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NETWORKED BATTLE COMMAND: IMPROVING JOINT FIRES FOR THE COMBATANT COMMANDER

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ABSTRACT

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This essay recommends a strategy to pursue a successful implementation of networked battle command in order to improve joint fires for the combatant commander. The plan for a global information grid to provide information superiority and decision making is described in the National Military Strategy, Joint Vision 2020, and the Joint Operating Concepts. There are many issues that have to be overcome for this to be successful. These issues are not just the speed in which technology is advancing and the acquisition process, but how the network will be implemented in accordance with doctrine, organization, training, leadership and education, materiel, personnel, and facilities. A successful implementation will result in a robust networked battle command system which will enable joint interdependence. The ability to link systems, platforms, and commanders will enhance joint fires for the combatant commander.

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> "If we are to achieve decisive and rapid decisions superiority in the future, we have to take a hard look at our command and control. And one of the key areas … the most important program for the Army right now aside from the Soldier and fighting that last 400 meters is getting the network right … networks, architectures, comms systems, applications to make that happen."[1]
>
> - General Kevin P. Byrnes

The primary purpose of America's Armed forces is to fight and win the Nation's wars. Throughout history, armed forces modify and adapt to the changing environment. Today, the United States Military is undergoing a change to account not only for current conditions but attempt to try and anticipate what the future environment will be. That current process is called transformation. Transformation is the creation of a force that is dominant across the full spectrum of military operations and is persuasive in peace, decisive in war, and preeminent in any form of conflict.[2] A critical part of transformation will be the establishment of a global information grid (GIG) to provide commanders with the ability to horizontally and vertically collaborate in order to see first, act first, and finish decisively. The concept for the GIG is described in the National Military Strategy, Joint Vision 2020, and the Joint Operating Concepts. The GIG will provide the structure for a network that connects the services and improves joint battle command capabilities. The purpose of this paper is to address the issues confronting the implementation of the network and examine recommendations to facilitate a successful system. The final result will provide networked battle command and enhance joint fires for the combatant commander.

Each service has developed a vision to support transformation. The Air Force Vision is to provide global vigilance, reach, and power to the nation by building the world's most respected air and space force. The Navy and Marine vision is to control the seas, assure access, and project power beyond the sea. They have the ability to change, adapt, and transform to meet any new threat to America. The Navy concept is a three-phased approach consisting of Sea Strike, Sea Shield, and Sea Basing, enabled by their version of networked battle command called FORCEnet. These concepts broaden naval power projection by leveraging enhanced command and control systems, communications, precision munitions, stealth, and endurance. The Marines Strategy 21 will provide an enhanced strategic agility, operational reach, and the tactical flexibility to enable joint, allied, and coalition operations. They have proved during Operation Iraqi Freedom (OIF) that they have the ability to conduct land operations. The Army

vision to support transformation is to provide a campaign quality army with Joint and Expeditionary capabilities. Soldiers will have a joint and expeditionary mindset and organized, trained, and equipped to go anywhere in the world, at any time, in any environment, against any adversary, to accomplish the assigned mission.[3] All service capabilities are being tested today as the United States Military is fully engaged throughout the world and its operations cover all the dimensions of the strategic security environment. This level of involvement will not diminish in the near future as the United States will continue to have global interests and be engaged with a variety of regional actors. The future force will be a joint force and will use all capabilities available. It is envisioned that U.S. forces will have superior intelligence and the power of information technologies to increase decision superiority, precision, and lethality of the force. In a globalizing world, military capable technology is available and potential adversaries may have the means to achieve parity or even superiority in niche technologies tailored to their military ambitions.[4] These missions will demand a flexible, reliable, and effective joint command and control architecture that provides the flexibility to maneuver, sustain, and protect U.S. forces across the battlefield in a timely manner. The command and control structure must be networked to ensure shared battlespace awareness.

