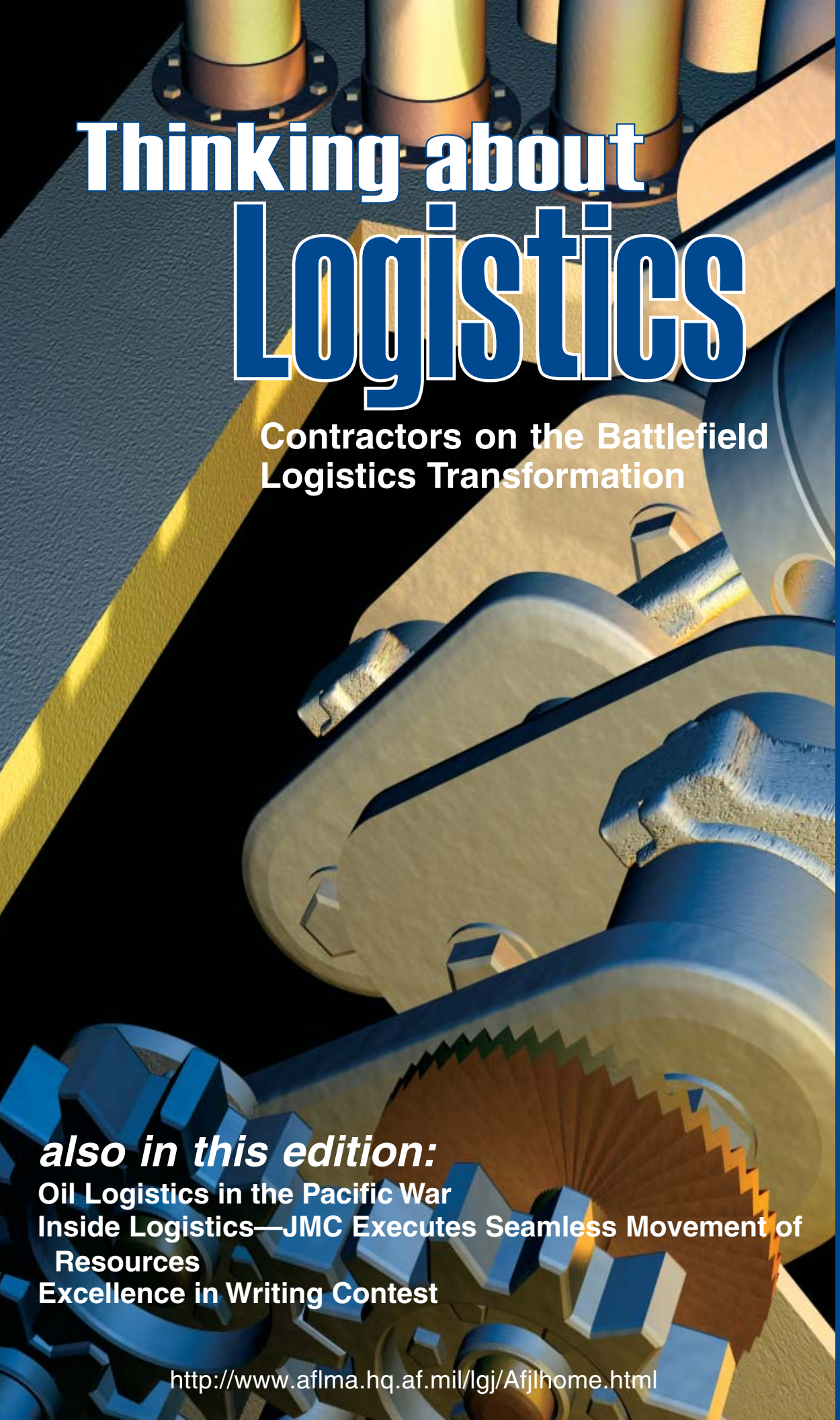

Thinking about Logistics

Contractors on the Battlefield
Logistics Transformation

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Oil Logistics in the Pacific War
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AIR FORCE JOURNAL of LOGISTICS

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Special Feature

Two of the major issues facing the US military today are the increasing use of contractors in areas once considered core functions and the need to transform itself to improve warfighting capabilities significantly to meet the demands of a changing security environment.

thinking about logistics

Increasing Reliance of Contractors on the Battlefield: How Do We Keep from Crossing the Line?

Logistics Transformation: Does Industry Have the Answer?

Force structure changes and technically complex weapons have led to a growing reliance on contractors to perform a variety of functions once performed exclusively by military personnel. Some of these functions border on direct participation in hostilities, and this has narrowed the line of distinction between contractors accompanying the forces and contractors illegally acting in a combatant capacity.

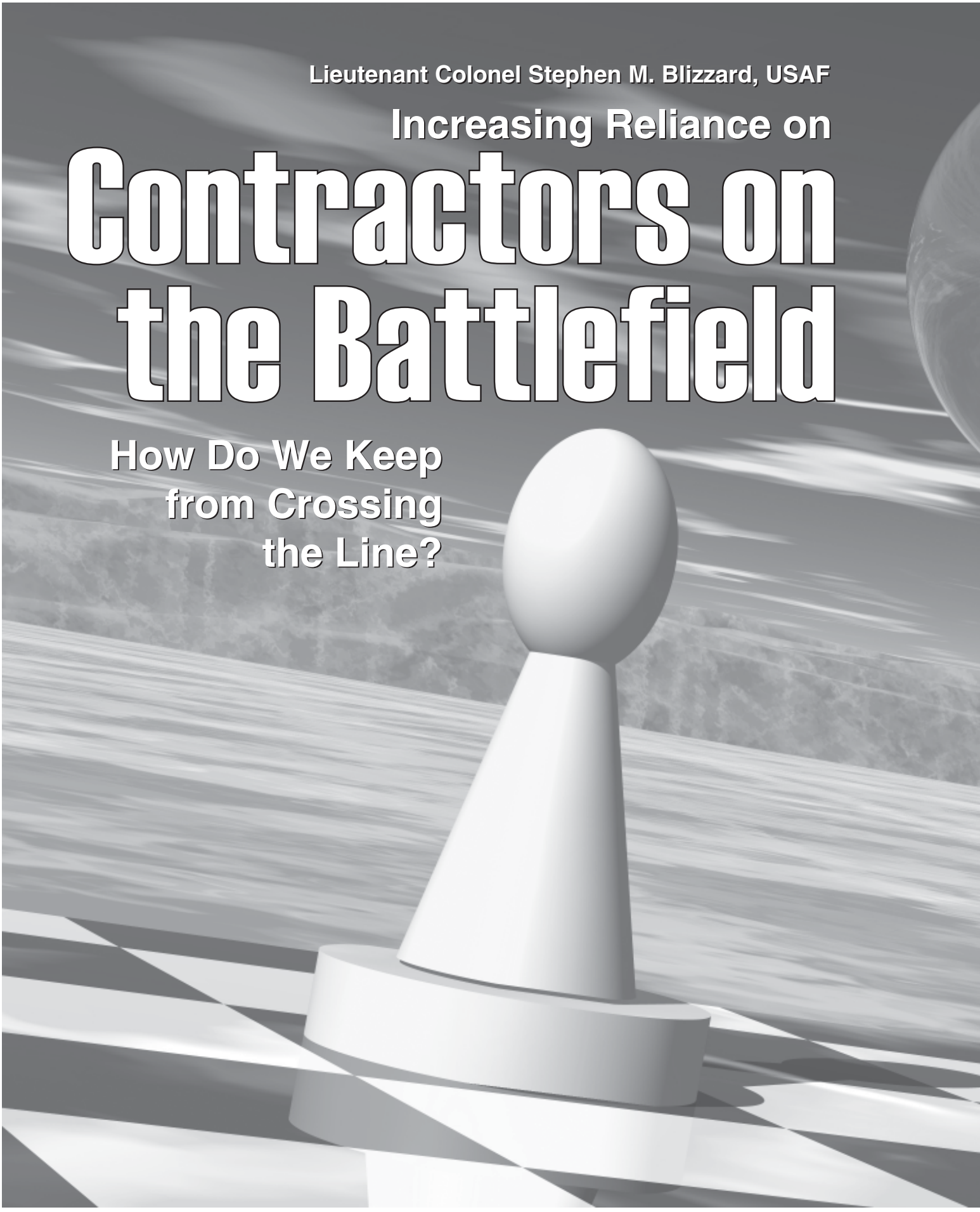
One of the favorite buzz words for the last several years has been *transformation*. The term has found its way into every major DoD planning document and continues to receive more than its share of space in virtually every periodical that is even remotely associated with the military. Transformation is a process by which the military achieves and maintains advantage through changes in operational concepts, organizational structure, and technologies that significantly improve its warfighting capabilities or ability to meet the demands of a changing security environment. Transformation has a purpose, to *achieve advantage*. It has a method, *change.* And it is intended to result in *improved warfighting capability*. This is the proverbial big picture leaders are often looking for.

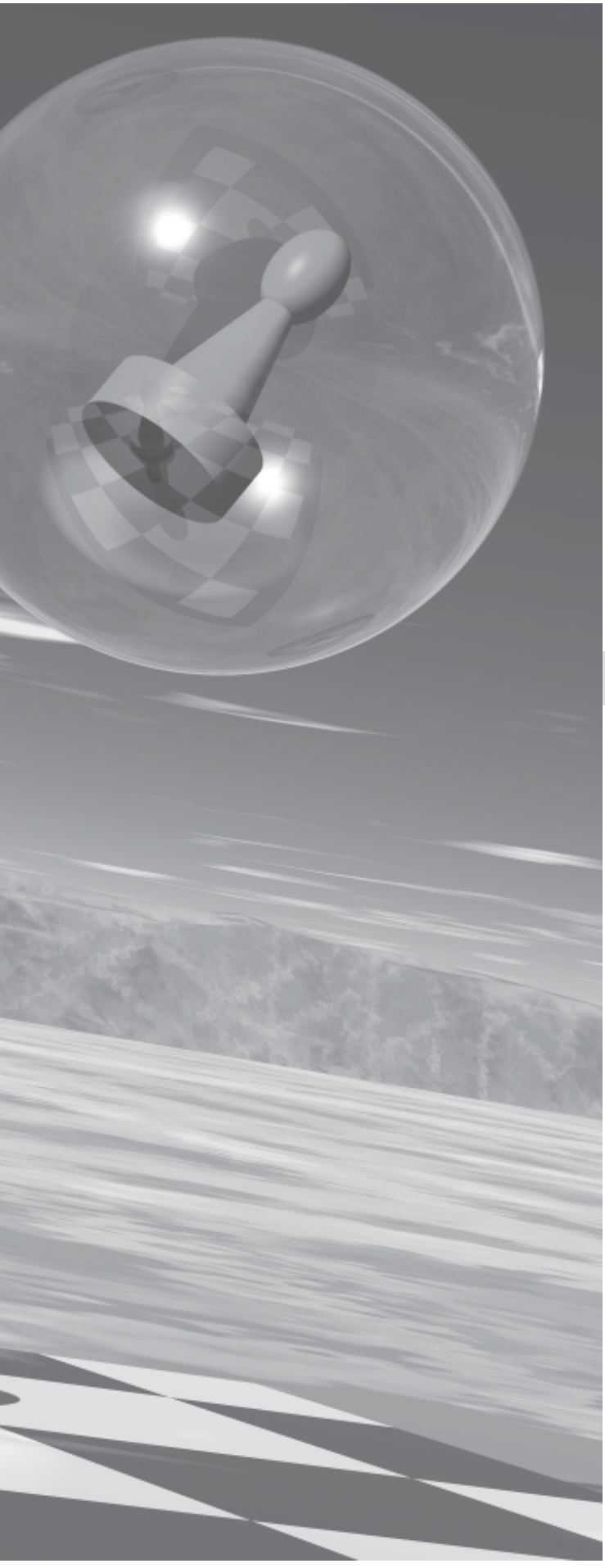
Lieutenant Colonel Stephen M. Blizzard, USAF

Increasing Reliance on

Contractors on the Battlefield

How Do We Keep from Crossing the Line?





Introduction

Contractors are no longer restricted to acquisition and logistics but are found nearly everywhere, and their presence on the battlefield is a reality.[1]

Special Feature

Since the end of the Cold War, US Armed Forces have increased their reliance on support contractors in contingency situations. Factors that have led to this increased reliance include post-Cold War reductions in the size of military forces, increases in the operations and missions undertaken by the military, and increased complexity and sophistication of new weapon systems. The concept of civilian contractors supporting military operations is nothing new. Throughout history, contractors have deployed with the military and performed various logistical and support functions. What is new is the expanding use of contractors in operational roles traditionally performed exclusively by uniformed military personnel. These new contractor roles are encroaching on what could be interpreted to be direct participation in hostilities. The impact of this expanding role has blurred the distinction between contractors performing as civilians accompanying the force and contractors engaging in hostilities.

The Expanding Use of Contractors

Never has there been such a reliance on nonmilitary members to accomplish tasks directly affecting the tactical successes of an engagement.[2]

Joint Publication 4-0, *Doctrine for Logistic Support of Joint Operations*, defines three types of contractors used in contingency situations: theater support, external theater support, and systems support.[3]

Theater support contractors assist deployed operational forces under prearranged contracts through host-nation and regional businesses and vendors. These contracts provide goods, services, and minor construction—usually from the local vendor base or nearby offshore sources—to meet immediate needs of the local commanders. External contracts, such as the Army Logistics Civilian Augmentation Program and Air Force Capability Assessment Program, provide support for deployed operational forces that is separate and distinct from theater and systems support contractors.[4] These may be US or third-party businesses and vendors. These types of contracts usually provide road and airfield construction, transportation services, mortuary services, billeting, and food services. System contractors support deployed, operational forces under existing weapon system contracts. These contractors "support specific systems throughout

their system's life cycle (including spare parts and maintenance) across a range of military operations."[5] For example, the F-117A stealth fighter, reconnaissance aircraft, and Global Hawk unmanned aerial vehicle rely on system contractors for maintenance and logistics support. Contractors must deploy with the military, since organic support is limited or nonexistent.

Since theater support contractors are used primarily for commodities purchase and traditional civilian roles, the nature of which has not changed, the focus of this discussion will be on external support contractors and system contractors.

Deploying contractor employees to support military operations is not a new phenomenon. History shows that contractors supported military operations as far back as the 16th century. Martin van Crevald notes in *Supplying War* that early commanders realized the need to furnish their armies with supplies beyond what they could plunder. Sutlers, with whom the army would sign contracts, helped supply the army with "the most elementary needs."[6]

The US military has relied on civilian support during military operations since its existence. General George Washington's Continental Army relied on civilians for transportation, carpentry, engineering, food, and medical services. Civilians performed these services, freeing soldiers to focus on fighting.[7] It seemed only logical to use civilians since these logistical functions were either "too menial for soldiers or were well-established or specialized in commercial industry."[8] This philosophy remained relatively unchanged throughout the history of warfare up to the Vietnam conflict. In the wars prior to Vietnam, contractors continued to provide basic logistics functions in support of soldiers, primarily in the rear areas away from the dangers of the battlefield.[9]

The contractor support philosophy began to change with the Vietnam conflict. *Business Week* referred to Vietnam as a "war by contract."[10] "More than ever before in any US conflict, American companies are working side by side with troops. One big reason is that military equipment has become so complex."[11] "Specialists in field maintenance checking on performance of battlefield equipment dodged Vietcong attacks on military bases at DaNang and Pleiku."[12] Contractors were no longer safely behind the lines of battle, and they were not performing only logistics and support functions.[13] "There might have been a time in the past when the site of military operations was an exclusive club for those in uniform, but those days are waning."[14] Beginning with Vietnam, the tools the military uses in combat have become so complex that the military does not have—or could not afford to have—the expertise required to provide maintenance and technological support. This fact, coupled with the use of contractors for other logistical functions within the *zones of occupation*, has brought contractors perilously "within sound of the guns."[15]

Since 1990, the trend toward using contractors in theater to perform support; logistics; and increasingly and more important, combat functions has increased and will continue to do so for the foreseeable future.[17] Increasing contingency operations from Desert Shield and Storm to Somalia and Haiti to Bosnia, Kosovo, Afghanistan, and Iraq, coupled with military downsizing, privatization of many support functions, omnibus base operating support contracts, and the growing complexity of weapon system hardware and software has caused contractor deployments to grow.[18] Table 1 provides a historical look at contractor deployment in theater.

Currently, the military relies on contractors for the maintenance of 28 percent of its weapon systems. The Bush administration would like to see this figure rise to 50 percent.

War/Conflict	Civilians/ Contractors	Military	Ratio
Revolution	1,500 (est)	9,000	1:6 (est)
Mexican/American	6,000 (est)	33,000	1:6 (est)
Civil War	200,000	1,000,000	1:5 (est)
World War I	85,000	2,000,000	1:24
World War II	734,000	5,400,000	1:7
Korean Conflict	156,000	393,000	1:2.5
Vietnam Conflict	70,000	359,000	1:5
Desert Shield/Storm	5,200	541,000	1:104
Balkans	20,000	20,000	1:1

Table 1. Civilian Participation in Combat[16]

The General Accounting Office (GAO) reported "nearly 5,200 contractor personnel voluntarily deployed to support the military forces during the Gulf War."[19] In Bosnia, "Our Army uniform presence was 6,000 supported by 5,900 contractors."[20] The Brookings Institute estimates that the ratio of military to contractors in Operation Iraqi Freedom is 10 to 1.[21] Currently, the military relies on contractors for the maintenance of 28 percent of its weapon systems. The Bush administration would like to see this figure rise to 50 percent.[22]

The trend toward the use of contractors in a theater can be attributed to four factors: deep cuts in military personnel; greater emphasis on privatization of functions that can be performed more efficiently outside the military; increased reliance on contractors because of the growing complexity and sophistication of weapon systems; and the lack of core military expertise, training, and flexibility gained by deploying contractors into theaters that have congressional, legislative, or host country-mandated troop ceilings.[23]

Since the end of the First World War, the American public has "historically demanded a peace dividend at the conclusion of each war or conflict."[24] The end of the Cold War was no exception. The fall of the Soviet Union led US taxpayers to call for major cutbacks in defense spending in order to "reap the benefits of winning the Cold War."[25] Since 1991, service force structures have been reduced by more than 30 percent, Department of

Defense (DoD) budgets have dropped 40 percent, and weapon system acquisitions have fallen 70 percent.[26] Additionally, the United States has withdrawn two-thirds of the ground forces and three-fourths of the air forces formerly forward deployed in Western Europe, leaving a large gap in the logistics infrastructure available for overseas operations.[27] These cuts occurred without any reduction in operational requirements.

In fact, since the end of the Cold War, US military commitments abroad have increased greatly. The operations tempo of all the Services has increased significantly over the last 12 years while operating with one-third fewer forces. For example, the Air Force has more than 35,000 airmen deployed, performing various missions around the world.[28] Thirteen years ago, the average was around 2,000.[29] "The Army has had a 300-percent increase in mission commitments during the last several years, and they do not appear to be tapering off."[30] This increase in commitments has not gone unnoticed by Congress. In his statement before the Senate Armed Services Committee, Senator Carl Levin noted:

> Our military forces are stretched thin. Over 180,000 are fighting the war in Iraq or supporting it from Kuwait and other Persian Gulf states. Another 10,000 are conducting combat and stability operations in Afghanistan. At the same time, we are helping maintain the peace in Liberia, Bosnia, and Kosovo. And of course, we have thousands of troops deployed in South Korea, dedicated in war plans to the defense of that nation in a region that is becoming ever volatile with the North Korean drive to develop nuclear weapons. We read in the paper this morning that thousands of National Guard and Reserve troops in Iraq and the Gulf area are going to have their tours of duty extended to a year.[31]

The Guard and Reserves have had their numbers reduced by nearly 48 percent while performing 13 times more man-days a year than previously done.[32] Furthermore, the DoD civilian rolls have been cut by more than 300,000 since 1989.[33] These budget and manpower reductions are forcing the DoD to look at demilitarizing core functions, those previously performed exclusively by military personnel, via privatization or contracting out to stretch limited dollars and free up military personnel for warfighting duties.[34]

Contractors have been used to fill the void created by the drawdown in troop strength. Use of contractors in support and logistics functions has allowed commanders to better utilize military forces in combat positions. The immense budgetary pressures, both inside and outside the DoD, demand that we get *more bang for the buck* in order to deal with the increasing military commitments. The drastic cuts in military spending, competition between funding modernization and other internal service programs, and a steadily declining military infrastructure and readiness have led Congress to order the DoD to develop ways of cutting costs without cutting (and in some cases increasing) services (doing more with less). To do this, the DoD has turned to reengineering, competitive sourcing, and privatization of increasingly military functions.[35] Office of Management and Budget Circular A-76 mandates that the Government obtain commercially available goods and services from the private sector when it makes economic sense to do so. Those functions, termed *commercial activities,* are the only functions eligible to be performed under contract.[36]

However, every commercial-type function is not automatically a contracting candidate. There could be several valid reasons to exempt an otherwise commercial activity from being performed by contract and, conversely, valid conditions to convert a

Article Highlights

The US military increasingly deploys with and relies more on contractor personnel during military operations. This article examines their employment under international and US law, joint doctrine, and DoD and Service regulations. It discusses the major issues involved in using contractor services in support of combat operations to include the manner in which contractor personnel may operate on the battlefield without being considered unlawful combatants. It then takes the four defined requirements for being a combatant and discusses each in terms of several key issues—the civilian nexus to combat, command and control of contractors, the bearing of arms, and uniform wear. Colonel Blizzard outlines the increasing use of contractor personnel in performing tasks formerly considered core military functions. Of note in this discussion are the sections that demonstrate that the increasing presence of contractors during combat operations is placing them dangerously close to being considered unlawful combatants under international law. The implications of becoming an unlawful combatant are discussed, including potential war crimes accountability under the International Criminal Court. The article concludes with a discussion of alternatives to eliminate or mitigate the problems associated with contractors operating in the combat environment.

government function into one that is contractor-operated.[37] The Government is allowed to perform an otherwise commercial function if the function is determined to be a core capability. A core capability is defined as:

> A commercial activity operated by a cadre of highly skilled employees, in a specialized, technical, or scientific development area, to ensure that a minimum capability is maintained. The core capability does not include the skills, functions, or full-time equivalent (FTE) that may be retained in house for reasons of national defense, including military mobilization, security, rotational necessity, or patient care or research and development activities.[38]

Previously, the Services defined core functions as "those requiring military or organic capability because it was combatant in nature, required potential deployment into harm's way, or required the capability to be expanded (surged) in times of crisis."[39] Today, the focus is moving away from specific tasks toward a big picture approach of looking at service core competencies. For example, instead of taking a function-by-function approach, one can look at the issue from a broad Air Force core competency approach of "Air and Space Superiority, Precision Engagement, Information Superiority, Global Attack, Rapid Global Mobility, and Agile Combat Support."[40] Using this approach, functions previously exempt from privatization or contracting—such as aircraft and munitions maintenance, communications, weapons calibration, and weapon system software maintenance—are now prime candidates.[41] The main advantage in using contractors to perform these missions is their lower cost. The GAO estimates that the average civilian support employee costs about $15K less than a comparably graded military person.[42] The Air Force estimates that it has saved $500M annually through privatization. DoD-wide cost savings were projected to be between $7B and $12B annually by fiscal year 2002.[43]

The preeminence of advanced technology and cutting-edge weapon systems is further exacerbating the military's reliance on contractor support. The high-tech weapon systems used to such devastating effect in Afghanistan and Iraq are so complex that combat units in the field have no choice but to depend on contractors to maintain and, in some cases, operate them. Many weapon systems—such as the F-117A stealth fighter, M1-A tank, Patriot missile, and Global Hawk—are contractor-dependent.[44] The operation and maintenance of state-of-the-art systems require technical expertise neither available in the military nor cost-effective for the military to develop in house.[45] For example, a new Marine Corps truck was designed to be at least partially contractor supported because the limited number of assets made contractor support more cost effective. Similarly, the Army's Guardrail surveillance aircraft is entirely supported by contractors because it was not cost-effective to develop an organic maintenance capability.[46] In the latest Iraqi conflict, the military used recently fielded systems or systems still under development that had unique technical requirements for which the Services could not develop timely training courses or train personnel. For instance, contractors recently deployed with the 3^{d} Infantry Division to Iraq to support the high-tech digital command and control systems still under development. Similarly, when the Air Force deployed the Predator unmanned aerial vehicle, contractor support was required because the vehicle was still in development, and Air Force personnel had not been trained to maintain the Predator's data link system. With limited expertise in these new high-tech weapon systems, the military is forced to rely on contractor support in operational situations.

