

A Global Infrastructure to Support Expeditionary Aerospace Forces

The post-Cold War environment has required the Air Force to rethink its policies, postures, and strategies. One result of this has been the development of the Expeditionary Aerospace Force (EAF) concept for projecting sustainable quick-strike force packages worldwide. The EAF will divide the Air Force into several Aerospace Expeditionary Forces (AEFs), each roughly equivalent in capability, among which deployment responsibilities are expected to be rotated on an equitable and fairly predictable basis.

A good deal of attention has been given to determining AEF composition and scheduling AEF deployments. Less attention has been given to strategic decisions that affect combat support infrastructures for enabling rapid deployments.

THE NEED FOR PREPOSITIONING

The original EAF concept envisioned expeditionary units deploying to any airfield worldwide, regardless of the level of prepositioned resources, with a runway capable of handling the operational and airlift equipment. Our analyses show, however, that prepositioned assets cannot be eliminated at present. Current logistics processes cannot sustain high operating tempos for rapidly deployed expeditionary units (e.g., units deployed in less than 48 hours) with heavy munitions and support equipment, given limitations of strategic airlift ramp space (e.g., Maximum on Ground of two). Although new technologies and policies can improve deployment timelines, implementing the EAF over the next few years will require judicious prepositioning at Forward Operating Locations (FOLs).

Prepositioning decisions will require global tradeoffs among several competing metrics, including timeline, cost, deployment footprint (the size of the materiel needed to deploy a specific force), risk, flexibility, and sortie gen-

eration. Prepositioning significant amounts of materiel at FOLs minimizes the timeline and deployment airlift footprint required for beginning expeditionary operations, but it also adds costs and political and military risks while reducing flexibility. Bringing support from CONUS or a Forward Support Location (FSL) near the area of operation increases flexibility and reduces risks and peacetime costs for materiel. It does so, however, by increasing deployment time and footprint.

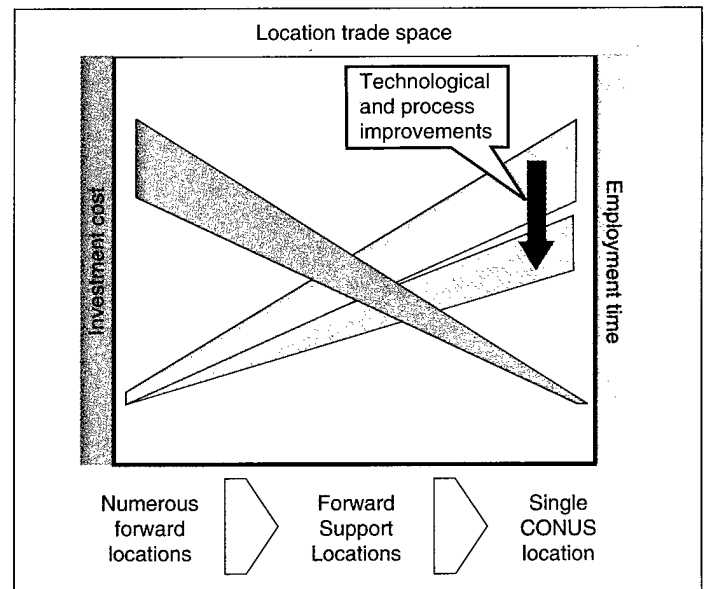


Figure 1—Employment Time Versus Investment

Figure 1 presents many of these issues—and their tradeoffs—in a notional graph. A support system relying on numerous FOLs offers lower employment times. Such a decentralized system, however, requires a large materiel investment. A consolidated system cuts the investments needed for support, but does so at the expense of employment times. Technological and process improvements could cut the employment times for a consolidated system.

ANALYZING SUPPORT OPTIONS

To analyze support basing structures, researchers from RAND and the Air Force Logistics Management Agency have developed models for major resource requirements and used them to assess how requirements change under different scenarios. These resources—munitions, unit support equipment, vehicles, etc.—constitute the majority of support materiel needed for an expeditionary air operation, as shown in Figure 2. Although our models focus on single commodities, they cut across organizational lines where necessary (for example, the munitions support model covers both munitions buildup and aircraft loading processes). Much of the support materiel is theater assets rather than unit materiel, whereas much of the unit materiel is support equipment. Such assets may lend themselves well to consolidation.