BACKGROUND

The military continuously undergoes self-examination as it grapples with changes in the global environment and how the United States plans to employ the military to meet strategic goals. In the past century, the military has transformed itself several times to try and meet the changing strategic environment. These efforts have taken into account changes in the strategic environment, technology advances, personnel changes, and doctrine improvements. Since the Wright brothers had their historic first flight at Kitty Hawk, North Carolina, the Air Force has continuously improved air power to integrate air, space, and information operations. Activities such as the Berlin airlift, application of space and missile technology, mid-air refueling, high altitude reconnaissance and aviation pioneers such as Chuck Yeager shows the Air Force has been an innovative, adaptive force. The Navy has evolved from the 1986 blue-water, war-at-sea maritime strategy to the 1992 littoral emphasis of from the sea, to the 1994 forward from the sea to its current broad strategy of fully integrating the Navy into global joint operations against regional and transnational dangers.[5] The army has continuously modified its division structure since its establishment in 1911 and the first permanent division assignment in 1917.[6] Initially, infantry and artillery coordination was not good enough to facilitate effective maneuver and artillery formations were not mobile enough to keep pace with infantry advances. Over the

years the army adopted the triangular division, Pentomic Division, and the Triangular Reorganization Objective Division known as ROAD. These units sought to improve command and control, incorporate new technologies, and streamline support. They suffered from technological and material shortcomings. The Pentomic Division was not capable of either conventional offensive action or survivable on the nuclear battlefield.[7] In 1986 the Army of Excellence Division (AOE) and Airland Battle Doctrine were developed. The formation and the doctrine tried to account for significant changes in weapon technology. In 1998, Division XXI was created and actually was a digitized version of the AOE design.[8] The key idea was to enhance each unit's knowledge of the battlefield through real intelligence sharing. As one looks back at these changes, they occurred because of changing battlefield needs, technology, economy, and national strategy. It is no different today. The military is undergoing its current transformation in order to compensate for the changes in the post cold war strategic environment. The United States, as the world's only superpower, must have a robust military to protect its National Interests. The globalization of economies is interlinking countries and making them dependent on each other. The speed in which technological advances in weaponry, information systems, and protection is occurring is unsurpassed and it is difficult to keep pace. Additionally, technology is becoming available to everyone. This environment will make any changes to military formations difficult and will take serious and intense experimentation to ensure the proper mix of forces and equipment is achieved.

The examples above show how the services deal with changes in the strategic environment. One of transformations current critical issues, and the basis for numerous assumptions in the structure of transforming units, is developing a robust networked command and control (C2) structure. Joint Pub 1-02 defines C2 as the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission.[9] C2 functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishments of the mission. Joint C2 is merely the exercise of authority and direction over the joint force. The central function of C2 is decision making. C2 is most effective when decision superiority exists. Decision superiority results from superior information filtered through the commander's experience, knowledge, training, and judgment. The issues facing the future force are the command structures, processes, information systems and technologies that can be developed to support Joint C2. A networked command and control structure must be developed to achieve the information dominance the military is seeking.

NETWORKED BATTLE COMMAND

U.S. Joint Forces Command (USJFCOM) is working with the chairman of the Joint Chiefs of Staff and other combatant commanders to develop the Joint Battle Management Command and Control (JBMC2) system. JBMC2 brings together several different programs and initiatives relating to joint battle management command and control to support improved joint interoperability and integrations. The end result will support future battle management capabilities from concepts, training, tactics, techniques, and procedures to fielded systems to fit a common, joint architecture and are, therefore, interoperable. The Joint Task Force commander will have a seamless, secure, interoperable global network with access to all the information he needs when, where, and how he requires it.

The Joint Command and Control (JC2) system will be the Department of Defense's principle command and control information network. JC2 will enable decision superiority via advanced collaborative information sharing achieved through vertical and horizontal interoperability. As the Net-Centric migration path to the Global Command and Control System (GCCS) Family of Systems, JC2 will support force-level planning, execution, monitoring, and assessment of joint and multinational operations. JC2 will use Net-Centric Enterprise Services to exchange data across multiple security domains. The Joint Requirements Oversight Council (JROC) approved JC2 Operational Requirements Document on 22 Aug 2003.[10]

The current Joint C2 system is the GCCS, developed by the Defense Information System Agency (DISA). The Global Command and Control System - Army (GCCS-A) is the Army's implementation, adding several applications to the DISA baseline. The GCCS-A Acquisition Decision Memorandum, dated 28 May 2002, directed development of a Block Implementation Plan, which identifies operational requirements. GCCS-A begins the transition to the GIG enterprise Services Common Operating Environment and Army Battle Command System (ABCS). The next major segment will be Block 1 of the JC2. The GCCS and the common operational picture it provides serve as a solid foundation for evolving C2 capabilities.[11] U.S. command and control systems require the ability to share situational awareness with other government agencies as well as allies and friends.

