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RESEARCH MEMORANDUM

THE NAVY MANPOWER-REQUIREMENTS SYSTEM

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THE NAVY MANPOWER-REQUIREMENTS SYSTEM

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ABSTRACT

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INTRODUCTION AND SUMMARY

A key factor in the Navy's ability to meet its peacetime and wartime contingencies is the supply of trained manpower available to perform assigned missions. As part of the Total Force concept, the Navy develops mobilization manpower requirements for planning and programming resources. This research memorandum describes the process used by the Navy to set, implement, and execute manpower requirements. In addition, it presents conclusions and makes recommendations for improving those processes.

The process used by the Navy to address these requirements is divided into three parts: (1) requirements determination, (2) billet structuring, and (3) execution.

Requirements determination is the Navy's method for choosing the proper quality and quantity of personnel needed to operate the Navy in peace and in war. The goal is to provide a feasible, affordable mix of active, reserve, and civilian personnel who can meet the Navy's peacetime needs and mobilize within a specified interval to meet the Navy's wartime needs.

Billet structuring is the process through which manpower requirements are organized into actual Navy units, such as a ship or headquarters staff.

The execution process involves manning the Navy and includes the distribution of personnel throughout the various commands. The principal functions of this process are recruiting, training, and assignment.

Requirements determination is conducted through the four elements of the Navy Manpower Engineering Program (NAVMEP): the Ship Manpower Document (SMD) program, the Squadron Manpower Document (SQMD) program, Shore Manpower Document (SHMD) program, and the Navy Manpower Mobilization System (NAMMOS). The SMD and SQMD programs directly provide wartime manpower requirements. The SHMD supplies peacetime operating requirements, which are adjusted through the NAMMOS process to account for changes in wartime workloads. The output of the SMD and SQMD programs are also stored within NAMMOS, along with the time-phased mobilization requirements for the shore establishment.

The manpower requirements that come out of NAMMOS are structured in the Navy Manpower Data Accounting System (NMDAS) (primarily for active Navy requirements) and the Reserve Unit Manpower Authorization System (RUMAS). Both systems contain information only on billet authorizations. The actual personnel available to fill the billets are managed on other data systems.

The analysis of the process used to set, structure, and execute Navy manpower requirements provides the following conclusions:

- The Navy's method for determining manpower requirements is generally sound with regard to ships and squadrons. The shore-establishment requirements suffer from a less rigorous methodology and constrained resources. However, the deficiencies of the SHMD program are difficult to overcome and may not be worth the resources needed to rectify the problems.

- Several deficiencies in the structure of the Selected Reserve requirements create excessive management problems and poor information flow to program managers. The principal problem is the lack of reserve authorization data in the NMDAS, which is inaccessible to manpower sponsors. This results in incomplete matching of requirements to billets in the Selected Reserve.

- There is too great a separation between the data bases that house requirements and those that deal with personnel. As a result, the Navy is unable to quickly determine the manpower deficiencies in the shore establishment and the personnel that will be made available at the onset of a national emergency.

- There is a gap in the Navy's manpower-requirements planning with respect to shortfalls between the USN inventory and the Billets Authorized (BA). These shortfalls are not treated as a Reserve requirement.

- Insufficient interaction between equipment design and manpower needs ignores the potential for designing new systems that minimize maintenance and manpower requirements.

- Many billets in the Navy are required only in peacetime, yet they are not clearly labeled as such in the official manpower data-processing systems. Accurate identification of non-essential billets will improve the efficiency of the Navy's mobilization manpower assignments by locating available personnel.

- Manpower requirements for manning sealift that will be necessary in wartime are not tabulated in the Navy's mobilization requirements.

Recommendations for dealing with these problems are to: (1) include Selected Reserve authorizations in the NMDAS; (2) develop a data-base management system that tracks both requirements and authorizations as well as personnel filling billets; and (3) evaluate the feasibility and desirability of creating a flexible personnel account within the Selected Reserve. This account would be used to recruit and train

skilled personnel who do not fulfill formal Selected Reserve requirements but who could be in short supply during national emergencies.