Finally, the use of contractors is beneficial in areas where countries impose *force caps*, limiting the number of military members allowed. For example, DoD has limited US troops to 15 percent of the North Atlantic Treaty Organization forces in Kosovo, and the Philippine government limited the number of US troops participating in a recent deployment to 660.[47] Since contractors are not included in most force caps, they have been substituted for military personnel to meet mission requirements usually met by using military personnel. In Bosnia, for example, the Army used contracted security guards to provide gate and base perimeter security. In Kosovo, the Army replaced its firefighters with contractors. There are several other examples of the military's relying on contractor support to perform traditionally military functions and maximize the limited combat forces in an area. As a result of the military's increased reliance on contractor support, contractors are providing a wide range of services (Table 2) at deployed locations around the world, as shown in Figure 1.

Deployment Issues

> *The citizen must be a citizen not a soldier…war law has a short shrift for the noncombatant who violates its principles by taking up arms.*[50]

The use of contractors to perform noncombat duties is advantageous to commanders in terms of freeing up uniformed military personnel to project combat power. However, while working to build a cohesive total force, commanders must remember that, while contractors provide many functions formerly performed by military members and commanders often become comfortable with their support contractors (almost to the point of referring to them as *my people*), contractors are not military members. As such, contractors deployed in theater present the commander with a myriad of potentially complex issues. One of the most important issues a commander faces is the question of what duties a civilian contractor should perform for an armed force in theater, termed *nexus to combat.* The line between allowable combat support roles and unallowable military combat roles is also an important issue.[51]

The increasing scope in which the US military is continuing to employ contractors to perform functions formerly performed exclusively by military personnel is moving dangerously closer to this line. The evolving trend toward employing contractors directly into military operations could lead to serious consequences. Commanders must take extreme caution in using contractors in roles that could be interpreted as mirroring combatant roles. Commanders usually have the ability to issue orders and exert command influence over personnel assigned or attached to their unit. However, since contractors are not military personnel, a commander's abilities to do this are limited, even as they direct contractors to perform legally assigned functions.[52]

In past conflicts, the philosophy regarding in-theater employment of civilians was "the closer the function to the sound of battle, the greater the need to have soldiers perform the function because of the greater need for discipline and control."[53] The Vietnam conflict started a trend where increasing reliance on contractors and the changing nature of conflicts positioned

Figure 1. Selected Countries Where Contractors Are Supporting Deployed Forces[48]

Service	Balkans	Southwest Asia	Central Asia
Weapons and systems support	X	X	X
Intelligence analysis	X	X	X
Linguists	X	X	X
Base operations support	X	X	X
Logistics support	X	X	
Prepositions equipment support		X	
Nontactical communications	X	X	
Generator maintenance	X	X	X
Biological/chemical detection systems		X	X
Management and control of government property	X	X	X
Command, control, communications, computers, and intelligence	X	X	X
Continuing education	X		X
Fuel and materiel transport	X	X	X
Security guards	X	X	
Tactical and nontactical vehicle maintenance	X	X	
Medical service		X	
Mail service	X		

Table 2. Selected Services Provided by Contractors in Deployed Locations[49]

them closer and closer to the sound of battle.[54] The increased reliance on contractors and today's nonlinear battlespace have contractors performing roles formerly performed exclusively by military members in areas "physically and functionally closer to the battlespace than ever before."[55] In addition to traditional support-type functions, contract personnel now perform actual mission tasks such as inter- and intratheater airlift and maintenance of vital weapon systems—such as the Joint Surveillance Target Attack Radar System, Patriot, Global Hawk, and Predator—and operate and support intelligence and information systems.[56] This evolution of contractor roles in battlefield operations puts employees at risk of crossing the line between lawful noncombatants and unlawful direct participation in hostilities under the Law of Armed Conflict (LOAC).

LOAC is "that part of international law that regulates the conduct of armed hostilities."[57] The purpose of LOAC is to limit the effects of conflict, protect combatants and noncombatants from unnecessary suffering, safeguard the fundamental rights of combatants and noncombatants, prevent the conflict from becoming worse, and make it easier to restore the peace when the conflict ends.[58] LOAC applies to armed conflict even when a state body has not been declared.[59] However, many LOAC provisions of LOAC are not binding under international law "during intrastate 'civil wars' or conflict between nonstate actors" as frequently experienced in military operations other than war scenarios like Operation Enduring Freedom.[60] It is US policy to follow the provisions of LOAC, even in situations where it may not be binding under international law. Chairman of the Joint Chiefs of Staff (CJCS) Instruction 5810.01A, *Implementation of the DoD Law of War Program*, states that military forces will "comply with law of war during all armed conflicts, however such conflicts are characterized, and, unless otherwise directed by competent authorities, will comply with the principles and spirit of the law during all other operations."[61]

LOAC is derived from two main sources: "Customary international law arising out of the conduct of nations during hostilities and binding upon all nations" and "treaty law arising from international treaties (also called conventional law) that only binds the nations that have ratified a particular treaty."[62] LOAC treaty law is divided into two areas: Hague Law (from the treaty negotiations conducted at The Hague, Netherlands), concerned with means and methods of warfare, and Geneva Law (from treaty negotiations held at Geneva, Switzerland), which is concerned with protecting persons involved in conflicts. LOAC classifies persons involved in armed conflict as either combatants or noncombatants.

Article 4, Geneva Convention III, Treatment of Prisoners of War, 12 August 1949, prescribes the following conditions to combatants: that of being commanded by a person responsible for subordinates; of having a fixed distinctive sign recognizable at a distance, of carrying arms openly, and of conducting their operations in accordance with the laws and customs of war.[63] Persons who do not meet the above description are classified as noncombatants. DoD contractors are, therefore, noncombatants. The reasons contractors cannot be considered combatants and cannot bear arms against an enemy are the contractor is not subject to the military commander's internal discipline system (Uniform Code of Military Justice [UCMJ]), "is not trained to conduct operations in compliance with armed conflict,"[64] and "is not subordinate to a field commander."[65]

LOAC historically has recognized the right of noncombatants to be in the battlefield and to "even be aboard combat aircraft, vessels, and vehicles on operational missions. They may provide technical support and perform logistics functions."[66] However, contractors are not exactly noncombatants in the true sense. They are something in between; they are "civilians authorized to accompany the force."[67] In this status, contractors are entitled to "some but not all protections afforded combatants and some but not all the protections afforded to noncombatants."[68] As such, contractors cannot be targeted deliberately as individuals, but they can be targeted as a part of a system. If the system (or function) is targeted and contractor personnel are wounded or killed, LOAC will regard them as legitimate collateral casualties.[69]

The Air Force and the Army realize the danger civilians face from uncertainty under LOAC.

> Civilians who take part in hostilities may be regarded as combatants and are subject to attack and/or injury incidental to attack on military objectives. Taking part in hostilities has not been clearly defined in the law of war but generally is not regarded as limited to civilians who engage in the actual fighting. Since civilians augment the Army in areas in which technical expertise is not available or is in short supply, they, in effect, become substitutes for military personnel who would be combatants.[70]

Therefore, if a contractor is performing F-117A maintenance and the enemy decides to bomb the fighter maintenance facility, any collateral injury to or death of the contractor resulting from the attack is considered legitimate. The danger of contractors' being attacked while performing their duties is very real as documented in Desert Storm, United Nations peacekeeping missions in Angola, and antidrug operations in Colombia.[71] More recently, during Iraqi Freedom, two contractor employees from EOD Technology Incorporated were killed by an improvised roadside explosive device as they were returning from assisting the Army Corps of Engineers defuse bombs and destroy munitions left over from the old Iraqi regime.[72] As of November 2003, 9 civilians working for the Government had been killed, 29 had been wounded, and many have had close calls.[73]

To avoid LOAC violations, contractors must take great care to ensure they do not conduct themselves in a manner that is inconsistent with their status. According to LOAC, only the combatant has the *honor* to conduct war and deliberately kill the enemy (direct action). A noncombatant or "civilian authorized to accompany the force" who engages and kills the enemy could be seen as a murderer.[74] If a soldier kills in war and is captured, he is considered a prisoner of war (POW) and must be treated accordingly. A noncombatant who kills and is captured can be subject to trial and punishment as a criminal. As long as contractor employees do not violate LOAC, they are entitled to POW status if captured.[75]

LOAC becomes nebulous when defining direct participation in hostilities. Direct action in warfare is considered those circumstances that, by their nature, are likely to cause some sort of physical harm or destruction of property. Direct action also includes "functioning as a guard, lookout, or intelligence agent for an armed force."[76] Therefore, a strict interpretation of *direct part in hostilities* on the part of other members in the international community could render the contractor Global Hawk pilot or F-117A maintainer as an *unlawful* combatant subject to prosecution for war crimes.[77]

The current use of more than a dozen private military companies in Iraq should be cause for concern. Armed contract employees guard Baghdad airport, man checkpoints in the same manner as military soldiers, provide armed protection for the Coalition Provisional Authority, and train Iraq's police. "Some soldiers said privately that the soldiers for hire walk around Iraq with their weapons in full view as if they belong to a coalition army."[78] In this situation, one taking a strict interpretation of LOAC could determine these contractor employees to be taking a direct part in hostilities.

The above example brings to mind two additional considerations in the LOAC area: whether to allow the contractor to wear a military uniform or carry weapons. Decisions on both of these areas must be made with the consideration of protecting

the contractor's noncombatant status since the wearing of uniforms and the carrying of weapons can create the appearance of being a combatant.

In accordance with LOAC, combatants must distinguish themselves from noncombatants in order to protect the noncombatants. Wearing a distinctive military uniform usually does this. However, in today's environment, contractors frequently wear military-type uniforms in performance of their duties. In this case, the uniform may include "utilities, chemical warfare protective clothing, and similar combat outerwear."[79] The commander's decision to allow contractor employees to wear a military uniform is based on the determination that "there is an actual or threatened outbreak of hostilities, involving war, major civil disturbance, or the deployment necessitates the wearing of uniforms in specifically defined geographic areas."[80] While commanders may allow contractors to wear military uniforms, Air Force policy generally advises against issuing military garments (for example, BDUs) to contractor employees. Exceptions to this policy may be made because of compelling reasons such as a need for chemical warfare gear when the contract requires the Government to issue the equipment rather than forcing the contractor to purchase and provide it to their employees. Caution must be used, however, since wearing the uniform exposes contractor employees to the risk of being accused of being an unlawful combatant. To help reduce this risk, commanders must ensure that if contractors wear the uniform they wear markings (for example, distinctively colored patches, armbands, and headgear) clearly identifying themselves as civilians.[81] Commanders should ensure the contractor employees understand the possible risks, in terms of LOAC, associated with uniform wear.

The *legality*, under LOAC, of civilians carrying weapons is not clear. Army Field Manual 100-21 allows civilian use of firearms for self-defense provided three conditions are met: commander approval; contractor company policy, which approves carrying of firearms by their employees; and the employee's volunteering to carry the firearm.[82] By carrying sidearms, contractor employees run the risk of being seen as unlawful combatants. In some areas, such as Iraq or Bosnia, the line between self-defense and direct participation in a military action could be extremely narrow and could depend upon through whose lens the contractor employee's actions are viewed. Aside from the contractor status concerns, the commander should review the status of forces agreement to ensure there are no host-nation prohibitions against arming civilians for self-defense.

The 2002 Rome Statute of the International Criminal Court (ICC) has increased the risk of contractor employees being tried on an individual basis for LOAC violations. The ICC is the first permanent, independent court capable of investigating and bringing to justice individuals who "commit the most serious violations of international humanitarian law; namely, war crimes, crimes against humanity, genocide, and once defined, aggression."[83] Even though the United States has not ratified the ICC, more than 139 countries have ratified it.[84] Thus, it is possible that contractor activities could be interpreted as crossing the line between lawful support and unlawful direct action, inviting indictment in the ICC. Therefore, it is incumbent upon the commander to ensure contractor employees are not engaging in activities that would compromise or create the appearance of compromising their status as noncombatants.

As discussed earlier, in combat situations, commanders generally feel more comfortable having direct command and control of the personnel assigned to them. Since contractor personnel are not under the direct control of the commander but governed by the contract, command and control over contractor employees continues to be a key challenge to deployed commanders.[85] Since contractor employees are not military members, they are, by definition, not subordinate to the commander or subject to the commander's internal discipline system, known as the UCMJ. Contractor employees are only subject to the UCMJ during a declared war, something we have not had since World War II. Lack of command and limited direct control over the contractor can provide challenges to the commander.

The contractor's effort is governed by the terms and conditions of the contract. As such, the contractor cannot be under a commander's chain of command and cannot be ordered to perform functions outside the scope of the contract. Additionally, contractor employees cannot be placed in the position where they appear to have a direct supervisor and subordinate relationship with a military commander (or any government employee for that matter). Only the contracting officer or the contracting officer's representative may direct the contractor within the scope of the contract, and only the contracting officer can make changes to the contract.

A strict interpretation of *direct part in hostilities* on the part of other members in the international community could render the contractor Global Hawk pilot or F-117A maintainer an *unlawful* combatant.

The use of private military companies in Iraq creates a serious command and control issue, especially where commanders have instituted strict rules of engagement for forces under their command. Unless this rule of engagement or some condition requiring the contractor to follow the local commander's rule of engagement is included in the contract, contractor employees will not be obligated to operate within the rules of engagement. In this situation, soldiers "worry that the private-sector soldiers might not be constricted by the same rules of engagement and that any rogues among them could kill or hurt Iraqis and bring reprisals on all foreign forces."[86] One coalition military commander, when asked, "What are the rules of engagement for the private companies? Are they civilian or are they military?"

replied, "I don't know who they are, and I don't want to go anywhere near them."[87] This type of situation should be of grave concern to commanders who have private military companies operating in their area of responsibility since the ability to control their actions directly will be limited if not nonexistent.

Another issue that causes concern is the fact that contractor employees may refuse to enter what they consider to be a dangerous situation. In this situation, the commander does not have the authority to order a contractor employee to perform. This proved problematic in Iraqi Freedom where contractor *no shows* led to an Army unit's "living in the mud, heat, and dust since the unit had no core support capability and had shifted to reliance on contractor support."[88] This point drives home a major concern voiced by Army Field Support Command officials, "You cannot order civilians into a war zone. People can sign up for that, but they also can back out."[89] Contractors leaving the theater at one time meant no hot food or limited support services. Now, because of the military's increased reliance on contractors, it could mean the loss of a core competency task such as aircraft maintenance or the loss of mission effectiveness of an entire platform like Global Hawk or Predator.[90]

In this situation, it is up to contractor management to take action against the employee and make adjustments to continue performance. If the contractor does not perform, the only recourse the Government may have is to terminate the contract for default and remove the contractor from the theater. This does the commander who is trying to execute a combat mission little good. In anticipation of this type of contingency, it is imperative for the commander to plan for a contractor's default by providing military to perform the function in the interim until the contracting officer can find another contractor.[91]

Since contractor employees are not military personnel, they are not, unless Congress has declared war, subject to the UCMJ. Without a declaration of war, contractors, like any other US citizen who is visiting a country (a tourist for example), are subject to the laws of the country.[92] An exception to this rule would be if contractor employees were covered under the status of forces agreement between the US Government and the host nation. The lack of applicability of US law or UCMJ, coupled with the hesitation of some host nations to prosecute Americans for certain offenses (especially if committed against other Americans), creates a situation where the contractor employee may be immune from prosecution despite the commission of a serious crime. In addition, in a country with no government, like Somalia, a contractor in a country supporting US efforts "could murder, rape, pillage, and plunder with complete legal unaccountability."[93] In these instances, there is little the commander can do other than seek remedy under the contract.

To compound this issue, there is little common understanding among the Services as to the Government's responsibility to contractor employees in the event of hostilities.[94] Guidance on the use of contractors to support deployed forces varies widely.[95] Commanders often have contractors supporting several different services, under several different contracts, each with different requirements and contract terms and conditions, operating within their area of responsibility. A recent GAO audit found that no overall DoD guidance regarding the use of contractors to support deployed forces exists. At the service level, only the Army has developed comprehensive guidance and formulated policies and doctrine for using contractors in deployment situations. Army regulations and field manuals provide comprehensive and detailed direction to commanders, contracting personnel, and contractors on their roles and responsibilities.[96] However, the other services have not matched the Army's fidelity in developing guidelines for using contractors in deployment situations.

Additionally, where there is guidance, at either the joint or service level, it is inconsistent and, in some cases, contradictory. These differences and contradictions can complicate the ability of the commander to execute that guidance and cause great confusion.[97] The rules regarding force protection of contractor employees provide an excellent example. Joint Publication 4-0, Chapter V, describes force protection as the responsibility of the contractor, unless stated otherwise in the contract. [98] Army Field Manual 3-100.21 places the responsibility for contractor force protection on the commander.[99] Air Force policy states that force protection commensurate with that provided to DoD civilians may be offered under the terms and conditions specified in the contract and in accordance with host-nation laws.[100] The need for clear guidance is obvious in order to allow commanders to focus on the task at hand, not the rules they need to apply for contractors in their area of responsibility.

Perhaps the best approach would be to turn questionable civilians into combatants. There are two approaches: requiring contractors to hire employees with military obligations and the sponsored reserve concept.

The above discussion, while far from comprehensive, identifies areas of concern associated with the increased reliance on contractors in deployment operations.

Potential Alternatives

The closer the function to the sound of battle, the greater the need to have soldiers perform the function because of a greater need for discipline and control.[101]

There are several possible solutions for alleviating the concerns created by the contractor's quasi-combatant status, mitigating the risks of using contractors in an inappropriate manner, and resolving command and control issues: curtailing or eliminating the use of contractors in roles that could cast doubt as to their status under LOAC; temporarily discontinuing the usage of contractors while attempting to clarify their quasi-combatant status under LOAC; realizing the risks involved and pressing ahead in the hope that no contractor employee is captured and

put on trial as a war criminal; or turning those contractors who perform questionable roles into combatants.[102]

The United States could decide not to use contractor support in roles where there is a possibility of crossing—or being interpreted by others as crossing—the line between indirect and direct participation in hostilities. This approach likely would be politically and publicly unacceptable. Eliminating contractor support in certain functions would decrease military effectiveness. This is because of the complexity of the systems employed in battle and the increased reliance on contractors to perform support functions. If contractors were taken out of these positions, the mission would be impacted since there would be limited to no military people available to perform those functions. Transferring positions back to the military also would be cost prohibitive.[103]

The United States temporarily could suspend contractor participation in questionable functions while attempting to sponsor changes to international law, clarifying the contractor's quasi-combatant status. The length of time required to present the US case, coordinate with the world community, and negotiate to get other countries to agree would make this alternative unattractive in the short to medium term.[104]

Another alternative simply could be to use the complexity of the law as an excuse to continue with business as usual and hope no contractor employee is captured, accused, and tried as a war criminal (that is, hope for the best). The problem with this alternative is that the United States prides itself on its support and adherence to international law and the conventions upon which LOAC is based. Taking this approach could expose the United States to embarrassment and criticism if a case went to trial and, thus, lower its standing in the international community. It would be difficult to expect other countries to take the *high ground* in terms of international law, in general, and LOAC, specifically, if the United States did not. Contractors would be leery of this approach since, if one of their employees were accused and convicted of war crimes, it could reflect badly on their standing in the international community and would be bad for foreign business. The companies and their executive leadership could run the risk of being held criminally or civilly libel for any damages attributed to their employees' contract performance. Additionally, it could be considered unethical to expect contractor employees to bear the personal risk associated with this approach. Also, contractor employees would be unlikely to go along voluntarily with this position once they understood the risks.[105]

Given the difficulties associated with the previous alternatives, perhaps the best approach would be to "turn questionable civilians (in this case contractor employees) into combatants."[106] There are two approaches to doing this: requiring contractors to hire employees with military obligations and the sponsored reserve concept.[107]

The Army Materiel Command already is exploring the possibility of including contract language requiring the contractor to hire retirees and reservists for potentially dangerous tasks.[108]

> For very dangerous situations, the contract may require the contractor to hire personnel with a military obligation, including retirees, individual reservists, and members of troop program units. The military chain of command can bring those personnel onto active duty through temporary active-duty tours or mobilize them involuntarily to ensure continuation of essential services. Of course, such action risks loss of contractor personnel to a callup or mobilization for other duties. Activation or mobilizations are last resorts. They will be used to ensure continuity of essential services, when civilian employees are evacuated.[109]

Many contractors already are looking to do this on their own to avoid a potential breach of contract in the event employees choose to terminate their employment rather than perform in a dangerous environment.[110]

While this may go a long way in solving the concerns previously noted, there is a new, creative, and more promising concept that takes this a step further: sponsored reserve.[111] Sponsored reserve is a nontraditional method that strikes a balance between maintaining needed military capacity and gaining the efficiencies of privatization and the skills available in the commercial marketplace.[112]

The sponsored reserve concept originated from the British *Regular/Reserve Forces Mix Study* of 1992. The study recommended exploring the feasibility of using civilians with reserve status for operational support functions. The results of this study led to the passage of the 1996 Sponsored Reserve Act, which required defense contractors to have a specified number of employees participate as military reservists. Service-specific implementation regulations were finalized in 1999 following indepth coordination with industry and trade union representatives.

Sponsored reserve is enacted through a contractual agreement between the Government and the contractor and requires a specified portion of the contractor's workforce supporting a contract be members of a military reserve component.[113] Under this arrangement, sponsored reservists are mobilized and deployed to a contingency operation as uniformed military members vice contractor employees.[114] Military commanders, not the contractor, are responsible for determining suitability of an individual to serve under sponsored reserve. Sponsored reservists are assigned either to active duty or reserve component units for training and deployment. Military commanders establish military requirements for the sponsored reservist. When a sponsored reservist is on active duty, the military commander assumes responsibility for work products and services. In peacetime, this responsibility falls on the contractor.[115]

The use of sponsored reserve personnel is appropriate under the following conditions: reserve component personnel are an acceptable alternative to active-duty personnel, it is acceptable for civilians to perform in peacetime, it is cost-effective for civilians to perform the task rather than active-duty personnel, and it is likely that civilians who perform the task will be deployed.[116]

Under the British model, the terms and conditions of service for sponsored reservists are the same as those that apply to a normal reservist but are amended to reflect the commercial basis of the relationship. Sponsored reservists undertake the same training required by their parent force and are subject to the same disciplinary acts when serving in active status. They are provided the necessary military training (including basic military training for employees with no previous military active-duty or reserve experience) to enable them to be called out for any level of operation, but the extent of their training is related specifically to the contracted service they provide.[117] Additionally, callup conditions for sponsored reservists are independent of those for

ordinary reservists in that they are called up specifically to accomplish the task for which their employer is on contract.

The sponsored reserve concept offers advantages to all parties: government, contractor, and individual employee.

> The advantage to the contractor may be entry into lines of business previously unavailable to them or expansion in the scope of existing business. The advantage to the employee may come in the form of additional pay, benefits, and job opportunities, as well as the protection that serving in a military status provides in a foreign theater or combat zone. The advantage to the military is the ability to deal with force reductions, privatization, and recruiting/training/retention challenges while retaining a military presence and status to seamlessly support peacetime, contingency, and wartime requirements.[118]

Under sponsored reserve, the issues identified PREVIOUSLY become moot, since contractor employees will be in active military status while deployed in theater. Contractor employees who perform aircraft maintenance functions in peacetime could perform the same functions in active military status during contingency operations. Therefore, rather than having the problem of determining the status of these employees, they clearly would be combatants. This type program also could alleviate other predeployment concerns, such as vaccinations and chemical warfare training.

Sponsored reserve presents another advantage in that when employees are called up to active status for deployment, they provide the same services under operational circumstances as that contracted out to their employer under peacetime conditions. Using the above example, if it is the employees' day-to-day job to provide maintenance services under a contract with the Government and they are called up to active military status to perform this function in support of a contingency, there is, theoretically, no void created if the employees are not physically present in the employer's location. Therefore, long-term deployments would be less stressful on the employer and the employee in terms of lost production and potential loss of employee benefits.[119]

The British currently have several sponsored reserve units providing a variety of functions. The Mobile Met Unit provides meteorological support to United Kingdom (UK) and allied forces operating in contingency locations where indigenous meteorological support is deemed inadequate to support the mission. The members of this unit are civil service employees in peacetime and special members of the Royal Air Force (RAF) Reserve.[120] A Halliburton-led consortium, FASTTRAX, provides heavy equipment transporter services to the British Army, mainly transportation of the Challenger main battle tank, in both peacetime and conflict scenarios. This contract frees up 92 heavy equipment transporter crews for other functions within the British Army.[121] Vosper Thornycroft Shipbuilding employees provide integrated logistics support for the Royal Navy's newest multirole hydrographic and oceanographic survey ships, *HMS Echo* and *HMS Enterprise*. The sponsored reserve concept has allowed the Royal Navy to recruit hydrographic and oceanographic specialists and highly focused personnel that otherwise might not have been available.[122]

One of the more interesting British uses of sponsored reserve is the proposed plan to have a contractor provide the next-generation RAF air-refueling and transport capabilities. Under this plan, the contractor will be able to use "dual civil/military registered aircraft" for its private revenue-earning operations when not required by the RAF. The contractor will employ aircrew and maintenance personnel as sponsored reserves, enabling them to be converted to military roles when required.[123] This plan, if incorporated, could free up air and maintenance crews for combat aircraft or other direct combatant roles.

