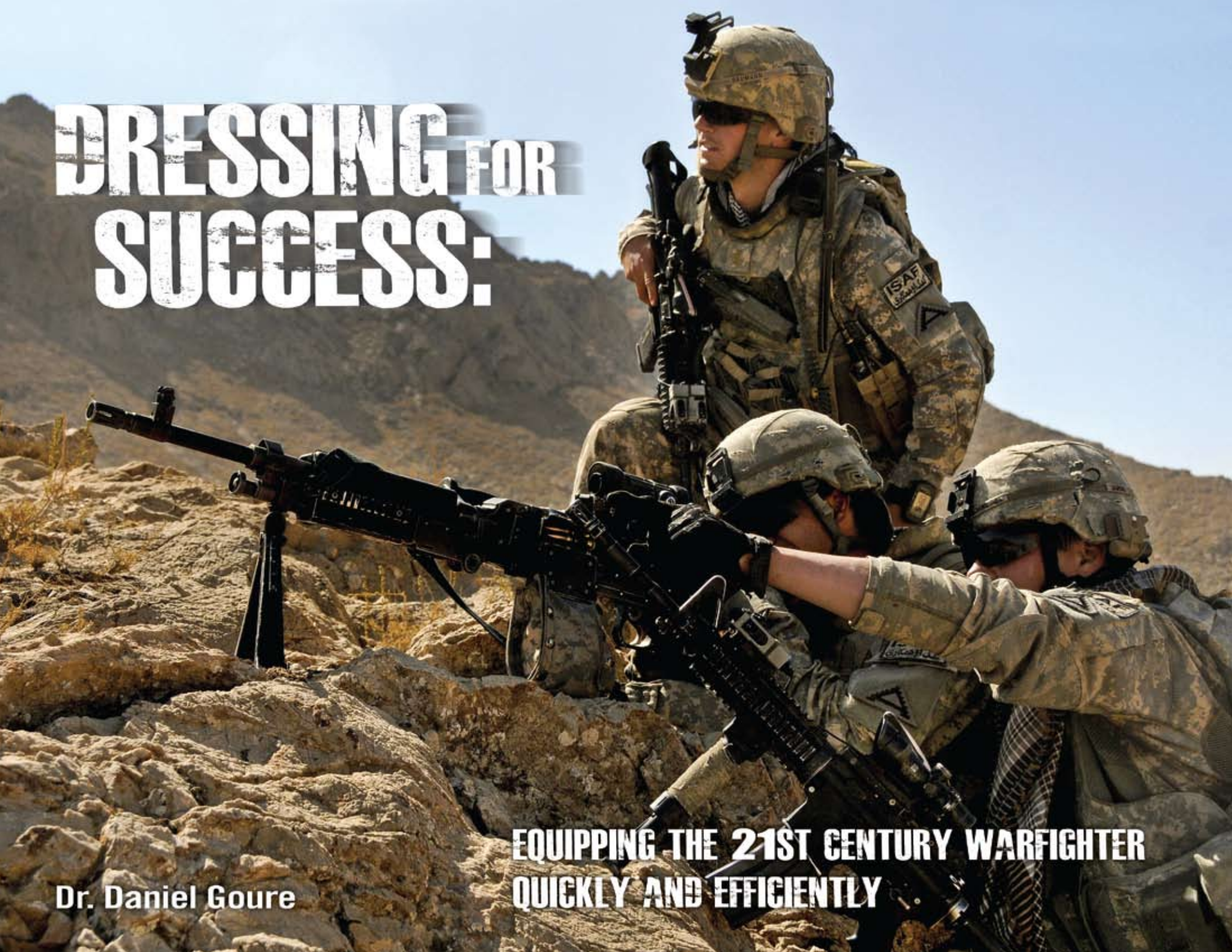

DRESSING FOR SUCCESS:

EQUIPPING THE 21ST CENTURY WARFIGHTER QUICKLY AND EFFICIENTLY

Dr. Daniel Goure

Executive Summary

United States ground forces entered Iraq and Afghanistan poorly equipped to deal with the challenges of protracted dismounted operations. While "equipping the man" has long been a maxim for land forces, the balance between fighting from mounted platforms to dismounted actions has radically shifted to the latter type of operation. Harsh terrain and irregular threats have all placed a premium on dismounted operations and the equipment necessary for this kind of fight. Once U.S. forces were engaged in protracted, intensive counterinsurgency and stability operations, they discovered an urgent need for an array of equipment.

Articulating urgent operational requirements and identifying readily available solutions were only two of the problems confronting the U.S. Army in the early years of Operations Iraqi Freedom and Enduring Freedom. The next challenge was finding appropriate solutions in a timely manner. This necessitated relying on the commercial industrial base. Yet a third challenge was funding. It was necessary to remedy more than a decade of underfunding. In addition, resolving urgent operational requirements did not lend itself to the traditional budget process. As a consequence, the majority of funds to meet these new demands came from supplemental and overseas contingency operations funding.

One of the key lessons to emerge from the experience of properly equipping warfighters in a time of war is the need for institutionalized processes and stable funding to ensure a timely and appropriate response. The Army's Rapid Equipping Force provides a mechanism for responding to urgent operational needs. The Rapid Fielding Initiative provides for the appropriate outfitting of units heading for combat.

As the current conflicts wind down and deficit reduction pressures grow, the Pentagon and the nation will face the problem of providing adequate support for operational clothing and individual equipment. The clothing and individual equipment industrial base is poised on a razor's edge. For example, there are only a handful of U.S. companies that can produce and finish advanced fabrics. To ensure the robustness of the soldier equipment industrial base, a smart collaborative industrial policy is needed that will promote continued availability of innovation and surge capacity in the area of soldier clothing and individual equipment.

