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THE AIR FORCE ACQUISITION PROCESS AND THE EXPEDITIONARY AEROSPACE FORCE CHALLENGE

by

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Preface

The 1998 announcement by the Air Force Chief of Staff and the Acting Secretary of the Air Force that the United States Air Force will transition to an Expeditionary Aerospace Force (EAF) structure caused many to question, "How can I help make this happen?" In particular, as a systems engineer with experience in logistics and acquisition, it quickly became apparent to me that the program manager plays a key role in the successful implementation of the EAF. This paper addresses why the Air Force acquisition community needs to get involved and how. Certainly the Air Force needs to start rethinking how to acquire weapon systems (including upgrades and modifications) if they are to be implemented in an EAF environment. A major Air Force challenge is standing up the EAF by the year 2000. The Air Force acquisition community needs to start making changes now.

I would like to thank my family for the support they provided during the time spent pursuing this research paper, especially listening to me while I was trying to find my way. I also extend gratitude to Mr. Don Cebulski of Naval Sea Systems Command, who provided invaluable information regarding the United States Navy's interoperability challenges.

Abstract

The successful implementation of the Expeditionary Aerospace Force (EAF) concept is dependent on the Air Force (AF) acquisition process. The new AF Doctrine Document (AFDD 2, 28 September 1998) describes the concept of operations and the organization of the air expeditionary force structure. However, there is no specific direction delineating the responsibilities of the AF acquisition community for implementing this new concept. The current AF acquisition process was created to support a Cold War operational environment and is not optimally structured to acquire upgrades or maintain support to weapon systems employed by the EAF. The result is an inefficient acquisition process in the deployment and sustainment of these weapons systems, identified as key war winning operations in AFDD 2. The acquisition community needs to address the EAF environment throughout the acquisition process in order to eliminate or reduce these inefficiencies, ensuring EAF success on the battlefield.

This paper is a preliminary analysis of a complex area and highlights some of the major shortcomings of the AF acquisition process supporting an EAF structure. The research covers five areas: 1) an investigation of the uniqueness of the EAF environment and current concerns; 2) a discussion on how the current AF acquisition process is ineffective at supporting the EAF concept; 3) a review of how the Navy supports a similar expeditionary structure; 4) recommendations on how the AF acquisition process should be adjusted to meet the EAF challenge; and 5) conclusions.

Chapter 1

Introduction

The Chief of Staff of the Air Force (CSAF), General Michael E. Ryan, and the Acting Secretary of the Air Force (SAF), F. Whitten Peters, have stated that the Air Force (AF) will transition to an Expeditionary Aerospace Force (EAF) by the year 2000.[1] The EAF is a major change in the AF force structure and considered the latest revolution in military affairs (RMA).[2] The AF is pulled towards this force structure not only by advances in aerospace technology but also by changes in the strategic environment: the end of the Cold War and increased regional instabilities. Another cause for restructure is continuing constraints on DoD spending. How the AF spends that reduced budget affects readiness and cost is now a major factor in the decision making process. The EAF is a response to these changes and promises greater stability for the airman by providing predictable deployment schedules. However, to truly accomplish a RMA and embrace the EAF concept, the AF needs to restructure its organization and basic support processes (infrastructure) as well. This paper is a preliminary analysis of a complex problem and attempts to highlight some of the major shortcomings of the AF acquisition process supporting an EAF structure.

The AF acquisition community within AF Materiel Command (AFMC) is focused on managing cost and schedule versus planning and executing deployments to remote locations. In response to the reduced budget and rapid improvements in technology, current acquisition reform

initiatives address smart ways of doing business: adopting industrial standards and purchasing commercial-off-the-shelf items. The government reduces costs and is better at keeping up with technology that advances faster than can be inserted into the field. The risk of constantly focusing on faster and cheaper methods via partnerships with industry is the creation of potential incompatibilities with the operational environment and affecting the ability to win wars. The acquisition community is organized along weapon systems that supported a force structure combating the Cold War environment. The EAF force structure responds to the current global environment of regional instabilities.

The EAF is best described as packaged capabilities of multiple weapon systems contributing their different roles and functions. Synergy between the different weapon systems will increase the AF effectiveness, but only if support issues and interoperability concerns are resolved. But, can the current acquisition process partitioned by weapon system functions and focused on partnership with industry be able to deliver systems that can work together, operating in an EAF environment? The theory is that without changes to the acquisition process the EAF concept will fail. The question then becomes, "How can the current Air Force acquisition process be restructured to effectively support the EAF mission?" This paper provides preliminary evidence that supports this theory and recommends changes to the AF acquisition process to fully integrate the EAF concept into force planning activities.

The literature search employed the internet (focusing on military web sites), the Air University Library located at Maxwell Air Force Base, and tapping the expertise and knowledge (and personal libraries) of various DoD personnel with acquisition backgrounds. The EAF is not yet implemented, therefore, relatively little material regarding concept of operations and infrastructure requirements are available. The material documenting AF and Navy expeditionary force

missions and structures, including lessons learned from preliminary deployments, support the tie between acquisition and operations and provide limited understanding on the employment of this new concept. The current DoD acquisition process guidance and the AF and Navy acquisition reform initiatives aid in developing and supporting the theory of the link between operations and acquisition, while providing the basis for applying expeditionary force environment considerations at critical points in the acquisition process. All information reviewed and presented in this research is unclassified. The goal is to present and support the theory that modifications to the current AF acquisition process are essential to the successful implementation of the EAF concept.

This research paper is presented in five areas. First the EAF is briefly described to emphasize the uniqueness of the EAF environment and how it is different from the current force structure. A discussion on the current AF acquisition process keys on existing problems impacting the ability to support the EAF concept. This is followed with a review on how the Navy supports a similar expeditionary structure (carrier battle group) including applicable lessons learned. Next, recommendations address how the AF acquisition process should be restructured or adjusted for EAF considerations. Finally, conclusions are presented including additional areas for continued work and investigation on how to successfully transition to an EAF concept.

Notes

[1] Department of the Air Force, "Expeditionary Aerospace Force: A Better Use of Aerospace Power for the 21st Century," 7 August 1998, n.p.; on-line, Internet, 24 November 1998, available from http://www.af.mil.issues/.

[2] Air Force Doctrine Document (AFDD) 2, *Organization and Employment of Aerospace Power*, 28 September 1998, ii.

Chapter 2

The Expeditionary Aerospace Force Concept

The EAF is the term used by the CSAF and Acting SAF to describe the AF's expeditionary 'concept.' The Air Expeditionary Force (AEF) is a generic term found in AFDD 2 to indicate the deployed unit (may be a wing, group, or squadron). AFDD 2 also introduces a third term, the Air and Space Expeditionary Task Force (ASETF) which encompasses all AF forces assigned or attached to the Joint Task Force (JTF). Functions of the ASETF can be accomplished by an in-place Numbered AF (NAF).[1] This paper uses the term EAF in reference to the concept, and AEF when discussing the fighting unit.

