Joint and Allied Logistics Opportunities and Tools Supporting 21st Century War Fighter Rapid Decisive Operations

Track
C2 Decisionmaking and Cognitive Analysis

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Joint and Allied Logistics Opportunities and Tools Supporting 21st Century War Fighter Rapid Decisive Operations

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Abstract

"Logistics and maintenance tools to support rapid decisive operations."

As the current review of DOD structures, capabilities, and plans are coming to completion and moving into implementation phases, a focus to maintain is the delivery of mission capabilities for the front line war fighters. The mission capabilities packages are supported by the materi**a**l, and also by the materi**e**l support process, which includes not only the hardware, but more importantly the people, training, maintenance and support, and the doctrine, concepts of operations, tactics, techniques, and procedures for the materi**a**l.

Following an updated discussion on Operational Engineering, this paper expands the authors' concept of Operational Engineering, to several applied logistics options and discussions in support of rapid decisive operations. It finishes with an introduction discussion of a Logistics Commander Operational Planning Tool, which potentially can support and enable generation of rapid decisive operations. This tool could assist Combatant Commanders and their war fighters to operate inside the decision cycle of opponents on the front lines.

Further, the concepts addressed align with the Quadrennial Defense Review 2001 task:

"Provide sufficient mobility, including airlift, sealift, prepositioning, basing infrastructure, alternative points of debarkation, and *new logistical concepts of operations, to conduct expeditionary operations in distant theaters* against adversaries armed with weapons of mass destruction and other means to deny access to U.S. forces." (emphasis added)[QDR, 2001, p. 26]

Introduction

New DoD 5000 series guidance continues the efforts to modernize and improve the process of how combat systems and weapons systems are developed, acquired, fielded, and supported. The new Joint Vision (JV) 2020 expands JV 2010 precepts by emphasizing the re-engineering and restructuring of U.S. military forces and methods for engaging and countering threats to U.S. national security as the 21st century unfolds. At the same time the 2001 Quadrennial Defense Review (QDR) also emphasizes a transformation of these forces to address the 21st Century threat environment. These documents highlight the opportunity for closer coordination and support between the military forces and the civilian work force. One of the critical interfaces is the maintenance and logistics support provided from the head-quarters organizations to those in the field, the war fighters and Commander-in-Chiefs (CINCs).

In this paper the authors enlarge on the specific opportunities which they believe are available to the maintenance and logistics communities by evaluating the decisions and products provided to the war fighter through an evolved systems engineering environment – Operational Engineering (OE). [Bryant & Flynn, 2000] Along with several other areas, logistics is a critical component in the maintenance and sustainment of high tempo, rapid decisive operations in the 21st century. The OE environment includes this logistics component in the development and fielding of systems and capabilities through war fighters participation in evaluating tactics, techniques, and procedures (TTPs), and concepts of operations (CONOPs) within the war fighters' operational requirements. (Please see Figures 1 & 2 below.) Improved and expanding computer communications networks, coupled with advancing modeling and simulation capabilities, foreshadow improved coordination and decision making between acquisition community head-quarters organizations, the war fighters, and the CINCs in the OE environment.

The authors explore and discuss several maintenance and logistics issues within the OE environment. This paper points out options for improved evaluation, reduced deployment cycle time, and faster delivery of flexible mission capabilities to the war fighters and their CINCs (combatant commanders). Examples are the initial supply and sustainment of limited foot print expeditionary logistics and war fighter development and testing of TTPs/CONOPs prior to system construction or delivery, including logistics and maintenance impacts.

Through the examples offered, the authors discuss how the emerging defense / national information infrastructure (DII/NII) [with supporting modeling and simulation capabilities] and the conceptual OE environment (with logistics fully integrated), enable significantly improved maintenance and logistics decisions. This provides better support to the war fighters and CINCs. These are the customers whom acquisition managers, logisticians, and systems engineers support. The expected result would be accelerated development and delivery of systems and improved mission capabilities to CINCs and their trained and ready war fighters.

Why is the OE environment important? – Because it links the acquisition to the operations OUTCOMES. Figure 1 [Piplani et al, 1996, p. 1-5] primarily addresses the material needs that are generally 'within the walls' of the Program Office but that do not fully satisfy the operational and employment requirements of the final end users: the front line CINCs and their war fighters.

Figures 1 & 2 represent a transition from material type thinking and approaches to a more inclusive materiel type applications environment – the Operational Engineering (OE) environment.

These two figures describe the familiar Systems Acquisition Process Cycle, from the Program Office perspective; and the potential transition to the OE environment. Program Offices usually stay within Figure 1 while producing and fielding systems. Testing, development, and evaluations are primarily framed in an environment of the individual system by itself, although there has been increased emphasis on such aspects as Total Systems Test Assessments for individual ships and battle groups, as well as for joint task force interoperability.

The transition from a material to an integrated materiel approach, allows for tighter integration of all aspects of systems engineering in the OE environment. Specifically, that the war fighters – the sailors, marines, soldiers, airman, and combatant commanders on the front line – are a fully integrated part of the materiel systems and their support.

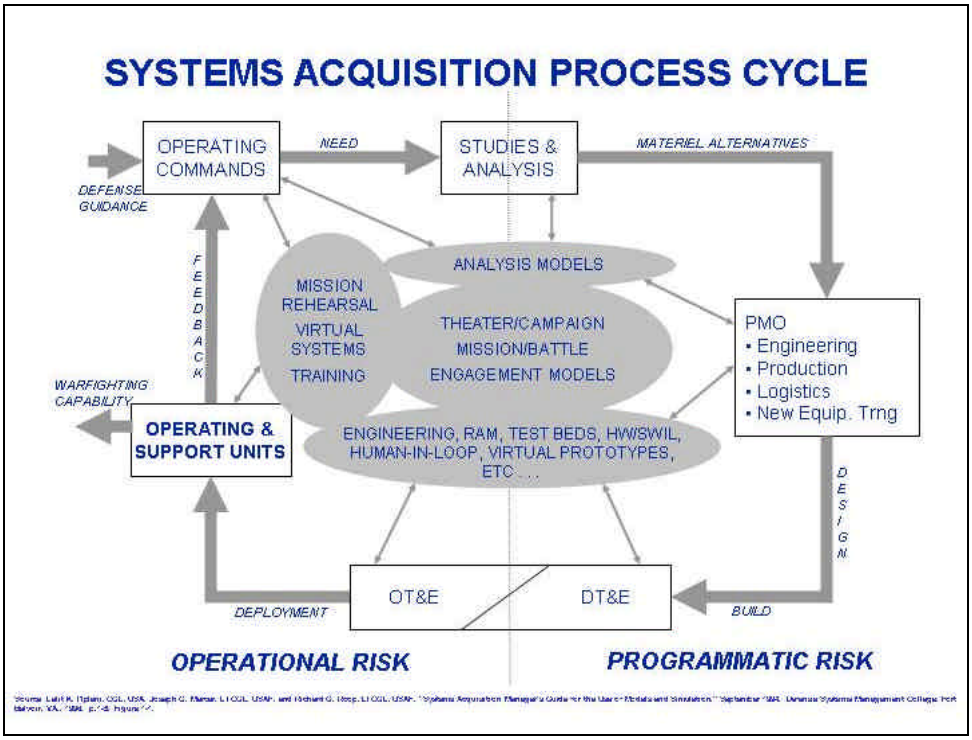

Figure 1 - Systems Acquisition Process Cycle

The authors highlight the potential for improved decision opportunities when producing systems that more accurately reflect users needs. This is done by analyzing decisions within an environment that includes the six surrounding areas depicted in Figure 2 in which systems decisions can be weighed within the framework 'environment of operations' in which the system will be utilized.

In the OE environment, logistics for a system interacts with the development of TTPs and CONOPs, not only for the operations, but also the rate of operations, and the service availability for mission employment. This is the critical entry point for the war fighters' requirements with regard to mission accomplishment under the assigned tasks of the Joint Strategic Capabilities Plan (JSCP).

Logistics support decisions, made during system design can be modeled to support the war fighters evaluation of CONOPs and TTPs and be used to provide feedback into system design. Models and simulations will permit operators to test and evaluate systems undergoing development. This will enable sufficient timely OE feedback into system design prior to system operational development. War fighters will therefore contribute to improving system operational performance while simultaneously acquiring the knowledge to be able to use the new systems and enhanced capabilities upon arrival in theater. The ability to more fully and rapidly employ and exploit new systems capabilities to achieve mission success is the principle goal of evolving System Engineering into the more comprehensive Operational Engineering.

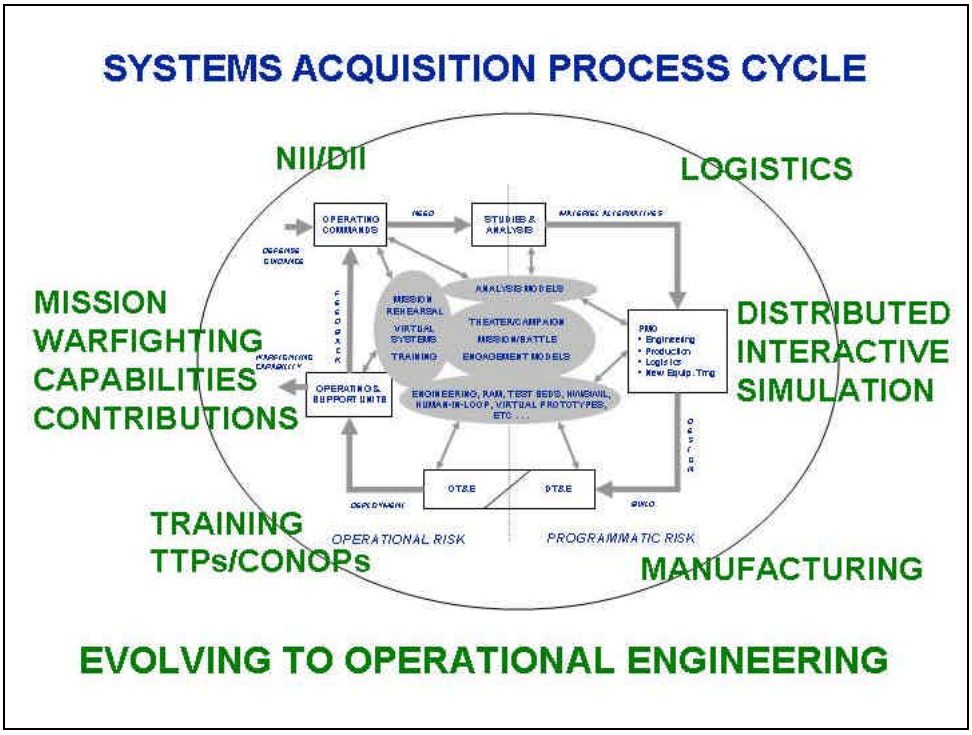

Figure 2 - Operational Engineering Includes Systems Acquisition

Operational Engineering builds upon the proven legacy of Systems Engineering through the addition of six elements. These are:

(1) **Logistics**: The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with: a. Design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of materiel; b. Movement, evacuation, and hospitalization of personnel; c. Acquisition or construction, maintenance, operation, and disposition of facilities; and, d. Acquisition or furnishing of services. [DOD, 2001, p. 248]

(2) **Manufacturing**: methods and techniques to improve maintenance processes to not only manufacture faster and maintain better, but reduce the maintenance cycle times and support improved availability for missions.