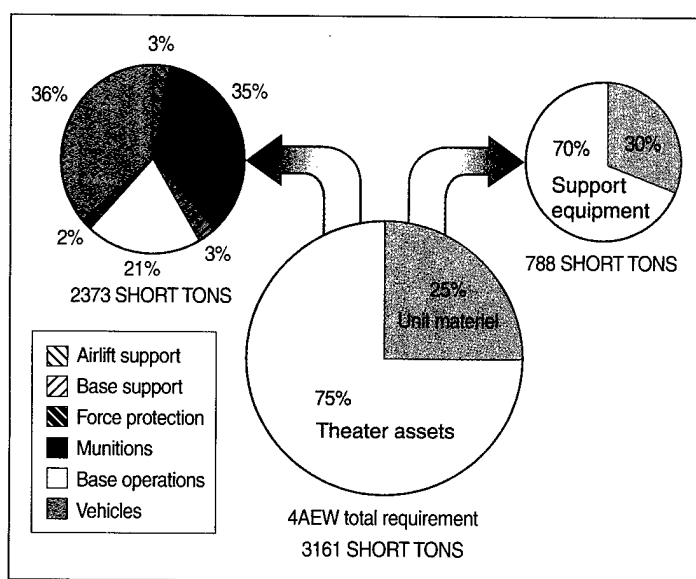


Figure 2—Materiel Requirements

Our analyses measure three key variables: timeline, footprint, and cost. Risk and flexibility are more difficult to quantify. For now, decisionmakers must judge the quantitative tradeoffs provided by the models with the subjective factors of risk and flexibility.

AN ILLUSTRATIVE ANALYSIS

These issues and their tradeoffs can be illustrated for a scenario requiring an AEF deployment of 12 F-15Cs, 12 F-16CJs, and 12 F-15Es conducting ground-attack operations with precision 2000-lb bombs (GBU-10s). We analyzed operational needs for this force depending on whether deployment was to a "bare" or to a fully equipped base. Bare bases meet only the minimum requirements for operations—runway, fuel, and water. Fully equipped bases have fuel storage facilities, a fuel distribution system, general-purpose vehicles, basic shelter, an aircraft arresting system, munitions buildup and storage

sites, and a three-day supply of munitions. Timelines are shorter, deployment footprints smaller, investment costs (i.e., costs to establish the system) larger, and recurring costs (i.e., costs to operate the system) smaller for deployments to fully equipped (rather than bare) bases or to those supported from FSLs (rather than CONUS).

THE EFFECTS OF CHANGING TECHNOLOGY

Our models can assess the effects of different technologies and policies on support option decisions. For our illustrative analysis, we replaced the GBU-10s with the Small Bomb System (SBS), a 250-lb bomb that is designed to be effective against 70 percent of targets for which GBU-10s are used. Because the SBS is much lighter than the GBU-10, each F-15E can carry more of the former, requiring fewer sorties to deliver the same amount of ordnance. This in turn reduces fuel requirements, although such savings must be weighed against higher investment costs for this more expensive munition.

As with the GBU-10s, deployment for our nominal AEF using the SBS finds shorter timelines, smaller footprints, larger investment costs, and smaller recurring costs for deployments to fully equipped bases or from FSLs. There are, however, differences for support performance depending on the munitions used. Using the SBS requires a longer employment timeline because the increased number of bombs per sortie requires more bomb buildup work for the first sortie. An AEF using the SBS has a smaller deployment footprint, although the weight of munitions-handling equipment is still significant. Finally, the investment and recurring costs are slightly lower for the SBS option, because fewer missiles are needed to defend the reduced number of sorties and less airlift is needed to transport the SBS for exercises. Changing technologies pose new tradeoffs for support structure decisions.

CONCLUSIONS AND CHALLENGES

The EAF concept can provide the Air Force with flexibility to meet its increasingly varied needs while providing more stability for deployed personnel. Nevertheless, whatever flexibility may be offered by future technology for EAF operations, certain requirements for combat support now are clear.

For very rapid (e.g., 48-hour) deadlines of placing bombs on target, deployment to a FOL with substantial prepositioning of heavy resources is essential. With lengthy flights to some likely locations taking up to 20 hours, pushing timelines below two days will require having personnel or materiel in advanced preparation deployed to such locations.

Equipping numerous FOLs to meet very rapid timelines would be very expensive. Such facilities may be

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reserved for regions most vital to U.S. interests. FSLs also provide a compromise in cost between prepositioning at FOLs or deploying everything from CONUS. Forward support locations have little effect on the timeline needed for initial capability, but they help free up strategic airlift for deploying additional combat units.

The placement and equipping of operating and support locations require that some planning decisions be

made centrally and with a global and strategic perspective. Such decisions should be revisited on a regular basis as the global political situation changes and as technology offers new options. The other Services could use similar support concepts and, indeed, have already raised similar ideas. It may be advantageous to share locations and some resources with them.

RAND research briefs summarize research that has been more fully documented elsewhere. This research brief describes work done for RAND's Project AIR FORCE; it is documented in Supporting Expeditionary Aerospace Forces: New Agile Combat Support Postures, by Lionel Galway, Robert S. Tripp, Timothy L. Ramey, and John Drew, MR-1075-AF, 2000, 65 pp., ISBN 0-8330-2801-4, available from RAND Distribution Services (Telephone: 310-451-7002; FAX 310-451-6915; Internet: order@rand.org). Abstracts of RAND documents may be viewed on the World Wide Web (<http://www.rand.org>). RAND® is a registered trademark. RAND is a nonprofit institution that seeks to improve public policy through research and analysis. Its publications do not necessarily reflect the opinions or policies of its research sponsors.

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