The EAF presents an entirely new way of conducting air warfare by seeking to fulfill a range of missions using existing capabilities and regrouping them to combat the spectrum of conflict found in the post Cold War strategic environment, from small scale contingencies to major theater wars. The AF goal is to have the EAF procedures, doctrine, and organization in place by January 2000, to meet the national security requirements of the next century.[2] Air Staff (AF/XO) is currently working on an implementation plan that will address organizational structure and processes to fulfill the EAF vision. But, problems from initial EAF deployments point to a need to re-look the supporting acquisition process in order to meet the year 2000 deadline.

The EAF concept is best defined as a flexible and responsive force structure organized, equipped and trained to meet the needs of the combatant commander, CINC, in response to mis-

sions ranging from small scale contingencies to a major theater war. CSAF describes the EAF force as a lighter, leaner and more responsive force.

> "Lighter, leaner forces, prepared for expeditionary operations and tailored to respond to CINC requirements across the spectrum of crises, must be able to deploy rapidly to execute the CINC's mission."[3]

The EAF concept is intended to fulfill several airpower tenets, the fundamental guiding truths of air and space power employment. [4]

Flexibility and Versatility: The AEF uses mass and maneuver simultaneously while executing parallel missions at the strategic, operational and tactical levels.

Synergistic Effects: The AEF is able to produce effects that exceed the individual contributions of each weapon system employed separately.

Balance: The CINC has the proper mix of resources for all missions.

Fulfillment of these tenets calls for a mixed bag of capabilities, e.g., fighters, bombers, surveillance and reconnaissance aircraft, in order to provide a quick response and effective force. The AEF does just that. Acting SAF, Mr. Peters, stated that each AEF will pull weapon systems from existing organizations.

> "Our plan is to link geographically separated Air Force operational wings, groups, and squadrons – Active, Reserve, and Guard – into 10 notional AEFs, each with a cross section of Air Force weapons systems to include fighters, bombers, support aircraft and tactical airlift, with integrated command and control, trained as a unit to respond rapidly and decisively to potential crises anywhere in the world."[5]

According to AFDD 2, the AEFs are deployed wings, groups, or squadrons attached to an ASETF, or in-place NAF.[6] Each AEF will consist of a set number of fighters, bombers, etc. What this means is that the AEF is dependent on interoperability between weapon systems, from communications capabilities to logistic and support requirements. However, the basic organizational structure for each weapon system will remain unchanged. For example, the home organization for the F-16s assigned to an AEF will remain the currently existing wing of F-16s, as in

the 388th ACW located at Hill AFB. Therefore, weapon systems are only operating in an EAF environment when deployed as part of an AEF.

The command and support structure for the AEF will be the ASETF or the NAF. Figure 1 depicts the notional command structure for the AEF. The staff will be pulled from existing organizations to support deployments. Therefore, certain AEF staff and command functions which may be pulled from a particular wing are not typically supporting the remaining elements comprising the AEF except when deployed.

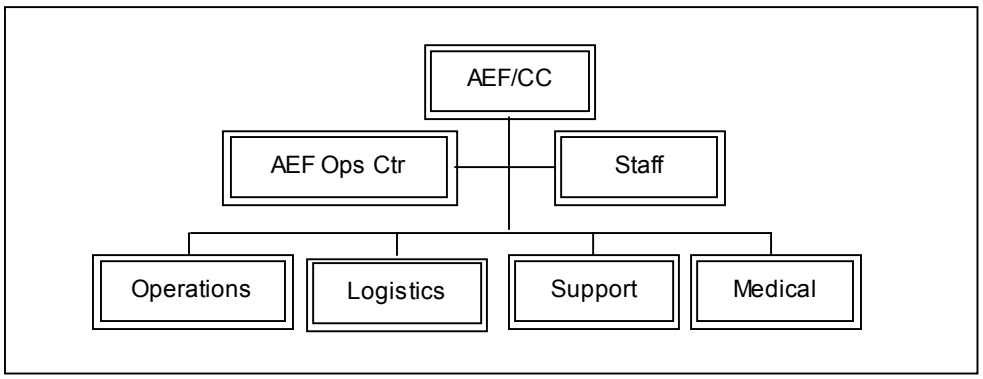

Figure 1 Notional AEF Command Structure[7]

The problem is the creation of tension between aligning capabilities and support to an AEF for deployments versus the current single weapon system organizational structure emphasizing unique and distinct capabilities, where inter-weapon system interoperability isn't so important. The operating environment for AEF weapon systems on the other hand is the packaging of diverse capabilities sent to anywhere on the globe at a moment's notice. Therefore, interoperability between weapon systems is crucial to the AEF's success. Interoperability will ensure that multiple weapon systems are integrated and enabling operations within a single organization. This integration will also provide the synergy sought by the EAF.

The EAF concept also fulfills several USAF core competencies: air and space superiority, global attack, and agile combat support. In particular, agile combat support includes mainte-

nance, supply, transportation, communications, services, engineering, security, medical, and chaplaincy support functions, which must be integrated to form a seamless and responsive combat support system. Agile combat support emphasizes compact and multi-use equipment, increased dependability and less redundancy, and the ability to reach back for support previously required in theater to increase responsiveness and effectiveness and reduce the overall footprint of forward-deployed support elements.[8] This is a greater challenge since the AEF must include the necessary support functions for each weapon system. Individual weapon systems have evolved unique support systems, resulting in a relatively large support tail for an entire AEF. The consequence is redundancy between weapon system support requirements. The integration effort to minimize the forward footprint is envisioned to be a major undertaking.

A major selling point of the EAF is the stability afforded by the AEF deployment schedule similar to the Navy deployment schedules. The AEF deployment schedule controlled by the CSAF is intended to relieve the increasing ops tempo currently experienced by AF units. Each AEF will be on a preplanned cycle consisting of training, deployment work-ups, on-call for deployment, and stand-down.[9] Figure 2 delineates the four phases of the 15-month AEF deployment cycle. The organization responsible for the unit during the Stand-down, Train, and AEF Deployment Preparation phases is the owning major command (MAJCOM). During the final Employment Phase, the owning organization is the combatant commander, or regional commander (CINC).

The uniqueness of the AEF rotation schedule requires close coordination between the MAJCOM and AFMC for the full integration of major acquisition activities. During the "Train" phase, all major maintenance activities, modifications and upgrades are implemented. Synchronization between acquisition/logistic activities and the AEF schedules is necessary to ensure that

no major maintenance activity is due while the system is deployed. The intent is that the weapon system is deployed within the maintenance schedules, and interoperable with the necessary upgrades on board. Complexity increases with each additional AEF.