(3) **Training, TTPs/CONOPs**: training the users and trainers, developing the TTPs and validating these along with the CONOPs for mission employment and planning for both the CINCs and units assigned missions and tasks.

(4) **Distributed Interactive Simulation (DIS)**: the ability to place a virtual component / simulation within the desired operational environment in a seamless manner. This supports the prior 3 items – like the holo-deck of *StarTrek: Next Generation*. (It also permits connection to other distributed entities, i.e., remote activities for enhanced interoperability and interaction.)

(5) **NII/DII**: NII consists of the networks and capabilities of the government and private industry, as well as the DOD and associated components systems which interconnect with the included information assurance, validation, verification, and throughput capabilities.

(6) **Mission Warfighting Capabilities contributions**: the systems results are interpreted through the CINCs missions of Shape, Prepare, and Respond, along with their assigned tasks within the JSCP.

Figure 2 implies a broader definition of Logistics. It represents the inclusion of the six additional significant components which are closely coupled to the CINCs, war fighters', and in many cases the public's opinion of 'what is success' – maximum effectiveness with minimum expenditure of effort, or national treasure – especially the lives of our war fighters on the front lines.

The Concept Of Operational Engineering

U.S. forces are increasingly expected to operate and fight in a joint, and probably coalition, environment. This requires knowledge and understanding of the other services and allies doctrines and TTPs, as well as the nuances of their service culture if we are to operate effectively together. Naval war fighting capabilities must have the requisite degree of joint and allied interoperability. In any Major Theater of War (MTW), there likely will be significant reliance upon allies and coalition partners. Many of these allies and coalition partners may not have the resources to acquire and maintain interoperability

with U.S. forces. This was highlighted during the recent Noble Anvil operations in Kosovo. [USACOM J6, 1999] Such joint and coalition military operations not only have political and economic dimensions, they also have implications for how the Naval community engineers and acquires systems, trains forces, and the extent to which the community designs in and implements force interoperability. Solutions will need to be crafted that address serious impediments such as common technical standards, common standards implementation, data release, standardized terminology, limitations with regard to operational control and discipline, and even different national acceptances and interpretations of international laws and protocols.

The stand-up of Joint Forces Command demonstrates leadership's recognition of these challenges in executing U.S. National Military Strategy. Seffers reported "The Joint Forces Command, formerly known as Atlantic Command, was . . . given a new mission to define strategies, doctrine and tactics that improve the ability of the military services to work together on the battlefield." The first Commander-in-Chief, Joint Forces Command, Admiral Gehman noted that, "To meet the challenges of the 21st century . . . we are going to have to change the way we address interoperability and joint operations." [Seffers, 1999, p. 25] It is the authors opinion that to perform this mission, Joint Forces Command will likely need to strengthen the linkage between the war fighters, the engineering and acquisition communities that arm and sustain the war fighters, and those responsible for training the war fighters. In this context the Navy needs to evolve the critical tangible kernel of system engineering into the broader concept of Operational Engineering.

Navy OE will build upon an already strong system engineering heritage and foundation. Navy OE must have a greatly expanded external outlook and will require even closer cooperation and coordination of all interested parties than does system engineering. Stakeholders include not only the system engineering and acquisition community; fleet war fighters; and, the test and evaluation community; but also, the other half of the Naval team, the Marine Corps; our sister services; the Surface Warfare Development Group; the Maritime Battle Center; and key Joint constituencies, especially those involving experimentation and joint interoperability. In the broadest sense, allies and potential coalition partners are also included.

This expanded group of stakeholders must influence how current and emerging programs are managed and resourced. Involvement is predicated upon the availability, and development, of knowledgeable liaison personnel. Pro-active development of these liaison personnel is important because understanding the other services' visions, master plans, and directions has critical implications for the development and operation of Naval forces. Conversely, there is a need to keep the other services informed about Naval efforts and intentions. There are a number of vehicles or forums for sharing this information throughout the key stakeholders' constituencies. Foremost among these are joint war games, exercises, and experiments sponsored by joint commands and the individual services. These events may include participation by allies and potential coalition partners.

Different events have different purposes. Exercises can be Tier II for staff training or Tier III for Field Exercises. Experimentation, on the other hand, allows testing of new ideas and technologies even though all the bugs are not worked out. In theory, such experimentation is a failure tolerant venue and provides valuable insights into what is worth pursuing and what is not. At times multiple smaller

exercises, experiments, and events can be grouped together and mutual leveraging occur such as during the Joint Forces Command sponsored Millennium Challenge 2000 exercise.

Each of the Unified CINCs is a different audience that crafts its exercises and war games to suit their specific needs, i.e., to test their Operations Plans (OPLANS) and Concept Plans (CONPLANS). Program Manager's pro-active involvement in these war games, experiments and exercises can garner the CINCs support, influence their Integrated Priorities Lists (IPLs), and even impact the CJCS Chairman's Program Assessment. Although this has always been true, it has become more important since the Goldwater-Nichols Act of 1986 delegated significantly greater power to the CINCs.

These CINC sponsored events are the most visible forums in which Navy can demonstrate current and emerging capabilities and where the engineering and acquisition community can directly engage in the development of CONOPS, tactics, and inter-operability. It is where current and emerging capabilities can be demonstrated and tested with the CINCs OPLANS. Failure to participate in those events with knowledgeable personnel can result in a vacuum where Navy capabilities can be ignored, misunderstood, or even misrepresented. In addition to building a broad based understanding of Navy capabilities within all the key CINCs and their staffs, CINCs' concerns can be relayed back to the acquisition community. Another benefit includes the ability to perform innovative side excursions to examine system capabilities in both symmetric and asymmetric war fighting operations. This permits assumptions to be critically challenged and evaluated with feedback provided into the OE process.

Given the nature of their missions, forward deployed CINCs have to emphasize current and near term capabilities of the forces that deploy in their theater. Time constraints impact issue resolution and generally emphasize procedural work arounds or quick technical fixes for urgent problems. While Joint Forces Command addresses current and near term capabilities, its role as a major force provider to the forward deployed CINCs, makes it the principle proponent for all CINCs in addressing mid- and long-term issues where solutions are more likely to involve engineering and acquisition. Supporting such efforts, Joint Forces Command already has unique infrastructure including the Joint Battle Center, the Joint War Fighting Center, the Joint Training Analysis and Simulation Center, and proximity to the services' acquisition, engineering, and logistics communities and facilities.

Joint Forces Command may well upgrade these existing centers. Investments are also being made in additional infrastructure including the Joint Distributed Engineering Plant (JDEP) with its potential for evaluating the interoperability of joint forces slated to arrive in CINC theaters as part of each OPLANs Time Phased Force Deployment List. Such a tool can be used in the OPLAN validation process as well as to establish a baseline from which near, mid and long term solutions can be planned, reflected in the CINCs IPL, executed, and subsequently re-tested. Under Joint Forces Command auspices, the potential exists for the individual CINC IPLs to be grouped under a single Joint IPL or Joint Requirements List. While possibly diluting an individual CINC's priorities, the overall effect may be to strengthen their collective input and bolster the annual Chairman's Program Assessment. Additionally,

individual services' system engineering and acquisition communities may receive more focused and consistent guidance.

From a broader perspective, event participation affords Navy an opportunity to 'strut our stuff' to the members of the Joint Services community and allies who come to these events. This in turn fosters vital data and information exchange, which is the foundation to improved interaction with the other services' current and emerging capabilities. It is a critical step in resolving joint interoperability issues and to Navy success as a service provider to the war fighting CINCs. Event participation also provides exposure to the Navy War College's intellectual and academic communities that are important to defining future roles, missions, and force structures. A good example occurred at the U.S. Air Force Chief of Staff sponsored, Global Engagement IV in October 1999, Navy's current and emerging capabilities were authoritatively portrayed and were reflected in the out briefs given to the Secretary of Air Force and the Chief of Staff of the Air Force.

