite applications to surfaces to act as a preventive or reactive coating.)
- Reduce logistics footprint of decontamination operations. (Need to continue pursuing the "silver bullet" decontaminant and at a minimum use non-aqueous decontaminants).
- Means to perform area damage control.
- Means to provide preventative medicine, and environmental surveillance.
- Disposal of unexploded ordnance.
- Means to conduct denial operations, to eliminate potential full spectrum CBRN hazards, to include toxic industrial chemicals (TICs) and TIMs.

b. Narrative.

(1) Enemy forces are likely to have access to, and be willing to employ WME, including the use of full spectrum CBRN weapons, toxic industrial chemicals, TIMs, and conventional mines and minefields. The enemy will use full spectrum CBRN to shape the battlefield, inflict casualties, and disrupt access to ports and airfields against targets of opportunity, or even against their own people, to create the perception that American forces employed them against civilians. The U.S. Forces could become exposed to full spectrum CBRN hazards used as a weapon of opportunity, anywhere on the battlefield, during any phase of conflict. Exposure could occur as a result of an intentional enemy attack, through an attack on a production or storage facility, as the result of collateral damage, or through catastrophic releases of toxic or contaminated materials. Delivery means vary, and can range in technological sophistication from a bicycle to a ballistic missile.

(2) The future Modular Force will be prepared to identify and deal with a wide variety of incidental and accidental hazards, and will practice sound environmental stewardship, consistent with the military situation. Neutralizing hazards, and restoring the environment, consists of many military tasks, ranging from identifying and mitigating toxic substances, pollutants, and full spectrum CBRN hazards; to military construction and repairs; clearing mines and other obstacles; decontaminating vehicles, equipment, and infrastructure; and destroying unexploded ordinance. It also includes preventive medicine, environmental surveillance, and identification of chemical, biological, and nuclear agents, environmental safety precautions, and protection or elimination of potential hazard sources. Neutralizing hazards, and restoring the environment, occurs across the FSOs, from disaster relief, to major combat operations, in any phase of an

operation, in the continental United States (CONUS) and abroad. It supports homeland security, force projection, assured theater access, and preserves combat power, sustaining operational and logistical distribution, and minimizing casualties, both military and civilian.

(3) The future Modular Force will minimize damage to soil, air, and water, in a manner consistent with the military mission. The Army's responsibility is to minimize health and occupational risks to Soldiers, while minimizing environmental impacts. Military operations are inherently harmful to the human and natural environment. The policy of the U.S. military is that incidental and collateral damage to the environment will be minimized (Status of Forces Agreement). The U.S. will not deliberately, and without compelling military necessity, damage the soil, air, water, or cultural or socioeconomic entities of any nation, on any battlefield**.** The Army recognizes that minimizing incidental and collateral environmental damage, to the natural environment, is clearly the most responsible, cost-effective, and long-term solution for reducing risks to human health, and the natural environment. By minimizing these damaging environmental impacts, the Army reduces compliance violations, and the costs of restoration.

c. Linkage to AUTL: ART 4.2.1.(Search for Aerial Platforms); ART 4.2.2.(Detect Aerial Platforms); ART 4.2.3.(Locate Aerial Platforms); ART 4.2.4.(Characterize Aerial Platforms) ART 5.1.1 (Overcome Barriers/Obstacles/Mines); ART 5.1.1.2 (Clear Obstacles); ART 5.1.1.2.1 (Conduct Area Clearance); ART 5.1.1.2.2. (Conduct Route Clearance); ART 5.3 (Conduct Survivability Operations); ART 5.3.1 (Protect Against Enemy Hazards within the Area of Operations); ART 5.3.1.1 (Protect Individuals and Systems); ART 5.3.1.4 (Employ Protective Equipment); ART 5.3.2 (Conduct Nuclear, Biological, and Chemical (NBC) Defense); ART 5.3.2.1 (Provide NBC Protection to Friendly Forces); ART 5.3.2.1.1 (Employ Contamination Avoidance); ART 5.3.2.1.2 (Identify Nuclear, Biological, and Chemical Hazards); ART 5.3.2.1.3 (Warn Personnel/Units of Contaminated Areas); ART 5.3.2.1.4 (Report NBC Hazards Throughout the Area of Operations); ART 5.3.2.1.5 (Use Individual/Collective Nuclear, Biological, and Chemical Protective Equipment); ART 5.3.2.1.6 (Prepare for a Nuclear Strike); ART 5.3.2.2 (Decontaminate Personnel and Systems); ART 5.3.2.2.1 (Perform Immediate Decontamination); ART 5.3.2.2.2 (Perform Operational Decontamination); ART 5.3.2.2.3 (Perform Thorough Decontamination); ART 5.3.2.2.4 (Perform Area Decontamination); ART 5.3.2.2.5 (Perform Patient Decontamination); ART 5.3.4 (Provide Explosive Ordnance Disposal Support); ART 6.10 (Provide General Engineer Support); ART 6.10.1 (Restore Damaged Areas); ART 6.10.2 (Construct and Maintain Sustainment Lines of Communications); ART 6.10.3 (Provide Engineer Construction Support); ART 6.10.4 (Supply Mobile Electric Power); ART 6.10.5 (Provide Facilities Engineering Support).

d. Linkage to UJTL: OP 1.3.1 (Overcome Operationally Significant Barriers, Obstacles, and Mines); OP 1.4 (Provide Operational Countermobility); OP 6 (Provide Operational Force Protection); OP 6.2 (Provide Protection for Operational Forces, Means, and Noncombatants); OP 6.2.8 (Establish NBC Protection in the Joint Operations Area); OP 6.2.13 (Conduct Countermine Activities).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Major Combat Operations Joint Operating Concept; Protection Joint Functional Concept; TRADOC Pam 525-3-

0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-1, Operational Maneuver; TRADOC Pam 525-3-5, Protect.

4-46. FOC-06-06: Understand the Operational Environment

a. Capstone Capabilities.

(1) The OE includes physical, informational, and human dimensions. These dimensions are dynamic; they change over time, often in difficult to predict ways. Understanding the OE is real time understanding of the environment (space, air, water, ground, subterranean), including terrain, weather, infrastructure, hazards, populations, and their interaction, impact on operations, and options to leverage or mitigate effects, tailored to the commander's needs. The five basic functions required to fully understand the physical dimension of the OE are: data acquisition, data exploitation, data management, data representation, and data dissemination.

(2) Required capabilities include:

- Locate and Map Tunnels.
- Collection, generation and fusion of high-resolution geospatial data, and comprehensive operational environment information, that includes real time collection of new data, as well as supplementing existing data sets with more detail, to Include civil and cultural data.
- Exploitation of the full range of sensors (including humans) to gather required operational environment and timely fusion of this data into actionable information. For example, Civil Affairs Team, Civil Liaison Teams, and Civil Affairs Functional Experts collect civil data for project assessments.
- Accurate, timely, current, relevant and scalable operational environment data that is compatible with the network-centric environment.
- Common or configurable databases, interoperable with current, future JIM systems. These same databases are used in garrison, in training and in war.
- Tailorable operational environment representation products, displayed either visually, or in some other form that is compatible with the user needs.
- Computer-aided analysis and reasoning tools that enable prediction and understanding, and provide accurate, timely, current and actionable advice.
- Efficient data management (storage, retrieval and update) resulting in the exploitation of vast amounts of operational environment information.
- Timely and assured, verified and validated IA dissemination of operational environment information to all who require it.
- Reachback to cultural/sociological subject matter expertise specific to the culture of the operational environment.

(3) Joint and coalition forces must have special purpose sensors capable of detecting and classifying full spectrum CBRNE threats. These CBRNE sensors must be integrated to accept data from disparate sensors existing for specific purposes not related to CBRNE (meteorological, fire control, and others) that, when combined with CBRNE sensor data, produce a synergistic data improvement.

(4) At the National Army command levels, there is a need to connect military decisionmakers to civilian organizations such as the U.S. Health and Human Services, World Health Organization, hospitals, and retail sales sources. This connectivity can provide seemingly disconnected indicators (rash of respiratory cases, ballooning off the shelf medication sales, industrial chemical ailments, etc.) that may indicate a WME attack masked by cyclic, seasonal illnesses (flu or allergy seasons, holiday travel crowds).

(5) Civil IM facilitates the JFC's SA, SU and full spectrum dominance. Developing the civil COP helps to achieve civil information dominance to support effects based operations. Civil IM must also support:

- Interagency (Department of State, Department of Homeland Security, United State of America for International Development, etc.).
- Coalition Partners (NATO, PFP, GWOT, etc.).
- Partner/Host Nation (PN/HN), International Organizations (UN, World Bank, IMF, OAS, etc.).
- NGOs (Red Cross, World Vision, etc.).

b. Narrative.

(1) The threat will stress adaptation and flexibility. Our adversaries will understand their OE, and seek to deny the same understanding to us. They will seek advantages of weather, terrain, and light conditions; take sanctuary in urban and other complex terrain, and employ terrain masking; and protect HPTs, by shielding these amongst noncombatants. They will leverage terrain by using natural and man-made obstacles, terrain compartments, and population centers (further complicated with mines and booby traps) to deny the JF freedom of movement. They will protect themselves from targeting, using cover and concealment, deception, obscuration, and terrain masking. They will employ special purpose forces, terror, long-range strikes, WME, and information capabilities. The enemy will attempt attacks on our homeland, friendly points of embarkation/points of debarkation, intermediate bases of operations, and key deployment nodes and routes. Opponents will try to counter U.S. strengths by attacking, or exploiting, our weaknesses, especially our critical dependence on C4ISR, so vital to our synergistic, SOS approach. Simple and effective ISR means will allow them to leverage advanced technologies, developed by others, with a focus on their force effectiveness, rather than a competitive system overmatch with the U.S. JFCs at all levels must know how the environment, across the full range of natural and man-made elements, will impact their operations, as well as the operations of the enemy, and be able to use this knowledge to gain military advantage. Future Modular Force units will dominate land operations, providing the decisive complement to sea, air, and space operations. Soldiers and leaders, integrated through an information network, while operationally dispersed across the OE, will provide the JFC SU. It is critical to be able to predict and understand, in real time, the impact of the environment and cultural aspects on friendly and enemy systems, including personnel, tactics, platforms, sensors and weapons. Rapid access to expert knowledge will minimize the danger of cultural misunderstanding that can rapidly deteriorate into confrontation.

(2) Leaders will conduct rapid, tactical decisionmaking, commander action-centric operations, from physical rehearsals, to virtual, and from static CPs, to battle command on the move. Terrain and weather form the foundation of the COP, the summation of critical combat information within the OE. The ability to achieve IS, conduct precision engagement, and execute rapid, violent decisive engagements, will hinge on the quality, fidelity, and freshness of the COP. Accurate terrain and weather products, with great spatial and temporal detail, will be a necessity for supporting network sensing, mission analysis, and the military decisionmaking process.

(3) In order to achieve unprecedented momentum, and freedom of maneuver, the future Modular Force must see the complete picture of the operating environment, in all of its aspects. Further, the future Modular Force must have an understanding of this picture that allows it to take away the enemy's 'home court advantage,' and give our leaders a better understanding of the environment than our adversaries. Future Modular Force units will see first by detecting, identifying, and tracking the individual components of enemy units. Advanced technologies, that lead to unprecedented ISR capabilities, coupled with other ground, air, and space sensors, are networked to provide a common, integrated operational picture that will enable seeing the enemy, both in whole, and in part, as a complex, adaptive organization.

c. Linkage to AUTL: ART 1.0 (The Intelligence Battlefield Operating System); ART 1.1 (Support to Situational Understanding); ART 1.1.1 (Perform Intelligence Preparation of the Battlefield); ART 1.1.1.1 (Define the Operational Environment); ART 1.1.1.2 (Describe the Environmental Effects on Operations); ART 1.1.1.5 (Conduct Geospatial Engineering Operations and Functions); ART 1.1.2 (Perform Situation Development); ART 1.5 (Conduct Police Intelligence Operations); ART 1.3.1 (Perform Intelligence Synchronization); ART 1.3.1.1 (Develop Information Requirements); ART 1.3.1.2 (Develop the Intelligence Synchronization Plan); ART 2.2.5 (Exploit Terrain to Expedite Tactical Movements); ART 7.0 (The Command and Control Battlefield Operating System); ART 7.2 (Manage Tactical Information); ART 7.2.1 (Collect Relevant Information); ART 7.2.2 (Process Relevant Information to Create A Common Operational Picture); ART 7.2.3 (Display a Common Operational Picture Tailored to User Needs); ART 7.2.4 (Store Relevant Information); ART 7.2.5 (Disseminate Common Operational Picture and Execution Information to High, Lower, Adjacent, Supported, and Supporting Organizations).

d. Linkage to UJTL: OP 2 (Provide Operational Intelligence, Surveillance, and Reconnaissance); ST 2 (Conduct Theater Strategic Intelligence, Surveillance, and Reconnaissance); TA 2 (Develop Intelligence).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Major Combat Operations Joint Operating Concept; Operational Environment Awareness Joint Functional Concept; Command and Control Joint Integrating Concept; TRADOC Pam 525-3-0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-1, Operational Maneuver; TRADOC Pam 525-3-3, Battle Command.

Section VII - Protection

4-47. Protection Capabilities

Protection is a process, a set of activities and capabilities by which the future Modular Force protects personnel (combatant/noncombatant), information, and physical assets against the full spectrum of threats. The future Modular Force will achieve this through the scaled and tailored selection and application of multilayered, active and passive, lethal and nonlethal measures, across the ROMO, based on assessment of an acceptable level of risk. The future Modular Force must protect itself from point of origin, continuing through transit, employment, sustainment, and redeployment. The goal is to prevent adversaries from employing capabilities that would restrict or prevent the future Modular Force from conducting decisive actions at a time and place of our choosing.

a. The key protection activities are detect, assess, warn, defend, and recover.

b. Mission capability Areas that focus protections efforts are:

- Protect personnel.
- Protect assets.
- Protect information.
- Protect unit

4-48. Joint/Army Concept Linkage

To implement future JF protection, the Protection Joint Functional Concept identifies four mission capability areas: protect personnel, protect physical assets, protect information, and protect unit. These mission capability areas are groupings of task-related mission capability elements that provide a synergistic effort to identify and develop protection capability enablers. In order to optimize protection, these capabilities must have the following attributes: fully integrated, networked, persistent, and effective. Their development and employment will focus on ensuring the JF is provided with the maximum opportunity to conduct operations.

4-49. Desired Protection Capabilities

Protection capabilities fall into the following areas:

- Protect personnel.
- Protect physical assets.
- Protect information.
- Protect unit.

4-50. FOC-07-01: Protect Personnel

a. Capstone Capabilities.

(1) The elements of personnel protection are: medical, antiterrorism, personal safety, fratricide, counterdrug, noncombatant evacuation, defensive deception and PSYOP, personnel recovery, consequence management, CBRNE detection, and enhanced high explosive (such as,

CBRNE) protection, counterintelligence, human intelligence, explosive ordnance demolition, and maritime interdiction operations.

(2) A description of the capabilities required to provide effective personnel protection follows:

(a) Detect. Detecting, monitoring, tracking and engaging adversary threats directed against military and civilian personnel. Surveillance, detecting and tracking must provide the necessary real time 360° hemispherical data to JFCs to view the overall threat to military and civilian personnel. A clear picture of the threat to personnel will allow the JFC to better synchronize protection measures against specific threats in time, space, and purpose. It will also allow the JFC to more rapidly identify and deploy resources in a manner where they will have the most effect to protect personnel and mitigate and or neutralize enemy capabilities through the engagement of hostile capabilities. Capabilities must include the ability to sense/detect personnel-borne explosive devices, including a standoff detection capability.

(b) Assess. The JFC must continually assess an adversary's capability for or understand the dynamics of an actual attack against personnel through the collection of different types of information from different sources. The commander must arrive at an understandable construct of pending attack, or task defensive measures (both active and passive), to protect personnel to reduce casualties, and to affect recovery operations. JFCs must develop appropriate countermeasures to threats that will enhance personnel survivability and safety and repelling attacks.

(c) Warn. Timely decision to warn personnel of impending attack and decide on what individual and collective personnel protection measures to implement (active and passive personnel protection measures) to achieve the desired degree of personnel survivability to support continuity of operations. From a clear SA and SU of adversary actions, timely protection measures may be implemented that will deny an adversary the ability to damage, destroy, or adversely affect personnel operating in a specific area. In order to develop personnel protection decisions and actions, JFCs must have a high degree of confidence that the personnel protection measures they take against an anticipated or actual adversary's attack will have a high degree of success and will achieve the desired result.

(d) Defend. Based on the JFC's assessment of the threat against personnel, specific active and passive personnel protection measures are executed. Personnel may be directed to don protective gear or go into hardened protective shelters. The timely and successful execution of personnel protection measures will reduce the effects of an adversary's attack, will allow the future Modular Force to better cope with a deteriorating situation, and will allow continuity of personnel operations and support recovery operations to return the future Modular Force to an operational status as soon as possible. A coordinated effort is required to ensure the capability to continue minimum essential functions and responsibilities during a catastrophic attack.

(e) Recover. Timely recovery is essential. Capabilities that support actions taken to mitigate the attack must include the ability to employ active and passive measures aimed at decreasing the impact of adversary attacks. If effectively applied, these capabilities will

facilitate quicker recovery. Recovery operations must include actions to effectively treat injured personnel, sanitize affected equipment, and return all too operational readiness.

(f) Understand. In the future OE the ability to understand what you observe is critical. Effective detection and assessment of threats are dependent upon an underlying understanding of the culture and the behaviors and conditions that are the norm for that society. Adapting perceptions to accept these norms and recognizing a deviation from these norms and responding correctly is critical to anticipating and neutralizing a threat. Improper interpretation and reaction to behavior may create a threat where none existed before.

b. Narrative. Protection of personnel is protection against the effects of adversary capabilities employed against the JF's combatant and noncombatant personnel, its friends and its allies. Protection activities must be fully integrated, networked, capable of mitigating the effects of an attack, and facilitate persistence within the OE. The process must protect military and selected/designated civilian personnel from the effects of kinetic, nonkinetic, chemical, biological, nuclear, explosives, projectiles, and directed enemy weapons. However, vehicle active protection systems must provide protection without adding an additional weight burden to the vehicle itself. Add on armor and slat armor are effective but their weight creates undo stress on suspensions and drive trains. Protection of personnel must also consider mitigating the effects of disease (nonbattle injury), through immunizations. Force health protection represents a critical part of the full spectrum of protecting against health threats to personnel. The desired outcome of personnel protection is mission assurance and continuity of personnel operations. Personnel protection measures may be both active and passive and will include surveillance/detection, warning to don protective gear or going to collective shelters, monitoring and assessing the degree of contamination, treatment and personnel rescue after an attack. Personnel protection includes the medical capabilities of medical surveillance/intelligence to detect, assess, warn against health threats, use of medical countermeasures to defend against threats, and medical rehabilitative care to recover following injury and illness.

c. Linkage to AUTL: ART 1.1.3 (Provide Intelligence Support to Force Protection); ART 1.3 (Conduct Intelligence, Surveillance, and Reconnaissance (ISR)); ART 2.2.1.1 (Conduct a Survivability Move); ART 4.0 (The Air Defense Battlefield Operating System); ART 4.1.(Prepare to Defend Against Air Attack and Aerial Surveillance); ART 4.2(Process Tactical Aerial Platforms); ART 4.3.(Destroy Aerial Platforms);ART 5.3 (Conduct Survivability Operations).

d. Linkage to UJTL: ST 6 (Coordinate Theater Force Protection); OP 6 (Provide Operational Force Protection); TA 6 (Protect the Force).

e. Linkage to Concepts: TRADOC Pam 525-3-5, Protect.

4-51. FOC-07-02: Protect Physical Assets

a. Capstone Capabilities. The continuous and cyclical nature of protecting critical assets is described by the interaction of the force operations activities related to sensing, understanding, deciding, and executing the tasks necessary to ensure attacks on critical assets are avoided,

neutralized, or mitigated. The force operations activities and how they are mapped to physical asset protection are as follows:

(1) Detect. The future Modular Force must be able to monitor, detect, track and engage adversary actions against critical facilities and infrastructure in sufficient time and distance to enable protection activities execution (adequately protecting these facilities and infrastructure and allowing time to assess the effectiveness of protection measures, and provide for sufficient mitigation and negation of these attacks through active and passive measures). Additionally, a system of personnel security measures to ensure the integrity of employees, contractors, and others who have access to critical assets in order to prevent sabotage and espionage must be incorporated in the protection process. Sensing physical attacks, such as air and missile attacks, cyber attacks, and sub-surface attacks against critical facilities will require pulling together multiple sensing capabilities and information input sources.

(2) Assess. The JFC must continually assess, develop, and gain a clear picture of the OE and gain a real time depiction of the threat against critical assets. Developing an initial understanding of the threat against critical facilities and the vulnerability of these facilities, will require the integration of sensors and information networks to provide the data necessary to create SA (or orient on the threat), allowing the future Modular Force to take timely and accurate protection measures to counter adversary actions against key facilities and to achieve the desired protection affects.

(3) Warn. This involves making timely and appropriate active and passive protection measure decisions based on the information collected from various sources. JFCs must decide to issue appropriate warnings to units and facilities and must deduce appropriate COA to implement appropriate critical asset protection measures in order to prevent or mitigate hostile actions against facilities. Commanders can elect to take active defense measures to interdict and neutralize an adversary's actions, or to take passive defense measures in anticipation of an adversary's attack. Once JFCs reach a decision, issuing timely warnings and implementing decisions will require a C2 system that provides effective means to issue warnings and to coordinate decisions to ensure mission success and to achieve the desired protection affects.

(4) Defend. The execution of active and passive protection orders and measures is critical to achieving effective personnel protection and to defending against an adversary's attack. JFCs must execute a desired plan based on collaborative intelligence, to include providing direction to subordinates to accomplish the successful protection of physical assets and posture the JF for timely recovery,. Execution must be of sufficient tempo and quality to give commanders the advantage over an adversary within his force operations activity structure.

(5) Recover. Recovery spans reconstitution efforts for forces deployed, assisting in managing the consequences of an attack at an installation, or conducting military support to designated civilian agencies. To support recovery, capabilities must be developed to reduce vulnerability and when required enable the commander to quickly restore physical assets to operational readiness.

(6) Understand. In the future OE the ability to understand what you observe is critical. Effective detection and assessment are dependent upon an underlying understanding of the culture and the behaviors and conditions that are the norm for that society. Adapting perceptions to accept these norms and recognizing a deviation from these norms and responding correctly is critical to anticipating and neutralizing a threat. Improper interpretation and reaction to behavior may create a threat where none existed before.

b. Narrative.

(1) The key elements of protecting physical assets are: critical infrastructure (both military and civilian), facilities, electronic protection, physical infrastructure (both natural and built, military and civilian), major equipment (such as, space-related facilities, air, surface, and sub-surface platforms, satellites, major bases, intermediate staging base(s) (ISB), etc.), rear area security, logistic lines of communications, space control, space operations, insensitive munitions/ordnance safety, mine clearing/countermeasures, anti-surface warfare and maritime intercept/interdiction operations.