The Rapid Equipping Force and Rapid Fielding Initiative should be programs of record to ensure that the best equipment is available should units deploy. Appropriate budgets must be set and funds made available for operational units to purchase mission specific operational equipment through rapid acquisition contractual vehicles such as the Defense Logistics Agency's Tailored Logistics Support contract or General Services Administration contracts.

This study was written by Dr. Daniel Goure of the Lexington Institute and was reviewed by participants in the Warfighter Equipment and Readiness Working Group.

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Introduction

For the past nine years, since September 11, the U.S. military has been adapting its tactics, techniques and procedures to fight in an irregular war environment. It had to learn how to fight wars it had not expected to be in, in places it had not thought it would go and against new types of adversaries. As part of this learning process, the U.S. military has had to relook doctrine, reorganize into modular formations, re-equip the warfighter and adjust its training. It has also had to learn new ways to support and supply warfighters on new and distant battlefields.

The wars in Iraq and Afghanistan have greatly evolved from initial planning. How unique many of the requirements would be was demonstrated in the latter conflict. The defeat of the Taliban in the Fall of 2001 was accomplished by some 350 Special Operations Forces (SOF), 100 Central Intelligence Agency employees and several thousand Afghan tribesmen, backed up by the most modern airpower in world history. The battle for Mazar-e Sharif was won by a combination of precision strikes by long-range B-1 and B-52 bombers and cavalry charges by Afghan warriors and their SOF allies.

But it became evident from the beginning that U.S. forces were ill-equipped for these new kinds of conflicts. When the first SOF elements were flown into Afghanistan on October 20, 2001 to join up with friendly Afghan forces, they found themselves required to operate on horseback. Not only were the SOF warriors not well-trained for mounted operations, but they found the traditional Afghan saddles impossibly uncomfortable. The start of the effort to properly and rapidly equip U.S. forces for the new kind of conflict began with the airlift of western saddles bought from a commercial vendor. In the ensuing charge of this 21st century Light Brigade, SOF troopers mounted on their new western saddles have become the stuff of legends.

The need to go outside the military's acquisition system to find necessary, even critical, equipment was not limited to saddles. Once the decision was made to insert SOF forces into Afghanistan, members of the Fifth Special Forces Group scrambled to get ready for the mission. As would be made public only years later, those original warriors lacked basic knowledge about the country in which they would soon fight and basic equipment with which to prosecute this new war.

> In the weeks after 9/11, Fifth Group soldiers scrambled to prepare for the coming war in Afghanistan. Intelligence on the Taliban, Al Qaeda and the Northern Alliance was so thin that the men resorted to old Discovery Channel shows and back issues of National Geographic. There wasn't time to requisition supplies through the Army, so they scooped up tents at REI, ordered fleece jackets direct from the North Face and bought every Garmin eTrex GPS unit they could find.[1]

Since the early months of Operation Enduring Freedom, responding to urgent needs of the warfighter has become a central acquisition challenge. Much has been made of the effort to increase the number of unmanned aerial vehicles, armored vehicles and other major pieces

of equipment. Now hundreds of unmanned systems of all sizes and shapes, and Mine Resistant Ambush Protected and MRAP All Terrain Vehicles by the thousands have been deployed to Iraq and Afghanistan. For fiscal year 2011 there is more than $26 billion allocated in

the overseas contingency operations (OCO) account for procurement of equipment to support the ongoing conflicts.

Less well publicized but equally important have been the efforts to get clothing, personal gear and soldier equipment to the warfighters. The harsh physical environment, intensity of combat and duration of deployments quickly illuminated inadequacies in standard equipment at the individual and unit level. Stories began to filter out of Iraq and Afghanistan that soldiers or their families were buying commercial products -- boots, backpacks, flashlights, laser designators, binoculars, knives and even night vision goggles -- that were of higher quality, more rugged or more usable than what the military had provided. Urgent requests for better clothing and soldier equipment flooded the system.

Given the volume of urgent operational requirements coming back from the war zones, the military was challenged not only to evaluate and respond to all the new demands but to find the appropriate means to meet these requirements. Lack of stable funding had resulted in a severely reduced defense industrial sector to meet these urgent operational demands. Equipment and tools had to be acquired from the commercial industrial base. The clothing and soldier equipment industrial base ramped up to meet the new demands.

The majority of OCO funds went to programs such as countering improvised explosive devices (IEDs), acquiring tens of thousands of armored vehicles and expanding the number of unmanned vehicles. But there was also a growing requirement to fund the necessary operational clothing and individual equipment that the new type of conflict demanded. Funding for individual and unit equipment also is provided largely through the OCO accounts.

As these conflicts wane there is the very real possibility that support for this important effort will also decline. Typically in the soldier clothing and equipment sector, vendors use internal funds to support research and development (R&D). When there is less demand, vendors stop risking the R&D dollars. Currently, the Army base budget is not sufficient to fund the R&D gap should vendors pull back. It is important to ensure that adequate budgetary resources continue to be provided for maintaining and improving individual clothing and soldier equipment. Without assured funding, the industrial base is likely to shrink and R&D activities will wane.

Different Equipment for a New Kind of Conflict

Irregular warfare as it has evolved in both Iraq and Afghanistan (and likely to be the case in projected future campaigns), has dramatically altered equipping paradigms for land forces. While “equipping the man” has long been a maxim for land forces, the balance between fighting from mounted platforms to dismounted actions has radically shifted to the latter type of operation. Harsh terrain, adversaries that blend with the population, urban sprawl and non-uniformed threats have all placed a premium on dismounted operations, and the equipment necessary for this kind of fight.

There were the now well-recognized physical environments of Iraq and Afghanistan which tested the durability and effectiveness of equipment, weapons, clothing and individual items. There were the challenges posed by a new kind of adversary using heretofore unknown weapons such as IEDs.