The services understand that these systems must be linked in order to improve joint command and control. Joint Vision 2020 and the Joint Operations Concepts describe how the Joint Force intends to operate in the future and provides the operational context for transformation by linking strategic guidance with the integrated application of Joint Force Capabilities.[12] Current systems support the needs of the command, but do so in a piecemeal disjointed manner that requires operators to have detailed technical knowledge of the systems

and spend an inordinate amount of time and attention on them. Exorbitant amounts of time, effort, and money have been invested to develop robust C2 systems. The Army, together with the joint community, must relentlessly address the architectures, protocols, and systems of a redundant, non-terrestrial network capable of providing the focused bandwidth necessary to support mobile Battle Command and joint Blue Force tracking. OIF and Operation Enduring Freedom (OEF) continue to highlight the successes and potential of network-enabled operations. The operational advantages of shared situational awareness, enhanced speed of command, and the ability of forces to self-synchronize are powerful.[13]

These command and control systems will be significant to the transformation effort and the establishment of an improved joint fires capability. The early establishment of joint fires capabilities and interoperability requirements will facilitate an interdependent joint force. The network will lead to an integrated joint fires capability.

ISSUES

There are numerous issues to overcome to ensure a successful network. Before the network specific issues can be overcome and discussed, service philosophy on requirements determination has to change. In the past, service requirements were determined at the tactical level and passed up to higher headquarters. This was a “bottom up” process. Training support managers worked with units in the field to determine what was needed and passed those to project managers who developed systems to meet these needs with prime contractors. This bottom up system led to systems being developed to meet tactical needs. However, these tactical systems did not meet the needs of higher headquarters and did not always have the ability to communicate with each other. Additionally, each service approached the requirement for command and control in different ways. Each service has its own particular requirements and has been unwilling or unable to work together to determine a joint solution. This has caused each service to have its own system and caused a lack of horizontal connectivity with the other services. Additionally, no efficiencies have been gained and money has been spent separately by the services in pursuit of the same objectives and goals. A true joint, networked battle command system has to be responsive and interoperable. The following areas are critical to achieve successful networked battle command.

The physical establishment of the network is the key to the future combat system and joint interdependence (See figure 1). This includes the hardware and software supplied to units to provide the ability to connect to the network and link with other services and the resources available to those services. The concept is a soldier on the ground could acquire a target, place

his call for fire in the network, an effects based solution would be determined, the delivery system notified, and the fires delivered for the shooter in a timely manner with minimum third party intervention. The network will provide the means for information to flow and collaboration to occur. This will include collaboration between units, services, and platforms. The network will also include on the move capabilities and appropriate band width to allow quick dissemination of data. Without the network, there will be shortcomings in the ability of the maneuver commander to accomplish his mission. An example of the current network failing was the initial movement and attack of United States Forces into Iraq. Current battle command systems were largely dependent on stable non-moving communications means. Tactical Command Posts used fixed antennas to communicate with their higher headquarters. In the quick movement into Iraq, tactical units relied on tactical whip antennas and quickly outran the fixed communication structure. The primary means of communications became voice FM and limited AM radios. The new network has to provide a robust communication structure that has the ability to operate on the move and over greater distances.

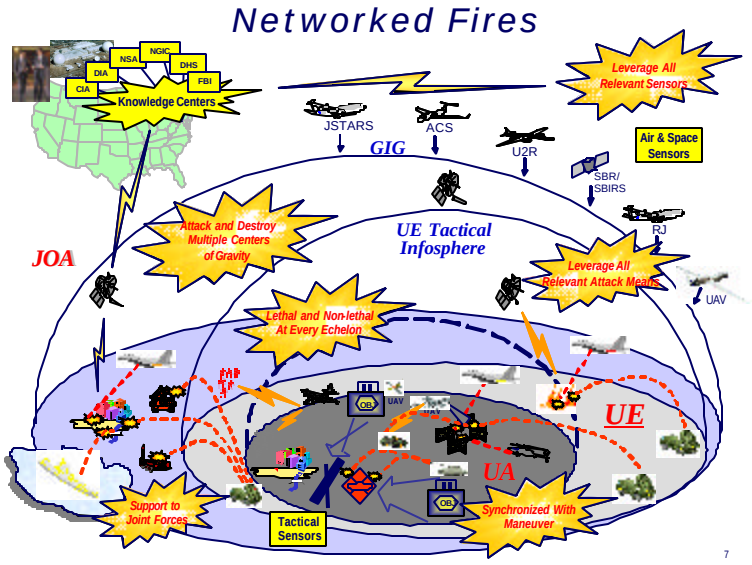

FIGURE 1: NETWORK FIRES CONCEPT

The network will enhance our ability to achieve Joint Interdependence. America's traditional way of current war is combined arms warfare. Each service brings a combination of

