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Supporting Air and Space Expeditionary Forces

Lessons from Operation Iraqi Freedom

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Summary

The Air Force developed the Air and Space Expeditionary Force (AEF) concept—substituting speed of deployment and employment for presence—to allow it to respond quickly to any national security issue with a tailored, sustainable force. Since 1997, RAND Project AIR FORCE and the Air Force Logistics Management Agency have studied and refined a framework for an agile combat support (ACS) system to support the AEF concept (Galway et al., 2000; Tripp et al., 1999).

Agile Combat Support System Background

As described in Tripp et al. (2000), the AEF operational goals are to

- foster an expeditionary mind-set
- rapidly configure support needed to achieve the desired operational effects
- quickly deploy both large and small tailored force packages with the capability to deliver substantial firepower anywhere in the world
- immediately employ such forces upon arrival
- smoothly shift from deployment to operational sustainment
- meet the demands of small-scale contingencies and peacekeeping commitments while maintaining readiness for potential contingencies outlined in defense guidance.

Key elements of an ACS system to enable these AEF operational goals include the following (Tripp et al., 1999):

- An expeditionary—forward-thinking—mind-set, which would be instilled in combat support personnel
- A combat support execution planning and control (CSC2) system to assess, organize, and direct combat support[3] activities, meet operational requirements, and be responsive to rapidly changing circumstances. The CSC2 capability would help combat support personnel
  —estimate combat support resource requirements and process performance needed to achieve the desired operational effects for the specific scenario.
  —configure supply chains for deployment and sustainment, including the military and commercial transportation needed to meet deployment and sustainment needs.
  —establish control parameters for the performance of various combat support processes required to meet specific operational needs.
  —track actual combat support performance against control parameters.
  —signal when a process is outside accepted control parameters so that plans can be developed to get the process back within control limits.
- A quickly configured and responsive distribution network to connect forward operating locations (FOLs), forward support locations (FSLs), and continental United States (CONUS) support locations (CSLs)
- A network of FOLs resourced to support varying deployment/ employment timelines

[3] In this report, the term *combat support* is defined as anything other than the actual flying operation. Combat support consists of civil engineering, communications, security forces, maintenance, service, munitions, etc. Not all aspects of combat support are addressed in this report because the scope was too broad.

- A network of FSLs configured outside CONUS to provide storage capabilities for heavy war reserve materiel (WRM), such as munitions and tents, and selected maintenance capabilities, such as centralized intermediate repair facilities (CIRFs) that service jet engines of units deployed to FOLs. FSLs could be collocated with transportation hubs.
- A network of CSLs, including Air Force depots, CIRFs, and contractor support facilities. As with FSLs, a variety of different activities may be set up at major Air Force bases, convenient civilian transportation hubs, or Air Force or other defense repair depots.

In 2000, Project AIR FORCE helped evaluate combat support lessons from Joint Task Force Noble Anvil (JTF NA),[4] in Serbia. In 2002, it evaluated combat support lessons from Operation Enduring Freedom (OEF), in Afghanistan. Some of the concepts and lessons learned from JTF NA and OEF were implemented in supporting Operation Iraqi Freedom (OIF).

Concentrating only on Air Force operations, this analysis provided the opportunity to compare findings and implications from JTF NA, OEF, and OIF. Specifically, the objectives of the analysis were to indicate how combat support performed in OIF, examine how ACS concepts were implemented in OIF, and compare JTF NA, OEF, and OIF experiences to determine similarities and applicability of lessons across experiences and to determine whether some experiences are unique to particular scenarios. This report does not address medical support issues.

JTF NA, OEF, and OIF provide three important opportunities to study how AEF ACS concepts were implemented during contingency operations and how they have been refined with each contingency experience to better support AEF goals. All three contingency operations provide important opportunities to study

[4] The U.S. portion of Operation Allied Force was code named Joint Task Force Noble Anvil. This report concentrates on Air Force operations conducted by JTF NA.

how AEF ACS concepts were implemented during contingency operations. In this report, we address six areas: CSC2 structure, FOL development, the use of FSLs and CSLs, the transportation system, the use of current technology, and resourcing to meet current operational requirements. Understanding these experiences could be of value for combat support and operational personnel who may be called upon to support future contingency operations. The Commander, Air Combat Command (ACC/CC), sponsored this research in coordination with the Air Force Deputy Chief of Staff for Installations and Logistics (AF/IL).