> *"When we arrived in Baghdad, our mission changed: we were tasked with establishing a safe and secure environment in a city of 7 million people spread over hundreds of square kilometers and separated physically and psychologically by a river. It took three months to understand the problem."*
>
> *-- General Martin E. Dempsey, Chief of Staff, U.S. Army*

And, there was the challenge posed by the need to revamp the tactics, techniques and procedures that had been developed for a different conception of a future conflict. Prior to September 11, the U.S. military had envisioned a future major conflict as involving combined arms engagements against a similarly equipped, if less capable, adversary. The role of U.S. ground forces was to engage in maneuver warfare to find, fix and destroy enemy formations. This type of conflict saw very little need for protracted operations by dismounted infantry, particularly not in very complex or difficult terrain. Counterinsurgency and counter-terrorism operations were not the emphasis for conventional U.S. forces. But the nature of the conflicts in Iraq and especially Afghanistan required very different tactics. Dismounted operations became central and with them a demand for clothing and personal equipment that could withstand the rigors of dismounted operations in complex terrain and harsh environmental conditions.

Once U.S. forces were engaged in protracted, intensive counterinsurgency and stability operations they urgently needed a whole new array of equipment. These urgent requirements reflected the character of the conflict in Iraq, for example the growing threat posed by IEDs. In other cases they were the result of a growing concern for the physical safety and general well-being of soldiers and a realization of the effects of some of the less-obvious stresses that heretofore had either passed unrecognized or had been dismissed. The urgent needs ranged from fire resistant environmental clothing, improved body armor and outerwear, cameras to look into wells, culverts and tunnels, improved night illumination devices, and automated language devices to support engagement with a foreign, non-English speaking population, to systems to protect soldiers' hearing.

Providing warfighters with the means needed to successfully conduct a new type of war was only part of the solution. A challenging physical environment posed its own problems for U.S. warfighters beyond the tactics and techniques employed by the adversary.

Dismounted warfighters found themselves burdened by upwards of 100 pounds of clothing and equipment including body armor, weapons and ammunition, communications devices, vision enhancement systems, batteries, food and water. A serious tension existed between the demands from the field for more and better equipment and the weight burdens thereby imposed. As one Army official explained:

> We've always been concerned with how much we're loading up on a soldier. But when you start operating in Afghanistan it becomes magnified immensely. Anything over 5,000 feet, you start to see issues. It's hard when you have to make a decision: Do I carry more ammunition or do I carry water?[2]

The combination of terrain, altitude and infrastructure made Afghanistan an entirely different conflict than Iraq from the perspective of individual soldiers and their equipment. For example, soldiers deploying to Afghanistan are now being provided the new "MultiCam" camouflage items, including new Mountain Combat Boots and MultiCam-patterned Modular Lightweight Load-carrying Equipment gear. The Army realized that the complex nature of the terrain in Afghanistan meant a different camouflage pattern for uniforms was required. In addition, the rough terrain necessitated tougher foot gear. Meeting these requirements required a technically sophisticated and responsive clothing industrial base.

The demands of combat in Afghanistan also resulted in changes to other soldier equipment. The Army decided to acquire a different protective vest that offers less coverage but half the weight. The vest worn by troops in Iraq was designed to protect against fragmentation and blasts such as roadside bombs. The risks of IEDs to individual soldiers in Afghanistan were considerably less while the cost of carrying the additional weight was very high. The Army developed lightweight versions of its MK48 and M240 machine guns. Chinook and Black Hawk helicopter pilots were provided with a new "portable oxygen delivery system" to replace the current chest-size oxygen tanks. The new oxygen tanks allow pilots additional mobility outside their aircraft.

Articulating urgent operational requirements and identifying readily available solutions were only two of the problems confronting the U.S. Army in the early years of Operations Iraqi Freedom and Enduring Freedom. Another challenge was funding. By their very nature, urgent operational requirements do not lend themselves to the traditional budget process. As a consequence, the majority of funds to meet these new demands came from supplemental and overseas contingency operations funding. Eventually the Army will face the challenge of maintaining progress in equipping individual soldiers through the regular budget process.

Rapid Equipping Force

Ironically, the problem of meeting urgent requirements was largely due to the unavailability of adequate operational clothing and soldier equipment. Many warfighters in Iraq and Afghanistan and their families had been demonstrating with their own resources that the private sector had a wealth of personal equipment, clothing and other items that were better than those available from government-approved sources. The private sector had the material, the production capability and the desire to help. What was lacking was a way for the government to take advantage of what was available.

Initially, the changing nature of the situation in Iraq and Afghanistan meant that there was little or no way to anticipate requirements. Unanticipated threats such as those from IEDs and the challenge of operating in complex, poorly understood environments were confounding U.S. forces. As a result, rapid equipping was an imperative as the Army's acquisition system was inundated by a flood of urgent needs from the field. Initially, the Army had no system for meeting such needs. In some instances, warfighters or their families could address an individual's need for better operational clothing or equipment by acquiring commercially based products, but this did not apply at the unit level. Moreover, there was no way for private citizens to purchase the larger pieces of equipment, such as robots, that were required. In addition, there was the need to make certain that new and innovative products met minimum standards with respect to effectiveness and safety.

As soon as the U.S. military invaded Afghanistan to hunt al Qaeda down in its caves, it started running into the improvised explosive device. Just a few months after September 11, IEDs had become major killers -- in the caves that U.S. soldiers were now scouring in the hunt for Osama bin Laden.

Just as quickly, the military started to devise ways of inserting eyes and ears into the cave without also putting life and limb in with them. One solution was a remote-controlled robot. It proved too heavy, too expensive, and not entirely practical for use in caves. But it was a step in the right direction and it taught the military an important lesson. The U.S. needed a force specifically designed to counter -- quickly and cheaply -- the lethal innovations of an exceedingly creative enemy. That is how the Rapid Equipping Force was born.[3]

"My men were operating in the mountains of Afghanistan for several days at a time with inadequate clothing. They were continuously cold and wet. I got on a satellite phone, called back to a private sector supplier who immediately acquired the necessary cold weather gear and had it shipped to me."

