Lexington Institute

FROM FACTORY TO FOXHOLE

THE TRANSFORMATION OF ARMY LOGISTICS

EXECUTIVE SUMMARY

A revolution in military affairs is occurring. This revolution involves the transformation of defense logistics from a system rooted in the Industrial Age with its mass armies and "Iron Mountains" of supplies to one that reflects the ways in which warfare is changing, as well as the impact of information technology on organizations and processes. This transformation is absolutely vital if the U.S. military is to achieve its goals of being able to rapidly and decisively project power at great distances against all manner of adversary anywhere in the world.

Recent military campaigns in Afghanistan and Iraq demonstrated the necessity of transforming defense logistics. U.S. forces deployed deep into enemy territory or conducting rapid advances on a nonlinear battlefield strained the capacity of the logistics system. The present supply system, while significantly more efficient than that which existed a decade earlier during the first Gulf War, lacks the flexibility, situational awareness, communications capacity and delivery means to fully meet the challenges of this new way of warfare with a reduced in-theater footprint. The logistics system also suffers from the decline of the defense industrial base over the past fifteen years.

The Army has begun a comprehensive transformation of its logistics system involving changes in technologies, organization, doctrine and even culture. There are four key focus areas in the current plan to transform the Army's logistics. The first is to connect the logisticians as part of the joint battlefield C4 network allowing them to see the battlefield and make more informed decisions. The second focus area is to modernize the distribution system in order to ensure rapid and responsive delivery of the required support at the right place and time. Third is to improve force reception by enhancing the ability for strategic movement of supplies, logistics command and control with reach-back capabilities and the creation of theater sustainment bases. Finally, the entire supply chain must be integrated as a two-way transparent process – from foxhole to factory and from factory to foxhole – so as to efficiently manage the flow of supplies.

The Army's logistics transformation plan is taking place amidst other dramatic changes that will impact the logistics system. Among these are the move towards modular formations, the deployment of the Stryker medium-weight brigades, the development of the Future Combat System (FCS), the creation of fully joint forces and a joint logistics system and the globalization of the defense industrial base. Each of these can contribute to logistics transformation but will also pose additional challenges.

Ultimately, the this "factory to foxhole" must create a seamless system. Beyond that, the system needs to extend to the cockpit, the bridge and all other elements of the joint and combined force. Logistics cannot be treated as an afterthought, but must be considered an integral part of combat operations. Properly organized, managed and supported, a modern logistics system of the kind the U.S. Army is striving to create is a potent force multiplier.

The initial draft of this report was written by Dr. Daniel Gouré and Kenneth A. Steadman.

INTRODUCTION

The United States Army is engaged in the boldest and most comprehensive transformation since before World War II, when it moved from the square to the triangular division structure. The Army is recasting itself into an expeditionary force capable of projecting significant land power rapidly and over long distances and of addressing more fully the expanding mission needs of the Regional Combatant Commands (RCC). To do this, the Army must get lighter as a fighting force while at the same time becoming more mobile, digital, survivable and lethal. It must learn to exploit information, to operate as part of a joint force and to create new organizations and operating concepts.

It is easy to understate the magnitude of this transformation. Over half a century ago the Armed Forces of the United States settled into positions occupied at the end of World War II and the Korean War. As the Cold War progressed, these positions became fixed and military planning focused on fighting large conventional wars with overwhelming, massed, forward stationed forces, sized for force-on-force attrition battles in coordinated, preplanned, sequential operations. Reinforcements were pre-designated and rehearsals for their deployment, reception, staging and onward movement practiced. As advanced technologies were introduced, U.S. and allied ground forces became more tactically mobile but less strategically mobile.

The Army's Cold War logistical system naturally reflected the way that the U.S. military planned and organized to fight future conflicts. The hierarchical logistic system of World War II remained fundamentally intact with each Service contracting for weapons systems, commodities and transportation from the industrial base to stateside depots then forwarding items on to overseas depots. The overseas depots were filled with anticipated levels of weapons, ammunition, food and prepositioned sets of unit equipment until there were "Iron Mountains" of military equipment and supplies scattered throughout Europe and Northeast Asia which could be moved forward as necessary to meet contingencies and combat operations. A large and robust industrial base was maintained, which could be energized on relatively short notice to produce increasing amounts of supplies.

The end of the Cold War fundamentally changed the international security environment and the kinds of security threats that U.S. armed forces would be required to address. Gone were the massed armies of the Warsaw Pact facing U.S. and allied forces across well-established borders. The Defense Guidance and the Quadrennial Defense Review directed a shift from the overwhelming massed force-on-force, attrition-based operations to an overmatching capabilities based joint force conducting effects-based operations (EBO). No longer would the U.S. fight from forward stationed forces, but with forward deployed forces, some arriving directly from the United States. There would be no need for reception, staging and onward movement as forces were deployed directly into the battle space. U.S. forces would not fight linear battles, but instead would conduct simultaneous – vice sequential – operations maneuvering in depth against an adversary's strategic rear and even his homeland. The effects-

based operation would be aimed at crippling the aggressor's ability to operate so that the conflict is ended on U.S. terms in a very short time.

