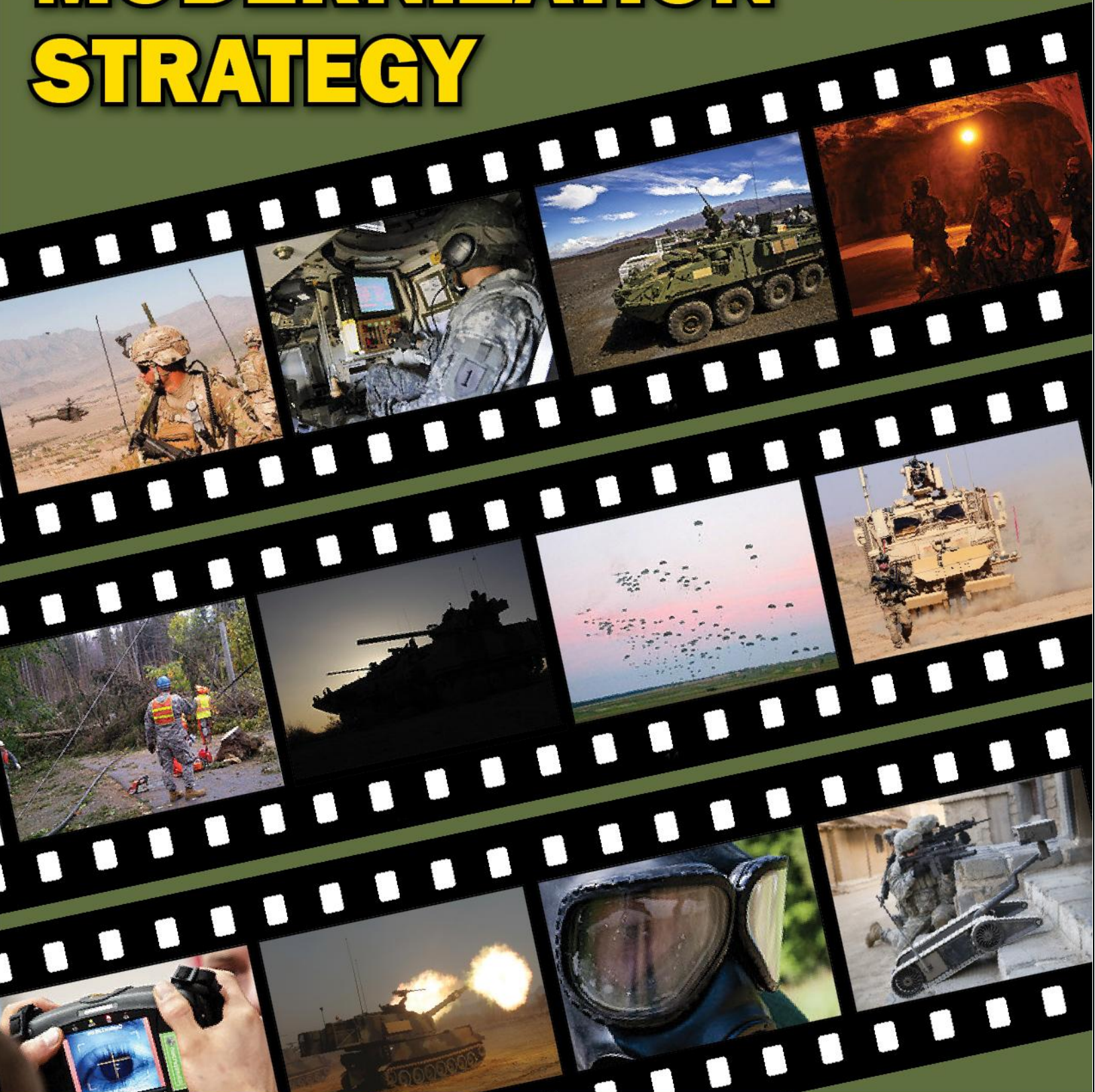


ARMY EQUIPMENT MODERNIZATION STRATEGY



“Versatile and Tailorable, Yet Affordable And Cost Effective”

04 March 2013

For more information contact: Headquarters, Department of the Army, Office of the Deputy Chief of Staff, G-8 Future Force Division (FDF), 700 Army Pentagon, Washington, D.C. 20310. Electronic copies of the strategy are available at www.g8.army.mil

Foreword

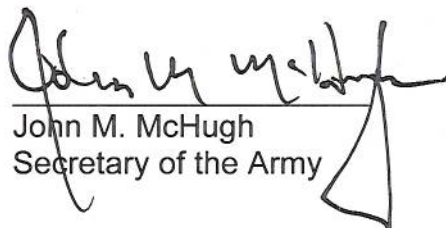
In January 2012, the Department of Defense issued strategic guidance that described a security environment in which the United States faces an array of challenges and potential threats in a period of fiscal uncertainty. This context means that the Armed Forces must seek innovative ways to achieve our security objectives. The qualitative edge of our ground forces – from the squad through the highest echelon – has long been a critical component of our national power. Our strategic guidance makes clear that we must maintain the technological edge over potential adversaries so that we can prevail in all domains.

This *Army Equipment Modernization Strategy* describes one element of that effort. The heart of the strategy is the use of mature technologies and incremental upgrades of existing equipment, while balancing research investments between evolutionary and disruptive technologies. When possible, we will procure already existing equipment that meets both Army and Joint requirements rather than starting a new program to solve near-term readiness needs. By describing the general approach toward modernization, this strategy provides a conceptual framework for how the Army is modernizing and equipping the force. Together, this document and the strategic, planning and prioritization guidance given in The Army Plan inform our thirty-year plan for programming, sustainment and acquisition processes and provide the specifics of what will be modernized and when.

Modernization is only one aspect of the Army's response to the Department of Defense strategic guidance; it complements our other efforts to answer the needs of the Nation, now and in the future. Though vital, modernization must be balanced with force structure and readiness to mitigate risk. As such, the theme of this strategy, "versatile and tailorable, yet affordable and cost-effective," perfectly summarizes how modernization fits within the larger goal of building an Army that is globally responsive and regionally engaged to meet the needs of combatant commanders and our Joint, interagency and multi-national partners.



Raymond T. Odierno
General, United States Army Chief of Staff



John M. McHugh
Secretary of the Army

Table of Contents

Overview	2
The Strategic Environment	3
The Technological Environment	4
The Fiscal Environment	5
Equipment Modernization Priorities and Guidance	6
Equipment Portfolio Management	7
Path Ahead	8
Summary	9
Endnotes	10
Annex A: Soldier and Squad	11
Annex B: Mission Command	13
Annex C: Intelligence	15
Annex D: Ground Movement and Maneuver	17
Annex E: Aviation	19
Annex F: Indirect Fires	21
Annex G: Air and Missile Defense Protection	23
Annex H: Assured Mobility	25
Annex I: Force Protection and Chemical, Biological, Radiological and Nuclear (CBRN)	27
Annex J: Sustainment Transportation	29
Annex K: Sustainment	31
Annex L: Operational Energy	33
Annex M: Army Medicine	35
Annex N: Science and Technology	37
Annex O: References	39
Annex P: Acronyms	41

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

Overview

“An Army that is capable of many missions, at many speeds, at many sizes, under many conditions and can operate in any environment”¹

This strategy establishes a framework for how the Army will modernize our equipment over time. Equipment modernization¹ is the materiel subset of the Army modernization effort that includes doctrine, organizations, training, leadership, personnel and facilities that will enable versatile and tailorable formation-based capabilities supporting the Army’s force generation model and Regionally Aligned Forces. This document addresses changes in the strategic, technological and fiscal environments following more than a decade of intense conflict and the Army’s adjustment to a broader Joint mission focus. Figure 1 illustrates the adjustment from a narrow to a broader focus as we prepare for future potential conflicts and adversaries.

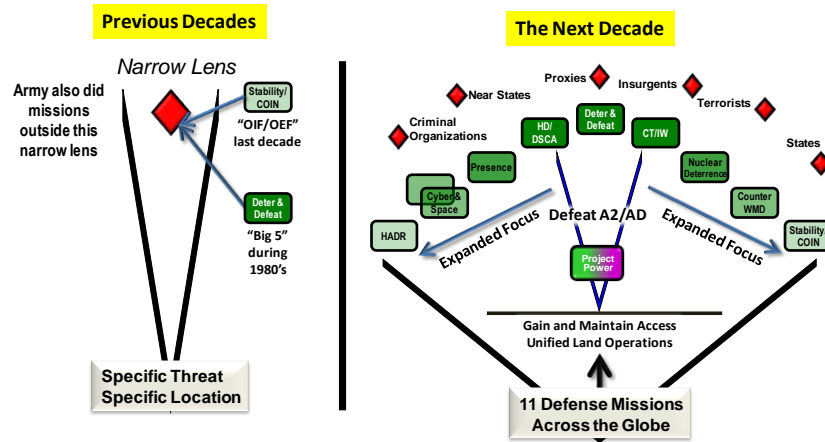


Figure 1

Our approach is to focus on supporting our Soldiers and small unit formations, while maintaining the capacity to deter and defeat potential adversaries by: 1) identifying achievable requirements; applying best practices in acquisition and sustainment; seeking incremental improvements; and harnessing network enabled capabilities to solve near-term capability gaps, while 2) investing in military-unique revolutionary and evolutionary technologies to solve future capability gaps. The Army will emphasize long range planning to define future decision points that considers equipment age, degradation of overmatch abilities, industrial base viability and closure of capability gaps in near (Fiscal Year 2014-2018 (FY 14-18)), mid (FY 19-27) and long-term (FY 28-48) timeframes, while allowing for cost-informed decisions that balance force generation needs with the Total Force modernization posture. The future environment will require versatile and tailorable formations that are regionally aligned and mission focused to meet combatant commander’s needs for land forces supporting the National Defense Strategy.

¹ General Raymond T. Odierno, Military Strategy Forum: The Future of the United States Army: Critical Questions for a Period of Transition, CSIS, 1 Nov 2012

The Strategic Environment

In contrast with the Cold War era, there is no clear and unequivocal primary threat. Instead, we face a complex and interconnected global operational environment characterized by a multitude of actors. This complex environment (figure 2) poses a wide range of possible threats under conditions of uncertainty and chaos. Adversaries' regular forces, irregulars, criminals, refugees and others intermingle in this environment and interact in many ways, as do our coalition partners and non-governmental organizations. Besides a broad range of readily available conventional weapons state and non-state actors can select from an array of affordable technologies and adapt them to create unexpected and lethal weapons. Social media will enable even small groups to mobilize people and resources in ways that can quickly constrain or disrupt operations. The reality is that capability gaps will emerge and disappear rapidly - military requirements will not remain constant so our requirement, resource, acquisition and sustainment processes must adjust to remain agile.