-- Former Special Operations Force unit commander, Afghanistan

In 2002 the Army created the Rapid Equipping Force (REF) whose mission was to identify immediate, unmet needs of combat soldiers and satisfy those requirements within 90 to 180 days. The short timelines involved for responding to requirements inevitably meant that the REF would have to rely extensively on items already available from private companies. There was no time for the traditional, elaborate acquisition

process which typically took years to go from requirements definition to fielded capabilities and then often provided a product that was less useful than what was available from the private sector.

The goal of the REF is to respond to specific, immediate needs faced by commanders and soldiers in the field. These needs may reflect a deficiency with existing equipment, a mission activity that cannot be adequately supported with existing equipment or an emerging threat.

> We tell commanders: 'If you lack technology that causes your soldiers to get hurt, we will try to find a solution. If you're not as effective in your environment as you want to be -- whether it's because of a force protection issue, or a weapons issue, or a deployment issue -- we will try to find solutions that make you more effective.'[4]

The Rapid Equipping Force became a permanent organization in 2005, assigned to the Army's Deputy Chief of Staff for Operations and Plans. The REF now provides single-stop shopping for critical soldier equipment. Its goal is to provide "game changing technology" to the warfighter with an emphasis on enhancing survivability, improving force protection and increasing lethality. To achieve the goal of rapidly fielding solutions, the REF has a full staff of some 150 people in all the necessary disciplines: intelligence, requirements validation, business management, acquisition, technology management and logistics. One REF official described the organization thusly:

> I kind of liken it to a spear. And if you look at the body of the spear you've got the tip, and the tip in my opinion is the Rapid Equipping Force. And then along that spear continuum, you've got the normal acquisition process, and if you think of it along those lines, we're the ones who get to the problem right away to help the soldier.[5]

In 2005 alone, the Rapid Equipping Force purchased more than 20,000 items, including robots, surveillance systems, digital translators and weapon accessories. Examples of the wide range of operational clothing and equipment that the REF provided to troops in the field include:

- Packbot man-portable robot
- Enhanced Logistical Support Off-Road Vehicle
- A specialized Wellcam to explore wells and tunnels
- Route Clearance Camera
- Forward Looking Infra-Red (FLIR) cameras
- Improved night vision goggles
- Helmet mounted camera with audio and video imagery, recorder module for download to a computer and LED lighting
- Green Laser Warning System
- Quiet Pro, hearing protection system

- Phraselator, a hard case, multi-language, hand-held translation device and pocket personal computer
- Tactical Mini Unmanned Aerial Vehicle
- Air Robot, a quad-rotor, electric miniature air vehicle with a video camera payload
- Hand-held thermal viewer for close-up images of forward sites

An example of how the REF met an urgent need arising from the unique circumstances confronting U.S. forces in Iraq and Afghanistan was the creation of the Escalation of Force kit. U.S. forces found themselves inadequately equipped for the range of encounters experienced with civilian populations that they were responsible for policing and defending. The Army had never considered the need for special equipment to assist soldiers in undertaking what were traditionally police duties such as traffic management or crowd control. The Escalation of Force kit provided units with a range of new capabilities, including loudspeakers, warning lights, traffic signs (in both English and Arabic), spike strips and a laser designator. This kit assisted U.S. forces in applying control in complex situations with the presence of civilians without immediate resort to deadly force. Virtually all these items were commercially available; the REF acquired them and packaged them in a kit.[6]

According to published reports, by 2008 the REF has provided more than 550 different types of equipment and delivered some 75,000 individual items to U.S. forces. Much of this equipment and clothing were commercial products, sometimes modified to meet military needs. In 2010, the House Appropriations Committee characterized the REF as a "national treasure" and approved its full budget request of $305 million.

Rapid Fielding Initiative

The work of the REF did not address a larger issue confronting the military in Iraq and Afghanistan: the persistent underfunding and lack of attention to soldier clothing and individual equipment. This problem was a result, in part, of the tendency to treat this area as a commodity procurement problem. Little or no funding was provided for research and development in peacetime. In addition, while there was a program

of record for clothing and equipment, it was unfunded. Thus, it was difficult to sustain adequate investment in soldier clothing in competition with the requirements of major weapons platforms.

As a result, the military services had to deal with a host of issues related to the equipping of combat units. First and most obvious was the need to ensure that units bound for the combat theaters in Iraq and Afghanistan were fully and properly equipped. Second, there was the need to support the re-equipping of units being reorganized under the Army's modularity plan. Third, there was the need to make up for peacetime shortfalls in unit equipment, particularly as applied to the National Guard. Finally, there was the growing requirement to refurbish and re-equip units cycling out of the combat zones.

Once it became clear that the conflicts in Iraq and Afghanistan were going to be protracted and that the global war on terrorism was likely to involve the deployment of U.S. forces to other difficult environments,

the U.S. Army sought to create an organization that could respond more systematically and over a longer period of time to emerging equipment requirements.

The Army saw the negative implications of soldiers or families subsidizing the Army's underfunding of organizational clothing and equipment by purchasing off-the-shelf items before deploying to alleviate deficiencies or specific equipment inadequacies. In late 2002, under Program Executive Office (PEO) Soldier, the Army established the Rapid Fielding Initiative (RFI). The RFI expedites acquiring and fielding up-to-date, off-the-shelf clothing and individual equipment.