Combat Support Execution Planning and Control

Findings (see pp. 19–38)

Lessons learned from JTF NA indicated problems in combat support execution planning and control. As a result, AF/IL asked RAND Project AIR FORCE to develop a CSC2 future, or "TO-BE," operational architecture.[5] That work began in 2000 and was concluded just as operations began in Afghanistan. Although the TO-BE operational architecture was not used during OEF, OEF provided an opportunity to improve its design.

Many of the issues identified in JTF NA and OEF did not emerge during OIF, because doctrine was undergoing change before OIF and roles and responsibilities were being defined or redefined. Likewise, because many standing organizations were still in place from OEF and because the command structure for those organizations was well defined, individuals and organizations were better prepared to meet their responsibilities than they were during Joint Task Force Noble Anvil. The leaders in OIF had learned from the recently completed OEF. Many of the same leaders held their same positions for OIF. Organizations built on an ad hoc basis for OEF were refined for OIF. Early in OIF planning, roles and

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[5] See the Appendix for a list of CSC2 TO-BE nodes and their responsibilities.

responsibilities were clearly defined and articulated. Given the long planning time, a solid plan was developed. Moreover, U.S. Air Forces, Central Command (CENTAF), was the supported command, with the rest of the Air Force supporting CENTAF. Although numerous other operations were ongoing, combat support personnel focused on providing the combatant commander with the essential elements he needed to succeed in OIF.

To address essential elements of the Logistics Sustainability Analysis (LSA) that was used to help build the combat support plan for OIF, the Air Force Materiel Command (AFMC) hosted a Warfighter Support Conference, which AF/IL facilitated. The LSA identified actions that needed to be taken to support the operational plan. Many major commands (MAJCOMs) and functions were represented and helped to finalize the plan. Once the efforts were all focused, it became easier for all involved to reach an agreement on the type and format of information that needed to flow between echelons. Standardized reports were defined and web-based updates were used.

The ability to adjust a plan during execution can become the most important requirement during any operation. The expeditionary mind-set of OIF leaders aided the success of the operation. Although the Air Force has had equipment and personnel deployed in the area of responsibility (AOR) since the end of Operation Desert Storm, problems occurred during OIF once the combatant commander changed the sequence of the forces called forward. In such a changing environment, the success of CENTAF during OIF was due to motivated, highly trained, ingenious individuals working around problems within the system.

Implications (see pp. 38–41)

The Air Force should ensure that the lessons from this operation—both the good and the bad—are passed on to future leaders, perhaps through doctrinal changes. Doctrine should institutionalize success from past operations. An expeditionary Air Force will be required in the future. Training and equipping leaders to deal with expeditionary operations will continue to be a challenge.

Much should be learned from the way in which roles and responsibilities were defined during OIF. Organizations established in recent operations should become standing organizations, used regularly.

Combat support planning needs to be integrated in the operational campaign planning process. The effects of alternative combat support strategies, tactics, and configurations need to be known to operations personnel when a plan is selected. In addition, once a jointly developed operation and combat support plan has been determined to be feasible—that is, capable of achieving the desired operational effects—a closed-loop[6] feedback and control system needs to track actual combat support process performance against planned values. When the system exceeds control parameter limits, the CSC2 system needs to signal combat support personnel that corrective action is needed. The CSC2 operational architecture outlines how this planning and control could occur across the echelons of support and throughout the phases of operational campaigns (Leftwich et al., 2002).

The combat support execution planning and control operational architecture also specifies CSC2 nodes and associated responsibilities that are consistent with those that were developed and used during OIF. The CSC2 architecture specifies the broad responsibilities of a commander, Air Force forces (COMAFFOR) A-4 (Logistics Directorate of the Air Component Staff, or A-Staff[7]) Forward and Rear, the Contingency Support Center, and Inventory Control Points. Many of the COMAFFOR A-4 functions, as well as those of the other nodes, can be performed by standing organizations.