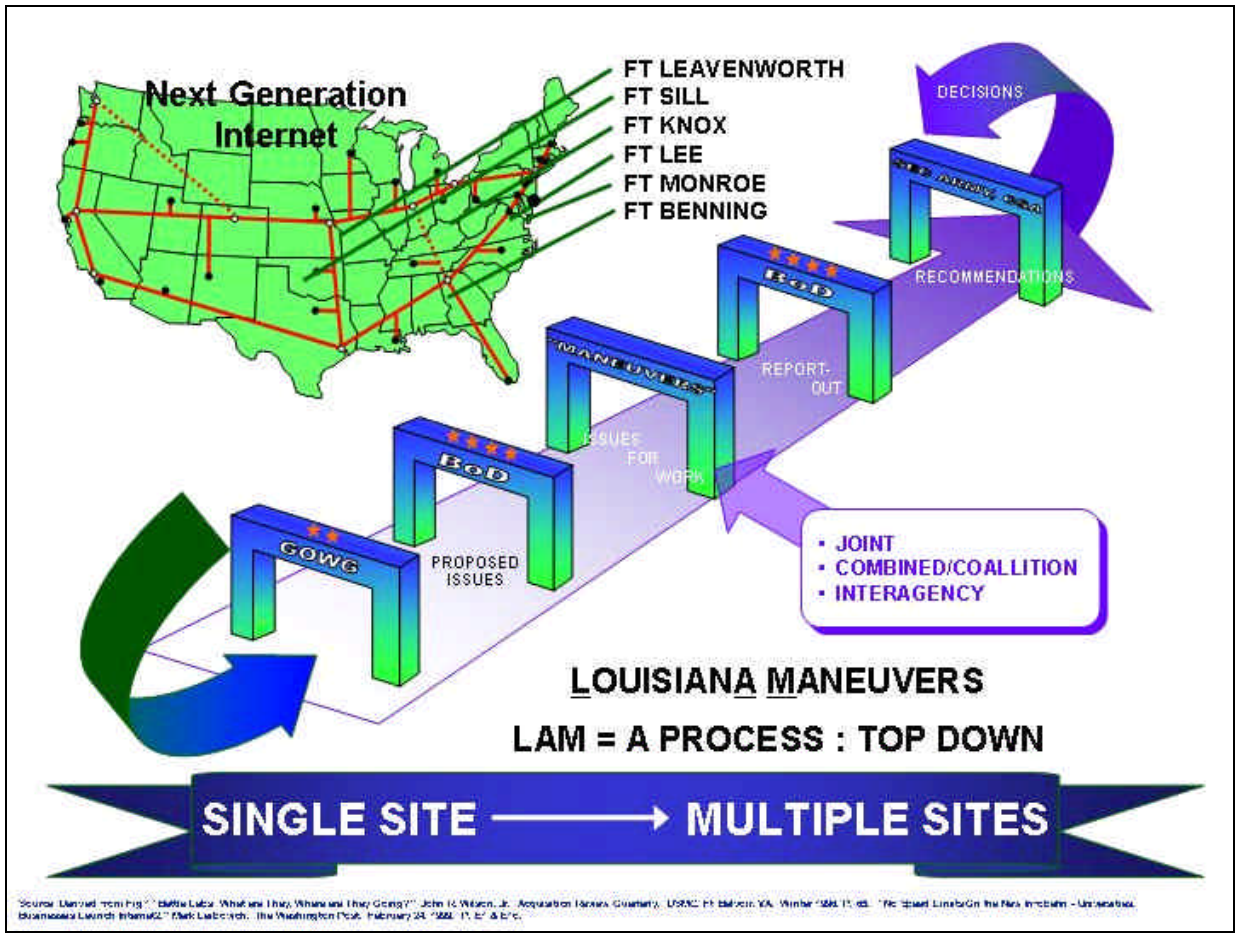

Figure 3. Testing the Ideas and Using the Network

Participation is useful from a 'marketing and education' standpoint as well as being an integral part of system engineering. Participation benefits include supporting the fielding of operational capability by contributing to the concurrent development of CONOPS, tactics, and interoperability, and to the

reduction of the timelines to field those capabilities. (An example is shown in Figure 3 – Louisiana Maneuvers – of the feedback loop similar to that of Operational Engineering, though at a higher level. [Wilson, 1996, p. 65][Leibovich, 1999, p. E1 & E10]) This interaction or bridge between the war fighters, strategists, and the engineering acquisition community is a fundamental component of Operational Engineering. It keeps the end users' needs in the forefront, gives the strategists a firm base of reality to work from, and allows the war fighters to influence the emerging systems that they soon will depend on for successful accomplishment of their assigned missions.

Finally, event participation is a two way street. Navy's on-going role in the system engineering development of the Joint Interface Control Officer (JICO) came about through participation in the Roving Sands and All Services Combat Identification Evaluation and Testing (ASCIET) exercise series since 1996. (This exercise series was renamed Joint Services Combat Identification Evaluation and Testing (JCIET) starting in 2002.) JICO cells have subsequently been deployed during Noble Anvil operations in Kosovo and are active in the on-going operations against Iraq. Another example is the Navy's Area Air Defense Capability (AADC) capability under the program management of

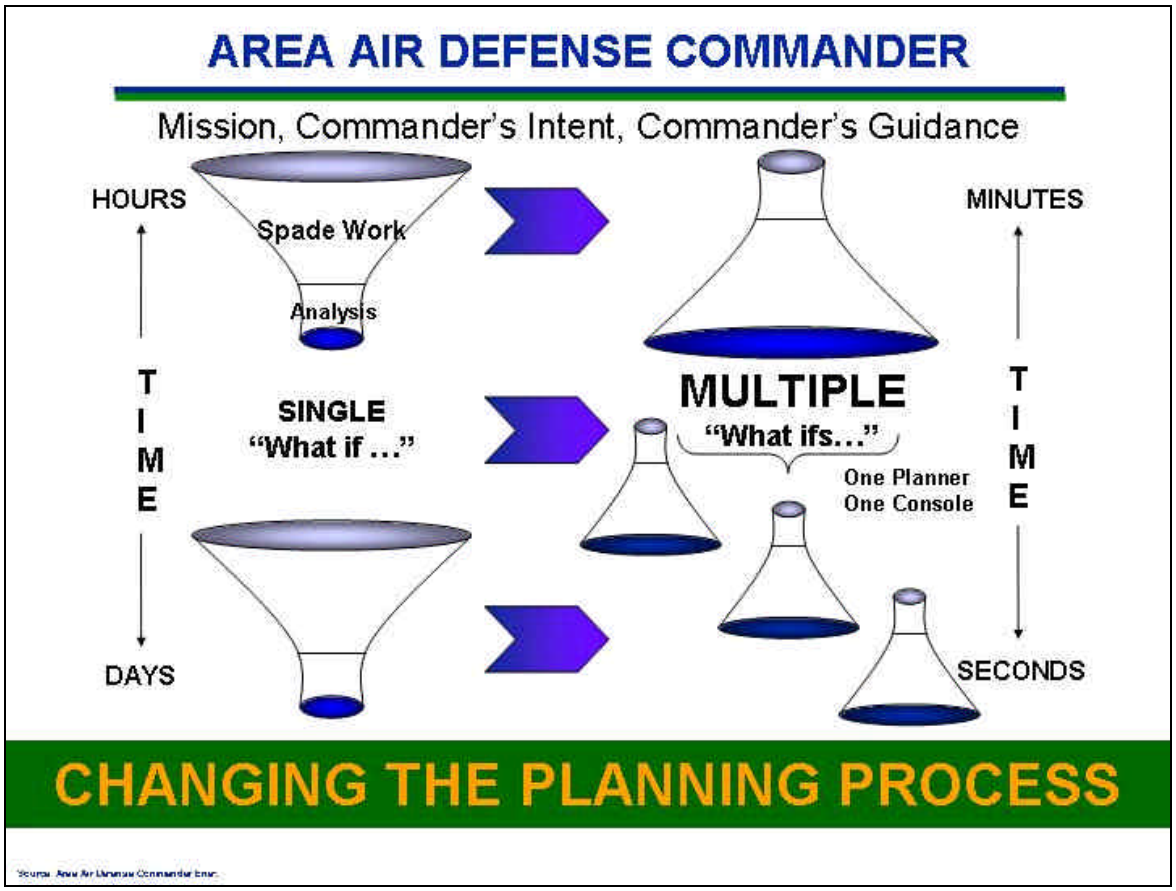

Figure 4. AADC - Helping Accelerate the Decision Cycle

PMS 467 within PEO TSC. (Figure 4 shows the intended reversal in levels of initial work and analysis of options offered by AADC.) This program traces its roots to Navy involvement in Roving Sands 95

and 96 where Navy was exposed to the Army's developing capabilities now resident in the 32nd and 263rd Army Air and Missile Defense Commands.

Accomplishing Operational Engineering

As previously outlined, OE embraces a broader perspective than system engineering.

While including "cradle to grave" system engineering, OE adds emphasis on the concurrent development or co-evolution of CONOPs, TTPs, training, logistics, and joint interoperability. These are the elements that transform a kernel system engineering capability into an operational war fighting capability. Overlaying OE throughout the proven system engineering process results in critical insights being gained early when changes can be made more cost effectively.

Based on the foregoing, the authors believe OE has three goals:

(1) provide greater early interaction between the system engineering and acquisition community, and the principal customer, the war fighters, to ensure that systems will satisfy known, valid requirements;
(2) concurrently engineer system interoperability with other existing and emerging systems with which the system will have to operate in order to ensure a seamless mesh within the joint war (and coalition) fighting environment; and,
(3) accelerate not just system initial operational capability (IOC) but real operational war fighting capability.

United States Warfighting In The 21st Century

". . . the principal operational challenge facing the US military in the 21st century is strengthening and preserving its capability for early, then continuous, application of dominant control effects across the full spectrum of conflict." [OSD DSB, 1999] This is the essence of JV 2020's concept of Rapid Decisive Operations (RDO). RDO implies the balanced mix of combat forces, as well as combat support and combat service support. In short, it includes those intertwined and essential elements of support that enable the application of combat power to achieve the operational objectives necessary to attain the desired political end state. This combat power application is normally entrusted to a designated Joint Task Force (JTF) Commander. This JTF Commander is usually selected from the service that has the preponderance of assets allocated to the assigned task. The last decade, in fact, has seen significant improvement in the ability of individual U.S. service component provided forces to operate as integrated JTF elements.

Political recognition of this US military operational concept exists. As Senator Pat Roberts, (at the time) Chairman of the Senate Emerging Threats and Capabilities Subcommittee, aptly noted, "There is not going to be a mission in the future that is not joint." [Holzer, 2001, p. 22] In fact, Congressional enactment of the Goldwater Nichols Act served as the catalyst for this significant evolutionary step away

from parochial interests toward more effective teamwork [Allard, 1999, p. 254]; and further, this constituted political recognition that the need for common victory transcends individual service interests. [p. 4] Operational Engineering re-enforces this point.

A self-inflicted challenge is the fact that force equipage for combat by the individual services does not fully reflect the planned conduct of joint operations. The fact is

"the law charges each military department to organize, train and equip forces to operate in a particular environment for which it is responsible." [p. 4] . . . "The common thread linking the three is that the services, in preparing their forces for war, can have very different perspectives on war itself, if not on the nature of such conflict, then certainly on the fundamental questions of service roles, missions, and capabilities that would be brought to bear." [p. 6]

This reality is reflected not only in the hard hitting edge of U.S. combat power, but also the ability to interoperate with the other services, as well as in the logistics concepts, practices, and structures that directly support U.S. combat power.

At a time when resources are severely constrained, it should not come as a surprise that individual service program managers focus on acquiring the most service component capability for the given resources. When resources are so limited that numerous programs are in the red, it should not be a surprise that program managers neck down and focus on delivering the minimum capability that arguably satisfies resource sponsor requirements. This acquisition reality is an operational fact of life.

Forces Involved in Rapid Decisive Operations

Forward Deployed Naval Forces (FDNF) consisting of aircraft carrier battle groups (CVBG) and Amphibious Readiness Groups (ARGs) provide global presence that can project significant combat capability ashore. Depending upon geography, the environment, and the capability of the opposing forces, this organic FDNF capability may be all that is needed to execute Rapid Decisive Operations (RDO.) In those cases where it is not, or where split operations have separated this team, additional naval forces, United States Air Force (USAF) Air Expeditionary Forces (AEF), or rapidly deployable Army forces, will need to be called upon, as well as those of allies willing and able to contribute in a sufficient and timely manner.