THE NAVY MANPOWER SYSTEM

The ability of the Navy to fulfill its peacetime and wartime missions depends critically on its success in manning its ships, squadrons, and shore facilities with the right number and kinds of personnel. In trying to reach that goal, the Navy spends at least 30 percent of its budget on manpower authorizations alone. Yet, for much if not most of the Navy, the manpower and personnel systems are unknown or poorly understood, even though they affect every function the Navy performs. This memorandum describes the Navy manpower process, with a primary focus on the manpower-requirements determination process and the systems used to implement these requirements.

Before starting with the description of the Navy's manpower-requirements system, it is useful to discuss what, in fact, such a system should actually do. As a minimum, a manpower requirements system should:

- Supply accurate, verifiable manpower requirements by quantity and quality, to be used in making planning, programming, and budgeting decisions
- Be accessible and comprehensible to all major participants, such as resource sponsors, claimants, and program managers
- Be compatible with and preferably housed along with data bases used in resource management.

For the purposes of this analysis, the Navy manpower system may be divided into three separate but related components: requirements determination, billet structuring, and execution. The goal of the requirements-determination process is to provide a method for planning and programming a feasible, affordable mix of active, reserve, and civilian personnel who can meet the Navy's peacetime needs and mobilize within a specified interval to meet the Navy's wartime needs. Quality in the context of personnel requirements is defined by rating and pay-grade, or by a combination of skills and experience. The determination process should be objective; it should not be based solely on the whims or judgment of local commanders. It should also be verifiable and defensible to the Office of Secretary of Defense (OSD), the Office of Management and Budget (OMB), the U.S. Congress, and the taxpayer. Since the requirements process is the foundation of the manpower system, it is imperative that manpower needs are accurately estimated in order to minimize costs and avoid mismatches between the demand and supply of personnel.

Billet structuring is the process by which manpower requirements are formed into units, such as a ship or headquarters staff. A key concept of this process is the need to distribute billets between active duty and the Selected Reserve that are consistent with peacetime operational readiness, mobilization capability, and attainability. Execution is the process used to man the Navy with the proper quantity and quality of personnel to enhance readiness and mobilization capability, subject to fiscal and other constraints that influence attainability. The principal functions of the execution process are recruiting, training, and assignment of personnel, and maintenance of reliable manpower data-processing systems that assist planners in meeting the Navy's manpower needs.

Although the three parts of the manpower system are closely related, the nature of most jobs within the system tends to cause an unawareness of how individual actions and decisions affect the other parts of the process. Efficient functioning of the system requires regular communication and feedback to ensure that different parts of the system are not working at cross purposes.

Figure 1 depicts the operation of the Navy manpower system. The manpower process starts by using the Ship Manpower Document (SMD), Squadron Manpower Document (SQMD), and Shore Manpower Document (SHMD) programs to set requirements. These programs should provide, through studies and analyses, the quantity and quality of personnel needed to operate the Navy's units in a wartime environment (peacetime in the case of the SHMD program). The manpower document programs are operated by the Navy Manpower Engineering Program (NAVMEP), with the overall process monitored by the Deputy Chief of Naval Operations (DCNO) for Manpower, Personnel, and Training (OP-01). An overview of the Navy's Total Force manpower process is contained in [1].

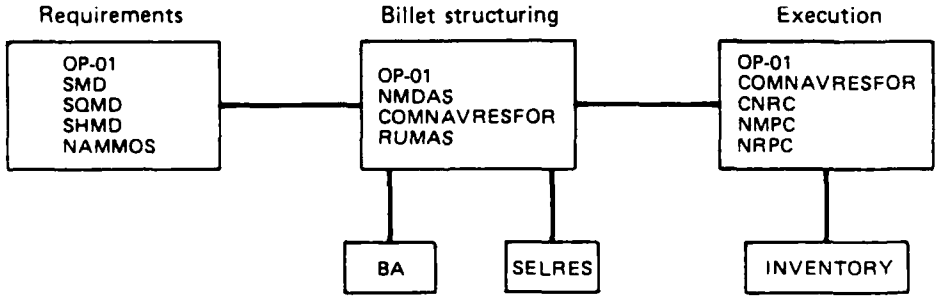

FIG. 1: THE NAVY MANPOWER SYSTEM

Billet structuring is accomplished by using the Navy Manpower Data Accounting System (NMDAS), which contains inputs from resource sponsors[1] and manpower claimants and is operated by OP-01. Billet structuring for the Naval Reserve is now done by the Commander, Naval Reserve Forces (COMNAVRESFOR), although until recently the function was performed by the Director of Naval Reserve (OP-09R). The Inactive Remote Inquiry System (IRIS) is used to structure Selected Reserve requirements based on inputs from NMDAS.