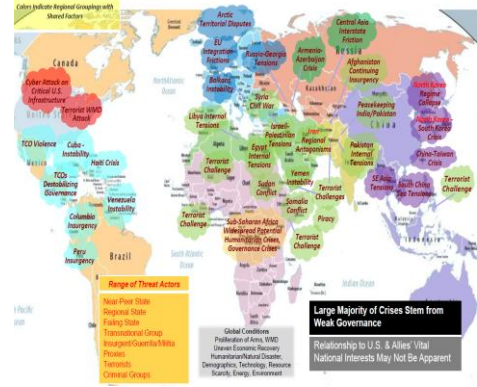


Figure 2

- Our equipment and acquisition must be versatile: Given the diversity of the 11 defense missions, our equipment must work safely in various terrains, in cold and hot weather, in energy and water constrained environments and only support niche missions or capabilities if it is cost-effective to do so; the ability to quickly procure equipment based upon mission needs is a priority;
- Our modernization efforts must consider Joint and Coalition interoperability: Interoperability and interdependence will become increasingly important with reductions in U.S. force structure; globally integrated operations will leverage unique capabilities of each military Service and coalition partner;
- Our equipment must support tailorable formations: Combatant commanders will use Army formations from the individual Soldier through Corps; therefore, our equipment and systems have to be scalable to different sized formations and retain capacity to surge quantities to meet mobilization needs;
- We must retain the ability to deter and defeat adversaries: Modernization preserves the Army's core capability to conduct decisive land operations;
- Our combat enablers will remain in high demand: Army capabilities such as engineers, military intelligence, air defense, aviation, communication, logistics and military police will maintain a high operational deployment tempo; keeping them resilient and equipped with up-to-date technologies is a priority; and
- We must reduce the training, maintaining and energy burdens to use equipment: Since we cannot anticipate which formations will deploy where, equipment that is "intuitive" in use and energy efficient/flexible, will greatly increase versatility; human factors engineering and virtual simulation-based training are highly desired attributes.

The Technological Environment

We are living in a time of both great technological innovation and proliferation. In the past, we were able to anticipate capability gaps based upon a relatively static threat, but that model has disintegrated over the past two decades. Today, non-state actors and other nations are capable of acquiring advanced communications, cyber, unmanned aviation and weapons that can provide them sophisticated capabilities. Additionally, the commercial sector in many industries has grown much larger than the traditional defense sector causing a disconnect in the rate of innovation between commercial-technologies and military-technologies. The effect of this disconnect is that we must change how we think about our traditional weapon systems and disaggregate them into three pieces to both take advantage of commercial advances and mitigate potential vulnerabilities:

The rate of innovation provides us with unprecedented opportunities, yet also makes us extremely vulnerable to adversaries who can quickly exploit or create capability gaps

- **Components:** These are items for which technologies rapidly change (three to five year cycles) such as sensors, software and communication equipment; we want them to be adaptable and reconfigurable across multiple platforms, expandable (readily updated in response to changing circumstances) and linked together to close multiple capability gaps; innovation is primarily driven by commercially available technologies requiring the Army to maintain and improve a core ability to integrate components across multiple sub-systems and systems; these components will be built with the understanding that size, weight and power must be minimized.
- **Sub-Systems:** These are the devices that link components to our platforms, for which technology changes more slowly (once a decade) such as engines, gun tubes, radars, radios and cockpits; they enable our platforms to shoot, move and communicate; innovation is shared between the commercial and defense sectors, requiring careful integration of investments in areas such as encryption, robotics, unmanned systems, networking/energy efficiency, energetic materials and mobility.
- **Systems:** Systems host our component and sub-systems, for which technology changes very slowly (several decades) such as tanks, helicopters, watercraft and facilities; there are generally fewer commercial innovations, forcing us to rely on government funded research and development efforts in areas such as protection, survivability and lethality; replacing systems is expensive and takes a generation; some of our platforms need to be replaced in the near-term as the threat has made them obsolete, while others will be with us for many decades.

We must be especially careful anticipating capability gaps that can and will be imposed upon us by potential adversaries as they use low-cost technologies which require our development of costly solutions. We simply cannot afford to be on the wrong side of a cost-imposing strategy. Finally, the cyber-domain will evolve in ways we cannot anticipate and is both one of our greatest advantages and disadvantages.

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

The Fiscal Environment

As a Nation, we are living in the midst of both a global and national fiscal environment that in the near-term is forcing crucial decisions relating to structure, readiness and equipment modernization. Decisions made in the next few years, driven by near-term fiscal challenges, will impact our national defense for decades to come. During periods following protracted wars (illustrated by figure 3), the defense budget has historically declined causing a “procurement holiday” which resulted in greater risk for the first battles of the next war. The impact as we put together our equipment strategy is to take into account the reality of defense spending – it rises and falls over time and is never constant.

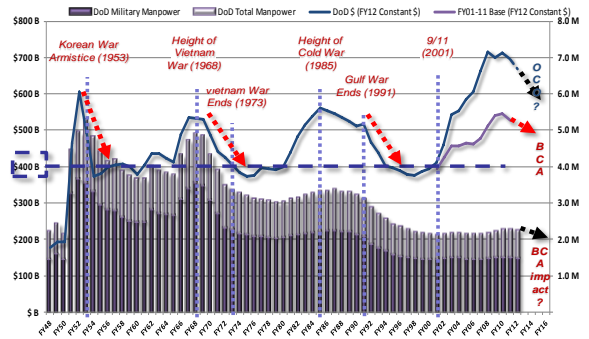


Figure 3

- Smaller procurement objectives: In between conflicts, the Army cannot afford to equip and sustain the entire force with the most advanced equipment, but we must be prepared to procure large quantities once war-funding is available; our challenge in the near-term is to balance modernization, sustainment and training of multiple variants in a constrained fiscal environment;
- Align threshold requirements with mature/non-developmental technologies: Many capability gaps can be closed with equipment or technologies that already exist; commodity-like procurements will capitalize on industry practice to incrementally improve equipment as we unbundle our systems and requirements into components, sub-systems and systems; this will also shorten acquisition timelines, enabling us to buy more often and divesting rather than sustaining some items;
- Cost-effectiveness is different than affordable: For the foreseeable future, every equipment decision has to be both affordable within the overall budget to include life cycle logistics costs, but also cost-effective in addressing the known capability gap that is being addressed; the opportunity cost of “over-spending” to close a specific gap is that we will not be able to afford closing other gaps; we will make cost-informed trades to manage risk;
- Setting requirements to be affordable: In the past, we spent large sums to develop programs that we later could not afford or the capability gap changed; we seek to minimize development times and costs to preclude a forced procurement holiday while also assessing standing requirements that we have decided not to fund to determine if those requirements should be cancelled; and
- Divest to reduce costs: To generate additional resources for modernization, we will accept risk by divesting older systems or niche capabilities in order to decrease sustainment costs; when planning platform replacements and upgrades assess the economically sustainable life of the current platforms to determine cost and risk of continuing to sustain, upgrade or replace the platform.

Equipment Modernization Priorities and Guidance

“The requirements and acquisition communities must cooperate more closely and continuously to ensure that requirements are technically achievable and affordable so that operational and Service leadership can make informed decisions about the costs associated with varying levels of performance”²

Guiding priorities and principles:

- **Enhance Soldiers for broad Joint Mission Sets**: Provide improvements by fielding technologies that empower, protect and unburden Soldiers and formations, thus providing equipment at the earliest time to better accomplish the mission;
- **Enable the Network for Mission Command**: Facilitate the decision-making of leaders and Soldiers with networked functional information requirements and connectivity across the Joint Force from home station down to the Soldier and across platforms through commodity-like procurement and rapid innovation; and
- **Remain Prepared for Decisive Action**: Facilitate fleet capabilities to increase lethality and mobility while optimizing survivability and sustainability. Manage the full suite of capabilities enabling the most stressing Joint war fights.

To accomplish these priorities, we must synchronize our requirements, acquisition, sustainment and resourcing processes:

- Reduce equipment complexity with the goal of improving the Soldier’s ability to more safely and effectively train, maintain and employ;
- Foster a competitive acquisition environment to control cost, foster innovation and improve quality while enabling evolutionary acquisition with time-phased capability needs and technologies; avoid obsolescence and sustain the organic and commercial industrial base;
- Transition equipment to full sustainment upon completion of the procurement phase and divest of unneeded equipment;
- Combine defense and commercial technologies to close capability gaps; emphasize interoperability and interface standards to minimize integration timelines and costs;
- Use “fork in the road”ⁱⁱ decisions to establish smaller procurement objectives with sustained production rates that preserve a capability to surge production rates to support large scale operations;
- Replace platforms on a schedule to avoid multiple, simultaneous “generational” buys;
- Use long range capital investment planning to balance affordable production and sustainment across portfolios; seek to reduce institutional and unit training costs;
- Account for the growing end-to-end network demand to meet all information requirements, training strategies and cyber capabilities; and
- Reduce operational energy requirements and develop operationally viable alternative energy sources to reduce Soldier risk and improve sustainment.

² Mr Frank Kendall, Under Secretary of Defense for Acquisition, Technology and Logistics, Better Buying Power Memo 13 Nov 2012

Equipment Portfolio Management

The Army manages equipment modernization through capability-based portfolios. The strategy for each portfolio will be different depending on the mix of commercial (e.g. robotics, software and communications) versus defense related technologies (e.g. indirect fire cannons, tanks and combat helicopters), the current modernization level within the portfolio, the life-cycle management needs within the portfolio, the threat gaps and gap closure priorities across the portfolio and the status of the industrial base. A short outline of the strategy of each portfolio is provided as an annex. Each portfolio is developing a plan that will look out over the near (FY 14-18), mid (FY 19-27) and far (FY 28-48) term to:

There is little downside to quickly putting promising capabilities in Soldier's hands, such as the Network Integration Exercise

- Segregate within portfolios based upon components, sub-systems and systems;
- Identify the blend and overlap of commercial and defense technologies;
- Develop a plan over time that describes the portfolio, defines the risk and challenges the portfolio faces in an uncertain future, identify procurement priorities and incremental near-term improvements and identify investment needs for technology insertions and transitions that address future gaps;
- Invest in integrating capabilities across components, sub-systems and systems to maximize the use of applications across multiple platforms and to reduce overall life cycle costs; open architectures are key alternatives to proprietary or niche solutions;
- Design for Soldiers by increasing our efforts in safety, health and human factors engineering to reduce the cognitive complexity, risk of non-combat effectiveness and physical burden to the Soldier thereby enhancing training opportunities and resources;
- Value versatility and tailorability in new programs for growth in future increments; designs should incorporate ability to change size, weight, power and space parameters of components without compromising capability; enable strategic responsiveness to rapidly deploy capabilities and conduct effective operations within different formations;
- Identify organic and commercial industrial base concerns to avoid block obsolescence and maintain a capacity to surge during mobilization;
- Determine the cost-effectiveness of closing capability gaps to maximize the achievement of closing gaps at the least cost possible; not every gap will be closed, especially if we are on the wrong end of the cost-benefit tradeoff; and
- Equipment modernization decisions must ensure a life-cycle management focus in modernizing and equipping the Total Force, minimizing maintenance burden and sustainment costs and reduce institutional and unit training costs; emphasize measures which reduce logistic demands, especially considering energy, water and waste for Soldiers, forward operating bases and vehicles.

Path Ahead

The vision of our equipment modernization strategy is to take advantage of government and commercial technologies to buy and integrate mature incremental improvements in the near-term, while investing in revolutionary and evolutionary technologies for the future.