In cases where RDO requires the insertion of ground forces, both the United States Marine Corps and the Army's XVIII Air Borne Corps (XVIII ABC) lay claims to being America's '911 force.' A forward deployed Amphibious Readiness Group / Marine Expeditionary Unit (ARG / MEU), working independently or in concert with a CVBG (a team forged in the rigors of the inter-deployment cycle) is a combined arms capable team consisting of infantry, armor, artillery, organic air, rounded out with combat support and combat service support. Many are Special Operations Capable (SOC). Coupled with the capabilities resident in the CVBG, the ARG / MEU permits Naval Forces to conduct opposed landings, seize advance bases, conduct amphibious raids and strike suddenly over large distances.

In the case of a MEU, initial force sustainment depends upon the proximity of the Amphibious Readiness Group. The ARG has the capacity to sustain a MEU's combat operations for thirty days. Additional follow on Marine forces may also be able to take advantage of a nearby Maritime Pre-Positioning Ship Squadron (MPSRON). A MPSRON can support a Marine Expeditionary Brigade's combat operations for up to thirty days. The U.S. Army has since embraced this concept, pioneered by the Marine Corps, with its significant capability resident in the Afloat Pre-Positioning Ships.

The XVIII ABC also provides a highly trained, worldwide, rapidly deployable capability which initially consists of a 3,500-man Single Brigade Assault (SBA). Given sufficient airlift, the "ready" 3500-man SBA force from the XVIII ABC can deploy from its base at Fort Bragg and conduct an airborne assault almost anywhere in the world within twenty-four hours of being alerted. In those cases where the ARG may be operating at significant distances away from the CVBG (such as the case of the Kearsarge ARG / MEU in 1996 which was off the coast of western Africa while its supporting CVBG, the Theodore Roosevelt Battle Group was over four days steaming time away in the Mediterranean Sea), the most readily available ground force might be an XVIII ABC SBA. Given the possibility of this occurring, or the possibility that additional ground forces might be needed in addition to those in a ARG / MEU, consideration needs to be given on how the sea based forces can best integrate and operate with the SBA. The key is to capitalize on each other's capabilities while reducing vulnerabilities that exist when these forces operate autonomously.

Although the XVIII ABC can extend the tactical options and range of U.S. striking power, it is reliant upon external support to sustain its initial surge. Further, this highly capable light infantry force does have some significant limitations. Anti-armor weapons consist of short to medium range TOW and Javelin. Organic short-range air defense consists of Stinger. If forced to rely solely on organic capabilities, an SBA is vulnerable to hostile mechanized, and especially armored, forces. This is true unless the terrain or environmental conditions are unsuitable for armor employment. Where conditions favor armor, XVIII ABC air assault and airborne forces are vulnerable. Further, a SBA has no organic capability against medium to high altitude air attack. Capability against medium to high altitude air breathing threats and Theater Ballistic Missiles is non-existent until Patriot, with its high airlift demands, arrives on scene.

Recognition of this fact occurred during Operation Desert Shield when the XVIII ABC was the first significant U.S. ground force in theater.

"The Army 82nd Airborne had troops on the ground earlier, but it was the Marines, with the armor and artillery delivered by MPS ships, that offered the first credible deterrence to a mechanized attack." [Schrady, 1999, p. 57]

In the case of a 3500-man SBA force from the XVIII ABC, initial sustainment consists of what little is carried by the force as well as that which is subsequently air dropped or air lifted in. Force sustainment during high intensity operations is highly dependent upon sufficiently available, uninterrupted air

sustainment. [RS 2000] During Operation Desert Shield, MPS ships supported arriving Marine forces and also provided early support to the 82nd Airborne.

A CVBG can provide air defense, offensive air support, and land attack support of forces such as the air borne and air assault echelons of the XVIII ABC. Navy's Linebacker capability currently provides a limited Theater Ballistic Missile Defense (TBMD) capability that will improve with the introduction of the Navy Area and Navy Theater Wide ballistic missile defense capabilities in the approximate 2003 and 2007 time frames respectively. [Authors' Note: The announced restructurings / realignment of the Missile Defense Agency (from the Ballistics Missile Defense Organization) will very likely change the timelines (and titles) of these efforts.] Further, the CVBG and ARG / MEU have significant fuel, fresh water and food resources that can, if necessary, be reallocated by a JTF commander until more conventional logistics sustainment can be put in place. Although a SBA from the XVIII ABC travels light, this does not mean that it has to be constrained by "light" capabilities. The SBA can leverage off capabilities resident in the other service components that are operating within supporting distance.

Central to the successful execution of this joint operational and logistics perspective is an understanding among the service component elements of the needs and capabilities resident in each of the other service components. During Roving Sands 2000 / Purple Dragon 2000, the senior Liaison Navy Officer (LNO) to the XVIII ABC used his daily general officer briefing sessions to not only present the status of current and planned operations, but to also specifically highlight the organic air offense, air defense, strike and logistic capabilities resident in the CVBG and ARG / MEU. Further, the senior LNO specifically discussed how these capabilities could contribute to the land campaign being waged by elements of the XVIII ABC. These insights were useful to the XVIII ABC's commander and senior corps staff. As then Lieutenant General Kernan [2000] stated, "We learned a great deal about naval operations." In fact, the capability and capacity of US Navy ships to make fresh water attracted significant interest.

Acting in coordination during Roving Sands 2000, Purple Dragon 2000, the USS Enterprise Battle Group and the XVIII ABC demonstrated the ability to work in synchronization. Joint force strength increased as component limitations and weaknesses were mitigated. Similar to the Air Land Battle concept that served the United States so well during Operation Desert Storm, Roving Sands 2000 / Purple Dragon 2000 highlighted the value of joint Sea Land operations that expanded the playing field from just Naval forces (Marines and Navy) to include other rapidly deployable forces such as the XVIII ABC and elements of the U.S. Special Operations Command (SOCOM). Naval forces can support the application of Land force power at the decisive points at the decisive times. Essential to the success of these joint operations are knowledgeable and aggressive liaison officers, who can identify fleeting opportunities and courses of action; succinctly advocating timely and effective responses. This is essential to joint force execution of RDOs and to the ability of U.S. and allied forces being able to operate inside of the enemy's Observe, Orient, Decide Act (OODA) loop.

Further Sea Land force experimentation and exercises may provide valuable insights especially in light of the Army's creation of airlift deployable Interim Brigade Combat Teams and the Navy's development of the DD-X/DD 21, Zumwalt class; ships currently with a strong emphasis on land attack capability.

JTF exercises between deploying CVBG and ARG / MEU with the XVIII ABC's brigades scheduled to be on alert status during the deployment of those Naval forces, including incorporation of the AEFs slated to be deployed during that time frame, might also pay off in near term operational warfighting capability.

Still, crises will emerge on short notice in areas where U.S. forward deployed forces are not present. In these cases, the United States may constitute a combined arms Sea Land force for RDOs with whatever forces are available. These forces may not have had the benefit of planned joint work-ups with each other. This has doctrinal, process and training implications particularly with respect to CONOPS, tactics, techniques and logistics. This needs to be addressed not only by the service components, but also by the joint commands tasked with providing ready forces to the forward deployed Commanders in Chief. This will enable the United States to credibly react "to fast breaking changes in the international situation." [Allard, p. 162]

Joint Operational Logistics in the 21st Century: The Enabler of Rapid Decisive Operations

The goal of Rapid Decisive Operations should be to disrupt enemy offensive capabilities, break the enemy's defense cohesion, and then exploit the breakthrough through speed. "The more speedy and uninterrupted the advance, the greater the chance of success. This contributes to shock." [Guderian, 1999, p. 51] Surprise, contributing to shock, can have a decisive impact in war. The application of novel tactical and operational concepts can upset enemy calculations and timetable estimates and add to the shock value inflicted by U.S. combat forces. This contributes to the ability of U.S. forces to seize and maintain control of the OODA cycle and set the pace of combat operations. It is "...shock action - actions that foreclose enemy options," [JFQ, 1998, p. 89] that is the key to victory in the context of RDOs. Further, the ability to execute rapid exploitation is necessary to convert tactical victories or advantage into broader, decisive operational, and even strategic success. Speed is essential to the exploitation of fleeting opportunities and to derail enemy initiatives. When asked the secret behind his stunning string of victories, Confederate General Nathan Bedford Forrest said, "I get there firstest with the mostest." [Ward, 1990, p. 270]

As Colonel General Guderian noted, forces "need sufficient power to bring about a rapid peace." [Guderian, p. 23] Likewise, RDO, which is philosophically similar to blitzkrieg, seeks the quick attainment of results. There is a correlation between this "sufficient power" and logistics support. Logistics support has to be in reasonable proportion to the objectives in order to possess a realistic chance of success with a tolerable degree of risk. It is this sufficient power that enables a break-in to be expanded into a breakthrough and ultimately to enable the exploitation phase of RDO. Unfortunately, "today's US military suffers from a separation of logistics from operations, an organizational principle of long standing, and a reliance on mass, rather than efficiency and certainty, to be effective." [OSD/DSB, 1999]

"As now configured, the logistics system frequently constrains operations." [OSD/DSB, 1999] It is a brake on brilliant ideas and plans. Concepts and plans that are not grounded in logistics reality have little chance of being successfully executed. The goal of RDO is likewise subject to this same logistics truth. On the other hand, improved joint logistics has the potential to improve the degree of mobility and shock power of our forces. Logistics is therefore an essential factor that needs to be addressed in the formulation of RDOs concepts. Effective and efficient joint logistics is the engine that enables the pace of joint operations to be accelerated and extends the operational range. What holds true for the warfighting principle of Unity of Command needs to include not only the combat forces but also the combat support, combat service support, and logistics that are essential to sustaining operational warfighting capability.

In order to bring this about, autonomous service interests must be subordinate to joint operational warfighting capability and the overall welfare of joint task forces. Focused joint operational logistics will fully support RDO when U.S. JTFs achieve "the fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while en route, and to deliver tailored logistics packages and sustainment directly at the strategic, operational and tactical level of operations." [Schrady, p. 64]

Joint Operational Logistics

Joint Doctrine says that

"to exercise control at the strategic, operational and tactical levels of war, commanders must also exercise control over logistics. Control can not be exercised without timely and comprehensive information, a picture of the battlefield logistically speaking, including not only what is already on the battlefield but what is flowing into it as well." [Schrady, p. 50]

JV 2010 and 2020's emphasis on Focused Logistics highlights the importance of logistics to operational capability. In order to fully contribute to operational capability, logistics must attain the necessary degree of jointness and interoperability that is more commonly found in JTF operations.