In this new environment, the Army faced with challenges posed by asymmetric threats from rogue state forces and shadowy terrorist groups possibly armed with weapons of mass destruction (WMD) in regions of the world far from established U.S. and allied bases. Meeting these new threats with a force structure that has shrunk by some 40 percent since the end of the Cold War has been a major challenge for U.S. forces in general and the Army in particular. These new threats required a new way of warfare based on rapid, joint expeditionary power projection from distant bases, swift and decisive air, ground and sea operations throughout the nonlinear battle space and timely transition from combat to stability and peacekeeping operations. To support the new way of warfare, the Army began to transform the way it was organized and operated. The goal was to create an Army that was lighter, more agile and yet more lethal and survivable on the battlefield. The experiences in Operations Allied Force (OAF), Enduring Freedom (OEF) and Iraqi Freedom (OIF) confirmed the wisdom of this transformation.

The end of the Cold War saw the logistics system scaled back and a repositioning of the "Iron Mountains" of supplies and equipment from Europe to new potential hotspots. The defense industrial base shrank as demand declined. Nevertheless, much of the industrial age logistics system remained fundamentally intact. Operation Desert Storm was fought with industrial age logistics. It took six months to stage the forces and supplies needed for the operation. It took another 13 months to withdraw the "Iron Mountains" of unneeded supplies pushed forward in the preparation phase. This came at a cost – in time – that may no longer be necessary or acceptable.

In the intervening decade, the Army, recognizing the need for change, undertook a wide range of initiatives to improve its logistics system and make it more compatible with the changes in forces, operating concepts and missions. Planners recognized that transformational changes to force structure and weapon systems, such as the extensive

application of precision delivery weapons technologies, could substantially lower the demand on logistics because it requires fewer weapons to kill a target. Conversely, a leaner, more efficient, networked supply chain could enable the even more rapid and agile maneuver of forces in theater. Yet, as was demonstrated in the campaigns in Afghanistan and Iraq, much remains to be done.

Currently, the defense logistics system or supply chain is a massive and complex collection of activities and organizations that stretches from laboratories and factories around the world to the foxhole, airstrip and combat vessel. Oversight and direction of the system is provided, on the civilian side, by the Under Secretary of Defense for Acquisition, Technology and Logistics and, on the military side, by the Director of Logistics on the Joint Staff. The actual supply chain includes: research and development facilities, factories and production sites, procurement and processing organizations, repair and maintenance facilities, transportation activities, and field distribution units. The Services have primary responsibility under Title 10 to develop and procure weapons systems and provide supplies, although defense agencies such as the Missile Defense Agency or the Corps of Engineers also can play a significant role in selected areas. Each of the military Services has its own logistics and supply organizations-- such as the Army Materiel Command (AMC) or Air Force Materiel Command (AFMC). The Department of Defense (DoD) has the Defense Logistics Agency (DLA). The organizations have responsibilities in the areas of technology, acquisition support and logistics. Logistics support commands and agencies such as AMC can have the responsibility for supporting not only their parent Service but also the other Services, thus giving them joint responsibilities. In addition to AMC and DLA and their Service peers, the supply chain also includes the U.S. Transportation Command (TRANSCOM), which is responsible for distribution management, and the theater support commands that must move supplies through their theaters to the warfighters.

The shift in U.S. defense strategy and the transformation of the Army must be matched by a similar transformation in logistics. The Service-centric, hierarchical logistical organizations that relied upon requisitions and historical consumption rates was ill-suited to supply or support strategically deploying forces in simultaneous actions across the breadth and depth of the battlespace. The new way of warfare requires a logistics system with the same characteristics as the tactical forces: speed, maneuver-in-depth, adaptability, agility, flexibility and battlespace situational awareness. It must be responsive in a timely manner to the needs of far-flung forces and do so without creating new "Iron Mountains" or establishing a large footprint that may be vulnerable to attack and will certainly be expensive. What the Army is doing for itself must eventually metamorphose into a fully joint logistics system.

THE LESSONS OF AFGHANISTAN AND IRAQ

The recent conflicts in Afghanistan and Iraq demonstrated that the U.S. Armed Forces were well on their way to creating a new type of military capable of conducting a new way of warfare. OEF and OIF were both transformational operations. OEF was characterized by strategically deployed forces conducting simultaneous joint and combined operations, maneuvering in depth, and employing organizational flexibility, operational agility and tactical speed in an effects based strategy. OIF was transformational in other ways. It combined the movement of strategically deployed forces with forward-staged forces, substantial joint and combined ground and air forces and the conduct of high-speed, nonlinear operations. OIF exploited unparalleled battle space situational awareness and advanced communications that allowed them great flexibility in force employment. Strategically deployed Special Operations Forces and airborne units, as well as fast moving ground units, provided maneuver-in-depth.

