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A Methodology for Determining Air Force Deployment Requirements

DON SNYDER, PATRICK MILLS

Prepared for the United States Air Force

PROJECT AIR FORCE

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Preface

Transforming from threat-based planning to capabilities-based planning has highlighted the need for the Air Force to be able to quantify quickly the manpower and materiel necessary to support a desired capability. From a logistical point of view, the transition accentuates the utility of having a rapid, analytical method for determining the total support required to deploy specified forces to bases across the full range of support infrastructures, including austere bases.

This monograph presents such a methodology for determining manpower and equipment deployment requirements and summarizes a prototype research tool—called the Strategic Tool for the Analysis of Required Transportation (START)—which illustrates the methodology. (The appendix serves as a user's guide for this prototype tool.) The START program, an Excel-based spreadsheet model, determines the list of Unit Type Codes (UTCs) required to support a user-specified operation, along with the movement characteristics of the materiel for a wide range of support areas. It therefore is a demand generator of the manpower and materiel needed at a base to achieve initial operating capability, and a fully implemented tool based on this prototype should be useful for both deliberate and crisis-action planning.

This work was conducted by the Resource Management Program of RAND Project AIR FORCE and was jointly sponsored by the USAF Deputy Chief of Staff of Installations and Logistics (USAF/IL) and the USAF Directorate of Operational Plans and Joint Matters (USAF/XOX). It is one element of a larger study entitled

"Forward Support Locations (FSLs) and Other Wartime Support," which in turn is part of a series of studies entitled "Supporting Expeditionary Aerospace Forces." Other reports in this series are:

- MR-1056-AF, *Supporting Expeditionary Aerospace Forces: An Integrated Strategic Agile Combat Support Planning Framework* by Robert S. Tripp, Lionel A. Galway, Paul S. Killingsworth, Eric Peltz, Timothy L. Ramey, and John G. Drew
- MR-1075-AF, *Supporting Expeditionary Aerospace Forces: New Agile Combat Support Postures* by Lionel A. Galway, Robert S. Tripp, Timothy L. Ramey, and John G. Drew
- MR-1174-AF, *Supporting Expeditionary Aerospace Forces: An Analysis of F-15 Avionics Options* by Eric Peltz, H. L. Shulman, Robert S. Tripp, Timothy L. Ramey, Randy King, and John G. Drew
- MR-1179-AF, *Supporting Expeditionary Aerospace Forces: A Concept for Evolving the Agile Combat Support/Mobility System of the Future,* Robert S. Tripp, Lionel A. Galway, Timothy L. Ramey, Mahyar A. Amouzegar, and Eric Peltz
- MR-1225-AF, *Supporting Expeditionary Aerospace Forces: Expanded Analysis of LANTIRN Options* by Amatzia Feinberg, H. L. Shulman, L. W. Miller, and Robert S. Tripp
- MR-1263-AF, *Supporting Expeditionary Aerospace Forces: Lessons From the Air War over Serbia* by Amatzia Feinberg, Eric Peltz, James Leftwich, Robert S. Tripp, Mahyar A. Amouzegar, Russell Grunch, John G. Drew, Tom LaTourrette, and Charles Robert Roll Jr. (for official use only; not releasable to the general public)
- MR-1431-AF, *Supporting Expeditionary Aerospace Forces: Alternatives for Jet Engine Intermediate Maintenance* by Mahyar A. Amouzegar, Lionel A. Galway, and Amanda Geller
- MR-1536-AF, *Supporting Expeditionary Aerospace Forces: An Operational Architecture for Combat Support Execution Planning and Control* by James Leftwich, Robert S. Tripp, Amanda Geller, Patrick H. Mills, Tom LaTourrette, Charles Robert Roll, Cauley Von Hoffman, and David Johansen.

This report should be of interest to logisticians and planners throughout the Air Force. The software described in this report can be obtained from the authors upon request (contact Don Snyder at snyder@rand.org and Patrick Mills at pmills@rand.org).

RAND Project AIR FORCE

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Summary

The Air Force is transitioning from a threat-based planning posture to a capabilities-based planning posture. Adopting a planning strategy based on a portfolio of capabilities[1] suggests the need to develop a means to calculate swiftly the manpower and equipment required to generate each of the capabilities in that portfolio. This need, in combination with the current expeditionary posture of the Air Force, highlights the value of expediting deployment-planning timelines.

Much of the logistical component of planning involves generating time-phased force deployment data (TPFDD). A TPFDD is a list of which units of capability need to be deployed in order to support the mission objectives, who will supply these capabilities, and details of the timing and routing of their transport. These units of capability are called Unit Type Codes (UTCs), and this list of UTCs is assembled by specialists in each career area, who are called functional area managers. For deliberate plans, this process can take on the order of a year. When a crisis occurs, assembling the TPFDD for a real deployment benefits from the experience of generating the deliberate plans (and sometimes planners use a deliberate plan as a template), thus compressing the time-scale, but the process still takes weeks to months to complete.