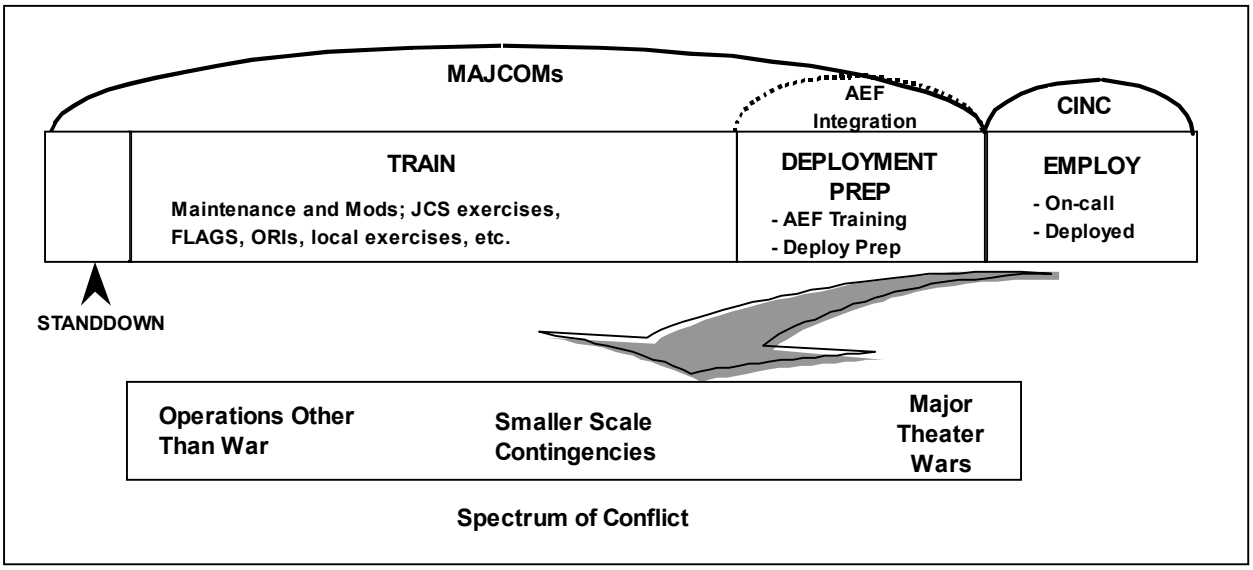

Figure 2 AEF Cycle[10]

The EAF force structure is based on the formation of ten AEFs. The use of 10 AEFs allows the availability of two AEFs for deployment at any time (see Figure 3). The AEF deployment schedules have to be inflexible in order to provide a stable planning environment. Close coordination will be required to avoid delays and slips. Effective integration of the deployment schedule with major maintenance activities, e.g., depot programmed maintenance, is essential. Software and hardware modifications or upgrades will also need to be synchronized across the ten AEFs. Major changes to the weapon system baseline typically require operational testing prior to acceptance by the user (may take days to weeks). Depending on the nature of the change, additional training may also be required prior to implementation and use. All these activities need to fit in the "Train" phase of the AEF deployment schedule. The acquisition community is responsible for planning major maintenance activities and modifications or upgrades. But, the scheduling of activities on operational systems ultimately resides with the user within the MA-

JCOM. A crucial link between the acquisition community and EAF is the synchronization of activities during the down times for each AEF.

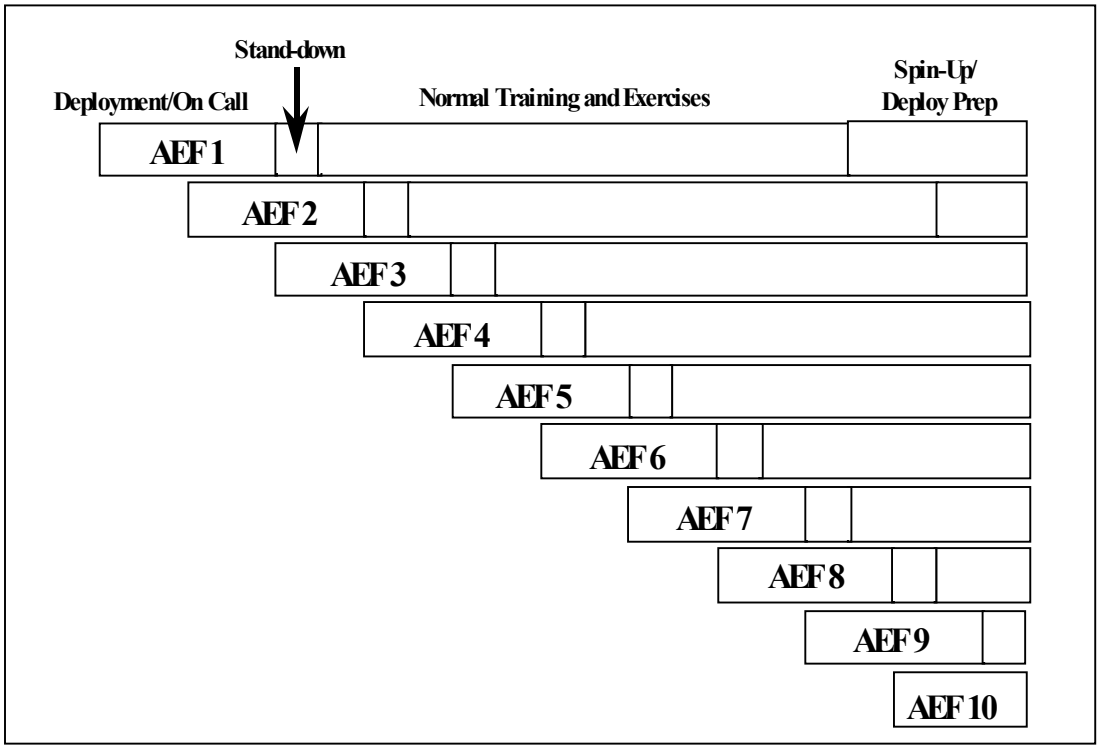

Figure 3 AEF Rotation Cycle[11]

The intent for the EAF concept to meet all CINC's mission requirements from the AF is clear. Several deployments applying EAF type operations have been implemented to verify the concept and validate the CSAF and Acting SAF vision, all provided a measure of synergy unique to the EAF environment. These deployments also surfaced acquisition concerns.

There have been seven preliminary AEF deployments from 1990 to 1998. From these deployments, several lessons learned compiled by Air Combat Command formed the basis for today's EAF concept. Most of the data for this paper is derived from the fifth AEF deployment, AEF V, which occurred at Bahrain, from 3 September to 2 November 1997.[12] The lessons learned from the previous AEFs didn't provide the detail found in the AEF V lessons learned af-

ter-action report. Additionally, the concerns surfaced from the previous four AEF deployments are consistent with those found in AEF V.[13,14]

Overall, the AEF lessons learned highlighted the ability for existing military systems to fulfill the mission, but pointed out several problem areas, in planning, organization, operational concepts, training, logistics and interoperability. Problems surrounding the planning, organization, operational concepts, and training need to be addressed by the operational community, namely Air Staff. It is assumed that the implementation plan due in January 2000 will address these concepts. The interoperability and logistic concerns (including scheduling maintenance actions) are areas that should be addressed by the acquisition process.

The problems regarding interoperability should not be ignored nor should the users be expected to develop workarounds attempting to resolve these problems. For example, there were consistent communication problems between different weapon systems, between the air and ground (support) segments and between U.S. and host nation (or coalition) equipment. Depending on where the support group is from, their radios may be designed to handle the units they are familiar supporting, and not the additional aircraft types comprising an AEF or the operating environment of the forward-deployed location. In another case, deployed personnel were unfamiliar with the equipment provided which resulted in misuse or delays before useful insertion into the mission. In this situation training was delinquent. Any operational time spent correcting support issues is time away from executing the mission.