(2) The desired outcome of critical asset protection is mission assurance, continuity of operations, and continuity of distribution and sustainment. Protection of physical assets may include active (monitor, detect, defend, access control systems, random access measures) and passive (use of fences, alarms, reaction forces, barriers, facility hardening) defense measures.

c. Linkage to AUTL: ART 1.3 (Conduct Intelligence, Surveillance, and Reconnaissance (ISR)); ART 2.2.11 (Conduct a Survivability Move); ART 4.0 (The Air Defense Battlefield Operating System); ART 5.3 (Conduct Survivability Operations); ART 5.3.5 (Conduct Security Operations); ART 6.3.1.3 (Conduct Maneuver and Mobility Support Operations); ART 6.10.3 (Provide Engineer Construction Support); ART 6.13 (Conduct Internment and Resettlement Activities); ART 6.13.2 (Conduct Populace and Resource Control); ART 7.7.2.2 (Provide Law and Order).

d. Linkage to UJTL: OP 6 (Provide Operational Force Protection); ST 6 (Coordinate Theater Force Protection); TA 6 (Protect the Force); OP 6.5.2 (Protect and Secure Flanks, Rear Areas, and COMMZ in the Joint Operations Area); OP 6.5.3 (Protect/Secure Operationally Critical Installations, Facilities, and Systems); OP 6.5.4 (Protect and Secure Air, Land, and Sea Lines of Communications in the Joint Operations Area); SN 8.1.10 (Coordinate Actions to Combat Terrorism); ST 6.2.6.3 (Establish and Coordinate Protection of Theater Air, Land, and Sea Lines of Communications); ST 6.2.6.4 (Establish and Coordinate Theater-Wide Counterintelligence Requirements); ST 8.4.2 (Assist in Combating Terrorism); TA 6.3 (Conduct Rear Area Security).

e. Linkage to Concepts: TRADOC Pam 525-3-5, Protect.

4-52. FOC-07-03: Protect Information

a. Capstone Capabilities. The conduct of information protection is the interaction of the force operations activities related to sensing, understanding, deciding, and executing the tasks

necessary to ensure that cyber attacks are avoided, neutralized, or mitigated. The force operations activities and how they relate to computer network defense are:

(1) Detect. The future Modular Force must employ an information protection sensor grid to monitor networks and detect potential EAs against system vulnerabilities. The grid is a coordinated constellation of intrusion and anomaly detection systems (implemented and deployed throughout the future Modular Force INFOSYS and computer networks. The sensors report back to Service, theater, and joint information protection service providers. Cyber attack refers to the attack on the world's networks, or cyberspace, by terriorist groups, narcotics traffickers, and organized crime. Cyber attacks may cause netrwork downing, information compromise, wrong instructions to trigger other events and much more. Cyber attacks can supplement or replace traditional military attacks, greatly complicating and expanding the vulnerabilities we must anticapte and counter.

(2) Assess. Assessing and understanding the nature of an adversary cyber attack requires the ability to quickly and accurately determine the characteristics of the attack including criticality and vulnerability of the systems against which an attack is directed, source of the attack, and purpose of the attack. By comparing the current attack's characteristics to previous attacks and coordinating with other information protection providers to learn if they are similarly affected, a JFC gains SU. A rapid assessment and employing state of the art event correlation and data reduction tools is critical to providing the JFC with predictions about the attack's effects on future Modular Force networks and the operational impact on the JFC's COA.

(3) Warn. The ability to take timely and appropriate defensive action is based on the future Modular Force's ability to warn users quickly and to make the right decisions that enable supporting commanders to effectively counter adversary cyber attacks. Effective information protection decisions must include efficient and effective implementation of the information condition and the information assurance process for warning others of the cyber attack, determining the appropriate actions to mitigate the effects of the current attack, and selecting additional protection measures to preclude a future occurrence.

(4) Defend. Execution of active and passive defensive response measures must be swift, focused, and effective. Successful execution is predicated upon well-understood, actionable intelligence that identifies the attack's characteristics and the attacker's identity sufficient to support a wide range of information protection response operations, as well as the restoration and recovery of future Modular Force network capabilities. Effective information protection relies heavily on automated remediation tools and can include recommendations or actions by network operations (including IA) restoration priorities, law enforcement, military forces, and other U.S. government agencies.

(5) Recover. The ability to effectively withstand attacks on friendly INFOSYS is measured by system resilience and the ability to precisely detect, identify, and to disseminate precise warnings and actions taken to isolate, repel or mitigate the effects of the attacks. The recovery capabilities will include effective access denial, the ability to recover from EM attacks, ability to prevent/mitigate system intrusions, and the ability to restore corrupted data.

b. Narrative.

(1) The protection of information is any action taken to protect, monitor, analyze, detect, and respond to unauthorized activity within future Modular Force, DOD INFOSYS, and computer networks. Protection activities must be fully integrated, networked, provide the ability for the computer network to persist within the OE, and be effective mitigating the effects of an attack. Protecting information consists of both active and passive defensive measures to protect and defend systems, and when designated, non-DOD information, computers, and networks. Information protection processes employ IA technical solutions to the greatest extent possible. The desired outcome of protecting information is sustained computer capabilities to support the wide range of required computer operations and IA.

(2) Unauthorized activity may include disruption, denial, degradation, destruction, exploitation, or access to computer networks, INFOSYS or their contents, or theft of information. Information protection measures intend to deter and defend networks from isolated threats and to detect and restore capabilities from state sponsored threats.

(3) The key elements and strategy of protecting information is the defense in depth approach. Defense in depth constructs defenses in successive layers and positions protective technologies at the network backbone, enclave boundaries, computing environment, and supporting infrastructures. Defense in depth involves monitoring, analysis, and detection activities, including trend and pattern analysis. Protecting information is performed by multiple disciplines within the DOD (such as network operations, information protection services, intelligence, counterintelligence, and law enforcement).

c. Linkage to AUTL: ART 5.3.8 (Conduct Tactical Counterintelligence in the Area of Operations); ART 5.3.7 (Conduct Defensive Information Operations); ART 5.3.5 (Conduct Security Operations); ART 5.3.7.3 (Conduct Tactical Information Assurance); ART 5.3.7.4 (Employ Signals Security).

d. Linkage to UJTL: OP 6 (Provide Operational Force Protection); OP 6.3.2 (Supervise Communications Security); OP 6.3.3 (Employ Electronics Security in the Joint Operations Area for Operational Forces); OP 6.3.4 (Protect Information Systems in the Joint Operations Area).

e. Linkage to Concepts: TRADOC Pam 525-3-5, Protect.

4-53. FOC-07-04: Protect Unit

a. Capstone Capabilities.

(1) Unit protection is the integration of active and passive capabilities and processes, provided to operational and/or tactical units, across the ROMO to protect unit personnel, assets, and information against traditional and asymmetrical ground, air, CBRNE and electronic hostile threats, in order to conserve unit fighting potential so it may be applied by JFCs at the decisive time and place.

(2) Required capabilities include:

- Detect at standoff distances (for example, distances beyond an adversary's engagement envelope).
- Provide overlapping sensor detection capability.
- Support operations in EMP and CBRN environments.
- Support all weather, climate and terrain operations, from open desert, to dense vegetation, mountainous and urban locales.
- Facilitate the air and missile defense mission to contribute to third dimensional SA/SU and will include actions and capabilities that provide visualization and understanding of aerial activities or events occurring in the third dimension operational environment.
- Likely threat IED techniques.
- Provide real time SA allowing commanders, staff, and Soldiers to visualize the battlefield three dimensionally.
- Support, as required, autonomous effective and fast sensor-to-shooter systems of precision-guided and intelligent munitions that can quickly render targets and/or hazards harmless.
- Disseminate warning (physically, audibly, virtually and visually) to all echelons, formations and the individual Soldier
- Provide the capability to execute nonlethal, graduated warning to the adversary which will deter, interrupt or cease intended or further hostile action.

b. Narrative.

(1) Protecting U.S. military forces has never been as complex a mission as it is in today's adversarial environment. This environment will likely worsen, and the adversaries will remain adaptive. The U.S. Army has numerous protection capabilities that are not integrated. The exposure of the widely distributed facilities of the joint support structure to attack by unconventional forces, long range fires, aviation and the remnants of enemy forces will present additional opportunities for ground defense. Corps, division, and BCT will be required to dedicate subordinate forces to defend critical support facilities and vital support operations such as logistical convoys. This security requirement will demand new solutions that integrate air, electronic, and ground defenses of both stationary and moving islands of infrastructure within the OE. Failure to integrate protection capabilities and provide modular and adaptive solutions to protection will be detrimental to forces operating in a JIM environment.

(2) Analysis of current and future operations suggest that adverse terrain and weather, coupled with adaptive enemies (representing social, physical, and economic failed states, fractured societies with rampant crime and/or international linkages, and religious and ethnic tensions) will likely characterize future operating conditions and opponents. Future opponents will understand and leverage our existing infrastructure to their advantage, targeting fixed facilities and areas where we are likely to operate.

(3) The emergence of unconventional and asymmetric threats, radical extremist and terrorist efforts aimed at the U.S. and other developed members of the global economy, and the

burdens of post-conflict pacification operations increase the mission requirements of the U.S. military. There are now a nexus of dangerous new enemies, methods, and capabilities that imperil the U.S., and its interests and alliances in strategically significant ways.

c. Linkage to AUTL: Conduct Police Intelligence Operations; ART 1.1.4.3 (Develop Police Intelligence Products); (Collect Environmental Info); ART 1.2.4 (Support Sensitive Site Exploitation); ART 1.3.3 (includes all sub-tasks) (Conduct a Tactical Recon); ART 1.3.4 (Conduct Surveillance); ART 1.4.2.1.1 (Provide Intelligence Support to Psychological Operations); ART 1.4.2.3.1 (Provide Intelligence Support to Civil-Military Ops); ART 2.4.1 (Conduct Lethal Direct Fire Against a Surface Target); ART 2.4.2 (Conduct Nonlethal Direct Fire Against a Surface Target); ART 3.2 (Detect and Locate Surface Targets); ART 3.3.1 (Conduct Lethal Fire Support); ART 4.1 (Prepare to Defend Against Air Attack and Aerial Surveillance); ART 4.3.2 (Select Appropriate Air Defense Systems); ART 4.3.3 (Conduct Engagements Using Air Defense Weapon Systems); ART 4.3.3.1 (Determine Air Defense Weapon System Capability for Engagement of Aerial Platforms); ART 4.3.3.2 (Determine Air Defense Weapon System Availability for Aerial Engagement); ART 4.3.3.3 (Designate Air Defense Weapon System for Aerial Engagement); ART 4.3.4 (Employ Combined Arms for Air Defense); ART 4.4 (Deny the Enemy Use of Airspace); ART 5.2.3 (Mark, Report, And Record Obstacles); ART 5.3.1.1 (Protect Individuals and Systems); ART 5.3.1.2 (Prepare Fighting Positions); ART 5.3.1.3.1 (Construct Protective Earth Walls, Berms, and Revetments); ART 5.3.1.4 (Employ Protective Equipment); ART 5.3.1.5 (Provide Positive Identification of Friendly Forces); ART 5.3.2.1.2 (Identify Nuclear, Biological, and Chemical Hazards); ART 5.3.2.1.3 (Warn Personnel/Units of Contaminated Areas); ART 5.3.2.1.4 (Report NBC Hazards throughout the Area of Operations); ART 5.3.2.1.5 (Use Individual / Collective NBC Protective Equipment); ART 5.3.2.2 (Decontaminate Personnel and Systems) (to include Area Decontamination); ART 5.3.4 (Provide Explosive Ordnance Disposal Support); ART 5.3.5 (Conduct Security Operations); ART 5.3.5.4 (Conduct Area Security Operations); ART 5.3.5.5.3 (Establish Perimeter Security); ART 5.3.5.5.4 (Establish Observation Posts); ART 5.3.5.5.8 (Employ Intrusion Detection Devices); ART 5.3.6.2 (React to a Terrorist Incident); ART 5.3.6.3 (Reduce Vulnerabilities to Terrorist Acts/Attacks); ART 7.2.2 (Process Relevant Information to Create a COP); ART 7.3.2.3 (Conduct Risk Management); ART 7 (Sig Collect Biometric Samples); ART 8.4.3.2.2 (Protect Critical Assets);

d. Linkage to UJTL: TA 1.3 (Conduct Countermine Operations); TA 2.4 (Disseminate Tactical Warning Information and Attack Assessment); TA 3 (Employ Firepower); TA 3.2.1 (Conduct Fire Support); TA 3.2.2 (Conduct Close Air Support); TA 3.2.3 (Conduct Interdiction Operations); TA 3.2.4 (Conduct Joint Suppression of Enemy Air Defenses); TA 3.2.6 (Conduct Attacks Using Non Lethal Means); TA 3.2.7 (Conduct Air and Missile Defense Operations); TA 3.2.8 (Conduct Air to Air Operations); TA 3.5 (Conduct Precision Engagement Counter Countermeasure Operations); TA 5.6 (Employ Tactical Information Operations); TA 6.2 (Execute Personnel Recovery Operations); TA 6.3 (Conduct Rear Area Security); TA 6.8 (Conduct Defensive Countermeasure Operations); TA 7.1 (Conduct Mission Operations in a CBRNE Environment).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Major Combat Operations Joint Operating Concept; Protection Joint Functional Concept; TRADOC Pam 525-3-

0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-1, Operational Maneuver; TRADOC Pam 525-3-5, Protect; TRADOC Pam 525-7-1, Unit Protection for the Future Modular Force.

Section VIII - Strategic Responsiveness and Deployability

4-54. Strategic Responsiveness and Deployability Guidelines
The future Modular Force must, within a joint context, be capable of rapidly deploying worldwide and arrive ready to fight or conduct other FSO immediately upon arrival. Current strategic deployment guidelines are to be capable of deploying to a distant theater to seize the initiative within 10 days, defeat the enemy within 30 days, and be prepared for deployment to another conflict elsewhere in the world 30 days later. In order to meet strategic responsiveness and deployability capability, the future Modular Force must deploy a BCT anywhere in the world within 4 to 7 days, a three BCT division in 10 days, nine BCTs in 20 days, and up to fifteen BCTs within 30 days. Capabilities that will enable the future Modular Force to be strategically responsive are:

- Airlift and sealift assets and enablers.
- Enabler theater access.
- Distribution system.Installation as flagships for force projection.

4-55. Joint/Army Concept Linkage

a. The U.S. global posture of high peacetime readiness, forward deployed and forward presence forces, sea and ground based prepositioned stocks, established access to regional bases, and standing agreements with foreign states supportive of power projection, represent permanent (or slow changing) elements that enhance strategic responsiveness. Strategic responsiveness is a core requirement for the future Modular Force to provide greater options to the JFC for entry operations and rapid transition to decisive operations.

b. Operational maneuver from strategic distances envisions rapid movement, over global distances of highly lethal air, ground, sea, and space capabilities, to converge with overwhelming power upon enemy centers of gravity, causing rapid disintegration of the enemy's ground force. The goal of future Modular Force strategic maneuver is to move sufficient combat power and sustainment from garrisons, through ISBs, directly into combat, significantly faster than today's timelines, enabling rapid, decisive maneuver. Deployment of ground forces directly into future areas denies the enemy their initial advantage, permits friendly forces to occupy or protect key terrain and facilities, and provides areas from which friendly forces can repel enemy forces and aggression.

c. Recognizing the superior power of U.S. military forces, creative and adaptive future adversaries are expected to adopt anti-access strategies, involving several integrated lines of operation (from diplomacy to IO to military actions), aimed at preventing or limiting U.S. involvement in regional crises. Simultaneously, they are developing focused capabilities that will permit them to physically thwart U.S. intervention through strikes against the U.S. deployment process and infrastructure, including forward operating bases, entry points, C2

nodes, and forces themselves. Anti-access capabilities readily available through global arms proliferation and careful investment will include theater ballistic missiles, inexpensive cruise missiles, long-range rockets and artillery, WMD, as well as an array of unconventional, asymmetric means and IO. Deliberate efforts to create mass casualties are additional likely components of an anti-access strategy aimed at eroding U.S. public will to remain engaged.

d. Army forces will usually deploy as part of a JF via strategic airlift and/or sealift, integrated within a JF deployment process. The process may often include synchronization with or integration of multinational forces participating in U.S.-led coalition operations. Theater infrastructure may vary from developed to austere, with increased emphasis recently on the necessity to be prepared for the latter. The U.S. must further expect and plan for compressed warning time, with an adversary, which possesses strategic initiative and advantage of time.

4-56. Desired Strategic Responsiveness and Deployability Capabilities

a. Capabilities envisioned to fulfill joint and Army concepts may be found in the following overarching capstones:

- Airlift and sealift enablers.
- Enabling theater access.
- Distribution system that leverages the deployment network to build and sustain combat power.
- Installations as flagships for power projection platforms, reachback and force sustainment.
- Automated tools that facilitate rapid planning and execution of the deployment of combined arms force packages in an integrated, collaborative, and combined fashion. (See TRADOC Pam 525-3-3 for battle command).
- Deployment SU of force and sustainment flow through robust C4ISR. (See TRADOC Pam 525-3-3 for battle command).

b. The future Modular Force must be capable of entry operations, including forcible entry operations. The future OE for deployment includes projection from our installations into underdeveloped nations with limited ports, or nations with developed infrastructures, where threat anti-access actions have degraded or denied seaports.

c. The future Modular Force will require fundamental changes to our Army installations, as well as strategic and operational lift capabilities, to facilitate strategic responsiveness, operational maneuver, and tactical maneuver. Additionally, the future Modular Force requires advanced over-the-shore capabilities, broader ability to use unimproved ports and airfields, and very rapid positioning of theater-opening enablers. These capabilities permit the JFC and division commander to throughput substantial, ready to fight combat power ashore through multiple, austere entry points.

d. Required capabilities to achieve strategic responsiveness, rapid deployability, and establish and maintain assured access include:

- Increased multi-modal throughput by means of multiple, parallel, simultaneous and sequential deployment to achieve deployment momentum.
- Synchronization of deployment with immediate employment of arriving forces in a Deploy=Employ paradigm, within any operational environment.
- Reduction in predictability and vulnerability to enemy counters through use of multiple improved and unimproved SPODs.
- Versatility and adaptability for both developed and austere theaters and to adjust deployment throughput in support of evolving campaign requirements.
- Reduction in the size of the deployment infrastructure (air and sea bridge) and the time required to emplace it.
- Vertical take-off and landing (VTOL) and super short take-off and landing capability to lift and move mounted and dismounted forces for tactical three-dimensional maneuver and operational maneuver.
- Sustainment of forces via VTOL and super short take off and landing along discontinous air lines of communication.
- Survivability against an array of air and ground-based threats.
- Sea-based platforms for operational agility within littoral regions.
- Jointly integrated deployment C2 and communications with en-route SA.
- Advanced automated deployment planning tools.

4-57. FOC-08-01: Airlift and Sealift Assets and Enablers

a. Capstone Capabilities. The following required force projection capabilities encompass those capabilities most critical to achieving required improvements in lift platforms and associated technologies:

- Joint high speed sealift. Intertheater that can deliver troops, equipment, and sustainment together in sufficient size and at a considerable speed to provide combat power from strategic distances to the JFC. With its shallow draft feature it can bypass established seaports and discharge its combat power, wherever, there is at least a 20-foot draft and an acceptable offload site. With a C4I suite on board, commanders can also conduct en route planning, receive intelligence updates, and integrate with JFs en route.
- Intratheater sealift. This is the intratheater version of strategic sealift and is the Army's future watercraft. It is another option of operational flexibility and agility that allows the JFC to insert combat power and sustainment with precision at countless locations along coastlines. Intratheater sealift also expands the reach and employment options of both land-based and afloat prepositioning, and enable operational maneuver within theater.
- Seabasing. Seabasing is the rapid deployment, assembly, command, projection, reconstitution, and re-employment of joint combat power from the sea, while providing continuous support, sustainment, and FP to select expeditionary JFs without reliance on land bases within the JOA. These capabilities extend operational maneuver options, and facilitate assured access and entry from the sea. Army Seabasing efforts place emphasis on articulating requirements that improve force projection considering ways to overcome anti-access environments, increase deployment momentum, attain deploy = employ

capabilities, enable operational maneuver from strategic distances, close the gap between early entry and campaign forces, and allow support to distributed operations.

- Joint logistics over-the-shore (JLOTS). The future Modular Force will require seaport throughput enabling technologies to enhance the ability to conduct JLOTS across the range of military operation (ROMO) including offloading in deep-water seaports, degraded seaports, denied ports, small austere ports/harbors, and in-stream discharge when other options are not available to counter an enemy's anti-access strategy.
- Super short takeoff and landing airlift. This is joint airlift with the ability to carry two light/medium armored vehicles 3500 miles. It can land on 750 feet of road or field in the joint AOs, which avoids fixed airfields and adds innumerable points of entry. Its features provide the joint commander sharply improved options to employ mounted ground forces to achieve operational surprise and conduct air-ground maneuver throughout the JOA.
- Heavy Lift Vertical Takeoff and Landing Airlift. This is joint or Army airlift with the ability to deliver a single light/medium armored vehicle to a distance of 750-1000 miles. Generally independent of ground conditions, it enables ground force commanders to conduct initial deployments and/or forcible entry from ISBs, vertical maneuver and air sustainment in support of campaign futures, as well as the ability to avoid predictable, linear patterns of operation.
- Rapid expeditionary airfield construction. These capabilities are those that increase maximum (aircraft) on ground capacity on austere airfields, thereby increasing inter or intratheater air movements. The materiel solution would enable joint early entry engineers to develop additional aircraft parking and cargo storage capability. This solution should be highly deployable, easily and rapidly emplaced, and capable of supporting a loaded C-5 or C-17.
- Precision aerial delivery. These are capabilities in support of the JFC's planned scheme of maneuver when it may be necessary or desirable to conduct airdrop operations to deliver equipment into the future Modular Force area with payloads up to 20-ton vehicles from an offset range of 30 km. An accurate high-altitude delivery capability will significantly reduce aircraft vulnerability in nonpermissive airdrop environments.
- Transportation node throughput technologies. Reduce or eliminate transportation node delays through reduced materials handling equipment requirements, advanced robotics, flexible packaging, configured loads, and improved inter-modal techniques.

b. Narrative.

(1) Creating and maintaining assured access to the theater in conflict is a complex endeavor involving all components of the JF with the aim of assured capability to project and sustain power from early entry through conflict resolution. In chapter 3, this pamphlet summarized how future adversaries of the U.S. are expected to adopt anti-access strategies to deny, delay, and/or degrade U.S. intervention in regional crises. Those strategies will have both political/diplomatic and physical components, synchronized wherever possible to strengthen their effects.