The logistics system that supported both OEF and OIF was more transitional than transformational. It was able to support both operations, but just barely. Improved planning, the creation of at-sea and shore-based prepositioned stocks and investments in both air and sea lift resulted in significantly smaller quantities of supplies being shipped into theater compared to what had been sent forward in the first Gulf War. Logisticians were able to utilize the advanced technology used by tactical commands – especially the Blue Force Tracking system and the communications of the Movement Tracking System – and they had some access to analytical models to estimate and anticipate supply requirements. Use of Radio Frequency Identification Devices (RFID) provided near real-time location of more than 70 percent of the supplies sent to the theater. The visibility of supplies into the theater was the best ever. However, once supplies got to the theater, the visibility became more opaque the closer those supplies got to the user unit.

In OIF, the great distances covered in short time by the combat forces placed a great strain on the transportation and the logistic communication systems. The combat forces often outran their supply lines in part because the logisticians used separate information and communications networks that were beyond the range of their higher headquarters. The nonlinear battlefield created new problems for the theater logistics command, which was forced to deal with the sudden vulnerability of supply columns to attack by unconventional forces.

Logisticians lacked the electronic connectivity of tactical units and often had to embed their requisitions in tactical electronic and radio systems.

The 3rd Corps Support Command purchased satellite phones to communicate with its logistical units trying to keep pace with the combat units. Providing consumables necessitated using intra-theater airlift to forward airheads just as would be required in simultaneous operations in depth.

The need to manage logistics as a joint activity became apparent early in the operation. Indeed, a strong joint character to the logistics systems already existed. For example, AMC provided munitions to both the Air Force and Navy and DLA provided all the fuel to forces in OIF. The Ground Component Logistical Commander established an ad hoc "Joint Common-use Distribution Center" (JLOC) to monitor demand and ensure distribution of such common but necessary items as batteries for electronic devices.

Overall, the more important lesson of OEF and OIF for logistics was that the hierarchical stovepipe supply system was too slow and too inflexible to deal adequately with the new environments and types of operations. Demand was determined by an inflexible requisition system and the historical wartime and even current peacetime consumption rates supplied the basis for making decisions. Surprisingly the logistical demand, expressed in ton miles, was three times greater in OEF and OIF than it had been in World War II, yet Afghanistan fell within 23 days and Baghdad on Day 20. At the same time, critical items such as batteries, small-arms ammunition and tank tracks were in extremely short supply. It is clear that the logistics system was overly rigid in some aspects while having insufficient command and control in other areas.

An After Action Study pointed out that the success of OIF "stemmed more from luck than design." Clearly, the United States cannot rely on luck to maintain its security. It is clear that in order to meet the needs of transformed tactical organizations, logistics doctrine and organizations would have to be transformed as well. It is also clear that some tentative, yet transitional, steps were taken in Operation Iraqi Freedom towards this goal.

THE ARMY'S PLAN FOR LOGISTICS TRANSFORMATION

One conclusion that can be reached from recent campaign experiences is that tactical transformation was beginning to show its great potential. The seeds of a truly revolutionary logistics system are to be found in the response by the logistics community to the experiences of OEF and OIF and in the initiatives underway in the various departments and agencies. The use of Blue Force Tracking systems, airlift of critical supplies to the forward battle areas, the recognized need for 24/7 logistic connectivity, attempts to develop a modernized distribution system and to achieve the effectiveness and efficiencies of operating jointly, point to the positive possibilities of a transformed logistics system.

The Army's logisticians, at all levels, have seen the future and each component of that system is, in its own way, reaching for it. Their efforts are compounded by the requirement to sustain the current force for the near term, support the deployed force and prepare for the transformed force of the future centered on the Future Combat System in the out years. The current force is being recast to make it more modular and, hence, more flexible. This change will further challenge the logistics system. The Army also must be prepared to conduct operations with all types of forces, in a joint environment and perhaps, as in Iraqi Freedom, with allied forces. It also needs to support the rapid evolution of operations from flexible deterrent options and major combat operations to complex humanitarian, stability and peacekeeping activities.

How then to proceed? The Army G-4 has identified four primary focus areas in its logistics transformation effort for intensive modernization and restructuring over the next several years. The first is the connection of Army logisticians in a manner that provides a secure communications and information network across the entire supply chain. The second is to modernize theater distribution so that it can support the rapid and precise actions of ground combat forces. The third focus is to improve force reception to increase the capacity to deploy forces at long distances, rapidly and without large footprints in theater. And finally, the fourth focus area, integration of the supply chain, is intended to ensure the necessary flow of supplies to the war fighters.

CONNECTING THE LOGISTICIANS

In the Army G-4's Logistics White Paper this requirement is referred to as "Connectivity" and foresees logisticians being an integral part of the battle staff in any joint operation, plugged into a satellite-based communications system able to transmit and receive data from the battle area to the industrial base: "The Army must be able to see the warfighter's requirements across the spectrum of operations, understand the requirements and respond with precision, speed and agility."