Another problem area concerned the support equipment needed in theater. There were instances when support equipment (including spares) was either left behind (limited airlift), missing (incorrectly palletized), or exhausted due to unexpectedly high sortie generation rates. This

resulted in low reliability rates, another design consideration.[15] An additional situation found an item not used in accordance with design specifications producing high failure rates.[16]

The unexpected high sortie generation rate incurred another problem: maintenance actions required. Maintenance checks are scheduled based on usage. The aircraft chosen for these earlier AEFs did not require major maintenance activities till after the deployment. In fact, it was an effort to select planes with the most time left prior to the next major maintenance event. However, the sortie generation rates during the deployment exceeded anticipated rates, rates that may have been based on designed reliability requirements.[17]

These types of problems arose from systems (weapon system and related support systems) that were not designed to work in the packaged environment required by the EAF. The current AF organization both operational and acquisition is stovepiped into individual weapon systems. The EAF combines capabilities and functions, and requires interoperability for successful mission accomplishment. This is evidenced in the lessons learned from the AEF deployments, where problems cited focused on the inability/deficiencies in fulfilling this core concept.

The current EAF requirement is still described at a very high level and the various details have not yet been disclosed (for example how to take 13 squadrons of F-15s and assign them to 10 EAFs). However, the basic organizational structure for weapon systems will remain unchanged and existing support systems are geared to specific weapon systems, not the composite AEF structure. Preliminary evidence supports the theory that a strong dependency exists between the acquisition process and the EAF to counter key problems discovered in the initial AEF deployments. Specifically the AF acquisition process needs to address interoperability requirements, reduced deployed footprint, and the synchronization of maintenance and modification schedules with AEF deployments.

Notes

[1] Air Force Doctrine Document (AFDD) 2, *Organization and Employment of Aerospace Power*, 28 September 1998, 32.

[2] Gen Michael E. Ryan, chief of staff, United States Air Force, "Commander's Notice to Airmen (NOTAM) 98-4," 28 July 1998, n.p.; on-line, Internet, October 1998, available from http://www.af.mil/issues/index.html.

[3] Ibid.

[4] Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, September 1997, 23-27.

[5] Department of the Air Force, "Expeditionary Aerospace Force: A Better Use of Aerospace Power for the 21st Century," 7 August 1998, n.p.; on-line, Internet, 24 November 1998, available from http://www.af.mil.issues/.

[6] AFDD 2, 36.

[7] Ibid.

[8] AFDD 1, 35.

[9] Ryan.

[10] Gen Michael E. Ryan, chief of staff, United States Air Force, "Expeditionary Aerospace Force: A Better Use of Aerospace Power for the 21st Century," lecture, Air Command and Staff College, Maxwell AFB, AL, 20 August 1998, 14.

[11] Ibid, 15.

[12] Air Combat Command, United States Air Force, "AEF V Lessons Learned," 6 January 1998, on-line, Internet, 24 November 1998, available from http://wwwmil.acc.af.mil/acccll/accless/aefv.doc.

[13] Air Combat Command, United States Air Force, AEF Lessons Learned, on-line, Internet, 24 November 1998, available from http://wwwmil.acc.af.mil/acccll/accless/.

[14] Tam T. Vo, *Exploratory Analysis of the Deployment Feasibility of United States Air Force Air Expeditionary Forces,* ADB230006, (Wright-Patterson AFB, OH: Air Force Institute of Technology, September 1997).

[15] Ibid, 94-95.

[16] Air Combat Command, "AEF V Lessons Learned," 12-23.

[17] Vo, 94.

Chapter 3

The Air Force Acquisition Process

Major changes expected in transitioning to the EAF concept cross the realm of the AF organization. Pre-packaging capabilities may limit as well as promote employment. For instance the training, planning, tasking, support and deployment of an AEF is dependent on the mission need. The acquisition community plays a key role in the design, development, implementation and sustainment of systems employed by the AEF. Several changes have occurred in recent years, including acquisition reforms primarily in response to the reduced budget. However, reducing cost and schedule is being achieved via a close partnership with industry, diverting the focus away from meeting the changing operational environment.

Analysis of the AF acquisition process provides evidence suggesting that without changes the EAF concept will fail. At first glance, the AF acquisition process appears very complex. A better understanding of this process requires a brief review of the defense acquisition requirements via Department of Defense (DoD) policies. However, any discussion on the acquisition process requires an understanding of some common terms including the role of the single manager.

Acquisition Program: A directed, funded effort that is designed to provide a new, improved, or continuing weapons system or automated information system (AIS) capability in response to a validated operational need.[1]

Single Manager: The individual responsible and accountable for decisions and resources in overall program execution of a military system, including operational support and system disposal.[2] Also known as the Program Manager or the System Program Director.

Integrated Product Team (IPT): Composed of representatives from all appropriate functional disciplines working together with a team leader to build successful and balanced programs, identify and resolve issues, and make sound and timely recommendations to facilitate decision-making.[3]

The AF merged the AF Logistics Command and the AF Systems Command creating AFMC in 1990. This merger empowered the single manager with the authority over the decisions and resources to satisfy customer requirements throughout the life cycle of the weapon system.[4] It is the single manager who has the responsibility for the design and implementation of a weapon system (including upgrades and modifications) and the development of the logistic and support aspects. The single manager also controls the sustainment effort after the system is delivered. Single manager responsibilities include ensuring a systems engineering process exists to control changes to the baseline, managing interoperability, and integrating user requirements into the process.[5] Clearly the single manager is a significant player in implementing the EAF concept. Coincident with the merger, the AF created the acquisition professional development program (APDP) to ensure that single managers are qualified to handle the task.

The complexity of the acquisition process requires years of exposure before a measure of expertise is evidenced. Training and experience are necessary requirements for an individual to be certified to the level necessary for senior program management and selected as the single manager for a weapon system. The result can be an individual smart on acquisition processes but unfamiliar with the unique operational needs and demands placed on a weapon system, hence the emphasis on user participation at critical design

decision points. Additionally, the single manager is currently focused on managing the specific weapon system and the mission it fulfills, as a single entity versus the contribution the weapon system makes as part of the AEF team. For example, the B-2 single manager doesn't currently consider the strains the AEF places on a support concept developed to support a squadron of B-2s. The result is a stovepiped single manager who manages the design and development of a weapon system and its modifications without regard for interoperability between systems deployed in an EAF environment. This division between weapon systems capabilities runs deep, all the way to the top.

