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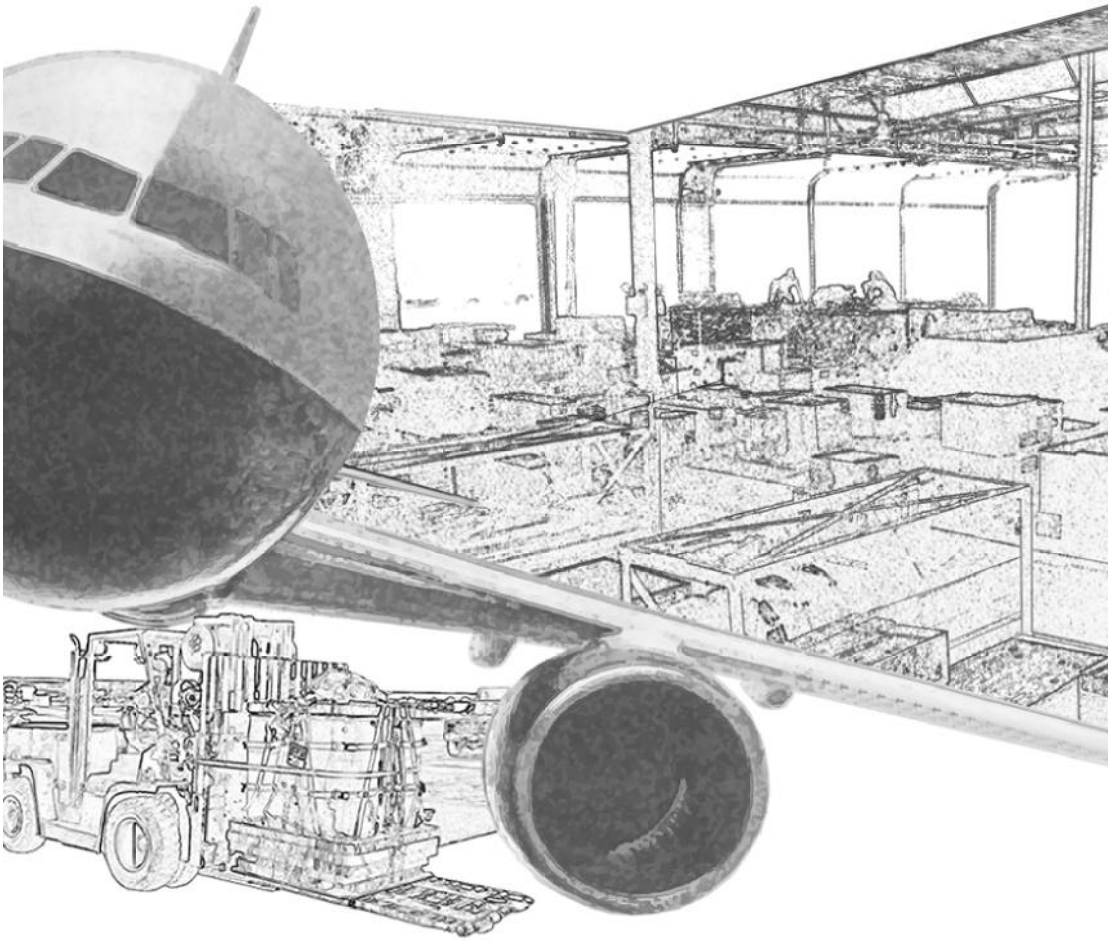

The Changing Nature of External Threats, Economic and Political Imperatives, and Seamless Logistics*

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SO LONG as the Soviet empire threatened our way of life and China attempted to subvert third world nations with communist ideology, elected officials had little difficulty passing large defense budgets. Neutralizing the military threat posed by the Soviet Union and China (effectiveness) was the central issue. Cost of the necessary weapons (efficiency) was secondary. Our way of life was worth preserving at practically any cost, even if it meant increasing taxes and/or running large budget deficits.