Given the strategic, technological and fiscal environment we cannot afford to buy everything. We will reduce overlap within our formations and across the joint force; we will determine if disposable is more cost-effective than durable; we will assess the affordability of broader mission applications and multi-role capabilities versus niche capabilities; and we will favor equipment that can be produced in larger numbers in case of large scale mobilizations like we saw this past decade. Acceptable risks will be balanced with other requirements and will be affected by decisions on force structure, force generation and regionally aligned forces.

Ensure that our Soldiers have the right equipment, for the right missions, at the right time by procuring versatile and tailorable equipment that is affordable, sustainable and cost effective

Our equipment modernization strategy requires an industrial base that is rewarded for reducing costs and can react to the increased quantity demanded during national emergencies while still retaining the ability to buy smaller quantities between major conflicts. We will take advantage of existing technologies, while investing in the research to produce disruptive technological change in defense-related capabilities. Integration of technologies and improvements in supportability and sustainment are key links in achieving real and significant cost-effective improvements in capabilities. Ensuring that we have capabilities able to operate in complex jungle terrains and the harsh desert terrain will ensure a degree of versatility in the Army's overall capabilities. Finally, we will manage modernization and equipment fill levels to achieve ready units to support specific regional mission needs of the combatant commanders. By presuming decision points at specified times, the Army will incorporate advancements in technology better, incorporate commercial technologies where appropriate and manage when platforms are due for replacement precluding the simultaneous replacement of multiple major systems. Ultimately a steady stream of improved capabilities at the best value is the desired outcome. These are identified in the accompanying integrated portfolio annexes as the near, mid and far term objectives.

Finally, one of our highest priorities is to off-load complexity from the Soldier to the machine and software, easing physical, training and maintenance burdens, standardizing mechanical and software interfaces and developing consistent cognitive and physical ergonomics that maximize safety and resilience. We simply cannot afford to increase our unit and institutional training costs and timelines because it will directly take competing resources away from warfighting units. Simplicity in design and functionality, along with interoperability is crucial and non-negotiable.

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

Summary

The United States Army is the world's decisive land force. Our Soldiers and formations must be equipped, enabled and prepared to operate in complex and uncertain battlefields supported by precise information and overmatch capabilities delivered to the right place and at the right time. The Army can prevent conflict by maintaining credibility based on: dominant capabilities, readiness, environments shaped by sustained relationships with other Armies and facilitating strategic access. If necessary, the Army rapidly applies its combined arms capabilities in a "discriminately lethal" fashion to deter and defeat any adversary. In pursuing this equipment strategy, we must equip the Army for many missions, under many conditions, in varied geographies, against evolving threats and in an uncertain fiscal environment.

Implications for Equipment Modernization

- Equipment must be *scalable* in production
- Components *must "fit"* across multiple platforms
- Must *maintain* capacity to deter and defeat
- Must enable "*fork in the road*" decisions
- *Threat gaps* will rapidly evolve
- *Funding levels* will change from year-to-year
- **Design for Soldiers -- *intuitive to use & train***
- Incorporate Energy and Water sustainability

The rate of innovation causes us to reflect upon two different drivers of change. The first driver is that of opportunity; where we will leverage good ideas like new designs and technologies to improve our capabilities. The second driver is capability gaps that are forced upon us by potential adversaries as they use technologies or other good ideas against us. The search for disruptive technologies is similarly a double edged sword as we look for opportunities but also hedge against future threats where a potential enemy creates a disruptive threat to us. Equipment solutions are often the most time consuming and expensive solutions, we will ensure we address all other potential remedies through a cost-benefit analysis across doctrine, organization, training, leadership, personnel and facilities.

This equipment modernization strategy will help us determine which systems to procure, which technologies to invest in and which applications to integrate during the yearly budgeting process. We realize that the optimal strategy for developing capabilities includes steady funding and stable requirements, but the next decade does not provide us this opportunity. Therefore, knowing that funding will be anything but stable and requirements will rapidly evolve based upon the threat and pace of innovation we will seek to leverage existing government and commercial "off the shelf" improvements, minimize development costs, invest in defense related disruptive technologies, make smaller but more frequent incremental procurements and always be prepared to "scale-up" to meet the requirements to defeat an adversary when large scale mobilization is required. We will work with the Joint Staff, combatant commanders, other Services, Office of the Secretary of Defense, U.S. Congress and industry to make the best decisions to enable the security of our Nation and to ensure we are prepared for the first battle of the next war.

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

Endnotes

ⁱ Equipment Modernization: We use this term when we intend to procure or modify a piece of equipment (component, sub-system, system) to fill a capability gap or replace it due to obsolescence. Continuous or incremental modernization allows us to fill capability gaps quickly through the indefinite service life of our platforms.

ⁱⁱ Forks in the road are knowledge and decision points, planned in advance, that provides Army leaders the opportunity to make informed strategic equipping decisions that either mitigate or address future operational and readiness risks.

Annex A

Soldier and Squad

Description

This portfolio develops and modernizes squad capabilities in lethality, mobility, protection and situational awareness to maintain overmatch against peer adversary formations. The rifle squad is the foundation of our versatile and tailorable formations and equipment that enhances the squad will, in many cases, cascade to other formations and to individual Soldiers. This portfolio includes items such as individual weapons, uniforms, night vision goggles and personal protective equipment.

Risks and Challenges

The rifle squad currently has overmatch but open market and commercial technologies are closing the gap between our capabilities and those of our adversaries. The proliferation of technologies, especially cheap asymmetrical capabilities and countering enemy timing, location and conditions for engagements are our primary risks. Armor piercing munitions, night vision devices and advanced body armor are available to potential adversaries and are easily acquired by non-state actors. As we think about managing this portfolio, equipment needs will be segregated into leader equipment, common equipment and mission specific equipment all integrated carefully with doctrine, organizations, training and leader development. Our key evaluation criteria will be:

- Lethal Squads capable of discriminate engagements, minimizing collateral damage, scalable non-lethal to full lethal effects, beyond line of sight engagements, engaging defiladed enemies;
- Distributed Squads capable of transmitting and receiving data to develop a common operating picture;
- Trained Squads with the ability to operate in a complex environment, among various cultures, in coordination with host nation and allied partners;
- Maneuverable Squads capable of moving long distances, while maintaining power requirements in austere environments; and
- Resilient and Protected Squads that have tailorable and scalable protection from small arms, blast and fragmentation and ability to measure and mitigate blast effects

Our priorities are to connect the squad to the network; improve counter defilade target engagement times and accuracy; improve lethality through reduced engagement times with rapid target acquisition technologies and increased small arms engagement ranges; improve training and leader development; reduce Soldier load and power consumption; and improve survivability through protection and blast mitigation.

To have an affordable and cost-effective solution, we are analyzing our core fielding needs potentially supplementing with capability packages such as Deployer Equipment Bundles for the first deployer that provide a bridge until full production; Rapid Fielding Initiatives of pre-approved unfunded needs that can be rapidly procured when funding is

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

available; and a Soldier enhancement program that enables us to “buy, try and decide” are concepts we are exploring for efficiencies.

Near-Term (FY 14-18) Objectives

In the near term, the Army will prioritize the modernization of existing weapons such as the M4A1 individual carbine and the M240L machine gun; invest in the development of new weapons while leveraging “off the shelf” technologies for some type of counter-defilade target engagement system and for improvements in our recoilless rifle capabilities. In the area of protection and mobility, the Army will incrementally improve ballistic protection against existing enemy weapons while lightening the Soldier’s load with continuous upgrades. We will increase safety, energy flexibility, interoperability, efficiency and management attributes among Soldier, vehicle and basing systems.

Mid-Term (FY 19-27) Objectives

Mid-Term goals include continued development of weapons and the use of threat studies to ensure consistent overmatch at the squad level. Lightening the Soldier’s load efforts include lighter weapons, ammunition and equipment such as caseless ammunition and modular body armor; a squad equipment transport system and improvement to tactical logistical systems; Soldier power networking and management capabilities; and processes to shift the burden from the Soldier and squad to the logistics infrastructure. The Army will continue ballistic protection improvements that result in greater protection against improved enemy weapons while being simultaneously lighter and more ergonomic. Future situational awareness efforts will fuse multiple types of sensors into a heads-up display that will link the Soldier to his weapon and network the Soldier and squad to higher, supporting and adjacent units. A major emphasis that will impact lethality, mobility, protection and situational awareness will be the leveraging of robotics/unmanned ground systems to enhance protection, persistence, resilience and endurance of the Soldier and the squad.

An example of lightweight priorities is our small arms program which has demonstrated the potential for a dramatic reduction in weapon and ammunition weight. More work is needed to ensure lethality improvements do not create reliability and durability gaps, as well as determining if the munitions and weapons can be cost-effectively mass produced. We will also develop flexible adaptive systems to manage and network energy and to leverage available resources where we are deployed.

Long-term (FY 28-48) Objectives

To support far term modernization we will invest in disruptive technologies to facilitate change to next generation capabilities. Research in the areas of Soldier power and advanced weaponry give an idea of where these breakthroughs could take place.

Annex B

Mission Command

Description

The Mission Command integrated portfolio is defined as the related tasks and systems that develop and integrate those activities enabling a commander to balance the art of command and the science of control to integrate the other warfighting functions. This portfolio builds incremental capability through an integrated equipment portfolio of four subcomponents: Transport, Applications, Network Integration and Enablers. The portfolio's principle objective is an integrated and interoperable network that connects all echelons from the Soldier to the Joint Task Force along with interagency and coalition partners enabling versatile and tailorable formations.

This portfolio provides the appropriate mix of these components to meet the information needs of Soldiers, commanders and their staffs at each echelon with scalable solutions. The portfolio is constantly assessed for opportunities to leverage commercial technologies, ensure sustainability, reduce complexity and seamlessly integrate from the platform to the enterprise. The Network Integration Evaluation (NIE) supports this strategy by conducting technically and operationally relevant evaluations to get equipment in the hands of Soldiers as quickly as possible.

This network must be safe, efficient, effective and secure; seamlessly support the operating and generating force; share information across levels of classification; and enable rapid capability development. The network must enable live, virtual, gaming and constructive training at all levels and ensures that expeditionary forces can train with their mission applications and systems in the garrison environment using Installation as a Docking Station and emerging capabilities to ensure a seamless transition from home station to training and mission locations. The key elements are Soldiers, platforms and command posts linked by a reliable and secure transport network.

Risks and Challenges

Recognizing the reality that network capability gaps will emerge and change rapidly, the mission command solutions cannot be static. Developmental timelines must be shortened with more mature incremental improvements. Our approach is to conduct reoccurring portfolio assessments culminating with twice-per-year NIEs. The result is an approved Capability Set describing an integrated set of available Mission Command capabilities at best value. Ensuring that all elements of the Network are procured, integrated and fielded together throughout a combat formation reduces the user's integration burden and increases unit readiness.

Keeping pace with operational requirements within a complex strategic environment while recognizing that adversaries continue to acquire and exploit increasingly sophisticated technologies entails inherent risks. A rapidly increasing risk is the cyber threat to both the network infrastructure and our mission command information. Similarly, the current complexity of our network increases our security risks while adding

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

to our training requirements and readiness – simplicity must be gained where feasible. Also, these improvements incur new energy demands (quantity and reliability) that must be balanced. The incremental approach to increased capability through commercial technology presents risk because of the continuous resource requirement and over time may introduce interoperability and sustainment issues if not managed closely.