The RFI maintains an equipment list that is continually updated based on feedback from soldiers and lessons learned from the ongoing conflicts. Currently, the RFI items include a wide array of operational clothing and soldier equipment including spotting scopes, weapons accessories, night vision systems, optics and lasers as well as improved versions of basic items such as socks, boots and moisture-wicking T-shirts. Virtually all of these are either commercially-available items

"The Regiment was on order to deploy to Iraq in 2007 in support of OIF [Operation Iraqi Freedom]. While we were filling up with brand new personnel, we were also severely deficient of equipment. All the avenues we had used before would not deliver to us exactly what we requested or was not available. We were under the impression we would be operating in austere and remote locations and that is what drove the requirement for all the gear. The problems we encountered both politically and systematically were archaic."

-- 3rd Armored Cavalry Regiment Officer in 2006

or derivatives of such. Some specific examples of equipment provided under the RFI are:

- Modular Lightweight Load-Carrying Equipment (MOLLE) which consists of removable compartments and components and a fighting load vest with removable pockets
- The Advanced Combat Helmet, which is lighter than the traditional Kevlar helmet while providing equal protection and allows for improved hearing, which can be of extreme importance in counterinsurgency operations
- Third Generation Extended Cold Weather Clothing System (GEN III ECWCS)
- Enhanced Night Vision Goggles that fuse image intensification and infrared vision to allow for both indoor and outdoor nighttime use
- Thermal Weapons Sight 2 which is half the size and weight of its predecessor with batteries that last twice as long
- Improved Tactical Assault Panel that permits soldiers to carry additional ammunition
- A second-generation improved outer tactical vest
- Miniature binoculars that give soldiers a small, lightweight means of supporting reconnaissance and target identification[7]

The RFI also developed and deployed a number of weapons systems that improved warfighter effectiveness and saved lives. One was the Common Remotely Operated Weapons Station (CROWS), a turret able to carry a variety of weapons systems and sensors that allows the operator to remain safe within the vehicle. Some 18,000 CROWS have

been acquired. Another was the redesigned M240 machine gun which used titanium to lighten its weight. Finally there was the man-portable XM-25 Individual Airburst Weapons System, a 25mm grenade launcher with a variety of shells for use against defended targets. The XM-25 is a game changer for dismounted combat.

The goal of the RFI is to ensure that Army units never again deploy for combat inadequately equipped. Unlike the REF, the Rapid Fielding Initiative strives to ensure that all deploying units possess the appropriate equipment in kit form for its intended mission. PEO Soldier began fielding RFI equipment in November 2002. The RFI seeks to gather feedback from soldiers in the field about inadequacies in equipment, emerging needs and ways of addressing them. According to PEO Soldier, since 2002 more than one million soldiers have been equipped with state-of-the-art equipment, providing significant enhancements to their lethality, mobility, survivability and operational quality of life. In 2006, the RFI's mission was expanded to encompass the complete equipping of the Operating Army. The nature of the global struggle against violent extremism has resulted in an open-ended requirement for appropriate equipment and soldier clothing.

The cost today of providing a soldier with basic mission essential gear is estimated to be around $2,000 per soldier. The basic equipment set includes helmet, boots, ballistic spectacles, cold weather garments, earplugs, gloves, goggles, first-aid kit, infrared markers, infrared helmet reflector, knee and elbow pads, sleeping bag, T-shirts and undergarments, modular backpack and strap cutter. To fully equip a soldier with the basic kit plus higher-end items such as body armor, electronic devices, sensors and weapons can cost up to $18,000.[8]

RFI has very successfully used a variety of contracting methods to support the rapid equipping of units going in-theater. One reason for RFI's success is its ability to employ a variety of rapid acquisition contractual vehicles such as the Defense Logistics Agency's (DLA) Tailored Logistics Support contract and General Services Administration contracts. So long as adequate funding is available to implement task orders on such contracts, RFI can respond to the demands of operational units promptly.

As urgent needs emerge, PEO Soldier continues to field thousands of items to the force over and above those identified by the RFI. At issue, however, is funding for continued improvement of soldier clothing and operational equipment. PEO Soldier currently funds RFI activities from the overseas contingency operations budget. This leaves the program vulnerable to reductions in this funding stream and the effort to put conflict funding into the regular defense budget.

The RFI also has moved into the arena of managing unit equipment and seeking to reduce defense costs by avoiding the fielding of unnecessary or redundant items. According to PEO Soldier, "RFI has implemented the Lean Six Sigma (LSS) processes to minimize duplicative fieldings of equipment." This has resulted in savings of over $84 million in its first 12 months. RFI is now pursuing the automation of its support systems in order to reduce the administrative workload on commands receiving items.

Soldier as a System

The current conflicts required that the Army rethink its long-term approach to equipping individual soldiers. No longer could the Army think in terms of individual items of equipment whether it be weapons, operational clothing, sensors, communications devices, soldier protection or other items. Decisions made in one area affected others as well as the overall well-being of the soldier. Adding more equipment meant adding weight the soldier had to carry. Additional electronics meant carrying more batteries. Soldier mobility and operational effectiveness was being challenged by the weight of equipment.

In addition, the designation of the soldier as a system is part of the Army's answer to the problem of the lack of adequate attention to funding of clothing and individual equipment. PEO Soldier now plans and programs for a Soldier Portfolio of equipment. The Soldier Portfolio currently divides items into four categories: soldier protection and individual equipment, soldier clothing and individual equipment, soldier sensors and lasers and soldier precision targeting devices. The creation of the Soldier Portfolio supports the treatment of soldier clothing and equipment as an equal competitor for funding with major acquisition programs.

The goal of the Soldier as a System program is to improve basic equipment and to ensure the acquisition of necessary specialized equipment for different basic soldier functions. The Soldier as a System concept offers a basic set of common equipment and operational clothing under the Core Soldier program. Core Soldier equips each soldier with the basic equipment to perform basic soldier missions. This clothing and equipment reflects eight years of thought, learning and experimentation.

