CHAPTER ONE

Introduction

As a rapidly deployable force with capabilities for ground, naval, and amphibious operations, the U.S. Marine Corps is responsible for missions that are both diverse and numerous. A single Marine Expeditionary Unit (MEU) may be involved in amphibious raids and assaults, covert reconnaissance carried out by special forces, humanitarian assistance (HA) following interstate conflicts and natural disasters, and the tactical recovery of displaced personnel. In many cases, MEUs afloat are the first responders to disasters and postconflict operations. Consequently, they are often called upon to initiate the stabilization missions in the absence of civilian leadership and direct support. Facing this wide range of missions, MEUs must have both the right personnel and the right types of equipment to successfully accomplish their objectives. Creating a stable environment requires the use of security forces, whereas reconstruction requires skills that are quite different from those needed in combat. The lack of such skills and equipment on board can mean significant delays or foregoing the completion of some tasks altogether.

However, the MEU is often forced to operate without its ideal or optimal set of equipment. In most cases, the U.S. Navy's lift capacity, or the space available on the ships that make up the MEU, falls short of what is needed to transport the MEU's full set of equipment. As a result, when the MEU departs, some equipment is left behind—considered cargo left on pier—leaving the MEU less than ideally equipped for certain missions. This is especially true when the MEU must be prepared for stabilization, humanitarian, and contingency operations.[1] Several factors may affect which equipment ultimately ends up aboard the ship and which equipment remains behind. The risk preferences of the commander, expectations about the nature of the deployment or previous MEU experience, and equipment readiness and repair schedules all play a role in equipment selection. Thus, the MEU commander must make choices between pieces of equipment and is not able to deploy with an ideal equipment set. What is the impact of this shortfall on mission accomplishment, especially when the mission includes stabilization operations?

[1] A critical component of mission accomplishment is the MEU's ability to access the equipment deemed necessary to accomplish all tasks associated with the mission. In this report, the notion of "mission accomplishment" refers to delivering the equipment needed to complete all tasks associated with a mission. It does not refer to how well the tasks are performed or, in the case of combat missions, the degree of combat effectiveness.

The term *requirement* also has a narrower meaning in the context of this report; it refers to the equipment that Marine Corps planners feel is needed to complete all tasks associated with a mission.

Research Objective

This report and the accompanying RAND-developed Marine Air-Ground Task Force (MAGTF) Equipment Structural Assessment (MESA) application are intended to provide a systematic framework and approach that can be used to evaluate the effect of equipment shortfalls on the performance of specific missions. As described in this report, the approach used to develop planning factors for a complex MEU mission and the MESA application, which uses these planning factors to prioritize and assign equipment to tasks, provides a framework that MEU commanders can use to develop mission plans and understand where equipment shortfalls are likely. It does so by defining a set of simple steps that translate mission requirements into tasks, subtasks, and military activities, each of which is linked directly to the types of equipment needed for completion. It also highlights key parameters that may affect the types of equipment needed for the execution of key tasks, including terrain, threat level, infrastructure quality, and host-nation support. The MESA application supports this same objective by asking the user to define mission-specific characteristics and allowing the user to tailor equipment lists, equipment priority, and task priority as appropriate.

The approach described in the report and the MESA tool both have significant value in that they provide an analytic method that can be used to estimate equipment requirements and shortfalls. They also highlight the importance of task sequencing and prioritization and equipment sequencing to mission planning, and they offer ways to address and overcome equipment shortfalls when they arise. This report is not intended to address either the broader set of factors affecting the choices of which equipment deploys and which remains behind (such as mission priorities and where commanders choose to accept risk), nor does it examine the specific impact of equipment shortfalls across missions.

This report aims to address several specific research questions:

- *What is the mission set?* The sponsor provided a set of 15 kinetic and nonkinetic missions to be assessed. In a previous edition of this report we focused on just one of these: humanitarian assistance operations. This report includes that mission and also addresses three more: noncombatant evacuation operations (NEO), tactical recovery of aircraft and personnel (TRAP), and airfield and port seizure operations.
- *What are the component tasks and subtasks comprise each of the 15 missions?* Answering this question required a thorough deconstruction of all 15 missions with a particular emphasis on the four missions assessed in this report.
- *What equipment is available to the MEU to accomplish mission tasks and subtasks?* A diverse set of factors will affect the types of equipment aboard an MEU, including space available, risk trade-offs made by commanders, and expectations about the nature of the deployment. This report does not focus on the factors or decisionmaking processes used to determine which pieces of equipment actually end up with the MEU. For the purposes of this study, the sponsor provided the RAND team with a loading list.
- *What measures and metrics should be used to assess the capability of selected equipment?* In addition to the loading list of available equipment, we used equipment manuals and sponsor input to define the capabilities of each piece of equipment in performing designated tasks.
- *What tasks cannot be accomplished immediately because of a lack of equipment?* A solution to the problem of a lack of equipment might be to reallocate equipment that is not neces-

sarily designed to accomplish the task but could do so in an emergency. Such an arrangement would resolve the shortfall impact assessment question.

Approach

This study drew on RAND work conducted in support of the Marine Corps Combat Development Command's Operational Analysis Division. RAND developed a computer-based system to allocate Marine Corps units to stabilization and reconstruction tasks in a way that accounted for changing situational factors. The finished system was called the Stabilization and Reconstruction Force Allocator (SRFA). It includes an index scoring system that reflects the capabilities of Marine Corps units with respect to stabilization and reconstruction operations. The index focuses on a narrow set of missions that are persistent in postconflict operations, including security missions (enabling kinetic activities) and stability and reconstruction missions (nonkinetic activities). The index scoring system measures a unit's capabilities in each of the mission areas selected, and it is used to allocate units to mission tasks. In this study, instead of allocating units to tasks and assuming that equipment organic to the units was available, we assigned equipment to tasks and assumed that the personnel to operate the equipment were available.