Near-Term (FY 14-18) Objectives

In the near-term, we will field capability sets to limited number of brigades to extend the network to mounted, dismounted, at-the-halt and on-the-move Soldiers and leaders in an integrated fashion fielding the capability across the force if needed and when funding becomes available. Priorities are fielding this integrated network with on-the-move capability; beginning migration to the Common Operating Environment to create standardized software/hardware infrastructure; and reducing complexity and sustainment requirements by converging transport on advanced networking waveforms. Power research efforts are focused on maximizing fuel efficiency and increasing reliability, maintainability and transportability by leveraging commercial technology.

Mid-Term (FY 19-27) Objectives

The portfolio modernizes increasing numbers of formations through Capability Set fielding and redistribution of at-the-halt capabilities; continues incremental upgrades of transport capacity and convergence to the tactical edge; completes common operating environment implementation; integrates improved capability into next generation combat platforms; and continues development and fielding of cyber and electronic warfare capability to overmatch threat. We will improve energy management by integrating and networking of energy systems (“energy-informed operations”) and by leveraging advancements in efficiency, flexibility, size and weight.

Long-term (FY 28-48) Objectives

The portfolio leverages the next generation of network technologies including nano for smaller, lighter, faster, more secure capabilities; implements data-centric networks; facilitates Joint Force enterprise constructs; and completes fielding of on-the-move and aerial layers integrated with advanced intelligence, surveillance and reconnaissance, electronic warfare, robotics, aviation and all ground platforms. The portfolio continues to leverage commercial energy technologies.

Overall, the Army’s Mission Command modernization strategy ensures extending careful balance of cost-effective incremental solutions that will deliver the network enterprise to the dismounted and mounted Soldier and leader; focus on reducing complexity to the Soldier, controlling costs through agile development and fielding, convergence of applications and systems and a common operating environment.

Annex C

Intelligence

Description

The Intelligence integrated portfolio integrates requirements and programming strategy to equip the force with versatile, scalable and multi-disciplined capabilities across four primary layers: Space, Aerial, Terrestrial and Foundation. These layers incorporate key components of intelligence collection, exploitation and analytics to ensure “No Military Intelligence (MI) Soldier is at rest.”

This portfolio ensures Army intelligence is globally engaged, regionally responsive and capable of performing as a joint partner. The intelligence portfolio provides scalable and affordable equipping solutions to meet the intelligence needs of Soldiers, commanders and their staffs at all echelons. The portfolio’s space layer leverages and integrates national space-based capabilities to provide commanders with the most advanced and current intelligence products available. The aerial layer integrates manned and unmanned airborne sensors to provide tactical, operational and strategic intelligence to the force. In the terrestrial layer, the portfolio equips multi-function teams with terrestrial sensors and systems tailored for full-spectrum support in any operating environment. The secret/top secret-capable foundation layer is the center of gravity within the intelligence portfolio. It integrates all layers into the Joint intelligence enterprise and provides commanders and decision makers the necessary tools to analyze, process and exploit information collected from the other layers. It provides the means to turn this information into actionable intelligence and disseminate the intelligence at the appropriate classification level to commanders at all echelons.

The portfolio provides integrated, interoperable and networked intelligence capabilities to support decisive action in all current and future contingencies. The portfolio must equip its Soldiers with capabilities that enhance functional and regional expertise through a collaborative enterprise. This enterprise will ensure operational and global engagement before the first boot ever sets foot on the ground. Current capabilities must be incrementally modernized or replaced.

Risks and Challenges

The Intelligence portfolio faces significant risk across all four layers if its systems do not meet or exceed the rapid pace of technological advances in communications, cyber, electronic warfare, counter-detection and analytics. Failure to keep these system technologies up-to-date will blind future commanders to threats, decision points and lines of operations endangering both lives and mission success. Failure to see and understand complex operating environments across the globe will result in degraded planning effectiveness and the loss of preventative or pre-emptive opportunities.

The greatest challenges facing this portfolio are the rapid pace of technological advances and the wide variance of potential operating environments. The operational environment will continue to grow more complex requiring greater interoperability and

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

collaboration across the force. These challenges are further exacerbated by budget constraints. The Army must continue to provide safe and cost effective incremental and scalable intelligence capabilities able to meet the full scope of operational demands in any environment and in concert with joint and coalition partners.

Near-Term (FY 14-18) Objectives

This portfolio benefited from investments in overseas contingency operations programs designed to satisfy critical needs over the last ten years of war in areas such as advanced analytics, aerial sensors, ground-based Signals Intelligence collection devices and biometrics. During this time frame we will focus on providing Soldiers multi-level and multi-intelligence, integrated analytical processing, exploitation and dissemination capabilities to support multi-function intelligence teams in a Joint and collaborative environment. The Army is analyzing adjustments to sensor and platform fielding strategy to improve coverage of critical Intelligence, Surveillance and Reconnaissance (ISR) demand by up to 18 percent. We must also integrate the proven capabilities of quick reaction capability systems and sensors developed over the last decade of war to leverage the success of these systems for the future force.

Mid-Term (FY 19-27) Objectives

During this time frame, we will keep pace with technology through modernization and enhancement of both ground and aerial intelligence, surveillance and reconnaissance sensor phenomenology and host platforms as they reach the end of their economic useful life. Sensor modernization will focus on a myriad of multi-discipline technologies including high definition full motion video, three dimensional imaging, advanced geospatial intelligence, signals intelligence, wide-area and counter-concealment sensing technologies such as foliage penetration (important to non-desert environments such as the Pacific jungle terrain) and hyperspectral imaging radars and light detection and spectral imaging sensors.

Long-term (FY 28-48) Objectives

Long-term objectives include the continuation of manned aerial ISR modernization through system upgrades and replacement of capabilities at the end of their useful lives. During this time period, our greatest risk is our adversaries' use of technology advances to the point that we have to field new air and ground systems to collect multiple signatures based upon the proliferation of new technology. Finally, we will prioritize the introduction of analytical capabilities to enhance our processing, exploitation and dissemination, as well as improving our regional situational awareness while maintaining a global persistent stare.

Annex D

Ground Movement and Maneuver

Description

The Ground Movement and Maneuver portfolio is our Nation's "heavy fleet" of combat power. It consists of a mounted lethality platform, infantry fighting vehicle platforms and a general purpose platform. Its primary purpose is to defeat peer adversaries through firepower and maneuver and also provides combatant commanders scalable and tailorable formations of light, medium and heavy forces for peer, hybrid and asymmetrical threats across a broad range of environments. This portfolio further provides Soldiers the protected mobility required to deliver them safely to, on and from the battlefield. Finally, this portfolio will provide the necessary platforms and technologies to truly network the force.

Risk and Challenges

There are several likely threats that will stress our combat vehicles and formations.

- Proliferation: A growing proliferation of less-expensive precision-guided anti-armor weapons will be present across the range of adversaries and will force not only doctrinal and policy change, but material change as well.
- Urbanization: The rapid expansion of urban areas and the need to engage the enemy in or near these urban areas will create challenges in the way we employ our combat vehicles and in the way we adapt existing platforms or develop new systems to cope with the urbanization of the battlefield.
- Protection, Mobility and Lethality: We can expect our adversaries to continue building larger explosive devices, thereby driving a continued challenge of protecting our Soldiers inside of the vehicles; in addition to cost (it remains cheaper to build a bigger explosive device than to protect against one), we will need to carefully balance protection against other requirements such as mobility and lethality.
- Rapid Adaptation and Flexibility: We cannot anticipate the entire set of threat challenges and must be able to adapt; we will need to become more agile in our requirement, resourcing and acquisition processes, as well as incorporate open architectures for energy, protection and other attributes.
- Simultaneous Obsolescence: We procured the majority of our current platforms decades ago; we must manage the fleet carefully since we cannot afford to replace them all at once. Therefore, addressing the near-term requirement for replacing the general purpose platform (the current M113 fleet), the mid-term requirement to replace the infantry fighting vehicle platform (the current Bradley fleet) and the long-term requirement to replace the mounted lethality platform (the current Abrams tank fleet) must be carefully planned; additionally, industrial base concerns must be

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

carefully managed as these platforms rely on non-commercial, defense-related technologies and production capacity.

Near-term (FY 14-18) Objectives

In the near term, current combat vehicles must remain viable, relevant and maintain high protection standards. This will be accomplished with continued recapitalization of Abrams, Bradley and Stryker vehicles to maintain fleet readiness. We will also invest in incremental improvements in the management of space, weight and power-cooling to regain design margins lost to protection enhancements and enable the insertion of future technologies, component devices and applications. Our research efforts must be postured during this period to impact the design of future combat vehicles that will incorporate survivability and protection upgrades, weight reduction, mobility improvements and other advances in lethality and situational awareness. We will also continue actions to replace our general purpose vehicle, the M113.

Mid-term (FY 19-27) Objectives

In the mid-term, we will continue to invest in critical capabilities to improve protection, survivability, mobility, lethality and network integration needed to fight and win against peer, hybrid and asymmetrical enemies. These improvements will impact current vehicles such as the Abrams main battle tank and Bradley fighting vehicle. Our priority is to restore protected mobility, expand on board power and increase our integrated network capability. To do this we are focusing on replacing two main platforms: our infantry carrier, currently the Bradley; and our multi-purpose carrier, currently the Vietnam-era M113. For both solutions, we seek to minimize technological risk to accelerate fielding timelines, minimize development and ensure they are both affordable and cost-effective.

Long-term (FY 28-48) Objectives

To support long term modernization we will invest now in disruptive technologies to facilitate change to next generation platforms such as a future mounted lethality platform (future tank) that utilizes revolutionary weaponry and protection systems and an Infantry carrier that seamlessly interfaces with light and medium forces and mounted and dismounted Soldiers, ensuring overmatch against peer and asymmetrical rivals. These platforms must have growth margins and the flexibility to accept unknown future technologies as proven hedges against yet to be defined future enemies and conditions.

A key design feature for our vehicular fleet is to provide for a versatile mix of capabilities, optimized with the reach, endurance, protection and staying power which will require energy and power management solutions focused on enhancing mission effectiveness, while reducing the logistical burdens for fuel and water.

Annex E

Aviation

Description

The Aviation integrated portfolio is defined as the related tasks and systems that develop and integrate rotary wing, fixed wing and aviation enablers to conduct air operations. These investments are a balanced combination of new production, remanufacturing and recapitalizing to achieve the desired goals. Over the next 30 years the Army will lead a Joint Service effort to transition from its current manned rotary-wing platforms to a future capability that will improve speed, range and lift capacity beyond the design limits of edge-wise rotor systems, focusing this future vertical lift development effort initially toward the medium aircraft class, the attack and utility helicopter fleets.

Risks and Challenges

The priorities for this portfolio are the sustainment of platforms and enablers, rebalancing the force to make it more affordable, leveraging science and technology to both modernize current capabilities and field future manned and unmanned aviation capabilities. To do this, we will improve our interoperability and modernization, while reducing underutilized capacity and legacy systems.

There are four distinct risks facing the Aviation integrated portfolio under the current and projected fiscal constraints. These risks impact the effectiveness, efficiency and survivability of our force.