There is significant historical precedence for this emphasis on logistics.

"The genius of Frederick the Great brought the military staff to an equally unprecedented level of efficiency. One of his most notable achievements, and an important step toward future organization, was the development of the quartermaster-general's office, a logistic post he expanded to embrace the function of reconnaissance, intelligence and operations. He recognized the need to strike a new balance." [Allard, p. 30]

Guderian, the brilliant theorist of what became known as blitzkrieg and one of its most successful practitioners, also realized the importance of logistics and noted the importance of extending "the new dimension of logistics into combat power." [Guderian, p. 139] In a similar vein, U.S. logistics doctrine,

techniques and procedures must evolve in accordance with political and military change that will enhance the credibility and capability of forward presence operations in the 21st century. [Ibid]

The DOD Transformation study recognizes the broad need to improve Joint Logistics. More specifically, there is a need to further develop the sub-set of Joint Operational Logistics. The first step is to view interoperability, in its broadest sense. Interoperability is not simply Battle Management, Command, Control, Communications and Intelligence (BMC3I) focused on operations. It must also encompass logistics. The reason is simple. Logistics bounds what is feasible. Logistics drives what is achievable on the battlefield. Logistics interoperability is a critical subset of overall operational interoperability that to date has emphasized BMC3I connectivity.

Achievement of operational logistics interoperability will not only require use of the Global Command and Support System and access to the existing Defense Logistics Agency and service databases and staffs. In order to be capable of supporting real time decision making, operational logistics will require full integration with the Network Centric Warfare infrastructure supporting combat forces. Whether this entails participation in multiple subnets, including local subnets, is a topic worthy of joint conceptual development, experimentation and validation.

The Common Operational Picture needs to include the common operational logistics picture. This picture needs to reflect the perspective that available U.S. Operational Logistics not only consists of what we bring with us; it also includes what we send to sustain us. Further, it includes what we can obtain from allies and neutrals as well as what we can seize from an enemy and subsequently utilize.

Logistics needs to focus on those key items that enable U.S. forces to establish and sustain presence. Presence may depend upon the timely and intact seizure of key facilities and equipment. This occurred during the Marine assault on Guadalcanal. Using captured weapons and ammunition, the Marines "strengthened their defenses with the enemy's undamaged engineering equipment and rushed to complete the airfield (Henderson field) as quickly as possible." [MacDonald, 1986, p. 74] Although U.S. Forces may occasionally operate in areas where infrastructure is superb, such as that offered by Saudi facilities during Operations Desert Shield and Desert Storm, U.S. forces must be able to operate and be supported for sustained periods in complex environments that will often possess little indigenous infrastructure. Operation Enduring Freedom is an excellent example of this.

Logistics will also need to focus on key consumables that sustain U.S. forces. Among these consumables, as validated during Desert Shield and Desert Storm, are water, fuel, food, and ammunition. Water and fuel are likely to be the largest commodities required as measured by bulk and consequently, impact on the U.S. military transportation infrastructure. In the context of those RDO that may require the use of expeditionary Army ground forces, with a strong requirement for airlift, the necessary additional logistics burden of sustainment or 'tail' comes at the expense of rapidly deploying 'teeth.'

The United States Marine Corps has over two hundred years of experience of participating in naval operations. The Marine Corps treats the oceans as highways that allow them to engage the enemy

when and where they choose. The oceans are the Marines floating airfields and afloat logistics bases. The oceans are the source of air and naval artillery fire power and are the key enabler and sustainer that are central to concepts such as Ship to Objective Maneuver, Operational Maneuver from the Sea, and Expeditionary Maneuver Warfare. Although the Army has emulated the Marine Corps and embraced the value of Afloat Pre-positioning Ships, the Army has not fully exploited the capabilities resident in FDNF.

Expeditionary ground forces projecting power overseas are likely to be initially dependent upon finite airlift and subsequently sea based transport for the critical logistics support that allows them to have decisive impact. The Army needs to routinely embrace Naval forces as part of its combined arms team, influence the development and outfitting of those forces, and expand that outlook to include a combined logistics team. The key here is the development and acceptance of a joint operational logistics capability and team. This must influence the manner in which U.S. forces train, develop and operate combat logistics forces to support the front line warfighters.

In addition to highly capable and mobile Naval firepower, the Army can gain major operational advantages by using the warships of a CVBG and ARG / MEU as floating logistics bases in the early phases of RDO. This is especially true if the Army and Naval units involved have previously operated together in JTF exercises. This will improve mutual understanding of each other's capabilities and limitations, as well as interoperability. Additional value is gained if the loadout of the Naval forces can be somewhat tailored in anticipation of working with those Army units in the projected forward deployed area of operations. Minor engineering changes and modifications, including procedural and technical safeguards, that permit the refueling, rearming and staging of Army helicopters aboard ships, the provisioning of shipboard produced fresh water to nearby ground forces, and even food, if required, can accelerate and sustain the application of Army combat power and have a material influence on the course of ground fighting. Conceptually, this extends interoperability beyond that normally associated with Battle Management Command and Control, to include force wide logistics interoperability. This does not have to include total logistics interoperability, but only interoperability with those key capabilities that support RDOs.

Interoperability in the broadest sense must embrace joint logistics. Redundant paths are needed for the most critical combat logistics items: fuel, water, ammunition, and food. With respect to Operation Desert Shield / Operation Desert Storm, "All the Marine generals involved have said that fuel, ordnance and water were the commodities that drove the logistics situation." [Schrady, p. 58] Logistics failure can mean the difference between fighting a battle of operational level maneuver and firepower and fighting a battle of attrition at the cost of increased U.S. casualties. Logisticians must keep informed of the current and projected tactical and operational situation in order to satisfy the war fighters needs. This requires war fighters to communicate frank estimates of the situation with their combat support elements.

Using the capability resident in Naval forces may permit Army combat power to take action sooner and thus increase the shock delivered upon an adversary. Further, the more rapid application of significant combat power may upset enemy estimates of operational timetables. An additional plus is the reduction

of the vulnerable logistics footprint ashore and the need to detail ground forces to protect it. An afloat, mobile operational logistics reserve confers significant tactical and operational flexibility. Besides being harder for an enemy to target, it is easier to direct the logistics flow where and when it is needed. This might impact the course of a campaign.

Negatives, however, need to be understood. Suitable secure facilities will be needed in order to conduct logistics transfers from the afloat to the shore based units especially in the decisive sector of operations. Suitable shore based infrastructure may also need to be either seized early on for planned utilization or rapidly brought into theater. Further, if sea control is an undecided issue, then there is an increased risk that damage to, or competing operational demands on the Naval forces could diminish the speed and amount of logistics that can be provided to ground based forces. In the case where fuel and / or selected types of munitions, such as Hellfire are provided in significant quantities to ground forces, if the follow-on replenishment of Naval forces is subsequently delayed or disrupted, the anticipated sustained effectiveness of the Naval forces may be reduced. It is a risk management decision that needs to be made by the JTF Commander.

The JTF Commander's span of control must include full understanding of the capabilities of his service components to logistically support joint operations. The Commander must be able to judge when providing such support has a perceived or real adverse impact on one component of the force, even though the balance supports the advancement of joint operational success. The goal is to improve overall joint tactical flexibility and success. A knowledgeable joint planning staff is critical to accomplishing this; a staff with a flair for how logistics can advance or constrain fleeting operational opportunities. There is a need for both horizontal and vertical staff connectivity on a joint level. Experimentation, a concept embraced by CINC Joint Forces Command, can support determination of what will, and what is likely to not, work under combat conditions. Based on these insights, the IPLs that are produced by the Unified CINCs can be used to influence not only joint tactics, techniques and procedures but also the service controlled acquisition community programs that are essential to the OE that produces integrated war fighting capabilities. The objective here is to improve the deployability and supportability of U.S. forces while embracing a central concept of Focused Logistics; that the tail must be at least as agile as the teeth.

Joint Operational Logistics may be able to benefit from capabilities and practices that are being developed and that are resident outside of the DOD. Selective utilization of Commercial Off The Shelf technology, improvements in cargo tracking, and access to corporate data bases and key personnel in a national emergency are prime examples. Still, these capabilities may come at a cost, whether it is increased susceptibility to information warfare, or the ability of an adversary to better discern not only U.S. forces movements but also intent and capabilities.

Certain business practices may be dangerous to embrace. Commercial cost effective 'just in time delivery' with its acceptable degree of commercial risk might equate to just too late in the context of military operations. Overly optimistic assumptions concerning U.S. forces ability to make due on 'shoestring logistics' could impact a prudent commander's confidence in the ability to successfully execute planned operations. Failure to adequately address risk and to ensure that the means provided

to the operational commander are proportional to the objectives may result in what Guderian called "the revenge of reality." [MacDonald, p. 52]

Concepts and Tools to Support a Joint Operational Logistics Capability

Joint Operational Logistics will be an essential enabler that supports the ability of U.S. forces to achieve swift and decisive victories in future conflicts. "Logistics is a central part of the operational and tactical levels of warfare and must be included in the command and control system of the joint force commander." [Schrady, p. 50] The JTF Commander, as well as the J4, needs timely, rapidly understandable, meaningful logistics information in order to be able to issue realistically executable orders. This quality of logistics information is necessary if the JTF Commander is to have comprehensive, operational battlespace awareness. Battlespace awareness includes logistics awareness. This awareness is central to effective command and control as well as to the Commander's ability to evaluate and order alternate courses of action. This is where Focused Logistics and Information Dominance merge as envisioned in JV 2010 and 2020.

A common, secure, networked, Joint Logistics picture that supports the JTF Commander, his Joint staff, and his key service component commanders, is vital to maintaining shared, logistics situational awareness. [Cahlink, 2000, p. 36] This common picture will provide insights of what is available and where, along with realistic projections of what will be available in the near term. It will serve as an aid in identifying opportunity as well as vulnerability both for U.S. and hostile forces.

This common Joint Logistics picture has to be a timely, readily understandable and credible representation if it is to support operational plans and execution. It must support a true estimate of the situation. Maintenance of this picture should be done by specifically designated personnel of the Joint Logistics Operations Center (JLOC). This logistics picture needs to integrate with the current and the projected tactical and operational pictures. Success will depend upon logisticians having access to these pictures and in logistician involvement in follow-on tactical and operational planning. This is a basic operational necessity.