The key to being able to operate successfully on the modern high-speed battlefield is information acquisition and sharing. This is as true for the logisticians as for the warfighters. The logistician needs constant access to the battlespace situational awareness available to the intelligence and operational staffs at all levels. Additionally, the logistician needs to have 24/7 electronic communications with other logistical staffs, suppliers and supporters. It will need to be a dedicated logistical network that provides a common operating picture to logisticians at all levels.

MODERNIZING THE DISTRIBUTION SYSTEM

The G-4's second area of focus is modernization of the distribution system. This reflects the fluid and dynamic battlefield and anticipates the maneuver-in-depth that will be employed by the transformed tactical forces. A new distribution system will probably require integrating new organizations, new processes, some adapted from business, and the 24/7 information connectivity extending from the unit of action through each Service to the industrial base.

Among the new processes under consideration is designing systems and platforms with modular components to simplify replacement and sustainment. Modular systems would permit simplification of the current maintenance system. Instead of multiple levels of maintenance a modular system would permit reduction to two levels of maintenance. Characterized as "replace forward and repair rear," field units would remove and replace modular components if possible or abandon the platform for evacuation and repair by a unit in the rear. The use of configured loads for specific consumers and for specific operations, when combined with an intelligent load-handling system for rapid loading and unloading of aircraft and ships, would reduce material handling time and speed up delivery of the configured loads to the designated units. Direct delivery of configured loads to the designated units will allow the tactical units to integrate logistic supply and resupply into their concept of operations and increase the tempo of tactical operations.

The Army also is planning to modernize the current set of Division Support Commands (DISCOMs) and Corps Support Commands (COSCOMs). This move reflects the decision to modularize the Army in order to achieve greater

flexibility, adaptability and responsiveness to the needs of the theater commanders. These ESCs will be able to support expeditionary force deployments across the spectrum of conflict.

Achieving this goal will require real-time visibility of supply or support items all the way from the industrial base to the battlefield. In short, from the "factory to the foxhole" and from the "foxhole to the factory." Real-time logistics visibility is crucial to ensuring that distribution is both timely enough to affect the battle and precise enough that it reaches the intended user.

IMPROVING FORCE RECEPTION

The third area of focus by the G-4 is the improvement of force reception in the theater or area of operations. Deployment, reception, staging and onward movement would not be distinct phases in the process of moving forces and supplies to a battle zone. Effects-based strategy calls for simultaneous attacks by joint expeditionary forces through the depth of the battlespace. Some of the attacking forces would be deployed from CONUS bases, others from forward-staging areas. Improved deployment capabilities in airlift, sealift and prepositioned stocks eliminates the need for time consuming phases. Moreover the supplies and support required to sustain the joint expeditionary force must arrive or converge with the force ready to fight. In the G-4's view, this will require total visibility of the supply network, a reachback capability and the capacity to adapt organizationally to the changing situation.

In addition, the supply lines to rapidly advancing forces must be made more secure. One of the lessons from OIF was that on the future non-linear battlefield supply units are not afforded the protection inherently available in the old days of linear warfare. Supply lines may become a major target for hostile forces, as demonstrated in the post-hostilities stability operations in Iraq. Greater force protection for supply units – to include better combat training in force protection and security for combat support and combat service support personnel manning the convoys, supply units, installations and infrastructure – must be developed.