- First, we assume risk by deferring new build AH-64Es beyond FY 18; currently, we are short 84 Apache Longbows across all components.
- Second, we assumed risk in our armed aerial reconnaissance portfolio and are in the process of a decision for a path ahead on the future platform for this capability (service life extension to the OH-58D Kiowa Warrior or a new start); we are working towards this cost-effective and affordable decision over the next year.
- Third, there are current enemy threats that our aircraft are incapable of detecting, thus defeating without improvements to our aircraft survivability suites; improvements that at best will take a decade to implement; these threats have not been a factor in Iraq and Afghanistan, but may pose a significant threat in the future.
- Lastly, we assume risk to our ability to be versatile and tailorable without significant turbulence within our formations, therefore we will consider force structure changes to better enable command and control, as well as sustainability in future conflicts.

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

Near-Term (FY 14-18) Objectives

In the near-term, the Army will upgrade the cargo portfolio aircraft to the digitized CH-47F Improved Cargo Helicopter and continue procurements of the digitized UH-60M while adding a digital capability to the remaining UH-60L fleet. In the attack portfolio, the AH-64 will continue fielding a Block III capability (designated the AH-64E) and the reconnaissance portfolio will see the continued fielding of an improved digitized OH-58F to eliminate obsolescence and modernize the recon fleet. The Army may pursue a new build Armed Aerial Scout helicopter or recapitalize the current fleet, a decision that will be based upon the maturity of technology, as well as affordability.

Mid-Term (FY 19-27) Objectives

In the midterm, the cargo portfolio will see an insertion of new performance enhancements for lift, range and energy efficiency, while evaluating data for future recapitalization. The utility portfolio will complete the procurement of the UH-60M and evaluate data for a follow on recapitalization. The fixed wing portfolio will look at options for a future utility aircraft to replace aging C-12 and UC-35 platforms. The recon and attack portfolios will continue to field their modernized platforms (OH-58F / AH-64E) while the Unmanned Aerial Systems (RQ-11/RQ-7/MQ-1C) continue to modernize payloads and mission equipment capabilities to ensure successful manned/unmanned teaming in the networked common operating environment. Aviation enablers will need to continue to modernize to support all aspects of aviation from survivability to increased attack capability. Aviation Ground Support Equipment and Air Traffic Services will continue incremental upgrades with a standard aircraft towing system and mobile tower operating system.

Long-term (FY 28-48) Objectives

In the long-term, Aviation will introduce the future vertical lift, medium utility and attack platforms while unmanned aerial systems introduce a future family of platforms with enhanced manned/unmanned teaming capabilities for operations in the networked common operating environment. This new aircraft will focus on airframe technology, power and efficiency, maintainability and a new digital architecture. Sustainment of the AH-64E, UH-60M, CH-47F and OH-58F aircraft will continue through a recapitalization program designed to insert new technologies and extend the economic useful life of the airframes until replaced with a future vertical lift variant.

Annex F Indirect Fires

Description

The Indirect Fires integrated portfolio consists of weapons platforms, sensors, target locating devices and precision munitions that identify targets and deliver operationally adaptable offensive and defensive munitions in support of combined arms maneuver and wide area security operations.

Risk and Challenges

Over the past several years our brigade combat team precision fires portfolio focus has been in two areas: accelerating and maintaining precision fires with the procurement of the Excalibur munition and the M777A2 lightweight howitzer; and continued development and procurement of key capabilities such as the Q-53 (EQ-36) radar, lightweight laser designator rangefinder and a handheld precision target location and designation device. During this time we have maintained our focus on procuring long range fire munitions and developing guided long range munitions as part of our echelon above brigade fires capability. We have accepted risk in our infantry brigade combat team precision fires and ability to destroy moving targets with the termination of non-line of sight launch system. Our tactical missile will age out of the inventory and we are working options for the way forward on precision long range fires. As we look forward, our priorities are to create a mix of affordable non-precision (varying circular error probable), near-precision (less than 50 meters circular error probable) and precision fires (less than 10 meters circular error probable) to:

- Provide brigade combat teams with organic precision and near-precision fires;
- Echelon above brigade long range fires; and
- The ability to precisely engage a moving target at extended ranges with organic fire.

The challenge is to modernize, integrate and transform indirect fire assets in a resource constrained environment while providing depth and versatility to meet the demand for fires. The decision space within this portfolio resides with the mix of indirect fires, direct fires and sensors (to acquire and identify targets, provide target location and battle damage assessment). To do this we fully leverage Joint munitions and capabilities because we simply cannot afford redundancies.

Near-Term (FY 14-18) Objectives

Indirect Fires will change as the Army shifts its focus to emerging threats in accordance with the National Security Strategy. Our challenges involve supporting the commanders in combined arms maneuver and wide area security, while providing our national security decision-makers the flexibility of a worldwide, deployable and capable field artillery arsenal. Our near term focus encompasses the tasks of delivering more survivable and sustainable self propelled delivery systems, expanding capabilities in

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

range and maneuverability, providing precision capabilities down to Squads, developing replacements for long range precision fires and increasing our ability to accurately locate and target threats. We will divest of older, less sustainable radars to reduce sustainment costs and we will also accept near-term risk in the pace of our self propelled howitzer procurement and the volume of our precision munitions inventory.

Mid-Term (FY 19-27) Objective

In the mid-term our challenges will primarily lie in weapons and targeting platform development and the precision munitions portion of the portfolio. Achieving greater range in our precision munitions and delivery systems will be accomplished by leveraging non-commercial science and technology efforts in long range propellants, advances in cannon tube metallurgy and larger caliber cannon efforts. Incremental improvements in range, responsiveness and accuracy with our precision munitions and platforms ensure our ability to engage targets across the full range of military operations to support Army and Joint/Multinational commanders and to achieve mission success.

We will leverage a new ground combat vehicle to migrate our existing targeting suite to a new platform. We will determine the best options, service life extension or new procurement to maintain indirect fires capability at operational ranges. Additionally, improvements in our net centric capabilities will enable our indirect fires to expand the battle-space, offer commanders more decision time to select the appropriate response, prevent fratricide and allow any Joint sensor to pair with the best kinetic or non-kinetic weapon. We will divest of obsolete targeting platforms and target locating sensors to further reduce costs and we will accept some mid-term risk by sustaining our towed howitzer fleet into the 2030 timeframe.

Long-term (FY 28-48) Objectives

Our future indirect fires focus involves longer range towed artillery delivery systems; enhanced target locating devices; and more synergy with Air and Missile Defense (AMD) in developing better radar capabilities. We will also address the indirect fire capability of our Stryker formations with the development of a new, lighter self-propelled howitzer. Indirect Fires must integrate and operate with Joint and Coalition partners from the tactical to strategic levels, delivering timely and effective offensive fires to preempt enemy actions at greater distances and defensive fires to protect friendly forces, population centers and critical infrastructure with improved precision munitions. Continued improvements in Mission Command will allow the achievement of timely, effective and efficient fires. The complexity of the environment, the technological advances of the threat and fiscal realities require cost efficient and operationally effective methods of integrating future capabilities with existing systems in the future.

Annex G

Air and Missile Defense Protection

Description

The Air and Missile Defense (AMD) integrated portfolio provides Joint Force commanders with the tactical through strategic capabilities they require to protect the force. Air and Missile Defense programs consists of ballistic missile defense; counter-unmanned aerial system; counter-rocket, artillery and mortar; cruise missile defense; and AMD command and control capabilities.

Risk and Challenges

Simply stated, this is a very expensive portfolio where technology proliferation is enabling the rapid evolution of low-cost threat capabilities that has the potential to impose upon us costly protection solutions. We are currently on the wrong side of this cost-imposing strategy.

The Air and Missile Defense portfolio assesses risk against capability gaps in the ability to intercept in-flight threat rockets, artillery and mortars; ballistic and cruise missiles; manned and unmanned aircraft and Joint and multinational integrated fire control for authorization and employment of fires. The challenge will be to incrementally improve mission command systems, seek affordable solutions for missile systems and maintain a technological lead against cheap asymmetrical capabilities. Current and future challenges necessitate transforming the Air and Missile Defense force to one that is more agile, capable and affordable and better able to execute operations as part of Army, Joint and coalition forces.

Near-term (FY 14-18) Objectives

Due to an increase in ballistic missile technical sophistication, inventories, advancement of countermeasures and proliferation, our known and potential adversaries will continue to challenge both the proficiency and sufficiency aspects of our ballistic missile defenses. Additionally, our adversaries have access to a range of cruise missiles, Unmanned Aerial Systems and easily attainable and lethal rockets, artillery and mortars. Thus, our near-term capability gap priorities, in order are: defeating ballistic missile threats; countering rockets, artillery and mortar threats; countering threat Unmanned Aerial Systems and countering cruise missiles. We will accept risk in lower priorities capability gaps to focus our resources on countering ballistic missiles and the rockets, artillery and mortar threat.

Mid-Term (FY 19-27) Objectives

In the mid-term, we need to begin our movement to more cost-efficient solutions. We will start by focusing on a net centric capability enabling over-the-horizon engagements to provide commanders more decision time to select the appropriate response, prevent fratricide, overcome defense design single points of failure and allow

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

any Joint sensor to pair with the best kinetic or non-kinetic weapon. This cost-effective and incremental modernization strategy will enable us to replace only those key components that bring the greatest or most critical capability to the family of systems while ensuring integration and synchronization. Our three priorities are:

- Moving Air and Missile Defense beyond sectorized line-of-sight engagements which will improve capabilities in cruise missile defense, counter unmanned aerial systems and indirect fire protection; it will also allow us to move toward achieving an integrated fire control capability with radars that can provide 360 degree coverage along with capabilities that can conduct advanced engagements from any direction against our adversary's most stressing threats;
- Developing a multi-missile launcher for cruise missile and Unmanned Aerial System (UAS) defense allowing for savings and efficiencies as we move toward a reliable missile mix for specific engagements; and
- Upgrading radars, using Advanced Electronically Scanned Array (AESA) technology, allowing us to improve the capability of multiple radars and providing increases to detection, tracking, discrimination to match the technical sophistication, inventories and advances of our known and potential adversaries.

Long-term (FY 28-48) Objectives

Our far term efforts focus on science and technological improvements, such as low-cost interceptors; directed energy weapons; future missiles and launchers; and cost-effective and efficient command, control and communications systems to provide capabilities across the Joint Kill Chain. Modernization of the missile fleet will provide increased capabilities of Air and Missile Defense batteries to clear the airspace and gain authority to operate in restricted airspace. We must jointly achieve an integrated air picture that will ensure we can accomplish our missions in complex and saturated airspace while minimizing the risk of fratricide, working toward Integrated Fire Control with the Navy and Air Force; seeking to capitalize on newly developed Joint capabilities and interdependencies to add depth to our defense, extend our battle space, preserve interceptors and enhance air-ground coordination.

The complexity of the environment, technological advances and fiscal realities require cost efficient and operationally effective methods of integrating future capabilities with existing systems. Air and Missile Defense must continue to explore integrating non-kinetic defeat mechanisms into architecture to stay on the right side of this cost-imposing strategy.

Annex H Assured Mobility

Description

This portfolio provides the Army with a versatile mix of capabilities which enables Engineer formations to provide support throughout the range of military operations to include Homeland Response and Domestic Support to Civil Authorities. This portfolio includes counter explosive hazard, construction, bridging, mobility and countermobility, mines and munitions, engineer support systems and unmanned ground systems.