Command and control reachback support needs to be defined for all A-staff functions. Should reachback be separated by functional responsibility, or should all A-staff functions be collocated in standing rear organizations that can serve more than one COMAFFOR?

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[6] A *closed-loop process* takes the output and uses it as an input for the next iteration of the process.

[7] The term "A-staff" refers to an Air Force staff that is organized using the joint staff designation (J-1, J-2, etc.).

Collocated reachback is the option presented in the CSC2 TO-BE operational architecture. For instance, if another numbered Air Force were to conduct a sizable operation at the same time that 9th Air Force was engaged in OIF, Air Combat Command (ACC) could conduct reachback for the new operation from a new section of the same Operations Support Center.

Implementing the CSC2 operational architecture concepts requires changes in doctrine, education and training, organization, and systems. AF/IL has initiated doctrinal changes to begin implementation of the CSC2 processes and standing organizations—a step in the right direction. But much more is needed. Education and training programs are needed to teach these concepts. The expeditionary mind-set should be incorporated in all doctrine, policy, education, and training so that leaders, both current and future, are prepared for expeditionary operations.

In addition, decision support systems are needed to carry control information to combat support personnel so that significant deviations from planned performance can be corrected for before operational effects are felt. The use of information systems has improved, but additional capability is needed, including automated system interfaces through which better access to control information could be provided. The wider use of automated tools would enhance beddown[8] assessments. Better links are needed between operational requirements and AFMC process performance and resource levels.

JOPES, the systems that support development of Time Phased Force and Deployment Data (TPFDD) in the deliberate planning cycle, should also be able to support crisis action execution. One possible solution may be for the Air Force to offer a single unit type code (UTC) to the combatant commander, as the Army does, and then to internally tailor that UTC as required. Another option may be Force Modules, whereby a prearranged force would be able to provide a given capability. Yet another option is a new system whereby certain inputs yield indexed outputs. For example, the

[8] *Beddown* refers to the basing locations of personnel and/or aircraft during operations.

number of fighters or bombers a commander wants to deploy are the inputs and the output is a list of UTCs; or the input could be a capability (the ability to provide close air support for a given size army force for *X* days, and deep strike capability to destroy *Y* number of targets and all associated expeditionary combat support to bed down and sustain forces for *Z* days) so the tool would not just add UTCs but would look for redundancy and define the requirements. CSC2 is a vital component of agile combat support concepts needed to meet air and space expeditionary force operational goals.

Forward Operating Locations and Site Preparation

Findings (see pp. 43–58)

Build-up timelines for forward operating locations varied in OIF and depended heavily on the preparation activities. Those FOLs that were partially developed or at which the Air Force had experience in previous deployments facilitated rapid force deployments. Many of the FOLs developed in support of OEF were also used in OIF. The speed with which FOLs could become operational depended on country clearances, access to the real estate, quality and timeliness of the site survey, the amount of development needed to bed down forces, and the amount of contract support available, among other things. For Air Force planners to have had detailed knowledge of the AOR before OIF greatly enhanced their ability to open bases.

During OIF, the decision to move Air Force forces forward into Iraq created additional challenges. Basic necessities, such as fuel, water, rations, housing, and rapid runway repair, all had to be brought into the country.

Preparation of FOLs was slowed by host-nation support. Even when host nations agreed to allow forces to use their facilities, they often asked that their support not become public knowledge. In some countries, such as Turkey, the support that the planners had assumed they would receive did not materialize.

Civil engineering played a large role in getting OIF forward operating locations ready for deploying forces. Civil engineers as well as resources were stressed in buildup efforts for ongoing deployments and for new construction efforts. There was also a large buildup in communications in the AOR. Finally, contractor support facilitated FOL development. Selection and development of FOLs play an important role in meeting the air and space expeditionary force goal.

Implications (see pp. 59–60)

In all three recent military operations, large amounts of time were expended in gaining country and specific-FOL access. Even when FOL sites were known and anticipated, time was required to develop these sites. Engagement policies and programs to familiarize Air Force planners with facilities in countries that may be sites for future operations could potentially reduce country access time. Such programs as Partnership for Peace, in which knowledge of and improvements to FOLs can be gained through exercises and deployments, could be valuable and should be encouraged. Knowledge gained through this and other programs that enhance military-to-military contact could help speed deployments to important areas around the world.