With the dissolution of the Soviet Union and with China looking inward, the worst-case scenario now posited by defense planners consists of engaging North Korea and Iraq, simultaneously or nearly simultaneously, with our military might. Not that many people have forgotten Granada, Libya, Panama, Somalia, Haiti, Bosnia, and Iraq, but most informed individuals realize that the standing military presence required by the new threats is different, both in terms of size and kind. In other words, the defense budget must now compete with salient domestic problems as it has not done for a half century. With citizens clamoring for tax relief, generating additional revenues through tax increases is no longer a viable option.

DOD should begin rethinking the role and size of staff departments. The purpose of staff departments is to serve line departments—not the other way around.

Also, a national consensus appears to be emerging on behalf of balancing the federal budget in the foreseeable future. Thus, deficit spending as a source of funds can be ruled out as well. Since many of the big-ticket problems, such as Social Security and Medicare, are political hot potatoes, the budget will not be balanced at their expense. Therefore, in the absence of a major new threat, the national security of the United States will have to be guaranteed with a significantly smaller defense budget. For better or for worse, efficiency now shares top billing with effectiveness because in the new order, cost has become the biggest enemy for any weapon system. This article addresses ways by which the logistical support of the war fighter can be provided much more efficiently than ever before, without materially sacrificing effectiveness.

Why Focus on Logistics and Acquisition?

The decision to shine the spotlight on logistics was made for good reason. The life cycle cost of a weapon system can be as high as 70 percent of the total cost. The logistics slice of the defense budget is in excess of $43 billion—or about 17 percent of the Department of Defense (DOD) top line each year—and roughly the same amount as is spent on procurement or research and development. Thus, the opportunity for savings is substantial.[1]

Furthermore, logistics will loom larger than ever, since US military forces are rapidly consolidating in the continental United States (CONUS). Hence, the US Air Force, as well as the other branches of the armed forces, perforce will have to deploy its assets in an expeditionary mode, and deployment, as we have learned the hard way, is largely about logistics.[2]

Many of the war-fighting assets are approaching the end of their useful life and need to be replaced. Some of the funding for new weapon systems will have to come from efficiencies created elsewhere, such as the logistics arena, because all the acquisition funding will no longer come from Congress for reasons already stated. In certain instances, the useful life of existing systems will need to be extended as well. This could prove quite costly unless innovative approaches for such extensions are adopted.

Creating lean and focused logistics is necessary but not sufficient.

Driving down weapon-acquisition costs is every bit as important. That is why DOD instituted acquisition reform and is taking its implementation very seriously, especially such features as cost as an independent variable (CAIV), slashing paperwork, incentives for good performance, and penalties for poor performance.[3]

Economic Imperatives

The Law of Large Numbers

The law of large numbers also drives down unit costs for five major reasons. First, fixed costs, especially research and development costs, are allocated across many units, thereby reducing unit cost. Otherwise, the kind of costs associated with the B-2 bomber can be expected. Second, large quantities of anything permit the producer to take advantage of economies of scale. Third, the greater the variety of inventory, the greater the cost. Fourth, training costs are inflated as an organization introduces a large number of different systems. Last but not least, when a large order is at stake, more organizations will bid on the project, thereby increasing the likelihood that the customer will receive a better bargain.

We must appreciate the fact that small quantities of complex and expensive systems do not justify organic sustainment capabilities. Under these conditions, the DOD may have no choice other than relegating sustainment to the commercial organization that produced the system in the first place.

Reliance on Interchangeable Components

During the height of the cold war, DOD purchased most items in sufficiently large quantities to exert considerable leverage over suppliers. With the shrinking of the DOD budget, much of that leverage has disappeared. Even at that, since much of what DOD ordered in the past had to be made in accordance with military specifications, unit costs were typically high relative to commercial items.

Many organizations have bloated staff departments, and too many of them.

Clearly, requiring all services to purchase the same or similar components and systems when appropriate—as is the case with the joint strike fighter—would create more defense for the dollar, not only with respect to acquisition, but also with regard to sustainment. There is, however, a downside to this approach. If a critical component, such as the engine, evinces a design flaw, the entire fleet is either grounded or compromised, with all the ensuing consequences. This is another argument for relying on proven technology. The electronic countermeasure system of the blocked impurity band (BIB) would be a case in point if the United States possessed only one bomber fleet. The tactical fighter experimental (TFX) experience is not forgotten by everyone either. It is much easier to intend to design one plane, even if it comes in variants, to execute multifarious missions than it is to actually do it.