JLOC support to the JTF Commander can be enhanced. JTF Commanders have at their disposal the services of the Joint Warfighting Analysis Center (JWAC) based in Dahlgren, Virginia. JWAC provides specialized tactical weapons targeting services against key enemy targets. This specialized targeting is designed to achieve significantly greater results than would normally be achievable by the force being applied. In essence, JWAC seeks to achieve the traditional Judo school maxim "Maximum efficiency with minimum effort." The time is ripe to extend this concept to operational logistics.

This extension is the development of a Joint Logistics Analysis Center (JLAC). JLAC's purpose is to support the JTF Commander with fused operational and intelligence logistics data, analysis and recommendations to support current and projected operations. It will consist of forward deployed elements, integral to the individual JTF Commander's J4 organization, as well as possess a reachback capability to additional Joint Staff expertise and resources. It will be able to utilize national intelligence and other government resources. JLAC's purpose will be to support the achievement of RDO through

the accelerated build up and sustainability of U.S. and coalition forces, obtain information to perform time critical analysis of logistics as an integral part of the evaluation of alternate courses of action by the JTF Commander, and the targeting of key enemy logistics resources.

During Operation Desert Shield and Operation Desert Storm, U.S. and coalition forces had the luxury of six months and established Saudi infrastructure to build up our theater wide logistics capability to support our operations plans and subsequent plan execution. Although decisive with respect to the liberation of Kuwait, Operation Desert Storm was not rapid. If the U.S. expects to engage in RDO in the 21st century, and given Air Mobility Command's excellent but the finite capabilities, can U.S. forces satisfy required logistics requirements through alternate means, thus permitting Air Mobility Command assets to be used for re-enforcement vice sustainment? The answer in some cases may be yes and JLAC can support this.

As part of the OPLAN process, JLAC should conduct an analysis of friendly and neutral sources of key consumables and other logistics requirements in the designated area of operations. JLAC's perspective should be that the world is our supply dump. JLAC should also analyze potential hostile logistics resources, capabilities and limitations. This analysis should be conducted from two distinct perspectives. First is the degradation, capture, or destruction of enemy logistics capability in order to diminish hostile offensive and defensive capability. Second is the systemic planning to capture and exploit enemy logistics resources for the benefit of U.S. and coalition forces. In both cases, the product is advice and recommendations to the JTF Commander and the real time monitoring of results.

Targeting of key enemy logistics resources has numerous precedents. The Viet Cong did this against U.S. forces in Vietnam, the Confederate forces did this against the Union forces during the American Civil War, and General Sherman did this on his march to the sea. Guadalcanal is a superb expeditionary force example. The unplanned, premature withdrawal of U.S. Navy forces and supply ships left the First Marine Division ashore

"short half of the division's supplies, much of its reserve ammunition, most of its barbed wire and heavy artillery. Nevertheless, the Marines made the best of their unattractive situation supplementing dwindling rations with Japanese rations and whatever edible roots and berries they could find. Using captured weapons and ammunition, they strengthened their defenses with the enemy's undamaged engineering equipment and rushed to complete the airfield (Henderson Field) as quickly as possible." [MacDonald, p. 74]

In addition to 'living off the land,' Lieutenant Colonel Mike Edson, USMC, and his Marine raiders and paratroopers did their best to 'live off the enemy.' Their raid on the Japanese supply dump on Taivu was a classic example. [p. 77]

Living off the enemy offers several advantages. These include letting the enemy pay for the logistics items and transporting it within reach of U.S. forces. Seizing enemy resources denies it to them while helping U.S. and coalition forces. Seizing usable enemy resources frees up Air Mobility Command and

other transportation assets as noted earlier. Threatening enemy logistics will force the enemy to use valuable forces to guard these assets.

In a modern context, there is no reason why expeditionary forces such as the XVIII ABC should not be able to live off the enemy wherever possible. Key to 'living off the enemy', however, is good intelligence and knowledge. This is where a JLAC can make a difference. Further, JLAC can identify the availability and accessibility of other neutral, coalition and other joint service logistics resources, including those present in nearby FDNF. A mobile, operational logistic reserve such as that resident in a FDNF can confer great tactical flexibility.

JLAC will also contribute through its ability to conduct force wide logistics analysis and present options to the JTF Commander. To accomplish this, JLAC's may require the development of a Logistics Commanders Operations Planning Tool (LCOPT). LCOPT is a decision superiority tool that has the potential to offer U.S. forces an operational advantage through its ability to permit command to make better informed decisions more rapidly than potential adversaries. Conceptually, it would perform a function similar to what the AADC module does for Theater Air and Missile Defense (TAMD) planning and operations support.

LCOPT would be developed by a joint and industry team, with representatives from the intelligence, operational and logistics communities. Experts involved in the manufacturing, shipping, storing, and handling of key logistics elements, including consumables such as fuel, water, ammunition, and food would be involved. When developed, LCOPT would support current and projected operations. It would have access to all source intelligence, support rapid response as well as indepth analysis, incorporate force planning modeling and simulation tools, and support prediction and projection of force requirements. LCOPT will take into account force combatant and logistics capabilities and limitations, consumable status and use rates, the current and projected geographic location of units, as well as communications and connectivity paths. LCOPT will support analysis to identify and minimize own force critical node vulnerabilities including alternate or back-up connectivity plans. It will support force logistics cover and deception operations. An important attribute will be the need to be flexible and to support "the needs of the situation of a fast moving force," as pointed out by Guderian. [p. 171] LCOPT, as a key JLAC tool, will provide U.S. war fighters with an operational information advantage that can be leveraged to sustain and increase combat power.

This expanded degree of operational logistics information availability will improve command's ability to allocate resources to achieve maximum effectiveness with the resources at hand. This logistics information sharing will unleash latent combat power resident in the JTF that has previously been untapped due to a lack of logistics synchronization. This logistics information will not only be used to obtain maximum efficiency from available logistics capability for U.S. Forces but to also specifically target those logistics elements that if degraded, destroyed or captured can inflict the degree of damage that U.S. forces wish to inflict on the enemy.

Allard [p. 29] has correctly stated that "The larger the force and the more varied its units and operating characteristics, the more complex were the tasks of logistical support and operational employment.

Thus the need for better tools and concepts." The integration of a JLAC capability into the existing JLOC structure, supported by a LCOPT decision support tool, coupled with a common Joint logistics operational visualization tool, staffed by a broad base of experts, provides the essential elements of an effective logistics command and control system. Through the power of network centric warfare, this system offers the benefits of centralized control and decentralized execution of joint logistics with the potential to maximize operational effectiveness. This will contribute to operational advantage over U.S. adversaries.

Transformation to Achieve the 21st Century Joint Operational Logistics Capability

The DOD Logistics Transportation, Volume I Final Report, December 1998 made several observations on the state of military logistics. Among these were that

"The military logistics system is a critical enabler of deployment, then sustainment, of dominant full spectrum engagement effects," and further, that "Failure to seamlessly blend military logistics with operations will be a showstopper for DOD's planned Revolution in Military Affairs." [OSD/DSB, 1999]

Senior DOD leadership has identified significant deficiencies with respect to how logistics currently supports U.S. forces. There is a need to 'achieve a true transformation.' The hope is that a

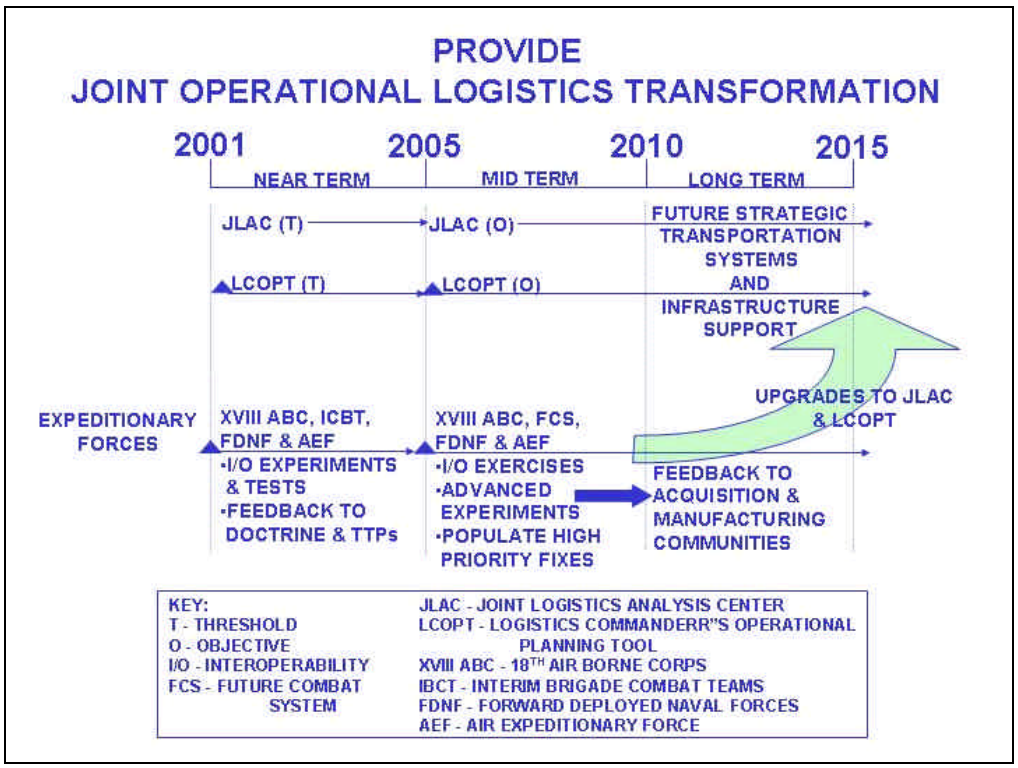

Figure 5 - Joint Operational Logistics Transformation

"Transformed Logistics System can be responsive to CINC (Joint Task Force Commander) needs, support rapid closure of combat power, permit a smaller footprint - both people and equipment, be more agile, response and survivable than today's system, (and) fully integrate business processes and information systems." [OSD/DSB, 1999]

The key to successful logistics transformation is a comprehensive, resourced approach that concurrently develops near, mid and long term improvements and fields these to U.S. war fighters. Figure 5 provides some specific insights that contribute to this comprehensive approach.

As depicted in Figure 5, the Near Term focus emphasizes realization of those capabilities that can be rapidly attained with relatively small changes and resource expenditure. Specifically, it encourages innovative thinking with a focus on joint, vice component service oriented, operational process improvement. The objective is to take better advantage of what already exists through improved access. In the context of RDO, especially in the early critical first days, a high percentage of the initial logistics required by the first ground expeditionary forces on scene may be available from local sources. This would permit the reallocation of finite assets, such as airlift, to re-inforcement vice sustainment of the initially deployed forces. This equates to more combat power on scene more rapidly.