Where possible, a select number of future FOLs in likely sites should be surveyed for capabilities. Goals could be established in each area of responsibility for surveying potential sites for future Air Force use, and funds could be set aside for carrying out such surveys. In some cases, sites in potential conflict areas could be prepared in advance for rapid deployment.

Training some Air Force combat support officers similarly to Army Foreign Area Officers could produce some country and area specialists.[9] Foreign Area Specialists could augment embassies in the early stages of conflict, when military staffs at embassies are often overwhelmed. They could facilitate rapid country clearances, access, and host-nation support agreements. In addition, military staffs at embassies should be augmented during wartime. During OIF, the

[9] The Air Force does have a career-broadening duty similar to the Foreign Area Officer. There is also discussion about developing a more robust Professional Military Strategist program in the Air Force for language and cultural specialists.

augmentation to many of the embassies was at the General Officer level, alleviating many potential roadblocks.

Once a contingency begins, leveraging contractor capabilities to assist civil engineers in developing FOLs is another method of decreasing FOL preparation time. The Air Force Contract Augmentation Program and other contractor capabilities, such as WRM maintenance contractors at forward support locations, can be capitalized on to aid civil engineers in rapidly building up and then sustaining forward operating locations, as demonstrated in OIF. Although it may be desirable to have Air Force civil engineers complete the initial beddown planning and construction, capabilities to augment scarce Air Force personnel skills could be developed through these programs. Databases of contractor capabilities, similar to FOL site surveys, should be developed in areas where potential conflicts may be likely.

Forward Support Location/CONUS Support Location Preparation for Meeting Uncertain FOL Requirements

Findings (see pp. 61–69)

Combat support resources, including fuel, munitions, spare parts, and rations, dominated sustainment movements.

As in JTF NA and OEF, moving assets from forward support locations to the forward operating locations satisfied most FOL combat support requirements. If speed of delivery of materiel is a requirement in future operations and the throughput issues are not resolved, the potential throughput constraints identified at some forward support locations during both OIF and OEF could slow deployment of large forces.

CONUS support locations were used effectively during OIF. During OEF, attention was given to creating better links between CSLs and the warfighters. AFMC has a Logistics Support Office and created a High Impact Target list to enhance responsiveness to the warfighter. AFMC expanded the Logistics Support Office and the High Impact Target list during OIF.

Centralized intermediate repair facilities were used successfully during OEF and again during OIF. They satisfied intermediate maintenance requirements for a number of reparable items for deployed fighter units, reducing the forward deployed footprint. Goals were established linking war fighter needs to the performance of the CIRF maintenance process and the theater distribution system.

Implications (see pp. 69–70)

JTF NA, OEF, and OIF demonstrate that future conflicts are likely to occur far from CONUS. A global network of FSLs with prepositioned WRM is necessary to meet AEF goals. The use of austere FOLs and an immature theater infrastructure in both OEF and OIF has illustrated the need for a portfolio of FSLs. The current AEF force structure of light, lean, and lethal response forces is highly dependent on forward support locations.

When developing a portfolio of FSLs to support numerous different operational challenges, many options should be provided and available for use in future contingencies. Trade-offs between improving existing FSLs, which may enhance throughput and storage capacity, and developing new FSLs need to be examined.

When considering whether to develop new FSLs or improve existing facilities, attention should be given to joint requirements. All services depend upon prepositioned materiel to meet contingency requirements. The management of joint facilities to meet multiple-service requirements may reduce operating costs. Information needs to be shared among services as well as with U.S. allies. If such arrangements are pursued, the throughput required for all participants needs to be considered explicitly.

Since the centralized intermediate repair facility Concept of Operations has been successful in the past two operations, CIRFs will likely be more widely used in future operations. As CIRFs are used in more operations, their requirements for reliable transportation should be included in the planning process. The trade-off of reducing deployment airlift in the early stages of a conflict is the availability of reliable sustainment transportation beginning on Day 1 of the operation. Without assured airlift, CIRFs will struggle to meet AEF operational goals. More work is required to ensure that the combatant commanders understand and support the risk that the Air Force is taking when agreeing to maintain aircraft using CIRF.