technologies and tools in each dimension-land, air, sea, and space-to generate a synergy of effects that creates overwhelming dilemmas for our opponents. Each service is developing capabilities that can influence land combat directly and they need to leverage every potential tool of speed, operational reach, and precision. By projecting coordinated combinations of force unhindered by distance and generally independent of terrain, we can achieve maximum effect for the Joint Force Commander without regard to the service of origin.[14] This integration and deconfliction is joint interdependence. Joint interdependence purposefully combines service capabilities to maximize their total complementary and reinforcing effects, while minimizing their relative vulnerabilities. Joint interdependence seeks to allow forces to depend on and use other services resources. The improvements in technology and communications has led to improvements in precision, lethality, and extended weapons range. The network will allow services to take advantage of information technologies, mobility, and firepower by combining those resources. However, without the network, joint interdependence cannot succeed. The network will permit the necessary coordination that is not possible today. Any discussion about joint interdependence must include discussions about the network. There is significant risk in assuming the network will be established and joint interdependence will be possible. The risk, prior to network establishment, is downsizing or eliminating capabilities currently organic and available today because another service will provide that capability. One example is reinforcing field artillery. If a maneuver company can link directly to air assets, there is a minimal need to have a large amount of artillery. Therefore, it can be removed from the force structure. However, if the network does not exist and the company cannot talk with the aircraft, they could find themselves without connectivity to joint fires assets. This is what occurred in Afghanistan during Operation ANACONDA. United States forces were conducting operations in the Arma Mountains and Shahikot Valley. They did not expect heavy contact and were told close air support would be available. However, upon reaching the landing zone, they found themselves in heavy contact. No artillery was available and mortars were out of range. The only fire support asset available was close air support and attack aviation. While the company was able to communicate with the attack aviation they did not have the communications means or abilities to communicate with the aircraft in order to provide the target location and clearance. There were aircraft available, but the aircraft could not engage because they could not distinguish between friendly and enemy elements and had no one on the ground to provide terminal guidance. There must be the capability to communicate with other service platforms. In this case the proper data elements could not be fed from the ground to the aircraft. The aircrafts link-16 system is not capable of communicating with most of the ground force

communications means. This lack of interoperability denied needed fire support to the ground force.

In recent years, the United States and the world are evolving from the industrial age to the information age. In this information age, power is increasingly derived from information sharing, information access, and speed. The vast technological opportunities are available to friend and foe alike.[15] Developing capabilities must be leveraged to enable interdependent network-centric warfare. Network Centric warfare refers to a combination of emerging tactics, techniques, and technologies that a networked force employs to create a decisive warfighting advantage.[16] This will require the network to be interoperable with all command and control systems and develop comprehensive and redundant information networks. The services will need to agree on the data definition, protocols, and standards informing the design of those networks. Currently each service has a command and control system, but these systems do not provide robust horizontal connectivity. The requirements for future automated battle command systems are continuous operations over extended distances, blue force tracking, joint fires, and logistics connectivity. Additionally, interagency, allies, and coalition partners must be able to operate on the system. Joint Forces Command leads the development of the JBMC2 capability which brings together the service's battle management programs to fit a common joint architecture and will be interoperable.[17]

Command and control systems will need to address levels of war. The requirements at the strategic level of war are different from the tactical level. The strategic level of war focuses primarily on command and control issues such as unit locations, collaboration, and interoperability with other services. The tactical level has similar requirements, but also the need to determine technical computations such as firing data of weapons systems. The vertical connectivity needs to allow for information to be passed higher to lower to higher. It has been a difficult task for one system to meet all the requirements from strategic to tactical. This will require our new systems to be flexible and scalable in the future. Part of the scalability is to load the modules needed for a workstation and not the whole program. Past systems have required that all modules be loaded and then work around those not needed.