It may very well be that a greater reliance on off-the-shelf components will be the only way by which the United States can acquire sufficient types and quantities of weapons to ensure military success in the next century. Relying on small quantities of technologically superior weapons is a risky proposition and is based largely on the childlike faith in technology with which some of our defense planners are imbued. Tank warfare during World War II constitutes a good example. The Soviet T-34 was the best tank during that war, yet the Soviets still needed prodigious numbers of that tank to defeat German armor. The US Sher-

The GBU-28 Bunker Buster Program is an excellent case in point. One of the fruits of that program is being loaded onto an FB-111 for its trip into Iraq.

man tank was inferior in most respects to the German counterparts, but we prevailed with it because we possessed it in huge numbers. The World War II German Me-262 jet fighter, even with its considerable advantages, had little bearing on the air war because of its limited numbers. World War II, the Korean conflict, and the Vietnam War are much better object lessons for defense planners than is the Persian Gulf War.

Dependence on Proven Technology

The combination of high research and development costs and small order quantities produces prohibitive costs. Creating new and effective weapon systems with proven technologies, wherever practicable, is one way to drive costs down. Again, the nature of the threat to some extent determines the viability of this option, since extensive reliance on extant technology may very well produce the 85 percent solution.

With the disintegration of the Soviet Union, no other nation can match the United States across-the-board as far as technological innovation is concerned. Therefore, creating weapon systems from low-hanging ripe fruit—if we may be forgiven for using a familiar analogy—may be acceptable in the post-cold-war risk environment. Although we cannot become preoccupied with efficiency at the expense of effectiveness in a variety of risk environments, whenever practicable, each technology effort still must "buy its way onto the program" in terms of reducing life-cycle cost and program risk.[4]

The 85 Percent Solution

In the age of fiscal austerity, when order sizes are typically much smaller, significant efficiencies will be generated if DOD buys commercially available items—preferably of the "commodity" variety—in the global marketplace whenever possible. Military specifications should be permitted only as a last resort. In many, if not most, cases the practice of purchasing commercial components or systems will sacrifice some capability, but it typically is that last 15 percent that disproportionately drives up the problems and the ensuing costs. Without the "evil empire," the question that must be asked by defense planners is, Can we afford the risks associated with the 85 percent solution in a given weapon system? Indeed, it is essential to strike the proper balance between efficiency, effectiveness, and risk. The consequences of not doing so are too great.

So long as the Soviet empire threatened our way of life and China attempted to subvert third world nations with communist ideology, elected officials had little difficulty passing large defense budgets.

In 1973 approximately 7 percent of the US economy was affected by international trade. By 1993 that percentage had increased tenfold, and the trend continues. Getting the best value requires trading in the international arena. Buying American will simply encourage similar shortsighted retaliatory responses by other nations. Moreover, the US defense establishment is consolidating, thereby reducing competition. That is all the more reason for pursuing a global procurement policy wherever practicable. Lastly, this approach is far more compatible with coalition war fighting than a rigid buy-American strategy.

Some people would argue that this suggestion is the functional equivalent of open architecture in the personal computer industry and that it poses serious security issues. There is merit in such concerns. However, the technological genie is out of the bottle, and no one is going to put it back. The personal computer and video games are now driving developments in the

electronic industry, and practically all of that technology is in the public domain. More and more, commercial communications are driving developments in that industry as well. The Internet, at the moment, is the best example, but commercial satellites possess unlimited dual-role capability.[5]

We simply must come to terms with the reality that multinational and/or transnational corporations produce most of the technology, and practically anyone can obtain it, either directly or through third parties. In any case, it is the software that accounts for the big performance differences in many fourth-generation weapon systems, and it may be the software that is in need of the greatest protection. More will be said about this issue in a subsequent part of the article.[6]

Relying on small quantities of technologically superior weapons is a risky proposition and is based largely on the childlike faith in technology with which some of our defense planners are imbued.