Reliable Transportation to Meet FOL Needs

Findings (see pp. 71–89)

Fuel dominated movement requirements. Assets such as FOL support, munitions, and rations also accounted for a significant portion of movements. Although spares accounted for only a small portion of the transportation requirements, the light, lean, lethal AEF depends upon rapid and reliable resupply capability, and many modes of transportation are called upon to move all the assets required to sustain an operation. In addition to Air Force aircraft, the Air Force contracted commercial airlift and land transportation, and used sealift. The transportation system was complex and involved coordination among services and among coalition partners.

Part of the transportation system involves distributing goods and assets within the theater. The theater distribution system (TDS) has two components: one that moves initial deployment and sustainment items to where they are needed, from the FSLs to the FOLs, storing many of them in or near the AOR. The second component, a tactical distribution system, provides the onward movement of resources received from CONUS and moves reparable parts to and from FSLs.

The intratheater distribution system appeared to be better organized in OIF than in OEF. Standard air routes were established before combat operations began and adequate airlift was allocated to the AOR for meeting airlift requirements.

TDS was established early and, on the surface, appeared to function well. However, the theater movements system was not always well coordinated with the strategic movements system. Illustrations of gaps between the two systems are the cargo that built up at transshipment points and the problems identifying priorities among services. There continued to be problems in establishing in-transit visibility when shipments moved from one system to the other—from the strategic system to TDS.

Differences in systems for paying for the transportation/shipments also caused problems in the theater distribution system. Strategic airlift draws from an industrial fund on a "pay-as-used" basis, whereas TDS air shipments are free to the shippers. Commercial trucks contracted for TDS use must be paid for on an as-used basis. Moreover, the difference in the pricing of services can cause air assets to be misallocated. For example, since air shipment is "free" (paid out of contingency funds), some cargo that may be better moved by surface transportation (truck) may be delivered by air.[10] This problem arose after major combat operations were over; however, it reflects a systemic problem with the theater distribution system.

Implications (see pp. 89–90)

If the Air Force is responsible for TDS, as it was during JTF NA and OEF, or even if it just provides input to another service that controls TDS, as it did during OIF, the Air Force needs to provide education and training to handle the TDS responsibilities. Creation of a logistics readiness officer can help fulfill this critical need. However, a specific education and training plan for theater distribution needs to be developed.

The transportation system used during any operation will be complex, multimodal, and involve numerous customers (for example, Army, coalition, and Air Force). Theater distribution is more than just the onward movement of spare parts using airlift. The system also includes a network to link forward support locations and CONUS support locations to forward operating locations. MAJCOM components need to work with U.S. Transportation Command (USTRANSCOM) to develop integrated plans to transition peacetime operations smoothly into wartime operations.

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[10] Telephone interview by Dr. Robert Tripp of Maj Gen Robert Elder, Central Command, Deputy CFACC, August 20, 2003.

An expeditionary Air Force cannot allow critical resources to sit backlogged at FSLs and transshipment points.

Options in having a single party develop an end-to-end military system instead of a strategic movements system and a TDS need to be explored.[11] The distinction between a strategic movements system and a tactical movements system is blurred. For instance, is a system that connects CIRFs or supply FSLs located in one AOR to FOLs in another AOR (as happened with CIRF shipments and other supplies in both OEF and OIF) a strategic system or a tactical system? If it is tactical, which combatant commander should set up the inter-AOR system, the supporting commander or the supported commander? Perhaps the separation of the TDS and the strategic movements system has outlived its usefulness, given the global war on terrorism and the global positioning of combat support resources to meet commitments across a wide variety of scenarios. A review and reconciliation of pricing issues associated with differing shipping modes and continuing efforts to improve in-transit visibility are also needed.

Exploitation of Technology

Findings (see pp. 91–97)

The communications system in place during OIF was much better than the system in place during OEF. The creation of a UTC for communications Air Force Engineering and Technical Service (AFETS) personnel and an Engineering and Technical Service (ETS) program office aided in the deconfliction of taskings and enabled the rapid deployment of taskings to meet changing mission needs.