Execution of the manpower plans is the joint responsibility of numerous commands, including the Chief of Naval Recruiting Command (CNRC), Chief of Naval Education and Training (CNET), and OP-01. These commands make decisions and program resources in the areas of recruiting, training, retention, and assignment. COMNAVRESFOR is responsible for executing reserve manpower plans; policy decisions are made by OP-09R.

As this brief description shows, the manpower system is actually divided into two parts. The first part deals with manpower requirements (spaces), the second part with people (faces). Some of the difficulties in the operation of the manpower system occur because the dividing line of responsibility between the two parts is too sharp: those concerned about requirements (or spaces) ignore the people side of the problem, and vice versa.

DETERMINING MANPOWER REQUIREMENTS

Background

Mobilization requirements are set within the Navy Manpower Mobilization System (NAMMOS) program, which was initiated in 1978 and brought on-line in 1983. NAMMOS determines shore-manpower requirements through the SHMD program. Ship and squadron requirements are set in the SMD and SQMD programs, with their outputs included in the NAMMOS data base. Since 1983, NAMMOS and its components have been under the direction of NAVMEP.

NAMMOS was created primarily in response to Congressional concerns about the accuracy of Navy mobilization-manpower requirements. NAMMOS should provide credible, justifiable requirements consistent with the need for readiness and minimal cost. The difficulty of achieving those objectives is obvious, and the NAMMOS process and output has been criticized frequently (but not nearly as much as its precursors).

NAMMOS is based on the idea that a particular warfighting scenario requires a set of functions to be performed. Those functions, in turn,

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1. A resource sponsor is a DCNO or a Director of a Major Staff Office who is responsible for programs under his cognizance.

imply workloads that determine the quantity of manpower needed to execute the workloads. The methodology uses information on the relationships between peacetime manpower and workloads to extrapolate the change in workload upon mobilization and the resulting change in manpower requirements. Some functions may not be expanded immediately, or the workloads may change at varying rates, so that the manpower requirements generated are time-phased by both quantity and quality. Although the estimates generated will be necessarily scenario-dependent, the process can be adjusted to reflect different wartime environments if desired.

The SMD and SQMD programs are conceptually and operationally similar and are discussed jointly in the next section. As the shore-based requirements program, the SHMD system functions in a different fashion and is discussed separately.

Ship and Squadron Requirements Determination

The process for determining manpower requirements for ships and squadrons is initiated by changes in missions, tasks, or functions, or by the acquisition of new ships and aircraft systems. The office responsible for the change is tasked with the job of defining the manpower implications. For example, manpower requirements for a new ship are the responsibility of the DCNO for Surface Warfare, whereas the DCNO for Air Warfare has the explicit job of identifying the manpower changes resulting from the introduction of new aircraft. Furthermore, if there are no specific changes, each activity is surveyed every three years to ensure that only validated requirements are in the system.

The primary processes for setting ship and squadron manpower requirements are the SMD and SQMD programs. There are, however, preliminary analyses conducted in earlier stages of equipment development that are relevant to the SMD and SQMD goals. The Navy's new Military Manpower/Hardware Integration (HARDMAN) program injects MPT considerations into the earliest stages of the Weapons System Acquisition Process (WSAP). In the analyses supporting HARDMAN, a great deal of data are gathered on the manpower and training requirements resulting from the introduction of new systems. The goal of HARDMAN is to provide preliminary estimates of MPT needs as early as possible to facilitate planning and, during the process, to generate data useful to the Manpower Document programs. Since HARDMAN was not officially approved until 1986, there is currently little information on how well it will fit into the requirements-determination process. It does, however, fill an important need for consideration of MPT requirements during the beginning stages of the acquisition process.