Of course, just about everything that applies to goods also applies to services. Like many manufacturing concerns, certain service companies have an international or even global presence. If Federal Express can ship DOD parts and supplies faster, cheaper, and better around the world, then it must be given serious consideration. Some folks ask a legitimate question: If hostilities break out, can DOD rely on commercial firms? First of all, whenever the United States has been endangered by external threats, civilians have come through admirably. Second, as a nation we must maintain our ability to preserve secure air routes and sea-lanes.

Paradigm Shift

Historically, most battles were fought in an understandably chaotic setting, euphemistically described as the "fog and friction of war." Little wonder that commanders insisted on a worst-case-scenario logistics system that we shall call "just-in-case" logistics. Under the new order, however, such an inventory system is simply not affordable, either in the private sector or in DOD.[7]

As it just happens, technological developments now make information and transportation less expensive, relative to inventories. Thus, DOD must now substitute information and transportation for inventory in much the same way as the private sector has—known as "just-in-time" logistics. Some firms have eliminated their warehouses. The necessary inventories are on trucks, in rail cars, on planes, and, in some instances, on barges and ships; arriving at the exact time they are needed. Some companies, such as Boeing and Caterpillar, have established worldwide guarantee of parts delivery in 24 hours.[8]

Since the face of battle will continue to be scarred by fog and friction, the pure just-in-case inventory model adopted by successful private-sector firms is in all likelihood unsuited for DOD. Therefore, we must begin syncretizing the two opposing approaches into a paradigm that will serve DOD in time of peace and war. Even the civilian just-in-time inventory models do not work that well around the Christmas rush, which does not even begin to approximate the chaos of battle. As battlefield commanders become confident that they know the range of their materiel requirements, the location of the materiel that they need at all times, and the amount of time it will take to acquire it, the need to own and hold stock will be dramatically reduced.

Necessary Preconditions

Reducing the DOD Infrastructure

The US force structure and budget have declined by about one-third from their 1985 peak levels. The infrastructure, however, has declined about 18 percent. Much work remains as far as bringing the infrastructure in

line with combat capability is concerned.[9] Otherwise, an excessive administrative overhang will frustrate any attempts at efficiency.

DOD should begin rethinking the role and size of staff departments. The purpose of staff departments is to serve line departments—not the other way around. Many organizations have bloated staff departments, and too many of them. By trying to justify their existence and growth, these staff departments frequently create work for line personnel that is marginally related to the principal mission of the organization, thereby making it more difficult for the line to attain its objectives.[10]

Tall organization structures possess certain advantages, such as more promotional opportunities and more time available for each subordinate from the superior because of narrower spans of control. However, the disadvantages outweigh the advantages. Removing unnecessary managerial levels has the potential to improve communications, to reduce the time it takes to accomplish tasks, to empower employees, and to reduce costs. Benchmarking successful private-sector organizations may very well constitute a good starting point, especially with respect to rightsizing headquarters staffs.

One reason for the size of the DOD infrastructure is the penchant for managing just about everything contractors and subcontractors do. Perhaps managing the most important 20 percent—typically at the front end of a weapon system—and either just tracking or ignoring the rest would produce the same results with a smaller DOD infrastructure.

Workers will concentrate on those activities and outcomes that are measured and rewarded. If an organization is serious about reducing bureaucracy, it must measure important activities and outcomes and reward in a significant way those individuals who perform them well. The best way to preserve the status quo is to measure everything, as is frequently done now, and to reward all outcomes and activities the same.[11]

Additional Preconditions

Reliance on a modified just-in-time inventory system requires other preconditions as well. First, if the US military has to operate around the globe from CONUS in an expeditionary mode, our armed forces must establish control over air routes and sea-lanes. Second, the United States must enhance its airlift and sea-lift capabilities. Given that recent coalitions have been situation specific, pre-positioning equipment and supplies on land becomes more and more problematic. Third, DOD must put in place the kinds of information technologies that will permit in real time not only battlefield awareness but also total asset visibility.