The theaterwide communication plan that was developed included redundant circuits to most locations, a communication bandwidth increase of nearly 600 percent, and an increase in satellite

[11] The Secretary of Defense named USTRANSCOM the Department of Defense Distribution Process Owner on September 16, 2003. USTRANSCOM is responsible for synchronizing global and theater distribution processes.

communications terminals of over 550 percent. The additional bandwidth enabled intelligence data feeds from Global Hawk and Predator to CONUS. The extensive use of precision-guided munitions improved the Air Force's ability to hit suspected targets; improvements in targeting and positioning systems enabled such munitions to be used in any weather.

Not all technology was updated, however. Air Force bare base fuels assets use outdated technology—a combination of pumps, filters, and valves that are not interchangeable and do not employ readily available commercial automation—and require extensive parts and personnel to set them up and operate them.

Implications (see pp. 97–98)

Communications support requirements are no longer limited to just basic bare base systems of local area networks (LANs) and telephone lines. Communications personnel are expected to understand systems and programs. Education and training on operating and maintaining command and control systems need to be developed for communications personnel.

Technological advances in communications and munitions have changed combat support requirements. With personnel in CONUS controlling the flight of unmanned aerial vehicles in the AOR, fewer communications and analysis personnel are required to be deployed forward during an operation. Deploying fewer personnel forward could change the functions of the COMAFFOR Forward and Rear.

The past two operations, OEF and OIF, used precision-guided munitions more often than did JTF NA. Often, fewer smart bombs than dumb bombs are required to achieve a target. Using fewer munitions means a smaller deployment footprint, both in terms of the bombs themselves and in the associated support equipment and personnel.

Fuels is one area in which technology has not been exploited. Each service has different equipment, different training, and different reporting. Better configuration control and interoperability in maintaining bare base fuels assets could reduce both the logistics and personnel footprints. Reducing the number of personnel and amount of equipment taken forward to support the warfighter results in a corresponding reduction in the number of services, security forces, etc.

Resourcing to Meet Contingency, Rotational, and MRC Requirements

Findings (see pp. 99–105)

Analysis of resource usages in the past three operations relative to defense guidance and wartime planning factors indicates that the usage factors associated with supporting permanent rotational commitments and unanticipated contingency operations are different from those used to make programming decisions to obtain resources. An implicit assumption in programming for combat support resources is that the resources necessary to meet major regional conflict (MRC) engagements will cover those needed to support permanent rotations or other contingency operations. We show that these assumptions are not correct and that key combat support resources are stretched thin. The current combat support system and programmed resource base has difficulty simultaneously supporting small-scale contingencies and current rotational deployment requirements. Current usage patterns consume war reserves that may have been planned for use in MRCs. All three past operations posed demands different from those assumed in wartime planning factors. In some cases, the operations have placed as much, or greater, stress on combat support resources as an MRC.

During OIF, some of the shortfalls were alleviated when additional combat support resources were obtained. Additional contract dollars were applied to critical shortages.

The AEF model used to allocate combat support resources is dented, if not severely broken. Before OIF even began, shortages in combat support assets, particularly in high-demand, low-density areas, such as force protection, civil engineering, combat communications, and fuels, stressed the AEF construct, resulting in the Air Force's borrowing against future AEFs during OIF. The current AEF scheduling rules, which allow personnel to be eligible for deployment for only 90 days in a 15-month cycle, were violated (Barthold, 2002, p. 19). Then, in December 2002, the AEF rotation was frozen altogether. Personnel in high-demand/low-density career fields were to remain in the AOR indefinitely.

The management of the expeditionary combat support portion of the deployment was given to the AEF Center. During OIF, the AEF Center found itself sourcing units for deployment. While this responsibility may not have part of the original design, the AEF Center handled it smoothly and was well suited for the job. However, the AEF Center did not source the equipment, the actual aircraft, or the associated flying squadrons.

Implications (see pp. 106–108)

Our findings in three recent operations indicate that the current resource-planning factors and methods are not aligned with current resource-consumption factors. Combat support resources are stretched thin in meeting current rotational, peacekeeping, and training requirements and may leave little capability for meeting future small-scale contingencies, much less potential MRCs. We show that small-scale contingencies such as JTF NA, OEF, and OIF may not necessarily require fewer support resources than an MRC. Actual resource-usage patterns differ from those used in MRC planning computations and, in some cases, small-scale contingencies may require as many resources as MRCs, or even more.