Risk and Challenges

This portfolio's challenge is to stay ahead of threat adaptation to current and future force protection and mobility capabilities. As we continue to address the improvised explosive device (IED) threats of today, we must simultaneously prepare for future IED threats as part of the overall Counter-Explosive Hazards (CEH) by focusing on the development of future and enduring CEH capabilities. This portfolio will execute a continuous modernization strategy by:

- Recapitalizing existing equipment to new condition; procuring new capabilities to meet operational requirements; and divesting of equipment which has limited ability to adapt to new requirements at a reasonable cost;
- Leveraging advancements in mature technologies to reduce defense funded research and development for construction and unique engineer support capabilities such as underwater construction and firefighting;
- Assuming risk in the modernization of construction and engineer support equipment while maintaining legacy bridging, mines and munitions; and
- Procuring and maintaining a limited quantity of modern mine systems while maintaining legacy mine systems with expiring shelf life.

Near-Term (FY 14-18) Objectives

Our top priority is the establishment of the CEH program of record by recapitalizing mine protected vehicles used in support of Iraq and Afghanistan contingencies. Next, we will focus efforts towards seeking mature technologies and incremental improvements to address capability gaps for deep buried, non-metallic IEDs and semi-autonomous route clearance capabilities to improve crew protection. For the high density of construction equipment, we will balance new procurement with the use of the Service Life Extension Program to defer modernization for select equipment. To become more cost-effective, we will continue extending the service life for select systems nearing the end of their useful life such as the Deuce and compaction equipment. New procurements nearing the end of their acquisition cycle include Skid Steer Loaders, High Mobility Engineer Excavator and Light Loader.

The strategy for military bridging capabilities includes near term procurement of an M1 Abrams platform based bridging and armored engineer capability to divest and

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

replace the aging M48/M60 Armored Vehicle Launched Bridge fleet. Modernization efforts focus on in-stride breaching operations (Assault Breacher Vehicle) and assault gap crossing support (Joint Assault Bridge) to only a portion of our formations. Near term development efforts for bridging will focus on the development of a capability to replace the legacy Bailey Bridge and identified gaps for a Light Assault Gap crossing capability.

Other key near term modernization efforts include development of a network munitions systems to replace persistent anti-personnel and anti-vehicle landmines that have been prohibited for use under the U.S. Landmine Policy with the near-term effort focused on developing anti-personnel capability while future efforts focus on anti-vehicle capability; development of mission command capabilities; and sustainment of unique support capabilities used to support firefighting and underwater construction operations.

Mid-Term (FY 19-27) Objectives

We will focus our efforts on completing the recapitalization of current route clearance platforms and procurement of enablers which provide Soldiers with semi-autonomous, gradually introducing autonomous, route clearance capabilities which enhance the forces' ability to identify, detect and mitigate explosive hazards while increasing Soldier protection. We will ensure our critical earth-moving capabilities, tactical bridging capability and light assault gap crossing capability are fielded and we will complete our tactical bridging fielding to allow the divestiture of legacy capabilities. A key technology research effort will focus on the development of a terrain shaping capability to replace expiring Family of Scatterable Mines capability.

Long-term (FY 28-48) Objectives

Our top priority is to field the next generation mobility systems including autonomous route clearance platform capability along with associated counter-explosive enabler capabilities needed to mitigate emerging and evolving explosive hazard threats. Far term counter-CEH objectives include developing improved capabilities to clear wide and deep paths containing explosive hazards along convoy and maneuver routes and detection of explosive hazards while traveling at convoy speeds. We will also conduct a Service Life Extension Program along with upgrades for fuel efficiency technology to maintain critical earth-moving capabilities.

Overall, this portfolio leverages advancements in the commercial sector, service life extension programs and procurement opportunities to ensure technological overmatch is maintained in the most cost-effective manner. Continuous investment in Counter-Explosive Hazards ensures technological overmatch is achieved resulting in reduced effectiveness and lethality of explosive hazards, increased freedom of maneuver for U.S. forces and increased protection for our Soldiers.

Annex I
Force Protection and Chemical, Biological, Radiological and Nuclear (CBRN)

Description

This portfolio provides for the procurement of a wide range of diverse capabilities including selected base defense; CBRN; Explosive Ordnance Disposal (EOD); Policing; Civil Affairs/ Military Information Support Operations (CA/MISO); non-lethal systems and countering weapons of mass destruction that are affordable and provides our forces with levels of force protection consistent with the functional application of these solutions in support of focused defense missions.

Risk and Challenges

This portfolio is responsive to a very adaptive threat where proliferation of CBRN technologies and the rise of global terrorism increases and diversifies the number of adversaries that possess CBRN capabilities. Today's rapidly changing operational environment involves a broad array of threats including diverse hazards such as toxic industrial materials as well as the potential lethal threats by the emergence of non-traditional agents. Like other portfolio's technology proliferation is enabling the rapid evolution of low-cost threat capabilities that has the potential to impose upon us costly protection solutions. We must not get on the wrong side of this cost-imposing strategy.

This portfolio accepts risks by extending timelines for technological development and upgrades to CA/MISO, base defense and EOD capabilities. We will execute a continuous modernization strategy by recapitalizing existing equipment to new condition; procuring new capabilities to meet operational requirements; and divesting of equipment which has limited ability to adapt to new requirements at a reasonable cost. Our challenge is to invest in promising and needed technologies and procure mission-specific equipment for immediate capability needs.

Near-Term (FY 14-18) Objectives

Key objectives are resetting base defense equipment returning from Afghanistan and establishing base defense capability sets to meet small, medium and large base contingency requirements. Integrated Base Defense (IBD) core capability packages, which are scalable and tailorable, while reducing requirements to deliver/distribute fuel and water, will be created to meet contingency requirements to serve as a bridge until enduring capabilities are procured to support contingency basing.

Current EOD robotic capability will be extended through reset to bridge the gap until a common medium robotic platform capability can be developed and procured to support EOD operations. Procurement of a small robotic platform capability will be completed in the near term while the service life for the large robotic platform will be extended until the mid-term for EOD formations. We will field CA/MISO equipment for general purpose forces by completing initial procurement of communication, media and print capability to seamlessly integrate with

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

Special Operations Forces. We will complete initial non-lethal fielding and invest in efforts to develop scalable non-lethal capabilities required to support entry control operations and our military police formations. We will invest in improved policing and evidence collection capabilities. Finally, our CBRN near term modernization efforts include investing in research to improve the stand-off and remote detection capability and sensor suite capabilities of the specialty nuclear, biological and chemical vehicles. We will also continue to resource the standardizations of our commercial-off-the-shelf capabilities through the Dismounted Reconnaissance – Sets, Kits and Outfits program.

Mid-Term (FY 19-27) Objectives

In the mid-term, our focus is on outpacing threat adaptation through modernization, replacing outdated platforms and ensuring increased force protection. Our efforts include the development of EOD robotic capability through capability and cost thresholds to inform investment decisions including divestiture of current systems; enhanced capabilities to locate and secure weapons of mass destruction and the means for their production and proliferation; and the continued transition to an enduring Integrated Base Defense capability. Research investments and technology advancements will dictate upgrades or replacements to selected CBRN, IBD, unmanned autonomy levels and CA/MISO capabilities.

Additionally, we will prioritize CBRN research investments and procurement of protection and detection capabilities to mitigate the threat posed by non-traditional agents. Through the efforts of the Chemical Biological Defense Program (CBDP), we will see the procurement of improved diagnostic, field analytics, detection and protection capabilities to not only counter traditional chemical and biological warfare agents but to also mitigate the impact of non-traditional agents and emerging infectious diseases. Other critical mid-term research efforts focus on enhancing the decontamination capability for sensitive military equipment and improving our projected and generated obscuration capabilities.

Long-term (FY 28-48) Objectives

In the long-term, the portfolio, supported by advancements in technology, focuses on acquiring the next generation of protection and non-lethal systems. We will continue to leverage the CBDP to ensure science and technology investments address evolving CBRN defense missions and future CBRN threats.

Threats to the deployed force are constantly changing in scope, character and intensity. In response to continued threats from IEDs, weapons of mass destruction and other traditional threats, this portfolio is committed to pursuing innovative force protection and base defense capabilities that protects our formations.

Annex J

Sustainment Transportation

Description

This integrated portfolio equips the Army with tactical wheeled vehicles and associated trailers, Mine Resistant Ambush Protected (MRAP) vehicles and Army watercraft systems. These platforms enable Soldiers to conduct distribution of personnel, equipment and supplies with greater protection, interface with Soldiers and bases to utilize/provide power, have greater reliability and availability with less specialized maintenance and can host interoperable applications to support distributed operations with joint, interagency, intergovernmental and multinational partners.

Risk and Challenges

The tactical wheeled vehicle fleet is relatively young and is the focus of a divestment effort that will reduce overall numbers and variants to become affordable. Our objectives are to progressively modernize this fleet to improve performance, payload and protection while maintaining a fleet age to minimize sustainment costs; integrate the Mine Resistant Ambush Protected Family of Vehicles into our structure; fill the light tactical vehicle capability gap in protection, transportability, mobility and network integration; integrate with Soldiers and contingency bases into the tactical power network; outfit at least 30 percent of the overall fleet with protection kits and have armor-capable trucks across at least 50 percent of the fleet. The portfolio is challenged to maintain balance because as vehicles receive added armor kits to protect Soldiers from evolving improvised explosive device (IED) threats, vehicle payloads and performance are degraded. Disruptive innovation for lighter and stronger armor kits will be sought. Affordability will remain a significant challenge.

The Army watercraft platforms are old (1960's and 1970's era designs) and in need of immediate modernization to provide the Army and the Joint force the ability to meet its expeditionary employment concepts. Our aged fleet is slow and does not have the cargo capacity to deliver combat configured forces and sustainment materials/equipment to the point of employment. As we move forward with cost-effective solutions, we will prioritize self-protection by integrating anti-terrorism/force protection measures such as scalable non-lethal-to-lethal escalation of force, selective integration of structural armor, ballistic glass and remote weapons and robust communications architecture. We will accept risk in other threat areas such as sea mines, anti-ship cruise missiles, rockets, cannons and mortars.

Affordability is at the forefront of all decisions in this portfolio. Solutions must carefully balance protection against cost and mobility. We will leverage commercial platforms for watercraft, where possible and take advantage of the young fleet age and divest ourselves of tens of thousands of wheeled vehicles so that we can afford the Joint Light Tactical Vehicle (JLTV).

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

Near-Term (FY 14-18) Objectives

Currently, the Army is moving forward with developing the JLTV to fill the capability gaps in the light vehicle fleet by carefully balancing performance, payload and protection. The JLTV provides the same level of protection as the Mine Resistant Ambush Protected All Terrain Vehicle (M-ATV), better network integration than the High Mobility Multipurpose Wheeled Vehicle (HMMWV) and better mobility and transportability than the M-ATV. Our goal is to ensure the wheeled fleet modernization and the Mission Command capability set fielding are mutually supporting. We will procure protection kits to move toward protection goal and modernize the Heavy Tactical Vehicle fleet thru recapitalization of Heavy Expanded Mobility Tactical Truck (HEMTT) and Palletized Load System. Finally, an aggressive divestment strategy will reduce the overall fleet size.