> *"The individual soldier is the most deployed and employed weapons system in the DoD's [Department of Defense] arsenal."*
> *-- Brigadier James Moran, U.S. Army (Ret.), PEO-Soldier*

In addition, Soldier as a System provides specialized operational clothing and individual equipment for dismounted and mounted soldiers and aircrews.

- The Ground Soldier System (GSS) equips soldiers who primarily fight dismounted. GSS capabilities include battle command and situational awareness, force protection, lethality, mobility, sustainability and reliability. Elements of the GSS kit include the rifleman hand-held radio (to be replaced by the Joint Tactical Radio System hand-held), night vision scopes, individual protection systems, language translators and laser designators.
- The Mounted Soldier System (MSS) focuses on soldiers who fight primarily from vehicles. Elements of the MSS system include specialized communications interfaces, improved survivability gear, night vision goggles, hearing protection systems and other individual equipment subsystems.

- The Air Soldier System (Air SS) provides necessary and appropriate clothing and equipment for soldiers who fight primarily from aviation platforms. The Air SS provides specialized clothing, communications devices and protective gear designed to assist the air soldier in his platform and also in the event he is forced down.[9]

The Army also is investing in a new scalable soldier protection system. This is a modular system including a soft armor vest, plate carrier and load-bearing belt. An important feature of this system is the ability to customize it to fit soldiers of different body types including female as well as male service members.

One of the most important features of the Soldier as a System concept is to integrate and coordinate the development and fielding of different pieces of operational clothing and equipment to ensure they work together to increase combat effectiveness. The value of new pieces of operational clothing and equipment needs to be weighed against the cost, weight, mobility, and complexity of the item.

Although the Soldier as a System is supposed to be an integrated equipment suite, it is not fully integrated with other programs. The Army has been leveraging RFI to get warfighters the required gear. There are a number of Soldier as a System components that are also RFI list products. The programs should be more integrated with the RFI effort.

Future Challenges

Two factors distinguish the current wars from those for which the military had prepared. The first is the dominance of dismounted maneuver. This situation clearly placed a much greater emphasis on the individual equipment available to the individual warfighters. The need for rugged and reliable operational clothing, deployable sensors and lights and lightweight power supplies became clear. In addition, the existing schema for providing connectivity was challenged by the need to operate dismounted. New radios, computers and communications links needed to be developed to ensure that dismounted warriors could remain connected to one another and higher echelons.[10]

The second is the need for a steady supply of properly trained, equipped and organized units. Afghanistan now stands as the longest war in U.S. history. As a result, the military has had to address the problem of maintaining an adequate forward deployed force while rotating new units in and out of theater. In response to the need for continuous deployment of forces, the Army created its transformational force generation model, termed ARFORGEN. As described by the Army, ARFORGEN "is the structured progression of increased unit readiness over time, resulting in recurring periods of availability of trained, ready, and cohesive active, Army National Guard, and U.S. Army Reserve units prepared for operational deployment."[11] All elements of the force generation process, including the provision of adequate soldier clothing and operational equipment, must be synchronized in order to ensure the continuous and predictable availability of forces.

To implement the ARFORGEN process, the Army had to recognize and respond to the lessons of Iraq and Afghanistan. Three important

lessons emerge from the experience of preparing the U.S. military to meet the challenges of current and future conflicts. The first is the likelihood of being surprised with respect to the nature, location and rapid timelines of future conflicts. As a result, it will be difficult to

guarantee that U.S. forces have all the necessary equipment and clothing at the start to achieve success. There needs to be a system for rapidly altering the mix of equipment and clothing available to soldiers as circumstances dictate.

The second lesson is the need to rapidly adapt to irregular warfare environments to take care of the (largely dismounted) land forces. This means, in part, making sure that deploying and next to deploy units have the proper equipment. But it also means having a system in place to meet urgent needs from the field that will inevitably appear.

The third lesson is to provide adequate attention and funding to both procure soldier clothing and individual equipment in peacetime and conduct continuous research and development. No longer can clothing and equipment be treated as commodity items. The technological component in modern military clothing and equipment is increasing and places a greater requirement for a sophisticated industrial base to support new demands. The military cannot simply assume that the peacetime industrial base will be able to meet new requirements and large increases in purchases when conflict ensues unless proper and steady funding is maintained.

From this experience emerges the clear challenge to the Department of Defense (DoD) to never again permit U.S. forces to enter combat without the best individual equipment available. This will entail maintaining an active institutional capability to respond to urgent requirements as they arise. The Army has taken an important step in this direction by institutionalizing the Rapid Equipping Force and the Rapid Fielding Initiative. They have more than proven their worth and saved lives in the process.

The 2009 Defense Science Board report, *Fulfillment of Urgent Operational Needs*, concluded that the Department of Defense "lacks the ability to rapidly field new capabilities to the warfighter in a systematic and effective way."[12] It recommends that the Department of Defense separate urgent acquisitions from the more deliberate acquisition process, create the Rapid Acquisition and Fielding Agency, and establish a separate and flexible fund to support rapid acquisition and fielding.

Another step is to ensure that the critical industrial base that supports development and manufacture of soldier equipment remains healthy. There are concerns regarding a number of critical sectors. For example, DLA conducted an industrial assessment of the DoD domestic body armor industrial base including both hard body armor (ceramic plate manufacturing) and soft body armor (ballistic outerwear garments and carriers). DLA concluded that:

> While the industry currently has the capacity to meet surge requirements, the DoD body armor industrial base has expanded significantly due to increased wartime requirements. As these requirements eventually decrease, it is critical to maintain the industrial base's ability to rapidly field new body armor systems during wartime. Several segments of this industry are at risk,

including manufacturers of ceramic plates, high performance polyethylene (HPPE), and aramid fiber.[13]

There have been situations where RFI and REF have been unable to meet the needs of combatant commanders. That is amongst the principal reasons why the defense department has allocated more funds and discretion to unit level commanders to purchase gear directly from vendors for their units. This program has been very successful. However, there is reason to be concerned that once supplemental budgets go away, there will no longer be funds or authority for unit level commanders to identify and address their needs. The experience of the past eight years leads to the conclusion that combat commanders will always need the authority and resources to fill gaps and acquire mission specific equipment even if RFI is fully funded.