The sponsored reserve concept has drawn interest from the Air Force as a potential tool to help mitigate critical manpower shortages. The Air Force Directorate of Strategic Planning currently is conducting a test program, based on the British model, to validate the effectiveness of the sponsored reserve concept within the Air Force and identify policy and legislative changes that would be needed to incorporate sponsored reserve.[124] The test program's goals include:

> …developing appropriate policies for future implementation, analyzing adjustments to US law that would have to be made for the most effective implementation of the concept through coordination of specific test memorandums of agreement and using the test as a tool to further enhance public-private partnerships.[125]

Increased reliance on contractor employees to perform functions formerly performed exclusively by military personnel and the nonlinear nature of the modern battle constantly places contractor employees in harm's way.

There are numerous challenges that must be resolved before the Air Force can implement sponsored reserve. The Air Force will have to determine the best method to integrate sponsored reserve into the present Air Force Reserve structure. Specifically, the Air Force will either have to establish a traditional Air Reserve Technician relationship with a commercial sector employee vice a government civilian employer or develop some other method.[126] Contracting and legal issues, such as the proper employee monetary and nonmonetary (benefits) compensation method (that is, contractor pay all compensation ala the British approach or some other combination), contract terms and conditions that would specify the relationship between them, and the responsibilities of the parties under sponsored reserve will need to be developed. If the commercial contracts involved require union membership, the concept must be discussed and negotiated with labor unions, and any issues must be resolved.[127] Resolution of these issues could prove challenging but not insurmountable and should not, in theory, prevent the sponsored reserve concept from being adopted.

The Air Force identified the following skill sets as initial candidates for sponsored reserve under the test program:

intelligence; space and satellite operations; information operations; unmanned aerial vehicle, unmanned combat aerial vehicle, and airborne laser operations; logistics and base infrastructure support; air traffic control; and engineer, science, and computer specialists.[128] As demonstrated in the RAF next-generation air-refueling and transport capabilities, the Air Force could explore the use of sponsored reservists to perform tanker and transport aircrew and aircraft maintenance duties in the future.

The increased reliance on contractor employees to perform tasks traditionally performed exclusively by military members, coupled with the nonlinear nature of today's battlefield, has created a situation where contractor employees are performing functions that cause them to encroach upon a thin line between combatants and noncombatants. In this type situation, contractor employees need the same type protections provided to military personnel under the Law of Armed Conflict. The ability of the commander to have direct command and control of personnel under this direction is crucial. Converting contractor employees, who are performing functions that call their LOAC noncombatant status into question, into active military personnel seems to be the best method to allay both concerns. The sponsored reserve concept shows great promise as the best method to accomplish this conversion.

Conclusions

Deploying contractors in the battlefield creates a unique set of issues for the commander. The increased reliance on contractor employees to perform functions formerly performed exclusively by military personnel and the nonlinear nature of the modern battle constantly put contractor employees in harm's way and have caused the line between contractors acting as civilians accompanying the force and civilians as combatants to narrow. The growing demands on the US military, increasing complexity and technology of weapon systems, and requirement to reduce the tail-to-tooth ratio to maximize the number of military people performing combat functions ensures more military functions will result in even more reliance on contractor personnel and a further narrowing, if not actual crossing, of the line.

It is extremely important for commanders at all levels to understand the status of civilian contractors under the Law of Armed Conflict and take special care to ensure the line is not breached. Contractor employees who are performing roles functionally similar to those normally performed by military personnel in a hostile area, while wearing uniforms and openly carrying weapons, run the risk of being seen as taking a direct role in hostilities. This could lead to several untenable personal risks, including increased targeting, physical harm, or indictment as a war criminal under the Law of Armed Conflict. The former two concerns have been readily seen in Iraqi Freedom as former regime loyalists, and other opposition fighters deliberately have attacked and killed contractor employees without regard for their status under the Law of Armed Conflict.

The increased role of contractors on the battlefield has created a command and control concern for commanders. Generally, the closer to an area of conflict, the more control commanders need to have over forces in their area of responsibility. Currently, unless specifically spelled out in the contract, the commander has either limited or no authority over the actions of contractor employees. The recent employment of professional military companies in Iraq highlights this concern as their employees perform combat-type functions absent the direct command and control of local military commanders and their specified rules of engagement.

The alternatives for alleviating these concerns range from limiting the reliance on contractors to ignoring the problem inherent in using them in questionable roles. Perhaps the best alternative is to turn contractor employees who perform questionable functions into combatants. The sponsored reserve concept seems to be the most promising method to make this conversion. Deploying contractor employees into theater in military status renders the LOAC status and command and control issues moot. This concept has been implemented successfully by the United Kingdom and currently is being tested by the Air Force. Air Force implementation of sponsored reserve will no doubt be challenging, as many legal, contractual, and military policy issues will have to be overcome. However, the benefits provided by alleviating the concerns noted in this article and erasing the line between noncombatant and combatant will prove beneficial.

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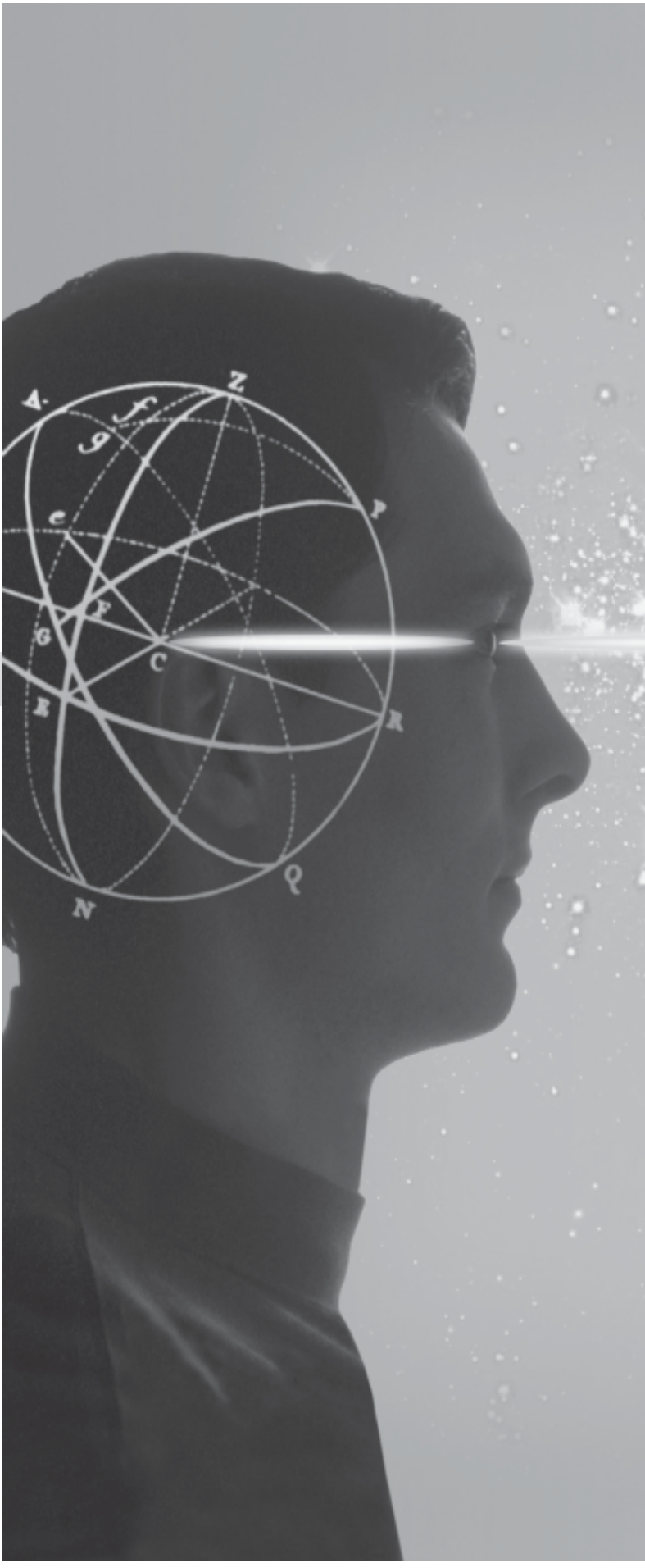
Introduction

Special Feature

One of the favorite buzz words for the last several years has been the idea of *transformation*. The term has found its way into every major Department of Defense (DoD) planning document and continues to receive more than its share of air time in virtually every periodical that is even remotely associated with the military.

> Transformation is a process by which the military achieves and maintains advantage through changes in operational concepts, organizational structure, and/or technologies that significantly improve its warfighting capabilities or ability to meet the demands of a changing security environment.[1]



This definition gives the reader a basic understanding of the concept. It explains that transformation has a purpose, to *achieve advantage*. It has a method, *change.* And it is intended to result in *improved warfighting capability*. This is the proverbial *big picture* leaders are often looking for. To put it another way:

> Transformation refers to fundamental change in the way an organization achieves its purpose. It means changing the way we work, interact, participate, and even think about how we get things done. It means bringing new methods and technology to bear, as well as changing our processes.[2]

The DoD is seeking new and innovative ways to achieve real transformation to include the possibility of adopting commercial industry *best practices*.

As one can imagine, the term transformation can have many different meanings, depending on the individual point of view and area of expertise. The logistics transformation initiative, as described in the Focused Logistics Campaign Plan, provides real-time logistics situational awareness; instills warfighter confidence by optimizing logistics business processes, transitioning to a logistics system open architecture that provides interoperable and actionable logistics information; and finally, enhances logistics response to the joint warfighter.[3] In general, defense logistics is a complex combination of support elements designed to provide maximum support to the warfighter. Logistics transformation challenges each logistician to provide new and innovative ways to improve logistics support and transform the current logistics infrastructure into the most efficient support system possible. Commercial industry best practices in the areas of supply support and acquisition may be the key to achieving real and lasting logistics transformation.

Logistics Transformation

Does Industry Have the Answer?

Lieutenant Colonel Keith D. Frede, USAF

Supply Support

Background

For the last several years, commercial industry has sought to improve profitability through effective management of the supply chain.

> There are many reasons for the popularity of the concept. Specific drivers may be traced to trends in global sourcing, an emphasis on time and quality-based competition, and their respective contributions to greater environmental uncertainty. Corporations have turned to global sources for their supplies. This globalization of supply has forced companies to look for more effective ways to coordinate the flow of materials into and out of the company. Key to such coordination is an orientation toward closer relationships with suppliers. Further, companies, in particular, and supply chains, in general, compete more today on the basis of time and quality. Getting a defect-free product to the customer faster, more reliably than the competition no longer is seen as a competitive advantage but simply a requirement to be in the market. Customers are demanding products be delivered consistently faster, exactly on time, and with no damage. Each of these necessitates closer coordination with suppliers and distributors. This global orientation and increased performance-based competition, combined with rapidly changing technology and economic conditions, all contribute to marketplace uncertainty. This uncertainty requires greater flexibility on the part of individual companies and supply chains, which, in turn, demands more flexibility in supply chain relationships.[4]

Additionally:

> …in an effort to reduce costs associated with managing and maintaining large inventories, many companies are seeking to improve their stock replenishment turn times. Simply put, large inventories tie up company capital/assets, and firms are seeking to free up those dollars for other investment opportunities. This is especially true in today's competitive market.[5]

Before we can understand the concept of managing the supply chain, known throughout industry as Supply Chain Management (SCM), a quick review of the elements that make up a supply chain is in order (Figure 1).

> A supply chain is made up of all the manufacturers and suppliers who provide the parts that make up a particular product. It includes production, storage, and distribution activities that procure materials, transform the materials into intermediate and finished products, and distribute the finished products to the customer.[6]
>
> Within the DoD, this definition is further expanded to include the return of failed components after use by the customer for rework, repair, or remanufacture. The DoD supply system is largely depended on its in-house repair process to keep needed parts available to the customer. Improving return and repair times of these components can positively affect the entire supply chain.[7]

SCM is best described as the:

> …systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across business within the supply chain, for the purpose of improving the long-term performance on the individual companies and the supply chain as a whole.[8]

This definition provides a great deal of insight for the logistician. First, the addition of the term *management* illustrates that this is an active process. In the last several years, commercial industry has come to realize that the elements of a supply chain are not independent variables. By that, they cannot and should not be looked at as individual actions but must be scrutinized (managed) as a process. Each individual element is affected by and affects the supply chain as a whole. Additionally, management is no longer thought of as simply the act of supervising or controlling. In today's context, management implies the use of tools, technology, and techniques for the explicit purpose of creating an environment of continuous improvement. It is no longer acceptable to manage the existing process; all logisticians must seek continuous improvement. This definition includes the strategic coordination of the traditional business functions (what companies do and produce), as well as the tactics (operating procedures) used to specify elements of the supply chain. This is very important because it illustrates that SCM may require adjusting or changing the fundamental operations of a particular company, if that change will improve the overall health of the supply chain. An example of this might include a firm's decision to develop the capability to make or manufacture a particular component in house, even if it is not a focus area for the firm, if by doing so the supply chain as a whole will be improved. These *make or buy decisions* are critical to the process.

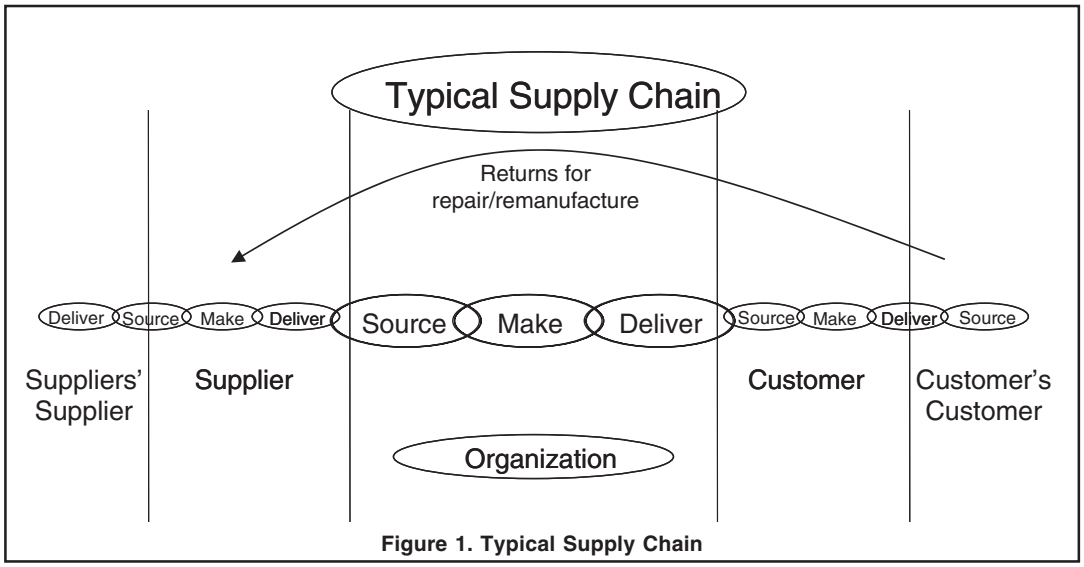


Figure 1. Typical Supply Chain

The supply chain is made up of all suppliers for a particular activity or manufacturing process, to include bit piece parts, subassemblies, and finished products. It includes the warehousing, transporting, and delivery of the products throughout the supply chain, to include the return of assets from the customer that require repair after use. SCM controls or adjusts the business process throughout the supply chain for the explicit purpose of improving the overall supply chain. As can be imagined, this is a

monumental task. In a complex operation like the building of a major weapon system, the chain might include thousands of suppliers, subsupplies, manufacturing, transportation, and warehousing functions. An example within the DoD would be the Air Force supply chain, which would include, as a minimum, commercial vendors, suppliers, the Defense Logistics Agency (DLA), air logistics centers, regional supply organizations, base-level supply units, and all organizations in place to store and transport assets for the customer. "From an Air Force perspective when analyzing best supply chain practices of industry, the key difference in the process is a shift from 'managing items' to managing supplier and customer relationships. Linked to this is focusing and managing performance outcomes along the supply chain."

Analysis

The essence of SCM as a commercial best practice can be summed up in a simple word—collaboration. To achieve the highest level of efficiency for the good of the supply chain as a whole, every participant in the supply chain must act as if it is a part of a unit.

> Previous research has suggested various activities necessary to successfully implement an SCM philosophy include integrated behavior; mutually sharing of information; mutually sharing of risk and rewards; cooperation; having the same goal of serving customers; integration of process; and finally, partners that build and maintain long-term relationships.[10]

A good example of the collaborative efforts is Boeing Commercial Airplanes' efforts to improve its supply chain. When interviewed for the article "Quest for the Ideal Supply Chain," Saundra Cope, Boeing Commercial Airplanes acting vice president and general manager, had this to say about efforts to streamline the supply chain:

> Ultimately, we need suppliers who can adopt and embrace change with us, engineer their products for the greatest value, implement lean manufacturing technologies in their plants to improve material flow and product flexibility, and continue to reduce costs and processes so we both benefit.[11]

In addition, Boeing Commercial Airplanes has come up with a unique method of collaborating supplier and manufacturing efforts. The article goes on to state:

> Supplier councils have been meeting and sharing ideas and working together since 1999. The councils centered in Europe, North Africa, and Asia are made up of eight to ten Boeing suppliers on each council and four Boeing representatives. They meet regularly around the world, and the meetings serve as forums for the open exchange of ideas. Council meetings address technical and process issues and help identify best practices, while allowing Supply Management and Procurement leaders to learn from suppliers how its own initiatives and policy decisions are received by members for the supply base. Councils are balanced to include representatives of the entire value chain. From raw materials, standards, interiors and payloads, structures, and systems.[12]

One of the most significant hurdles when transitioning a company to an SCM philosophy is developing effective measurement tools to assess the performance of the entire supply chain. Most, if not all, industries have long-established standards for delivery performance, fill rates, supply response time (reorder response time), costs of goods, warranty and return costs or rates, and new order lead time.

Article Highlights

Transformation refers to fundamental change in the way an organization achieves its purpose. It means changing the way we work, interact, participate, and even think about how we get things done. It means bringing new methods and technology to bear, as well as changing our processes. The DoD is seeking new and innovative ways to achieve real transformation, to include the possibility of adopting commercial industry best practices. This article outlines newly developed commercial best practices and innovative commercial support processes in the areas of supply support (supply-chain management), and acquisition. Selected industry best practices are analyzed in an effort to answer the question, "Are commercial industry best practices in the areas of supply support and acquisition applicable to the DoD transformation efforts?" This review is organized by focus area (supply support and acquisition) and includes background, analysis, and recommendations concerning the application of these new techniques within DoD. In addition, the article provides insight as to how these new and innovative approaches might be used as a springboard for the eventual transformation of the DoD support processes.

> A more innovative approach to performance measurement grew out of a study group comprised of executives from companies like Apple Computer, Bell South, CIGNA, DuPont, and General Electric. This group developed a balanced scorecard that presents a holistic view of performance metrics that must be assessed together in a way that will ensure a collaborative enterprise solution. Viewed individually, supply chain components may deliver optimal performance. However, viewed holistically, their collective performance may impact quality, productivity, finances, and human costs that affect the bottom line.[13]

The benefits of applying the balanced scorecard as a best practice include:

> ...helping to align key performance measures with strategy, provides management with a comprehensive picture of business operations, facilitates communication and understanding of business goals and strategies at all levels of an organization, and provides strategic feedback and learning.[14]

The balanced scorecard will give logisticians a comprehensive method for tracking performance of the supply chain as adjustments in company functions and tactics are made to improve efficiency.

So far, this article has provided an indepth look at the elements of the supply chain, defined SCM, and suggested various activities that are inherent in a successful supply chain such as integrating activities; sharing information; risk and rewards; building long-term relationships; and finally, always keeping the needs of the customer as the ultimate goal. While all these are useful best practices, the description alone will not facilitate DoD's transformation into a more efficient warfighting capability. The missing piece is a review of the best practice tools and techniques used by industry to transition companies to an SCM philosophy.

Supply Chain Excellence, a Handbook for Dramatic Improvement Using the Supply Chain Operations Reference Model (SCOR) outlines several steps or best practices successful companies have taken during the transition to a supply chain orientation. Of course, the first step requires leadership to build organizational support for supply chain improvement *(*best practice*)*. This step should include active executive sponsorship, education, and training, as well as buy-in from key leadership team members.

SCOR combines elements of business process engineering, benchmarking, and leading practices into a single framework *(*best practice).

The SCOR Project Roadmap separates the process into four distinct segments, addressing operational strategy, material flow, work work, and information flow. The segments include analyzing the basis of competition, which focuses on supply chain metrics and operational strategy; configuring the supply chain material flow; aligning performance levels; practices and systems; and finally, implementing the supply chain changes to improve performance *(*best practice*)*.

Each segment is comprised of deliverables that help a company understand and improve a specific dimension of supply chain performance. The first segment develops an understanding of how many supply chains a company has and how those chains perform. The second segment helps optimize material flow efficiency. The third helps optimize transactional productivity. And the fourth helps plan and implement supply chain improvements.[16]

The SCOR model is just one of several techniques companies are using to adopt an SCM focus and begin reaping the rewards of this proven concept by improving the efficiency of the supply chain. These last few paragraphs show that, although the concept works, it is not adopted without considerable effort on the part of all organizations involved in the supply chain.

Recommendations and Implications for DoD Logistics Transformation—Supply Support

The analysis thus far has provided a basic understanding of SCM and described how industry is using this approach to increase profitability. Companies across America and, for that matter, the world are adopting this new approach, and it is working. As individual elements of industry supply chains begin to collaborate, the supply chain, as a whole, becomes more efficient, which results in increased profits for shareholders and company owners. While the DoD may not be concerned with the profitability of any particular logistics segment, managers have a responsibility to increase the efficiency of their organizations and, wherever possible, reduce costs. As such, the DoD should adopt SCM as a new and innovative way of providing the best support to the warfighter. Of course, the next step must be to answer the question, "How can the DoD go about implementation?" The first step must be to assign responsibility for implementation to major commands within each service. As an example, within the Air Force, this responsibility would fall to the Air Force Materiel Command (AFMC). AFMC would assume responsibility for developing the overarching framework and time lines for implementation of the concept. The framework should include

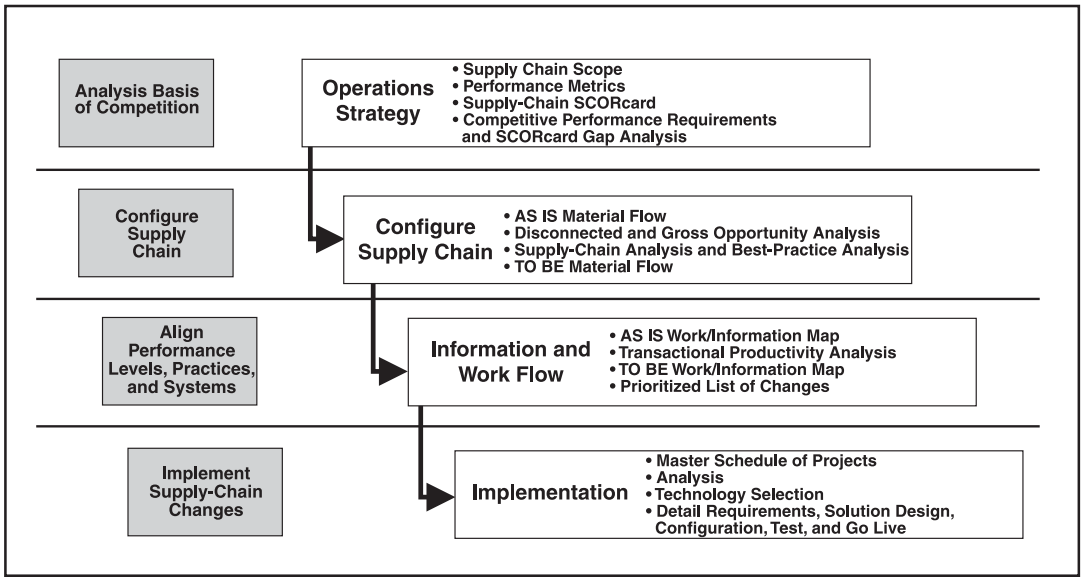


Figure 2. SCOR Project Roadmap[15]

guidance, in sufficient detail, to prevent each subordinate unit from developing country options during the implementation of the process. In addition, AFMC must act as a review authority to ensure subordinate agencies are striving to reap the full benefits of the new philosophy and assist in ensuring the buy-in from other agencies such as DLA. Below major command level, the actual nuts and bolts of the implementation must rest with agencies that own or support a product, from concept to boneyard. Again, for the Air Force, this responsibility would fall to the weapon system program offices (SPO), and in particular, the system program director should be responsible for ensuring the team adopts the new philosophy. Once a clear line of responsibility is established, the next step would be to educate the staff functions within the SPO, as well as the major commands that ultimately receive support. Again, to use an Air Force example, an organization such as the C-17 SPO would work with Air Mobility Command (AMC) staff to ensure a complete understanding of the new approach. They jointly would analyze the current support posture and then develop a balanced scorecard to align key performance measures with the new strategy. The balanced scorecard should provide management with a comprehensive picture of the support posture, especially key elements that are critical to support from the user or warfighter (in this case AMC) perspective. Most important, the balanced scorecard must be tied to warfighter support metrics (aircraft fully mission capable rates, on-time departures, and sortie generation rates), not just supply statistics such as fill rates and reorder times. The final steps would include analysis of the existing supply chain in which managers would seek out opportunities for improvement, development, and test proposals that increase the supply chain efficiency and, finally, the full implementation of new procedures and tactics to support the customer. One example of some *low hanging fruit* would be the elimination of dual supply chains that exist during the initial procurement of major weapon systems. In the past, when production of the new weapon system was taking place, the contractors established supply chains to support production and testing efforts, and the Air Force established supply chains to support newly fielded systems. Oftentimes, both the contractor and the Government compete with each other for the same scarce resources, driving up costs and reducing efficiencies. The development of a single government or contractor supply chain that supports both the assembly line and the fielded weapon systems could, in fact, increase support to the warfighter. This is just one example of how application of the SCM could reduce support costs and, ultimately, provide the best possible support to the warfighter.