(2) Preparations and measures needed to counter anti-access and achieve assured access will often begin well before an actual contingency occurs and then intensify as crisis breaks into conflict and U.S. intervention is undertaken.

(3) Development of advanced air and sealift platforms will enable future Modular Force formations to deploy in combat-ready unit configurations (intact battalion and brigades with integrated sustainment) in a matter of days, with units prepared to begin operations shortly after arrival consistent with the Deploy=Employ paradigm. Austere joint high speed sealift access, high speed sealift; advanced JLOTS; Army watercraft for theater support; and super short takeoff and landing or heavy lift vertical takeoff and landing airlift capabilities will permit the JF and future Modular Force commander to push substantial, ready to fight land power ashore through multiple, unimproved entry points. This approach will accelerate force flow, enhance strategic and operational agility, help deceive the enemy, and reduce his ability to deny access. The speed and versatility of these platforms will permit Army commanders to close the gap between entry forces arriving by air and immediate follow-on forces, insuring deployment momentum to expand initial entry operations and build combat power sufficiently to assume the offensive throughout the JOA.

(4) Development of fort-to-fight, ISB/afloat forward staging base to-fight airlifters capable of takeoff and landing on unprepared runways will help reduce the number of nodes that must be transited during deployment, saving significant time, expand available entry points for both prompt and sustained power projection, and deliver future Modular Force formations within striking distance of future areas.

c. Linkage to AUTL: ART 2.1 (Perform Tactical Actions Associated with Force Projection and Deployment); ART 2.1.2 (Conduct Tactical Deployment/Redeployment Activities); ART 2.3 (Conduct Tactical Troop Movements); ART 6.3.1 (Provide Movement Control); ART 6.3.2 (Conduct Terminal Operations); ART 6.3.2.3 (Conduct Rail Transfer Operations); ART 6.3.2.4 (Conduct Marine Terminal Operations); ART 6.3.3 (Conduct Mode Operations); ART 6.3.3.1 (Move by Surface); ART 6.3.3.2 (Move by Air); ART 6.3.3.3 (Conduct Water Transport Operations); ART 6.4.3 (Conduct Aerial Delivery Support).

d. Linkage to UJTL: SN 1 (Conduct Strategic Deployment and Redeployment); SN 3.5 (Provide Space Capabilities); SN 6 (Conduct Mobilization); ST 1 (Deploy, Concentrate, and Maneuver Theater Forces).

e. Linkage to Concepts: TRADOC Pam 525–6, Move**.**

4-58. FOC-08-02: Enable Theater Access

a. Capstone Capabilities.

(1) Enabling theater access provides proactive means to ensure forces can deploy, and freely enter the theater of operations, by enhancing entry capabilities and infrastructure, mitigating adverse effects of the environment (terrain, weather, enemy action, infrastructure, industrial hazards, and local population), and protecting/facilitating multiple ports of debarkation, LOC, and theater entry points. Once the foothold is established, the focus of enable theater access changes to continuing the flow into, and out of, the theater, as well as enabling ‘intratheater access’ in support of operational maneuver. The continued flow of forces and the

sustainment footprint, required for continued operations development of base camps and sustainment LOC, becomes vital.

(2) Required capabilities include:

- Construction and general engineering support, including a rapidly deployable capability to expand operating capacities of aerial ports of embarkation/seaports of embarkation, ISB forward operating bases, and aerial ports of debarkation (APOD) and seaport of debarkation (SPOD).
- Means for identification of multiple, simultaneous, unimproved, or minimally improved, departure points and entry points.
- Standoff infrastructure assessment.
- Means to protect, preserve, enhance, and maintain deployment and employment infrastructure, to include power projection platforms.
- Means to detect and display full spectrum CBRN agents, weapons, caches, transporters, and employment means prior to entering a theater of operation.
- Enhanced over-the-shore delivery of personnel, equipment, and materiel; and controlling and managing property.
- Populace and resource control (PRC).
- Reachback to cultural/sociological subject matter expertise specific to the culture of the operational environment.

b. Narrative.

(1) Army forces must be ready to rapidly deploy alone via organic Army aircraft, ground vehicles, and vessels, or as part of a fully integrated JTF, in response to crisis situations, to any part of the world. Such deployments will likely be into areas with poor infrastructure, limited points of entry, widely disparate climates, terrain, and cultures, and little host-nation support. The ability of U.S. Forces to gain and sustain access into the theater, to facilitate the appropriate flow of forces, will be vital to the success of future operations and perhaps the center of gravity in the opening phases. Likewise, denying or impeding theater access will be a chief aim of any enemy force, whether it is a state-sponsored force, or transnational foes, such as cultural or political factions. The threat's overall strategy to preclude theater access will take many forms, and likely comprise varied and simultaneous operations across the theater. The U.S. forces can expect indirect attacks by asymmetric means, direct attacks using special purpose forces, and major terrorist attacks, potentially employing weapons of mass destruction or effects. These attacks will be designed to deny the use of, or disable, transportation infrastructure, manipulate the population, or for attrition of U.S. combat power. The threat's effort to deny theater access will not be geographically limited to the theater of operation, but will likely extend to our homeland operating bases, and homeland infrastructure. Denying the enemy the capability to influence departure and entry points, and preventing or mitigating enemy anti-access strategies, is vital to our future Modular Force strategy.

(2) MS organizations will aim to achieve 'prompt' and 'sustained' operations in enabling theater access. MS focus is to enable 'prompt' theater access to ensure deployment of a BCT anywhere in the world within 4 to 7 days and a three BCT division in 10 days. Enabling

'sustained' theater access encompasses activities to enable sustainment of initially deployed U.S. Forces in theater, as well as to maintain the flow of combat forces to achieve deployment nine BCTs in 20 days, and up to fifteen BCTs within 30 days. In addition to support to the future Modular Force, MS organizations must be capable of providing support to current Army organizations, allied and coalition forces, OGAs, such as the State Department, and NGO, such as the American Red Cross.

(3) Cultural awareness and the ability to rapidly consult social and cultural subject matter expertise are critical to maintaining theater access. The future Modular Force must understand and address cultural matters in a manner that minimizes potential for cultural conflict. Continued access may at times be dependent upon acceptance by the resident society and culture. It is critical to understand that culture and act in a manner that minimizes the potential for conflict and increases the potential for cooperation and acceptance.

c. Linkage to AUTL: ART 2.1 (Perform Tactical Actions Associated with Force Projection and Deployment); ART 2.1.2 (Conduct Tactical Deployment/Redeployment Activities); ART 6.10 (Provide General Engineer Support); ART 6.10.1 (Restore Damaged Areas); ART 6.10.2 (Construct and Maintain Sustainment Lines of Communications); ART 6.10.3 (Provide Engineer Construction Support); ART 6.10.4 (Supply Mobile Electric Power); ART 6.10.5 (Provide Facilities Engineering Support).

d. Linkage to UJTL: SN 1 (Conduct Strategic Deployment and Redeployment); SN 1.1.5 (Determine Impact of Environmental Conditions on Strategic Mobility); ST 4.2.6 (Determine Theater Residual Capabilities); ST 4.4. (Develop and Maintain Sustainment Bases); TA 1 (Develop/Conduct Maneuver); TA 1.1.1 (Conduct Tactical Airlift); TA 1.1.4 (Conduct Sea and Air Deployment Operations); TA 4.4 (Conduct Joint Logistics Over-the-Shore Operations).

e. Linkage to Concepts: Capstone Concept for Joint Operations; Major Combat Operations Joint Operating Concept; Focused Logistics Joint Functional Concept; Joint Logistics Joint Integrating Concept; TRADOC Pam 525-3-0, The Army in Joint Operations – The Army's Future Force Capstone Concept; TRADOC Pam 525-3-1, Operational Maneuver; TRADOC Pam 525-4-1, Sustain.

4-59. FOC-08-03: Distribution System

a. Capstone Capabilities. The following required force projection capabilities encompass those capabilities most critical to achieving required improvements in distribution:

- Inter-modal platform technologies. Inter-modal platform and interface technologies/techniques and advanced commodity packaging and faster on/off loading techniques for rapid deployment and distribution of forces and sustainment. Reduced number of and simplify mode transfers to increase the velocity of sustainment distribution.
- Unit configured load technologies. Technologies to enhance the ability to rapidly balance unit configured loads with efficient stowage for tactical employment.

- Small payload/high value delivery technologies. Technologies that support the rapid delivery of small, high value, discrete (low tonnage, high payoff) commodities to bridge gap between traditional ground-based

b. Narrative.

(1) Distribution is a component of force projection, supporting the concept of operational maneuver from strategic distances and includes the use of the ISBs, contractors, host nation support, and the requirement for theater opening packages to minimize RSOI at multiple entry points.

(2) Future Modular Force sustainment operations are based on the fundamental concept of distribution based logistics with key underlying principles of: velocity over mass; centralized management with decentralized, multi-nodal/multi-modal execution; maximum throughput; minimum essential stockpiling; seamless two-way flow of resource; in-transit visibility of stocks; configured loads; real time sustainment SU that enables anticipatory logistics; and time-definite delivery.

(3) At the operational level, distribution based sustainment operations must be continuous, but distributed through often shifting LOCs in order to adapt rapidly to changing conditions within the OE. Future Modular Force sustainment commands must share the same quality of SU as that provided to operational HQ, ensuring that the logistics COP is fully harmonized and supportive of the JFC's priorities to optimize the efficiency of sustainment operations. Key capabilities needed are:

- Rapid BCTs entry into the Defense Transportation System.
- In-transit joint logistics COP which provides a secure, pervasive, logistics C2 support infrastructure emphasizing speed, precision, accuracy, visibility, and centralized management from Soldier platform to CONUS through a logistics COP to include: Supply distribution and management, reachback to industry and knowledge centers, passive radio frequency identification (RFID) tags, Soldier health status, petroleum and fuel supply, ability to support a logistics COP, proactive and anticipatory maintenance, munitions, and water.
- Intermodal, distribution-based operations for force projection and sustainment.
- Ability to provide/maintain seamless in-transit visibility of all sustainment assets and supporting logistical activities, supplies, and services by leveraging space and high altitude network support capabilities.

(4) The future Modular Force must have the means to protect critical deployment infrastructure from attack by weapons of mass effects/destruction. This includes the means to restore operations at a port or airfield, and along lines of communication.

(5) Improvements to the speed and effectiveness of the distribution system may be achieved by a combination of the following:

- Standardized, pre-configured, modular deployment packages, and easy force flow reconfigurability.
- Rapid force alert, assembly, and load-out.
- Forces in a ready-to-fight configuration; integrated, combined arms, unit packages.
- Faster on/off load of lift platforms.
- Simplified and common packaging and material handling, with reduced requirements for inter-nodal or inter-modal re-packaging or handling.
- Minimum intermediate staging and transshipping; movement from fort to tactical assembly area (TAA).
- Minimum reception, staging, onward movement, and integration (RSOI) on arrival.
- Integrated sustainment to enable initial self-sufficiency in short-term operations.
- Low vulnerability to flow interruption.
- Multiple departure and secure theater entry points; multiple, parallel deployment routes; offset port and airfield facilities.
- High throughput, including directly to forward operating areas.
- Distribution-based logistics in lieu of large in theater stockpiles.
- Deployment SU through automated, joint interoperable BCSs.

(6) The central measures of effectiveness for distribution systems are: arrival at the right place of a reasonably survivable, self–sufficient, immediately employable and effective combined arms force package appropriate to the mission and threat and sufficiently timely to arrest further deterioration of the conflict or crisis; and maintaining a rate of deployment that achieves and retains force dominance sufficient to prevent a major tactical reverse or operational pause and that directly enables campaign execution.

c. Linkage to AUTL: ART 2.1 (Perform Tactical Actions Associated with Force Projection and Deployment); ART 2.1.2 (Conduct Tactical Deployment/Redeployment Activities); ART 6.3.1 (Provide Movement Control); ART 6.3.2 (Conduct Terminal Operations); ART 6.3.2.3 (Conduct Rail Transfer Operations); ART 6.3.2.4 (Conduct Marine Terminal Operations); ART 6.3.3 (Conduct Mode Operations); ART 6.3.3.1 (Move by Surface); ART 6.3.3.2 (Move by Air); ART 6.3.3.3 (Conduct Water Transport Operations); ART 6.4.3 (Conduct Aerial Delivery Support).

d. Linkage to UJTL: ST 1 (Deploy, Concentrate, and Maneuver Theater Forces).

e. Linkage to Concepts: TRADOC Pam 525-3-6, Move.

4-60. FOC-08-04: Installations as Flagships for Force Projection

a. Capstone Capabilities. The revolutionary changes reflected by initiatives such as the Army Transformation, Modular Force fielding located at http://www.army.mil/institution/leaders/modplan/2007/high-res/Army%20Mod%20Plan%202007.pdf will require fundamental changes in our installations. The role of installation is shifting to continuous support from home station to foxhole. Significant demands are placed on the warfighter because of the following:

- Increased OPTEMPO.
- Modular and agile units.
- Diversity of the army family.
- Required flexibility to support rapidly changing functional/operational needs.

(1) These capabilities apply to our permanent installations at home and abroad, as well as to those that support expeditionary and contingency activities. In addition or adjunct to installation natural and built infrastructure needs inculcated into the other FOCs contained herein as DOTMLPF synchronization considerations, the following encompasses those focused capabilities most critical to achieving required installation support for the Army:

(2) The JFCs must have the ability to rapidly respond to and sustain military actions worldwide from installations and base camps which includes the following capabilities:

- Provide processes, decision aids and analysis tools to assist in installation planning for effective and efficient operational support at national, regional and installation levels.
- Enable structure installations to rapidly resize facility or infrastructure operations as required and the flexibility to adapt to evolving functional support requirements rapidly.
- Provide analysis and planning tools to augment installation capabilities with commercial provision of goods and services.
- Provide models and simulations to address joint mobilization, deployment and sustainment; provide systems for distributed operational support, maintenance, intelligence operations, and logistical support from multiple sites.
- Digitize and automate installation communication systems; ensure reliable and integrated road, rail, sea and air facilities.
- Provide for the protection critical deployment infrastructure.
- Ensure connectivity between deployed units and home station that maintains real time SA and rapid response/reinforcement capabilities, as well as providing logistical and sustainment support; and provide decision aids and current, accurate information for garrison commanders.

(3) In order to maintain readiness, the future Modular Force must provide Soldiers with the natural and man-made infrastructure to train, maintain, and reconstitute to include the following:

- Provide the ground, air, and water resources in the quantity, quality, and configuration to meet current and future training and testing requirements (see FOC-10-07).
- Providing universal training support.
- Provide new materials, processes and technologies for facility planning, design and construction that lower life cycle costs.
- Provide processes, analysis tools and decision aids to detect, assess, warn, defend and recover from attack, sabotage, emergencies and natural disasters.

- Be able to effectively set the conditions to sustain mission planning/rehearsal or deployment exercise connectivity.
- Provide infrastructure capacities that enable embedded/distributed training across all training domains integrated through a network of interconnected installations.
- Provide models and simulations to address joint stationing.
- Provide technologies, analysis and risk assessment tools, and decision aids for reducing power and energy costs.

(4) There are three critical areas involved in maintaining a quality of life:

- HowSoldiers and their families live.
- Where Soldiers and their families live.
- Where Soldiers and civilians work.

(5) In addition, maintaining a quality of life requires providing facilities and work places for soldiers and their families. Equally important are tools, systems, and processes that address demands the mission places on the Soldier, their families, and our civilian workforce. The future Modular Force must maintain a realistic training environment that contributes to the quality of life for Soldiers, their families and the general public.

(6) All BCTs of the future Modular Force will have mobility support elements such as a mobility officer and mobility NCO (http://www.eustis.army.mil/ocot/Documents/Warrant_Proponency/MO_Brochure_May05.pdf) on their table of distribution and allowances. This element will advise the commander on the joint deployment process. The mobility officer must have a single automated deployment that aggregates information from the Army's legacy and future automated logistics systems (to include, but not be limited to transportation systems, supply systems, and HAZMAT systems. The tool must have the capability to plan deployments, create shipping documents, and track shipments. The tool must be integrated with combat systems in theater to improve the efficiency of RSOI. It must also be compatible with other service DOD logistics systems to allow easy integration of Army forces into joint campaigns and. have an embedded communications capability that permits connectivity throughout the OE.

b. Narrative.

(1) Our installations support a joint and expeditionary force where Soldiers train, mobilize, and deploy to fight and win. These forces are sustained through reach operations reducing the theater footprint, as well as providing unprecedented battle command and SA at home station. Soldiers and their families who live on and off installations deserve the same quality of life as is afforded the society they are pledged to defend.

(2) The role of installations has changed significantly. They function now more than just training, testing, and deployment platforms that supports the well-being of Soldiers and their families. Installations now provide continuous deployment support from the home station throughout the deployment. Installations will undergo a corresponding change in business processes, roles, and responsibilities as the Army transcends to an unprecedented level of force

structure change and technology integration. The integrated, collective capabilities and capacities of all installations will far exceed that of any one installation. The Army is simultaneously enhancing its joint support role to interagency (domestic) and multinational (international) cooperation.

(3) Army installations are essential to maintaining the premier, expeditionary Army. The installations mission continues to be the provision of effective natural and built infrastructure to enable training, mobilization, and deployment, while sustaining and reconstituting the force, and taking care of our families. The future Modular Force requires installations to provide crutial support to deployed forces over a longer period of time with integrated technology. This requirement has led to a greater desire for standardized, multipurpose, adaptive facilities to maximize economical and functional benefits. Progress has been made, yet the need to upgrade our installation facilities to support the mission, Soldiers, and their families continues. Adjustments to existing programs have been made and strategies continue to be refined. Installations exist to support the warfighters' well-being. The Army remains dedicated to meeting the challenge of providing quality, mission-ready installations.

(4) A key to the success of the strategic responsiveness and deployability capability goals is the ability of installations to assist the mobility officer and the unit set to deploy. The mobility officer program (http://www.eustis.army.mil/ocot/Documents/Warrant_Proponency/MO_Brochure_May05.pdf) is the introduction of a deployment technician dedicated to the business of deployment. Prior to the assignment of the mobility officer, unit movement responsibility was assigned on an ad hoc basis. The mobility officer program provides the commander with a proficient technician to advise them on the following:

- Joint deployment process.
- Planning, coordinating, and executing deployments and redeployments.
- Develops and conducts training associated with unit movement operations.
- Identifies and remedies deployment issues.
- Provides expert distribution advice to facilitate theater sustainment operations.
- Assists the commanders in planning and conducting operational maneuver that starts at the installation and continues to employment and redeployment.

c. Linkage to AUTL: ART 2.1 (Perform Tactical Actions Associated with Force Projection and Deployment); ART 2.1.2 (Conduct Tactical Deployment/Redeployment Activities); ART 6.3.1 (Provide Movement Control); ART 6.3.2 (Conduct Terminal Operations); ART 6.4.1 (Provide Basecamp Sustainment); ART 6.10.3 (Provide Engineering Construction Support); ART 6.10.5 (Provide Facilities Engineering Support); ART 7.7.3 (Train Subordinates and Units); ART 8.3 (Conduct Stability Operations).

d. Linkage to UJTL: SN 1 (Conduct Strategic Deployment and Redeployment); SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); SN 4.2 (Provide for Base Support and Services); SN 6 (Conduct Mobilization); Strategic Theater tasks (ST) 1 (Deploy, Concentrate, and Maneuver Theater Forces); ST 4 (Sustain Theater Forces); Operational (OP)

OP 4.6 (Build and Maintain Sustainment Bases in the Joint Operations Area); OP 5 (Provide Operational Command and Control); TA 5 (Exercise Command and Control).

e. Linkage to Concepts: TRADOC Pam 525-3-6, Move.

Section IX - Maneuver Sustainment

4-61. Maneuver Sustainment Operations

Army concepts characterize maneuver sustainment as a full spectrum capability that is strategically responsive, deployable, agile, versatile, and survivable throughout the ROMO and across the spectrum of conflict. Maneuver sustainment units will conduct operational maneuver from strategic distances, deploy through multiple austere points of entry, and rapidly establish maneuver sustainment operations. They will arrive in the theater of operations immediately capable of supporting simultaneous, distributed, and continuous joint operations throughout the OE, day and night in any terrain. Future Modular Force maneuver sustainment operations are characterized by simultaneous operations distributed across the OE IAW the maneuver JFC's intent and operations plan. Superior SU, based on advanced C4ISR capabilities and visibility of the distribution network, enables maneuver sustainment organizations to operate within the battle rhythm of maneuver commanders. Capabilities identified as necessary to fulfill future Modular Force concepts include:

- Sustainability.
- Global precision delivery.
- Power and energy.
- Enhancements, reliability, maintainability and commonality for sustained operational tempo.
- Army Health System.
- Health service support.
- Army Health System casualty prevention.
- Soldier support.
- Global military religious support.

4-62. Joint/Army Concepts Linkage

a. The operational capabilities outlined in the maneuver sustainment FOC area, when achieved in aggregate, fulfill the vision articulated in the future Modular Force concepts and along with the strategic responsiveness and deployability FOC area, fulfill the Army contribution to the joint functional concept for focused logistics.

b. The capabilities required to fulfill focused logistics includes timely and precise delivery of mission-ready forces (strategic responsiveness and deployability FOC), and their essential support to destinations specified by the supported JFC. The right-sized (and potentially reduced) combat support, and combat service support footprint in the joint or combined operations area, and more cost-effective logistics support for the warfighter is vital. Achieving the full potential of focused logistic will mean much greater certainty that JFs will receive the right support, at the right place, at the right time, and in the right quantities, across the full ROMO.

c. Army concepts characterize maneuver sustainment as a full spectrum capability that is strategically responsive, deployable, agile, versatile, and survivable throughout the ROMO and across the spectrum of conflict. Maneuver sustainment units will conduct operational maneuver from strategic distances, deploy through multiple austere points of entry, and rapidly establish maneuver sustainment operations. They will arrive in the theater of operations immediately capable of supporting simultaneous, distributed, and continuous joint operations throughout the OE, day and night in any terrain.

d. Future Modular Force maneuver sustainment operations are characterized by simultaneous operations distributed across the OE IAW the JFC's intent and operations plan. Superior SU, based on advanced C4ISR capabilities and visibility of the distribution network, enables maneuver sustainment organizations to operate within the battle rhythm of maneuver commanders. Maneuver sustainment operations at the tactical level are predicated upon sustainment pulses and the cycling of units in and out of combat operations. It is from within this operational framework that mission staging, sustainment replenishment, and combat replenishment operations are conducted.

4-63. Desired Maneuver Sustainment Capabilities

Capabilities identified as necessary to fulfill the vision articulated for maneuver sustainment in the joint and Army concepts fall into the following areas:

- Sustainability.
- Global precision delivery.
- Power and energy.
- Readiness, reliability, maintainability, and commonality for sustained operational tempo.
- Army Health System.
- Health service support.
- Army Health System casualty prevention.
- Soldier support.
- Global military religious support.

4-64. FOC-09-01: Sustainability

a. Capstone Capabilities.