As the current conflicts wind down and deficit reduction pressures grow, the Pentagon and the nation will face the problem of ensuring adequate funding for operational clothing and individual equipment. One of the reasons that so many inadequacies emerged in the clothing and equipment with which soldiers were originally provided is because the military skimped on investments in this area for decades. Through overseas contingency operations funding, the REF and RFI were able to make great strides in upgrading the equipment provided to the individual soldier.

One of the most valuable contributions of the REF and RFI to the current conflict is how they have permitted unit level commanders to equip their warfighters in ways that were previously unheard of. Whether it is better night vision systems, combat lights, well cameras or small robots, unit commanders have been able to identify needs and field capabilities more rapidly than in any conflict in American history.

However, as this funding diminishes with the drawdown that is taking place in Iraq and will inevitably occur in Afghanistan, there is a risk that this funding will be lost. Equally a factor, if OCO (versus base budget) funding remains the "programmatic strategy" to procure individual equipment -- with the rationale being that Congress would not refuse individual warfighter needs -- production schedule slippage and delivery

lag times will still remain. The continuation of both the REF and the RFI as permanent Army organizations could also be at risk without adequate funding for soldier clothing and individual equipment. The loss of these organizations could be catastrophic to the ability to supply the individual warfighter with the proper gear.

As a consequence, many of the recent technological advancements that took place with respect to operational clothing and individual equipment could be lost and the domestic industrial base which designs and manufactures many of these products would suffer. If procurement for solider equipment is reduced significantly, the domestic manufacturing base will inevitably be forced to contract and many companies could go out of business. This could create a risk that the military would be unable to ramp-up in a manner compliant with U.S. law giving preference in procurement to domestically produced, manufactured, or home grown products. It is important that future defense budgets continue to fund acquisition of, and research and development for, operational clothing and individual equipment.

Recommendations

To preserve the diversity and capabilities of the soldier equipment industrial base, a smart collaborative industrial policy is needed that will promote continued availability of innovation and surge capacity in the area of soldier clothing and individual equipment and strengthen the soldier for today and tomorrow. Among the steps that should be taken are:

1) The Department of Defense should create and maintain a cross-service strategic communications plan for industry. The goal would be to provide industry with the insight needed to make necessary investments in capacity, infrastructure, and technology development to meet the department's needs.

2) The Secretary of Defense should create a clothing and individual equipment industrial base task force to assess the economic health of participants and the depth of innovation pipelines. A lack of comprehensive market research is a contributor to a lack of industrial policy and the associated increased risk to the base. The Office of the Secretary of Defense should task an appropriate executive agent to institute a more robust market research process.

3) The Secretary of Defense should implement the recommendations of the Defense Science Board regarding institutionalizing the processes for rapid fielding in response to urgent operational needs statements from the field. To improve operational readiness, the Army must standardize the RFI function and tie it directly to the ARFORGEN process. The RFI equipment list can evolve over time as part of the Army's biennial cycle for altering ARFORGEN. Thus, as units prepare for deployment, the nation can be assured that there will not be a repetition of the early experiences in Iraq and Afghanistan.

4) Make RFI and REF fully funded programs of record. This would ensure that the RFI list of equipment is provided to all units that are made available to combatant commanders and civil authority as part of the ARFORGEN process. In order to respond to ARFORGEN, a stable level of support for existing RFI items must be maintained even in an era of tightening defense budgets. Appropriate budgets must be set and funds made available for operational units to purchase mission specific operational equipment through rapid acquisition contractual vehicles such as DLA's Tailored Logistics Support contract or General Services Administration contracts.

5) The Army must support research and development programs at a level that sustains innovation. Robust research and development funding is needed to avoid a major disconnect between future needs of the operational force and available clothing and equipment. R&D funding also is a mechanism for current industry participants and non-traditional suppliers to stay engaged as contract volume decreases.

6) PEO Soldier must develop a long-term acquisition strategy for soldier equipment that includes: raising minimum quantities on soldier equipment contracts; making optimum use of prime contractors to assist in the management of highly complex supply chains and integrating items into product sets; giving preference to contractors incorporating new technology into equipment designs; reviewing mandatory sourcing policy and its contribution to contract delays and quality problems; expanding the "Warstopper" program for holding buffer stocks of strategic materials; maximizing the use of performance specifications in lieu of military specifications; and, sustaining the rapid equipping and fielding processes developed during the current conflicts.

7) PEO Soldier should use Qualified Product Lists to pre-approve soldier clothing and individual equipment items outside of contract actions. The process of qualifying a new equipment design or technology is long and expensive. This process needs more flexibility to qualify new items outside of contracting actions to generate designs that will meet or exceed the required performance.

Conclusions

Today's infantry soldier in Afghanistan is the best equipped in the world -- the best body armor, the best fire-resistant uniform ensembles, the best weapons, night vision goggles, mountain boots, etc. The challenge is to maintain this situation as the current conflicts wind down and competition for resources across the defense sector intensifies. The soldier equipment industrial base will suffer in such a competition because the sector is included in the procurement category "commodity," which describes goods generally not requiring deliberate investment, e.g. food and fuel. This label by the military, and the associated procurement methods and authorities sends a mixed message.

"Commodity" purchase decisions are based on criteria such as price and delivery not "value." Once technology, manufacturing processes, skilled labor, and design are utilized to convert these materials into end-items, they are no longer "commodities." In light of the level of technology now incorporated in soldier equipment items, including clothing, boots and helmets, the defense acquisition system needs to recognize that this sector is no longer a commodity.