With respect to relatively lightly armed forces, such as the forces in a XVIII ABC SBA, ready access to key consumables are the prime logistics constraint. As noted by Schrady [p. 71], "The critical commodities for ground forces are fuel, water and ordnance, but for ships in combat they are only fuel and ordnance; ships make fresh water from sea water." In fact, "Navy afloat logistics requirements in war differ little from those of peacetime. The principal difference is that in wartime live ordnance is expended and must be resupplied to afloat forces." [p. 59] Although true now, this may be exacerbated if the Navy is called upon to re-arm early arriving expeditionary forces with common weapons such as helicopter launched Hellfire missiles.

Ships make substantial quantities of water; water that can be provided to local expeditionary ground forces. ARG ships each carry two, one thousand gallon water buffaloes that can be used to transport water. Early entry of a Naval Construction Force Air Detachments may enable expeditionary forces such as a SBA from the XVIII ABC to better tap into the logistics capabilities resident in a forward deployed Navy carrier battle group, especially in the absence of the MEU /ARG. These Air Detachments not only can repair battle damage and construct urgent projects required by OPLANS during the early stages of a contingency execution, an air detachment can deploy within 48 hours with 89 personnel and is capable of sustained operations in contingency or war time conditions for 30 days without re-supply except for more restrictive limits on subsistence, fuel, and ammunition. This detachment can also bring in four, 1000 gallon water buffaloes, in addition to a front-end loader, a back hoe and generators. The water buffaloes, in turn, can be used to take water from pier side Navy ships and transport this to ground forces if needed. Helicopter delivery of filled water buffaloes staging from the flight decks of ships at sea may also be an option. This equates to the all essential Last Mile connectivity.

U.S. Navy LM 2500 gas turbine powered warships and aircraft use JP-5 fuel. U.S. Army helicopters use JP-8. The principal difference is that JP-8 has a lower flash point and posses a greater hazard if used aboard ship. In the event that an aviation brigade component of an expeditionary ground force arrives in the early phase of an operation, Navy JP-5 fuel can be used by the Army's aviation brigade helicopters. Key technical factors that need to be examined however include such basics as fuel nozzle fittings, electro-magnetic interference, and in the case of smaller warships, landing footprints. Fuel nozzle converters that permit Navy JP-5 refueling of Army helicopters are carried in Army aviation support battalions. These should also be part of Navy aviation capable ships Consolidated Shipboard Allowance Lists of equipage. Operational safety requires detailed consideration.

The MEU / ARG has combat supplies for thirty days, which if necessary, can be re-apportioned by the JTF Commander and used to support initial entry Army ground expeditionary forces such as a SBA force. The trade off is a reduction in MEU sustainability, which may be an acceptable risk depending upon the proximity and timeliness of follow on logistics sustainment.

During Operation Desert Shield and Operation Desert Storm, "CENTCOM logistics contingency plans were based on the doctrine that each service would train, equip, and sustain its own forces in the CENTCOM area of responsibility. Each service was responsible for its own logistics, except that common-user support (such as water and food) would be provided by the component having the greatest presence." [Scrady, p. 53] Continued reliance on this type of logistics doctrine may adversely impact the ability of U.S. forces to engage in RDO.

The above examples on water, fuel, food and re-armament are illustrative of how a joint operational logistics perspective, advanced through experimentation, improved and validated logistics techniques, accompanied by any necessary engineering modifications and additions, can greatly advance U.S. forces ability to conduct joint, RDOs. Interoperability in this broadest sense is not a radical concept. U.S. interoperability with NATO included not just interoperability from a BMC3I systems perspective, it included interoperability on items as diverse as small arms ammunition, air to air missiles, and the standard shipboard NATO underway refueling coupling. The real challenge is not likely to be the engineering modifications needed, rather it is likely to be service cultural and the willingness to evolve. Further, a JTF Commander must be willing to reduce one component's margin to support the greater common good. It is important to break down the psychological and physical barriers of individual service logistics autonomous outlooks and to function logistically as we intend to fight - from the perspective of a joint force. National interests and joint operational advantage are paramount to an individual service's benefit.

The development of the JLAC concept and its supporting tool, as depicted in Figure 5, should emphasize early development of decision support capability and initiate incremental improvements based on end user inputs. The spiral software development process may be an appropriate model for LCOPT with the achievement of a near term threshold capability followed by attainment of a mid term objective capability. Experimentation and operational exercises are an integral part of this development process.

The bottom line, however, for allocating resources to LCOPT tool development and establishment of a JLAC, is value added to the operational commander.

Experimentation and exercise results need to be fed back into the Acquisition, Engineering and Manufacturing communities. Feedback to the Defense Logistics Agency, service program managers, and to industry is essential if joint operational logistics is to become institutionalized. Advanced Concept Technology Demonstrations and CINC Initiative Funds need to support logistics experimentation. The Joint Staff and Joint Forces Command need to weigh in and ensure that the services' program managers are properly resourced to integrate assigned joint logistics requirements and capabilities as needed, and to hold these program managers and the Defense Logistics Agency accountable for results. A comprehensive approach is needed because logistics and maintenance decisions made during the acquisition process impacts on the CINCs JSCP tasks and plans.

Long term transformation will also require the support of the Joint Staff, the services, Joint Forces Command, and the Defense Logistics Agency among others. These commands and agencies must keep a broad, opportunistic outlook in a wide range of relevant fields and technologies. These include, but are not limited to, new fast transportation systems; secure, survivable and sufficient information technology; management of unique personnel assets; and pro-active involvement in setting international standards including parts nomenclatures and connectors. An important caveat, however, is that the advantages of embracing and fielding the newest technology must be balanced against the needs for process standardization and force interoperability.

The DOD Logistics Transportation [1998, slide 6] study notes that the U.S. wishes to go from

"today's capabilities of heavy forces in weeks and very light forces in days (to) entry in twenty four hours and sustainability in seven days . . . (to go from a) slow, inflexible planning process based on inaccurate data (to) a planning process that is rapid and flexible . . . (and from a) large and fixed in-theater footprint (to one that is) small, dispersed, (and) mobile."

There is envisioned a requirement to enhance global mobility and at the same time to streamline combat support. Logistics situational awareness improvements are needed, as well as the need to protect our key information networks and investing in redundant capability where operationally necessary. There is a general consensus that our information systems "should run in the Common Operating Environment and employ principles of Open Systems for information acquisition and sharing." [DOD, 1998, p. vii] These are profound changes, yet "profound change only takes place when new concepts of operations incorporating new technologies are developed." [Ftizsimmons & Van Tol, 1994, p. 25] The purpose of this paper has been to propose these new concepts of operations, along with the necessary supporting tools, in the hope of stimulating the development of the profound changes that will be needed in order for U.S. forces to be able to successfully execute Rapid Decisive Operations in the 21st century.

Summary And Conclusions: Joint Logistics - Fortes In Unitate [Strength In Unity]

There is significant value in creating a Joint Logistics Analysis Center (JLAC), akin philosophically to the Joint Warfighting Analysis Center. JLAC will have a primary focus of targeting the enemy logistics and where possible embracing LtCol Merritt Edson's philosophy of 'living off the enemy.' In addition, the JLAC should identify neutral or available allied "sources of supply" that can be readily tapped in order to accelerate U.S. combat operations. The JLAC would have access to the logistics and operational network centric warfare nodes. (This transformation toward Joint Logistics is depicted in part within Figure 6.) It would be fed by all source intelligence information. It would be staffed by a balanced, combined logistics team composed of intelligence specialists, field and headquarters logisticians, front line warfighters, engineers, experts from the acquisition community and recalled reserve personnel with special knowledge of the area of operations and the key commodities, commodity storage and transportation capabilities of the region. The JLAC, in turn, needs to support the Joint Logistics Operations Center (JLOC) (one already exists in PACOM) while reporting directly to the JTF J4. JLAC not only needs to identify usable logistics capability outside normal DOD channels, it also needs to identify the people with special skills: active duty, reservists and industry, who can operate and maintain equipment and facilities obtained outside these channels. Further, the JLAC needs to have an integral "red force" capability that can conduct logistics vulnerability assessment of own forces and provide appropriate recommendations to the JTF J4.

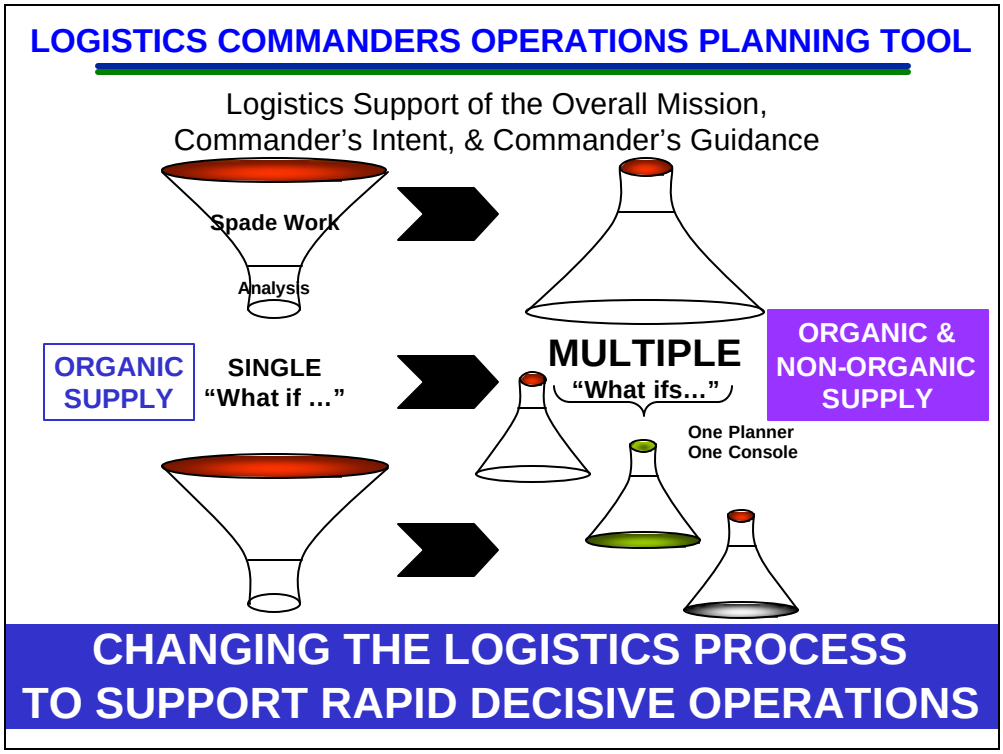

Figure 6 – Logistics Commanders Operations Planning Tool

JLAC effectiveness can be enhanced by a robust modeling and simulation capability and logistics planning tool equivalent to what the AADC module does for air defense planning. Working in conjunction with the JLOC, such a Logistics Commander Operations Planning Tool (LCOPT) needs to support the development of alternate courses of action that allow the J4 staff to recommend options to

the JTF Commander. Given sufficient modeling and simulation capability, JLAC may be able to identify operational opportunities. Further the LCOPT's modeling and simulation capability may be able to support JSOTF missions to seize key enemy logistics nodes and preserve these for use by U.S. forces.