The Assistant SAF for Acquisition (SAF/AQ) organizational chart breaks down capabilities into three main areas: Mission Area, Program Execution, and Functions (Figure 4).[6] The Mission Area Directors cover four basic categories: Global Reach, Global

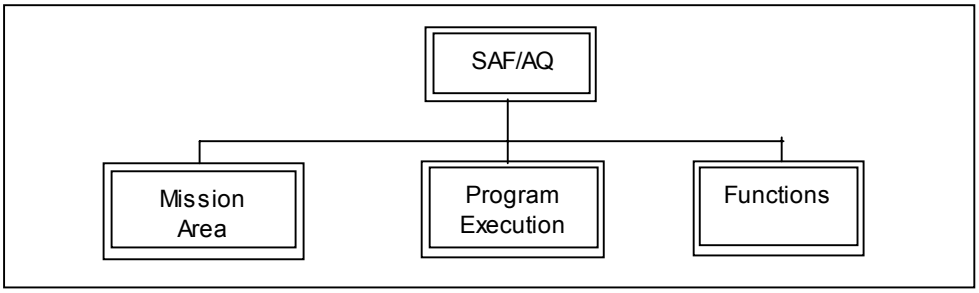

Figure 4 SAF/AQ Organizational Chart

Power, Information Dominance, and Space and Nuclear Deterrence. There are seven Program Executive Officers (PEOs) covering a range of weapon systems: Airlift and Trainers; Fighters and Bombers; Weapons; Warning, Surveillance and Control; Battle Management; Joint Logistic Systems; and Space. The four functional directors drive policies for their particular area of control, e.g., Contracting. The single managers report directly to the PEO or the Mission Area Directors on program management issues. Clearly, weapon system capabilities are divided into stovepiped organizations. EAF

interoperability problems surface from systems designed in stovepiped weapon system managed organizations. The AF acquisition process rooted in DoD policies and guidance has additional incompatibilities with the EAF concept.

The end of the cold war and the shrinking defense budget required internal scrutiny of the DoD process for acquiring, modifying or upgrading military systems. A 1995 memorandum from the Under Secretary of Defense for Acquisition and Technology, USD(A&T), Dr. Paul G. Kaminski, initiated major reforms within the DoD acquisition process.[7] Shortly after on 15 March 1996, DoD issued a new directive regarding defense acquisition, DoDD 5000.1 and associated regulation DoD 5000.2-R. DoDD 5000.1 establishes a disciplined management approach for defense acquisition programs and DoD 5000.2-R establishes associated mandatory procedures. These documents revamp a defense acquisition system created in the 1970s, and embrace smart business practices such as teamwork, empowerment, and integration of commercially developed products.

The DoDD 5000.1 cites 29 DoD defense acquisition policies and principles guiding all defense acquisition programs, and divides them into three categories: Translating Operational Needs into Stable, Affordable Programs; Acquiring Quality Products; and Organizing for Efficiency and Effectiveness.[8]

A principle that falls into the first category is the 'total systems approach,' which optimizes total system performance while minimizing the cost of ownership. This principle includes cognizance of system compatibility, interoperability, and integration with other systems. Interoperability is defined as the internal and external operable interfaces of the weapon system, with increased emphasis on joint and coalition operations. In the second category, the DoD directive addresses the importance of open communication

with the user to ensure the product fulfills the mission need.[9] The third category includes the principle involving program flexibility regarding establishment of acquisition program phases and milestones.[10] Major program milestones are the decision points where approval is required to begin the next acquisition phase. DoD 5000.2-R contains detailed descriptions of the acquisition phases and the milestone decision points.[11] Appendices to DoD 5000.2-R detail acquisition documents required at milestone decisions, including the Operational Requirements Document (ORD) and the Test and Evaluation Master Plan (TEMP). These vital documents provide the link between the acquisition process and the operational environment.

The ORD, created by the user and approved by CSAF, defines the system level capabilities satisfying the mission need. It is the document used for system design.[12] The TEMP delineates system testing and final acceptance criteria. This document relates program test strategy to critical operational issues and the objectives and thresholds derived from the ORD. For major acquisition programs, the TEMP is developed through the IPT process and approved by OSD.[13] These two documents drive the weapon system design and acceptance requirements. The single manager is responsible to deliver a system that fulfills these requirements.

The purpose of highlighting segments of the DoD acquisition reform documentation is to indicate the DoD's emphasis on system interoperability, the importance of user involvement at important design decisions (as well as throughout the acquisition program), and the level of flexibility in the management of the acquisition effort. These documents signify a revolution in business affairs entitled acquisition reform, which required each service to reform their internal acquisition processes.[14] However, DoD acquisition poli-

cies are kept at a high level, leaving each armed service latitude in the implementation of these policies. How are these key principles applied and in what manner are they manifested in AF acquisition reforms? The acquisition reforms adopted by the AF attempt to add flexibility to the acquisition process, but don't address preliminary problems identified in the AEF deployments directly affecting the feasibility of the EAF concept.

The AF acquisition reform efforts, termed Lightening Bolts, are based on the initial USD(A&T) direction for DoD acquisition reform. These tend to focus on partnering with industry and reducing cycle times (time from requirement definition to system delivery and deployment) to reduce program costs and delivery schedules. Of the eleven Lightening Bolts, only two show linkage to the user and the operational environment.[15]

#2. **Standing Senior Level Acquisition Strategy Panel (ASP)** – Created standing ASP composed of senior level acquisition personnel from the Assistant Secretary of the Air Force for Acquisition (SAF/AQ), the Air Force Materiel Command (AFMC) and the *user* to provide advice to program managers on their program strategies.

#10. **Reducing Cycle Times** – Continuing efforts to reduce the time from requirement definition to contract award.

The nine remaining Lightening Bolts address using commercial-off-the-shelf items (COTS) and eliminating unnecessary and redundant reporting and documentation. For example, one Lightening Bolt drove the replacement of all acquisition documents with the Single Acquisition Management Plan (SAMP). The SAMP is a comprehensive, integrated plan laying out the development and delivery for a weapon system.[16] However, none of the Lightening Bolts focus on sharing capabilities across weapon systems – such as ensuring that interoperable systems are delivered (part of the AF's organize, train and equip responsibility). Why didn't the AF acquisition reforms address the DoD principle of interoperability? Perhaps the emphasis was on joint interoperability resulting in the

emergence of joint systems, such as Joint STARS, Joint Strike Fighter and various joint theater information systems. But again, each system has its own single manager. The organizational structure defines the AF acquisition process.

This chapter highlighted the responsibilities of the single manager with regard to weapon system design, and presented an abbreviated view of the defense acquisition system and the AF's derivative acquisition process. The emphasis regarding defense acquisition principles selected those which applied to the EAF and underscored the importance of weapon system design based on a total systems concept while allowing the services more latitude on the development and execution of acquisition strategies. Recent acquisition reforms seek to remove a lot of the obstacles that legacy organizations and processes invoked. The goals in reducing structure are to remove some of the strain on the budget and allow efforts to focus on providing the CINCs with a warfighting advantage by speeding up the acquisition cycle. The AF acquisition reform initiatives are focused on fulfilling many of the defense acquisition principles. Reducing overhead and eliminating ineffectual reporting streamlined the organization and related processes. But, the stovepiped organizational structure dependent on military system functions remains.