For the watercraft, we will modernize the Landing Craft Utility (LCU) with network upgrades and a service life extension program as part of our refocus to the Asia-Pacific region. We will field Harbormaster Command Control and Communications to provide the necessary capabilities for performing expeditionary intermodal operations.

Mid-Term (FY 19-27) Objectives

Our wheeled fleet focus will be the full rate production of the JLTV and the continued production of crew and cargo protection kits for medium and heavy vehicles. By this time our MRAP fleet will have stabilized and divestiture will be completed. We will emphasize platform procurement of the Light Engineer Utility Trailer and 20T Dump Truck. We will strive to maintain the wheeled fleet to an average age of 15 years.

The top priority for watercraft is completing the LCU service life extension program, followed by a replacement capability for the mechanized landing craft vessel. The next priority is to procure a medium tug-like capability to replace various small and large tugs and also to find a replacement capability for the logistics support vessel. At all times we will maintain seaworthiness and apply safety modifications to the remaining fleet.

Long-term (FY 28-48) Objectives

At this point, we will need to begin a recapitalization program of the light wheeled fleet to maintain an average fleet age of 15 years. We expect the need to develop add-on armor packages that increase the survivability of personnel traveling by tactical trucks. We will also have to improve our distribution capability while investing in technologies to increase energy flexibility and efficiencies. Finally, we will seek opportunities to employ disruptive technologies in armor protection whenever possible.

The long term objectives of Army watercraft will be driven by the concept of employment against various threats. Commercial solutions, with military-unique upgrades will suffice so long as the concept of employment continues to accept risk against sea mines, anti-ship cruise missiles, rockets, cannon and mortars.

Annex K Sustainment

Description

This integrated portfolio equips the Army with versatile and tailorable systems providing commanders with required capabilities to conduct sustainment operations. The sustainment portfolio includes direct support to Soldier mental and physical health and subsistence, maintaining Army equipment operational availability, resupplying forward deployed forces in austere locations, logistical support to move equipment, store and transport fuel and water and purify water. The portfolio will seek incremental and cost effective solutions to mitigate risks to provide tailorable and decentralized sustainment support; improve equipment reliability, availability and maintainability to improve readiness and improve health care services.

Risks and Challenges

Affordability will be a key challenge within this portfolio. To remain affordable the following strategy will be used: we will delay and stagger program starts; reduce procurement rates and assume risk of using legacy systems for longer periods of time; assume a moderate risk of obsolescence and sustainment cost increases; and shift programs to sustainment instead of performing constant technical upgrades when possible.

In addition to affordability, the portfolio is challenged with: inter-dependencies with other programs; and staying ahead of obsolescence in medical items, computer based systems and diagnostic and repair maintenance equipment. This will require continuous coordination, collaboration and synchronization with other portfolios. Specifically, coordination is required for: tactical wheeled vehicles; mission command and intelligence capabilities in the watercraft fleet; and chemical, biological, radiation and nuclear capabilities for integrated basing system.

Near-Term (FY 14-18) Objectives

- **Medical**: Prioritize commercial solutions to ensure we have the best medical care from point of injury to combat support hospital; invest research funding to ensure we have Food and Drug Administration approved vaccinations and preventive medicine against infectious diseases;
- **Delivery and Storage**: Field a more capable precision airdrop capability to improve our ability to accurately deliver supplies to forward deployed forces in austere locations; focus on liquid delivery by improving our fuel and water storage to reduce resupply requirements; and improve materiel handling with more capable forklifts;
- **Food**: Modernize our field feeding systems and refrigeration to support battalion and below subsistence operations;
- **Maintenance**: Improve operational readiness and reduce legacy systems inventory through upgraded maintenance support devices, stations and sets/kits/outfits; and

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

- Energy: Provide better energy reliability, flexibility and efficiency and reduce logistical support requirements by improving power, shelter and water technologies in our base camp Force Provider systems and selected formations. Improve operational energy for sustained ground operations through material and doctrine actions.

Mid-Term (FY 19-27) Objectives

- Medical: Improve Soldier protection thru partnerships with industry on new advancements in drugs and vaccines and new medical equipment that can be fielded to medical units and medical evacuation platforms;
- Delivery and Storage: Increase our precision airdrop accuracy and terrain avoidance; begin research investments for a future precision airdrop system; accept risk by relying on legacy water trailers through 2030; legacy water purification and fuelers through 2035;
- Food: Continue our reliance on legacy feeding systems for about 20 percent of the requirement for company feeding through 2048; begin an investment for new research to enable the procurement of a future field feeding kitchen;
- Maintenance: Slow procurement of certain sets and kits, while delaying the start of future maintenance systems until the far term; and
- Energy: Increase energy management, networking and alternative solutions to increase flexibility for operational forces to sustain Soldiers, vehicle systems and contingency basing components as part of globally-integrated operations.

Long-term (FY 28-48) Objectives

The portfolio will begin to procure next generation solutions in all mission areas to support sustainment operations. To do this we will effectively invest our research dollars to close capability gaps, partner with industry for medical capabilities, simplify our equipment to ensure ease of use and maintainability and reduce the demand characteristics of the force and improve equipment readiness rates. Continue to challenge industry for sustainable energy solutions that enable greater force projection and flexibility while overcoming limitations of access, resources and vulnerability to disruption.

Annex L

Operational Energy

Description

Operational Energy is the energy and associated systems, information and processes required to train, move and sustain forces and systems for military operations. Operational Energy is critical to the force's ability to conduct and support operations, enabling maneuver and freedom of action and providing operational reach and endurance. Providing for energy efficiency, energy alternative capabilities and interoperability builds flexibility and resilience through increased ability to respond to changes in operational demands and greater ability to adapt to changes in the operational environment.

Risks and Challenges

The Army faces significant risks from outdated and inefficient energy capabilities. The availability of energy constrains the range and endurance of mounted and dismounted formations and challenges our ability to integrate new capabilities. The requirement to protect long fossil fuel supply lines places Soldiers at risk and constrains commanders' freedom of action. Recent experience indicates a lack of sufficient power generation, energy storage, energy conversion and power distribution systems to meet the demands of distributed operations in harsh environments. Leaders at all levels require the ability to manage our energy resources in order to maximize our overall combat effectiveness and our systems need to become more efficient overall.

- **Soldier Power and Energy:** Soldier systems must be sustainable, interoperable, flexible and enable the Soldier to operate independently for extended periods. These systems must be developed to reduce energy consumption, improve operating efficiencies and increase the operational availability of the Soldier.
- **Aviation Systems Power and Energy:** Future aerial systems require greater lift, range and endurance without increasing logistical requirements. More efficient components, energy management processes and reduced size, weight and power demands of supporting sensors and engagement systems will be essential.
- **Surface Systems Power and Energy:** The force is challenged to provide mobility and power for an ever-increasing array of sensors, communications systems, computers, weapons and environmental systems. The force is challenged to manage tactical power requirements through the application of power distribution, conditioning and the understanding of power use, storage and generation. Future vehicles require sufficient power, power distribution and management, heating/cooling of hosted systems and sufficient exportable power to meet the needs of the tactical commander. Increased system fuel efficiency overall is required.
- **Contingency Base Camps Power and Energy:** Our challenge is to design and establish modular, flexible, sustainable, scalable and adaptable base camps that include innovative energy sources and planning for power generation and management which provides the commander with the means to accomplish base camp operations while minimizing resource consumption through efficiency.

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

Near-Term (FY 14-18) Objectives

Phase I, Initial Operating Capability (underway) is improving energy capabilities and management in current operations, with corresponding net improvements to force mobility, agility, flexibility, lethality and protection. Improve Soldier mobility and endurance, increase resource availability and reduce force vulnerabilities by: creating awareness and establishing energy-related roles and accountabilities; fielding flexible and networked energy technologies; identifying and eliminating waste; increasing efficiency of energy delivery; and utilization and establishing mechanisms to enable and incentivize performance improvement. The expected outcome is improved performance in current operations, primarily in terms of increased availability/reliability of energy as needed to support the mission, with reduced Soldier load, fuel consumption and manpower requirements.

Mid-Term (FY 19-27) Objectives

Phase II, Interim Operating Capability will integrate energy-informed concepts into Army formations and force generation processes, providing flexible, scalable energy capabilities to support the range of military operations, executed through regionally-aligned and globally-integrated forces. This phase requires systematic mission and capability analysis to expose respective energy-related contributions and liabilities associated with operational missions and modes; development of plans and modular/interoperable energy capabilities to support task organization and regional deployment; tailoring of energy capabilities within force generation processes; and application of mission-oriented energy performance management. This phase will involve significant interaction with Phase II implementation of the Regionally-Aligned Force model, with a desired outcome that enables the Army to design, deploy and manage energy capabilities as an integral component of task-organized, globally-integrated formations.

Long-term (FY 28-48) Objectives

Phase III, Final Operating Capability will build energy considerations into culture, operating and business processes to seamlessly inform Army decisions and behaviors. This phase requires comprehensive analysis of energy use cases and architectures; establishment of enterprise-wide energy information requirements and metrics; integration of energy concepts into Army and Joint training and education curricula and visibility of energy investments, costs and benefits within planning, programming, budget and performance management processes. As a desired outcome, this phase will instill within the Total Army an enterprise ability to value energy attributes and to consider the range of possible future conditions, contributing to near and long-term decisions that manage risks to our sustained readiness into the future.

Annex M Army Medicine

Description

The Army Medicine portfolio provides the means to protect, treat and optimize the health and performance of our Soldiers. Medical standards, defined by institutional and governmental organizations, are the foundation for determining the appropriate standard of care applied to military medicine. One of our top priorities is providing Soldiers on the battle field with the most modern and affordable, quality driven, evidenced based standard of care. Medical materiel includes equipment (such as Computed Tomography (CT) scanners and ventilators), medical/surgical items, pharmaceuticals, narcotics, vaccines and blood products.

Medical commodities are driven by the commercial sector, with more than 95 percent of medical supplies and equipment coming from commercial sources. The remaining five percent requires research and development efforts to provide military capabilities that industry will not address. Our research and development strategy focuses primarily on the future medical needs of Soldiers and sustaining medical research and development of core capabilities such as neuroscience, hemorrhage control, performance and resilience, thermal stress, infectious diseases, drug design and medicinal chemistry.

Risks and Challenges

Evolving clinical practices and rapid improvements in medical technology causes rapid turnover, which in turn greatly escalates costs. For example, medical inflation is at about 18 percent compared to the standard inflation of about two percent. Besides medical equipment, many items are potency and shelf-life dated (expire in five years or less). Most items are subject to the regulations and standards of agencies such as the Food and Drug Administration (FDA), the Environmental Protection Agency and the Drug Enforcement Agency. Also, medical devices drive unique energy needs. We must balance the rapid rate of medical technology change and limited resources, with the complex and critical array of medical capabilities required during military operations. To meet these challenges, we are advancing medical devices, knowledge products like changes in clinical practice based on research, drugs, vaccines, biologicals (blood products and resuscitative fluids) and other materiel for use in operational environments.