One possible solution would be to change planning factors, increasing the inventory levels of materiel and adding personnel. Computations could be made to determine requirements as a function of the current combat support posture and policies. But with many competing needs, the Air Force may not be able to afford that approach. Several options and trade-offs are available among alternative requirements, alternative combat support distribution options, and other support policies; they may be able to satisfy operational requirements more effectively than just increasing the size of existing pipelines, assuming the current way of providing combat support is the best way.

One such option would be for the Air Force to make investments to decrease delivery time by positioning items closer to the point of need so that they would be distributed to more FSLs in various AORs. Another way to decrease delivery time would be to improve throughput capability of existing FSLs and associated distribution capability. Distribution improvements could be made by increasing working maximum on ground (MOG) at FSL sites or nearby airports, or by improving rail- or sea-handling capabilities. Additional ships to store and move WRM might improve delivery times to FOLs. Smaller, faster ships carrying high-demand assets may help to alleviate some initial airlift concerns. An integrated analysis of options is needed.

WRM requirements and distribution need to be considered jointly. Alternatives to stockpiling munitions and other WRM assets need to be considered in today's uncertain world. One approach might include flexible munitions production with surge capabilities, beyond stocks needed to support the initial phases of likely contingencies.

To evaluate combat support options today requires a capabilities-based assessment of support required in a wide variety of scenarios. A capabilities view of resources is a more appropriate way than a scenarios-based view to consider resource investments in today's world. Using this view, various investments would be stated in terms of what they could support—for example, the ability to support *X* permanent rotations, a small-scale contingency of *Y* size (defined by beddown sites), and an MRC of *Z* size (defined by beddown sites). The Air Force cannot know what scenarios it may be expected to support in the future, but it should be able to state what capabilities it can support.

Systems and organizations need to be developed or refined to enhance expeditionary operations. The AEF Center could have the sole responsibility for nominating all AEF forces for deployment to include aviation UTCs. While this responsibility may not have been part of the AEF Center's original design, the Center handled it smoothly during OIF and is well suited for the job. It did not, however, source much of the equipment, the actual aircraft, or the associated flying squadrons. If these functions were moved from Air Combat Command, Director of Air and Space Operations (ACC/DO) to the AEF Center, and if it were given tools and personnel to manage the equipment issues, it could manage all aspects of the deployment nomination process.

Conclusions (see pp. 109–114)

Combat support execution planning and control processes and command and control organizational alignments have improved since JTF NA and OEF. The implementation of the TO-BE operational architecture has aided in this improvement. Integrating deliberate planning processes and crisis-planning activities requires more work. Although deliberate planning is time-consuming, the process fosters an understanding of the area of responsibility and helps to identify shortfalls. During crisis action planning, there is no time to do the detailed analysis and coordination required during the deliberate-planning stage. Planners should receive training in deliberate planning so that they are prepared for deliberate and crisis action planning.

Austere forward operating locations and an immature theater infrastructure make early planning, knowledge of the theater, and FOL preparation more important. The Air Force recognizes the need to develop these processes and has taken steps to improve them. Survey information to develop FOLs was more readily available during OIF than during the other two operations because of other ongoing operations in the region. Host-nation support was difficult to negotiate, and resultant deployment timelines varied widely throughout the theater.

The current AEF force structure of light, lean, and lethal response forces is highly dependent upon the capacities of forward support locations and throughput. Austere FOLs and immature theater infrastructure illustrate the importance of using FSLs efficiently. Improvements have been made in linking forward support locations and CONUS support locations to dynamic warfighter needs. Much more can be done in this area.

AEF operational goals are dependent upon assured and reliable end-to-end deployment and distribution capabilities that can be configured quickly to connect the selected sets of FOLs, FSLs, and CSLs in contingency operations. By using centralized intermediate repair facilities, the Air Force has traded early strategic lift requirements, used to stock parts at forward operating locations, for a continuous sustainment requirement, to supply the CIRFs. Centralized intermediate repair facilities and other forward support have enabled the combatant commander to deploy more warfighting forces instead of combat support capabilities. However, the continued success of CIRFs relies on dependable resupply, which involves the theater distribution system.