The EAF concept, though new, presents a new dilemma for combating interoperability. The DoD policies clearly hinted at the importance of interoperability in joint and coalition operations. The EAF surfaces inter-weapon system interoperability issues, from communications to support aspects. Certainly the stovepiped nature of the AF acquisition organization hinders interoperability and causes additional friction between support structures. The trial AEF deployments were conducted in isolation, without the increased complexity of synchronizing 10 AEF deployment schedules. Without

the support and coordination of all AEF weapon systems' single managers the EAF concept will fail where it counts most: in the global theater.

Notes

[1] Department of Defense Directive (DoDD) 5000.1, *Defense Acquisition*, 15 March 1996, 2.

[2] Thomas R. Evans, Kathleen M. Lyman, and Michael S. Ennis, *Modernization in Lean Times: Modifications and Upgrades* (Fort Belvoir, VA: Defense Systems Management College Press, July 1995) 5-4, 5-5.

[3] DoDD 5000.1, 11.

[4] Evans, 5-4.

[5] Department of Defense (DoD) Regulation, 5000.2-R, *Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information system Acquisition Programs*, 15 March 1996, Part 4, 1.

[6]Assistant Secretary for Acquisition, United States Air Force, "SAF/AQ Organization Chart," n.p.; on-line, Internet, 24 November 1998, available from http://www.safaq.hq.af.mil/safaq_info/orgchart.html.

[7] Evans, Appendix B.

[8] DoDD 5000.1, 3-4.

[9] Ibid, 6.

[10] Ibid, 8.

[11] DoD 5000.2-R, Part 1, 4-7.

[12] Ibid, Appendix II.

[13] Ibid, Appendix III.

[14] Hon Jacques S. Gansler, Under Secretary of Defense Acquisition and Technology, "Building on the Momentum: The Revolution in Business Affairs," address to the Air War College, Maxwell AFB, AL, 13 January 1999.

[15] Assistant Secretary for Acquisition, United States Air Force, "Lightening Bolt Update #14," 6 August 1997, on-line; Internet, 24 November 1998, available from http://www.safaq.hq.af.mil/acq-ref/bolts/releas14.doc.

[16] Darleen A. Druyun, Principal Deputy Assistant Secretary (Acquisition and Management), United States Air Force, memorandum for distribution, subject: Processing Single Acquisition Management Plans (SAMPs), Policy Memo 97-02, 24 April 1997.

Chapter 4

The Naval Expeditionary Force

The United States Navy can provide valuable information on the implementation of an expeditionary force, specifically, the interoperability challenges that remain. The Navy responded to the interoperability challenge through the creation of a new group, called SEA 05. Additionally, the Navy implemented acquisition reforms in response to the DoDD 5000.1 and DoD 5000.2-R. Similar to the AF, these reforms focus on reducing cycle times and program costs. However, in one instance, additional benefits were reaped when the user was involved in all major design decisions.

The United States Navy's expeditionary force (NEF) is a mixture of the carrier battle group with the amphibious ready group.[1] The primary attributes of the NEF are flexibility and sustainability. They are flexible to meet any mission because the NEF can be tailored to meet a variety of situations across the spectrum of conflict, from demonstrating United States commitment and political support, to full scale combat. The NEF is also extremely self-sufficient. Without the AEF's deployed footprint restrictions they are able to bring their own infrastructure which releases them from relying on land-based or host nation support during deployments. A unique aspect of the NEF is the combination of capabilities packaged together to provide a "9-1-1" capability.

Focusing on the carrier battle group, its composition consists of carrier air wings (including strike fighters, helicopters, SEAD and EW aircraft), surface warships (destroyers and frigates) and submarines. The combination of different weapon systems providing a more synergistic and effective force is similar to the EAF force structure by packaging different capabilities together to provide greater firepower. The NEF provides several core capabilities to the joint commander. Of these, Network-Centric Warfare is the most significant.

> "Network-Centric Warfare derives its power from the robust networking of a well-informed geographically dispersed force. Enabling elements are a highly webbed information service, access to all appropriate information sources, weapons reach with precision and speed of response, enhanced command and control (C2) process and integrated sensors hosted on the information network closely coupled in time to shooters and C2 processes."[2]

Network-Centric Warfare provides a common picture to each member of the NEF. This capability requires interoperability between weapons systems. Similar to the initial AEF deployments, implementation of the NEF uncovered deep-rooted problems, primarily associated with inter-weapon system connectivity or interoperability.

Part of the interoperability problem is the proliferation of modifications and upgrades on existing weapon systems leading to the existence of multiple baselines prevalent when fielding incremental upgrades in response to budgetary constraints. Additionally, the introduction of COTS technology into military specification compliant designed systems increased system complexity. Software upgrades, for example, may require the creation of 'middleware' to overcome interface problems. These problems are compounded with an acquisition process that focuses on individual weapon systems rather than integrated systems. The Navy's acquisition organizational structure is stovepiped into weapon system functions.[3] The increased complexity results in erosion of systems interoperability

affecting warfighting capabilities. The AF is now in the same situation. The Navy's solution to the interoperability problems was to create a new and independent organization, SEA 05.[4]

In November 1997, the Naval Sea Systems Command established a focal point for system integration and interoperability: the Deputy Commander for Warfare Systems, also known as SEA 05. The purpose of this group is to "develop policy and architecture for warfare systems engineering, implement a common warfare systems engineering process, and provide top systems level direction for development, acquisition, deployment, support and disposal of balanced combat systems for ships and submarines."[5] SEA 05 is the Navy office responsible for ensuring that new and modified weapon systems are compatible with the rest of the NEF, solving the interoperability problems. One of the SEA 05 strategies is to provide engineering leadership not only within the Navy, but also across DOD for joint weapon systems in order to optimize Navy warfighting effectiveness in the joint battle force.[6] On 4 August 1998, SEA 05 published one of its first policy documents: Warfare Systems Guidance and Policy Paper No. 98-03 regarding the Battle Force Interoperability (BFI) Certification Process.[7] This paper provides the interim methodology for BFI resulting in certified battle force (BF) configurations.

The BFI process ensures disciplined change control and lays out the events and the responsible organizations required for BFI certification. The Baseline Review Board (BRB) chaired by the using command establishes the proposed baseline configuration. Upon approval as the Final Baseline Configuration, the new BF Change Control Board (BF CCB), chaired by the SEA 05 controls future changes. Of significance is the new requirement for a series of systems integration tests prior to deployment. The intent is

that significant deficiencies will be caught and fixed prior to deployment, reducing if not eliminating interoperability problems. Overall, the creation of SEA 05 sets up a single focal point for BF integration issues. Here is the organization with the authority and responsibility for making sure that any weapon system modification or upgrade is compatible with existing systems prior to deployment.

The Navy's innovative approach to the interoperability challenge bears further consideration. It is too soon to tell how effective this organization will be able to resolve the interoperability problems. SEA 05 may not help in identifying the problems earlier, i.e., during design, versus final systems integration (just prior to deployment). Much of the SEA 05 staff positions (primarily systems engineers) still remain vacant. Depending on leadership and support from the top, the success or failure of this organization remains in the balance. Still, just the fact that the organization has been stood up and directing policy towards rectifying interoperability problems indicates a measure of permanence. From an acquisition standpoint, SEA 05 branches across the stovepiped organizations and links them together.