The system will also need to allow filtering of data to help commander's span of control. Systems are increasing the speed with which information can be disseminated and coordinated, allowing the possibility for commanders to adjust their plans. Technology can enhance human capabilities, but war remains more art than science. Battle Command is more important than battle management. There can be "perfect" knowledge with very "imperfect" understanding.[18] Systems have to be able to be scalable and filter the information for the commander. With

increased number of targeting and intelligence gathering systems such as UAVs, radar, and aircraft, battle staffs can quickly be overwhelmed. The enemy “red” picture is captured by many automatic sources, but these sources do not have robust automatic integration and deconfliction capabilities. The current system for designating and deconflicting the red picture is manual. An intelligence specialist has to analyze the data and input it into the system. This usually occurs at the operational level and the result is too little enemy data is of use to tactical commanders. Another example is the current air radar integration system that brings together a multitude of ground and air based radar systems to create one coherent but imperfect air picture. Enemy forces can disappear from friendly sensors, but that does not mean they have departed the area. The numbers of targets acquired can grow to hundreds and thousands and the information processed from the sensors will compete with target nominations, fire missions, and other automated information exchanges. The result is information overload and network stoppages. Staffs will be challenged to make sense of the information being provided by their sensors. Planning will be iterative and collaborative rather than sequential and linear.

The networked battle command system that is developed will require building of trust in the system. There is much discussion about the network providing the means for the sensor (forward observer, infantryman, UAV, radar, other intelligence acquisition systems) to see a target, input the call for fire, and have that call for fire go into the network and the sensor receive the proper system to achieve the effects he desired. This capability exists today in the army’s battle command system. A sensor to shooter link can be established and calls for fire can go directly to the shooter. Two issues must be resolved. The first is automated clearance of fires procedures. Today’s systems only check against fire support coordination measures that have been input. The future system requirement is the ability to conduct an automated check on all friendly units operating in the area. This will require systems to be integrated using the network so that friendly unit locations are available to all fire support systems and platforms. This includes fixed wing aircraft having the ability to display ground forces in the cockpit and their fire control system conducting a check before engaging. The second issue is building trust in the system. Today, commanders will not allow a sensor to shooter link except in certain, highly controlled circumstances. There is not a lot of trust in the automated systems having all the required information so units resort to voice clearance procedures. The voice process is time consuming. For an efficient network, sensor to shooter links must be established and this will require the system to prove to commanders that it is trustworthy and correct. Additionally, the system must be adaptable to changing situations such as rules of engagement. Currently,

restrictive rules of engagement, such as a particular person has to clear a certain type of mission, slows clearance of fires.

The Depth and Simultaneous Attack Battle Lab, Fort Sill, Oklahoma, in support of the Defense Advanced Research Projects Agency, has conducted experiments on how automated command and control would enhance joint fires. Automatic fires for this experiment meant organic assets were available for the network to select. Initial insights showed that commanders were uncomfortable with fully automatic fires. Commanders did not like seeing their assets delivering fires, and possibly, putting at risk their own capability to deliver fires later in the operation. These automatic fires sometimes caused commanders to unexpectedly receive enemy counterfire which affected their plans. Additionally, commanders did not like being unable to stop the network from selecting their units to fire in mutual support of peer units. So while automatic fires increase efficiency and speed in processing fire missions, the delivery of fires may not be as effective as the commander needs to achieve his intent or properly influence the battle.[19]

The acquisition system has to respond to unexpected technical breakthroughs. The current process cannot keep pace with the speed of technology advances. Technology in the military sphere is developing as rapidly as the changes reshaping the civilian sector. The combination of scientific advancement and globalization of commerce and communications have contributed to several trends that significantly affect U.S. defense strategy and planning.[20] The acquisition system currently cannot rapidly adapt to circumstances that were not foreseen. During peacetime, acquisition is more about economy vice effectiveness. Services focus on preserving force structure and budgetary programs of record. Resource risk is spread across budget years and programs, including forces in the field. This will not suffice. There needs to be a balance in the way equipment is procured. The current acquisition system, Programs of Record, take years to determine requirements and go through the entire acquisition process. The Advanced Field Artillery Automated Data System (AFATDS) has been in development since 1981 and is not completely fielded. The Maneuver Control System (MCS) was introduced in 1987 and still has not successfully met all the requirements in an operational test. These systems were developed using older technology and are trying to insert new technology as it is developed. However, technology advances are moving faster than systems can incorporate them under the current process. At the other end of the spectrum is Advanced Concept technology demonstrations (ACTDs). These programs make use of existing off the shelf hardware and software and use spiral development to accomplish the task. They can quickly bring capabilities to the combatant commander. However, ACTDs are not designed to become

systems of record, but have their capabilities incorporated into current systems. There is usually no money in the ACTD development to do this. There needs to be a balance between the two in order to bring capability to the field to meet requirements and take quick advantage with advancing technology without sacrificing security. The current system has services conducting similar efforts, but not working together. This is wasting valuable resources that could be used to further development.