The SMD and SQMD programs identify mobilization requirements only. Peacetime operating-manpower levels are basically determined by the interactions among available inventory, sea-shore rotation goals, fiscal and endstrength constraints, and the willful acceptance of risk.

SETTING MANPOWER WORKLOADS

The SMD program was started in 1966 and is designed to determine the minimum number and quality of positions needed on board ship in a wartime environment at sea. Specific peacetime manpower requirements are not determined; peacetime manpower reflects wartime requirements with imposed constraints (e.g., budgetary). The SMD process incorporates information on the projected wartime operating environment with data on ship functions to estimate the total warfighting needs of each ship. The SMD for particular classes of ships are similar, but not necessarily identical because of variations in the equipment on board each ship.

The SMD process begins with a description of the expected wartime scenario, usually based on the Defense Guidance. The scenario uses the various operational plans and assumptions conceived by the Navy. The program sponsor uses the scenario to develop statements of Required Operational Capability (ROC) and the Projected Operational Environment (POE). The ROC/POE statements define what level of mission capability is required by the ship utilizing the installed configuration of equipment at different levels of readiness. These operational capabilities then become the basis for determining manpower requirements when they are translated into workloads.

New ship acquisitions require the development of Preliminary Ship Manpower Documents (PSMDs), which both justify and describe the quality and quantity of manpower requirements associated with the new ship. The need for preliminary estimates is based not only on the desire to check the calculations, but also to provide inputs into the Navy Training Plan (NTP). The long lead time needed to recruit and train personnel makes it mandatory to identify requirements at an early stage. Once the first of a new ship class has been in service through its first deployment, an SMD for that class of ship will serve as the starting point for all follow-on ships in that class. A PSMD may also be necessary for major ship conversions or service-life extension programs.

The manning level needed to operate a ship depends on the level of readiness. The ROC should provide enough detailed information on mission capabilities to estimate objectively the minimum watch-station requirements under the various readiness conditions. Allowance must also be made for special operational evolutions such as underway replenishment and flight quarters.

The workloads for ships are divided into four functional areas:

1. Operational manning, or watch stations. Watch stations are ship positions responsible for monitoring systems and equipment. Condition III positions are usually manned on a continuous basis to maintain the safe operation of the ship and provide for defense.

2. Maintenance manpower. Maintenance manpower is manning needed to perform the three types of maintenance: planned, corrective, and facilities.

3. Own-unit support. Own-unit support is the manpower needed to perform administrative, military, food service, utility, and other tasks.

4. Customer support. Customer support is the manpower required to supply repair and support services to other ships in the fleet. Customer support is unique to tenders and repair ships.

All time spent on ship is not necessarily personal or fully productive, so allowances are made for other considerations that affect manpower needs. These factors account for the time that sailors are available for work but are not specifically performing the functions listed above. The three allowances are:

- Service diversion: an adjustment for activities that are conducted during normal working hours. An example is time spent in inspections.

- Training allowance: time spent in required proficiency training.

- Make-ready/put-away allowance: time spent gathering the necessary tools, parts, and equipment needed to perform a task, and the time spent cleaning up the workplace when the job is completed.

The amount of manpower needed to accomplish any particular function is therefore dependent on the actual time needed to accomplish the job and the preparation and clean-up time needed to complete the task. The allowances for service diversion and training are deductions from the amount of time an individual is available to perform functional workloads, and do not directly influence the amount of time needed to complete a task. These allowances will, however, strongly influence the number of people needed to perform a specific workload because they affect the amount of time each person is available.

The key to providing accurate, verifiable requirements is the methodology used to generate the estimated requirements. Several approaches are used by the Navy to determine its manpower needs. For the SMD and SQMD programs, workloads are usually validated by job-task analyses, work-study methods, other available industrial engineering techniques, and on-site surveys of work-center supervisors. The people writing the SMDs use historical data ("experience") and other sources

for information on equipment. If the equipment is new, such sources are usually unavailable or unreliable, and more detailed study is needed.