Rapid reaction, expeditionary forces should be aware of the forward deployed operational and logistics capabilities aboard USN combatants and the potential to support RDOs. Land expeditionary forces, in particular the 'ready' SBA of the XVIII ABC should routinely familiarize themselves with such capabilities as occurred during Exercises Roving Sand 00 / Purple Dragon 00. Participating with deploying CVBGs during JTF Exercises could create necessary mutual confidence and even result in tailoring of the CVBG force loadout as approved by the gaining CINC. Periodic field experimentation is also valuable, as are knowledge and skill sustaining exercises between land and sea expeditionary forces. This will assist in the identification of the full range of interoperability capabilities and limitations and support remedial action on the latter. This remedial action may simply be mutually agreed terminology and procedures, but may well entail physical and information system connectivity. It may also include re-engineering of systems to address issues such as electro-magnetic interference, fuel handling, and rearmament. The key point is that FDNF and the XVIII ABC, can partner to form an innovative warfighting relationship. This relationship would allow the XVIII ABC to not only tap into deployed Naval forces operational capabilities, especially medium and high altitude air defense and land attack, to overcome limitations inherent with light, agile ground forces, but also to fully exploit other available Naval capabilities including logistics.

The master developer and applier of innovative armored warfare principles, Colonel General Heinz Guderian [p. 45] stated, "novel weapons and surprise can defeat good troops." The application of innovative, operational logistics concepts may also contribute to U.S. ability to defeat 'good troops'. The operational application of novel logistics concepts can not only accelerate the employment of U.S. forces, but also upset enemy calculations of U.S. capabilities. "Operating outside the bounds of the predictable" can surprise an enemy and may even contribute to inducing exploitable shock according to Allard. [p. 187]

There are limits to what a CVBG or MEU / ARG can provide to other land expeditionary forces. Early support of an expeditionary force involved in humanitarian operations or in support of small scale combat operations can be performed. Initial support in the early stages of Rapid Decisive Operations, particularly of forces involved in the initial build up of major U.S. war fighting capability similar to the support provided to the XVIII ABC in August 1991 during Operation Desert Shield may also be feasible. Still, the boundaries of U.S. capabilities need to be tested through exercises and experimentation.

Logistics is a basic element. There will be distribution, employment, intellectual and institutional differences to be resolved among the various stakeholders. Still, these differences must be resolved in order that our national interests can be advanced. The national welfare and homeland defense must take precedence. Further, the Joint Logistics concepts presented align with the QDR tenet for 'new logistical concepts of operations . . . ' .

There is no single solution that will lead to a logistics transformation that will enable 21st century combat operations. Rather, an integrated combination of OE logistics elements has the potential to support rapid decisive operations in many of the operational environments that the U.S. expects to encounter in the early decades of the 21st century.

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[Allard, 1996] Allard, C. Kenneth, "Command, Control and the Common Defense." *Command and Control Research Program, National Defense University*, Washington:DC. Revised Edition 1996, Second printing 1999. Allard, Kenneth. Command, Control, and the Common Defense (revised edition). October 1996. p. 254.

[_____, ___, p. 4.] The fact is "the law charges each military department to organize, train and equip forces to operate in a particular environment for which it is responsible."

[Bryant & Flynn, 2000] Bryant, Russell E., and John E. Flynn, "Cutting Through the Fog with Knowledge Superiority – Employing the System-of-Systems Through Operational Engineering, The Edge of the Future," CCRTS 2000 – Naval Post Graduate School, Monterey, CA., June 2000, CD-ROM. *Command and Control Research Program, National Defense University*, Washington:D.C.

[Cahlink, 2000] Cahlink, George, "Supply and Demand." *Government Executive, National Journal Group*, Washington:DC. November 2000. p. 36. It may well be that the Armed Forces need to operate on one common system or on a network of systems that can readily access up to the minute information on the availability of **key combat, theater wide** logistics inventories. The definition of this network includes the knowledgeable service logisticians and tactical operators who manage network operations. This does not necessarily mean a single joint system for all DOD logistics similar to the "effort spearheaded by the Joint Logistics Service Center. . . (which by 1997) had failed due to unique service requirements, service rivalries, and immature technology." We need a logistics information network that can produce a common joint combat logistics picture that can support tactical and operational level actions. It will need to have near real time access to distributed, remote logistics data bases and network nodes.

[DOD, 1998] DoD Logistics Transformation, Volume I Final Report, December 1998, Office of the Under Secretary of Defense for Acquisition and Technology, Washington:DC. Slide 6.

[DOD, 2001] Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, J7, Joint Doctrine Division, Joint Staff. Washington:DC. 21 April 2001. p. 248. http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf

[Fitzsimmons & Van Tol, 1994] Fitzsimmons, James, and Jan Van Tol. "Revolution in Military Affairs." *Joint Forces Quarterly, Institute for National Strategic Studies, National Defense University*, Washington:DC. Spring 1994. p. 25.

[Guderian, 1999] Guderian, Heinz, Mgen., Wehrmacht. "Achtung Panzer". *Brock Hampton Press*, London: UK. 1999. (re-publish from *Arms & Armour Press*, 1992. Original publication 1937, Germany.) p. 51.

[_____, _____, p. 139] Theory, supported by precedence, is a necessary starting point. Guderian's theories, for example, were intended to support preparation for warfare in the immediate future. He attempted to understand the events of the recent past (WWI and its aftermath) enough to draw the correct military lessons for the future. His observations drew him to a logical projection of trends that

revolutionized warfare. What made him unique, however, was that Guderian was able to mastermind the application of the theories which he developed. He was able to consider alternatives to the accepted norm by distilling the thoughts and strategic theories of others, building the tools, training the operators and maintainers, and then wielding the tool he had such a significant role in fashioning during the great German victories in France in 1940 and in Russia in 1941. p. 139
[Holzer, 2001] Holzer, Robert, "One on One". *Defense News*, 19 Feb 2001. p. 22
[Kernan, 2000] Letter from Commanding General, XVIII ABC, to Captain John Flynn USNR, 10 July 2000.
[JFQ, 1998] "Innovation and Warfighting." *Joint Forces Quarterly, Institute for National Strategic Studies, National Defense University*, Washington:DC. Summer 1998. p. 89.
[Leibovich, 1999] Leibovich, Mark, "No Speed Limits On the New Infobahn – Universities, Businesses Launch Internet2," *The Washington Post*, February 24, 1999. p. E1 & E10. The layout of the network comes from this article covering the launch of Internet2 by universities and businesses. It is not the Department of Energy's Next Generation Internet, or the Navy/Marine Corps Intranet, they are different initiatives and efforts which could end up supporting similar functionality.
[MacDonald, 1986] MacDonald, John. This is in reference to the Battle of Guadalcanal. "Great Battles of World War II." *MacMillian Publishing*. New York:NY. 1986. p. 74.
[_____, ____, p. 77] Lieutenant Colonel Merritt "Red Mike" Edson, Marine Commander at the Battle of Bloody Ridge during the Battle of Guadalcanal, "was a strong advocate of his men living off the land, or better still, off the enemy. This they achieved in fine style on 7 September (1942) when they carried out a sea borne raid on a Japanese supply depot at Taivu and returned with their assault boats full of rice, tinned meat and vegetables, as well as plentiful supplies of sake and beer."
[OSD/DBS, 1999] OSD, Defense Science Board Memo: Report of the Defense Science Board (DSB) Summer Study on DOD Logistics Transformation, Jan 11, 1999. Transmittal memo for DoD Logistics Transformation, Volume I Final Report, December 1998, Office of the Under Secretary of Defense for Acquisition and Technology, Washington:DC.
[Piplani et al, 1996] Piplani, Lalit K., COL, USA, Joseph G. Mercer, LTCOL, USAF, and Richard O. Roop, LTCOL, USAF, "Systems Acquisition Manager's Guide for the Use of Models and Simulation," September 1994. *Defense Systems Management College*, Fort Belvoir, VA., 1996. p.1-5. Figure 1-1. While the text discusses the diagram from the point of view of modeling and simulation, it is a representation of the approach actually carried out by Program Offices.
[QDR, 2001] DOD, Quadrennial Defense Review, September 31, 2001. p. 26.
[RS, 2000] During RS, the Senior NAVFOR LNO determined that the senior leadership of the XVIII ABC did not have a full appreciation of the capabilities that Navy forces bring to the JTF Commander. Once these capabilities were highlighted, however, significant interest was generated.
[Schrady, 1999] Schrady, David, "Combatant Logistics Command and Control for the Joint Task Force Commander." *Naval War College Review*, Summer 1999, Vol. LII, N 3. Naval War College, Newport: RI. p. 57
[Seffers, 1999] Seffers, George I., "New U.S. Command Adopts Unorthodox Structure," *Defense News*, November 1, 1999. p. 25.
[USACOM J6, 1999] USACOM J6, "Balkans Theater – TADILs & Link Management Lessons Learned," July 22, 1999. Briefing package covering Kosovo interconnectivity and interoperability plans and the ultimate configuration which resulted.

[Ward, 1990] Ward, Geoffrey C., "The Civil War, An Illustrated History," *Alfred A. Knopf*, New York, N.Y., 1990. p. 270.
[Wilson, 1996] Wilson, Jr., John R., "Battle Labs: What are They, Where are They Going?", *Acquisition Review Quarterly*, Winter 1996. Defense Systems Management College, Fort Belvoir, VA., 1996. p. 65. The Louisiana maneuvers model/picture is from the Acquisition Review Quarterly article.

Opinions, conclusions, and recommendations, expressed or implied are those of the authors. They do not reflect the views of the CCRP, DOD, U.S. Navy, Naval Sea Systems Command, or Program Executive Office for Theater Surface Combatants. The authors likewise assume responsibility for any errors in their work.

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