(1) Improve both strategic responsiveness and core warfighting abilities to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force, by substantially reducing overall sustainment demand by ultimately up to 90 percent, compared to previously envisioned Force XXI/AXXI (http://www.army.mil/aps/98/foreword.htm) levels while retaining an overmatching and robust operational posture. The goals and objectives of sustainment will remain to provide the necessary support at the right time, in the right quantities, and in the right location.

(2) Future Modular Force must build upon new sustainment concepts that are emerging in support of the current force, including:

- Split-based, modular units.
- Distribution-based sustainment—delivering the right support, to the right place, at the right time, over extended distances.
- Precision and conventional aerial delivery (to include air-land, air-drop, and sling load) for both routine and emergency resupply.
- Sustainment integrated with combat operations by the combat commander.
- Medical treatment on the move.
- Lighter weight, shelf-stable, appealing and nutritious individual and group operational rations which require little or no preparation.
- Simultaneous Deployment-Employment-Sustainment in a JIM environment.
- Reduced water consumption for CBRN decontamination, field service equipment (showers, laundries, personal hygiene, etc.), and feeding equipment.
- The ability to provide a secure, pervasive, logistics C2 support infrastructure emphasizing speed, precision, accuracy, visibility, and centralized management from Soldier platform to CONUS through a logistics COP to include: supply distribution and management, Reachback to industry and knowledge centers, passive RFID tags, Soldier health status, petroleum and fuel supply, ability to support a logistics COP, proactive and anticipatory maintenance, munitions, and water.
- Ability to conduct space-based route reconnaissance and convoy monitoring.

(3) Mission staging operations and extended sustainment replenishment operations require that the future Modular Force possess enhanced abilities to provide field services (shower, field feeding, laundry, latrines, temporary shelter and mortuary affairs) along with on-site Soldier services (human resources, postal, military pay input, legal assistance and religious worship and counseling).

(4) Future Modular Force units must be capable of executing the support missions within a JIM environment.

(5) Future Modular Force must be capable of executing DOD executive agent responsibilities as well as those missions outlined in Army support to other Services directives at http://www.dtic.mil/whs/directives/corres/pdf/300005p.pdf.

- Mortuary affairs.
- Inland petroleum distribution operations.
- Blood supply.
- Theater common ttem and common service support.
- Manager for military traffic management.
- Manager for military postal operations.
- Manager for conventional ammunitions.

(6) Future Modular Force sustainment forces must retain the ability to support current forces.

b. Narrative. Revolutionary changes, required to support the future Modular Force, are among the most challenging goals of transformation, but are indeed critical to achieving the envisioned operational posture. Aggressive goals of reducing overall operational sustainment demand will not be easily achieved, but are vital to future warfighting success in the distributed OE. Demand for power, fuel, ammunition, repair parts, and other consumables, must be reduced or optimized across the OE to validate strategic responsiveness and achieve effective worldwide force projection. The Army can no longer routinely incur the expense of sustaining a largely heavy force, either at home station or deployed. Concentrated efforts must be made to develop technologies that reduce or eliminate demand. More efficient, alternative fuel propulsion systems, improved reliability, multifunctional system of systems components, and lightweight, mobile, hybrid power generation must become the norm. In addition, the warfighting support apparatus must be capable of maintaining the same OPTEMPO as maneuver forces, in all weather and OE conditions. Sustainment must become an integral part of the maneuver commander's battle rhythm, vice an adjunct appendage. Efficiencies are also required in providing designated support to other Services within the joint warfighting team, and to other lead federal agencies, when conducting interagency operations. To achieve reductions in logistics demand and footprint, mechanisms developed for the future Modular Force by the Army must be migrated to other supported Services and federal agencies to achieve similar reductions.

c. Linkage to AUTL: ART 6.0 (The Combat Service Support Battlefield Operating System); ART 6.1 (Provide Supplies); ART 6.2 (Provide Maintenance); ART 6.4 (Provide Sustainment Support); ART 6.5 (Provide Force Health Protection in a Global Environment); ART 6.6 (Provide Human Resources Support); ART 6.11 (Provide Contracting Support); ART 6.12 (Provide Distribution Management).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support); SN 6.6.3 (Expand Logistical Support).

e. Linkage to Concept: TRADOC Pam 525-4-1, Sustain, chapter 5.

4-65. FOC-09-02: Global Precision Delivery

a. Capstone Capabilities. Improve both strategic responsiveness, and core warfighting abilities, to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force.

(1) Provide real time IM, graphically and/or digitally, of asset availability, throughout the maneuver sustainment pipeline, from point of origin to delivery at final destination, allowing the logistician to effectively and efficiently support the warfighter within and beyond the defined OE.

(2) Deploy an operationally effective force, anywhere in the world, with reduced RSOI requirements. The ability to 'fight upon arrival' requires that equipment will not require reassembly of major components in order to prepare it for operations. The crew can accomplish

any reconfiguration required in minutes, after unloading from the aircraft, without the assistance of external materiel handling equipment.

(3) Equip the future Modular Force with distribution enablers that allow the following:

- Rapid transit of multiple classes of supply over vast distances (both surface and air).
- Distribution assets with sufficient SA capability as to allow “right time, right place”sustainment flow anywhere on the OE.
- Standardize sustainment packaging to maximize configuration and reconfiguration of loads, limit off-system material handling equipment, and speed the movement of sustainment through the distribution system.

b. Narrative.

(1) The warfighter’s ultimate effectiveness depends on the sustainment capability to deliver (project, receive, and stage, onward move, sustain, and redeploy) the necessary forces and materiel to a joint/multinational force, at successful corresponding mission velocity. A COP of the defined OE, sustainment data, and an optimized seamless sustainment system will allow the JFCs to anticipate requirements, and provide focused support, when and where needed, including austere OE locations.

(2) Managed distribution and responsive transportation enabled by reachback communications, is replacing stockpiles of supplies and lessening needed services. Reducing the ‘logistics footprint’ will give way to rightsizing the ‘sustainment footprint’ in the future Modular Force. The transactions based environment of today may be replaced by instantaneous, query based, ‘web based’ systems, enabling the force to carry fewer supplies, and streamlining overly complex and duplicative organizational structures. The future Modular Force must have pervasive space communications and position navigation system links to facilitate transmission of equipment data, such as position, operational status, equipment and aircraft conditions, and maintenance diagnostics and prognostics anywhere in the JOA. Supply inventory will be moving in the pipeline with definite time delivery goals. Customer wait time will be significantly reduced. Stock levels will be measured in relevant operational parameters, not hours or days of supply. Likewise, human resource support will be directed by task organizing and tailoring from the National provider level.

(3) Along with optimizing sustainment information and reporting, there must be significant improvements in deployment execution systems, planning and decision support tools, asset visibility, packaging, reliability, efficiency, intermodal transfers, and intertheater and intratheater lift assets. In addition, forces must have the ability to maintain in-transit visibility of all supporting logistical activities, supplies, and services using space-based reachback capabilities. Reductions in the weight and volume of equipment and supplies, specifically fuel and ammunition (the largest commodities by volume and weight), are required for contingency and initial forces flow. Changes in force design through modularity, and split-based operations, are required to achieve this goal. Upgrading mechanisms, such as engineering change proposals, preplanned product improvement proposals, as well as block improvements and multistage improvement programs support the transition.

c. Linkage to AUTL: ART 6.0 (The Combat Service Support Battlefield Operating System); ART 6.1 (Provide Supplies); ART 6.3 (Provide Transportation Support); ART 6.4.3 (Conduct Aerial Delivery); ART 6.12 (Provide Distribution Management).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain, chapter 5, Distribution and Transportation.

4-66. FOC-09-03: Power and Energy

a. Capstone Capabilities. Improve both strategic responsiveness and core warfighting capabilities to effectively fight as a joint, interdependent, full spectrum, mission-tailored force. The future Modular Forces will optimize their combat effectiveness by employing advanced tactical electric power sources, fuels, and energy storage. These tactical electric power and energy storage systems will enable key operational capabilities throughout the OE by providing electricity to supported systems and managing power distribution across the force. Tactical electric power and energy sources are encompassed in all systems, for example weapons platforms (onboard and exportable power), tactical vehicles (air and ground), Soldier systems, and all electrical/electronic systems. Reducing the amount of power needed to support these individual systems provides operationally significant benefits to the overall sustainment support system. For the purpose of this FOC, "operationally significant" is defined as any readily measurable savings that results in positive second order affects that favorably impact JFCs. For example, fewer fuel tankers would be needed to support the warfighter; which would reduce system weight and volume, and increase mobility and available space on vehicles and aircraft.

b. Narrative.

(1) The means of generating, distributing, and storing electrical power must exceed near-term performance and capabilities. These systems must increase performance while reducing fuel consumption, improving mobility and deployability, and increasing reliability. The capability must be readily maintainable, sufficiently durable, quiet, and survivable against all types of threats. These requirements also equally apply to energy sources and the means to store these sources, to include fuels. Tactical electric power systems and various energy sources will directly support all field electrical systems, such as C4ISR, fire direction and controls, target acquisition, life support, sustainment, illumination, etc. All these functions are critical to efficient unit operation and mission accomplishment. Tactical electric power and energy sources provide power to enable all information dominance technologies and infrastructure.

(2) System-integrated power management technologies can potentially reduce the overall power needs of consumers. Current P&E consumption rates across the force significantly burden the warfighter and sustainment force. Many proposed FOC depend on significant reductions in P&E consumption. Concurrent improvements are required in tactical electric power distribution, generation, and embedded power management for all systems. This requires optimizing power

source characteristics and performance, such as increased output with operationally significant reductions in fuel needs, weight, size, and maintenance.

(3) Providing bulk fuels and packaged oils/lubricants to the future Modular Force remains a significant mission for the sustainment force. A single fuel forward for ground and aviation systems simplifies sustainment operations. The continued advancements in engineering, materials science, and manufacturing processes results in ground systems with reduced fuel and lubrication requirements. Advanced P&E technologies could significantly reduce requirements for storing large quantities of bulk fuels for ground systems. Continued pursuit is needed for a single, common fluid to replace all system fluids, for example, engine oil, transmission and power steering fluids, and coolants. A common fluid would significantly reduce the logistics management burden of packaged petroleum, oil, and lubricants products.

(4) Fossil fuels will remain the Army's major fuel source well into this century, even though these fuels may be reformed (or otherwise converted) into usable products other than jet or diesel fuels. Continued improvement in system fuel efficiency is critical to achieve a reduction in fuel support equipment and personnel. Reducing fuel consumption for highly mobile systems allows travel over greater distances in the OE. Reducing fuel consumption by 50 percent or greater will yield vast savings in fuel costs and the resources needed to supply fuel, and will also provide the opportunity to use resupply methods not currently operationally efficient due to the volume required. Consequently, continued and accelerated investigation is needed of P&E technologies that show the greatest potential for providing operationally significant advantages to the future Modular Force. These technologies must meet user needs for performance (power quality and output); system efficiency in using or converting energy sources; and reliability and reductions in weight/size. The obvious operational benefits are joined by operations and support cost savings throughout the systems life cycle. The Army must also investigate technologies that show promise in replacing fossil fuels. The selection of an alternative fuel source must consider all fuel requirements in order to avoid situations where multiple types of fuel are required. The single fuel concept is critical to maintaining an agile, adaptive, efficient distribution system in the future. Again, Army efforts must pursue P&E technologies that show the greatest potential for military utility. The application of these technologies must have the likelihood of significantly improving system efficiency and operational effectiveness.

(5) As Land Warrior Systems continue to evolve, the Army will have a greater need for Soldier carried lightweight power sources with higher specific power and/or energy values than today's power sources. The Army must continue to leverage multidiscipline technological advances that improve individual Soldier sustainment. Processes and methodologies normally used for developing weapons platforms apply to the complexities of the Land Warrior System. The Army must continually seek technologies that can produce reliable and rugged miniature power sources for the future Modular Force's Soldier Systems, such as, cooling/heating, communications, target acquisition and individual weapon functions; sensors for surveillance and reconnaissance; assisted breathing, and strength amplification. Soldiers must have the capability to plug into a variety of sources for their P&E needs. Future Modular Force platforms must provide an interface for Soldiers to replenish Soldier System energy storage subsystems.

c. Linkage to AUTL: ART 6.1.3. (Provide Petroleum, Oil, and Lubricants (Class III B/P); ART 6.10.4. (Supply Mobile Electric Power).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain, chapter 5.

4-67. FOC-09-04: Readiness, Reliability, Maintainability, and Commonality for Sustained Operational Tempo

a. Capstone Capabilities. Improve both strategic responsiveness and core warfighting abilities, for example, to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force, through optimized application of individual component, and SOS reliability, for combat and support equipment mission profiles and weapons systems. Achieving leap ahead reliability will greatly support the future Modular Force's charter to decisively conduct the varied missions involved in FSO, anywhere in the world, in any battlefield condition.

b. Narrative.

(1) Current battlefield 'down time' for maintenance renders the most lethal combat systems unacceptably exposed and vulnerable to inferior threat platforms. JFCs must have confidence that all fielded systems will perform the combat mission, without routinely experiencing maintenance problems during the execution phase. Existing vulnerabilities can be mitigated and battlefield effectiveness (such as mission performance) optimized, by embedding improved system of systems reliability into the new generation of combat vehicles and weapon systems. This desired improved reliability effect consists of systems, subsystems, and components that do not fail catastrophically during the applicable mission profile. This empowering capability can be achieved through optimized application of selective mechanical, electrical and electronic redundancy, self-healing technology, and onboard diagnostic/prognostic components, leveraged from commercial technology and manufacturing processes. It can also be achieved by utilizing materials that provide quantum increases in strength, and are non-corrosive and non-erosive. The improved reliability effect is bolstered by leveraging the application of human factors technologies and practices into the analyses and execution of logistics processes, to significantly reduce manpower, operations, and training costs, while increasing responsiveness, flexibility, and agility. Down time can be minimized as well with a secure, pervasive, logistics C2 support infrastructure emphasizing speed, precision, accuracy, visibility, and centralized management from Soldier platform to CONUS through a logistics COP to include:

- Supply distribution and management
- Reachback to industry and knowledge centers
- Passive radio frequency identification tags
- Soldier health status

- Petroleum and fuel supply
- Ability to support a logistics COP, proactive and anticipatory maintenance, munitions, and water.

(2) System Reliability. FCS platforms must maximize the following system (total mission package, including directed government furnished equipment) reliability benchmarks:

- Mean Time Between System Abort. Failures that deadline a platform, result in unsafe operation, or make it non-mission capable.
- Mean Time Between Essential Function Failures. Failure that results in system degradation.
- Mean Time Between System Abort–Mobility. Failures that affect a platform's mobility system, resulting in unsafe operation, or making it noncombat capable.

(a) The established mean time between system abort and mean time between essential function failure values provide sufficient reliability to minimize critical failures during 72-hour high intensity operational periods, providing JFCs acceptable levels of weapon systems availability during mission pulses. The platform crew chief and organic maintenance assets that are able to return ground platforms to operational condition will support inherent platform reliability. The mean time between essential function failure reliability values enables the crew chief and maintainers to return platforms to fully mission capable status during maintenance/logistics pulses. Mean time between system abort mobility enhances FP by maintaining integrity of combat formations, and minimizing exposure and dispersion requirements for crews and maintenance personnel. Reliability requirements ensure that a 95 percent operational availability is maintained over an operational period/pulse. SA (critical failure) events, by definition, deadline a system and require immediate (maintenance) action to return the system to an operational condition. Either the FCS crew chief or combat repair teams organic to the future Modular Force will immediately address these failures. The stated reliability provides compliance with equipment readiness objective(s) while maximizing available combat power and minimizing sustainability demands (repair parts and maintenance resources), and at the same time accommodating future Modular Force structure allocations.

(b) To meet required OPTEMPO, it is expected that future Modular Force combat systems will be developed using ultra-reliable and/or redundant components, and perhaps have onboard spares, in order to enable it to remain operationally effective for the full 3 to 7-day mission period. This will reduce demand, and minimize the maneuver sustainment burden on unit effectiveness, through balanced system reliability, redundancy, and repair, to include embedded diagnostics and prognostics on Soldiers and platforms, as well as modular component design. The inability to meet the stated reliability requirements will result in manpower demands exceeding those currently proposed for the future Modular Force design. Additionally, the inability to meet the stated mean time between system abort requirements may result in excessive, nondeferrable maintenance and increases in manpower demands, while adversely impacting FCS ability to meet mission pulse requirements.

(3) System Maintainability. FCS platforms must be designed to be easily maintained. They should be designed for maximum modular component plug and play capability and with

integrated pit stop-like efficiencies for repairing failed systems, with an ultimate goal of rapid return to combat capability. FCS platforms must achieve the following minimum maintainability benchmarks:

- Maintenance ratio will not exceed 0.05 maintenance man-hours/operating hour.
- At least 80 percent of system unscheduled field maintenance level failures must be repairable at the platform crew chief level.
- Mean time to repair must not exceed 0.5 hours.
- Maximum time to repair must not exceed 0.5 hours for any crew chief task.
- No special tools and minimal external test equipment required for unscheduled field maintenance tasks.
- Each FCS must provide the capability for automated preventive maintenance checks.
- A single scheduled service requirement no more frequently than annually.

(4) All future Modular Force combat systems must be supportable by the emerging Army Two-Level Maintenance System that will be in place at the time of fielding. Two-level maintenance is based on a 'replace forward, repair rear' process (http://www.almc.army.mil/alog/issues/SepOct02/MS838.htm). Only unscheduled field level maintenance will be conducted within the OE by crew chiefs and/or organic combat repair teams. The crew chief/crew or personnel supporting the combat repair team replaces components and line replacement unit or line replacement module in the OE, with on hand spares or replacements ordered through the normal supply system. Unserviceable components are evacuated to and repaired by brigade units or higher echelons (military, government, or contractors) potentially as far back as CONUS. Low-cost, discard upon failure components are preferred. As the maintenance requirements for the digitized force become clearer, and time estimates of workload requirements are available, the sparing percentage should be reviewed in context with the overall maintenance plan.

(5) The future Modular Force maintenance concept will allow for significant forward deployed sustainment footprint reduction from those of current unit; but includes a high reliance on:

- Very high reliability levels.
- Modular, 'plug and play' designs that facilitate ease of maintenance at the lowest levels.
- Embedded diagnostics and prognostics, to include remote interrogation and triage capability.
- A crew chief maintenance concept for both manned and unmanned platforms, that allows field maintenance replaceable components that are part of the crew tasks to be removed and replaced/installed by those tools on board each future combat platform.
- On-board Interactive IETMs.
- A high degree of commonality in components.

(6) Commonality. FCS platforms will enable significant sustainment effectiveness and efficiencies, through commonality in platforms and components, to simplify and reduce sustainment, support multifunctionality, reduce personnel and skills required, and contribute to simplification of deployment. Commonality across formations, in platforms, and components will also contribute to simplification of maintenance and training, and reduce equipment and other resource requirements.

(7) System Readiness. The net result of reliability, maintainability, and commonality must achieve high levels of system readiness. FCS platforms must achieve an operational readiness rate of 95 percent (threshold) and 99 percent (objective). System readiness is determined as the percentage of systems and government furnished equipment available during the rating period. The operational readiness rate is a function of system reliability, and reduction of time to repair through ease of maintenance, redundancy, commonality, and modularity. The ease of maintainability of the system will allow the future Modular Force to achieve high readiness levels, with an austere logistic footprint, while increasing combat power by ensuring systems are operationally ready. Additionally, high operational readiness rates decrease the maintenance burden on the crew chief and mechanics.

c. Linkage to AUTL: ART 6.0 (The Combat Service Support Battlefield Operating System).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain, chapter 5.

4-68. FOC-09-05: Army Health System

a. Capstone Capabilities. Improve both strategic responsiveness, and core warfighting abilities, to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force, by maintaining the health and medical readiness of individual Soldiers and units, in all geographic operational conditions.

(1) The Army Health System. The US Army Center for Health Promotion and Preventive Medicine (USACHPPM) is a component of the U.S. DOD Military Health Systems that is responsible for operational management of the health service support (HSS) and force health protection missions for training, predeployment, deployment, and postdeployment operations. Army health system includes all mission support services performed, provided, or arranged by the U.S. Army Medical Department (AMEDD) to support HSS and force health protection mission requirements for the Army, and as directed for joint, intergovernmental agencies, coalition, and multinational forces.

(2) The Army Health Service is constantly improving in order to provide better and more comprehensive medical care to the Soldier in garrison and in theater. To meet the challenges of medical support, Joint Publication 4-02, Health Service Support, identifies both HSS and force

health protection support requirements. In the latest revision of Field Manual (FM) 3-0, the HSS mission and the force health protection mission were identified as two distinct missions and were placed under two separate warfighting functions. The HSS mission was placed under the warfighting function of sustainment and the FHP mission was placed under the warfighting function of protection..

(3) HSS is defined as all support and services performed, provided, or arranged by the AMEDD to improve, conserve, or restore the mental or physical well-being of personnel in the Army, and as directed in other Services, agencies, and organizations. This includes casualty care, encompassing a number of AMEDD functions; organic and area medical support; hospitalization; the treatment aspects of dental care and behavioral health/neuropsychiatric treatment; clinical laboratory services; and the treatment of CBRN patients; medical evacuation; and medical logistics. FHP is defined as those measures to promote, improve, or conserve the mental and physical well-being of Soldiers. These measures enable a healthy and fit force, prevent injury and illness, and protect the force from health hazards. FHP includes the prevention aspects of a number of AMEDD functions; preventive medicine, including medical surveillance and occupational and environmental health surveillance; veterinary services, including the food inspection and animal care missions, and the prevention of zoonotic diseases transmissible to man; combat/operational stress control prevention; and dental services (preventive dentistry).

b. Narrative.

(1) The Army Health Service emphasizes physical and mental wellness, preparedness, and preventive medicine measures; and is based upon the premise that a healthy and fit force is the necessary precondition for maintaining Soldier readiness. The most important element of any weapon system in the future Modular Force is the Soldier. A Soldier’s health and fitness is a basic requirement for military success across FSOs. The health support goal is to provide optimally fit Soldiers that are able to better withstand the physical, mental, and environmental stressors of any contingency deployment, across FSOs in support of the JFCs. Over the course of a deployment, the opportunities and resources to enhance and maintain Soldier health and effectiveness decrease. This emphasizes the importance of the FHP measures employed before and during deployment in , support of contingency operations.

(2) The geostrategic environment will mandate a viable force projection Army. Frequent and lengthy major deployments have and will become the rule. Physically fit Soldiers must be physiologically adaptable, and capable of serving for relatively long periods of time in austere and harsh environments, with little or no acclimation preparation. To fulfill full spectrum mission requirements, Soldiers must be able to operate under a variety of different OEs, exposing them to numerous health hazards.