> The recent DoD decision to establish the Defense Logistics Executive (DLE), as well as the Defense Logistics Board, to help manage the transformation process within the logistics community is a step in the right direction. One of the first orders of business by the DLE and SECDEF [Secretary of Defense] was the establishment of TRANSCOM [Transportation Command] as the distribution process owner. That key act gave TRANSCOM the responsibility to help lead transformation efforts beyond strategic movement. General Handy's [John W.] staff is already working immediate improvements to theater distribution in OIF [Operation Iraqi Freedom] by establishing Deployed Distribution Operations Centers. Initiatives like these highlight the fact that supply chain improvements are necessary across all the Services and defense agencies if we are to be successful in achieving real logistics transformation.[17]

Acquisition Reform

Background

Accomplishing real and effective acquisition reform will impact every aspect of the logistics transformation process positively. Secretary of Defense Donald Rumsfeld provided the strategy with the following words:

> Another priority element of the Department's corporate transformation strategy is the reform of the acquisition process. The Department is reducing cycle time and aligning acquisitions with a new capabilities-based resource allocation process built around joint operating concepts.[18]

Past acquisition practices have set the stage for very costly and inefficient support structures. An example of this can be seen in large weapon system acquisitions that were completed using sequential engineering and without regard for the complete life-cycle costs associated with design. These practices and many other examples have forced the Government to relook the acquisition process. "Acquisition and logistics reform deals with the modernization dilemma by changing procedures and processes to increase efficiency and effectiveness. Non-value-added effort is eliminated. The goal is to free funds to accomplish needed modernization."[19] Adopting commercial-like practices is one example of recent initiatives for acquisition reform.

The SCOR model is just one of several techniques companies are using to adopt an SCM focus and begin reaping the rewards of this proven concept by improving the efficiency of the supply chain.

> The Joint Direct Attack Munitions (JDAM) program, one of the most successful programs in recent years, instituted several commercial practices to include the following: performance-based requirements with no mandatory specifications; emphasis on price/performance parameters; lean manufacturing techniques; extensive reliance on commercial products; and opportunity for long-term commitment with the contractor.[20]

These initiatives were essential elements of this highly successful program and can be used as examples of how application of best commercial acquisition practices can improve support to the warfighter. While this example is a step in the right direction, it falls short of achieving the measure of acquisition reform required to transform the DoD as outlined by Rumsfeld. If examples of how applying commercial best practices to acquisition programs like the JDAM program are available for DoD contracting officers to use as benchmarks, why do we need

acquisition reform? To start with, the JDAM program was a congressionally mandated defense acquisition pilot program—so many of the techniques used during procurement are not available to other contracting officers.[21] Additionally, applying commercial best practices to a small-scale program like the JDAM is much easier than applying the same techniques to a major weapon system purchase like the F-22.

In the last decade, the military has gone through one of the most dramatic transformations in history. The DoD force structure has been reduced by one-third since 1992, and the drive to reduce uniformed members has given way to an increased reliance on contracted support provided by industry. One example of this new reliance on contracted services was outlined in a 2 January 2001 memo on performance-based services acquisition. Dr Jacques Gansler (former Under Secretary of Defense for Acquisition, Technology, and Logistics) noted, "From 1992 through 1999, DoD procurement of services increased from 39.9 billion to 51.8. In 1999, total dollars spent on service acquisition equaled the amount spent on supplies/systems."[22] While this ever-increasing spending trend might indicate the DoD is well-funded to provide needed support, in reality, major programs needed to improve American warfighting capability go unfunded each and every year. There are many reasons for the shortfall in funding, to include the costs of past, unplanned operations in Bosnia and Kosovo, as well as the enormous costs of current operations such as Enduring and Iraqi Freedom. Another significant cost driver is the age of existing weapon systems and support assets. To be frank, DoD assets are remaining in service much longer than planned, driving support costs associated with maintaining readiness such as modernization modifications and periodic maintenance to never-before-seen heights (Figure 3).

> Jacques Gansler, in *Affording Defense*, observes that acquisition time varies in the range of 11 to 19 years. By assuming a 15-year acquisition time and a 54-year service life, a representative time perspective for defense systems can be defined as approximately 70 years. Some systems, such as the B-52 and C-130, have projected system life cycles of 90 years.[23]

In addition, the costs of unscheduled or unplanned maintenance often will delay much needed modifications to increase capability, as well as reduce support costs. This phenomenon is known throughout the aircraft industry as the aging aircraft *death spiral,* but the principle can be applied to any aging system or subsystem (Figure 4).

In practical terms, the funds programmed to modernize the fleet are siphoned off to pay for unplanned repairs caused by the aging of the weapon system, thus creating a death spiral.[26]

Maintaining near-term readiness at acceptable levels to support current operations has and will continue to take precedence over modifications to increase capability and reduce long-term life-cycle costs. Couple that with the fact that many of the current operations such as Enduring and Iraqi Freedom are putting additional strains on already stretched defense dollars, any logistician can see something has to change. Paul McIlvaine, in "The Evolution of 21st Century Acquisition and Logistics Reform," put it this way:

> One response to this gradual decrease in modernization is to exhort managers to do more with less. But you simply cannot do more with less; you either do more with more or do less with less. The remaining alternative is to change procedures and processes to increase efficiency and effectiveness.[27]

Adopting acquisition commercial practices, procedures, and processes proven to increase efficiency and effectiveness of organizations will free up needed dollars for modernization of current weapon systems, as well as provide funds to replace aging weapon systems and support assets.

Benchmarking off proven best practices is nothing new. In fact, this is a common and acceptable method of change throughout industry. The transformation of the American automobile industry in the early 1990s is a good example. When American automobile companies realized their designs were no longer competitive with imports, they looked to their Japanese competitors and often copied their techniques to produce a more reliable and appealing automobile. The result was a dramatic increase in American automobile sales in the late 1990s.[28] It is logical to assume that the same types of positive results could be achieved if the DoD adopted more commercial business practices in its acquisition contracts.

The key success element in commercial acquisition best practices of major programs was the separation of technology development from product development.

Analysis

Are there acquisition best practices that may be useful to the DoD transformation process? If so, what are they? The Government Accounting Office (GAO) completed a study of acquisition best practices in 1999 and concluded that the use of commercial practices from leading industry could, in fact, improve development of technology and weapon systems in the DoD. The GAO Report GAO/T-NSIAD-99-116, *Best Commercial Practices Can Improve Program Outcomes,* suggested the key success element in commercial acquisition best practices of major programs was the separation of technology development (research and development [R&D]) from product development. As stated in the report, adopting this approach has "put managers in the best position to succeed in developing better products in less time and producing them within estimated costs."[29] The report goes on to state that successful commercial acquisition programs have a high level of knowledge of the product being developed**.** Commercial industry goes to great lengths to understand what the customers want, ensures the technology is available to provide the product, and then focuses its efforts on

gaining efficiencies during production. The concept is quite simple. The greater the level of knowledge, the greater the chances of having a successful program (on schedule and below or on budget.) As the GAO report stated:

> The characteristics of best practices, as we (GAO) have analyzed them, suggest a process for developing new capabilities—whether they are commercial or defense products—that is based on knowledge. It is a process in which technology development and product development are treated differently and managed separately.

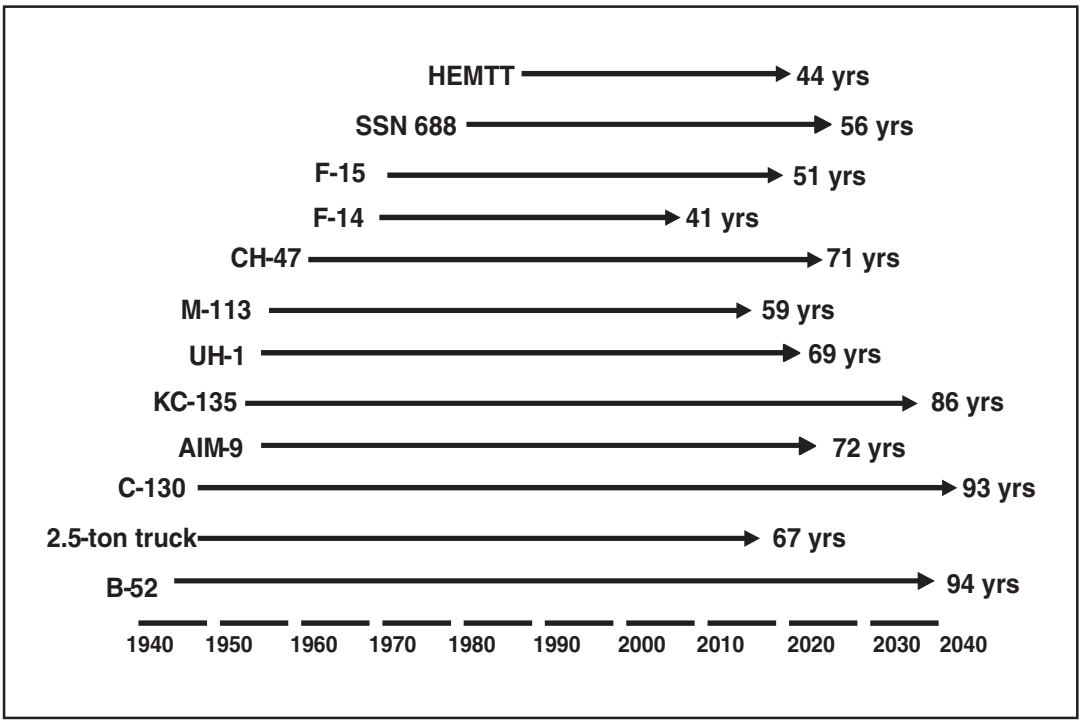


Figure 3: Defense System Life Cycles[24]

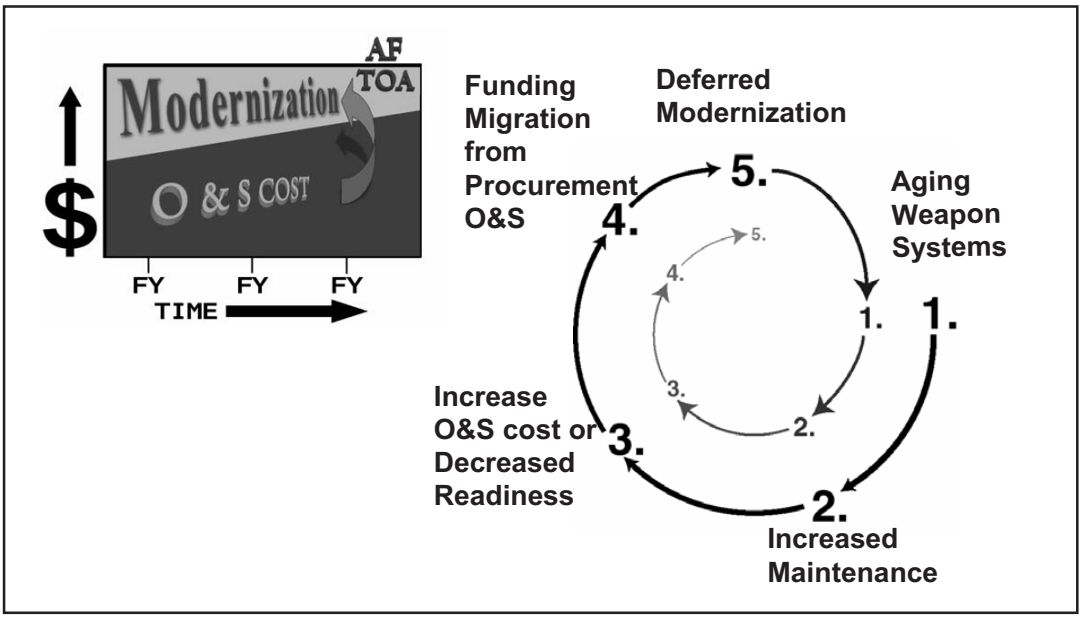


Figure 4. Death Spiral[25]

The report draws a comparison that developing technology, which is culminated in discovery, is quite different from product development, which culminates in delivery. Discovery is weighted with risk, while developing a product gives great weight to design and production and, by its very nature, is a more exact process. Put simply, knowledge is the inverse of risk. As stated in the report, "An important corollary to having a knowledge-based process is that technology development should take place separate from an acquisition program and its related product development process"[30] (Figure 5).

The difference in commercial industry and the DoD acquisition program is that commercial industry has a greater level of knowledge of the product technology, design, and ability to produce much earlier in the acquisition cycle than do the DoD programs. Research and development (discovery of new technologies) is accomplished separate from production. Once the companies attain the appropriate level of knowledge and the technology is on hand, "the firms demand—and receive—specific knowledge about design capability and producibility of the new product before production begins…there is synergy in this process, as the attainment of each successive knowledge point builds on the proceeding one."[32] In contrast, DoD acquisition programs begin product development and often initial production without the appropriate level of knowledge of either the technology or the producibility of the product. Moving ahead with production without the appropriate level of knowledge could lead to cost overruns, which would require major funding adjustments during the production cycle.

The best example to help illustrate the importance of adopting a knowledge-based acquisition philosophy could be found in GAO Report 03-645T, *Best Practices, Better Acquisition Outcomes Are Possible if DoD Can Apply Lessons from F/A-22 Program,* which was released in April 2003. The report explains that the shortcomings in the F/A–22 acquisition program could be traced to failure of the program mangers to adopt knowledge-based acquisition strategy.

> The F/A-22 provides an excellent example of what can happen when a major acquisition program is not guided by the principles of evolutionary, knowledge-based acquisition. The program failed to match requirements with resources and made early tradeoffs and took on a number of new unproven technologies. Instead of fielding early capability and then evolving the product to get new capabilities to the warfighter sooner, the Air Force chose a "big bang" product development approach that is now planned to take 19 years. This created a challenging and risky acquisition environment that delayed the warfighter the capabilities expected from this new aircraft. Program leaders did not capture the specific knowledge identified as key for each of the three critical knowledge points in product development. Instead, program managers proceeded through the F/A-22's development without the requisite knowledge necessary for reducing program risks and achieving more successful program outcomes. Now the optimism underlying these decisions has resulted in significant cost increases, schedule delays, tradeoffs—making do with less than half the number of originally desired aircraft—and concerns about the capability to be delivered.[33]

If the DoD were to adopt a true knowledge-based acquisition philosophy, which would separate the risk associated with research and development from the actual production efforts for new systems, the Government would have the ability to better estimate the costs associated with the production of major weapon systems, which would help stabilize the entire budgeting process.

Another significant area of distress for major acquisition programs is how to appropriately estimate costs associated with the risk inherent in R&D and high-tech applications. In theory, the separation of these two tasks (research and development from production), while very important, does not answer the question of how to accurately *cost out* or estimate the price of R&D contracts. As pointed out earlier, these types of contracts are laden with risk, which must somehow be mitigated. For the purposes of this article, a better question might be, "How does commercial industry address this problem?" If they are successful in administering R&D contracts, what are the tactics and techniques *(best practices)* used to mitigate the risk? What can the DoD learn from commercial industry acquisition strategies that might help solve this long-term issue?

A recent study by the Air Force Institute of Technology on behalf of Richard K. Sylvester—Deputy Director, System Acquisition, Office of the Director of Acquisition Initiatives, supporting the Under Secretary of Defense (Acquisition, Technology and Logistics)—addresses this very issue. This study discusses two issues relevant to mitigating risk in R&D contracts.[34]

- How do commercial companies establish fair and reasonable prices in the absence of competition with respect to R&D and high-tech applications?
- How do commercial companies establish and foster cooperative, long-term supplier relationships with respect to R&D and high-tech application contracts?

The study points out that traditionally military-specific contracts have been negotiated as cost-based procurements, which offer little incentive for contractors to reduce any costs since the amount of profit is based on the overall dollars associated with the contract. The study goes on to say, "The DoD has explored alternative approaches such as price-based acquisition, wherein price is established on a variety of conditions."[35] These types of contracts are negotiated utilizing "exceptions and price analysis to determine price instead of certified cost or pricing data."[36] The use of exceptions and price analysis to determine price instead of certified cost or pricing data generally is not supported by most government auditing agencies since certified cost and pricing data are required by law for all government cost-based contracts that are governed by the Truth in Negotiations Act (TINA).[37] "The TINA requires contractors to submit accurate, complete, and current cost or pricing data when negotiating contracts over $550K with the Government."[38] This requirement puts a tremendous paperwork burden on the contractor and has hamstrung DoD contracting agencies for years. In addition, it has chased some contractors, who simply do not want to put up with the administrative burden, out of the government market.

Commercial industry R&D contracts (those associated with discovery of new technologies) are negotiated without regard to TINA. Therein lies the issue for the DoD: "How to ascertain a fair and reasonable price without reliance on certified cost and pricing data?"[39] The study points out that commercial industry uses its expertise and knowledge of the market as a basis for determining fair and reasonable pricing *(*best practice*)*. Commercial firms simply have a better level of sophistication concerning pricing rates, projected milestones, and development timetables that help to make the process much easier to manage. According to a contracting specialist at an established commercial firm:

> There is a better understanding of forces that impact price by our buyers than we perceive the average government buyer has. The conduct of market research and indepth understanding of the product

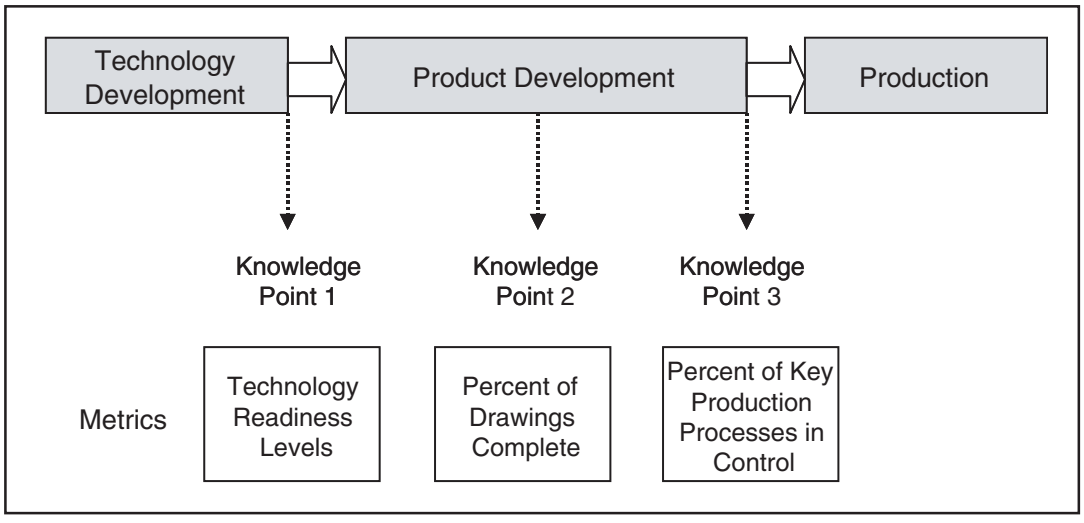


Figure 5. Levels of Knowledge Attained for Developing Technology and Products[31]

and processes help to focus buyers on price reasonableness[40] (best practice).

Determining fair and reasonable compensation for research and development is a difficult task. However, the study points out that "commercial companies across multiple industries claim that judicious market research on the part of the buyer is the only way to secure a fair price."[41] The bottom line is that the DoD must invest the time and energy in market research, and contract negotiators must become savvy experts in the fields being negotiated to ascertain a fair and reasonable price without reliance on certified cost and pricing data (best practice). This step will quiet the auditors' concerns and relieve contractors of the bureaucratic paperwork required under TINA.

The study makes several recommendations to address how to determine a fair and reasonable price in the absence of competition with respect to research and development. It also answers the question of how to foster cooperative, long-term relationships with respect to R&D contracts, to include the following:[42]

- Develop expertise with regard to the pricing nature of research and development and train a cadre of negotiating experts, which can represent the Government (best practice).
- Build strategic partnerships by establishing advisory councils holding conferences to exchange communication, and set up problem-solving teams to address contractor concerns (best practice).

These recommendations, if adopted, will go a long way in establishing real acquisition reform and, in the end, have a positive effect on the DoD transformation process and, ultimately, improve warfighter support.

DoD must invest the time and energy in market research, and contract negotiators must become savvy experts in the fields being negotiated to ascertain a fair and reasonable price.

Recommendations and Implications for DoD Logistics Transformation—Acquisition Reform

The need for acquisition reform has never been higher. The Government is relying on commercial contracts to provide an ever-increasing list of supplies and services to the warfighter. In addition, "despite current budgetary increases and focused emphasis on readiness, the US military recently experienced a 13-year-long trend of real defense spending decline, marking a 38-percent real reduction in spending from defense budgets in the mid-1980s."[43] At the same time, the operations tempo has risen to unprecedented heights. These two facts highlight the need for a more efficient and effective DoD acquisition strategy.

This section introduced and provided an indepth analysis of commercial industry acquisition best practices in an effort to answer the question of whether these concepts can be applied to the DoD acquisition programs. The first commercial industry best practice reviewed included adopting a knowledge-based acquisition strategy, which would separate R&D (acquiring new technologies) contracts from the actual production efforts for major weapon systems. By doing so, the Government would be able to stabilize large weapon system acquisitions since more knowledge would be available before key contract decisions are made. The Government should adopt this best practice immediately for all major weapon system acquisition contracts. This concept has been supported by at least two GAO reports to Congress and would be well received by contracting agencies and, more important, ultimately provide the best possible support to the joint warfighter.

The second commercial industry best practice reviewed outlined how industry mitigates the risk associated with R&D contracts (those associated with discovery of new technologies). The main point of this discussion centered on the fact that R&D contracts are inherently risk laden, and as such, stabilizing contract costs is a major challenge for contracting agencies. In addition, the analysis pointed out government contracts are required by law (unless special waivers are authorized) to utilize certified cost or pricing data in accordance with the TINA. Commercial industry, on the other hand, negotiates R&D contracts without regard to TINA. They utilize their expertise and knowledge of the market as a basis for determining fair and reasonable pricing. This method not only provides a good value of their investment dollars but also stabilizes R&D contract costs, negating the need for major adjustments in funding requirements as seen in government contracts.

Here again, the Government immediately should take steps to adopt this commercial industry best practice. The Government should develop expertise with regard to the pricing nature of research and development, to include market research and market analysis and training of its contracting officers. Once established, expertise in this area would give the Government an ability to negotiate for a fair and reasonable price in the absence of competition with respect to R&D contracts and, at the same time, stabilize the costs of these very expensive programs. This recommendation is supported by the Federal Acquisition Regulation (FAR) 12.1, *Acquisition of Commercial Items,* policy, which reads:

> Market research is an essential element of building an effective strategy for acquisition of commercial items and established the foundation for the agency description of need, the solicitation, and resulting contract.[44]

If adopted, the application of these acquisition commercial best practices can be used as a springboard for the eventual transformation of the DoD acquisition process; however, these issues alone will not transform the DoD acquisition process to the level envisioned by Rumsfeld. Much more must be done. The Government must seek internal changes in the way it budgets,

manages, and administers contracts before real acquisition reform can take place.