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DOD has too many stand-alone computer systems (hardware and software) and databases. Top priority must be assigned to making these computer systems and databases interoperable across DOD and the industrial base that supports it. Until that is accomplished, it will be difficult to achieve the kind of efficiencies discussed throughout this article. We call this the "information age" because timely information shrinks time and space, thereby becoming the primary engine that drives the important processes in practically every facet of human activity.

Recently, the Air Force conducted a comprehensive study of its role in the year 2025. One of the conclusions of this study is that "information—as a commodity as well as a combat medium—will be more influential

than bombs in thirty years, and expertise in manipulating information will offer the United States its most telling advantage over future adversaries."[12]

"Our intoxication with technological advantages has made us blind and deaf to information-age vulnerabilities."

However, we must enter the information age with eyes wide open because of its double-edge nature. Sen. Sam Nunn cites DOD estimates that there are approximately 250,000 attacks on its computers each year, and that only the least competent and least mature hackers have been detected so far. He goes on to say that "our intoxication with technological advantages has made us blind and deaf to information-age vulnerabilities . . . and we should not wait for an electronic Pearl Harbor to spur us into rethinking the speed and nature of our entry into some of these information technologies."[13]

Specific Practices That Should Be Adopted

Reengineering

This word happens to be in vogue at the moment, as we well know; unfortunately, it means what folks want it to mean. It should be defined, however, as excising occupational hobbies (i.e., activities that are either unrelated or marginally connected to the principal mission of the organization), removing redundancies, and creating or refining processes through which the goals and objectives that are central to the mission of the organization are attained in an efficient and effective manner. Reengineering requires evaluating the value chain and eliminating or reducing components that add either no value or very little, while retaining and even enhancing those that add considerable value. Downsizing, on the other hand, may or may not be synonymous with reengineering, depending on whether or not the aforementioned issues were considered before manpower reductions were made. Perhaps it would be more accurate to assert that the DOD needs to reinvent itself, rather than just reengineer itself.

Reducing Cycle Time

Even without the threats posed by the Soviet Union, it is still a dangerous world. However, future threats will be far less predictable than those during the cold war era. Consequently, future senior DOD leaders will have to name that tune after hearing just a few notes, and short cycle times will give them the ability to fashion appropriate and affordable technological responses. Since our enemies and potential enemies will have access to much the same technology as we possess, we must acquire dominance of product cycle time in order to maintain our competitive edge on future battlefields.[14] Furthermore, time is money; in a resource-constrained environment, reducing cost by reducing cycle time is critical.

The GBU-28 Bunker Buster Program is an excellent case in point. During Operation Desert Storm, a new weapon system was needed to deal with deeply buried command and control bunkers, and time was of essence. A team of government and industry people integrated existing subsystems (off-the-shelf components) in an innovative manner so that in only 28 days they had conceived, developed, tested, and deployed an effective weapon that played a crucial role in terms of the outcome of that conflict.[15]

Establishing Dominant Battle-Cycle Time

The ability to turn inside an adversary's plans, to act before the adversary can act, even to act before the adversary's battlefield awareness system can see his opponent beginning to act is what is meant by dominant battle-cycle time. To achieve a dominant battle-cycle time capability, one must possess rapid and effective planning tools, a strong command and control system, superior mobility, and information superiority. Attaining and maintaining information superiority requires protecting it as well, and that is why "information warfare" must be placed on the front burner and supported in a manner that befits a top priority. Out of economic necessity, if for no other reason, DOD will have to rely on commercial systems of communication such as the Internet and commercial satellites. Therefore, reliable encryption and decryption must be developed and implemented. Without information superiority, it will be difficult at best to attain battle-cycle-time supremacy.[16]

Establishing Appropriate Systemwide Objective Functions

System-optimization models typically outperform their single-item or single-echelon counterparts.[17] The value added by system optimization models typically outweighs the additional time and expense associated with their development. If the system-optimization model includes the complete life cycle of the weapon system, then life-cycle costs can be minimized. Another example would be the optimization of weapons readiness at the unit level—or simply materiel readiness. Clearly, weapons-system readiness is the right metric for determining our war-fighting capability.