INTEGRATING THE SUPPLY CHAIN

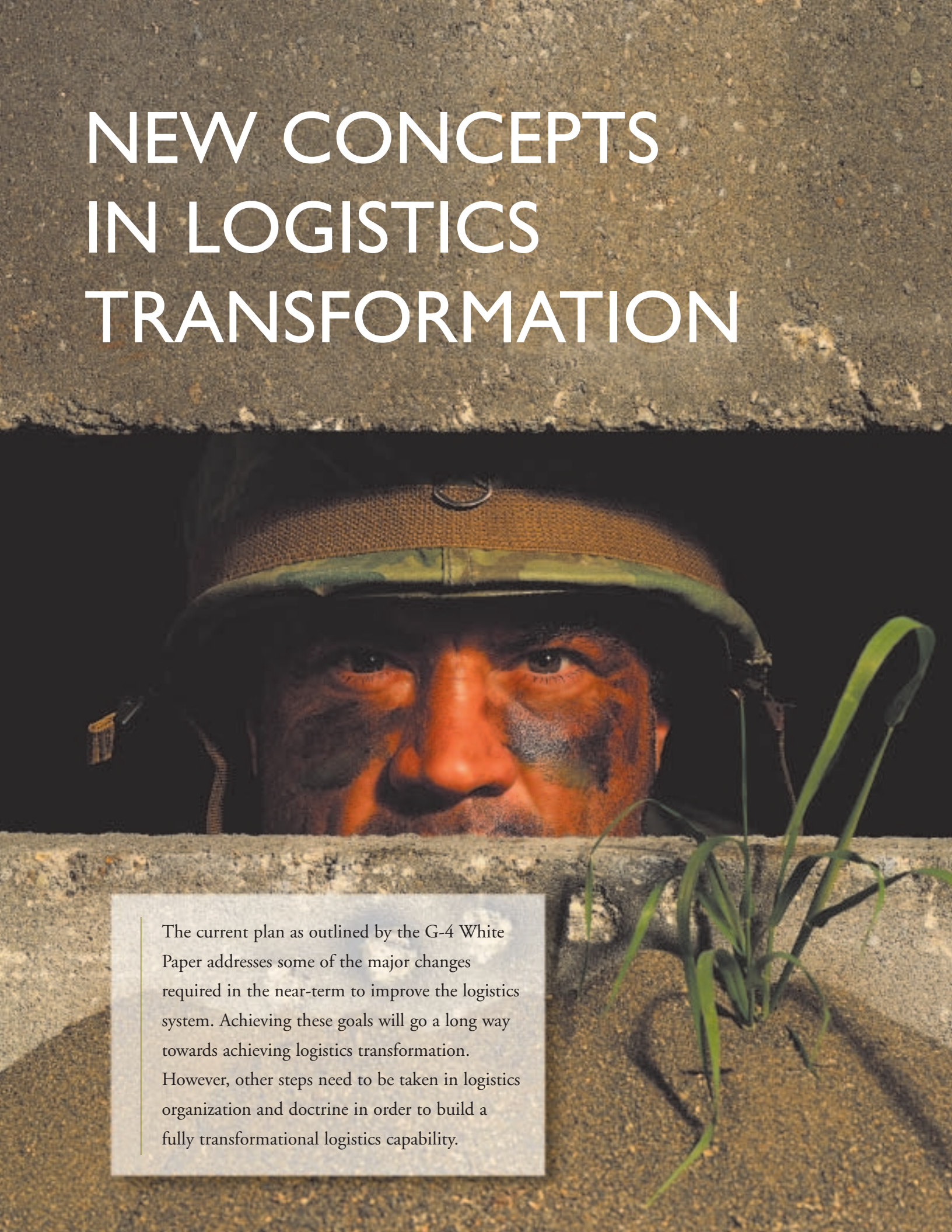
Lastly the G-4's White Paper focuses on integrating the supply chain. A joint end-to-end view of the entire logistic enterprise will be essential if logistic transformation is to succeed. An all-Service network must be capable of capturing and sharing information at all levels with both consumers and suppliers. Also, the supply chain must be integrated with the joint transportation system. Combining the supply function with the responsibility for transportation, for example in a Joint Logistics Command, eliminates unnecessary Service stovepipe organizations and identifies a single proponent of logistics transformation. There are a range of studies underway within the Army, other Services, the Army Secretariat and The Office of the Secretary of Defense (OSD), which may determine where and who will become this proponent.

Timeliness of delivery evidently remains a critical problem in Iraq even today. But it is clear from the experiences in OEF and OIF that the idea of just-in-time delivery of logistics support, a concept developed in the private sector, is not sufficient as a management concept for a military supply chain in time of war. The Secretary of Defense directed the Commander of TRANSCOM and the Undersecretary of Acquisition, Technology and Logistics, who also directs the Defense Logistics Agency, to bring all the participants of the logistics supply chain together and determine how to fix the distribution problems. A Deployment and Distribution Center is to be set up in the region to facilitate fixing the problems.

The private sector is well advanced in the area of supply chain management. For example, United Parcel Service (UPS) has expanded its services from its initial transportation function to a role as a supply chain manager from factory to after-sale servicing. Walmart has become the world's leader in inventory control and analysis. By collaborating with private industry, DoD could enhance its abilities to manage its supply chain. The relevant logistics lessons learned by the officers assigned to the Secretary of Defense Corporate Fellows Program over the last eight years need to be revisited as part of the effort to extract from industry that which is relevant to logistics transformation.

Taking a cue from the TRANSCOM effort to fix the distribution problems in Iraq, the Army is reorganizing its prepositioned stock into more flexible regional fleets. These new forward-stationed stocks will provide theater or field commanders with more flexible assets that are better managed and aligned with the command's mission. The Army is also working on improving the capability of transport and other support units to protect themselves.

NEW CONCEPTS IN LOGISTICS TRANSFORMATION



The current plan as outlined by the G-4 White Paper addresses some of the major changes required in the near-term to improve the logistics system. Achieving these goals will go a long way towards achieving logistics transformation. However, other steps need to be taken in logistics organization and doctrine in order to build a fully transformational logistics capability.

"SENSE AND RESPOND" LOGISTICS

One step towards a fully transformed logistics capability is the implementation of a new paradigm for managing both the flow of information and of supplies in the logistics system. One concept for achieving such a dynamic and flexible capability is called "Sense and Respond" logistics. The key to "Sense and Respond" logistics is the ability to accurately track and predict supply and support needs of operating units and meet those needs from whatever source is able to do so in a timely manner.