A significant risk factor in the implementation of the network is the proliferation of technology. There is worldwide availability of very low cost, very high quality, very powerful information technology. Most countries have access to similar technology that the United States has. This includes the ability to jam, collect, and spoof networks. Cheap, simple technology provides the capability for just about anyone to make cheap weapons and the means to deploy those weapons. Global Positioning System and cell phones are two examples of cheap, easily available technology. If an enemy has access to technology, the possibility exists of network exploitation. If the network fails, there needs to be backup systems or manual techniques. The dependency on technology and the network can lead to significant issues if the enemies of the United States gain access to the same technology and exploit it.

ASSESSMENT

The services will have to address how to mitigate the risk and successfully implement networked battle command. Currently, several processes are underway and several need to be considered and implemented.

The Joint Requirements Oversight Council (JROC) process will help define future requirements for the joint force. The JROC is responsible to oversee the requirements generation process for major defense acquisition programs. The JROC focuses on Combatant Commanders warfighting requirements. It does this by its oversight on the activities of the Joint Warfighting Capability Assessments (JWCA) process which provides recommendations to the Chairman Joint Chiefs of Staff on the content of the planning and programming advice documents.[21] The JROC established JWCA in 1994 as a tool to improve analysis and assessment capabilities to enhance joint operations. JWCA teams are sponsored by a Joint Staff director and examine key relationships and interactions among joint warfighting, capabilities, and identify opportunities for improving warfighting effectiveness. The Deputy Chairman, Joint Chiefs of Staff, chairs the JROC. The JROC assists in building senior military consensus across a range of functional areas. The functional areas are capabilities, assessments, joint integration, and resources.[22] The JROC provides top down guidance in

defining military capabilities requirements from a joint perspective. Under the JROC process, no service is allowed to develop a system without the JROC approval. This will keep the services focused in a common direction, work toward common goals, and support interdependence.

The organization that will take the lead is USJFCOM. USJFCOM's mission is to maximize the nation's future and present military capabilities by leading the transformation of joint forces through joint concept development and experimentation, identifying joint requirements, advancing interoperability, conducting joint training, and providing ready continental U.S. based forces and capabilities to support combatant commands.[23] USJFCOM is responsible for transformation, experimentation, joint training, interoperability and force provision. USJFCOM is the "transformation laboratory" of the United States military that serves to enhance the Unified Commanders' capabilities to implement transformation. USJFCOM develops future concepts, test these concepts through rigorous experimentation, educates joint leaders, trains joint forces, and makes recommendations on how the services can better integrate their warfighting capabilities.[24] USJFCOM is poised to become the overall headquarters to supervise joint systems and operations. There are four component commands assigned: the Air Combat Command in Langley, Virginia; the Atlantic Fleet in Norfolk, Virginia; Forces Command at Ft. McPherson, Georgia; and Marine Forces Atlantic also in Norfolk, Virginia. These commands represent over 80% of the entire Armed Forces of the United States. Since USJFCOM has the preponderance of forces, they should be responsible for leading joint training and integration. With all services represented, USJFCOM can focus on the major areas of interest as outlined in the different strategic documents. This unique headquarters can channel a large amount of resources to allow forces to achieve Full Spectrum Dominance, dominance across the entire range of military operations. USJFCOM drives the transformation effort through the development of joint concepts and then through rigorous experimentation and testing. The testing allows for the evaluation of concepts, develop doctrine and tactics, techniques, and procedures, and recommend joint requirements for implementation. This helps frame the efforts for the services and the joint community. Since USJFCOM is a joint command, it is not hindered by service parochial views and this will assist in developing joint solutions and not service solutions to problems.