Central to this work was the development of a software system—loosely based on the previously developed SRFA. Inputs to the system consisted of the loading list provided by the sponsor, the tasks identified through the mission deconstruction process (described in Chapter Two), the measures and metrics used to define equipment capabilities, and the set of linkages between tasks and equipment.

The research answered the questions posed earlier in three phases: (1) we conducted a thorough review and deconstruction of the 15 missions focusing, in particular, on the four missions assessed in this report; (2) we identified the equipment needed to accomplish the tasks identified for all four missions; and (3) we identified the measures and metrics, or "planning factors," needed to assess the capability of each piece of equipment on the loading list. This last phase also included identifying which alternative equipment might accomplish a task (albeit not as effectively). The software upgrades proceeded in parallel with these activities.

Challenges

Several methodological challenges affected the research approach and placed some constraints on the MESA application and its outputs. First, there was ambiguity associated with the definition of subtasks within each mission. Although it is possible to provide some general description of the military activities involved in a generic MEU mission, the specific requirements are highly variable and difficult to predict. This report and the MESA application attempt to provide as much detail as possible about the activities involved in each subtask and the environmental or situational factors that may affect these activities.

One of our first steps was to deconstruct the four missions into their component tasks and subtasks, using as guidance Marine Corps documents, joint publications, and other relevant information. The MESA application similarly attempts to capture requirements at the subtask

level by providing screens for each sub-task and allowing the user to tailor the predefined scenario as necessary. However, the mission tasks and subtask discussions remain relatively general and are unlikely to support detailed mission planning. However, this ambiguity does not affect the value or generalizability of the approach used to develop inputs for the planning tool. Mission deconstruction, prioritization of tasks and equipment, and task sequencing are still the relevant steps that planners must take to develop mission plans and to estimate equipment requirements, even if, in reality, deconstruction must occur at a more granular level.

A second challenge and limitation of the method is associated with the planning factors used in the study. Planning factors link equipment to military tasks and activities, defining in relevant units what a given piece of equipment can do in a set period of time if properly used. MEU commanders and marines involved in MEU operations typically have relatively clear ideas about the planning factors for specific pieces of equipment. However, the MEU does not have a written set of planning factors that it uses to develop mission plans or to guide what it brings aboard its ships. This lack of written planning factors meant that we were forced to develop alternative ways of defining equipment as related to specific mission tasks.

As a second-best alternative, we relied on equipment manuals that provided details on the capabilities of pieces of equipment, such as payload, maximum speed, and lift capacity. These metrics provide estimates of the relative capabilities of different pieces of equipment and their ability to complete a given task, but they may not provide planning factors that are meaningful in an operational environment. The MESA tool links these planning factors to specific military tasks and activities and allocates equipment accordingly. The limitations inherent in our planning factors make it difficult to consistently match equipment to military activities, especially when these activities are themselves fairly broadly defined. The quality of the planning factors does not affect the value of the method or the MESA application. Furthermore, the quality of the planning factors will be easily addressed once better information is available. Updating the tool involves a simple data-entry change.

Limitations

In deconstructing the missions and developing the MESA application, we considered only the tasks and equipment involved in operational activities. This includes the movement of personnel and equipment to an area of operations but not the sustainment of these personnel and equipment or the tasks involved in reception, staging, and onward movement (RSOM).

Sustainment of personnel and equipment may include everyday logistics, routine maintenance and repair to equipment, and basic personnel support activities. RSOM is similarly focused on logistics and organization of personnel. Specifically, it describes the process through which personnel, materiel, and equipment are received and cleared through the point of debarkation (reception); assembled and organized into units and forces (staging); and moved from reception and staging areas to the area of operations (onward movement).

Although sustainment and RSOM tasks fell outside the scope of our research effort, these activities are central to the successful completion of MEU missions. They also often have additional resource implications, requiring specialized repair or communication equipment, additional personnel, and basic commodities, such as food, water, and fuel. Users of the MESA

application must keep these additional requirements in mind when translating the MESA application's output from hypothetical to real operational plans.[2]

About This Report

This report records the tasks associated with the set of 15 missions defined in the Marine Corps Task List, the specific pieces of equipment that may be necessary to complete these tasks and the capabilities of this equipment, and the software system developed to assess the impact of equipment shortfalls. Chapter Two describes the deconstruction process, focusing on the humanitarian assistance mission, the prototype used for the previous edition of this report and the MESA application, as well as tasks that are common across missions. Chapter Three records the deconstruction of the three new missions: NEO, TRAP, and airfield and port seizure operations. Chapter Four describes the analytic process used to identify and link equipment to tasks and to assess equipment capability. Chapter Five describes the MESA application and its utility in assessing equipment shortfalls and their impacts. Chapter Six presents some conclusions concerning this process and possible extensions. The report concludes with three appendixes: Appendix A presents planning factors for 11 of the 15 the deconstructed missions; Appendix B lists the planning factors associated with all the equipment included in the equipment list provided by the sponsor, followed by a series of tables that describe the equipment needed for each of the tasks associated with the HA, NEO, TRAP, and airfield and port seizure operations; Appendix C is a detailed user's guide to the software.

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[2] U.S. Joint Chiefs of Staff, *Joint Tactics, Techniques, and Procedures for Joint Reception, Staging, Onward Movement, and Integration*, Joint Publication 4-01.8, Washington D.C., June 13, 2000.