The most important component of the "Sense and Respond" concept is the timely, accurate and comprehensive battlespace situational awareness, which is effective only where intelligence, operational and logistical capabilities are part of a cohesive, integrated network. "Sense and Respond" begins with a similar understanding among intelligence, operational and logistical staff of the current or future battlespace and a common view of what is likely to occur in the future. This is the "Sensing" function, a part of the ongoing intelligence and operational planning cycle, and makes use of predictive evaluations gained from modeling, garrison duty and training exercises and anticipation of likely future actions gained from battlespace situational awareness. The logistics staff at each level sees the same battlespace as the commanders and anticipates, based on the commander's intent, what future action will take place. The logistics staffs, in electronic 24/7 communication with not only hierarchical logistical staffs but also other unit staffs, determine the supplies or support necessary to conduct the current and future action and requests all staffs to "Respond" with their capability to meet the demand. In the "Respond" function, the joint logistical staff, in conjunction with other unit staffs, make the necessary arrangements to provide and transport the demand items.

A critical factor in responding is the availability of the items and the timeliness of delivery. The use of other similar units to provide the timely supply delivery is known as "self-synchronization." Such synchronization among tactical units, if the hoarding tendencies are overcome, has the potential of accelerating the execution of the operation and shortening the length of the conflict. Hoarding tendencies can be overcome at all levels, except at the cutting edge of the combat units who will always want as much as they can have or carry and should be allowed to do so, by reducing the variability in the supply chain, i.e. reducing the bullwhip effect. This can be done by having total transparency throughout the supply chain by marrying Automated Information Technology (AIT-UIDS and RFID) with processes to provide decisionable information to the logisticians.

At the tactical or unit-of-action level the "Sense and Respond" concept allows more rapid adaptation to the conditions of the battlespace. It permits dispersed units that are maneuvering in depth to aid each other in adapting much more quickly to changing conditions of the battlespace. This requires devolving greater logistical decision-making authority to lower tactical levels. This is only possible if all logistical levels have "connectivity" electronics and all have a common understanding of the battlespace situation. Logisticians of the future also must be trained to operate in this mode. Ideally, the self-synchronization and rapid adaptation should accelerate the speed of execution at the tactical level and would permit achievement of strategic objectives sooner.

At the strategic level, "Sense and Respond" fits the network-centric warfare concept outlined in the Defense Guidance. Network Centric Warfare (NCW), like the "Sense and Respond" system, is knowledge-driven and based on an advanced command, control, communications, computers, intelligence, sensors and reconnaissance capabilities formed into a comprehensive network that provides a common strategic, tactical and logistic picture of the enemy and friendly forces in the battlespace to all levels of command. Using the information or knowledge base developed through intelligence, surveillance and reconnaissance (ISR), order of battle information and other data, NCW allows the commander to use his forces to produce paralyzing effects on the enemy's ability to fight, thus achieving strategic victory much earlier and at lesser cost in lives and material. This would also permit a smaller logistic footprint in the operational theater and the elimination of the "Iron Mountains" of supplies left after earlier conflicts.

The "Sense and Respond" concept utilizes both the common picture of the battlespace and the relevant logistical information base such as expenditure rates, unit readiness and total visibility of all supplies in theater, inbound or in depots/industrial base to aid in making high probability of success logistic decisions. Total visibility of supplies and support units is possible using RFIDs on all modular replacement components and all configured loads that transmit their location electronically to the logistician's computer base. Blue Force Tracker information fed into their computer base is used to maintain connectivity with support units. This allows a higher rate of favorable change in the battlespace, enabling decision makers to seize opportunities more quickly or to preempt a potential action. NCW is also aided by "Sense and Respond" concepts to ensure that actions have their intended consequences and not an unintended event. Finally self-synchronization enhances NCW by speeding the execution and completion of a successful expeditionary campaign.

Both Network Centric Warfare and "Sense and Respond" concepts are knowledge-driven – they depend on acquired and stored information. Much of the information can be acquired through careful monitoring of exercises and simulations and can be confirmed or modified from the experience gained in smaller contingency or expeditionary operations and in exercises with allies.

MODULARITY

Part of the Army's transformation strategy is to create a more modular organization, with a greater number of combat units and a more flexible structure for organizing mission-specific force packages. As proposed by the Army Chief of Staff, brigades are to become the smallest self-supporting and sustaining units, rather than divisions. To do this General Schoomaker intends to "modularize" the Army. Division and corps combat support and service support units will be reorganized into smaller self-sufficient units and assigned to the brigades. In principle, this should make brigades self-sufficient and independent of divisions for support and sustainment. It must be noted that concerns have already arisen about the Stryker Brigade Combat Team in Iraq. Some sources have noted the unit has inadequate organic transport and cannot carry enough supplies to sustain itself for more than a day or two. In other separate brigade-sized units the support elements comprise approximately a third of the brigade manpower and still require logistical augmentation. This suggests that making the independent brigades logistically self-sufficient would be a daunting task.

It is much easier to see how the Sense and Respond concept works at the tactical or unit of action level. Under this arrangement supply and service sections would become organic to the brigade along with engineer, military police and signal units. It would seem essential that the brigade logistical staff have a robust 24/7 encrypted communications and information capability (TACLANE and FASTLANE technology can support encrypted data at broadband speeds).