Historically, the low value-add components of supply chains (in this case small business apparel and equipment contractors) exit during down cycles but can recapitalize quickly during a demand surge. However, high value-added capital intensive production lines, such as specialty materials suppliers, do not respond quickly to surge demand.

If these large manufacturing lines go idle, those that are military unique may not recapitalize without government intervention. Even if they are dual use assets that service global markets, they may recapitalize but are likely to do so offshore in regions of greater commercial market growth. This may create a strategic sourcing national security risk.

The greatest risk is not of losing commodity supply in the short-term, but of losing the long-term innovation pipeline created by a diverse, domestic manufacturing base. In light of the importance of such innovations to the military's successes in Iraq and Afghanistan, this is an intolerable risk.

In the absence of adequate funds or if DoD fails to provide proper long-term planning for soldier clothing and individual equipment the risks are many and significant. First there would be the loss of the institutional knowledge acquired by the REF and RFI over almost a decade of conflict. There would be the loss of the organizational structures and skilled personnel that have allowed unit commanders to rapidly enhance the capabilities of the forces under their command to respond to circumstances. It would place the lives of warfighters at additional risk. And it would reduce the prospects of U.S. forces being properly equipped for the next conflict.

End Notes

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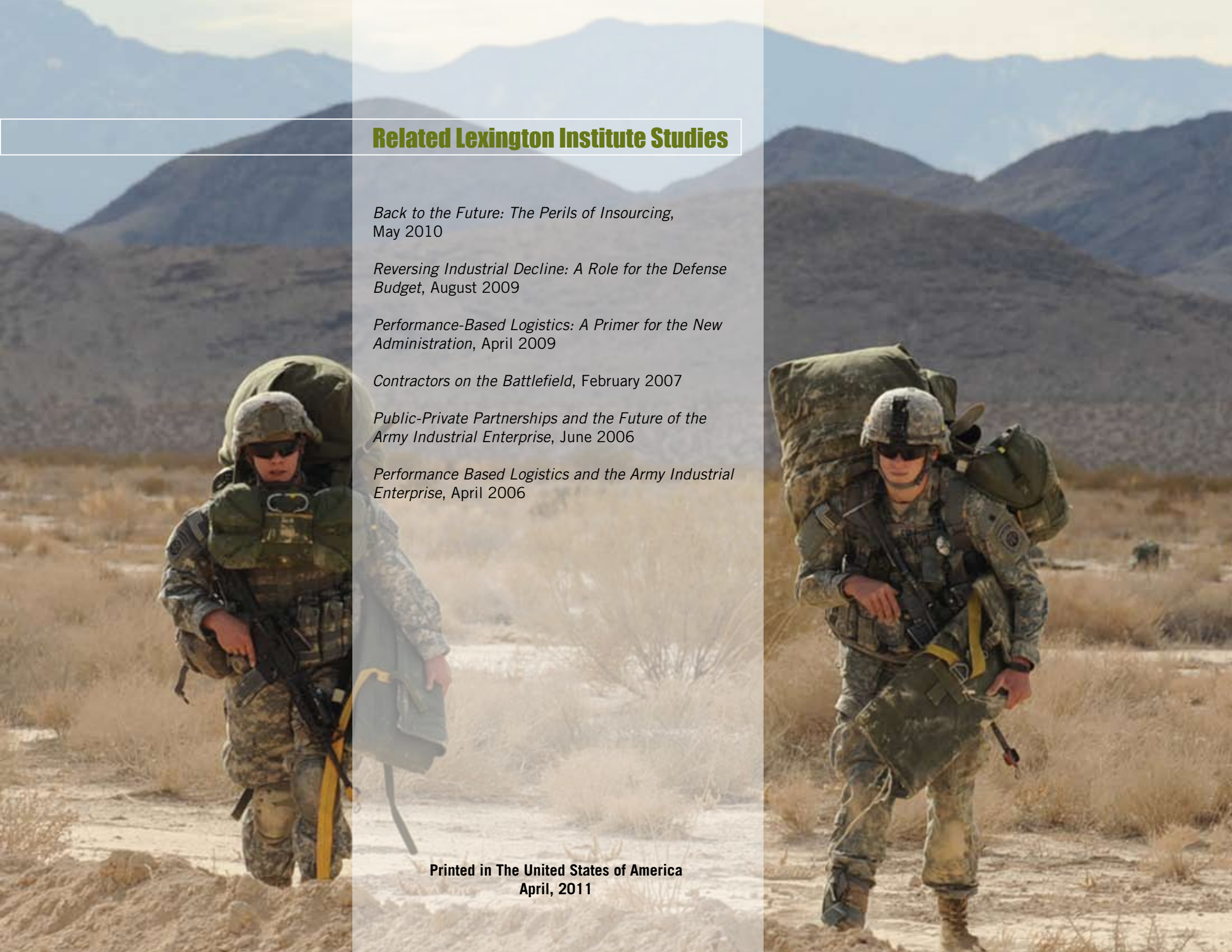
Glossary of Terms

Air SS	Air Soldier System
ARFORGEN	Army Force Generation
CROWS	Common Remotely Operated Weapons Station
DLA	Defense Logistics Agency
DoD	U.S. Department of Defense
ECWCS	Extended Cold Weather Clothing System
FLIR	Forward Looking Infra-Red
GPS	Global Positioning System
GSS	Ground Soldier System
HPPE	High Performance Polyethylene
IED	Improvised Explosive Device
LED	Light-emitting Diode
LSS	Lean Six Sigma
MOLLE	Modular Lightweight Load-carrying Equipment
MRAP	Mine Resistant Ambush Protected
MSS	Mounted Soldier System
OCO	Overseas Contingency Operations
PEO	Program Executive Office
R&D	Research and Development
REF	Rapid Equipping Force
RFI	Rapid Fielding Initiative
SOF	Special Operations Forces



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