An analysis tool that can automate as much of this planning work as possible would greatly expedite the planning process and hence would help to usher along the transition to a capabilities-based,

[1] Rumsfeld, 2001.

expeditionary Air Force. This monograph presents a prototype analysis tool that illustrates a methodology for developing this capability. The analysis tool was developed with two objectives in mind: to demonstrate the feasibility of a tool to generate a parameterized list of UTCs necessary to support a specified mission based on a limited number of inputs, and to estimate the movement requirements to achieve initial operating capability at all deployed locations.

Quantifying Deployment Requirements

Requirements in a theater can be approximated by adding the requirements at each base (including theater-level requirements on at least one base, such as command and control), and then subtracting theater-level efficiencies, such as centralized maintenance facilities. Hence, our analysis focuses on calculating requirements at a base level and aggregates over bases to estimate theater requirements.[2]

At a base, the principal factors that drive which and how many UTCs deploy are

- the existing base infrastructure and working Maximum on Ground (MOG)
- the number, type, and mission of the aircraft bedded down
- the total base population
- the level of conventional and unconventional threats to which the base is exposed.

Using these general inputs, we compiled rules for the deployment of UTCs for the following functional areas: aviation and maintenance, aerial port operations, civil engineering, bare-base support, munitions, fuels mobility support equipment, deployed communications, force protection, medical support, and general-purpose vehicles. These areas constitute the bulk of the deployed manpower and

[2] Galway et al., 2002.

equipment. The rules were compiled from detailed interviews with senior noncommissioned officers and functional area managers at Air Combat Command (ACC) and Air Mobility Command (AMC), as well as consulting published Air Force documents.

The result is a prototype Excel-based model called the Strategic Tool for the Analysis of Required Transportation (START). It translates specified operational capability at a deployed location into a list of UTCs needed to generate that capability. Inputs to the program are type, number, mission, and sortie rate of aircraft bedded down at the site; generalities of the existing infrastructure at the base, selected from a checklist; and levels of conventional and nuclear, biological, and chemical (NBC) threats to which the base is vulnerable.

Using these inputs, the model determines a list of core UTCs needed to support these requirements. This UTC list, along with movement characteristics listed in the Manpower and Equipment Force Packaging (MEFPAK),[3] are then aggregated by functional area to indicate the movement requirements by weight (short tons) and volume (cubic feet). These movement characteristics are then further aggregated into C-17 equivalents. The user can view these aggregate figures in tabular and graphical form, as well as drill down to the UTC lists.

Example Applications

A fully implemented tool based on this prototype should be useful for a range of Air Force planning needs. Three potential applications are as follows:

Crisis-Action Planning[4]

An analysis tool that can generate a first approximation of a TPFDD within minutes without the planner having special experience in lo-

[3] Taken from the December 2001 MEFPAK list.

[4] See pp. 41–42.

gistics would provide operational planners with rapid feedback on the logistical feasibility of their plans, and once a plan is agreed upon, would provide a template for the logisticians to build the execution TPFDD. An analysis tool should greatly accelerate both phases of the crisis-action planning process.

Setting Manpower and Equipment Authorizations[5]

In capabilities-based planning, planners may wish to evaluate dozens of scenarios requiring capabilities of varying scope in unspecified locations.[6] An analytical tool that can rapidly generate a requirements TPFDD would permit such an analysis by providing an assessment of the manpower and equipment needs to achieve each element of the desired portfolio of capabilities.

War Reserve Materiel Prepositioning and Forward Support Locations[7]

The analysis tool described in this report can generate the movement requirements for a range of possible scenarios at a range of locations. This demand can, in turn, be combined with data on storage capacities, transportation times and capacities (air, land, and sea), and other logistical constraints for each potential war reserve materiel (WRM) site to optimize for the location of these sites and distribution of WRM among these sites.

Recommendations

We foresee no theoretical impediments that would prevent the START prototype tool described in this monograph to be developed into an execution-level tool. To facilitate this implementation, we make the following recommendations:

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[5] See pp. 42–43.

[6] Davis, 2002.

[7] See p. 43.

Develop formal definitions for deployed locations.[8] Other than for a bare base, no accepted vocabulary exists that describes common types of sites to which the Air Force typically deploys. Defining a limited number of standard deployment sites will permit UTCs to be tailored and sized according to a common set of planning factors.

Develop formal definitions of conventional and NBC threat.[9] Uniform definitions for these threats agreed by all relevant groups would provide a common vocabulary for advanced echelon (ADVON) teams and facilitate rapid decisions on which UTCs are needed across all functional areas.

Establish an office of primary responsibility to maintain the spreadsheet model.[10] Maintaining a spreadsheet model to generate the UTC lists that are necessary to support operations will give the Air Force a greater expeditionary posture and facilitate its transition to capabilities-based planning.

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[8] See pp. 45–46.

[9] See p. 46.

[10] See pp. 46–47.