Additional acquisition reform enablers were highlighted in McIlvaine's article "The Evolution of 21st Century Acquisition and Logistics Reform." His most compelling recommendations include:

> Changing government contracting tools to reflect a new reality, long-term, life-cycle contractor support requires innovative multiyear service contract arrangements, possible statutory changes, and logistics contractual strategies that encompass longer defense service lives; second, a long-term financial perspective is necessary, the Planning, Programming, and Budgeting System (PPBS) does not look far enough into the future, and thus, government financial reform has not kept pace with acquisition reform; third, government program managers who can obtain great return on investment of upfront RDT&E monies to significantly reduce downstream costs are still thwarted in the attempt to make serious tradeoff decisions. Colors of money and the intractability of the current PPBS may defeat a compelling government business case analysis for upfront investment. A commercial producer would readily adopt this same business case. Procedures that allow program managers to retain and reinvest savings in their programs are needed.[45]

The application of acquisition commercial best practices singularly will not provide the framework necessary to transform the DoD acquisition process. These commercial practices must be adopted in concert with solutions for the myriad of issues outlined above, such as the adoption of multiyear contract provisions; changes in the PPBS; changes to establish a greater return on investment for R&D contracts; and finally, give program managers procedures that allow them to retain and reinvest savings in their programs.

> Another area industry does better than the Government is in spend analysis and leveraging their buying power. The good news is the Air Force SCM implementation team is now doing spend analysis and helping implement commodity councils to better leverage government buying power. The government procurement system currently has a small percentage of buys under any sort of strategic contract/relationship; 25 percent of buys are given to procurements inside lead times and a large percentage of contracts and dollars on sole source requirements….so this area is a target for improvement. The Air Force is currently prototyping this new process at three air logistics centers.[46]

Conclusions

DoD has embraced the concept of transformation with good reason: to achieve an advantage, through change, that ultimately will improve our warfighting capability.

> Transformation refers to fundamental change in the way an organization achieves its purpose. It means changing the way we work, interact, participate, and even think about how we get things done. It means bringing new methods and technology to bear, as well as changing our processes.[47]

Transformation has a purpose: to achieve advantage. It has a method: change. And it is intended to result in improved warfighing capability. Logistics transformation is an integral part of the process, for without transforming logistics, the warfighter will not be supported optimally. DoD is seeking new and innovative ways to achieve real transformation, to include the possibility of adopting commercial industry best practices. This article outlined newly developed commercial best practices and innovative commercial support processes in the areas of supply support (SCM) and acquisition. Selected industry best practices were analyzed in an effort to answer the question, Are commercial industry best practices in the areas of supply support and acquisition applicable to the DoD transformation efforts?

The first commercial best practice analyzed was the concept of SCM, which, for the last several years, has been adopted by commercial industry to improve profitability through effective management of the supply chain. SCM is described as the:

> …systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across business within the supply chain for the purpose of improving the long-term performance on the individual companies and the supply chain as a whole.[48]

Transformation has a purpose: to achieve advantage. It has a method: change. And it is intended to result in improved warfighing capability. Logistics transformation is an integral part of the process.

SCM includes strategic coordination of traditional business functions (what companies do or produce) as well as the tactics (operating procedures) used to specify elements of the supply chain. The importance of this concept cannot be overemphasized; it illustrates that SCM may include adjusting or changing the fundamental operations of a particular company, if that change will improve the overall health of the supply chain. The essence of SCM as a commercial best practice can be summed up as collaboration among all participants of the supply chain for the common good of the supply chain.

One of the most significant hurdles of transitioning a company to an SCM philosophy is the development of effective measurement tools to assess the performance of the entire supply chain. Most, if not all, industries have long-established standards for delivery performance, fill rate, supply response time (reorder response time), cost of goods, warranty and return costs, and rates, and new order lead time. "A more innovative approach to performance measurement is the concept of a balanced scorecard, which presents a holistic view of performance metrics that must be assessed together in a way that will ensure a collaborative enterprise solution."[49] The balanced scorecard will give logisticians a comprehensive method for tracking performance of the supply chain as adjustments in company functions and tactics are made to improve efficiency.

Of course, with any new concept, the transition from old procedures to a new orientation and focus presents new challenges

for all involved. *Supply Chain Excellence, a Handbook for Dramatic Improvement Using the Supply Chain Operations Reference Model* outlines several key steps or best practices successful companies have taken during the transition to a supply chain orientation. The first step requires leadership to build organizational support for supply chain improvement. This should include active executive sponsorship, education, and training, as well as buy-in from key leadership team members. In addition, the SCOR Project Roadmap breaks the process down into four distinct segments, addressing operational strategy, material, work, and information flow. The segments include analysis of the basis of competition, which focuses on supply chain metrics and operational strategy; configuring the supply chain material flow; aligning performance levels, practices, and systems; and finally, implementing the supply chain changes to improve performance.[50]

Analyses have shown companies across America and, for that matter, the world are adopting an SCM focus, and this new approach is working. As individual elements of the supply chain begin to collaborate their efforts, the supply chain, as a whole, becomes more efficient, which results in increased profits for the shareholders and company owners. It is clear the potential benefits of the new approach for the DoD are significant. As such, the DoD should adopt the industry best practice of SMC as a new and innovative way of providing the best support to the warfighter.

The second focus area for this article centered on applying commercial best practices in acquisition to improve DoD acquisition process. Past acquisition practices, such as *lowest bid c*ontracts and major weapon system development programs that did not consider life-cycle cost impacts of design, set the stage for very costly and inefficient support structures. These practices and many other examples have forced the Government to relook the acquisition process. "Acquisition and logistics reform deals with the modernization dilemma by changing procedures and processes to increase efficiency and effectiveness. Non-value-added effort is eliminated. The goal is to free funds to accomplish needed modernization."[51] Adopting commercial-like practices is one example of recent initiatives for acquisition reform.

Research has shown there are commercial industry best practices that may be useful to the DoD acquisition transformation process. The GAO completed a study in 1999 of acquisition *best practices* and concluded that the use of commercial practices from leading industry could, in fact, improve development of technology and weapon systems in the DoD. *Best Commercial Practices Can Improve Program Outcomes* suggested the key success element in commercial acquisition best practices of major programs was the separation of technology development from product development. The report draws a comparison that developing technology, which is culminated in discovery, is quite different from product development, which culminates in delivery. One of the major differences in commercial industry and the DoD acquisition program is that commercial industry has a greater level of knowledge of the product technology, design, and ability to produce much earlier in the acquisition cycle than do the DoD programs. Research and development is accomplished separate from production. In contrast, DoD acquisition programs begin product development and often even initial production without the appropriate level of knowledge of either the technology or the producibility of the product.

The final focus area sought to answer the question of how to appropriately estimate costs associated with R&D and high-tech application contracts. Oftentimes, government estimates are not accurate, which results in budgeting shortfalls and administrative adjustments to the contract. Simply stated, the problem stems from the Government's inability to determine dependable cost estimates for R&D contracts. Here again, commercial industry *best practices* have been developed to deal with this issue. Industry uses its expertise and knowledge of the market as a basis for determining fair and reasonable pricing. This method not only provides a *good value* of their investment dollars but also stabilizes R&D contract costs, negating the need for major adjustments in funding requirements as seen in government contracts.

The Government should take immediate steps to adopt commercial industry best practices to assist in the DoD transformation process. By adopting a knowledge-based acquisition strategy, which separates technology development (research and development) from product development, the Government would be able to stabilize large weapon system acquisitions. In addition, the Government should develop expertise with regard to the pricing nature of R&D contracts, to include market research and market analysis, and the training of its contracting officers. Once established, expertise in this area would give the Government an ability to negotiate for a fair and reasonable price in the absence of competition with respect to R&D contracts and, at the same time, stabilize the costs of these very expensive programs.

It is clear commercial industry best practices in the areas of supply support and acquisition can be utilized as a springboard for the eventual transformation of the DoD support processes.

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EXPLORING THE HEART OF LOGISTICS

JMC Executes Seamless Movement of Resources

Lieutenant Colonel Dave McClean, USA
Captain Phil Henson, USA

More than 95 percent of US-based units transit the US European Command (EUCOM) area of responsibility (AOR) en route to Afghanistan and Iraq. The organization responsible for managing this and the movement of EUCOM-based forces is the Joint Movement Center (JMC) located in Stuttgart, Germany.

The JMC is the cornerstone of the command's movement process. As part of Operation Enduring Freedom, the JMC coordinated more than 8,217 missions from October 2002 through January 2004. Approximately 140,000 passengers (PAX), 207,400 short tons, and 115,300 square feet of ship tonnage traversed the AOR via multimodal transport. The JMC also coordinated more than 2,060 missions in support of Operation Iraqi Freedom, moving 59,881 passengers, 178,802 short tons, and 6,473,328 square feet of tonnage within a 4-month window.

The multimodal (trucks, trains, barge, airlift, and sealift) movement of troops and equipment supporting the Global War on Terrorism is the largest force rotation in EUCOM's history. The JMC plays a pivotal role in the planning, coordination, and execution of these movements. It is organized based on joint doctrine and designed to expand and contract in proportion to operational requirements.

The JMC executes the strategic and intratheater transportation system within the EUCOM theater. Its primary mission is to manage transportation by planning, allocating, apportioning, deconflicting, coordinating, and tracking deployment, redeployment, and sustainment of EUCOM and supported forces and ensure their movement supports the theater distribution plan.

The JMC participates in crisis action planning, writes transportation estimates, provides information on airfield and port capabilities and limitations, contributes to mission analysis, and orders preparation for numerous contingency operations. JMC personnel perform these functions around the clock by working closely with the US Transportation Command, US Central Command, host-nation countries, components, and numerous transportation agencies. The goal is to ensure all movement is synchronized to meet operational and logistical time lines.

The JMC also serves as an interface between our components and numerous transportation agencies to facilitate planning and resolve mobility issues.

During normal operations, 26 joint service people are assigned to the JMC. However, during the height of Enduring Freedom, in the winter and spring of 2003, the JMC surged to 53 persons. Complicating things further, it conducted split-base operations at a forward deployed organization of 21 persons at Incirlik AB, Turkey. Approximately 70 percent of the JMC are reservists and National Guard augmentees with tours of duty ranging from 90 days to 1 year. Although turbulent because of the high turnover rate, the JMC could not accomplish its mission without mobilized citizen soldiers, sailors, marines, and airmen.

The JMC consists of a data transportation feasibility section, plans section, and operations section. The operations section is divided further into sealift, inland, and airlift cells. The data transportation feasibility section uses 12 automated systems (Joint Operations Planning and Execution System, Global Transportation Network, Single Mobility System, Global Decision Support System, Allied Deployment and Movement System, to name a few) to track and provide a current and forward look of upcoming movements within the AOR. It also maintains a database on all modes of movement within the command. For example, this database calculates the number of passengers and short tons moved by each mode of transportation during a given

Figure 1. *USNS Brittin* Loading Equipment for Iraqi Freedom II

(continued on page 46)

Lessons for Transforming Logistics

There is an old saying, “Amateurs talk strategy, and professionals talk logistics.” Commanders and their staffs must remember the importance of logistics to achieving the overall goal, for friendly forces as well as the enemy.

logistics history

Oil Logistics in the Pacific War

Oil played a crucial, if not the key, role in the Japanese decision to go to war with the United States in 1941. Because of the deteriorating political situation with the United States, United Kingdom, and Netherlands East Indies, the future of Japan’s oil reserve and supply was in danger. When diplomatic efforts failed to resolve the political impasse, Japan made plans to seize militarily what it could not achieve diplomatically. An inevitability of this military option was war with the United States. With this in mind, the Japanese planned to eliminate any short-term American threat quickly and seize needed oil at the same time.

Lieutenant Colonel Patrick H. Donovan, USAF

The Japanese were not the first to ignore the importance and vulnerability of logistics. As long ago as 1187, history shows that logistics played a key part in the Muslim's victory over the Crusaders at the Battle of Hittin. The Muslim commander Saladin captured the only water source on the battlefield and denied its use to the Crusaders.

Oil Logistics In the Pacific War

Oil's Role in Japan's Decision for War

The shortage of oil was the key to Japan's military situation. It was the main problem for those preparing for war, at the same time, the reason why the nation was moving toward war.... Without oil, Japan's pretensions to empire were empty shadows.

—Louis Morton
Command Decisions[1]

Oil Available in the Netherlands East Indies

June 1941 was a pivotal month for the future of Japanese oil supplies. The Japanese had been in economic negotiations with the Netherlands East Indies (NEI) government in Batavia since September 1940 and were seeking a special economic position in the Netherlands East Indies. Previous embargoes of aviation fuel, iron, and scrap steel by the United States in July and October 1940 (to counter the

Japanese occupation of northern French Indochina) had sent the Japanese searching for alternative sources of raw materials. Also, the entrance of Japan into the Tripartite Pact with Germany and Italy on 27 September 1940, a pact that was aimed directly against the United States, further exacerbated US-Japanese relations. The Netherlands East Indies seemed to fit this bill, the Nazis (a putative partner of the Japanese) had overrun the NEI's parent country, and its geographic location put the Japanese closer to the Netherlands East Indies than any of the latter's allies. Thus, the Netherlands East Indies was deemed to be more malleable to Japanese desires than the increasingly recalcitrant United States. Some of Japan's demands included participation in NEI natural resource development and freedom of access and enterprise in the Netherlands East Indies, as well as a steady supply of oil. However, Japanese aspirations were about to receive a serious setback.[2]

The NEI government was willing to negotiate with the Japanese, but Batavia was not willing to yield special economic concessions to the Japanese (there were to be increases of nonpetroleum products). Although these increases were less than what was sought, they did fulfill Japanese needs. Japanese requests for larger exports of oil were passed on to the NEI oil companies, but these requests were deferred. Also, Japanese requests to conduct military and political activities in the Netherlands East Indies were also rejected. On 17 June 1941, economic talks were broken off between Japan and the Netherlands East Indies.[3]

Almost directly on the heels of the breakdown in talks between Batavia and Tokyo was an announcement from the United States on 20 June 1941 that, henceforth, no petroleum would be shipped from the US east coast, or gulf coast ports, outside the Western Hemisphere. There was a shortage of fuel for domestic use on the east coast of the United States in June 1941. To ship fuel out of areas with shortages to semibelligerent foreign governments was politically untenable for the US Government. Thus, from Japan's point of view, the commodity most desired by them was being choked off.[4]

Because of this reversal of fortunes, Japan felt it must make a move toward securing a source of oil in Southeast Asia:

> Consequently, at an Imperial conference on 2 July, Japan decided to adopt the "Outline of the Empire National Policy to Cope with the Changing Situation." By executing a daring plan calling for the occupation of southern French Indochina, Japan hoped to gain dominance over the military situation in the southern areas and to force the Netherlands East Indies to accede to her demands.[5]

Japan Needs a Secure Source of Oil

The move into southern French Indochina was not without some internal debate in Japan. In the end, however, it was decided that the military occupation of the territory was too good an opportunity to pass up. By occupying the southern half of French Indochina, the Japanese would consolidate their strategic position; it would stop the encroachment of the ABCD powers on her economic life line. Also, the occupation would be a blow to the Chungking government and help settle the China issue; it would also put pressure on the NEI government to come to terms with Japanese demands.[6] The Japanese were not making this move as a step toward provoking the United States, Britain, or the Netherlands East Indies to war; Tokyo wished economic negotiations to continue. The move into southern Indochina was a preemptive action that would help the Japanese if conflict with the ABCD powers became inevitable.[7] One wonders if the Japanese later realized that their actions eventually turned into a self-fulfilling prophecy.

The Japanese did not consider how the ABCD powers would react to Tokyo's move into southern Indochina.[8] Indeed, Tokyo felt that this move was possible because it believed the threat of US economic sanctions to the Japanese move to be less than 50 percent. The Japanese still moved forward, even though President Franklin D. Roosevelt had hinted to Kichisaburo Nomura, the Japanese Ambassador to the United States, that sanctions would occur if Tokyo moved troops into southern Indochina.[9] However, the Japanese felt that the United States would not follow through with such a move because it would provoke a war at a time when the United States was not ready to fight.[10]

There was some logic in the Japanese thought process. Since March 1941, the United States and Japan had been in dialogue to avoid such a war. However, as much as the United States wanted to avoid war, it would not do so at the sacrifice of basic principles of international conduct.[11] Therefore, reaction from the United States was swift. With the Japanese movement into southern French Indochina, the United States froze all Japanese assets on 25 July 1941.[12] The governments of Great Britain and the Netherlands East Indies soon followed with their own freezing actions.[13]

With this freezing action came a complete embargo of all oil products into Japan by these countries. It was not the intent of Roosevelt to bring about a complete embargo of oil to Japan.[14] He felt that such an action would cause the Japanese to invade the Netherlands East Indies and Malaya to seize the oilfields there. This would possibly suck the United States into an early conflict in the Pacific, a conflict the United States was not prepared for and which would be at the expense of devoting energy toward the European conflict.[15] Roosevelt's freeze order allowed the Japanese to apply for export licenses for oil; however, hard liners within Roosevelt's administration acted as if the freeze were total, so no licenses were ever approved.[16]

This situation put the Japanese into a quandary; they did not gain any oil by moving into southern Indochina. Now they had isolated themselves from 90 percent of their annual requirements. The Japanese did have a strategic reserve in place that they had been building up since the early 1930s. So some time was available to try and find a diplomatic way out of the impasse.[17]

Oil in the Netherlands East Indies Cannot Be Secured without US Intervention

Throughout the summer and into the fall of 1941, Japanese negotiators and the United States were at loggerheads. The US-led embargo would not be suspended until the Japanese stopped their militaristic expansion; indeed, Japan would have to roll back some of its gains. Included in the US demands were calls for a retreat from all French Indochina and China. This demand was unacceptable to the Japanese.[18] Likewise, the minimum demands of the Japanese stated that the United States must accept the current status quo in east Asia with vague promises that the Japanese would withdraw from disputed areas once peace had been established in the Far East on a fair and just basis.[19]

Meanwhile, Japanese oil stocks were dwindling. If the Japanese could not get oil by negotiation, they would have to use force. The nearest available source was in the Netherlands East Indies. Would it be possible to seize the oil there without involving the British and the Americans? There were numerous reasons why Tokyo felt this was not the case.

The Japanese had come into possession of British War Cabinet minutes that stated the British would fight alongside the Dutch if the Japanese invaded the Netherlands East Indies.[20] The Japanese were also aware that any conflict involving them and the British would draw the United States into conflict on the side of the British.[21] The director of the War Plans Division of the Navy Department, Admiral Richmond Kelly Turner, confided this policy to Nomura "that the United States would not tolerate, in view of its policy of aiding Britain and its interpretation of self-defense, a Japanese threat to the Malay barrier."[22] The United States was not limiting its interest to the British. In a note handed to Nomura from Roosevelt, the United States stated any further aggression by Japan against its neighbors and the United States would be forced "to take immediately any and all steps which it may deem necessary" to safeguard US interests.[23] Finally, the Japanese foreign office believed some type of military understanding had been reached among Washington, London, and Batavia. The Foreign Office produced two reports that supported its claims that a joint ABCD defense understanding existed and was being implemented.[24]

Even with this potential alliance arrayed against them, could the Japanese afford to dismiss the warnings as bluster? As appealing as the thought was, the B-17s based at Clark Field and the Cavite Naval Base in Manila Bay were too much of a strategic threat to the Japanese lines of communication. Any shipments of raw materials that the Japanese might acquire in the Netherlands East Indies or Malay Barrier potentially could be attacked by US forces stationed in the Philippines. Because of this, those US forces would have to be dealt with if the Japanese could not get the resources they needed diplomatically.[25]

All these factors played into the Japanese belief they eventually and inevitably would come into conflict with the United States. As far back as 1909, the United States was identified as one of the principal enemies of Japan.[26] Indeed, the Japanese realized fairly soon after the oil embargo was imposed that the Japanese and American positions were mutually exclusive. At the 6 September 1941 Japanese Imperial Conference, materials addressing such a question were distributed to the participants.

> *Is War with the United States Inevitable?*…it appears that the policy of the United States toward Japan is based upon the idea of preserving the status quo and aims, in order to dominate the world and defend democracy, to prevent our empire from rising and developing in Eastern Asia. Under these circumstances, it must be pointed out the policies of Japan and the United States are mutually inconsistent and that it is historically inevitable the conflict between the two countries, which is sometimes tense and moderate, should ultimately lead to war.
>
> If we should ever concede one point to the United States by giving up a part of our national policy for the sake of a temporary peace, the United States, its military position strengthened, is sure to demand tens and hundreds of concessions on our part, and ultimately, our Empire will have to lie prostrate at the feet of the United States.[27]

It should be noted that these were not the views of one individual alone but those of the government and the supreme command of the Japanese military. If Japan were to obtain the oil and other resources it needed, it would have to control the Netherlands East Indies and the Malay Barrier. Japan also would have to remove the US threat to this plan.

Pearl Harbor and the Southern Operation

Japanese naval strategy was built around the premise that when the United States and Japan went to war it would be a one-time decisive battle. The Japanese believed a large American fleet, as much as 40 percent larger than the Japanese fleet because of restrictions imposed by the Washington Naval Treaty, would drive across the Pacific to attack the Japanese. During this drive, the Japanese would initially send out submarines to whittle down the size of the US fleet. Closer in, the Japanese would throw land- and carrier-based aircraft into the battle. Once the reduced US fleet was far enough into the western Pacific, the Imperial Japanese Navy (IJN) would sortie out and engage in a classic ship of the line battle that the Japanese would inevitably win.[28]

The problem with this strategy was that it was passive. Japan would have to devote the majority of its fleet to support amphibious landings if the Southern Operation of seizing the Netherlands East Indies and Malay Barrier were to succeed. The decisive battle plan left the initiative and time of the conflict up to the US Navy. This left Japanese forces even more at risk after the US Pacific Fleet's move to Pearl Harbor. If that fleet could be neutralized or destroyed at Pearl Harbor, it would deprive the US fleet of any initiative and allow the Japanese to run unhindered in the southern area.[29] This line of thought ran totally counter to 30 years of navy doctrine, and ordinarily, it would have been dismissed.[30] However, this proposal came from the current head of the Combined Fleet, Admiral Isoroku Yamamoto, and could not be easily brushed aside.

Origins of the Pearl Harbor Attack

Yamamoto was opposed to conflict with America. He felt that, given the material and technological strength of the United States, Japan would have no hope of ultimate victory over America. If it came to blows though, Yamamoto would put forth every effort to ensure the goals of his homeland were achieved.[31] He had doubts whether the Japanese Navy could seize the vast southern areas with the majority of its forces and fend off a flank attack by the US Navy at the same time. The solution that Yamamoto came up with was to take out the Pacific Fleet with one quick action. Then the Southern Operation could proceed unmolested and new Japanese gains consolidated. Yamamoto placed heavy emphasis on aerial warfare because of an earlier posting with the air arm of the Japanese Navy. With the advances the Japanese Navy made in aerial warfare, Yamamoto began contemplating an aerial strike on the fleet at Pearl Harbor. This plan, or the Hawaii Operation as it came to be known, became the means to achieve that goal.[32]

Yamamoto built a planning staff to address the possible Hawaii Operation. One of the first officers tasked was Commander Minoru Genda, the man who brought forth a feasible plan for the strike. Among other things, Genda stressed the need for a surprise attack by a six-carrier task force, which would refuel at sea to make the long voyage. His plan would concentrate the

IJN's aerial attack on US Navy carriers and Pearl Harbor's land-based aircraft. These targets were to be the primary ones; other strategic targets—such as the oil storage facilities, drydocks, and so on—were not mentioned at all.[33]

There was disagreement as to the feasibility of the Hawaii Operation from not only the Naval General Staff but also officers within the First Air Fleet staff that would be tasked to carry out the Pearl Harbor attack plan.[34] The plan was finally put before the Japanese Naval General Staff in wargames from 10 to 13 September 1941 at the Tokyo Naval War College. The exercise demonstrated the practicality of the Pearl Harbor attack, but it was felt by the general staff that the chance of the strike force's being detected was too high, thus putting almost all Japan's aircraft carriers at risk.[35] Yamamoto's staff was not deterred. They stressed Yamamoto's argument:

> The present situation—*i.e.*, that of the US fleet in the Hawaiian Islands, strategically speaking—is tantamount to a dagger being pointed at our throat. Should war be declared under these circumstances, the length and breadth of our Southern Operation would immediately be exposed to a serious threat on its flank. In short, the Hawaii Operation is absolutely indispensable for successful accomplishment for the Southern Operation.[36]

Yamamoto's personal feelings were best summed up in a letter to a friend:

> I feel, as officer in command of the fleet, that there will be little prospect of success if we employ the normal type of operations…. In short, my plan is one conceived in desperation…from lack of confidence in a perfectly safe, properly ordered frontal attack; if there is some other suitable person to take over, I am ready to withdraw, gladly and without hesitation.[37]

It was the same argument he used with the Naval General Staff, in a sense "my way or the highway." No one was willing to let the commander in chief resign, so after about a month of deliberations, the plan to attack Pearl Harbor was approved.[38]

Securing the Eastern Flank

Along with the Hawaii Operation, ancillary plans were drawn up to seize the US bases at Wake, Guam, and the Philippines.[39] Occupation of these territories would complement Japanese island holdings in the Central Pacific that were acquired after World War I. These seizures would help build an impregnable barrier against the Americans when such time arose that the US Navy would finally be able to sortie a fleet against the Japanese.