Greater Reliance on Simulation

The military has relied on simulations for years. What is needed now are simulations that will provide reliable estimates of the total life-cycle costs of a weapon system in its earliest stages of conceptualization. "Back end" sustainment costs must receive more "up front" design attention, and simulation may be the only practical way of attaining this objective.

Total Asset Visibility

One of the critical necessary conditions to lean and focused logistics is total-asset visibility. The United States sent twice as much materiel to the Persian Gulf as was required, and our troops did not know where half of it was at any given moment in time. Half of the 40,000 bulk containers shipped into the theater had to be opened in order to identify their contents, and most of it failed to contribute in any way to our success on the battlefield. The tools being developed will prevent such a situation from recurring by giving the commander real-time information regarding the quantity, location, and condition of virtually all DOD assets anywhere in the logistics system at any time. If we recognize the coalition nature of present and future conflicts, then it becomes obvious that there is a big payoff associated with integration of our total asset-visibility system with that of our allies.[18]

The US Air Force, as well as the other branches of the armed forces, perforce will have to deploy its assets in an expeditionary mode, and deployment, as we have learned the hard way, is largely about logistics.

A major system-integration effort is needed to implement this logistics concept. We are quite certain that most of the enabling technologies have been developed. Some of these information technologies that could immediately be brought to bear on total asset visibility include bar-code tagging; relational database systems; miniature global positioning system receivers and position-reporting transmitters; satellite and fiber

command and control communications links; and predictive planning tools.[19]

Reducing the Logistics Footprint

Another salient guiding principle associated with lean and focused logistics consists of the reduction of the logistics footprint to the minimum level that will permit the war fighter to attain his or her mission in a satisfactory manner. In light of the fact that the armed forces are now deploying precision strike weapons in much smaller numbers than before (six fighter planes at a time, for example), we must reduce the amount of support equipment and consumables that these expeditionary units must take when they go to war. This is especially important in the early stages of a conflict, when airlift assets are scarce and before a sea-lift bridge can be established.[20]

There is doubt in many quarters that the United States could have prosecuted another MRC while it was engaged in Operation Desert Storm.

As has just been pointed out, the minimum supplies that the war fighter needs in the short run must be deployed with him or her. For the intermediate run, pre-positioning necessary materiel on automated fast ships at strategic points on the globe may prove to be the most viable option, in the absence of a huge airlift capability. One advantage of this approach is the ability to change locations of the fast ships at a moment's notice.

Deployment of war-fighting assets in small numbers requires major refinements in logistics doctrine. If a squadron needs only one item of a highly specialized maintenance or test device, does it get deployed with the six fighter planes, or does it remain with the rest of the squadron? The same quandary presents itself with respect to scarce human skills.

Fashioning Shorter Pipelines

Through the use of real-time information, off-the-shelf inventory, outsourcing, and fast transportation, the number of steps in the distribution channel needs to be reduced, which, in turn, will lower cost and reduce cycle time. For example, the Defense Logistics Agency has reduced its wholesale medical inventory by 60 percent—$380 million since 1992—and has achieved shorter response times as well by using commercial distribution methods rather than DOD warehouses to distribute medical supplies. Since more than $22 billion of total DOD inventory—nearly 30 percent—is comprised of consumable items, these initiatives are obviously critical to achievement of continuing inventory reductions. Unless the $75 billion inventory is significantly reduced, an effective modernization program will be difficult to achieve.[21]

Aircraft repair is another good example. Aircraft can be repaired at the wing (base) level, at a depot, or at the manufacturer's factory. Eliminating one of these steps will shorten the pipeline, thereby improving the mission-capable status of the planes and lowering inventory carrying costs. Whenever practicable, bypassing the depots by using commercial transportation companies to provide timely delivery of parts to the flight line should receive serious consideration. In the meantime, total-asset visibility could lower inventory costs and improve delivery times.