This paper does not discuss specific methods used to determine workloads for particular items of equipment. Although the specifics of the process can be improved, the accuracy of the requirements determined through the SMD and SQMD programs is generally good. Deficiencies in the original requirements gradually become corrected over time as the Navy gains experience with new equipment and ships. More importantly, the system has a built-in feedback mechanism that acts to correct imbalances in requirements. Ship commanders who believe the requirements are deficient have incentives to provide evidence for changing the requirement. Excess requirements may also be reduced because commanders do not want to be listed as short in particular ratings or NECs if they are not needed. (This does not happen often, however.) These factors help to push the system in such a direction that, at least for current work practices, ship and squadron manpower requirements will reflect true needs.[1]

There are, however, areas where immediate imrovements can be made in the requirements process. For example, a recent CNA study [11] analyzes the procedures for setting maintenance workloads for ships and identifies ways to improve the system. The research demonstrates that the assumed ratios of PM to CM of 1.0 for electronic systems and 2.0 for mechanical systems are inaccurate. The estimated ratios exhibit wide variation and the median ratios are not close to the 1.0 or 2.0 figures currently in use. Secondly, the use of the ratio is a logical inconsistency that could result in inaccurate requirements. For example, when additional PM requirements are placed on an existing system, the presumption must be that future CM requirements will decline (why else perform the additional PM?). But use of the fixed ratio forces PM and CM requirements to increase in proportion. In fact, if increased PM reduces future CM, the PM/CM ratio will rise above historical levels. By using the historical PM/CM ratios, the Navy overestimates the CM workload and hence the manpower requirement.

The output of the SMD and SQMD process is a listing of the mobilization manpower requirements by rating and pay grade for each unit. Based on those tables, the sponsor decides which billets to choose, or buy, for active duty. This collection of billets is the Billets Authorized (BA). The difference between the mobilization

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1. The Government Accounting Office [2] has criticized the Navy for its lack of methods-improvement studies in the SMD program as well as other perceived deficiencies.

requirement and the BA is usually the Selected Reserve requirement.[1] The allocation of billets between active and reserves can create problems, which are discussed later in this paper.

DETERMINATION OF MANPOWER TYPE

A critical part of the requirements determination process is the identification of the manpower type needed. Workloads can be accomplished through three types of personnel: active-duty military, reserve military, and civilian. A requirement is identified as being military if the billet:

- Engages in or maintains readiness for combat
- Requires military experience for successful performance of duties
- Requires the exercise of military authority
- Requires military personnel by law
- Requires skills for which a civilian with the skills cannot be hired or trained to meet the time-phased requirement
- Is outside the continental United States.

Any billet that does not meet one of these specifications will be civilian.

After the decision has been made to create a military billet, it must be determined whether it needs to be active duty, Selected Reserve, or other military. The other military consists of the Individual Ready Reserve (IRR), Standby Reserve, and retired personnel. Several factors are incorporated into the decision. Units that provide forces to bring the active component up to the required readiness level upon mobilization will be SELRES, as will special capabilities that exist only in the reserves. For other billets the decision between active duty, SELRES, and other military will depend primarily on the mobilization stage at which the manpower is needed. Requirements after M+30 days will not be SELRES, but other military.

The main problem with the manpower-requirements determination process for ships and squadrons is not with the design or methodology

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1. This policy is currently being reviewed to allow for the identification of peacetime-only billets that are in the BA. Upon mobilization, the personnel filling these billets may be available for reassignment.

used, but rather with the execution of the program. Resource constraints frequently prevent the analysts tasked with setting standards from doing a comprehensive job. The lack of personnel, time, and expertise has left the Navy exposed to criticism of the accuracy of its manpower requirements. The price of this criticism may well be a reduction in badly needed endstrength.[1]

INTERACTION BETWEEN MANPOWER NEEDS AND EQUIPMENT

Another difficulty with the manpower-determination process for ships and squadrons is the lack of much interaction between equipment design and manpower needs. In most cases, new equipment is engineered without determining how it affects the need for either quantity or quality of manpower. The Navy's new HARDMAN program addresses part of this problem, but primarily focuses on the need for early identification of the final manpower requirement. The equally critical need to design new systems so that they minimize maintenance and manpower is virtually ignored. This need has been ignored because program managers are not pressured to incorporate manpower needs into the acquisition process. The serverity of this problem indicates that the manpower-requirements determination process must be integrated into the rest of the Navy's planning systems, rather than treated as something in isolation or solely as a way to satisfy Congressional or GAO criticism.