It was a strategy built on sound principles. Because of the Washington Naval Treaty's limitations, the United States was forbidden to build up any bases west of Pearl Harbor. After the Japanese withdrew from the Washington Accords,[40] proposals were made by a Navy board, in late 1938, to beef up its defenses west of Hawaii. However, the appropriations never made it through Congress.[41] Thus, if the Japanese attacked, these bases would fall relatively quickly. This would leave no US bases in the entire Pacific west of Hawaii.[42] Any operations planned by the Navy would have to be run out of and supported from Pearl Harbor.

Time Is Oil

The Japanese felt they had a finite amount of time in which to solve their oil problem. It was decided at the 5 November 1941 Imperial Conference that Japan would go to war with the United States (and Great Britain) if negotiations to break the diplomatic impasse were not successful by 1 December 1941. Guidance from this same meeting directed the Army and Navy to complete plans for the Hawaii and Southern Operations.[43]

There were many reasons this stance was adopted at the conference. First, every day the Japanese delayed the Southern Operation, ABCD forces were growing larger. For example, Army strength in Malaya and the Philippines was being reinforced at the rate of 4,000 men every month; air strength and infrastructure were also increasing. It was also feared that the ABCD powers would become closer politically, economically, and militarily in the interim.[44] There was concern that the Soviet Union possibly would attack Japan in the springtime. If this occurred, the Japanese wanted to be sure the Southern Operation had been completed.[45] Another concern was the weather. The northeast monsoon would make the amphibious landings required in the Southern Operation increasingly difficult after December.[46] It also would affect ships in the Hawaii Operation. Refueling at sea was an absolute necessity for the First Air Fleet to have the range to strike Pearl Harbor. Meteorological studies showed there were only 7 days, on average, that refueling could be accomplished in December.[47] That number could be expected to decrease with the onset of the winter season.

However, the ultimate factor that decided the start of offensive operations was the status of the Japanese fuel stockpile. The Japanese realized that oil was the bottleneck in their fighting strength; any lengthy delay in securing an oil source would be disastrous.[48] Indeed, it was stated at a conference in late October 1941 that Japan needed to occupy the oilfields in the southern areas by March. If this did not occur, adding in such factors as normal stockpile depletion and getting the oilfields back into production, the Japanese would run out of oil in about 18 months.[49] By September 1941, Japanese reserves had dropped to 50 million barrels, and their navy alone was burning 2,900 barrels of oil every hour. The Japanese had reached a crossroads. If they did nothing, they would be out of oil and options in less than 2 years. If they chose war, there was a good chance they could lose a protracted conflict. Given the possibility of success with the second option, versus none with the first option, the Japanese chose war.[50]

There are many critical points of this preconflict period. The Japanese realized the importance of oil to their modern military machine, and any operations undertaken in the vast Pacific theater would require large amounts of oil. They were willing to send a huge task force of irreplaceable ships thousands of miles into hostile waters (and all the attendant oil this operation would consume) to attack a formidable enemy fleet to help achieve oil self-sufficiency.[51] The concurrent plan to seize the US possessions in the Central Pacific would ensure the Japanese would control all the oil-producing regions between the west coast of the United States and the Persian Gulf. Finally, there is the planning of the Pearl Harbor raid; without oil tankers, it would have been impossible for the Japanese Navy to accomplish that mission. Armed with this knowledge, would the Japanese realize this same need for oil applied to the US Navy?

Oil, Pearl Harbor, and the US Navy

The thing that tied the fleet to the base [Pearl Harbor] more than any one factor was the question of fuel.

—Admiral Husband E. Kimmel
Joint Committee on the Investigation of the Pearl Harbor Attack[52]

Like the Japanese, the Pacific Fleet had its own oil problems. The only major base for the US Navy in the Pacific was located in Hawaii. All major fleet logistics, repair, and storage were at the naval base at Pearl Harbor. The Navy also suffered from a severe shortage of oilers, which limited the operations radius of the fleet. The Japanese were well-informed on the strengths and logistics necessities of the Pacific Fleet. With the known vulnerabilities of the Pacific Fleet's logistics train, the Japanese, nevertheless, chose to attack military combatants only, such as the US battleships. This operational strategy was going to come back and haunt the Japanese.

Japanese Intelligence on the US Navy and Pearl Harbor

Extensive intelligence gathering by the Japanese informed them of the abilities, limitations, and makeup of the Pacific Fleet and those areas and facilities required for its support. No scrap of information was too small. Detailed intelligence on the Pacific Fleet was the linchpin of the Hawaii Operation.[53]

> The information received from the Japanese after the war shows that their methodical observations and espionage kept them well informed of everything concerning the defenses of Hawaii and the activities of the Pacific Fleet. In our open democratic society, Japanese agents were free to observe fleet practices, take photographs with their high-powered equipment, and solicit almost any information desired…. High-powered binoculars were hardly necessary, but they showed particular details, which, in large measure, were unknown even to any single officer of the fleet.[54]

The IJN intelligence officer at Pearl Harbor was Ensign Takeo Yoshikawa. From the spring of 1941, he was in charge of intelligence gathering in Hawaii. Yoshikawa had been studying methods and operations of the Pacific Fleet for the previous 7 years.

> I read a vast amount of material in that period, from obscure American newspapers to military and scientific journals devoted to my area of interest .... I studied *Jane's Fighting Ships* and *Aircraft*…devoured the *US Naval Institute Proceedings* and other US books…and magazines…. In addition to this mass of seemingly innocuous information on the Navy and its bases, I had access to the periodic reports of Japanese agents in foreign ports, particularly Singapore and Manila….
>
> In any event, by 1940, I was the Naval General Staff's acknowledged American expert—I knew by then every US man-of-war and aircraft type by name, hull number, configuration, and technical characteristics; and I knew, too, a great deal of general information about the US naval bases at Manila, Guam, and Pearl Harbor.[55]

It should be noted that the ship information being collected on the west coast also included commercial traffic, especially petroleum shipments. Radio intercepts of Japanese diplomatic messages showed that in mid-1941, Japanese agents operating out of Los Angeles reported the departure of five tankers carrying 400,000 barrels of high-octane fuel to Vladivostok.[56]

The result was a vast intelligence tome, *The Habits, Strengths, and Defenses of the American Fleet in the Hawaiian Area*. In addition, detailed maps of Pearl Harbor were drawn up showing all the information reported above, to include the locations of fuel-storage depots.[57] Yamamoto and the Japanese Navy had the required information to target the Pacific Fleet at Pearl Harbor. Since the purpose of the Hawaiian Operation was to eliminate the Pacific Fleet as a threat, the question was whether Yamamoto would use this information to hit the most vulnerable center of gravity to achieve that goal.

The Primary Targets of the Pearl Harbor Attack Were Ships

On the morning of 7 December 1941, there were 86 ships of the Pacific Fleet in Pearl Harbor. At the end of that day, nine of the ships were sunk or sinking, and ten others were severely damaged in the raid. [58]

The most important targets among the ships of the Pacific Fleet were the aircraft carriers. Intelligence indicated there would be no carriers in Pearl Harbor that morning, however, so Battleship Row on the east side of Ford Island would be the initial focal point of the raid.[59] The 352-plane raid[60] lasted from 0755, when the first bomb exploded near the seaplane ramp on Ford Island, to approximately 1000 Hawaiian time when the last Japanese planes headed north to their carriers.[61] By the time the raid ended, the Japanese had caused significant injury to the Pacific Fleet; eight battleships, three light cruisers, three destroyers, and four auxiliary vessels were sunk or damaged. There were also major losses among Army and Navy air forces on the island of Oahu and nearly 3,600 US casualties. The Japanese, on the other hand, lost 29 aircraft and 5 midget submarines.[62] Surprise, the key tenet to the success of the Hawaii Operation, had been utter and complete.[63]

Horrible and devastating as the Pearl Harbor raid was, it was by no means a knockout blow to the Pacific Fleet. It is true that all eight battleships attacked on 7 December were either sunk or damaged. However, many factors mitigated the overall results of the attack. It is probably most important to note that the majority of sailors, less those who were killed outright in the attack or in the capsized *Oklahoma*, were easily rescued because the attack took place in a relatively small, landlocked harbor. Another factor was the physical state of the ships located on Battleship Row that morning. Professor Thomas C. Hone best stated this condition: "The American battleships were all old; several were nearly overage; most were overweight. None of the battleships in Pearl Harbor was a first-line warship in a material sense; all had recognized deficiencies."[64] They were also a good 10 knots slower than the US aircraft carriers.[65] These details were not unknown to the hierarchy of the Pacific Fleet. When Vice Admiral William F. Halsey was asked whether or not he wanted to take any battleships with him on his reenforcement trip to Wake Island, he retorted "Hell, no! If I have to run, I don't want anything to interfere with my running!"[66] Last, but not least, because of the shallowness of Pearl Harbor, which had an average depth of only 40 feet, all but two battleships eventually would be salvaged.[67] The Japanese were well-aware of the depth of the harbor and the fact some ships would be salvaged. However, the Japanese felt American salvage efforts would take a lot longer than the time required to complete IJN operations in the Southern Area.[68]

Figure 1. Aerial View of Pearl Harbor Drydock, 10 December 1941. Note the improvised antitorpedo barriers located near the drydock openings. *USS Pennsylvania* and the sunken destroyers *Cassin* and *Downes* are in the lower, No 1, drydock. The *USS Helena* occupies the middle drydock. The *USS Shaw* and the sunken drydock *YFD-2* are on top. Numerous support shops and base facilities are located in the lower right corner. Also, note the black oil streaks on the harbor surface. [77]

Figure 2. Submarine Base, Pearl Harbor and Adjacent Fuel Tank Farms, 13 October 1941. This is a view of the upper oil tank farm located on the east side of the Pearl Harbor naval base. The lower tank farm was located between Hickam Field and the naval base (see Figure 1 for oil tanks in the lower farm). Note the attempts at camouflage. Two of the tanks in the foreground are painted to resemble terrain features. The third, closest to the submarine base, is painted to resemble a building.[87]

Commander Mitsuo Fuchida, airborne leader of the Pearl Harbor attack force, verbally reported strike results to Vice Admiral Chuichi Nagumo after landing on the carrier *Akagi* following the raid:

> Four battleships definitely sunk . . . . One sank instantly, another capsized, the other two may have settled to the bottom of the bay and may have capsized. This seemed to please Admiral Nagumo who observed, "We may then conclude that anticipated results have been achieved."
>
> Discussion next centered upon the extent of damage inflicted at airfields and airbases, and I expressed my views saying, "All things considered, we have achieved a great amount of destruction, but it would be unwise to assume that we have destroyed everything. There are still many targets remaining which should be hit."[69]

As far as Nagumo was concerned, though, his primary mission had been accomplished. Now his concern turned to the missing US carriers and their threat to his task force. There was no provision in the Pearl Harbor attack plan to remain in the Hawaiian area to search for US ships not at anchor at the time of attack. Nagumo, who had opposed the Hawaii Operation at its inception, was ready to withdraw. His chief of staff, Rear Admiral Jin'ichi Kusaka, had held the same opinion. Kusaka recommended to Nagumo that the fleet withdraw to Japan. Nagumo immediately concurred. A second strike on Pearl Harbor—which would have focused on the dockyards, fuel tanks, and remaining ships—was canceled.[70]

Drydocks, Repair Shops, and Oil Storage Areas Spared

Nagumo did not realize the magnitude of his error in not completing the destruction of Pearl Harbor by attacking the base and fuel facilities. His pedantic and traditional view of naval strategy blinded him to the opportunity of a lifetime.[71] Never again would the Japanese Navy be in a position to deliver such a mortal blow to the US Fleet.[72]

Ironically, the Japanese missed their opportunity to strike at the drydocks during the initial attack. Torpedo bombers approaching from the west over Ford Island commenced their run on the battleship *Pennsylvania*. Once they came over the island, the Japanese pilots saw that it was moored in drydock No 1. Seeing this, the torpedo bombers shifted their attack runs toward a cruiser, the *USS Helena*, and the destroyer *Ogala* (actually a minesweeper).[73] They would have been served better by attacking the drydocks. Torpedo strikes on the drydock gates would have rendered these essential repair facilities inoperable until those gates were repaired or replaced. It certainly was a fear of the Navy that the Japanese would return and do just that (Figure 1). As can be seen in Figure 1, salvage operations were up and running almost immediately. The drydocks, along with the base support and repair facilities, were never targeted specifically. The only bombs that fell near these critical facilities were intended for ships on or near these facilities.[74] Had Nagumo returned with a third wave, he could have leveled the navy yard's support facilities,[75] thereby destroying the Navy's industrial capacity and setting back salvage operations.[76] This oversight would come back to haunt Nagumo in a most personal fashion.

The *USS Yorktown* utilized drydock No 1 after the mauling it had received on the Coral Sea. In a turnaround that can be described nothing short of miraculous, essential temporary repairs were made, and it was sent back out to sea within 72 hours for the critical Midway battle. There, its aircraft were crucial in sending all four of Nagumo's carriers to the bottom of the sea.[78]

By far, the most surprising target oversight of the Japanese attack was the oil and gas storage tanks. The entire fuel supply for the Pacific Fleet was stored in above-ground tanks on the eastern side of the naval base (Figure 2).

As can be seen in Figure 2, these tanks were perfectly visible to the naked eye; ergo, perfect targets.[79] These tanks were particularly susceptible to enemy action; none of the tanks had bombproof covers.[80] Even a few bombs dropped amongst the tanks could have started a raging conflagration.[81]

Why were these crucial targets not hit? Their loss essentially would have starved the Navy out of the Central Pacific.[82] Did the Japanese not know they were there?

> The Japanese knew all about those oil storage tanks. Their failure to bomb the Fleet's oil supply reflected their preoccupation with tactical rather than logistical targets . . . . Nagumo's mission was to destroy Kimmel's ships and the airpower on Oahu. If Yamamoto and his advisers chose the wrong targets, or insufficiently diversified ones, the mistake rests on their shoulders . . . .[83]

Pearl Harbor Was the Only Filling Station in Town

Pearl Harbor was the only refueling, replacement, and repair point for ships operating in the Hawaiian area.[84] Part of Pearl Harbor's duty of being the Pacific Fleet's chandlery was the stocking and disbursing of oil. To that end, the Navy had just finished restocking its tanks in Pearl Harbor to their total capacity of 4.5 million barrels of oil.[85] The loss of this amount of oil would have effectively driven the Pacific Fleet back to the west coast and effectively knocked almost all ships of the Pacific Fleet out of contention, instead of just 19.[86] The Japanese knew the importance of oil to a fighting fleet; after all, they had just started a war to achieve a secure source of oil. Why did they not see that the US Fleet needed a secure source of oil if it was to operate in the vast reaches of the Pacific?

Genda later wrote that the question of demolishing the oil tanks only arose after the attack's amazing success. "That was an instance of being given an inch and asking for a mile."[87] He insisted that the objective of the plan was to destroy American warships so they could not interfere with the Southern Operation; oil tanks did not enter into the original idea.

As no one could charge Genda with lacking either imagination or vision, this uncharacteristic obtuseness could be due only to failure to understand the importance of logistics. Most Japanese naval planners apparently suffered from this same myopia toward the less glamorous necessities of modern warfare.

> The Hawaiian Islands produced no oil; every drop had to be tanked from the mainland. Destruction of the Pacific Fleet's fuel reserves, plus the tanks in which it was stored, would have immobilized every ship based at Pearl Harbor, not just those struck on December 7 . . . . "We had 4½ million barrels of oil out there, and all of it was vulnerable to .50 caliber bullets."[88]

The state of Allied oil supplies in the rest of the Pacific theater was extremely poor. The Japanese rapidly captured the bases at Wake and Guam in pursuit of their Southern Operation goals. This geographically isolated the Philippines and made the US naval base there untenable.[89] A sampling of four other ports in the Pacific highlights this problem. Brisbane had 12,000 tons of fuel available in January 1941, Sydney and Melbourne both had 8,000, and Port Moresby had none. Other bases, in the Netherlands East Indies, for example, could not be counted on for oil supplies because of their proximity to Japanese airpower and imminent Japanese invasion.

Once the Japanese seized the oilfields in the Netherlands East Indies and Burma, they eliminated all potential oil supplies in the Pacific between the Americas and the Middle East.[90]

For the Allies, geography had become almost as big an enemy as the Japanese.[91] The fuel supplies at Pearl Harbor were crucial for the Navy to bring the war to the Japanese Navy. Admiral Chester W. Nimitz summed up the situation best, "Had the Japanese destroyed the oil, it would have prolonged the war another two years."[92]

A Lack of US Oil Tankers

It is interesting to note that only one ship located on Battleship Row on 7 December received no damage at all. Yet, had the Japanese sank or severely damaged this ship, its effect on the Pacific Fleet would have been almost as great a loss as sinking an aircraft carrier. That ship was the fleet oil tanker, *USS Neosho*.[93]

The lack of fleet oilers, like *Neosho*, hung like a large cement albatross around the neck of Navy planners contemplating operations in the Pacific before and after the Pearl Harbor raid.[94] This dearth of oilers was a key vulnerability of the Navy. The Japanese Navy, who had just seen how it would have been impossible to carry out the Pearl Harbor attack without tanker support, should have targeted these ships that were so crucial to the Navy.

In the years from 1925 to 1940, the quantity of most surface combatants in the Navy had doubled in size; the size of the auxiliary force had not. Although there had been an increase in the number of fleet oilers, they were all kept busy ferrying fuel between bases.[95] On 7 December, the Pacific Fleet had two oilers in Pearl Harbor and three at sea and six others in ports on the west coast; only four of these were capable of at-sea refueling.[96] This shortage of tankers effectively limited the radius of the Pacific Fleet.[97] It was also a key reason so many ships were located in Pearl Harbor on 7 December. Kimmel was unable to keep less than half his fleet at sea without starting to deplete the oil reserves at Pearl Harbor; his limited supply of oilers could not keep up with the deficit.[98]

Because of this lack of oilers, the fleet could not have even exercised its primary war plan (even if most of its battle line was not at the bottom of Pearl Harbor). The total capacity of the Pacific Fleet's oilers was 760,000 barrels of oil. In the first 9 days after Pearl Harbor, the fleet had expended 750,000 barrels of this sum. Thus, the fleet was tied to its oil supply at Pearl Harbor,[99] and if the Japanese had attacked the oil storage and the associated oilers at Pearl Harbor on 7 December, they would have driven the Pacific Fleet back to the west coast.[100]

If the Pacific Fleet had been forced back to the west coast, would it have been effective in opposing the Japanese? The short answer is no, especially if the Japanese began targeting oilers. To give an example, the *USS Lexington* was dispatched from California to assist in the search for Amelia Earhart in July 1937. First, the *Lexington* had to top off its bunkers on the west coast.[101] It then proceeded on a high-speed run of about 30 knots to the

Hawaiian Islands. Here, it had to refuel again from the fleet oiler *USS Ramapo* off Lahaina Roads, Maui. The result was that the *Lexington* did not arrive in the search area off Howland Island until 11 days after its departure from the west coast and could not even have done that without the support of the *Ramapo*.[102]

Ships *sortieing* from the west coast would be adding 2,000 nautical miles to their patrols into the Pacific just to get to Hawaii.[103] This number would have to be doubled, obviously, because these same ships would have to get back to the west coast if no oiler support were available and the oil storage at Pearl Harbor no longer existed.

The cruising ranges of the Pacific Fleet simply could not meet this necessity. The best range of the *Yorktown*-class carriers was 12,000 nautical miles at 15 knots, while older carriers had even less endurance.[104] Battleships had much less endurance and were slower. They averaged out at 8,000 nautical miles at 10 knots.[105] Cruisers were a little better off than the carriers; they averaged 14,000-14,500 nautical miles at approximately 15 knots. Destroyers, depending on their class, could go 6,000-9,000 plus nautical miles at 15 knots.[106] Looking at the carriers' and cruisers' endurance capabilities, the situation does not seem so bad. However, there are other factors that need to be thrown into the equation.

First, ranges needed to be decreased by a minimum of 15 percent whenever antisubmarine steering measures were taken.[107] Also, a prudent commander might want to avoid a suspected submarine-operating area altogether, if time and circumstances permitted such a detour. This too, would decrease overall endurance. Another factor was ship speeds. Higher speed means more fuel burned. Task force operations require much high-speed steaming for the launch and recovery of aircraft, search tasks, antisubmarine patrol, and so forth. This process, as can be seen by the previous *Lexington* example, burns a prodigious amount of fuel.[108]

The equation all boils down to the availability of oil and sufficient tankers to transport this precious commodity. Kimmel summed up this essential truth when he testified:

> A destroyer at full power exhausts its fuel supply in 30 to 40 hours, at medium speed in 4 to 6 days. War experience has proven the necessity of fueling destroyers every third day, and heavy ships about every fifth day to keep a fighting reserve on board. To have kept the entire fleet at sea for long periods would not have required 11 tankers but approximately 75, with at least one-third of them equipped for underway delivery.[109]

Oil Logistics After Pearl Harbor

The Japanese followed up their attack on Pearl Harbor with submarine operations off the west coast of the United States. These operations were planned to concentrate on striking warships versus logistical support ships and merchantmen. Although the Japanese managed to sink some ships, their submarine operations were a rather feeble effort compared to German U-boat operations against US commercial shipping in the Atlantic. The Germans committed wholesale slaughter along the east coast of the United States after Pearl Harbor. The number of available German submarines for these operations was even less than the Japanese deployment. Yet, the Germans' success was much higher because of their operational strategy of targeting Allied merchantmen, with an emphasis on oil tankers. The Japanese operational strategy of focusing only on symmetric targets, like warships, was adhered to even when asymmetric US vulnerabilities were present. This window of opportunity began to close slowly after Pearl Harbor. The Japanese lost all ability to exploit this weakness by late 1942; by then, they had lost the ability for the offensive, which was never to be recovered.

War Comes to the US West Coast

Japan's geographical situation determined that war in the Pacific would be, in large measure, a war to control the sea so as to exploit its new territorial gains in the Southern Operation. One of the items in its arsenal to help accomplish this task was the submarine.[110]

The overall strategic mission of the Japanese submarine force was to serve as an adjunct to the main battle force. This is to say, when an enemy fleet (the US Pacific Fleet) was bearing down on Japanese waters, the IJN submarines would sortie and intercept the Americans. The Japanese subs would maintain a reconnaissance of the enemy, reporting movements to the Japanese battle fleet, while reducing the enemy force by attrition. When the two fleets met, there would be a great Jutland-style clash that would determine everything.[111] The Hawaii Operation's whole tenet was to nullify the need for this strategy, at least for the first 6 months. However, the submarine was too valuable a tool to be withheld from operations, so the Japanese submarine force was included in the planning of the Hawaii Operation. It would be used for prestrike reconnaissance, to attack targets that escaped the airstrike, and to interdict a counterattacking force.[112] Thirty large fleet boats from the Sixth Fleet were to take part in the attack. Three were to operate as a screen for the Pearl Harbor strike force, 20 others were to position themselves around Oahu, and 5 others each were to carry a two-man midget submarine. The remaining two submarines were to conduct reconnaissance around the Aleutian Islands and other US possessions in the Pacific. Following the attack, 12 of the submarines would remain in the Hawaiian area, and 9 would proceed to the US west coast.[113] There, they were to interdict US lines of communication by destroying enemy shipping.[114]

Although it was part of the original Japanese grand strategy to vigorously prosecute attacks against US commercial shipping, this was not reflected in IJN submarine operations or tactical thought.[115] The Japanese submarines off the west coast of the United States were primarily there to strike at US naval assets.[116] The Japanese hamstrung themselves with their own rules of engagement when it came to merchant traffic. They only were allowed to use one torpedo per merchant ship. Because of this, they often surfaced to engage merchant vessels with their deck guns.[117] This action denied them the use of two of the best weapons the submarine possessed. First, they sacrificed the relative accuracy and lethality of their primary weapon, the torpedo.[118] Second, this tactic sacrificed one of the submarine's greatest commodities—stealth.