(3) Deployed Soldiers must be protected against major endemic diseases, the increasing threat of occupational and environmental health threats, and full spectrum CBRN agents. Given the intensity of future FSO, the Soldier must be able to adapt to highly stressful OEs, with increased mental and physical demands. This capability necessitates greater institutional emphasis on preventive medical strategies that promote overall Soldier health and wellness as

the foundation of operational readiness, and precursor to contingency deployment. All future Modular Force Soldiers will benefit from this specific capability directed at early interventions (before deployment) to ensure immediate and long-term health and the ability to withstand both physical and mental health hazards.

(4) New products and technologies will be developed or co-developed by the biotechnology and biomedical engineering communities that will include:

- Multivariate databases containing animal and human physiological, immunological, biochemical, and performance information.
- Medium to large scale realtime analysis and modeling.
- Miniaturization and microminiaturization of diverse sensors and effectors/actuators, mechanical and chemical.
- Bioengineered materials.
- High efficiency medical and personal wellness training, supported by diverse hardware and software teaching systems that provide immediate, detailed feedback [plus high speed communications and Internet connections.

(5) Changes to the Soldiers rations include the following:

- Provide additional nutritional value.
- Reduce the weight.
- Provide essential nourishment.
- Nutritional value/nourishment will contribute to an increase in mental awareness and physical stamina.

c. Linkage to AUTL: ART 6.0 (The Combat Service Support Battlefield Operating System); ART 6.1.8 (Provide Medical Material and Repair Parts (Class VIII)); ART 6.4 (Provide Sustainment Support); ART 6.5 (Provide Force Health Protection in a Global Environment).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain, chapter 5, Force Health Protection Support.

4-69. FOC-09-06: Health Services Support

a. Capstone Capabilities. Improve both strategic responsiveness and core warfighting abilities, to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force, by improvements in combat lifesaving diagnosis, treatment, and stabilization of casualties for further evacuation to the next level of care.

b. Narrative.

(1) HSS casualty care management and evacuation provides continuous essential care, to treat casualties and return them to duty, or stabilize them in theater and evacuate them for the appropriate level of care. Treatment begins with the self-aid/buddy aid which will be critical in the initial early treatment of casualties. Self-aid/buddy aid is followed by the integral adjunct of enhanced first aid by a combat lifesaver. The trauma specialist (91W) will provide additional medical treatment, stabilize casualties, and coordinate evacuation, supporting basic prevention and caring, for both disease and nonbattle injury (DNBI) and combat casualties, as quickly and as close to the point of injury as possible. First aid begins with the self-aid/buddy aid which will be critical in the initial early care of casualties, and forward resuscitative care designed to triage, resuscitate, and prepare casualties for evacuation to theater hospitals. Normally the first medical person to see a casualty is the combat medic (68W), who provides emergency medical treatment and stabilization of patients as close to the point of injury as possible and coordinates evacuation. The combat medic also supports basic prevention and caring for both DNBI and combat casualties. Physicians, physician assistants, combat medics, and health care specialists with medical treatment facilities located with movement and maneuver, fires, and sustainment units also provides emergency medical treatment and advances trauma management designed to initiate life and limb saving essential care, and forward resuscitative care designed to triage, resuscitate, and prepare casualties for evacuation to next level of care.

(2) The preponderance of Soldiers will die in combat within minutes of experiencing penetrating trauma and hemorrhage. Prompt localization, resuscitation, and stabilization, followed by expedient medical evacuation of patients, are essential in order to save lives. While the importance of these tenets of combat casualty care management has been demonstrated throughout the history of warfare, the nature and character of future FSO will place even greater demands upon this aspect of warfighter support. Casualties will be more dispersed; thus the length of time required for evacuation will potentially increase. As the premier force projection Army, U.S. Forces must deploy worldwide, and conduct dominant FSO, day and night, in all environments, without degradation of this critical element of battlefield support. Inversely, these services must be provided without disrupting operational and tactical momentum.

(3) Distributed operations, as envisioned in the next major theater war, will require warfighting support of all types, to be conducted increasingly forward of present day norms. Chief among these is the requirement for the AMEDD to effectively provide individual relief, while clearing the battlefield of all casualties, thus permitting the warfighter to continue the battle unencumbered. Responsive far-forward resuscitation, stabilization, and timely/rapid evacuation of casualties with major trauma, not only affect the availability of the fighting force, but also impact the morale and readiness of the unit at large. Capabilities are required that improve diagnosis, treatment, and stabilization of casualties, for further evacuation to the next level of care, utilizing technology to enhance forward treatment to greatly improve casualty survivability. These capabilities must also significantly improve the ability of the Soldier to perform self-aid/buddy aid and combat lifesaver enhanced first aid, in the more dispersed and non-linear OE.

(4) Future Modular Force Soldiers must be trained and equipped to address the operational and tactically medical challenges associated with noncontiguous operations. While specially trained medical personnel will be present on the battlefield, the Soldier will serve as the

'first responder', as opposed to the unit combat medic. As a 'first responder', all Soldiers must be trained as combat lifesavers, and be capable of clearing airways, stopping bleeding, and performing cardiopulmonary resuscitation. Additionally, the Soldier must be capable of preventing shock, protecting the wound or injured area, and evacuation (under a variety of conditions and environments) for further treatment.

(5) Future Soldiers will utilize unmanned vehicles, robotics, and advanced standoff equipment to recover wounded and injured Soldiers from high-risk areas, with minimal exposure. These systems will facilitate immediate evacuation and transport, under even the harshest combat or environmental hazard conditions.

(6) Casualty collection points will be equipped with state-of-the-art treatment equipment. The ability to provide advanced battlefield diagnosis, initial treatment, and rapidly evacuate Soldiers to/from the collection point, will greatly improve survivability. Computer based monitoring systems will allow combat medical personnel to evaluate the patient, before reaching the rearward care facility. It will also be possible for a Soldier to be evacuated directly from the battlefield, to advanced treatment facilities outside the theater of operations.

(7) The future Modular Force can improve casualty survivability through responsive medical resuscitation, stabilization, and timely evacuation. Critical challenges are self-aid and buddy aid, casualty acquisition, casualty assessment, casualty stabilization, status reporting, and evacuation. Key technologies to facilitate these capabilities include:

(a) Physiological sensors and databases. Develop physiological sensors, to gather/collect data on the Soldier's health status, organized and reduced through algorithms and knowledge management, and used to generate operationally relevant performance and health status indicators, and to refine predictive models for use by JFCs and medical personnel. These sensors will ultimately be integrated into a noninvasive, wear-and-forget warfighter physiological status monitor. These include multivariate databases containing:

- Animal and human physiological, immunological, biochemical, and performance information.
- Medium- to large-scale real time analysis and modeling.
- Miniaturization and microminiaturization of diverse sensors and effectors/actuators mechanical and chemical.
- Bioengineered materials.
- Real time medical, occupational, and environmental surveillance and monitoring.
- High efficiency medical and personal wellness training.
- Diverse hardware and software teaching systems that provide immediate, detailed feedback.
- High-speed communications and Internet connections support these databases.

(b) Recognize casualty. This primary requirement involves both locating the Soldiers in three-dimensional space, and determining whether they are well, injured, or dead. In addition to non-medical communication and locator technologies, this requirement involves capturing,

analyzing, and interpreting signals from biological sensors on, in, or near the Soldier. This complex detection task requires most of the technologies noted in the preceding paragraph.

(c) Assess casualty. Although partly overlapping the casualty identification requirement, this element more specifically concerns assistance to the on-site medic, by providing significantly more detailed information on casualty status. The ability to diagnose the injury or illness as a result of a CBRN exposure is paramount to effective treatment. This requires real time detection and monitoring capabilities throughout the OE. Relevant technologies will include high fidelity, noninvasive imaging; employing diverse energy spectra to identify internal trauma; micro analytic techniques to assess metabolic parameters in blood and tissue; plus noninvasive instrumentation, to assess internal pressure in the brain, chest, and abdomen. Medical personnel must be able to provide triage, and utilize training and decision support tools to identify full spectrum CBRN agent effects and recommend appropriate treatment.

(d) Stabilize casualty. Although potentially addressing multiple issues when stabilizing severely injured casualties, the crucial concerns are the management of hemorrhage, replacement of fluids, replacement of blood components, and stabilization of vital functions. The critical technologies listed below include drug and protein analysis and synthesis, materials science, and the biomedical engineering. To provide optimum HSS required products are:

- Naturally enhanced and synthetic materials to promote blood clotting, whether externally applied or injected into the body.
- Intelligent tourniquets to limit blood loss, without irreparable tissue damage.
- Noninvasive cauterization of small blood vessels with focally applied energy.
- Liquid compounds to restore fluid and electrolyte balance, including some that may eliminate the need to transfuse with human blood.
- Automated and semi-automated servo-controlled sensor/actuator systems for life support.
- Injectable drugs, to limit and stop secondary metabolic damage to tissue.
- Improved drugs to manage pain.
- Lyophilized and viral inactivated blood products that carry oxygen and promote clotting to injured area.
- Advanced storage systems and transportation devices to ensure temperature integrity and in-transit visibility.

(e) Evacuate casualty. The time sensitive nature of treating critically injured Soldiers requires an immediately responsive medical system that includes medical evacuation and emergency Class VIII (medical material) resupply on demand. FHP must be immediate and continuous in nature. Patients will be evacuated immediately from the battlefield to more definitive care. Medical evacuation platforms must have the ability to provide “en route care,” through such enablers as oxygen generation systems, physiologic monitoring, networked medical information interfaces, and other life support technologies. Other key capabilities for medical evacuation include:

- Platforms capable of carrying dismounted Soldiers must have the ability to conduct casualty evacuation activities which include the ability to carry litter patients for

extraction, transportation of severely injured casualties, and execution of in-stride casualty transfer to future combat medical vehicles.

- All manned future combat platforms, capable of transporting and extracting casualties, will have the ability of performing networked medical information interface support between system personnel, combat lifesavers, combat medics, unit medical elements, and higher-level medical treatment facilities.
- Future combat medical vehicle capabilities must enable the ability to treat on the move, hold, and transport casualties until evacuation or extraction.

(8) Force monitoring will aid medical personnel in providing the JFC with relevant, decision point medical information, thereby permitting timely assessments and decisions regarding force preparedness, and employment of reserve forces.

c. Linkage to AUTL: ART 6.1.8 (Provide Medical Material and Repair Parts (Class VIII)); ART 6.5 (Provide Force Health Protection in a Global Environment); ART 6.5.4 (Provide Casualty Prevention); ART 6.5.2 (Provide Medical Evacuation); ART 6.5.3 (Provide Medical Logistics).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain, chapter 5, Force Health Protection Support.

4-70. FOC-09-07: Army Health System Casualty Prevention

a. Capstone Capabilities. Improve both strategic responsiveness and core warfighting abilities, to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force, through the prevention of casualties. Advanced medical, occupational, and environmental surveillance will allow real time detection of CBRN health hazards. This will minimize health impacts by exploiting preventive measure and controls, and by providing forward interim essential diagnosis and treatment of patients prior to strategic evacuation, as well as other critical health care support services in theater.

b. Narrative.

(1) Casualty prevention concentrates on those measures that prevent or reduce the incidence of DNBI. Casualty prevention is the most significant medical contributions to the warfighter. Soldiers who do not become casualties remain part of the fighting force; they do not require treatment, evacuation, or hospitalization; thereby reducing the medical footprint and logistic requirements in theater. Prevention of DNBI allows medical assets to support Soldiers wounded by battle injury. DNBI remain the largest contributor to casualty production on the battlefield and include the following factors: endemic and epidemic diseases, occupational and environmental health threats to include chemical hazards (such as TIM), physical hazards, industrial pollutants, as well as low-level chemical or other CBRN agents, toxic or poisonous

flora and fauna, and physiological and physical stressors. The main thrust is directed at preventing casualties, reducing morbidity and mortality, and ensuring Soldier health across the FSOs.

(2) Combat/operational stress reactions also can comprise large number of casualties in intense combat, most of who return to duty quickly, if treated properly and expediently in the unit area. The key to reducing combat stress is to utilize proactive and preventive techniques employed by forward positioned combat/operational stress control personnel. The threat of CBRN health hazards adds an extra dimension of stress. Uncontrolled stress also endangers the mission, through impaired duty performance, and by stimulating misconduct that requires disciplinary action.

(3) Opportunities and resources to maintain Soldier health and effectiveness nearly always decrease as deployments progress, therefore it is critical to provide efficient, effective prevention control measures to reduce the health risk posed by health threat hazards in theater. Proper health risk assessment is important to implementing any control measure, since control measures often have a direct impact on the mission. The main thrust is directed at preventing casualties, reducing morbidity and mortality, and ensuring Soldier health, while successfully completing the mission objectives. The following are key elements to preventing casualties:

(a) Predeployment:

- Rapid health diagnostic tests, to screen Soldiers for exiting and potential medical conditions.
- Rapidly assess and document Soldiers health status, to establish baseline prior to deployment.
- Administer vaccines and chemoprophylaxis protecting Soldiers from full spectrum of medical threat.
- Provide Personnel Protective Equipment that will significantly reduce exposure to health threat.
- Comprehensive training in protective measures to minimize health threat.

(b) During Deployment:

- Remote sensors will rapidly detect presence of CBRN hazard at all roles.
- Role 1 medical treatment facility (MTF) provides primary health care, specialized first aid, triage, resuscitation and stabilization. Normally included within the basic Role 1 capabilities are routine sick call and the management of minor sick and injured personnel for immediate return to duty, as well as casualty collection from the point of wounding and preparation of casualties for evacuation to the rear. Role 1 is the lowest level where at least one medically qualified doctor is available.
- A Role 2 MTF is a structure that is capable of the reception and triage of casualties, as well as the capacity to perform resuscitation and treatment of shock to a higher level than Role 1. It usually includes damage control surgery and a limited holding facility for the short-term holding of casualties until they can be returned to duty or evacuated. The deployment of Role 2 MTFs is mission-dependent and some Role 2

MTFs are structured with improved clinical capability. These Role 2 MTFs are classified into Role 2 light maneuver and Role 2 enhanced.

- Two light maneuver MTFs are light, highly mobile MTFs designed to support land maneuver formations (normally brigade level). A Role 2 light maneuver MTF is able to conduct advanced resuscitation procedures up to damage control surgery. It will always evacuate its post surgical cases to Role 3 (or Role 2 enhanced for stabilization and possible primary surgery before evacuation to Role 4.
- Two enhanced MTFs are effectively small field hospitals. They provide basic secondary health care, built around primary surgery, intensive care unit, and nursed beds. A Role 2 enhanced MTF is able to stabilize postsurgical cases for evacuation to Role 4 without the requirement to first route them through a higher MTF.

- Role 3 MTFs are designed to provide theater secondary health care within the restrictions of the theater holding policy. Role 3 medical support is deployed hospitalization and the elements required to support it. It includes a variety of mission-tailored clinical specialties including primary surgery and appropriate diagnostic support.
- A Role 4 MTF provides the full spectrum of definitive medical care that cannot be deployed to theater or is too time consuming to be conducted in theater. It typically includes definitive care specialists, surgical and medical procedures, reconstructive surgery, and rehabilitation.

(c) Redeployment:

- Rapid diagnostic tests to screen Soldiers for potential hazard exposure or medical conditions.
- Automated medical records system to all potential health care providers documenting hazard exposure or illness.
- Chemoprophylaxis or treatment to mitigate health effects after hazard exposure.
- Automated OEHs tracking system to minimize Soldier's risk of additional exposures increasing health risk.

(d) Postdeployment:

- Treatment for Soldiers who develop problems (sometimes several months/years after deployment).
- Post-deployment mental health screenings.
- Significant support is required by S&T organizations with objectives under development to attain this capability such as, the ability to provide pervasive, extended range, intertheater and intratheater global BLOS communications relay capability and broadcast services between noncontiguous forces at the halt, at the quick halt and on the move in all operational environments and conditions.

(4) Cutting broadly across the many challenges will be a set of products and technologies developed or codeveloped by the engineering community. These include:

- Multivariate databases containing animal and human physiological, immunological, biochemical, and performance information.
- Medium- to large-scale real time analysis and modeling.
- Miniaturization and microminiaturization of diverse sensors and effectors/actuators, mechanical and chemical.
- Bioengineered materials.
- High-efficiency medical and personal wellness training, supported by diverse hardware and software teaching systems that provide immediate, detailed feedback; plus high-speed communications and Internet connections.

(5) Key technologies to facilitate these capabilities include:

(a) Integration of all various individual Soldier medically oriented, advanced technologies, and routing the data gathering, calculation, decisionmaking, and communication through the Soldier's individual computer, common to all twenty-first century ground mounted and air Soldiers. Development of communications-enabled advanced technologies (both sensor and microprocessing) to support triage, diagnosis, treatment, casualty monitoring, and patient status awareness during en route care/evacuation.

(b) Biomolecular threats include the small or large molecules or complexes that enter the body and interact with cells and tissues, to cause injury or death. Primary examples are chemical and biological warfare agents, infectious diseases, and toxic environmental contaminants. The ability to rapidly detect these hazards, and implement protective measures, will significantly reduce DNBI. Critical medical products for successfully addressing these threats include vaccines and biomolecular scavengers, pre-engagement to enhance the body's internal defense mechanisms, and drugs to treat casualties. Barrier chemicals and repellants will be used on or near the body to deflect some kinds of agents and infections. A wide variety of individual and local area medical diagnostics will be used to rapidly recognize and identify biomolecular threats. Requisite technologies include molecular and receptor structural analysis; genetic, binding, immunological, and other assays; chemical synthesis and high throughput drug screening; pharmacokinetic modeling; genetic and protein engineering; protein synthesis; small- and large-scale drug and vaccine production; animal and human safety and efficacy testing; molecular reference libraries; plus the analytic and communications technologies noted above. Develop diagnostic assays and reagents that will provide rapid laboratory diagnosis for broad array of biological threats and infectious diseases, using common diagnostic technologies. Identify technologies that allow for forward and confirmatory laboratory diagnosis, regardless of the agent or hazard.

(c) Traumatic energy threats include the numerous, diverse ways that large amounts of energy are deposited in the body, usually during a short time span, causing small-and large-scale tissue damage leading to injury or death. Primary examples include blunt or penetrating trauma, blast, burn, heat, cold, pressure, noise, vibration, plus laser and microwave radiation. The ability to rapidly detect these hazards, and implement protective measures, will significantly reduce DNBI. Critical products for addressing these threats include extensive animal and human exposure data upon which safe equipment, training, and doctrine can be developed. Individual and local area sensors will provide both early threat alerts, and remote casualty identification. A

variety of chemical and other biological products will include some that can be administered before injury, to potentially limit later damage. Required technologies include remote physiological instrumentation, generation and characterization of complex energy fields/waves, light and electron microscopic tissue pathology, biomedical risk assessment, plus most of the protein and drug analytic and development techniques mentioned above. Stress threats include those performance-degrading challenges to the 'human dimension' that affect the body diffusely, working through poorly understood mechanisms that often involve the nervous system. Operational stress reflects degraded physical and mental performance from sleep deprivation and schedule irregularity, metabolic depletion from extended and strenuous operations, boredom, fear, etc. Training and behavior stress may result in less than optimal performance, possibly reflecting the inadequacy of formal instruction, or the maladaptive elements in individual behavior. Unit, leader, and family stress concerns performance decrements related to the demands of group participation. Critical medical products for addressing these threats include recommendations for health promoting personal behavior; performance-sustaining ration supplements; injury-reducing training regimens; optimal sleep-wake schedules; performance-sustaining drugs; evolving recommendations for in theater stress management teams; plus individual, unit, and family stress diagnostics, based partly on medical data.

(d) Beyond those noted previously, requisite technologies include behavioral epidemiology, brain and muscle metabolic imaging, individual Soldier status monitoring, plus cognitive and psychomotor performance assessment technologies. Ability to take advantage of space and near space platforms, links, and processors to enable the fusion, sharing, push, and pull to update information from a wide variety of sensors and sources in all domains, access that information simultaneously from multiple noncontiguous locations in order to provide timely, actionable, and relevant information in support of the planning, execution, and assessment operations of the JF and JFCs. Rapidly developing biomedical technologies, teamed with parallel developments in computer, engineering, and materials sciences, will significantly transform the Army's capacity to establish and maintain Soldiers' health, as they operate in increasingly diverse and dangerous environments.

c. Linkage to AUTL: ART 6.5 (Provide Force Health Protection in a Global Environment).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain, chapter 5, Force Health Protection Support.

4-71. FOC-09-08: Soldier Support

a. Capstone Capabilities. Improve both strategic responsiveness and core warfighting abilities to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force, by enhancing the individual and collective Soldiers' operational quality of life, directly impacting their confidence, motivation, and fundamental ability to accomplish the

mission. Provide responsive, quality support, in both the combat and noncombat areas of general administration (military pay, mail, legal), and other services. Examples include: personnel support and services, religious support, individual protection and survivability, Soldier sustainment, equipment endurance and functionality, and morale and welfare operations adaptable to all echelons and environments within the OE.

b. Narrative. Sustaining the warfighter is the paramount maneuver sustainment mission. The pursuit of mature leap-ahead technologies, advanced warfighting concepts, and increased vulnerability in the OE has increased overall Soldier support demands. Soldier capabilities are evolving over time, and keeping pace with the rapid advance of Soldier systems technology. Increased power density demand is the result of increased Soldier systems capabilities; from proficiency with global positioning location and tracking equipment, to an array of thermal imaging devices, laser range finders and pointers, image intensifiers, target designators, and sophisticated communications equipment. Emerging subordinate concepts responding to self-sustainment challenges in rapid deployment, early entry, minimized footprint, asymmetric warfare, non-linear three-dimensional OE, and urban and complex terrain will dictate new, more efficient strategies in power and endurance management, and production, storage, and distribution of even basic human sustainment items such as water, food, and shelter. The advancement and proliferation of threat sensors and weapons have resulted in increased vulnerability of all Soldiers, even when sheltered, resulting from thermal, radar, visual, electronic, and acoustic emissions signatures. Efficient maneuver sustainment and overall support of the warfighter are paramount maneuver sustainment missions. The application of advanced technology in power, distribution, Soldier sustainment, ammunition, and C4I (all integral subsets of Soldier support) will allow the warfighting Soldier to keep pace with emerging state-of-the-art combat systems.

c. Linkage AUTL: ART 6.4 (Provide Sustainment Support); ART 6.5.4 (Provide Casualty Prevention); ART 6.6 (Provide Human Resource Support); ART 6.7 (Provide Finance and Resource Management Services); ART 6.8 (Provide Religious Support); ART 7.7 (Support the Commander's Leadership Responsibilities for Morale, Welfare, and Discipline).

d. Linkage UJTL: SN 4 (Provide Sustainment), ST 4.2 (Coordinate Support for Forces in Theater), OP 4 (Provide Operational Logistics and Personnel Support).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain.