The Air Force may be the predominant user of the theater distribution system in early phases of future campaigns; therefore, the Air Force may be delegated the TDS responsibility. Even if another military service is delegated TDS responsibilities, the Air Force should play an active role in determining TDS capacities and capabilities. The Air Force has made advances in the use of centralized maintenance, expanding its dependence on support from forward support locations. Yet, it finds itself poorly prepared to estimate lift requirements.

Current doctrine splits the responsibility for developing the end-to-end deployment and resupply system among multiple parties, placing the responsibility for developing the strategic movements system on USTRANSCOM and that for intratheater lift on the combatant commander for the AOR. Having one AOR's combat support facilities supporting another AOR's combatant commander—for instance, moving WRM or repaired spares from the European Command AOR to the Central Command AOR—confuses TDS and strategic movements. Where these two systems came together at transshipment points, significant backlogs and system disconnects occurred. This joint doctrine may be inappropriate for expeditionary forces that rely on fast deployment, immediate employment, and responsive resupply of lean, forward-deployed forces. The Air Force's reliance on lean deployments and responsive resupply of deployed units places great importance on the rapid development of contingency end-to-end deployment and distribution capabilities.

During OIF, significant improvements in communications were achieved. Near-real-time raw intelligence data were received in CONUS, then the data were exploited and redistributed to numerous agencies. At the same time, personnel were identifying emerging targets and coordinating attacks—all from inside CONUS. These communications advances reduced the number of expeditionary combat support personnel and equipment deployed; more resources were kept in the rear. There may be other opportunities to exploit technology.

Finally, the planning factors and assumptions that are used to determine resource requirements differ significantly from those that are encountered in current rotational and contingency operations. In many cases, the current resource employment factors are more demanding than the assumptions used to fund resources. This imbalance creates resource shortages that appear in contingency operations. Shortages in combat support assets, particularly in high-demand/low-density areas, such as combat communications, civil engineers (CE), and force protection, stressed the AEF construct.

In addition, the current AEF employment practices differ significantly from planning factors used in the Program Objective Memorandum process to provide for combat support resources. The current AEF scheduling rules are routinely violated in stressed combat support areas. Current AEF scheduling rules may be an effective and efficient means of scheduling and deploying aircraft and aircraft support units; however, the current rules may not be the best for scheduling combat support. Specifically, balances should be maintained between home-station support disruption and deployment commitments.

Below is a list of the recommendations derived from the work on this study. These recommendations are suggested methods to improve agile combat support for the AEF.

Combat Support Execution Planning and Control

- Integrate deliberate planning and crisis planning activities.
- Consider the requirements of both joint and unified commands and identify how to meet those requirements while remaining responsive and adaptive.

Forward Operating Locations and Site Preparation

- Focus attention on political agreements and engagement policies.
- Standardize site-survey procedures and processes within the Air Force, with U.S. allies, and with other services.

Forward Support Location/CONUS Support Location Preparation for Meeting Uncertain FOL Requirements

- Further develop the existing global network of FSLs and CSLs.
- Continue improvements in linking FSLs and CSLs to dynamic warfighter needs.

Reliable Transportation to Meet FOL Needs

- Ensure dependable resupply to CIRFs.
- Identify lift requirements, including airlift, sealift, and movement by land, for theater distribution system.
- Review joint doctrine on the transportation system.
  —Consider having USTRANSCOM develop end-to-end distribution channel capabilities.
  —Consider ways to improve TDS performance, including examining pricing mechanisms, and instituting better in-transit visibility and demand-forecasting mechanisms.

- Provide additional training and enhance personnel development policies for the Air Force to meet future theater distribution responsibilities, such as in the exercise EAGLE FLAG.

Exploitation of Technology

- Review contingency combat support functions that could be done in the rear (CONUS)—for example, sustainment planning and execution—because of advances in communications technology that offer the possibility of reducing the forward-deployed footprint.

Resourcing to Meet Contingency, Rotational, and MRC Requirements

- Reevaluate current processes and policies for AEF assignments and the current Program Objective Memorandum assumptions with respect to combat support resources.
- Evaluate existing scheduling rules for combat support with respect to impacts on home-station and deployed combat support performance.