Nevertheless, the Japanese submarines did score some victories on the west coast of the United States. The *I-17* damaged one freighter with shell fire and caused the tanker *Emidio* to beach itself off Crescent City, California.[119] The submarine *I-23* attempted a surface attack on another tanker near Monterrey, California, but achieved no hits. The tanker *Agriworld* was able to get off a distress call to the Navy. Two surface attacks by the

submarine *I-21* yielded no results. However, its luck was about to change. It torpedoed and sank the tanker *Montebello* 20 miles from Avila, California, on the morning of 23 December. Two other torpedo attacks were made farther down the coast near Los Angeles by *I-19*; one was ineffectual, the other hit the freighter *Absaroka*. With the help of a nearby Navy tug, *Absaroka* was beached right below Fort MacArthur. An order for the subs to shell west coast cities was rescinded at the last minute, and the subs withdrew to Japanese waters in late December.[120] This order for a premature withdrawal (the subs had hardly made a dent in their torpedo stocks) possibly was due to overconfidence on the part of the Japanese. It was decided to recall subs in the eastern Pacific to support the Southern Operation.[121]

A few more attacks were made on west coast targets later in 1942. One strike that had merit was an attempt to start a large forest fire with bombs dropped by a sublaunched seaplane. Unfortunately for the Japanese, unseasonable rain and fog managed to keep the fire from spreading beyond a small area, and it burned itself out.[122] Another attack against a California oil refinery and tank farm was motivated more by personal rather than military strategy; in any case, that attack was also ineffectual.[123] From December 1941 to October 1942, Japanese submarines attacked just 19 merchant ships between Hawaii and the west coast; 15 of these were in December 1941.[124]

Overall, the Japanese submarine campaign on the west coast had meager results. Overconfidence, poor tactics, and a mentality that stressed commerce and logistical targets were not worthy of destruction let a golden opportunity slip through the Japanese's fingers.[125] Such would not be the case with their new partners one ocean over.

Roll of the Drums

For reasons probably known only to him, Hitler declared war on the United States on 11 December 1941.[126] For the scope of this article, why he declared war is not important; only the immediate results of that action are reviewed here. The German Navy no longer had any constraints on attacking American shipping. Since he was given such short notice of the imminent declaration of war, Admiral Karl Doenitz, head of Germany's submarine fleet, could only muster five submarines for this first foray into US waters. Operation *Paukenschlag* (Roll of the Drums) effectively began on 12 January 1942 with the sinking of the steamer *Cyclops* by *U-123*, 300 miles off Cape Cod.[127] The primary targets of *Paukenschlag* were to be Allied tankers. As Doenitz summed it up, "Can anyone tell me what good tanks and trucks and airplanes are if the enemy doesn't have the fuel for them?"

Doenitz' *Grey Wolves* fell on Allied shipping as if it was an unprotected flock of sheep. The Germans were aided by the fact the Americans were not at all prepared for what was about to occur. This lack of preparedness aided the Germans, and many mistakes were made. There was no blackout on the east coast, maritime navigational aids were still operating, and ships lacked communications security discipline.[128] From 13 to 23 January 1942, *Paukenschlag* subs sank 25 ships.[129] Seventy percent of the *Paukenschlag* losses were tankers, at an average of 130,000 barrels. If this attrition rate were kept up, the Allies would lose half their tanker fleet in 1 year.[130] The Germans came through *Paukenschlag* without any losses; in fact, not even one German submarine was ever attacked. The American antisubmarine warfare response was pitiful. There existed no plans to deal with the possibility of a submarine assault and no forces to implement them had they existed.[131] This is ironic because the Atlantic Fleet received 18 destroyers in a transfer from the Pacific Fleet in May 1941.[132]

German submarines eventually sank 391 ships in the western Atlantic, 141 of which were tankers. One quarter of the US tanker fleet was sunk in 1942. Even though US shipyards were beginning to produce new merchant ships in record numbers, there was still a drop in overall available merchant and tanker tonnage. This came at a time when every ship was needed to help support offensives around the globe in a two-ocean war.[133]

Unswerving Devotion to the Decisive Battle Strategy

"The massacre enjoyed by the U-boats along our Atlantic coast in 1942 was as much a national disaster as if saboteurs had destroyed half a dozen of our biggest war plants," wrote Samuel Elliott Morison. Petroleum shipped from the gulf coast to east coast ports dropped fourfold from January 1942 until it began to climb in mid-1943. Tanker tonnage was woefully short.[134]

The Germans, to their credit, realized the importance oil played in the Allies' war plan. As early as 3 January 1942, the Germans were urging the Japanese to concentrate their submarine efforts on a *guerre de course* strategy of commerce warfare. If the two Axis partners could concentrate their submarine efforts on Allied logistics, it would severely limit the Allies' ability to launch any type of offensive.[135] The German naval attache to Japan, Vice Admiral Paul H. Wenneker, repeatedly would urge such a change in strategy. The Japanese would listen courteously, but they were not willing to change their strategy of focusing on warships. Wenneker stated later:

> The Japanese argued that merchant shipping could be easily replaced with the great American production capacity but that naval vessels represented the real power against which they fought and that these vessels and their trained crews were most difficult to replace and hence were the logical targets. If, therefore, they were to hazard their subs, it must be against the Navy.[136]

The Japanese remained slavishly addicted to their decisive battle doctrine. Despite the success of German U-boats off the east coast of the United States (and even their success in World War I), the Japanese would not change their strategy of using subs to support fleet operations.[137]

Unfortunately for the Germans and the Japanese, the Axis alliance was a political arrangement based on self-opportunistic motives. Neither the German nor the Japanese Navy considered mutual cooperation in war planning a matter of much importance when Germany and Japan entered into their alliance with each other.[138]

The Japanese should have concentrated all their submarines off the US west coast oil ports and off Hawaii. While in these patrol areas, the subs should have systematically hunted down and destroyed US tankers and Navy oilers. The Japanese Navy also should have run a shuttle-type operation where some subs could be operating in these patrol areas at all times.[139] Had the Japanese followed such a strategy, there would have been much less chance that the Navy would have been able to launch any type of offensive in the Pacific in 1942.

Oil and South Pacific Ops

> During the first year of war in the Pacific, the United States Navy was forced to fight a war that it was unprepared for. It had neither enough ships, storage facilities...nor petroleum. But with a lot of hard work, hasty improvisation, sound leadership, and some honest good luck, it managed (with great difficulty at times) to supply its fighting forces with enough fuel for combat operations. Although the supply system was strained to the breaking point, it never collapsed.[140]

The fuel state in the first half of 1942 was straining the logistics support system to the breaking point. As previously mentioned, shortly after Pearl Harbor, the Pacific Fleet had, for all purposes, expended almost all the fuel stored aboard its oilers. With the Pacific Fleet's oilers supplying fuel to ships in the Hawaiian area, it meant new supplies were not being brought in from the mainland. Fuel and tankers became so scarce in the spring of 1942 that oil was scavenged from the unsalvageable battleships still resting on the bottom of Battleship Row.[141]

The fuel and tanker shortage became an operational factor almost immediately in the Pacific. The *Neches* was part of Task Force 14 sent to relieve Wake Island in December 1941. *Neches*' slow speed (task forces could proceed only as fast as the accompanying oiler), along with some bad weather, meant the Wake Island relief force was not in position to attack Japanese forces prior to the island's being overrun.[142] A later, planned airstrike by the *Lexington* task force against Wake in January 1942 had to be canceled when the Japanese submarine *I-72* sank that same oiler, *Neches*.[143] Pacific Fleet raids on Japanese-occupied islands in January and February 1942 would have been impossible without support from Navy oilers. In a precursor of events, one carrier raiding force that had *sortied* against Rabaul was forced to retire after the Japanese had discovered it, and much fuel was used up during high-speed maneuvering while fending off Japanese air attacks. The Doolittle raid on Tokyo, which was to have immense strategic implications for the Pacific war, also would not have been possible without tanker support.[144]

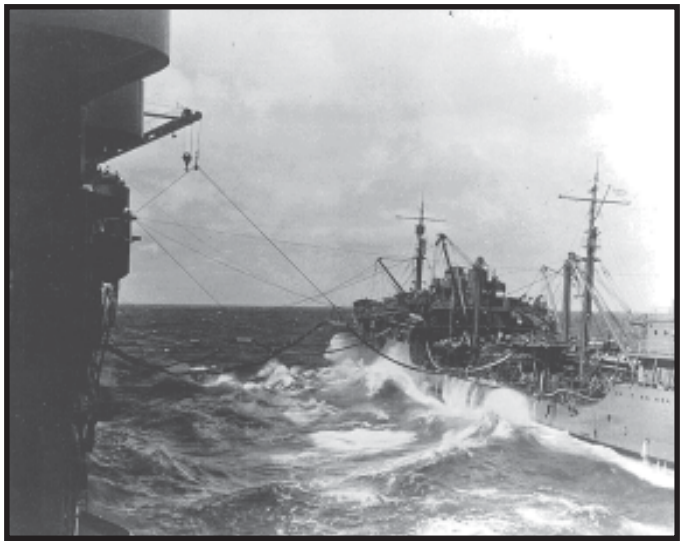

Figure 3. *Neosho* Refueling the *Yorktown*, Probably on 1 May 1942. *Neosho* and its escort, the destroyer *Sims*, were sunk by Japanese aircraft on 7 May 1942 after being misidentified as an aircraft carrier and a cruiser. However, by then, the *Neosho* had dispensed enough fuel to Task Force 17 for it to complete its mission of stopping the Port Moresby invasion force. Note the use of the *Yorktown* aircraft crane to support the refueling hose.[148]

The absence of tankers also was becoming a real concern for operations in the South Pacific in early 1942. Although it was merely a question of time before larger IJN forces overwhelmed US and Allied naval vessels during this period of the Southern Operation, the situation was aggravated by the loss of all available ABCD oil sources in that region by mid-February 1942. The loss of the fleet oiler *USS Pecos* to Japanese action exacerbated the situation further.[145]

The lack of fleet oilers also was a secondary factor from the Pacific Fleet's turning from a battleship-centric navy to one formed around aircraft carrier task forces. Even after Pearl Harbor, the Navy still had a sizable battleship force. Seven battleships were available at west coast ports in late March 1942. However, since the Navy tanker shortage was so acute, there were none available for duty with this force.[146] This force *sortied* on 14 April 1942 to help stem the Japanese advance in the South Pacific. The battleships were loaded down with so much fuel, food, and ammunition that armored belts and decks were below the waterline. If these ships had sailed into harm's way, they would not have lasted long. Fortunately, the Coral Sea action was decided before they could participate, and the force was ordered back to the west coast.[147]

The oilers that could not be spared for the battleships were supporting carrier forces engaged in the Coral Sea. Again, fleet oilers were indispensable to operations. Coral Sea fueling operations were aided by the oilers *Tippecanoe* and *Neosho* (Figure 3).

The fleet oiler *Neosho* supported Task Force 17, led by Rear Admiral J. Jack Fletcher aboard the carrier *Yorktown*. This was the same *Neosho* that was so pointedly ignored by the Japanese during the Pearl Harbor raid. Although sunk by Japanese aircraft on 7 May 1942, the *Neosho* had already played its critical role in dispensing fuel oil to Task Force 14. Had Fletcher needed more fuel, the situation might have gotten a little sticky.[149] Ironically, the Japanese ran into their first fuel problem. A lack of tanker support for their task force, as well as a lack of fuel for its aircraft, caused the Japanese Navy to halt its task force short of its goal, Port Moresby.[150]

Following the miraculous success at Midway, the Pacific Fleet was finally able to go on the offensive in August 1942 with Operation Watchtower, the invasion of Guadalcanal in the Solomon Islands. Inadequate fuel logistics were still a major concern.[151] Fuel and support depots had been set up in Tonga and New Caledonia to support the operation, but they were 1,300 and 500 miles away, respectively, from the action on Guadalcanal.[152]

Preliminary plans to supply oil for this operation were made based on the past experience of normal operations. The officer in charge of the operation, Admiral Robert L. Ghormely, tried to factor in problems that might arise, such as unforeseen losses or changes in operations. However, his logistics staff was small and had no experience. So a supply of fuel thought to be a comfortable margin for the Guadalcanal operation turned out to be an inadequate amount.[153]

With such a tenuous logistics situation, Operation Watchtower became known derisively as Operation *Shoestring* by the Marines who were surviving on captured enemy rations. Inadequate fuel supplies meant the aircraft carriers covering the Marine landing forces could not stay in place and, after 2 days, withdrew 500 miles to the south to refuel. Operations were touch-and-go on Guadalcanal for the next month. The US position could have been

put in jeopardy by a concerted attack on fuel supplies, but this never occurred.[154] In September, Ghormely finally started to get a handle on his logistics requirements, with detailed fuel requests being forwarded up the chain. His actions alleviated much of the fuel problem for the rest of the South Pacific Operation.[155]

With the increase of fuel supplies and the inability of the Japanese to dislodge the Marine defenders on Guadalcanal, the tide had truly begun to turn in the Pacific. From this point on, the Pacific Fleet's fuel situation grew stronger, while the Japanese position grew weaker. The Japanese had lost their opportunity to strike at the key vulnerability of the United States in the Pacific—fuel logistics.

Conclusions

God was on the side of the nation that had the oil.

—Professor Wakimura
Tokyo Imperial University in Postwar Interrogation[156]

The IJN's devotion to an outdated operational strategy, rather than focusing on what effects were needed to ensure their national strategy was met, proved to be their downfall. The Japanese knew that if they did not find a secure and stable source of oil they eventually would have had to comply with US prewar demands. Once it was realized that diplomatic measures would be ineffective, the Japanese plan was to seize and secure as much oil and other resources as possible. The raid at Pearl Harbor was but a branch to achieve that overall goal.

As effective as Japanese intelligence and initial military actions were, they never were focused on the destruction of the key target that might have let them achieve their goal of keeping the Navy out of the Pacific. The Japanese strategic disregard of the fragile US oil infrastructure in the Pacific was an incredible oversight on their part. The Japanese should have attacked the US oil supply at Pearl Harbor and followed up that raid with attacks on US oilers and tankers in the Pacific. Japanese attacks, in conjunction with German strikes, on the oil supply and infrastructure would have bought the Japanese much valuable time—time that could have been used consolidating gains in its newly won territories, time that might have allowed Japan to build up such a defensive perimeter that the cost of an Allied victory might have been too high.

The Japanese were not the first to ignore the importance and vulnerability of logistics. As long ago as 1187, history shows that logistics played a key part in the Muslim's victory over the Crusaders at the Battle of Hittin. The Muslim commander Saladin captured the only water source on the battlefield and denied its use to the Crusaders. The loss of water severely demoralized and debilitated the Crusaders, contributing to their defeat and eventual expulsion from the Holy Land.[157]

The vulnerability and importance of logistics remains evident today. The terrorist bombing of the destroyer *USS Cole* occurred while it was in port, fueling, at Aden, Yemen, on 12 October 2000. Had it not required fueling, the *USS Cole* would not have put in at Aden, 17 sailors would not have been killed, and the Navy would not temporarily have lost a valuable maritime asset.[158] There is an old saying, "Amateurs talk strategy, and professionals talk logistics." Commanders and their staffs must remember the importance of logistics to achieving the overall goal, for friendly forces as well as the enemy.

Notes

1. Kent Roberts Greenfield, ed, *Command Decisions*, Washington DC: Office of the Chief of Military History, Department of the Army, 1960, 100-101.
2. Military History Section, Headquarters, Army Forces Far East, Japanese Monograph No 147, *Political Strategy Prior to Outbreak of War, Part III*, Washington: Office of the Chief of Military History, Department of the Army, 1947, 12-13. For a chronological record of these and other events leading up to World War II, see Congress of the United States, *Events Leading Up to World War II*, Washington: US Government Printing Office, 1944.
3. Herbert Feis, *The Road to Pearl Harbor*, Princeton, New Jersey: Princeton University Press, 1950, 207.
4. Feis, 206.
5. *Japanese Monograph No 147*, 25.
6. Akira Iriye, *Pearl Harbor and the Coming of the Pacific War,* Boston: Bedford/St Martin's, 1999, 134. The ABCD powers were defined as the American, British, Chinese, and Dutch governments.
7. *Japanese Monograph No 147*, 28-33.
8. Iriye, 134.
9. *Japanese Monograph No 147*, 42-43.
10. Iriye, 136.
11. Eric Larrabee, *Commander in Chief*, New York: Harper & Row, 1987, 46.
12. *Papers Relating to the Foreign Relations of the United States, Japan: 1931-1941*, Vol II, Washington: US Government Printing Office, 1943, 266.
13. Iriye, 145.
14. Robert Goralski and Russell W. Freeburg, *Oil and War*, New York: William Morrow and Co, 1987, 101.
15. *Foreign Relations of the United States. Diplomatic Papers, 1941, Vol IV, The Far East,* Washington: US Government Printing Office, 1956, 840.
16. Goralski, 101.
17. Feis, 268.
18. Nobutaka Ike, *The International Political Roots of Pearl Harbor: The United States-Japanese Dyad, Translations of the Records of the Liaison Conferences 19 through 75;* and *Four Imperial Conferences*, report to Dr Thomas W. Milburn, Behavioral Sciences Group, China Lake, California: United States Naval Ordnance Test Station, 30 Mar 64-15 Jun 65, 16-17.
19. *Japanese Monograph N, 147*, 46-48.
20. Iriye, 128.
21. *Papers Relating to the Foreign Relations of the United States*, *Japan: 1931-1941,* Vol II, 137-143. In this correspondence, the Counselor of the US Embassy in Tokyo related to the Japanese Vice Minister for Foreign Affairs that any nation that was to prejudice British lines of communication could expect to come into conflict with the United States. When asked by the Japanese minister that if the Japanese attacked Singapore there would be war with the United States, the counselor replied that the situation would "inevitably raise that question." The US Ambassador, Joseph Grew, later confirmed this position to the Japanese Prime Minister.
22. Congress of the United States, Hearings before the Joint Committee on the Investigation of the Pearl Harbor Attack, Part 6, Washington: US Government Printing Office, 1946, 2866.
23. *Papers Relating to the Foreign Relations of the United States, Japan: 1931-1941,* Vol II, 556-557. It is interesting to note that, although these were rather explicit warnings sent by Roosevelt to the Japanese, Roosevelt himself questioned whether the United States had the political will to back them up. When asked by the Chief of Naval Operations, Adm H. R. Stark, what the US response would be in the event of an attack on British possessions in the Far East, Roosevelt responded, "Don't ask me these questions." See *Investigation of the Pearl Harbor Attack, Part 5,* 2231-2232.
24. Feis, 190.
25. Kent Roberts Greenfield, ed, *Command Decisions*, 106; also see Larrabee, 91.
26. Military History Section, Headquarters, Army Forces Far East, Japanese Monograph No 150, *Political Strategy Prior to Outbreak of War Part IV*, Washington: Office of the Chief of Military History, Department of the Army, 1947, 1.
27. Nobutaka Ike, *The International Political Roots of Pearl Harbor,* Imperial Conference, 6 Sep 41, 33-34.
28. John Buckley, *Air Power in the Age of Total War*, Bloomington, Indiana: Indiana University Press, 1999, 95.

29. Dr David C. Evans, *The Japanese Navy in World War II*, 2d ed, Annapolis Maryland: Naval Institute Press, 1986, 8-9.
30. Hiroyuki Agawa, *The Reluctant Admiral*, New York: Kodansha International, 1979, 197-198. The author relates two stories: one that shows how independent operational thought that ran counter to naval general staff policy was frowned upon. He also relates an incident during fleet map maneuvers that showed minor trivialities, such as logistics, could be discounted if overall results were negative to the desired outcome.
31. Gordon W. Prange, *At Dawn We Slept: The Untold Story of Pearl Harbor*, New York: McGraw-Hill, 1986, 10.
32. Prange, *At Dawn We Slept,* 12-14.
33. Prange, *At Dawn We Slept,* 20-28.
34. Shigeru Fukudome, "Hawaii Operation," *US Naval Institute Proceedings*, Dec 55, 1318. It is interesting to note that the two men who were to carry out the tactical part of the plan at Pearl Harbor—Nagumo and his chief of staff, Rear Adm Ryunosuke Kusaka—felt that the Hawaii Operation was too risky, and this apprehension stayed with them throughout the planning and execution of the attack. See also Agawa, 263-264.
35. *Command Decisions*, 109.
36. Fukudome, 1320.
37. Agawa, 235. This letter was written after the Naval General Staff approved the Pearl Harbor attack plan.
38. *Ibid*.
39. Military History Section, Headquarters, Army Forces Far East, Japanese Monograph No 152, *Political Strategy Prior to Outbreak of War, Part V,* Washington: Office of the Chief of Military History, Department of the Army, 1947, 50-51.
40. *Events Leading up to World War II*, 54.
41. Senator David I. Walsh, *The Decline and Renaissance of the Navy 1922-1944*, Washington: US Government Printing Office, 1944, 4-7.
42. Arthur Zich, *The Rising Sun*, Alexandria, Virginia: Time-Life Books, 1977, 87 and 89-97. When the Japanese attacked Guam on 10 Dec 41, the garrison of a little more than 425 men surrendered in less than 1 day. When attempts were made to increase the defenses of Wake and the Philippines in the second half of 1941, it was too little, too late. Wake fell on 23 Dec 41. Although the Philippines took longer to conquer (the Americans didn't formally surrender until 6 May 42), their demise was a forgone conclusion. The United States could not relieve the Philippines because there were no reinforcements available and no way to protect them even if they were.
43. The International Political Roots of Pearl Harbor, Imperial Conference, 5 Nov 41, 22-23.
44. *Japanese Monograph No 150*, 87-88.
45. *Japanese Monograph No 147*, 15.
46. Ronald Spector, *Eagle Against the Sun,* New York: The Free Press, 1985, 83.
47. Fukudome, 1319.
48. *The International Political Roots of Pearl Harbor*, Imperial Conference, 6 Sep 41, 37.
49. *Japanese Monograph No 150*, 20.
50. Goralski, 102.
51. Gordon W. Prange with Donald M. Goldstein, and Katherine V. Dillon, *Pearl Harbor: The Verdict of History,* New York: McGraw-Hill, 1986, 490.
52. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2569.
53. Prange, *Pearl Harbor: The Verdict of History*, 482.
54. Homer N. Wallin, *Pearl Harbor: Why, How, Fleet Salvage and Final Appraisal,* Washington: Naval History Division, 1968, 60.
55. Takeo Yoshikawa and Norman Stanford, "Top Secret Assignment," *US Naval Institute Proceedings,* Dec 60, 27-29 and 33.
56. Goralski, 85.
57. John Costello, *The Pacific War,* New York: Quill, 1982, 84.
58. Homer N. Wallin, "Rejuvenation at Pearl Harbor," *US Naval Institute Proceedings*, Dec 46, 1521-1523. This total includes the floating drydock, YFD-2. It is also important to note that there were many ships of the Pacific Fleet that were not in Pearl Harbor that Sunday. For example, the carriers *Enterprise* and *Lexingto*n were ferrying USMC aircraft to Wake and Midway Islands in anticipation of war starting in the Pacific. Numerous other ships were patrolling in the Pacific or were in ports on the west coast.
59. Prange, *At Dawn We Slept*, 25 and 374. An interesting note of controversy exists over the primacy of battleships versus aircraft carriers as the primary targets of the Pearl Harbor raid. Genda had been pushing for carriers as the primary targets since Feb 41. Testimony made by Capt Mitsuo Fuchida during his interview with the US Strategic Bombing Survey team backs up Genda's statement (see *United States Strategic Bombing Survey* [Pacific], Interrogations of Japanese Officials, No 72, Vol I, 122. However, those statements do not jibe with "Carrier Striking Task Force Operations Order No 3" sent to the Pearl Harbor attack force on 23 Nov 41 (see Japanese Monograph No 97, *Pearl Harbor Operations: General Outline and Orders and Plans,* 14). In this order, Yamamoto specifies that both battleships and carriers will be attacked but battleships will be the priority targets for the first wave of attacking aircraft. Carriers were the priority of the second wave. Although the Japanese knew there were not any carriers in Pearl Harbor as of 6 Dec, there was a chance that one or more might return that night. "If that happens," said Genda, "I don't care if all eight of the battleships are away." "As an airman," remarked Oishi (Nagumo's senior staff officer), "you naturally place much importance on carriers. Of course, it would be good if we could get three of them, but I think it would be better if we get all eight of the battleships." (See Mitsuo Fuchida, "I Led the Air Attack on Pearl Harbor," *US Naval Institute Proceedings*, Sep 52, 944). Since no carriers did come into Pearl Harbor during the night of 6-7 Dec, the point is moot. However, it does give insight to the prioritization of potential targets in the eyes of the IJN leadership. It also gives pause to wonder what those Japanese airmen would have targeted first if the carriers had been in Pearl Harbor.
60. Fuchida, 945 and 951.
61. Prange, *At Dawn We Slept*, 506 and 538.
62. Prange, *At Dawn We Slept*, 539-540.
63. Prange, *At Dawn We Slept*, 25 and 503-504.
64. Prange, *Pearl Harbor: The Verdict of History*, 537.
65. Spector, 147.
66. Prange, *At Dawn We Slept*, 401.
67. Wallin, "Rejuvenation at Pearl Harbor," 1521. In addition, the target battleship *Utah* was not raised because of her age and the time and effort salvage would entail. Although she tends to be overshadowed by the memorial of her sister ship *Arizona* and the *USS Missouri* floating museum, a small monument to the *Utah* and the 58 men still entombed can be found on the west-northwest shore of Ford Island behind a family housing area. See also E. B. Potter, ed, *Sea Power—A Naval History*, Englewood Cliffs, New Jersey: Prentice-Hall, 1960, 651, for information on the *Arizona* and *Oklahoma*. Also, because of the shallow depth of the harbor, the Japanese had worked feverishly to develop a torpedo that would not dive to 60 feet before leveling out. By the addition of wooden stabilizers, they only were able to solve this problem in Oct 41 (see Prange, *At Dawn We Slept*, 160 and 321).
68. Prange, *At Dawn We Slept*, 374. The Japanese Ambassador to the United States, Nomura, who had no fore knowledge of the Pearl Harbor attack, saw this as a key tactical flaw in the Hawaii Operation (see Prange, *Pearl Harbor: The Verdict of History*, 538).
69. Fuchida, 952.
70. Prange, *At Dawn We Slept*, 542-545.
71. Prange, *At Dawn We Slept*, 545.
72. Evans, 40.
73. Fuchida, 950. See also Wallin, *Pearl Harbor: Why, How, Fleet Salvage and Final Appraisal*, 141.
74. Wallin, "Rejuvenation at Pearl Harbor," 1524.
75. In defense of Nagumo, machine and repair tools were notoriously hard to destroy. Industrial plants targeted by the US Army Air Forces in Europe would be destroyed, but the machine tools inside the buildings showed more durability. See the *United States Strategic Bombing Survey*, Maxwell AFB, Alabama: Air University Press, 1987, 15, 17-18.
76. Wallin, *Pearl Harbor: Why, How, Fleet Salvage and Final Appraisal,* 175. The salvage and repair operations at Pearl Harbor were nothing short of Herculean. A short summary will show the reader how quickly some temporary repairs were made. The *Pennsylvania* sailed to the west coast 2 weeks after the attack. The *Maryland* and *Tennessee* were ready for combat the same day. The destroyer *Shaw*, whose bow was blown off in a spectacular explosion, left for California under her own steam on 9 Feb 42. The *Nevada,* which Nimitz doubted would ever sail again, was in drydock by mid-February and en route to the west coast by mid-April (see Prange, *Pearl Harbor: The Verdict of History*, 538-539).
77. Naval Historical Center, Department of the Navy, Various photographs, 40-41 [Online] Available: http://www.history.navy.mil/photos/images, Feb 01. Drydock photos [Online] Available: http://www.history.navy.mil/photos/images/g380000/g387598c.htm.
78. Robert Cressman, *That Gallant Ship USS Yorktown* CV-5, Missoula, Montana: Pictorial Histories Publishing Co, 1985, 115, 117, and 118. To be filed under the heading of ironic justice, all four carriers had

participated in the Pearl Harbor attack; see Gordon W. Prange's *Miracle at Midway*, New York: McGraw-Hill, 1982, for an excellent review of that conflict.