4-72. FOC-09-09: Global Military Religious Support

a. Capstone Capabilities. U.S. Army Chaplains ensure the free exercise of religion for America’s Army through a spiritually based professional military chaplaincy. The two core religious support capabilities are professional military religious support and principal religious advisor to the command. The Unit Ministry Team (UMT) integrates these capabilities within the military religious support environment at all levels beginning with the Soldier. The UMT maintains a religious support command, coordination, and communication center at all times within the AOs. The functioning of these core capabilities inextricably weaves together the unique military religious support skills of the UMT.

b. Narrative.

(1) In the future Modular Force, religious support will reflect an asymmetric capability that is modular, scalable, and flexible for prompt, sustained spiritual care of Soldiers. UMTs deliver timely religious support to each future Modular Force warrior, when and where each individual needs it, and in the form that supports his or her free exercise of religion requirements. The very core of the religious support environment is the Soldier. Chaplaincy in the future Modular Force creatively integrates sophisticated technologies to enhance and extend religious support to the Soldier.

(2) The chaplaincy will require equipment and systems that enable the UMT to perform and provide personal military religious support to the future Modular Force. It is critical that the UMT be resourced at all levels with the current and future Modular Force. The chaplaincy will manage the Soldiers' religious support environment through professional, spiritually based, and net-centric technological systems. The UMT will require the ability to deliver requested religious support to the Soldier.

c. Linkage to AUTL: ART 6.8 (Provide Religious Support); ART 6.8.1 (Conduct Religious Services); ART 6.8.2 (Provide Religious Care and Counseling); ART 6.8.3 (Advise on Religious, Moral, and Ethical Issues); ART 6.8.4 (Conduct Religious Support Activity Training)

d. Linkage to UJTL: SN 4.3.2 (Coordinate Defense-Wide Religious Support); ST 4.2.5 (Provide Religious Ministry Support within Theater); OP 4.4.6 (Provide Religious Ministry Support in the Joint Operations Area).

e. Linkage to Concepts: TRADOC Pam 525-4-1, Sustain.

Section X - Training, Leader Development and Education

4-73. Training, Leader Development and Education Demands

Future Modular Force Soldiers and leaders must be multifunctional, and capable of fighting and winning decisively, as part of a JF, on the full spectrum battlefields of the future. The demands of future conflict will continue to place great responsibility on future Army leaders at all levels, requiring mature judgment even while they are still gaining experience. Future battle will also require leaders who can operate with mission command in an environment of rapidly changing operational conditions, confronting a wide variety of threats. Future leaders must possess a "joint and expeditionary mindset," accept change as a routine condition, and acquire proficiency in the use of a wide range of new technologies, particularly within the information arena. Army leaders will also need JIM education and experience earlier in their careers than has been the norm in the past. Training capabilities will enable operators, maintainers, unit leaders, and staff planners to be trained in SOS functions, by leveraging networked, embedded, virtual, constructive, and live training modes anywhere, anytime. Training leader development and education regimens will develop thinking, confident, versatile, adaptive, and seasoned leaders.

4-74. FOC Areas
The FOCs identified for training, in order to fulfill the vision articulated in joint and Army concepts fall into the following areas:

- Leadership training and education.
- Accessible training.
- Realistic training.
- Responsive training development and delivery.
- Training for JIM operations.
- Managing unit performance.
- Providing universal training support.

4-75. Joint/Army Concept Linkage

a. Training is at the very core of the capabilities envisioned in all joint and Army warfighting concepts. Commanders determine readiness based on training. JTF staffs must be trained on the capabilities of the different Services to effectively plan and execute joint operations.

b. Successful execution of Army concepts results from quality training and leader development. The superior performance of Soldiers and units in recent joint military operations can be directly linked to effective training of leaders and Soldiers, collectively and individually.

4-76. Desired Training, Leader Development, and Education Capabilities

a. Future Modular Force units will continue to train in the Army training centers and schools, at home station, at Combat Training Centers (CTCs), and during operational deployments. The centers and schools will develop the foundation for Army doctrine, initial military training, and professional military education based on timely input from units in the OE. The major difference from today will be the pervasive nature of technology that will make training more realistic and distributive. Breakthroughs in behavioral science and learning technologies will enable acceleration in the training and development of leaders and Soldiers. The accessibility of training to Soldiers anywhere, anytime will be improved through many means. For example, electronic repositories may enable rapid, on demand access to tactics, techniques, and procedures publications, training support packages, and other training support materials. The classrooms will be both real and virtual, providing new connectivity that ports the institutional classroom to the location of Soldiers and units. Links to the U.S. Army Center for Army Lessons Learned will permit students to obtain the lessons of the CTCs. Embedded training capabilities will provide connectivity to enable training delivery from the institution directly to the platform.

(1) The objective of unit training in the future Modular Force remains combat readiness. JFCs will continue to employ proven training principles embedded in the training doctrine manuals FM 7-0 and FM 7-1. Training will be based on mission essential tasks. Unit training will continue to be standards based, providing Soldiers and leaders relevant, realistic training environments for training across the FSOs. This training will be conducted to the same high

standards at home station, at the CTCs, and during deployments. Army institutions will seamlessly support units throughout this training. Meeting these requirements will require an integrated and responsive training development system, enabled by an integrated training support system to links Soldiers and units to the centers, schools, and the CTCs through the GIG. Finally, new technologies will streamline unit training management, making it less time consuming and less resource intensive.

(2) Self-development will remain one of the pillars of training. Each Soldier and leader in the future Modular Force will bear greater responsibility for his or her own individual development. The scope of joint professional military education must expand to encompass more leaders from each of the Services, expand interagency and multinational participation, and address the entire spectrum of conflict. Soldiers and leaders will be empowered with technology and utilize new training strategies to maintain individual readiness and manage their training needs. Artificial intelligence expert mentors and coaches will enhance and enrich Soldier and leader experiences by guiding them through learning experiences.

(3) Training is closely related to human dimension due to the shared interest in "trainability," and ensuring that human performance parameters are prime considerations in new equipment design. Common ground between training and battle command are the complex cognitive skills required to train Soldiers for battle command. In addition, training is a very horizontal component of the FOCs and extends into each of the individual FOCs, all of which have Soldier and leader training dimensions. The FOCs required to achieve the joint and Army vision for training concepts are:

- Leadership training and education.
- Accessible training.
- Realistic training.
- Responsive training development and delivery.
- Training for JIM operations.
- Managing unit performance.
- Providing universal training support.

b. Training Soldiers to high standards is essential for the future Modular Force to maintain the high level of readiness required. Battle-focused training on combat and noncombat tasks prepares Soldiers, units, and leaders to deploy, fight, and win.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

4-77. FOC-10-01: Leadership Training and Education

a. Capstone Capabilities.

(1) The Army must provide a relevant and effective learning system to enable leaders to be trained and educated to meet the challenges of tomorrow's contemporary OE and adapt to the constancy of change. To succeed in this environment, future leaders must possess: mature judgment; awareness of their own strengths and weaknesses, excellent interpersonal, social and cultural skills; the ability to train effective teams; a wide range of kinetic and nonkinetic skills; and above all, be adaptive and agile. Leaders must be trained to do more and think more incisively, earlier in their careers. To fill these challenging requirements the leader training and education system must identify and employ the most innovative, effective and efficient learning models and strategies possible and enable every leader to become an expert learner capable of accelerated learning and personal mastery of core competencies.

(2) Leadership will remain the essential dynamic in the application of combat power, and significant changes in the strategic environment will have far reaching implications for the Army's leader training and education system. This system must prepare adaptive thinking and flexible officers required to lead effectively during FSO. Leaders at all levels must possess the skills necessary to work effectively within culturally diverse environments, make decisions, adapt readily, and respond appropriately in complex and dynamic situations. The science of learning will provide new strategies for accelerating leader skill development in a meaningful, structured, life-long learning process to extend and enhance learning throughout leaders' careers. All pillars of the Army's leader training and education process will be oriented on preparing:

- Leaders who excel in the human dimension of leadership.
- Leaders who are adaptive.
- Leaders who can rapidly develop and sustain effective teams.
- Leaders who are more highly skilled, earlier in their careers.
- Leaders who possess both tactical and technical expertise across the full spectrum of operations.
- Leaders who can competently employ a wide range of new information technologies and data systems.
- Leaders who are committed to sustaining their skills throughout their careers.

b. Narrative.

(1) First and foremost, future leaders must excel in the human interaction skills required for leadership. Interpersonal, social, and cultural skills, including expertise in group dynamics, will play an increasingly important role in commissioned and noncommissioned officer success and Army combat readiness. A leader's human dimension skills will largely determine his or her ability to foster unit cohesion, mentor Soldiers, work effectively with persons ranging widely in background, personality, and work style, and lead successfully when deployed to foreign countries. In the OE, leaders must possess the essential social, cultural, and interpersonal knowledge and skills needed to understand, communicate, and coordinate effectively with diverse groups of people including joint, coalition, and interagency personnel, U.S and foreign

civilians of all walks of life, particularly the media. Future leaders must understand the impact of the cultural dimension on the OE. Trends of population growth, urbanization, and globalization all contribute to the likelihood that future leaders will be asked to contribute to, and in many cases lead, the resolution of the conflict that sometimes arises when different cultures interact. The leadership training and education system must identify those interpersonal, social, and cultural skills and behaviors that relate most closely to Army leader performance, accelerate their initial learning, and enhance their development through life-long learning.

(2) Adaptability (the ability to apply critical and creative thinking to change strategy or behavior during actual (or anticipated) altered situations) will be integral to effective Army leadership, at increasingly junior levels, as long as the Army continues to operate in unstable, diverse, and unpredictable environments. Adaptable leaders must possess higher order cognitive skills, the ability to rapidly synthesize information and make intuitive assessments of situations, the ability to rapidly conceptualize the COA, the ability to maintain SA on the move, and the ability to transition smoothly from kinetic to nonkinetic events within a rapidly changing spectrum of operations. While the continuing importance of leader adaptability is a certainty, training leaders to be adaptable will continue to be a challenge. Due to the differences among leaders and their jobs, and the infinite numbers and types of situations where adaptive behavior is required, adaptability training procedures must be flexible, and inculcate, in leaders at all levels, a generic capacity for adaptability. The key to generic leader adaptability will be teaching leaders “how to learn” (that is how to assess situations under different circumstances). Training and educational techniques must focus on the development of conceptual skills required for learning, and provide repeated practice of those skills. The leader training and education system must also continue to identify and employ techniques for accelerating growth of adaptability based on an understanding of when, where, and how much adaptability-oriented training is needed by leaders at different levels.

(3) Future leaders must excel in their ability to build adaptive, cohesive, and high performing teams, rapidly. However, the geographic space for practicing leadership continues to expand from a human scale that facilitates face-to-face interpersonal contact, to one in which the information rich and technically charged environment will typically create physical remoteness. Since team members may often be geographically distributed there will be a heightened need for shared conceptualization of the JFC’s intent and teamwork built on trust. Information age communications methods (teleconferencing, instant messaging, e-mail, ‘texting,’) will become the norm for interactions among team members and between leaders and their teams. Teams and task forces will form and operate without offering opportunities for face-to-face encounters between leaders and subordinates. Leaders must learn the principles of effective leadership at a distance and understand the roles and impacts of various communication media in building effective teams. Teams will not be able to rely as much on standard operating procedures and predetermined ways of coordinating tasks as in the past, because of the dynamic environment. Therefore, leaders must develop adaptability in their teams by encouraging and rewarding adaptive behavior and by setting expectations for adaptive performance by team members. The leader training and education system must train leaders to understand the influences they have on team processes and how they can best contribute to the development of adaptive and cohesive teams.

(4) Future leaders at all levels must be ready to assume leadership positions equipped with an understanding of FSOs, capable of being effective in any environment, and able to quickly transition from combat to noncombat roles. In the years since 9/11 junior leaders, both noncommissioned officers and officers, have found themselves increasingly responsible for planning and executing missions that had been handled at one or more echelons above them in the past. Company level leaders will regularly coordinate plans and activities with local or national civil leaders, and make decisions that may have strategic impacts. While having expanded their scope of responsibilities, junior leaders will continue to plan small scale operations. Preparing young leaders to assume this range of responsibilities will require a shortened training and leader development timeline. To sustain and enhance skills, leaders must learn skills earlier in their careers and be devoted to continuous learning. This will require an integrated training and education process, extending from the institution, to home station, to deployment, that enables future leaders to gain, reinforce, sustain, advance, and accelerate learning of essential leadership and battle command skills, when and where needed. In addition to compressed learning of tactics and technical proficiency, training system tools, techniques, and learner centered models must prepare leaders early to master the transition from kinetic to nonkinetic warfare and back again, and from Army to JIM operations.

(5) Future Modular Force leaders must be exposed to the range of operational experiences, as well as having the tactical and technical expertise, to lead a force optimized for the full ROMO, including humanitarian assistance, peacekeeping, peace enforcement, and low or high intensity conflict, as part of JIM operations. Stability and reconstruction operations will place a higher premium on an evolving set of conceptual skills such as negotiation, conflict resolution, multinational cultural awareness and influence, multitasking, employing indirect/nonlethal effects, dealing with ambiguity, ethical reasoning, dealing with corrupt/irrational/desperate agents, countering anti-U.S. propaganda, violation of ROE, and retaliation to terrorist acts. These skills must be integrated into the leader training and education system based on a thorough understanding of how, when, and where these skills can best be trained and sustained during a leader's career.

(6) Future Modular Force leaders also must competently employ a wide range of new information technologies and data systems in a networked environment, where leaders must be prepared to operate and exploit network enabling capabilities. The Army will employ a single, networked, integrated C2 systems and ISR architecture that will link JIM forces, and the most typical type of communication will be digital. Leaders must be provided educational and training opportunities that broaden their understanding of leadership and battle command in the net-centric strategic, operational, and tactical environments. In addition, to providing effective training of digital and network collaboration skills to support this capability, cognitive decision support, and planning aids will be required. This training will help commanders build cognitive endurance and avoid cognitive overload, ensuring the increased availability of information is efficiently processed in real time, understood, and disseminated, to maintain dominant SU.

(7) Future leaders, and in deed, all Soldiers, will need to play an increasingly important role in their own training and development throughout their careers. FM 6-22 defines life-long learning as the individual's lifelong choice to actively and overtly pursue knowledge, the comprehension of ideas, and the expansion of depth in any area in order to progress beyond a

known state of development and competency. To enable life-long learning the Army must continue to provide excellent institutional and operational training, however, it will be particularly important to expand opportunities in the self-development arena. Self-development must evolve to a meaningful competency-based program that encourages individual initiative, results in improved leader focus on the profession of arms; and enables a "train ahead" approach to development allowing high performers to shape their speed of advancement. The end state must be Soldiers and leaders who are confident, diligent and resourceful learners; able to self-assess and recognize gaps in their knowledge and skills, and seek out new information to build expertise over time.

(a) Within the future leader training and education system there will be four key enablers for effective lifelong learning:

- Distributed learning (DL).
- A comprehensive body of knowledge/relevant content and an accompanying knowledge management system.
- An information structure that creates a network-enabled adaptive learning environment with anytime access to learning content.
- Leader and Soldier self-assessment processes and tools.

(b) Soldiers and leaders must be able to self-monitor their successful comprehension and mastery of new skills and knowledge. Leader assessment tools must identify individual leader strengths and weaknesses in areas such as the abilities to:

- Relate to others.
- Influence others to develop.
- Shape a positive command climate.
- Effectively lead in a culturally diverse environment.
- Develop high performing teams.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

4-78. FOC-10-02: Accessible Training

a. Capstone Capabilities.

(1) Training for the future Modular Force will capitalize on emerging technologies to make training readily accessible to Soldiers any place, any time. This training capability will be without the presence of human instructors and capable in all environments, 24/7, using GIG linkages and organic power systems. The capability will be applicable to both cognitive and

psychomotor skill training for any target audience. Dispersed Soldiers and units will be linked with one another and with the training institutions through distributed training and integrated live, virtual, and constructive training environments. Embedding training in equipment will enable more cost-effective training and mission rehearsal, on demand, whether at home station or deployed. New training technologies will provide a universal training support capability that extends to active Army, U.S. Army National Guard, and U.S. Army Reserve units and ensures that training capabilities keep pace with advancements in warfighting technologies. Soldiers and leaders in units will have quick access through reachback to the training opportunities, lessons learned, and other knowledge relevant to their immediate mission or required as part of their career development plan.

(2) Accessible training must be more than merely ubiquitous. It must be easy to obtain, feasible to use or operate as is, or easily and quickly modifiable as needed. To be truly accessible, relevant training must be provided in a form that is not cost or manpower prohibitive. The accessible training capability will be characterized by:

- Effective distributed individual and collective training available globally, on demand.
- Knowledge management and supporting information structure to support Soldier training and decisionmaking.
- Ability for Soldiers to train and commanders to train units without significant external support through enhanced embedded training.

b. Narrative.

(1) The future training system must be as responsive as the future Modular Force itself, anticipating Soldier and unit training requirements to make the right training available on demand. Future Modular Force training must reflect the global nature of Army operations as part of JIM missions and the need to deliver, on a push and pull basis, appropriate, dynamic, tactically realistic training to units during deployment, redeployment, and reconstitution, as well as to Soldiers in the institution, and at home station. Training must be distributed using a common operating environment that can be accessed by future Modular Force Soldiers, whenever and wherever training is needed to acquire skills, sustain combat readiness, and conduct mission rehearsal exercises. Advanced training technologies and processes must be exploited to permit the integration of individual and collective training during routine operations, and other training in hostile environments. Training strategies and tools must address geographic dispersion, both during operations and at home station.

(2) The future Modular Force will greatly increase reliance on DL technologies, primarily as a means of increasing training accessibility and tailorability, but also as a means of reducing costs. DL used to augment or replace resident training will lower travel costs. Use of DL as a means of individualizing training to the needs of a specific Soldier and their duty assignment will reduce the time and cost to achieve training objectives. Following the trend in higher education, the Army will frequently employ a blended approach to learning which will combine, in a single course, both synchronous DL (video teletraining and audio conferencing) and asynchronous DL (students taking on-line courses at their convenience). This approach will typically be experiential and student/team centered and incorporate on-line structured “communities of

practice" augmented with digital resource materials. The training system will continue to be challenged to ensure the DL content is relevant, current, and intellectually challenging, the delivery mechanism is user-friendly and engaging, and the access is assured without technical interruptions.

(3) Knowledge management will work hand-in-hand with training to keep the Army on point and prepared. Through application of knowledge management principles, the individual and collective know-how of warfighters will be captured, preserved and made easily accessible to Soldiers and leaders throughout the Army to support their decisionmaking. For the Army, knowledge management is the systematic process of finding, selecting, organizing, improving, sharing and benchmarking explicit and tacit information to support optimal combat effectiveness. Common knowledge management capabilities include collaboration via network technologies, communities of practice (the Army calls these structured professional forums), knowledge portals, and repositories. The success of major current initiatives, such as Army Knowledge On-line, the Battle Command Knowledge System, and U.S. Army Center for Army Lessons Learned, as well as a variety of mission specific knowledge management capabilities, raise expectations of a greatly increased information sharing capability in the future. Another key element for a comprehensive knowledge management capability will be Soldiers' reachback to training repositories. Access to training repositories will reduce the turn around times for Soldiers to obtain doctrine, lessons learned, technical information, performance support, training support packages, and after action reviews. This will greatly ease training management for leaders and provide access to training that can be tailored to the Soldier or unit need. Robust collaboration capabilities over the network will be essential to achieving the full potential of knowledge management for the Army.

(4) To achieve the vision of on demand access to appropriate and relevant learning activities and related information requires a lifecycle approach to information resources and an investment in the associated people, processes, technology standards and policy. Content must be searchable, shareable, reusable in multiple formats and the content management and delivery system must be consistent and accessible to both learners and developers. Planned learning activities, such as on-line or resident courses or simulation exercises, need to be enriched and reinforced by on demand access to relevant information, such as pertinent articles, on-line discussions, or video vignettes from a related after action review. Joint, multinational, and even Army students outside a particular network domain must have access to learning content. Network reliability, latency, and recovery must be sufficient to provide ensured access to learning content at any time.

(5) To ensure maximum accessibility, as well as flexibility in execution of training, Soldiers and commanders must have the capability to train without significant external support. This capability will sustain/improve unit performance with an immediate training/retraining capability anywhere, anytime. Units will rapidly execute training with organic assets, saving time for leaders to focus on execution and retraining instead of extensive planning and coordinating unit training support, resources, and movement. In lieu of the subject matter and instructional expertise of trainers, the artificial intelligence tutors, coaches, and mentors will monitor and track Soldier learning needs, assessing and diagnosing problems, and providing other assistance, as needed. Embedding training and performance support systems in future

concept, organization, and system designs will provide much of the needed deployable capability. Embedded training will provide access to virtual and constructive multi-echelon combined arms training for leaders, staffs, and units to build combined arms teams, integrating reserve component and JIM capabilities. It will provide units with the capability to conduct a full range of collective training events without the physical participation of other units. As FCS equipped units are fielded, embedded training will begin to meet the needs of both mounted and dismounted Soldiers. However, more work in this area will be required to meet the needs of the total force.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

4-79. FOC-10-03: Realistic Training

a. Capstone Capabilities.

(1) Future Modular Force training capabilities must, to the maximum extent possible, replicate the OE. This capability must include live training at home station and during deployments, and extend to CTCs and operational areas. Training support capabilities must complement the fielding of current and future warfighter technologies and provide the human performance development applications that enable realistic joint and Army training and education. Further, the virtual and constructive environments must provide the realism and feel needed to train individuals, teams, and units effectively across the FSO.

(2) Realistic training replicates the OE to the extent needed to optimize training effectiveness. Realistic training requires organizations to train the way they will operate or support within all dimensions of the AOs. Realistic training includes all available elements of combined arms teams and, as appropriate, JIM teams. It optimizes the use of training support system products to replicate stresses, sounds, and conditions of actual operations. The following elements characterize realistic training:

- Training that provides realistic replication of weapons, the environment and battlefield effects.
- Models and simulations that enable training and mission rehearsal for the full spectrum of operations in a JIM environment.
- A synthetic training environment that accommodates training the full spectrum of operations.
- Live, virtual and constructive training environments that realistically and accurately portray the societal and cultural aspects of the contemporary operational environment.

b. Narrative.

(1) Live training will remain a cornerstone of training for future Modular Force Soldiers and units, but constrained resources and training environments and the availability of simulators and simulations will continue to limit live training. Future Modular Force training must provide realistic, real time replication of weapons and OE effects, embedded into all training environments with commonality at the institution, home station, operational theater, and CTC. In addition to the replication of weapons employment and effects, to be realistic, future Modular Force training must also replicate employment of C2 systems capabilities, employment of ISR resources/information, survivability capabilities, sustainment capabilities, and replication of the effects of the environment on the battlefield. Training support must universally enable realistic training in the operational arts of war constructs of: move, shoot, communicate, see the battlefield, survive, and sustain, all within a JIM context. Portrayal of that environment must include an accurate representation of the social and cultural aspects to be encountered.