Vilfredo Pareto, a brilliant mathematician, economist, and sociologist, observed some time ago that many phenomena are distributed in accordance with the 80/20 rule. In the inventory management sphere, Pareto's 80/20 rule is known as "ABC analysis." Since typically about 20 percent of the items account for 80 percent of the cost or activity (and 5 percent of the inventory is often responsible for half of the cost or activity), these items receive special attention, while the remaining 80 percent are handled in a routine manner.

The Air Force's program is known as "lean logistics." Through better information and fast transportation, lean logistics is consolidating wholesale inventories, drastically reducing base-level inventories, and providing an unprecedented focus on customer's mission requirements. Lean logistics also includes repair and return packaging (R2P), mail-like matter movement (M3), electronic data interchange (EDI), just-in-time (JIT) practices, industry information processor (I2P), and cargo movement operations systems (CMOS).[22] The Air Force is expecting a $4 billion savings from lean logistics.[23]

Lease versus Buy

DOD should conduct "buy versus lease" analyses whenever practicable, just as is done in the private sector. For instance, many commercial airlines lease their planes. Many firms lease their buildings, trucks, and automobiles; and most railroads lease their rolling stock. DOD can save money in certain situations by leasing certain planes, ships, engines, vehicles, buildings, and so forth. Again, in the interest of affordability, the leasing needs to take place in the international marketplace.

Reliance on Flexible Manufacturing Systems

One way to shorten product cycle time and lower inventory costs is to rely on suppliers who in turn depend on flexible manufacturing systems that do not exact large productivity penalties resulting from retooling, setup times, and learning curves. At the moment, the heart of flexible manufacturing systems consists of reprogrammable machining centers; but as the potential of industrial robots is realized, it will be they who will form the heart of flexible manufacturing systems. It is this technology that will permit the production of small quantities of components on a timely basis and at reasonable cost.

Privatization

Scanning the environment for the best business practices and introducing them into DOD is an excellent way of achieving efficiencies. But in the absence of competition, and lots of it, these best practices will become bureaucratized—and quite quickly. Although one can point to a number of privatization success stories already, we need to privatize all the activities that can benefit from the rigors of the marketplace without increasing the risk factor before the appropriate balance between public and private-sector logistics support for the war fighter is attained.

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Integrating the Guard and Reserve into the Logistics Mainstream

For those people who weren't following recent trends, the "total force concept" is upon us. The reserve components participate in war fighting and forward presence with a combined total of nearly 40 percent of the fighter force, 25 percent of bomber capability, two-thirds of theater airlift, and over half of all KC-135 refueling. If we are to meet our future defense needs, the guard and reserve must be integrated into the new seamless logistics paradigm.[24]

Summary

In terms of technology and doctrine, there has been a revolution in military affairs. What is needed now is a concomitant sea change in logistics doctrine and practice. Our national defense strategy calls for coping militarily with two major regional contingencies (MRC) nearly simultaneously. There is doubt in many quarters that the United States could

have prosecuted another MRC while it was engaged in Operation Desert Storm.

The question that remains unanswered is, Could the United States have successfully fought two MRCs had it sent just enough of the right materiel into the Persian Gulf under total asset visibility conditions? Reducing our national defense strategy to anything less than two MRCs is tantamount to an invitation to an adversary to gain militarily an advantage in one part of the world while the United States is engaged militarily in another. It appears that a more prudent approach would be to preserve the two-MRC capability in an affordable manner.

Efficiencies created in the logistics domain will not free up all the funds needed for modernization, and other arenas must be examined with the same diligence that was applied to logistics. However, logistics constitutes fertile ground for significant savings. Toward that end, an attempt was made to offer a blueprint for the remainder of this century and the beginning of the next one. The cornerstone of this blueprint consists of a seamless logistics system that blurs the distinctions between civilian and military specifications, practices, and responsibilities; between domestic and foreign goods and services; and between active duty and reserve or national guard.

Gen Omar Bradley observed that "drawing a plan is 10 percent of the job; seeing that plan through is the other 90 percent." Given that the "devil is in the implementation," what is being proposed will not materialize unless incentives and ownership are passed down to all the stakeholders. ☐

Notes

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19. Kaminski, "Information Technology," 3.

20. Kaminski, "Reengineering Defense Logistics," 6–7.

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