79. *Investigation of the Pearl Harbor Attack, Part 6*, 2570. The upper tank farm was clearly visible next to the southeast loch of Pearl Harbor as Figure 2 shows. The lower tank farm was next to the Hickam Field water tower, an approximate 150-foot high obelisk, that was visible from up to 5 miles away (see *Investigation of the Pearl Harbor Attack, Part 38,* Item 117).
80. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2812.
81. Wallin, "Rejuvenation at Pearl Harbor," 1524. The Navy realized the vulnerability of the oil supply and was in the process of building some underground storage tanks; however, these would not be completed until late 1942 (Gunter Bischof and Robert L. Dupont, ed, *The Pacific War Revisited*, Baton Rouge, Louisiana: Louisiana State University Press, 1997). There was to be a total of 15 underground tanks (100 feet wide by 285 feet high) with a storage capacity of approximately 4.5 million barrels, the same amount as the above-ground tanks. See *Investigation of the Pearl Harbor Attack, Part 23*, 966. Also see William M. Powers, "Pearl Harbor Today," *US Naval Institute Proceedings*, Dec 81, 52.
82. Prange, *Miracle at Midway*, 4.
83. Prange, *Pearl Harbor: The Verdict of History*, 485.
84. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2506.
85. Goralski, 154. It should be noted that there are several discrepancies in the total amount of fuel in storage and total capacity available at Pearl Harbor on 7 Dec 41. Kimmel testified that there were 4 million gallons in storage (see *Investigation of the Pearl Harbor Attack, Part 6,* 2812). Adm Claude C. Bloch, commander of the 14th Naval District at the time of the attack, testified to the Hart Commission that there were approximately 4 million barrels in storage that morning (*Investigation of the Pearl Harbor Attack, Part 26*, 101). Goralski states that there were 4.5 million barrels stored. Since the purpose of the inquiries following the Pearl Harbor attack were to find out why the US Armed Forces on Hawaii were caught unawares and Goralski's work is more focused on the role of oil in war, his numbers will be used.
86. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2570.
87. Photos [Online] Available: http://www.history.navy.mil/photos/images/g100000/g182880c.htm. The earthen berms located between the tanks were used to contain potential oil spills.
88. Prange, P*earl Harbor: The Verdict of History*, 509-510. The quote at the end is from Nimitz.
89. Duncan S. Ballantine, *US Naval Logistics in the Second World War*, Newport, Rhode Island, Naval War College Press, 1998, 39. Japanese aircraft destroyed the Cavite naval base on 10 Dec 41 (see *Dictionary of American Naval Fighting Ships,* Vol VII, Washington: Naval Historical Center, Department of the Navy, 1981, 282).
90. Bischof and Dupont, 61-62.
91. Bischof and Dupont, 43. By Mar 42, at least one navy tanker was sent to Abadan, Iran, to get oil to support operations in the South Pacific (see D*ictionary of American Naval Fighting Ships*, Vol VII, 282).
92. Prange, *Pearl Harbor: The Verdict of History*, 510.
93. Wallin, *Pearl Harbor: Why, How, Fleet Salvage and Final Appraisal,* 103-104. Also see Commanding Officer *USS Neosho*, "Report on Raid on Pearl Harbor, T. H., 7 Dec 41 [Online] Available: http://www.ibiblio.org/hyperwar/USN/ships/logs/AO/ao23-Pearl.html, 5 Mar 01.
94. Bischof and Dupont, 57. The Navy classified its oil tankers as fleet oilers. For the purposes of this article, Navy oilers is synonymous with tanker or oil tanker.
95. Ballantine, 4.
96. *Investigation of the Pearl Harbor Attack*, *Part 6*, 2504. Also see *Investigation of the Pearl Harbor Attack, Part 12*, 345-346. In addition, there were two other oilers in the Cavite Navy Yard the morning of the Pearl Harbor attack; they were attached to US Asiatic Fleet (see *Dictionary of American Naval Fighting Ships,* Vol VII, 282).
97. Prange, *Pearl Harbor: The Verdict of History*, 547.
98. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2504, 2569, and 2732.
99. *Investigation of the Pearl Harbor Attack*, *Part 32,* 593.
100. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2570. The Japanese knew the oilers were in Pearl Harbor; the Japanese consulate kept them informed on all ship arrivals and departures (see Fuchida, 943). The Japanese attack force made a conscious decision to not attack the *Neosho*. She was berthed at the F-4 fueling dock at Ford Island. In their planning, the Japanese had a torpedo bomber of the initial strike force tasked against the ship in this berth (torpedo track 3); the *Neosho* was not torpedoed. Later, when the *Neosho* was backing up the East Loch of the harbor, she was purposefully not attacked by a Japanese bomber who held its fire in order to strike the battleship *Nevada*. Strangely, the oiler at the F-4 berth was marked as sunk in Fuchida's post battle report (see Prange, *At Dawn We Slept*, 385, 512, 518, and 536). The Japanese were also aware that there were two oilers at Cavite; they even knew their names (see *Investigation of the Pearl Harbor Attack, Part 12,* 302-303). It is also a fair assumption that the Japanese knew the locations of the other oilers that were in port on the west coast on 7 Dec 41.
101. B. Orchard Lisle, "The Case for Aircraft-Carrying Oil Tankers," *US Naval Institute Proceedings*, Nov 42, 1555. There is debate on where *Lexington* departed from on the west coast, but there was a delay in her departure. Given the desire among naval officers to have as much fuel in their bunkers as possible, with time available to the *Lexington* prior to her departure from the west coast, it is assumed she topped off her fuel bunkers.
102. Susan Butler, *East to the Dawn*, Reading, Massachusetts: Addison-Wesley, 1997, 414. Also see Elgen M. Long and Marie K. Long, *Amelia Earhart,* New York: Simon & Schuster, 1999, 220. Ironically, the *USS Ramapo* was the other oiler at Pearl Harbor the morning of 7 Dec 41 (see *Investigation of the Pearl Harbor Attack*, *Part 12,* 348-349); also see *Commanding Officer USS Ramapo*. "Report on Raid on Pearl Harbor," 7 Dec 41 [Online] Available: http://www.ibiblio.org/hyperwar/USN/ships/logs/AO/ao12-Pearl.html, 5 Mar 01.
103. Ballantine, 40.
104. Roger Chesnau, *Aircraft Carriers of the World*, *1914 to the Present*, Annapolis, Maryland: Naval Institute Press, 1984, 201, 205, and 206.
105. Ian Sturton, ed, *Conway's All the World's Battleships 1906 to the Present,* Annapolis, Maryland: Naval Institute Press, 1987, 160, 164, 168, 172, and 176.
106. James C. Fahey, *The Ships and Aircraft of the US Fleet*, New York: Ships and Aircraft, 1945, 15, 18, 23-25.
107. "The Zig-Zag Course as a Defence Against Submarines," *US Naval Institute Proceedings*, Professional Notes, Aug 17, 1836. Although a dated article, this technique, which was a proven defense at the end of World War I, could be expected to be used at the start of World War II.
108. Bischof, 70.
109. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2504.
110. *Strategic Bombing Survey*, 108.
111. Norman Polmar and Dorr Carpenter, *Submarines of the Imperial Japanese Navy,* Annapolis, Maryland: Naval Institute Press, 1986, 1.
112. Polmar and Carpenter, 12-13. Also see Potter, 796.
113. Polmar and Carpenter, 13-14. The midget submarines were to attack US warships in Pearl Harbor in conjunction with the air raid. Following the attack, none of the five midget submarines ever made it back to the mother ship.
114. Military History Section, Headquarters, Army Forces Far East, Japanese *Monograph No 108, Submarine Operations in the First Phase Operations, December 1941 to April 1942,* Washington: Office of the Chief of Military History, Department of the Army, 1947, 1.
115. Japanese Monograph N. 150, *Political Strategy Prior to Outbreak of War, Part IV*, 47.
116. Polmar, 11. The prewar strategy of the primary role of fleet attack remained unchanged until Apr 42. After this point, submarines switched to commercial shipping; however, most of these attacks seemed to concentrate in the Indian Ocean area, which had minimal effect on Pacific Fleet operations.
117. Donald J. Young, "For a week in December 1941, Japanese submarines prowled the Pacific coastline, searching for merchant ships to sink," *World War II*, Jul 98.
118. William Scheck, "Japanese submarine commander Kozo Nishino gained personal satisfaction from shelling the California coast." *World War II*, Jul 98, 18. Among other items, the article mentions the difficulty of keeping the submarine deck gun trained on targets while the submarine was constantly moving. Also the Japanese torpedo, a 24-inch, oxygen-driven weapon, had characteristics that more than doubled the nearest US model (see Prange, *At Dawn We Slept*, 394).
119. Young, "For a week in December 1941, Japanese submarines prowled the Pacific coastline, searching for merchant ships to sink," 27-29. It should be noted that the *I-17* attempted to shell the *Emidio* first, and the tanker was able to send out a distress call. Responding aircraft were able to drop depth charges on the sub—twice. Although the sub suffered no damage, the surface attack shows the increased risk the Japanese took.

120. Young, 29-32.
121. Carl Boyd and Akihiko Yoshida, *The Japanese Submarine Force and World War II,* Annapolis, Maryland: Naval Institute Press, 1995, 68-69.
122. William H. Langenberg, "A floatplane launched from an Imperial Japanese Navy submarine dropped its bombs in September 1942—the first time the continental United States was bombed from the air." [Online] Available: http://www.theistorynetcom/AviationHistory/articles/1998/11982_text.htm, 7 Mar 01.
123. Scheck, "Japanese submarine commander Kozo Nishino gained personal satisfaction from shelling California coast," 16-18. The sub commander Kozo Nishino had visited the refinery during the prewar period as the commander of a Japanese tanker. In a welcoming ceremony, he slipped on some oil and ended up in a cactus patch, much to the amusement of local refinery workers. Nishino, insulted by the laughter, saw his chance to get revenge in Feb 42. He peppered away at the refinery for 45 minutes with his 5.5-inch gun. He did not cause any significant damage, but apparently, it was enough to settle a personal score.
124. Juergen Rohwer, *Axis Submarine Successes 1939-1945,* Annapolis, Maryland: Naval Institute Press, 1983, 278-281.
125. Potter, 799.
126. *Events Leading up to World War II*, 310.
127. Ladilas Farago, *The Tenth Fleet,* New York: Ivan Oblensky Inc, 1962, 46-47, 55.
128. Goralski, 103-104.
129. Farago, 58. Estimates range from 25 to 44 ships sunk, depending on the source. It should also be noted that the Germans sank 74 ships within 300 miles of the American coast in Mar 42 alone; again, a high proportion of these were tankers. Losses were so bad that if the rate continued there would not be enough fuel to carry on the war (see also Goralski, 106-112).
130. Goralski, 106.
131. Farago, 58
132. *Investigation of the Pearl Harbor Attack*, *Part 6,* 2505. The destroyers (along with other ships transferred) were to be used in neutrality patrols to keep German naval forces out of the western Atlantic.
133. Goralski, 116.
134. Goralski, 109-111. The tanker shortage became so acute that some Liberty-type dry cargo ships were converted into tankers with most being delivered in 1943 (see L. A. Sawyer and W. H. Mitchell, *The Liberty Ships,* Cambridge, Maryland: Cornell Maritime Press, 1970, 161.
135. *International Military Tribunal for the Far East,* Vol 256, Tokyo, Japan, 1 Dec 47, 34257.
136. Goralski, 186-188.
137. Potter, 796.
138. John W. Masland, "Japanese-German Naval Collaboration in World War II," *US Naval Institute Proceedings*, Feb 49, 179 and 182.
139. Boyd and Yoshida, 189-190.
140. Bischof and Dupont, 78.
141. Wallin, "Rejuvenation at Pearl Harbor," 1545. About 1 million gallons of oil were recovered from the *Oklahoma* alone.
142. Bischof and Dupont, 66.
143. Bischof and Dupont, 77.
144. Worrall R Carter, *Beans, Bullets, and Black Oil,* Newport, Rhode Island: Naval War College Press, 1998, 17-20. The raid was a boost for American morale after a steady diet of defeat. It also confirmed to Yamamoto the need for the upcoming Midway operation, where the defeat of the Japanese Navy later proved to be the turning point in the Pacific war (see Prange, *Miracle at Midway*, 24-27).
145. Carter, 15-16. The *Pecos* was attempting to join her sister ship *Trinity* in the Persian Gulf when she was sunk. The oil situation became so critical that the Australian cruiser *Hobart* could not participate in the Java Sea battle on 27 Feb 42 because of a lack of fuel. Another factor in fueling operations was the excruciating pace of refueling operations. The 1938 standard tanker could pump only 200 tons of fuel per hour. The newer T-2 tankers could pump approximately 700 tons an hour. At the end of 1941, the Navy only possessed six of these T-2 types (Cimarron class) with four in the Pacific Fleet (see Lane C. Kendall, "Tanker Operation and Management," *US Naval Institute Proceedings*, Apr 57, 425. Also see Fahey, 48.
146. Spector, 158 and 168.
147. Carter, 11.
148. Photos [Online] Available: http://www.history.navy.mil/photos/images/g460000/g464653c.htm. Also see Carter, 20-21, and see Zich, 69.
149. Carter, 21.
150. Goralski, 156. This was the first time the Japanese were to run into a fuel supply problem. It was an awful portent of the IJN's future operations.
151. George C. Dyer, The Amphibians Came to Conquer: The Story of Admiral Richmond Kelly Turner, Washington: US Government Printing Office, 1972, 311-312.
152. Carter, 21, 23-24.
153. Carter, 24-25.
154. Goralski, 157. Japanese bombing and naval gunfire came close to putting the US airstrip Henderson Field out of action when critical fuel supplies were destroyed. Another time, the arrival of four tankers was said to have turned the battle, "If they hadn't arrived when they did, we wouldn't have Guadalcanal" said Ghormely.
155. Carter, 28, 30, and 32.
156. Goralski, 304.
157. Gerard Chaliand, ed, *The Art of War in World History,* Los Angeles, California: University of California Press, 1994, 400-404.
158. Speaker remarks and press coverage. Lecture to AY01 students and faculty, Air Command and Staff College, Maxwell AFB, Alabama, 15 Mar 01.

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(*Contractors on the Battlefield* continued from page 15)

25. *Ibid.*
26. Defense Systems Management College, *Acquisition Logistics Guide,* Fort Belvoir, Virginia: Third Edition, 1997, 1-5.
27. *Ibid.*
28. Gen John J. Jumper, "The Future Air Force," address, Air Force Association Air Warfare Symposium, Orlando, Florida, 31 Jan 03.
29. Peters, 24.
30. Maj Gen Norman E. Williams and Jon M. Schandelmeir, "Contractors on the Battlefield," *Army Magazine*, Jan 99, 32-35.
31. Senator Carl Levin, "US Military Commitments and Ongoing Military Operations," statement, Senate Armed Services Committee, Washington DC, 9 Sep 03.
32. Maj Christopher D. Croft, "Contractors on the Battlefield: Has the Military Accepted Too Much Risk?" Fort Leavenworth Kansas: School of Advanced Military Studies, Army Command and General Staff College, 2001, 8.
33. Zamparelli, 11.
34. Cahink, 69.
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(*Logistics Transformation* continued from page 27)

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At the time of the writing of this article, Lieutenant Colonel Frede was a student at the Air War College

(*JMC Exercises Seamless Movement of Resources* continued from page 28)

operation. It also provides useful information for tracking mission progress and force closure and gives a summary of force flow for future planning.

The JMC currently operates the Logistics Sustainment Cell (LSC) at Incirlik. The LSC's primary mission is to coordinate and monitor the movement of sustainment to US forces and humanitarian efforts in northern Iraq. From April 2003 through January 2004, the LSC coordinated the delivery of more than 62 million liters of water, 3 million pounds of fresh fruit and vegetables, 447 million liters of fuel, 276 measurement tons of liquid propane gas, 1.3 billion liters of benzene and kerosene, and 12 million short tons of miscellaneous cargo. Commercial trucks moved all this into Iraq via ground lines of communication from several locations in Germany and Turkey. This line of communication averages more than 5,000 trucks in the transportation system on a daily basis. It extends from central Germany, south through Turkey, and crosses into northern Iraq through the only crossing point—Habur Gate at the Turkey-Iraq border. This vital supply route significantly reduces airlift and sealift cost. In addition to ground resupply, approximately three strategic airlift channels from Ramstein AB, Germany, and Moron AB, Spain, deliver equipment and sustainment into northern Iraq each week.

Figure 2. Trucks Awaiting Passage into Northern Iraq Through Harbur Gate

The JMC also manages transportation in numerous other countries throughout the theater, ranging from Africa to Russia and the Middle East. Some other major operations the JMC supports are the Stabilization Force in Bosnia and Herzegovina, Kosovo Forces (KFOR), humanitarian assistance in Africa, North Atlantic Treaty Organization (NATO) member support for participation in multinational exercises, Georgia Train and Equip Program, and exercise-related construction programs in the West African states. Sustainment into the Balkans includes more than 55 trucks daily, 2 trains per month, and 6 C-130 flights per week. The ground movement crosses eight countries (some trips lasting more than 3 weeks) to arrive at their destination. Another elongated movement is delivering cargo and sustainment to Enduring Freedom in Afghanistan. In addition to C-17 channels, trains move through Germany, Poland, the Ukraine, Russia, Uzbekistan, and Kazakhstan to Bishkek, Kyrgyzstan. Ships carrying cargo to Enduring Freedom sail through the Mediterranean Sea through the Suez Canal to Karachi, Pakistan, then via truck into Afghanistan.

Most notable of these smaller but significant operations was the role played by the EUCOM JMC in the Joint Task Force (JTF) Liberia Operation. The JMC deployed personnel to the joint task force and assisted in the development and execution of a JTF Liberia JMC in support of the humanitarian assistance and stability operation in Liberia, Africa.

One of JMC's most challenging missions is the planning, coordination, and execution of coalition movements for the

Figure 3. KFOR Deployment

Figure 4. Albanian Troops Preparing to Board a C-17

Polish-led Multinational Division-Center South sector in Iraq and other troop-contributing nations in support of Iraqi Freedom and Enduring Freedom. The contributing nations include 17 countries within the EUCOM AOR, while the Multinational Division involves 23 countries from around the globe. To execute these movements effectively, the JMC established the European Deployment Cell in Warsaw, Poland. The European Deployment Cell is responsible for movements through numerous air and seaports of embarkation and debarkation to ensure that troop-contributing nations within the EUCOM AOR meet US and NATO standards for movement on US military transports. In addition to NATO countries, the European Deployment Cell has moved Moldovan, Albanian, Ukrainian, Azerbaijani, Estonian, Latvian, Georgian, and Lithuanian forces. Surface Deployment and Distribution Command teams augment the deployment cell to execute port of debarkation operations in countries such as Poland, Spain, Romania, and Bulgaria. US Army Europe and US Air Forces in Europe (USAFE) operated the European Deployment Cell during the Iraqi Freedom rotations.

Another JMC initiative was unit movement certification training of Polish military personnel. Certification ensured that allied forces possess the skills necessary to prepare PAX and cargo for movement in accordance with US and NATO standards. The US Army, Europe Seventh Army Training Command conducted the training, which included unit movement, hazardous materials, and load planning courses. The 45-day movement training certified 21 Polish military members to perform functions formerly executed by the US military, resulting in significant cost savings for the US Government. This first-ever training sets the standard for future training so that contributing nations can achieve unit movement standards.

Recently, the JMC was responsible for developing the concept of a forward aerial transload hub at Incirlik. The hub serves as an intermediate transfer point for the redeployment of more than 25,000 US persons from northern Iraq. This operation expedites the redeployment of personnel and equipment from Iraqi Freedom II to the continental United States and adheres to the boots on ground time line. Furthermore, it minimizes the use of precious C-130 intratheater air assets and reduces load capacity on the aerial port at Kuwait City International Airport. USAFE's 39th Airlift Wing executes the transload operation, which runs from January through April 2004. Most important, the use of Incirlik demonstrates the Turkish commitment to the Global War on Terrorism.

In addition to contingency movements, the EUCOM JMC resolves numerous issues to include:

- Air space and overflight coordination and approval
- Transit rights through various countries within the EUCOM AOR
- Force protection for all vessels transiting the Mediterranean and calling ports in the EUCOM AOR
- Beddown locations for aircraft and passengers (air-to-air interface sites)
- Fuel, subsistence, replenishment, and maintenance support for aircraft, ships, and vehicles transiting AOR

The JMC is a multifaceted, diverse entity, executing short- and long-range movement issues to improve transportation into, out of, and through the EUCOM AOR. The key to its success is a simple movement formula:

Planning + Coordinating + More Coordinating +
Flexibility in Execution = Success

Lieutenant Colonel McClean is the chief of the J-4, Joint Movement Center, EUCOM, Stuttgart, Germany. Captain Henson is a Tennessee Army National Guardsman assigned to the J-4, Movement Center.

notable quotes

The line between disorder and order lies in logistics.

—Sun Tzu

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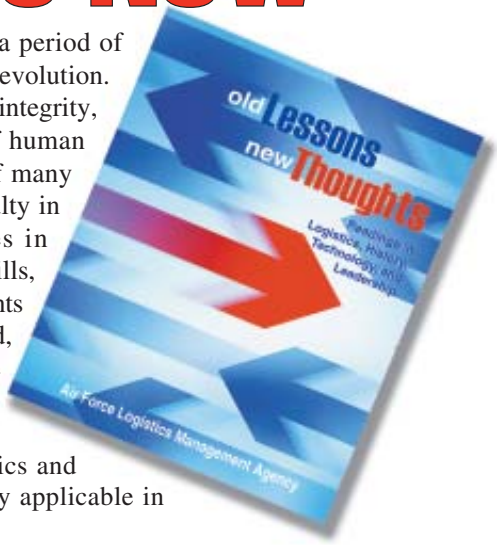

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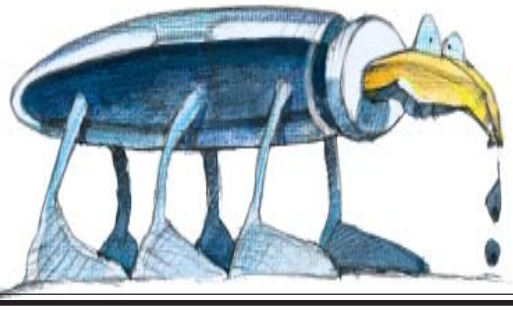

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