(2) Virtual training will provide an immersive environment. This environment will provide the necessary suspension of disbelief, realistic locomotion of the Soldier, and realistic touch and feel of fellow Soldiers. It will have a 210 degree instantaneous horizontal field of view and a 360 degree total horizontal field of view, a 75 degree instantaneous vertical field of view, and a 180 degree total vertical field of view. It will have the ability to move in and through multi-elevation structures and will be interoperable with the common virtual environment provided through the program of record, synthetic environment core. Virtual humans with the same level of fidelity as an avatar controlled by a human will be the norm. Virtual human technology will use natural language processing, be reprogrammable to adopt different identities (that is. provide cultural fidelity), and have appropriate facial expressions and gestures. Virtual humans will also respond based on the situation and be capable of showing emotion. Virtual humans will have the ability to act, react, and counter react to verbal and non-verbal stimuli.

(3) Future Modular Force training requires models and simulations that enable training and mission rehearsal for FSOs within a networked JIM environment. Models and simulations must be flexible and adaptable, replicating the OE, emerging weapons systems, human factors, and robot behaviors. These models must be available in a continuous, persistent environment to meet training demands from distributed locations worldwide. The successful execution of training for the future Modular Force will also require the capability to link live, virtual, and constructive simulations seamlessly, to present the best environment for training individuals, leaders, staffs, and units on the right tasks, at the right place and time. To create this interactive ‘synthetic training environment’, all simulation systems, instrumentation systems, C2 systems, and weapons systems must operate and interoperate, using common databases that accurately represent human and group behaviors, atmospheric and ground effects, and include virtual terrain that replicates the actual theater of operation. This synthetic training environment must be able to accommodate FSOs within the JIM environment, from special operations to logistics to combat, and be sufficiently interactive to allow combined training of the different elements. This capability must also provide commanders the tools to select or modify the range of available OEs, for precisely training their Soldiers, staffs, and units on specific shortcomings, or tasks relevant to an upcoming mission.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

4-80. FOC-10-04: Responsive Training Development and Delivery

a. Capstone Capabilities.

(1) The end state training system must have the capability to support shorter cycle times by rapidly capturing and integrating collected insights and changes, leading to timely and effective training products needed for both individual and collective training for future Modular Force jobs. It will provide training, education and mission rehearsal tailored to the specific skills and knowledge level of the individual Soldier or unit and their defined needs. It will be a learner-centric system of leader education in which individual knowledge, skill and other developmental needs are used to tailor timing, delivery, and duration. Timing and content are individual needs and differ based on individual experiences and capabilities. Future education can be enhanced by exploring educational models that are based on the learner's individual needs.

(2) Training products needed for both individual and collective training for future Modular Force Soldiers and units are delivered in a timely and effective manner. A responsive training development system must be capable of:

- Meaningful integration with the operating force to meet their needs.
- Applying best models, methods and principles of learning science to improving training effectiveness and efficiency.
- Applying Human Performance Improvement methods to optimize Soldier performance.
- Conducting comprehensive analysis of Future Force functions, jobs, skills, and knowledge requirements.
- Using skill decay models and decision tools that enable trainers to determine how, when, and where to deliver training and performance support most effectively and efficiently.
- Enabling trainers and training developers to work collaboratively in a distributed environment to rapidly develop training tailored to individual or unit needs.
- Providing units the ability to develop or reconfigure training locally to meet their needs.
- Ensuring, through quality assurance and other feedback mechanisms, that training planning and development address the most critical FF training requirements.

b. Narrative.

(1) TRADOC will evolve toward a more dynamic mission that is more fully integrated with the operating force. Given the unpredictability of combat conditions, and the rapid adaptability of threats, the linear model of training development and delivery will evolve into a model that allows for more spontaneity and responsiveness to immediate needs. TRADOC, the "generating force," will be integrated with the operating force to enable lessons learned and other feedback to be applied to improve training and doctrine rapidly within and between the two force components. TRADOC will be challenged to develop relevant training and deliver it more rapidly.

(2) TRADOC will apply the best principles of learning science to meet the challenges of increased training demands. The application of learning science will have the following goals:

- Accelerate learning while maintaining effectiveness
- Choose and leverage learning technologies based on learning effectiveness
- Enable rapid insertion of lessons learned into training and leader development
- Minimize resource requirements (time, cost, people) by streamlining time in institutional training and education settings.

(3) TRADOC will apply a new learning model. Years of research and practice in the science of learning have pinpointed key attributes of effective and efficient training and education that comprise the new model. In general, future training will be more: experiential, authentic/current/relevant, guided, motivational/engaging, tailored to the learner, and collaborative (as needed). Guided experiential learning is one method for designing instruction for cognitive tasks that is grounded in these principles and will be widely applied to both classroom and DL instruction. Guided experiential learning will be applicable to many different tasks and settings, and as it is integrated into training and education across the system there will be decreases in time to learn and increases in level of learning.

(4) The future Modular Force will apply approaches, in addition to training, to optimize Soldier performance. The Army will follow the lead of industrial and military human resource experts who recommend a focus on human performance improvements and selection from a menu of options for improving human performance, rather than relying solely on training. These other approaches (for example personnel selection, doctrinal change, human machine interface design), along with training, are integrated within the overall "human performance improvement" human framework adopted by TRADOC. The human performance improvement process is distinguished by its emphasis on a front end performance analysis to identify the gap between desired and actual performance, and a thorough analysis of the cause(s) of the performance problem. Application of HPI analytic techniques will lead to determination of the most effective solution or set of solutions to a problem. Training will often be part of a blended solution set but seldom the total remedy. Based on U.S. Navy and U.S. Coast Guard experience, adoption of the human performance improvement approach should enable the Army to realize significant return on its investment in HPI techniques. Other advantages of the human performance improvement approach will be closer alignment of human resource, training and

acquisition systems, elimination of unnecessary training, better understanding of Soldier performance problems, and attainment of optimal Soldier performance outcomes.

(5) As many future Soldier skill sets will need definition, TRADOC must maintain a robust capability comprehensively analyze functions, jobs, tasks, skills, and knowledge requirements to support the training and leader development process for unit and individual training. Advanced technologies, such as robotic vehicles, advanced sensors, and information technologies, will be incorporated into future equipment systems with significant training implications. Changes in force designs and missions, executed in a JIM environment, will introduce more collective/team tasks and increase task performance requirements. Stability and reconstruction operations will place a higher premium on an evolving set of conceptual skills such as negotiation, conflict resolution, multinational cultural awareness and influence, multitasking, employing indirect/nonlethal effects, dealing with ambiguity, ethical reasoning, dealing with corrupt/irrational/desperate agents, countering anti-U.S. propaganda, violation of ROE, and retaliation to terrorist acts. A specialized type of task analysis, cognitive task analysis, will be used to determine the required elements of knowledge and skills for nonkinetic and other problem solving and decisionmaking types of tasks. Quality assurance mechanisms and other feedback capabilities will be critical to ensure that training development is addressing the most critical training requirements.

(6) Responsiveness must characterize future training development, as well as training execution. Skill decay models and decision tools that enable trainers to determine when, where, and how to deliver training and performance support most effectively and efficiently are essential capabilities. The training system must also provide training developers the tools and decision support systems needed to analyze, design, develop, and execute training efficiently and effectively. Low-cost, personal computer based tools that facilitate shorter training development lines will be critical.

(7) Future training must be sufficiently responsive and robust to ensure that units accommodate rapid changes in doctrine, organization, and equipment, while maintaining readiness and meeting current operational requirements. This will necessitate links between units, schools, and training centers to enable collaborative training development, delivery, testing, and evaluation in a distributed mode, as well as rapid feedback on training requirements. In addition to the links required to support collaboration, all Army trainers, regardless of component or location, must have at least a limited local capability to prepare, produce, and rapidly reconfigure individual Soldier and unit performance-oriented, standards-based, and realistic multi-echelon training. Nearly all operations encounter unexpected and unanticipated challenges. One way to prepare for these challenges is to ensure that capabilities for preparing or editing DL, simulation, and or simulation scenarios are available to local commanders whenever and wherever needed in a format that does not require substantial computer skills. Such tools will be equally useful for institutional training to streamline the development process.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and

Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

4-81. FOC-10-05: Training for Joint, Interagency, and Multinational (JIM) Operations

a. Capstone Capabilities.

(1) The future Modular Force will train and operate in a joint environment that will frequently include interagency and multinational organizations. During JIM operations, JFCs and Soldiers will be interdependent with personnel from other services, coalition forces, governmental and NGO, and they must be prepared to operate effectively in that environment in spite of language and cultural differences, communication difficulties and disparities in technologies. The conditions will be set in our training culture for Soldiers to succeed in JIM operations. Soldiers from top to bottom will be trained and comfortable working in JIM environments.

(2) This capability allows the Soldier to train, conduct mission planning and rehearsals within a JIM contemporary operating environment and with JIM participants. The future Modular Force training system must have:

- Capability to train JIM operations, including capabilities that facilitate the training of forces with incompatible coalition C2 systems.
- Joint and multinational doctrine, training and knowledge programs.
- Cultural awareness/sensitivity.

b. Narrative.

(1) JIM training is performed using approved joint doctrine and tactics, techniques, and procedures. When assigned as the JFC, Army commanders establish joint training objectives and plans, execute and evaluate joint training, and assess training proficiency. The training experience facilitates understanding of the other Services, as well as interagency and multinational partners. The Army trains with those partners to better understand their capabilities, interests, cultures, and ways of conducting operations. When Army missions involve JIM partners, training should be conducted with the organizations and people likely to be involved. Army organizations often provide forces to JF formations. Certain Army HQ may be designated as a joint task force HQ, a JFs land component HQ, a combined forces land component, or Army forces HQ. This requires the designated Army HQ to develop a joint mission-essential task list. The JFC and Service component commanders derive the formation of joint mission-essential task list from the Universal Joint Task List. The combatant commander then approves these missions and joint mission-essential task lists.

(2) Future Modular Force operations will routinely have significant JIM aspects, making effective, well-integrated training vital to ensure the readiness of the entire team to respond to crisis, and conduct operations throughout FSOs. The training system must provide commanders the capability to conduct training or mission rehearsals simultaneously, at widespread geographic

locations, using different simulation systems, in a mix of live, virtual, and constructive environments, on an interactive basis, in preparation for single Service or JIM operations. A greater reliance on virtual technologies will facilitate this increased participation of other organizations in training. Training simulations and capabilities that link to other Services for geographically dispersed training will be essential to develop and sustain JTF HQ training readiness, as well as JTF augmentation elements. These same capabilities must be utilized to facilitate the routine integration of the reserve component into live, virtual, and constructive exercises, thereby enhancing readiness. In addition, future Modular Force leaders must have training aids and other technologies necessary to facilitate the integration and training of dissimilar forces, particularly with respect to different levels of C2 systems capabilities that complicate information interoperability with coalition forces. CTCs will train Army units in a JIM environment, so that leaders are trained in the complexity of the future battlefield.

(3) Army JIM doctrine and training programs must produce strategically responsive, rapidly deployable training support packages and other training and training support products designed for training in a JIM environments and/or for training within a JIM context. There will be an increased emphasis on adapting JIM training with lessons learned from JIM operations, as well as incorporating scenarios, case studies, and other instructional approaches with JIM operations as the context. Soldiers will be trained to understand and appreciate the cultures of other nations, other services, and other governmental agencies and NGO. Tasks and conditions will be identified and training and feedback strategies will be developed to make JTF and tactical interactions effective. There will be an increased emphasis paid to training of skills needed for collaborative planning and decisionmaking in a JIM context. Given the requirement for future Modular Force division/corps to function as ARFOR Commands, JFLCC, and JTF HQ, many capabilities are required to be embedded at the appropriate level of professional military education curriculum for the preparation and training of future JFC commanders and staff elements, beyond the inherent Army-based leadership and education curriculum. Leader development standards define what is required of JTF commanders and staffs.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

4-82. FOC-10-06: Managing Unit Performance

a. Capstone Capabilities.

(1) Commanders will have on demand access to relevant performance information on Soldiers in their unit. Capability will build on the Army's Career Tracker Program (which provides a single access portal for information on a Soldier's training, education, and experience) by providing the commander a team/unit level roll-up of Soldier performance information that pinpoints both individual and collective skill deficiencies. Tools must directly to support

collective performance assessment and/or translate the performance of individuals into a measure of collective performance. This capability will enable commanders to select Soldiers for units, task forces, special team assignments, and duty assignments based on skills and proficiency on mission-relevant tasks. In addition to assisting commanders to create high performing teams and units, it will enable commanders to tailor training/performance support strategies to a team's/unit's unique training requirements, as well as the tasks and conditions of the immediate mission. The capability will provide access to diagnostic testing of individual and collective skills and enable commanders to hone in on skill deficiencies and fine tune individual and collective training in order to maximize training efficiency. The capability must contribute to a commander's assessment of unit readiness for current or predicted mission contingencies.

(2) Future Modular Force commanders must have the capability to quickly provide the training and performance support needed by their Soldiers to reach the required level of readiness. Once performance deficiencies have been identified, tools will assist commanders by prescribing effective practice and feedback events for individual Soldiers and units. These tools will be developed based on an understanding of the specific learning activities that support stages of skill acquisition and support specific transfer and retention goals based on the unit mission. Soldier and commanders will access the "prescribed" training through reachback, or will use tools available to them to tailor DL, simulations and scenarios to their needs. Automated tools will also be needed to support rapid team building and mission preparation programs to insure that mission-tailored units achieve the level of readiness needed for rapid deployment. Commanders will also need capabilities to do collaborative training of active component and reserve component Soldiers and units considered most likely to deploy together, based on contingency planning.

(3) Training management strategies must optimize the time warfighters spend participating in training, vice preparing for training or conducting administrative duties, and must support institution, unit, and operational theater, and CTC training. A training management system must assess, document, and report individual and collective training status and requirements, providing feedback on training needs and assisting trainers, Soldiers, and leaders in identifying training events and resources required to carry out training plans.

b. Narrative.

(1) The performance management capability to identify Soldier and unit performance deficiencies and training needs against mission-essential task list or joint mission-essential task list requirements. Provides training management tools and strategies to assist commanders and their units to achieve and maintain readiness.

(2) Key capabilities are:

- Future Modular Force commanders can quickly identify and provide the training and performance support needed by their Soldiers to reach the required level of readiness.
- Training management strategies optimize the time warfighters spend in training vice preparing for training or carrying out training related administrative duties.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

4-83. FOC-10-07: Providing Universal Training Support

a. Capstone Capabilities.

(1) The universal aspect of training support will provide access, at all Army installations and during deployments, to whatever training capabilities are needed to support training of units, whether those units are equipped fully with digitized battlefield capabilities, or not. The capability will provide training support products and services for exercises, battle drills, and mission rehearsal capabilities with worldwide, around-the-clock availability to Soldiers, leaders, and trainers. The capability will support the provision of realistic, mission-focused, individual, unit, and leader training support, using state-of-the-art performance enhancement technologies that prepare the Army to succeed across a wide ROMO in JIM environments. The capability will allow the Army to synchronize training capabilities with warfighting capabilities and provide operationally relevant training opportunities that directly support the Army mission as appropriate.

(2) These capabilities will provide training support products and services for all training with worldwide, around-the-clock availability to Soldiers, leaders, and trainers. Key capabilities are embodied in the following characteristics:

- Universal accessibility to training support products and services.
- Operational characteristics that support training to move, shoot, communicate, see the battlefield, survive, and sustain.
- Responsive, timely delivery/fielding of training enablers to units and the institution; a holistic plan that provides for equipment, facilities, maintenance, and operators throughout the lifecycle of the enabler.

b. Narrative.

(1) The key universal accessibility characteristic extends training products and services to Active Army, U.S. National Guard, and U.S. Reserve units and matches advanced warfighting technologies used in units to their training capabilities. The universal training support capability will provide the human performance development applications that enable Army training and supporting education. Accessibility to advanced training services and technologies will add improved functionality and flexibility especially in a military training setting where time and relevance are critical. Key elements of the universal training support capability will be:

(a) Architectures and standards. A universal approach for the structure, the relationships, standards, and protocols used to build training support hardware, software, and materiel.

(b) Training information infrastructure. A standards-based information exchange backbone capability that connects training and operational infrastructures.

(c) Training aids, devices, simulations, and simulators. The capability to reach out and use training instrumentation, engagement simulation, war games and simulator systems, targetry, ammunition, and OPFOR systems and simulators.

(d) Training products. Are universal means of assuring of compliance with and development of regulatory, administrative, guidance, doctrinal, technical, documents, and training materials and tools.

(e) Training facilities and land. Pprovide coordinated access to and allocation of real estate assets, classrooms, battle simulations centers, distance learning facilities, buildings, training ranges, impact areas, logistic support areas, and maneuver areas that provide the venues in which training occurs. This includes availability of optimization methods to mitigate environmental conflicts and constraints while supporting the ability to train to proficiency. The future Modular Force requires state-of-the-art training lands and ranges. Increased environmental scrutiny and land-use pressures threaten the Army's ability to support these training requirements. Threatened and endangered species present on training lands causes a significant impact on current and future mission and training activities. Methods to assess the impact of military training activities on threatened and endangered species to include disturbance from maneuver and other training, smokes and obscurants, noise, military-generated toxics, habitat encroachment and fragmentation, must be developed. Minimizing environmental conflicts and constraints, while supporting the ability to train to proficiency, requires that Army lands, including active live-fire and test ranges, inactive ranges, and other Army lands, must be restored, modernized, and sustained. Optimal beneficial use of Army lands requires integrated planning, design, management, and maintenance procedures that incorporate explosive safety, environmental compliance and restoration, and natural resources management.

(f) Training services. Provide access to essential ancillary capabilities, including instructional/doctrinal/logistical support, courseware management/development, devices management, training literature and IM, video information services, requirements/acquisition management, and resource management.

(g) Training management, evaluation, and resource tools. Are tools that provide the capability to reach out and use tools to schedule/manage events, monitor/assess training performance, and manage training support/resources/requirements. Evaluations must be performance-based, not memorization-based.

(2) Key operational characteristics of the universal training support system will correspond to the operational art of war constructs of: move, shoot, communicate, see the battlefield, survive, and sustain. Just as these operational constructs must work together on the battlefield, essential training support characteristics must work together within the institutional,

operational, and self-development domains to support individual, collective, and joint training. Characteristics of the training support capability for each of the operational constructs include:

(a) Move. Move is the characteristic ability to train warfighters to deploy and maneuver over vast open or complex and urban terrain.

(b) Shoot. Shoot is the characteristic ability to train warfighters to employ firepower in complex operational circumstances.

(c) Communicate. The characteristic ability to train warfighters to C2, make decisions and collaborate over unprecedented distances.

(d) See the battlefield. The characteristic ability to train warfighters to use sensors and their personal senses to understand what's happening.

(e) Survive. The characteristic ability to train warfighters to use protective measures and countermeasures to avoid casualties.

(f) Sustain. The characteristic ability to train warfighters to resupply, transport logistics supplies, conduct medical operations, and perform support engineering tasks.

c. Linkage to AUTL: ART 1.1 (Support to Situational Understanding); ART 2.2 (Conduct Tactical Maneuver); ART 3.1 (Decide Surface Targets to Attack); ART 4.1 (Prepare to Defend Against Air Attack and Aerial Surveillance); ART 5.1 (Conduct Mobility Operations); ART 6.1 (Provide Supplies); ART 7.1 (Establish Command Post Operations).

d. Linkage to UJTL: SN 1.2 (Conduct Deployment and Redeployment); SN 3.1 (Coordinate Forward Presence of Forces in Theaters); SN 3.4.2 (Provide Integrated Tactical Warning and Attack Assessment); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready Preparation for Overseas Replacement Status); SN 7.4 (Educate and Train the Force; OP 1.1 Conduct Operational Movement); OP 2.1 (Direct Operational Intelligence Activities); OP 3.1 (Conduct Joint Force Targeting); OP 4.1 (Coordinate Supply of Arms, Munitions, and Equipment in the Joint Operations Area); OP 5.1 (Acquire and Communicate Operational Level Information and Maintain Status); OP 6.1 (Provide Operational Air, Space, and Missile Defense); OP 7.2 (Coordinate Active CBRNE Defense in the Joint Operations Area).

Section XI - Human Dimension

4-84. Human Dimension Aspect

The Soldier is the single most important aspect of the combat power of the future Modular Force. The future Modular Force Soldier is a combat Soldier first and foremost. Despite the expected proliferation of unmanned systems, the role Soldiers will have in the future OE demands they remain the cornerstone for force design and employment. Soldiers, not equipment, accomplish missions and win wars. In order to achieve revolutionary effectiveness across the full spectrum of conflict, human engineering capabilities will enable the future Modular Force to:

- Decrease task complexity and execution times to improve performance while minimizing sensory, cognitive, and physically demands on the Soldier.
- Systems that have been human engineered to improve Soldier trainability.

4-85. Joint/Army Concept Linkage

While there are no concepts that human dimension is directly linked to, it is indirectly linked to all concepts and proposed capabilities. The Soldier-system interface is a critical consideration in all capability developments. If the system does not enhance or improve Soldier performance, its utility is suspect.

4-86. Desired Human Dimension Capabilities

Desired capabilities for the Human Dimension FOC area are combined in the following area:

- Human dimension for the soldier.
- Trainability.

4-87. FOC-11-01: Human Dimension for the Soldier

a. Capstone Capabilities. Soldiers are the enduring hallmark of the Army. To achieve revolutionary effectiveness across the full spectrum of conflict, the future Modular Force will consist of high quality, multifunctional Soldiers, supported by state-of-the-art weapons and equipment, to engage BLOS, dominate close combat, and ultimately seize and control an objective, on any terrain, anywhere in the world, and an exceptional quality of life for their families. The U.S. Soldier will stand as the premier warfighter, capable of effectively employing digitized, computer-based planning, decision, combat, communication, and service support aids, to overwhelm the enemy in any OE. The Army seeks to optimize the mutual operational benefits of Soldiers enabled by systems, and systems enabled by Soldiers. Regardless of the importance of equipment, or the expansion of technological capabilities, Soldiers are more important than machines. Soldiers, not equipment, accomplish missions and win wars. They continue to be the centerpiece of the future Modular Force. In order to achieve revolutionary effectiveness across the full spectrum of conflict, human dimension capabilities will enable the future Modular Force to:

- Reduce Soldier dismounted movement approach load to no more than 40 pounds.
- Reduce dismounted Soldier's fighting load to 15 pounds.
- Decrease task complexity and execution times to improve performance, while minimizing sensory, cognitive, and physical demands on the Soldier.
- Provide mobility enhancements to reduce Soldier workload through environmental ride quality and task automation.
- Exploit unmanned technology in manned systems, to enhance continuous 24/7 operations.

b. Narrative.

(1) The warrior Soldier is the single most important aspect of the future Modular Force combat power. The future Modular Force Soldier is a combat Soldier first and foremost.