In addition, a modular support unit of approximately brigade size will be created that can provide sustainment for one or more combat brigade equivalents. In theory, such a support unit could also become the primary formation conducting a humanitarian operation. In the event of a major humanitarian disaster, several such units could be organized under a superior headquarters.

What expeditionary logistic organizations will exist at theater level is even less clear. In all probability, the organization will be joint, but it may require Service-centric cells embedded to interface with Department of the Army-level offices and agencies. These agencies, such as Army Materiel Command, will likely remain in the loop through electronic connectivity because of the important role they play in directing the various depots and contractors. Because there will be more independently operating tactical units arrayed in depth without any distinct boundaries in the battlespace, adequate communication connectivity, total supply visibility and distribution dedicated transportation will be absolutely essential if the tactical units are to be supplied.

The knowledge gained from OEF and OIF already has had an impact on the logistic system as a whole. The ad hoc arrangements made during the drive to Baghdad, the after-action reports and the continuing distribution problems in Iraq have drawn notice from all logistical levels. The outline of Network Centric Warfare and the close fit with the Sense and Respond concept are being closely studied. Out of this will come new or revised organizations and redefined relationships. The Army Materiel Command (AMC) already is at work adjusting its organization in the areas of research, development and engineering; integrating its logistic activities in the overseas theaters and looking to business and industry for new ideas, best business practices and improved relationships. At the Department of Defense level there are new initiatives underway in weapons systems support, life cycle management and enterprise integration.

OUTSTANDING ISSUES

The Army is faced with a range of problem areas that must be clearly identified, closely studied, and optional solutions must be identified for decision makers. The most pressing problem is of resetting the force. The Army as a whole – its tactical formations, logistical organizations and rebuilder/supplier/contractor arrangements – has been degraded by the constant grind of nearly continuous combat deployments to Afghanistan and Iraq, as well as the maintenance of deployments to Korea, Bosnia, Kosovo and elsewhere. Unfortunately the stockpiles have been depleted; there is little to spare. Over the past decade stockage levels were allowed to drop or "leaned out" to keep costs down. Even the Prescribed Load Lists (PLL) were "leaned out." The extraordinary demands of fighting two near simultaneous wars have dropped stock levels to the bottom of the barrel. In fact, war reserve stocks were invaded to provide supplies and parts for OIF. For example, the Army made a colossal effort to supply armored-vehicle tracks to forces in Iraq. Yet, Army Tank-Automotive Command (TACOM) had stockpiled tracks based on peacetime vehicle usage rates that were substantially lower than the current experience in OIF. A surge capacity or additional stocks were not available due to funding constraints.

In the midst of resetting the force, the Army leadership has embarked on a process of reorganizing of the force. General Schoomaker's vision is to add 15 new brigades to the tactical force. These brigades require equipment already in short supply. The Army faces the challenge of creating a new, modular force structure while supporting currently deployed forces and moving ahead on future capabilities such as the FCS.

There are significant problems with the industrial base. As pointed out earlier, the industrial base had been degraded to the point that its capability to surge was limited. There were few stocks of armored vehicle tracks and only two industrial sources -- one domestic and one foreign firm. The Army has exactly one small-arms manufacturing facility. This illustrates another problem with the industrial base. So much of the manufacturing capability has shifted overseas that the U.S. will have to rely on foreign manufacturers. The Congress already recognizes the magnitude of this problem and has begun the political battle to "buy American."

Where ever we retain an industrial capability the Army will have to find ways of increasing its role in the logistic structure. Performance-Based Logistics has worked for the Air Force and is being adopted by AMC. Industrial developers and contractors are being encouraged to establish partnerships with Army agencies that can support the development, engineering or maintenance of systems. Other ways of using contractors to provide service or support to the Army are being explored as best-business practices are more closely tailored to fit Army needs. One idea is to provide transparency/total visibility of the Logistics Common Operating Picture/supply chain to industry, to allow it to gear up or mobilize in anticipation of future needs even though contracts have not been let. In addition, the future is likely to see a dramatic increase in outsourcing to both domestic and foreign firms.

The Army's logistic infrastructure faces an uncertain future. The location of many of the logistics infrastructure facilities and installations is a

product of World War II, the Cold War and in some cases even World War I. For an expeditionary Army, logistic installation infrastructure ideally should be located adjacent to ports and airfields to cut out and/or reduce the need to transship goods by truck from current sites to then be offloaded onto ships or aircraft.

At the behest of the Department of Defense a Base Realignment and Closure (BRAC) Commission will begin work in 2005. At the present time the BRAC commissioners have not even been appointed and there is no way of foretelling what the outcome will be. Until then the Army's installations, depots and bases are left with an uncertain future. It will be important for the Army to consider how to reduce its infrastructure overhang and, where possible, expand the public-private partnerships that have held it in such good stead with its production facilities and depots.