The Department of the Navy developed eight acquisition reform thrusts and like the Air Force these thrusts focus on partnering with industry and shortening cycle times between requirement definition and implementation/deployment.[8] Of the eight, only two show linkage to the user and marginally support an expeditionary force structure:

Communications: Decrease dissemination cycle times and customer response times.

Partnering and Customer: Increase organizational effectiveness.

Navy acquisition reform has proven successful at increasing user involvement throughout the design process. The Advance Amphibious Assault Vehicle (AAAV) pro-

gram office team of Marines, civilians, and industry used "user juries" to improve supportability, readiness, operability and ergonomics. They took advantage of mock-ups, simulators, prototypes and system components to perform actual tasks to identify several design improvements. The key to success was the participation of Marines (in this case infantry, vehicle crews and maintainers) on every IPT throughout the organization ensuring the operational suitability of every design decision.[9] The result is a system that will accomplish the mission at a reduced cost and delivered when needed.

A component of the expeditionary force is the carrier battle group. The carrier air wing of the NEF is similar to an AEF because it employs various weapons systems to fulfill a range of missions, from small-scale contingencies to a major conflict. The central theme is Network-Centric Warfare providing the warfighters a common picture of the battlefield. If Network-Centric Warfare is the central theme, then interoperability is the essence upon which this capability depends. The self-sufficient support concept, an essential element of carrier battle group is the main delineator between the AEF and the NEF. The carrier battle group brings their infrastructure with them, eliminating the dependency on land-based support. The AF uses agile combat support to reduce the deployed footprint, depending on home-based or host nation support. The Navy acquisition reform initiatives, similar to the AF, focus on streamlining the acquisition process and partnering with industry.

The Naval acquisition reforms, like the AF acquisition reforms, have had success in accomplishing stated goals: using COTS to reduce costs and decrease time between requirement definition and deployment, and involving the user throughout the acquisition process to deliver a capability that fits the operational requirement. These efforts show

little linkage to an expeditionary force structure and cause interoperability problems. But unlike the AF, the Navy recently reorganized to create an integrating organization to handle its interoperability challenges. SEA 05 was formed to ensure BF Interoperability. Continued interoperability deficiencies hindered mission accomplishment, reducing warfighting capabilities – especially, Network-Centric Warfare. The first guidance published by SEA 05 addresses certifying BF configurations. A rigorous, event driven schedule outlines responsible organizations in the certification process. The guidance introduces the BF CCB, which approves changes to NEF weapon system configurations, and requires the completion of several systems integration tests prior to deployment. The SEA 05 has heightened the Navy's awareness of interoperability issues and bridges weapon system boundaries in order to ensure warfighting effectiveness.

Notes

[1] Department of the Navy, *Vision, Presence, Power* 1998, 8-9.

[2] Ibid, 21.

[3] Ibid, 46.

[4] Edward J. Walsh, "Making It All Work Together," *Military Information Technology*, Vol 2, Issue 5, 15-16.

[5] Naval Sea Systems Command, United States Navy, memorandum for distribution, subject: Establishment of the Deputy Commander, Warfare Systems, Ser OOB/146, 7 November 1997.

[6] Department of the Navy, n.p.; on-line, Internet, 6 January 1999, available from http://www.navsea.navy.mil/StrategicPlan/pg-14.html.

[7] Naval Sea Systems Command, United States Navy, *Warfare Systems Guidance and Policy Paper No. 98-03*, 9400 Ser O5/046, 4 August 1998.

[8] Department of the Navy, "About the 8 Thrusts of DoN Acquisition Reform," n.p.; on-line, Internet, 24 November 1998, available from http://www.acq-ref.navy.mil/thrusts.html.

[9] Department of the Navy, "Marine Corps Acquisition Reform Realizers," *DoN Implementation of Acquisition Reform Manual*, 3 April 1998, 3; on-line, Internet, 24 November 1998, available from http://www.acq-ref.navy.mil/implman/real/real1.html.

Chapter 5

Recommendations

Initial AEF deployments and an analysis of the AF and Navy acquisition processes provide preliminary evidence supporting the theory that without changes to the current AF acquisition process the EAF concept will fail. Specific areas which the acquisition community should address are: interoperability problems which exist between AEF weapon systems; the inability to effectively reduce the deployed footprint without impacting operational capability; and the vision of a fixed deployment schedule dependent on highly synchronized maintenance activities. In order for the AF acquisition process to be able to deliver and support systems that can operate in an EAF environment, weapon systems partitions need to be overcome and user involvement increased throughout the acquisition process. The stated need for an EAF culture change pervading the entire AF has significant impacts on the support community.

The problems listed above identify the link between force planning (acquisition) and the operational implementation of EAF capabilities. Both sides have very experienced and knowledgeable people in what are very complex processes. But their distinct expertise requires increased cooperation to ensure an acquisition process able to deliver and support systems effective in an EAF environment. For instance, the AEF V after-action report listing specific deficiencies wasn't distributed to any organization within AFMC,

perhaps because they didn't know who to send it to. The acquisition process exacerbates the interoperability problem by organizing along weapons system functions and focusing on budget and schedule constraints versus operational environment needs.

A key assumption of this research is that an EAF user organization will exist to participate in the acquisition process. It is assumed that this organization will represent the using command with the operational experience and knowledge to develop and implement the concept of operations and future requirements for the EAF. Air Staff, AF/XO, is currently putting together the EAF implementation plan to meet the year 2000 deadline, and it is expected that this plan will include an EAF integrating or oversight organization.

Putting aside the EAF organizational, planning, and concept of operations challenges, when the dust clears and the AEF is ***the*** AF force structure, certain challenges will remain. Of these, interoperability cannot be resolved with additional training, or increasing personnel and equipment. Interoperability needs to be designed into the system of systems. Therefore, part of the solution is to modify the AF acquisition process to absorb the AEF culture. First and foremost, key players need to be identified and their responsibilities explained.

The leaders of the acquisition and operational communities need to initiate the changes within the acquisition process. Specifically, SAF/AQ needs to realign resources to more effectively support the EAF vision. At the lower level, the single managers and program managers need to consider the EAF environment at all design decisions. The AEF commanders need to make sure they are involved in the acquisition development

phases and are included in the design decisions. As mentioned, the EAF concept requires a culture change throughout the Air Force.

SAF/AQ needs to make the changes that are necessary within the acquisition organizational structure. A major change that needs to occur in the acquisition organization is the creation of a group similar to the Navy's SEA 05 which would span across stovepiped acquisition organizations. A recommendation is that this organization be the AEF acquisition counterpart responsible for managing the integration of the system of systems. This organization would control the systems engineering aspect of the AEF including conducting trade-off studies to predetermine if upgrades enhance the AEF as a whole. For example, the addition of a COTS based technology to a single weapon system may not be as effective in the EAF environment as first conceived. This organization would take advantage of the IPT concept to pull in representatives from the other program offices and the AEF users for major design decisions. The AEF acquisition organization would provide the authority and the vision to integrate AEF essential capabilities across all weapon systems. In addition to organizational changes, the acquisition strategies for AEF capabilities will also need to change.