One JFCOM program to develop and enhance joint fires is the Joint Fires Initiative Block 2 (JFI-2). JFI is a JFCOM experimentation effort to provide the Joint Force Commander the ability to employ the weapon of his choosing and to reduce the timeline for immediate targets.[25] It incorporates lessons learned from OEF, OIF, Combatant Commanders, and previous

experiments such as Millennium Challenge. The JFI-2 brings together several similar efforts being conducted by different services which are attempting to accomplish the same task. Additionally, JFCOM briefs the JROC on its findings and provides the documentation to the JROC. This assists the JROC in determining requirements for the combatant commander. The JFI-2 has worked to join service efforts. The programs that were joined together were the Web Enabled Execution Management Capability, AFATDS, the Automated Deep Operations Coordination System, and the Naval Fires Control System.

Network implementation will require changes to doctrine, organization, training, leadership, education, materiel, personnel and facilities. Training is a key component to build expertise and trust in the network. The services must re-examine and challenge the most basic institutional assumptions, organizational structures, paradigms, policies, and procedures to better serve the nation. There needs to be a change to the way we train leaders and soldiers. Leader development should focus on educating leaders capable of operating as part of the joint team. Leaders need to be exposed to technology and learn how to incorporate it into their training programs. Leaders need to be adaptable to changing circumstances, which include new hardware and software being issued to their units. In the changing technical world, a unit cannot stand pat with what they have. While this can be frustrating to a commander, it will continue to be how the military operates if it wants to maintain its technological advantages over the army. Today's new soldiers understand and trust technology because they have grown up with it. A training program needs to address those soldiers already in the field. They need to be trained on new systems in order to build up the expertise needed in each unit. One can go to a unit today and find one or two experts in any given system and no one else has the experience to operate the equipment. This must be addressed. Leaders must learn to empower our soldiers to be able to make decisions.

As the JROC approves requirements, the hardware and software to support the system will be developed. A prime consideration is how operators view systems. From a simplistic point of view, operators learn more quickly and are more accepting of automation that looks like and performs like their personal computers. A user looks for a "Windows-type" environment with internet access, chat capability, and collaboration tools. Additionally, the "box" should have a similar look and feel. Today's systems are very difficult to use and require extensive training. Any new system will have to meet these needs and be capable of handling information requirements. The Army has the ABCS Good Enough process which is looking at fielding a common automated C2 system throughout the army.[26] It will be a top down developed system

and attempt to take into account all the considerations previously discussed. This top down effort will lead to greater efficiencies and economies of scale.

The acquisition system will have to be modified to streamline its processes and find an efficient way to change with technology. Technology is changing and improving at a rate too fast to continue with current systems. The current weapons and C2 acquisition process takes too long. ACTDS produce quick results using emerging technologies and are not constrained by acquisition requirements. However, ACTDs may not meet all security requirements. The answer is an acquisition process that balances the needs between security, speed, economy, and quality.

While the network is being built and tested, the risk associated with this transformation process must be taken into account. To mitigate the risk of the network not meeting all requirements, units should maintain an organic fires capability. Ground maneuver commanders have always been able to count on their organic mortars, cannons, and rockets to provide responsive, all weather, 24/7 fire support capability. The dilemma is the discussion of the network and interdependence reducing the ground commander's reliance on organic fire support since he will have access to all fire support assets available to the network. The recommendation is to reduce the amount of future risk by maintaining a company's organic fire support capability and not reduce it until the network has proven itself reliable. Even when the network is established, there still exists a need to maintain organic fire support because there are times that an area fire weapon is needed and aircraft or ships may not be available. By removing organic fire support, it reduces the options a commander has to react to unforeseen circumstances. Colonel Robert Barry provides an in-depth assessment of the need for organic fires in the June-August 2004 Field Artillery Journal. His conclusion is ground combat requires responsive and timely indirect fires and the only way to guarantee that is to maintain an organic fires capability. [27]

SUMMARY

As the United States military continue the transformation process, the lessons of history provide lessons learned that need to be incorporated into the military's thinking. A top down approach will facilitate the services moving forward. Assigning JFCOM to lead and integrate this effort will provide a common bond. The JROC process will help ensure that services meet a common set of requirements and there will be precise guidance and control. Finally, as JFCOM and the JROC approve projects to meet the warfighters requirements, the acquisition system will adapt to provide the material solutions to meet the warfighters timelines. By following these

recommendations and joining together in a joint effort, the network will become a reality and the result will be a robust, networked battle command system. The ability to link systems, platforms, and commanders will enhance joint fires for the combatant commander by providing the resources in an integrated fashion.

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ENDNOTES

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