Another uncertainty is how the Army, in the middle of a war and a major transformation, will continue to support and supply the current force, which is being expanded by 15 brigades, add six (five active and one reserve) component Stryker brigades and plan for the Future Combat System in the outyears. The Army has been underfunded for years and its logistic base has been the bill payer far too long. The Army has not been able to even field the Radio Frequency Identification Device necessary to attain visibility of supply from point-of-origin to point-of-effect. How the Army will be able to expand its current force, pay for the development of the current and the future force and rebuild its logistics base is a major issue.

The deployment of the first Stryker medium-weight brigades to Iraq is the beginning of a process that will link changes in equipment and organizations to changes in logistics. The Stryker brigade provides the Army with a strategically deployable, mobile, flexible, survivable and still powerful capability. Its mobility allows the brigade to cover a larger area than atraditional light brigade, thereby reducing the total in-theater force requirement and, indirectly, the logistics burden for the theater commander. More directly, the wheeled Stryker family of vehicles uses considerably less fuel that its heavier armored and mechanized counterparts.

The next generation of Army fighting vehicles, the Future Combat System (FCS), is expected to reduce the logistics burden still further. New technologies should reduce power requirements, fuel and ammunition expenditures and redundant operating and communications systems. There is even a technology for the vehicles to generate drinking water as a byproduct of its power system. The FCS is expected to have embedded diagnostics which will make gathering information on equipment status and managing supplies of spare parts much easier. The ability to sense potential parts failures and respond in an anticipatory manner will serve both to ensure the highest availability of equipment in the field and to reduce the unnecessary movement or stockpiling of spare parts. However, the FCS-equipped future force is not expected to reach full

fielding until 2020 or later. Until then, many of the technological innovations that could enhance logistics transformation may have to wait for deployment.

Finally, it must be recognized that there are so many players intent on revising, restructuring and remaking the entire Army logistics system that it is difficult to discern who is doing what. The Office of the Secretary of Defense began an initiative called the Future Logistics Enterprise (FLE) aimed at a near-term transformation of logistics. Then it started a Business Enterprise Architecture-Logistic (BEA-LOG) to develop a concept for transforming logistics over the next 5-10 years. This is the same time frame in which the Army begins shifting from maintaining the current force to supporting the introduction of the future force with the FCS. Juggling multiple modernization efforts will surely challenge the Army as an institution and, in particular, its logistics system. In addition, there are the Joint Logistics Corporate Enterprise, the Joint Deployment Logistics study and the Integrated Logistics Analysis Program, all underway simultaneously. In his February 4, 2004 testimony before the House Armed Services Committee, Defense Secretary Rumsfeld spelled out yet another program, the Business Management Modernization Program, to overhaul DoD processes, including those of the Undersecretary of Acquisition, Technology and Logistics.

Confronting the challenge posed by multiple, compartmented efforts and logistics transformation, OSD has begun an effort to create a single DoD-wide logistics plan, the Focused Logistics Campaign Plan. Under the umbrella of Focused Logistics, DoD is seeking to develop a logistics system that includes sufficient capacity in the deployment and sustainment pipeline, appropriate control over the pipeline from end to end and a high degree of certainty to the joint force commander in theater that forces, equipment, sustainment and support will arrive where and when needed. The Campaign Plan seeks to integrate the set of current transformational efforts such as the FLE, joint theater logistics management, agile sustainment and multinational logistics initiatives. One aspect of this effort to provide guidance and leadership to the logistics transformation effort was the designation of TRANSCOM as the responsible agent for the management of the Strategic Distribution System.

CONCLUDING OBSERVATIONS

The process of transformation is inevitably difficult and protracted. This is particularly the case when the process requires undertaking initiatives in a number of different areas simultaneously, or at least in parallel. The current U.S. Army path to transformation may be the most challenging ever undertaken by a military service. It is restructuring its current forces while supporting forward-operating forces and planning for the transition to an entirely new force in the future.

No less challenging is the transformation of Army logistics. Begun before OEF and OIF, logistics transformation must continue even as those operations go on. Indeed, one reason for moving forward now on logistics transformation is to incorporate the rich set of lessons learned from these operations. The transformation of logistics means changing most if not all parts of the logistics system. In order to just support the current forces better, technologies and techniques to connect the logisticians and to flow information across a secure communications network must be developed. The system of force reception and supply distribution from CONUS all the way to the farthest forward U.S. unit must be changed. The supply chain must be integrated to ensure that needed supplies can be produced, stockpiled, shipped and delivered where and when needed.

Were that not sufficient, a fully transformed Army logistics system needs to prepare the way for the introduction of the FCS, plan investments in technologies that will reduce the logistics burden on future forces, develop new ways of managing a global defense industrial base, and stimulate the creation of a fully joint and even combined logistics system. It might be easy to conclude that this is an overwhelming task and the effort should be abandoned. This the Army has not done. Rather it has pushed forward in the sure knowledge that transformational logistics is a force multiplier that can – and very probably will – make the difference between victory and defeat in a future conflict.

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