Despite the expected proliferation of unmanned systems, the significant role that Soldiers will have in the future OE demands that they remain the cornerstone for force design and employment. Technology is merely a tool to be utilized by a thinking Soldier, to enhance human characteristics such as common sense, battlefield instinct, and the warrior ethos. Soldiers must react to issues of morality, and exercise mature judgment, while decisively wielding highly lethal weapons in the demanding, chaotic environment of war.

(2) The need for Soldiers to close with the enemy, by fire and maneuver, remains a critical requirement for the future Modular Force, regardless of the introduction of advanced technologies and the desire for sterile long-range precision warfare. Only a ground force can deny the enemy the option to pursue a protracted stalemate, and only the Soldier can effectively control populations, and take terrain. This is especially true for operations in urban and complex terrain, which many military experts believe to be the most likely battlefield of the future. Additionally, the nature of the environment, and the ROE, may limit other options available to the commander. For the foreseeable future, as throughout all of the recorded history of warfare, a Soldier on the ground, winning the close fight, is our defining capability, and an indispensable resource for the Nation.

(3) The future Modular Force Soldier will experience a paradigm shift from a linear, contiguous battlefield, to a more distributed noncontiguous, non-linear battlefield. Transitions from peace, to deployment, to warfighting, will be compressed. Psychological preparedness will be as important as physical and cognitive preparedness for contingency deployments. Future Modular Force Soldiers must exercise judgment and initiative under stressful circumstances, and be capable of learning and adapting to the demands of FSO.

(4) The Army must aggressively recruit and retain high quality individuals who can meet the training and operational demands required in information age warfare. Both officer and enlisted recruits must possess a strong aptitude for computer-based learning, and must be comfortable working with advanced computer-based technologies. All Soldiers (not only leaders) must have the ability to make rapid decisions, while under stresses normally not realized by present day personnel. They must demonstrate an above average maturity level, as these individuals will have access to more firepower and lethality than did their predecessors in history. Future Modular Force leaders and Soldiers must clearly demonstrate the ability to handle that responsibility.

(5) To retain those Soldiers, the Army must address the changing expectations of our more diverse and educated Army in three critical areas: how Soldiers and their families live; where Soldiers and their families live; and where Soldiers and civilians work. (See FOC-08-04, for additional installations as flagships information).

(6) On the multidimensional battlefield, the Soldier will require near absolute SA. Soldiers will need to be fully integrated into the battlefield information flow with their C4I suite. This capability will permit the Soldier to positively know their own location, the location of team members, and the location of other friendly forces (such as, resupply points, casualty collection point, coalition forces, etc.), enemy locations, and noncombatants. Soldiers must have the ability to physically see the battlefield with great fidelity in all light, weather, and temperature

conditions, as well as man-made obscuration, and to rapidly transition across these varied conditions.

(7) Future Modular Force Soldiers will have a microcomputer capability that is small, lightweight, powerful, voice-activated and responsive, and will facilitate the Soldiers' ability to push/pull information from the GIG. Unlike the systems of today, this system will not have visible reception and transmitting devices, such as antennas, reducing the enemy's ability to discern the location of key leaders/personnel. The ability of the Soldier to communicate must be unencumbered by terrain, man-made structures and other influences (to include subterranean), units equipped with current systems, and languages. The system will feature a two-way translation device, an earpiece for improved listening, and 'whisper microphone' capability for improved verbal communications, reducing battlefield confusion and the possibility of enemy detection.

(8) The placement of advanced and fused sensors will also contribute to improving battlefield awareness. These sensors will provide the Soldier with the ability to *see* through obstacles, such as buildings and complex terrain. These sensors will be deployed through the employment of a wide array of manned/unmanned ground, aerial, and space platforms, as well as robotics.

(9) Additionally, robotics and UGV will provide greater Soldier standoff during operations that are inherently close quarters in nature, such as operations in urban and complex terrain. Augmented with a wide array of 'tools', these unmanned systems can assist with obstacle/structure breaching, and provide the Soldier with improved mobility. Unmanned systems will also provide the Soldier with the ability to avoid/detect hazardous areas like minefields, subterranean passages, and contaminated areas. These systems will be value-added for security operations; filling gaps, and providing early warning/detection, will assist with force conservation (the ability to do more with the same size force). Additionally, unmanned systems can support by carrying gear and conducting resupply operations.

(10) Future Modular Force Soldiers will have the capability to directly command remote precision fire support, without compromising their location. Soldiers will have the ability to 'call for fire' from a wide array of autonomous, semiautonomous, and manned fire support platforms. This capability will extend to close air support as well. Although more restrictive, Soldiers and air platforms (manned and unmanned) will have improved interoperability, which will allow them to work closely with regard to target identification and interdiction. This teaming will improve 'Soldier lethality' at greater target standoff, and enhance system survivability for the aerial platform.

(11) The future Modular Force Soldier will employ advanced individual and crew-served weapons with LOS and bursting munitions capabilities. These lethal capabilities will allow the Soldier to rapidly suppress and kill enemy forces, engage and defeat light armored vehicles, defeat/reduce 'light' obstacles, and facilitate greater standoff, while breaching larger structures during operations in urban and complex terrain.

(12) The future Modular Force Soldier will have the ability to employ a wide array of lethal and nonlethal munitions, based upon mission need, FP, and ROE. Nonlethal munitions will include antimaterial, chemical, EM, obscurants, directed energy, thermal, marking, acoustic, incapacitating electric, kinetic, optical, and informational. This nonlethal capability will be essential for improved SA, FP, limiting collateral damage, and reducing noncombatant and friendly force deaths, especially during operations in urban and complex terrain.

(13) Soldiers will utilize unmanned vehicles, robotics, and advanced (standoff) recovery equipment to 'recover' wounded and injured Soldiers from high-risk areas, with minimal exposure. These systems will also be utilized to evacuate the wounded/injured under extremely hazardous conditions.

(14) Future Modular Force Soldiers will need a light, non-bulky 'smart' uniform/suit that will provide a 'chameleon-like' camouflage capability, combat identification, and physical and respiratory protection from ballistic threats (chemical and biological agents), as well as environmental effects (heat, cold, wind, rain, snow). The suit will provide protection from those hazards normally associated with the urban environment, (for example glass, rubble, steel shards, etc.), and will be durable enough to withstand the demands of close quarters combat operations in urban and complex terrain without adversely affecting mobility. The flexible, full spectrum protection offered by the suit will allow the Soldier to adapt to dynamic threats. If exposed to chemical, biological, or TIM, the suit will have the ability to detoxify itself. It will also provide signature reduction from a variety of enemy detection systems. Suit will come in a wide range of sizes to precisely fit Soldiers from in 5^{th} to 95^{th} percentile. Head protection will be lightweight and not interfere with natural hearing or vision and provide a stable mounting platform for vision enhancement devices (for example, devices include long range viewing systems and multispectrum fussed goggles that enhance target detection and identification).

(15) The future Modular Force Soldier will require superior mobility capabilities. Advanced all condition optical devices will allow movement on the battlefield under the most extreme conditions. The Soldier's assured link to the GIG will enable navigation through the most restrictive terrain, including surface and subterranean corridors. The Soldier's weapon systems and links to fires/effects and MS platforms will aid the in-stride reduction of obstacles, allowing the Force to maintain momentum, significantly reducing the possibility of becoming decisively engaged by the enemy. Access to individual lift systems will aid in reaching upper levels of urban structures, bypass man-made and natural obstacles, and quickly negotiate restricted areas of the battlefield. Additionally, the Soldier will utilize precision airdrop to facilitate rapid entry operations.

c. Linkage to AUTL: ART 7.7 (Support the Commander's Leadership Responsibilities for Morale, Welfare, and Discipline); ART 7.8 (Conduct Continuous Operations).

d. Linkage to UJTL: No UJTL task is specific to the topic of human dimension.

e. Linkage to Concepts: TRADOC Pam 525-3-7-01, The U.S. Army Study of the Human Dimension in the Future 2015-2024.

4-88. FOC-11-02: Man-Machine Interface

a. Capstone Capabilities.

(1) Effective man-machine interface and human dimension will be essential, in order for future Modular Force Soldiers to operate new equipment quickly, easily, and effectively, with only the minimum essential new equipment training, sustainment training, experience, or reliance on mentoring or performance support systems. The direct benefit to the FF will be the reduction of Soldier and unit operational 'down-time' due to extended new equipment training requirements. By embedding performance support systems into equipment from the onset, the Army will further reduce the negative impact of increased cognitive demands placed upon leaders and Soldiers by multitasking; the capability to perform a wider range of tasks than today's Soldiers; and adaptability, the ability to apply their skills in a wide range of operations. Increases in skill demands must be fully considered in future Modular Force weapons/equipment system design, to ensure optimal Soldier and equipment performance. The following capabilities are essential to achieving the capstone capability for trainability:

- Material systems engineered to optimize the human dimension.
- Ability to forecast the impacts of DOTMLPF changes and the OE, alone or in combination, on Soldier performance and training.

b. Narrative.

(1) The future Modular Force must have the capability to provide Soldiers new equipment systems that have been human-engineered, to optimize both Soldier performance, and the ease of training and sustaining equipment-related skills. All aspects of the SOS must be easy to learn, user friendly, preclude catastrophic mistakes, and facilitate operational competence. System of systems must support adaptive training, enabling team proficiency with a common set of operational user interfaces, (look, feel, and function). A formal and accountable 'usability engineering' process must be rigorously and systematically incorporated into the SOS developmental process. This capability must ensure that Soldiers can operate equipment reliably and effectively, under high workload and other high stress conditions, when future Modular Force performance demands will be greatest. Additionally, the training construct itself must be validated through user trials during the acquisition process, simultaneously engineering functionally sound and reliable training systems to accompany equipment systems.

(2) The design and development of effective training and training support for the future Modular Force will depend in part on our ability to understand and forecast the impacts on Soldier performance of future Modular Force DOTMLPF changes (such as new equipment, new organizational designs, and new personnel concepts) while also factoring in impacts of the future Modular Force OE. Leadership must have the capability to understand the individual impacts of DOTMLPF changes on training, but it will be equally important to understand the combined impacts of changes in two or more DOTMLPF domains, which often happen simultaneously in transition to the future Modular Force. Tools and procedures to improve our ability to identify changing demands on Soldier performance, and translate those into training

needs, will support the conduct of future Modular Force training impact analysis and manpower, personnel, and training analysis on future Modular Force systems.

(3) The future Modular Force must also have the capability to provide Soldiers distributed technical assistance (such as electronic performance support systems) to achieve and maintain readiness on mission essential tasks, while minimizing reliance on training. This capability must enable Soldiers to effectively and efficiently use and/or maintain equipment. This capability must also assist Soldiers to multitask, to perform mission essential tasks that are inherently difficult, complex, and that have multiple steps, which are performed infrequently, or have not been previously performed.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

Appendix A
References

Section I
Required Publications

ARs, DA pamphlets, FMs, and DA forms are available at http://www.usapa.army.mil/.
TRADOC publications and forms are available at http://www.tradoc.army.mil/publications.htm.

Army Concept and Capability Development Plan.

Army Transformation, Modular Force Fielding. (Available at http://asc.army.mil/docs/transformation/2004_army_transformation_roadmap.pdf.)

Capstone Concept for Joint Operations (CCJO). (Available at http://www.dtic.mil/futurejointwarfare/concepts/approved_ccjov2.pdf.)

CJCSI 6212.01B
Interoperability and Supportability of National Security Systems, and Information Technology Systems. (Available at http://www.army.mil/thewayahead/acpdownloads/cjcsi.pdf.)

CJCSM 3500.04C
Universal Joint Task List. (Available at https://acc.dau.mil/communitybrowser.aspx?id=18493&lang=enus.)

Excecutive Order 13231
(Available at http://www.ncs.gov/library/policy_docs/eo_13231.pdf.)

Force XX1/AXX1. (Available at http://www.army.mil/aps/98/foreword.htm.)

Focused Logistics Joint Functional Concept. (Available at https://acc.dau.mil/communitybrowser.aspx?id=22548&lang=en-us.)

Force Application Functional Concept. (Available at http://www.dtic.mil/jointvision/jroc_fa_jfc.doc.)

Force Management (Available at http://usacac.army.mil/CAC/fmd.asp.)

Global Positioning System. (Available at http://www.navcen.uscg.gov/gps)

Joint Functional Concept for Protection. (Available at http://www.dtic.mil/futurejointwarfare/concepts/jroc_protection_jfc.doc.)

Joint Battlespace Awareness. (Available at http://www.fas.org/spp/military/docops/defense/jwsp/jw04a.htm.)

Joint Focused Logistics. (Available at https://acc.dau.mil/CommunityBrowser.aspx?id=22548&lang=en-US.)

Joint Mission Area Analysis for Nonlethal Weapons. (Available at https://www.jnlwp.com/research.asp.)

Joint Publication 4-02
Health Service Support. (Available at http://www.dtic.mil/doctrine/jel/new_pubs/jp4_02.pdf.)

Net-Centric Operating Environment. (Available at http://www.afei.org/brochure/5AF7/documents/Powell_J6.pdf.)
Joint Training (Available at http://www.jfcom.mil/about/abt_j7.htm.)

Protection Joint Functional Concept. (Available at http://www.dtic.mil/futurejointwarfare/concepts/jroc_protection_jfc.doc.)

Status of Forces Agreement. (Available at http://www.globalsecurity.org/militaryfacility/sofa.htm.)

TRADOC Pam 525-2-1
The United States Army Functional Concept for See 2015-2024.

TRADOC Pam 525-3-0
The Army in Joint Operations, The Army's Future Force Capstone Concept 2015-2024.

TRADOC Pam 525-3-1
The United States Army Operating Concept for Operational Maneuver 2015-2024.

TRADOC Pam 525-3-2
The United States Army Concept for Tactical Maneuver 2015-2024.

TRADOC Pam 525-3-3
The United States Army Functional Concept for Battle Command 2015-2024.

TRADOC Pam 525-3-4
The United States Army Functional Concept for Strike 2015-2024.

TRADOC Pam 525-3-5
The United States Army Functional Concept for Protect 2015-2024.

TRADOC Pam 525-3-7-01
The U.S. Army's Study of Human Dimension in the Future 2015-2024.

TRADOC Pam 525-3-6
The United States Army Functional Concept for Move 2015-2024.

Section II
Related Publications
A related publication is a source of additional information. The user does not have to read a related reference to understand this publication.

AR 380-19
Information Systems Security

FM 1-0
The Army.

FM 3-0
Operations.

FM 3-22-40
Tactical Employment of Nonlethal Weapons.

FM 3-24
Counterinsurgency.

FM 6-22
Army Leadership.

FM 7-0
Training the Force.

FM 7-1
Battle Focused Training.

Appendix B
FOC Format

FOCs are formatted as outlined below:

1. FOC Identifier: Alphanumeric designator and title of the FOC.

2. Description of [the] FOC: (No more than 10 bullets).

3. Capstone capability overview: Describes the intended capability's end state if fully attained. Describes how the particular capability significantly empowers the force in concise operational terms.

4. Narrative: Substantive description of the operational background, conceptual rationale, scope and warfighting impact of the required capability.

5. AUTL/UJTL Linkage: Linkages to Army Universal Task List (AUTL) contained in FM 7-15 and the Universal Joint Task List (UJTL) contained in Chairman of the Joint Chiefs of Staff (CJCS) Manual (**CJCSM) 3500.04C**.

Glossary

Section I
Abbreviations

ACS	Army concept strategy
AMEDD	U.S. Army Medical Department
AO	area of operation
APOD	aerial port of debarkation
ARFOR	Army Forces
ART	article
ATD	advanced technology demonstration
ATO	Army technology objectives
AUTL	Army Universal Task List
BA	battlespace awareness
BCOTM	battle command on the move
BCS	battle command system
BCT	brigade combat team
BDA	battle damage assessment
BLOS	beyond line of sight
C2	command and control
C4	command, control, communications and computers
C4I	command, control, communications, computers and intelligence
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
CBRN	chemical, biological, radiological, and nuclear
CBRNE	chemical, biological, radiological, nuclear, and explosives
CIE	collaborative information environment
CJCS	Chairman of the Joint Chiefs of Staff
CJFLCC	Coalition Joint Forces Land Component Command
COA	course of action
COIN	counterinsurgency
CONUS	continental United States
COP	common operational picture
CP	command post
CTC	Combat Training Center
DA	Department of the Army
DL	distributed learning
DNBI	disease and nonbattle injury
DOD	Department of Defense
DOTMLPF	doctrine, organization, training, materiel, leader development, personnel, and facilities
DST	decision support tools
EA	electronic attack
EPW	enemy prisoners of war
EM	electromagnetic

EW	electronic warfare
EWS	electronic warfare support
FCS	future combat system
FHP	force health protection
FOC	Force Operating Capability
FP	force protection
FM	field manual
FSO	full spectrum operation
GIG	global information grid
HN	host nation
HPI	human performance improvement
HPM	high powered microwave
HPT	high payoff target
HQ	headquarters
HSS	health service support
IA	information assurance
IAW	in accordance with
IED	improvised explosive device
IM	information management
INFOSYS	information systems
IO	information operations
IS	information superiority
ISB	intermediate staging base
ISR	intelligence, surveillance, and reconnaissance
JCIDS	Joint Capabilities Intergration Development System
JFC	joint force commander
JFLCC	Joint Force Land Component Command
JIM	joint, interagency, and multinational
JLOTS	joint logistics over-the-shore
JOA	joint operations area
JOC	Joint Operational Concept
JTF	joint task force
km	kilometers
LOC	lines of communications
LOS	line of sight
MS	maneuver support
MTF	medical treatment facility
NLOS	nonline of sight
NGO	nongovernmental organization
OE	operational environment
OGO	other goventmental organizations
OP	operational
OPTEMPO	operational tempo
P&E	power and energy
PFP	partnership for peace
PN	partner nation

POSNAV	positive navigation
PSYOP	psychological operations
PRC	populace and resource control
RFID	radio frequency identification
ROE	rules of engagement
ROMO	range of military operations
RSTA	reconnaissance, surveillance, and target acquisition
RSOI	reception, staging, onward movement, and integration
S&T	science and technology
SA	situational awareness
SPOD	seaport of debarkation
SOS	system of systems
SN	Strategic National tasks
ST	strategic theater
SU	situational understanding
TA	tactical
TIM	toxic industrial material
TOC	tactical operations center
TPFDD	time-phased force and deployment data
TRADOC	U.S. Army Training and Doctrine Command
UAS	unmanned aerial systems
UGV	unmanned ground vehicles
UJTL	Universal Joint Task List
UMT	Unit Ministry Team
U.S.	United States
VTOL	vertical take off and landing
WMD	weapons of mass destruction
WME	weapons of mass effect

Section II
Terms

Buddy aid
Acute medical care (first aid) provided by a non-medical Service member to another person. (JP 2-04.)

Counterinsurgency
Those military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat insurgency. Also called COIN. (DOD)

Defense in depth
The sitting of mutually supporting defense positions designed to absorb and progressively weaken attack, prevent initial observations of the whole position by the enemy, and to allow the commander to maneuver the reserve. (DOD)

Electromagnetic spectrum
The range of frequencies of electromagnetic radiation from zero to infinity. It is divided into 26 alphabetically designated bands. See also electronic warfare. (DOD)

Electronic warfare support
Division of electronic warfare involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate or localize sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition, targeting, planning and conduct of future operations. Also called ES. See also electronic attack; electronic protection; electronic warfare. (DOD)
Fires
The use of weapon systems to create a specific lethal or nonlethal effect on a target. (DOD)

Fusion
In intelligence usage, the process of examining all sources of intelligence and information to derive a complete assessment of activity. (DOD)

Geospacial
Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth, including: statistical data and information derived from, among other things, remote sensing, mapping, and surveying technologies: and mapping, charting, geodetic data and related products. (DOD)

Global information grid
A globally interconnected, end-to-end set of information capabilities, associated processes, and personnel for collecting, processing, storing, disseminating, and managing information, on demand, to warfighters, policy makers, and support personnel.

Homeland defense
The protection of United States sovereignty, territory, domestic population, and critical defense infrastructure against external threats and aggression or other threats as directed by the President. (DOD)

Information age
Measures that protect and defend information and information systems by ensuring their availability, intergrity, authentication, confidentiality, and nonrepudiation. This includes providing for restoration of information systems by incorporating protection, detection, and reaction capabilities. (DOD)

Information assurance
Information operations that protect and defend information and information systems by ensuring their availability, intergrity, authentication, confidentially, and nonreputiation. This includes providing for restoration of informationsystems by incorporating protection, detection, and reaction capabilities. (DOD)

Intelligence system
Any formal or informal system to manage data gathering, to obtain and process the data, to interpret the data, and to provide reasoned judgments to decisionmakers as a basis for action. The term is not limited to intelligence organizations or services but includes any system, in all its parts, that accomplishes the listed tasks. (DOD)

Joint force land component commander
The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of assigned, attached, and/or made available for tasking land forces; planning and coordinating land operations; or accomplishing such operational missions as may be assigned. The joint force land component commander is given the authoritynecessary to accomplish missions and tasks assigned by theestablishing commander. Also called JFLCC. See also joint force commander. (DOD)

Joint logistics
The art and science of planning and carrying out, by a JFC and staff, logistic operations to support the protection, movement, maneuver, firepower, and sustainmentof operating forces of two or more Military Departments of the same nation. See also logistics. (DOD)

Land Warrior System
An integrated fighting system for individual infantry soldiers which gives the soldier enhanced tactical awareness, lethality, and survivability.

Material handling equipment
Mechanical device for handling of supplies with greater ease and economy. See also material handling. (DOD)

Nongovernmental organization
A private, self-govering, not –for profit organization dedicated to alleviating human suffering, and/or promoting education, health care, economic development, envrironmental protection, human rights, and conflict resoliuton; and/or encouraging the establishment of demovrtatic institutions and civil society. Also called NGO. (DOD)

Profession of arms
The vocation ascribed to all whose work involves mastery of the disciplined and open, collective application of force in pursuit of public purpose (FM 6-22).

Reachback
The process of obtaining products, services, and applications, or forces, or equipment, or material from organizations that are not forward deployed. (DOD)

Red team
An organizational element comprised of trained and educated members that provide an independent capability to fully explore alternatives in plans and operations in the context of the operational environment and from the perspective of adversaries and others. (DOD)

See first
See/sense the entire environment before and more clearly than the enemy, while countering the enemy's ability to do the same; the network of integrated manned and unmanned sensors, at all points of the battlefield, from tactical through operational and strategic levels.

Soldier Systems Center
The U.S. Army Soldier Systems Center (SSC), located in Natick, Massachusetts, is the Army's one-stop Soldier-support organization. SSC is responsible for researching, developing, fielding, and managing food, clothing, shelters, airdrop systems, and Soldier support items. NSSC's goal is simple: Provide America's Soldiers with the best equipment in the world. To achieve this goal, the Natick team has consolidated full life-cycle management of Soldier items into a one-stop, Soldier support organization.

Strike
An attack to damage or destroy an objective or a capability. (DOD)

Section III
Special Abbreviations and Terms

This section contains no entries.