Near (FY 14-18) Objectives

- Army Medicine Equipping Strategy: The Army Medical Department cannot sustain readiness of the 33 Combat Support Hospitals (CSH) at current levels of investment. As a result, our near term objective focuses on the development, sustainment and modernization of 17 CSHs that provide for the rotational units in support of the Army force generation model;

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

- Drugs and Vaccines: Complete the development and begin fielding of a topical Leishmania treatment and a drug to treat the severe/deadly form of malaria; continue the development of vaccines, drugs, diagnostics and anti-bacterial wound infection treatments such as the Dengue vaccine, Diarrheal vaccines, a regional human immunodeficiency virus (HIV) vaccine and bacterial resistant wound infection solutions; and
- Medical Field Systems: Complete the development and begin fielding of a Traumatic Brain Injury (TBI) diagnostic, patient handling system for air medical evacuation, Hydration Status Monitor and improved wound dressings; continue development of biologics, such as freeze-dried Plasma and Cryopreserved Platelets; work with the health care industry to make value-based decisions on which technologies to adopt; ensure specialized energy needs are met.

Mid-Term (FY 19-27) Objective

- Combat Support Hospital Equipping Strategy: We will focus on 17 - 248 bed hospitals to complete the development, sustainment and modernization based on a modular force design;
- Drugs and Vaccines: Field various drugs and vaccines including those to prevent or treat Dengue, Diarrheal, Hemorrhagic Fever and Staph; field the next generation Malarial Prophylaxis (prevention) and the capability for single infectious disease diagnostics; continue development efforts on infectious disease insect control and begin the development of a Malaria vaccine;
- Medical Field Systems: Field a handheld TBI diagnostic device and begin the development of drug therapies for TBI and Psych Health (post-traumatic stress disorder (PTSD)/suicide); Establish the first increment of telemedicine and expand through the adoption of wireless communication and miniaturization; begin the development of medical products such as miniaturized vital signs monitors and new hemorrhage control products; and
- Medical Evacuation: Complete the equipping of 619 aircraft for the medical evacuation Mission Equipment Package program.

Long-term (FY 28-48) Objectives

- Combat Support Hospital Sustainment and Modernization: Sustain readiness and incrementally modernize;
- Drugs and Vaccines: Field a combination vaccine for all diarrheal diseases and Malaria and a global HIV vaccine; complete the development of a single Infectious Disease diagnostic that provides diagnostic capability for all endemic-related diseases; complete the development and field the next generation of vector (insect) control and surveillance technology; and
- Medical Field Systems: Begin the development of a robotic evacuation capability. Complete the development and field a miniaturized, multi function medical monitor and diagnostic device that will interface into the telemedicine infrastructure.

Annex N

Science and Technology

Description

Army Science and Technology (S&T) investments support the Army's equipment modernization goals to develop and field affordable equipment in a rapidly changing technological environment for the current and future fight.

The Army's strategic modernization plan is designed to provide informed near-term decisions based on long-term Army objectives. The development of these plans is deliberate and focused, as a means to prepare the Army for an unknown future. This approach to modernization includes an awareness of existing and potential gaps and seams, an understanding of emerging threats, knowledge of state-of-the-art commercial, academic, international and government research, as well as a clear understanding of competing needs for limited resources. The Army will ensure its investment decisions, whether in S&T research or formal programs of record, are continuously refined to address ongoing challenges, changes and discoveries.

Risks and Challenges

Army S&T investments must be carefully focused to maximize our technological advantage in whatever future conflict we may find ourselves so that we never lose our technological advantage. Army S&T has a responsibility to lay the foundation for defining the Army's technology needs and driving future capabilities. The Army depends on S&T to research, develop and demonstrate high pay-off technological solutions to the hard problems faced by Soldiers. We will meet the challenge first by understanding the environment in worldwide operations with the diverse threats and then by understanding the critical capability gaps. From there we map S&T strategy to close those capability gaps and assess where this technology can be inserted into existing and potentially new programs. The underpinning all of Army S&T efforts is a strong research program that builds an agile and adaptive base in technical understanding to be able to respond to near, mid and far term threats. It is very important to continue making smart investments in basic and applied research, especially in Army unique areas for unexpected technology opportunities.

The Army will invest research funds to deal with a range of threats and challenges in uncertain locations around the globe. Many emerging technologies such as autonomous systems, networked and alternative energy solutions and biometrics will become vital components of military effectiveness. The Army will continue to develop countermeasures to future threat capabilities and pursue technological opportunities. Enemies and adversaries, however, will attempt to counter our technological advantages through cover, concealment, camouflage, denial, deception, emulation, adaptation or evasion. We will need to be prepared. Finally, understanding how human beings apply technology to gain capabilities will continue to be as important as the technologies themselves. Technological innovation, when combined with appropriate

Army Equipment Modernization Strategy
Versatile and Tailorable, yet Affordable and Cost Effective

doctrine, integrated effectively into the organization and training of Army forces, will provide tremendous advantages for future missions and operations.

Near-Term (FY 14-18) Objectives

We are making progress in addressing the S&T challenges started during the last decade of combat that includes: the need for greater force protection for Soldiers, vehicles, bases and combat outposts; easing the cognitive and physical overburdening of our Soldiers in small units; providing our Soldiers timely mission command and tactical intelligence that provides situational awareness and communications in all environments; reducing the expense of storing, transporting and distributing of consumables; and, to create operational overmatch through enhanced lethality and accuracy. Similarly we will continue research to improve individual and team training and early detection of traumatic brain injury. We will continue to support the current needs of Soldiers conducting missions around the world providing technology enabled solutions to improve their survivability, lethality, maneuverability and agility capabilities.

Mid-Term (FY 19-27) Objectives

Challenges that have become more prevalent during operations in Iraq and Afghanistan include the need to achieve operational maneuverability in all environments and operational tempo. We will support the future needs of the Army in the Soldier, Air, Ground and Mission Command domains providing technology enabled concepts and solutions that address acquisition requirements and addressing capability gaps identified as the Army's Top Challenges and priority Warfighter outcomes.

Long-term (FY 28-48) Objectives

Apply a disciplined approach to investments in basic research to create an environment for discovery. These long term investments are a critical hedge in acquiring revolutionary advances and paradigm shifting technologies to counter future threats. Investing wisely in people with innovative ideas is our best hope for catching these unexpected discoveries.

As we continue to diligently identify and harvest technologies suitable for transition to our force, we aim to remain ever vigilant of potential and emerging threats. We will sharpen our research efforts to focus upon those core capabilities we need to sustain for the future while identifying promising or disruptive technologies able to change the existing paradigms of combat operations. Our focus remains upon Soldiers engaged across the full range of military operations; we will consistently seek new avenues to increase their capability and ensure their technological superiority.

Annex O
References for the Army Equipment Modernization Strategy

Anthony H. Cordesman, Center for Strategic and International Studies, Defense Budget Cuts and Non-Traditional Threats to US Strategy: An Update, November 2011

Sydney J. Freedburg Jr., AoL Defense, How To Fight Hybrid Threats: Tanks, Airstrikes and Training, 06 April 2012

Nathan Freier, Center for Strategic and International Studies, U.S. Ground Forces Capabilities through 2020, October 2011

Todd Harrison, Center for Strategic and Budgetary Assessments, Strategy in a Year of Fiscal Uncertainty, February 2012

Adam J. Herbert, Editor in Chief, Air Force Magazine, Beyond Ground Wars, February 2012

Andrew F. Krepinevich, Center for Strategic and Budgetary Assessments, Why Air Sea Battle?, 2010

Nicholas R. Krueger, AUSA Institute of Land Warfare, National Security Watch, The Rationale for a Robust U.S. Army Presence in the Pacific Basin, 08 March 2012

General Raymond T. Odierno, Foreign Affairs, The U.S. Army in a Time of Transition: Building a Flexible Force, May/June 2012

General Raymond T. Odierno, Eisenhower Luncheon Speech, Association of the United States Army Annual Meeting, 23 October 2012

General Raymond T. Odierno, Speech at Royal United Services Institute (RUSI) Conference, 08 June 2012

General Raymond T. Odierno, Discussion at the Center for Strategic and International Studies (CSIS), subject: Military Strategy Forum: The Future of the United States Army: Critical Questions for a Period of Transition, 01 November 2012

General Norton A. Schwartz, USAF & Admiral Jonathan W. Greenert, USN, The American Interest Magazine, Air-Sea Battle: Promoting Stability in an Era of Uncertainty, 20 February 2012

AUSA Torchbearer National Security Report, A New Equipping Strategy: Modernizing the U.S. Army of 2020, June 2012

Association of the United States Army, Torchbearer National Security Report, U.S. Army Energy Security and Sustainability: Vital to National Defense; 15 April 2011

Department of the Army, Army Posture 2012, February 2012

Department of the Army, Army Program Guidance Memorandum for Fiscal Years 2013-2017 Program Objective Memorandum, 7 April 2011

Department of the Army, Army Strategic Planning Guidance 2012, 19 April 2012

Department of Defense, Operational Energy Strategy: Implementation Plan, March 6, 2012

Department of the Army, Addendum Q – Equipment Modernization, Army Posture 2012, June 2012

Department of the Army, Army Strategic Planning Guidance Draft 5.1, January 2013

Department of Defense, Energy for the Warfighter: Operational Energy Strategy, May 2011

Department of Defense, Sustaining U.S. Global Leadership: Priorities for the 21st Century Defense, January 2012

Department of Defense, Joint Operational Access Concept v1.0, 17 January 2012

Department of Defense, Quadrennial Roles and Missions Review, July 2012

Training and Doctrine Command, TRADOC Publication 525-3-0, The Army Capstone Concept, 19 December 2012

Training and Doctrine Command, TRADOC Publication 525-3-1, The United States Army Operating Concept, 19 August 2010

Training and Doctrine Command, TRADOC G2, Operational Environments to 2028: The Strategic Environment for Unified Land Operations, August 2012

United States Army and United States Marine Corps, Gaining and Maintaining Access: An Army-Marine Corps Concept, March 2012

Annex P Acronyms

AESA	Advanced Electronically Scanned Array
AMD	Air and Missile Defense
CA/MISO	Civil Affairs/ Military Information Support Operations
CBRN	Chemical, Biological, Radiological, Nuclear
CEH	Counter Explosive Hazard
CSH	Combat Support Hospital
EOD	Explosive Ordnance Disposal
HEMTT	Heavy Expanded Mobility Tactical Truck
HIV	Human immunodeficiency virus
HMMWV	High Mobility Multipurpose Wheeled Vehicle
IBD	Integrated Base Defense
IED	Improvised Explosive Device
ISR	Intelligence, Surveillance and Reconnaissance
JLTV	Joint Light Tactical Vehicle
LCU	Landing Craft Utility
M-ATV	Mine Resistant Ambush Protected All Terrain Vehicle
MI	Military Intelligence
MRAP	Mine Resistant Ambush Protected
NIE	Network Integration Evaluation
PTSD	post-traumatic stress disorder
S&T	Science and Technology
TBI	Traumatic Brain Injury
UAS	Unmanned Aerial System



04 March 2013

For more information contact: Headquarters, Department of the Army, Office of the Deputy Chief of Staff, G-8 Future Force Division (FDF), 700 Army Pentagon, Washington, D.C. 20310. Electronic copies of the strategy are available at www.g8.army.mil