The Milestone Decision Points determine entry into the next major acquisition phase. It is essential that EAF considerations play a role in the milestone decisions, especially leading into the Engineering and Manufacturing Development (EMD) Phase. It is at this point that new or modified requirements need to be played against the EAF environment to justify the value in pursuing the acquisition program. The EMD Phase translates the most promising concept into a stable, interoperable, producible, supportable, and cost-effective design.[1] The Milestone Decision Authority must assess weapon system

interoperability before granting approval to begin any acquisition phase. As part of the milestone decision, three core documents need to address EAF considerations. These three documents need to be updated to reflect EAF considerations (specific interoperability requirements, reduced footprint, and integration of the maintenance schedules with the AEF deployment schedules).

The ORD, developed by the user, is crucial as it serves as the baseline document for specifying the system design. Additional acquisition documents that need to be amended are the SAMP and the TEMP. In particular, the TEMP should address the operational testing of the entire system of systems prior to deployment. Another recommendation is the implementation of a Capstone TEMP[2] for EAF systems similar to the Naval Battle Force Certification process. A Capstone TEMP is DoD's method for evaluating the total system of systems. The effort (cost and schedule) contributed to this task will provide dividends on the battlefield.

Besides the top down direction, the key players pushing change up through the acquisition organization are the single managers. They need to break down the barriers that bound their acquisition programs in order to include AEF environment considerations. The IPT structure is the method for including interface considerations and the total system approach. To achieve maximum synergy, the acquisition community must enforce the AEF deployment schedules. The single manager (for any weapon system or military capability employed by the AEF) has the responsibility for coordinating maintenance and modifications with AEF deployments. The single managers should also ensure EAF considerations are captured in the weapon system design and related modifications. An AEF user must be present throughout development and at significant design decisions. The

user's involvement and continued presence throughout the acquisition process is vital to capture the unique demands of the AEF operational environment. Continuous communication between the operational and acquisition communities is vital towards ensuring an interoperable and effective design.

The recommendations for incorporating AEF considerations into the acquisition process, in summary are: the creation of an AEF acquisition counterpart organization; EAF considerations at major milestone decision points (specifying AEF requirements in the three core acquisition documents: ORD, TEMP, and SAMP); single manager's responsibility for enforcing the AEF deployment schedule; and increased user involvement throughout the acquisition effort. The biggest payoff will be the ability to enable informed decisions allowing tradeoffs to occur in favor of programming updates that improve the AEF's ability to meet the CINC's mission. Once the EAF concept is implemented, continuing to capture the lessons learned of deployed AEFs will prove valuable towards fine tuning the EAF concept and making it more effective. The combination of providing interoperable systems, reducing the deployed footprint and enforcing the AEF deployment schedule will synergize the EAF force structure and guarantee its success beyond the year 2000.

Notes

[1] Department of Defense (DoD) Regulation, 5000.2-R, *Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information system Acquisition Programs*, 15 March 1996, Part 1, 4, 5

[2] DoD 5000.2-R, Appendix III

Chapter 6

Conclusions

The purpose of this paper is to present and support the theory that without changes to the current AF acquisition process the EAF concept will fail. The EAF concept described by the CSAF and the acting SAF is sufficient to paint a new operating environment for AF weapon systems. The most significant changes are the packaging of capabilities combining different weapons systems (vs. sending independent squadrons of each), the reduced deployed footprint (minimizing infrastructure), a fixed deployment schedule, and the heightened dependency on interoperability, not only between the AF and joint and coalition forces, but also between weapon systems. These considerations are critical design parameters for military systems, and must be included in the planning for major acquisition programs and potential modifications or upgrades to systems deployed by the AEF. A look at the initial AEF deployments suggests that these are valid concerns that need to be addressed to make the EAF an achievable concept. The AEF V lessons learned report painted a more detailed picture of the deployment feasibility for an AEF structure, specifically in the logistic and support facets of the deployments. The AF acquisition community can address many of these concerns.

The recommendations to the AF acquisition process, i.e., establishment of an AEF acquisition organization, incorporating EAF considerations in important acquisition

documentation, single manager support of the AEF deployment schedule, and insisting on increased involvement by the user during design decisions, will enable current and future weapon systems to operate more effectively in the EAF environment. The payoff is a more cognizant and effective process, where tradeoffs can occur that support improving the capabilities of the AEF as a system of systems. Unfortunately, due to limited information on the EAF, a more detailed analysis of EAF requirements and changes to the acquisition process was not possible. In particular, it will be necessary to identify EAF unique requirements for mission accomplishment.

The EAF concept places unique demands upon AEF components. The Scientific Advisory Board (SAB) working directly for the AF produced a report on the AF Expeditionary Forces.[1] This report evaluated the AEF concept and provided several conclusions on its implementation in various areas: Operational Context and Training; Command, Control and Information; Technology Thrusts; and Lean Logistics. This document highlights areas for future funding considerations including recommendations for future research utilizing commercial technology. Another source for identifying technologies improving EAF effectiveness is the AEF Battlelab.[2]

The AF recently created the Battlelabs to seek, evaluate, implement and test new technology. The Battlelabs conduct experiments to evaluate the 'best bang for the buck,' and then seek program approval and funding for further development (if necessary), production and implementation. The AEF Battlelab located at Mountainhome AFB is focused on identifying technologies that promote the capabilities of the AEF. Research should continue to assess available commercial technologies that add value to the AEF

capabilities. Additionally, this paper did not address reducing deployed footprint by modifying current support processes, a characteristic vital to the EAF mission.

Agile combat support includes several initiatives not included here, but need to be evaluated from an EAF (including interoperability) standpoint. Integrating support requirements across weapon systems will reduce the forward-deployed footprint and enable the EAF concept. These logistics efforts are essential towards meeting the unique environmental constraints imposed by the new EAF operational environment.

Overall, the global environment in which the AF finds itself has changed dramatically. The AF leaders have responded by providing a new vision: the EAF concept. It is up to each individual airman to make this vision a reality. The rewards for implementing these recommendations are a streamlined acquisition process focused on providing a robust EAF capability, and a more effective AF. However, the time to make these changes is now. If these changes are slow to implement, or are not implemented at all, then the vision will never be realized by the year 2000. The result is an inability to adapt to the current global environment, impacting AF readiness to fight wars. According to Sun Tzu, there is no better time to attack the enemy then when they are not ready.[3]

Notes

[1] R. Fuchs, et al. (Scientific Advisory Board), *United States Air Force Expeditionary Forces*, Vols 1, 2, SAB-TR-97-01 (Washington, DC: Department of the Air Force, February 1998)

[2] Air Expeditionary Force Battlelab, on-line, Internet, 24 November 1998, available at http://www.mountainhome.af.mil/

[3] Sun Tzu, *The Art of War*, translated by Samuel B. Griffith, (New York, NY, Oxford University Press, 1971) 69

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