Most discussions of the Total Force revolve around the issue of the mix between active and reserve personnel and resources. A more comprehensive and productive perspective would be to include equipment or technology in the discussion. A truly effective Total Force planning system would evaluate the interactions between manpower and technology and use all opportunities to increase the effectiveness of the Navy's warfighting capabilities. Such a system would require more detailed analysis of the effects of technological change on manpower requirements and would necessitate the inclusion of MPT consideration in the weapons-acquisition process rather than viewing technology and equipment as a given. Current policies generally treat manpower concerns separately, which ensures that manpower will always operate as an excessive constraint on the Navy since opportunities to ovecome those constraints before they occur are ignored.

SEALIFT MANPOWER

Before the shore establishment is discussed, it is important to note that the only ships and squadrons covered by the SMD and SQMD programs are active and reserve commissioned units. The Navy's Ready Reserve Fleet, its inactive ships, and any merchant ships that might be used in a global war are not included, and are not counted in the

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1. References [2] and [3] provide summaries of GAO critiques of the Navy's manpower determination process.

overall NAMMOS requirement. Therefore, any estimated requirements found in either the NMDAS or NAMMOS systems should appropriately be considered minimum requirements. Since the need for these ships is unquestioned, the lack of any firm estimate of manpower requirements to use them represents a large gap in the Navy's mobilization planning.[1]

SHORE-BASED REQUIREMENTS

The Navy's struggle to determine accurate shore-based requirements has a long history. The first program, the Shore Requirements, Standards, and Manpower Planning System (SHORSTAMPS), was started in 1972 at the urging of Congress, which had questioned the reliability of the Navy's requirements. In subsequent years Congress pressured the Navy to provide full funding and support to SHORSTAMPS, but the Navy was slow in making progress. The Navy's slow movement in developing and implementing standards for shore staffing was the object of Congressional and GAO criticism [5] in subsequent years. In 1979, the House Armed Services Committee (HASC) declared the Navy's progress unacceptable and directed the Navy to revise its plans and speed up its implementation rate. The Navy then set 1987 as the date by which 70 percent of the shore billets would be covered by staffing standards. By 1983, however, less than half of the Navy shore establishment was under the new standards.

In December 1983, the Navy reorganized its requirements-determination process and designated SHORSTAMPS as the Shore Manpower Documents (SHMD) program. SHMD was incorporated with the SMD and SQMD programs into the new Navy Manpower Engineering Program (NAVMEP). This did not solve the problem, at least to the satisfaction of Congress or the GAO.[2] At present, the entire SHMD program is in a state of flux as a result of an October 1986 decision by the Secretary of the Navy that greatly reduces the size and function of NAVMEP and decentralizes its responsibilities to the manpower claimants.

The SHMD program is actually comprised of two subsystems. The Shore Required Operational Capability (SHOROC) subsystem defines the tasks to be performed, and states how much, how long, and how well those tasks should be performed.

In setting requirements for the shore establishment, SHOROC translates Navy manpower needs from an activity orientation to a functional orientation. That is, for analytical purposes individual billets and

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1. As of January 1986 there were 72 ships in the Ready Reserve Fleet, with plans to increase that to 136 by fiscal year 1992. There are currently 26 inactive ships in the Navy's inventory. Reference [4] presents information on the manpower needs for inactive ships.
2. See [6] for the GAO critique of the Navy's manpower-requirements system for the shore establisment.

positions are aggregated on the basis of what function they are performing; a function is defined as the responsibilities, assigned duties, missions, or tasks of an organization.[1] Manpower performing similar tasks are grouped into functional areas so that the workload-manpower relationship can be identified. By aggregating all tasks Navy-wide, all positions are functionally accounted for and amenable to analysis. If an activity performs a single function, all manpower spaces within that activity will fall into the same functional area.

For example, all Navy Correctional Centers perform a single function and are assigned to the functional area of "Correctional Centers." Multidimensional activities, such as Naval Air Stations, require examination of each individual billet to determine the functions performed and the functional area into which they should be placed. Within an Air Station, for example, only those billets involved in providing intermediate-level aircraft maintenance will be included in the functional area "Aircraft Maintenace--Intermediate Level." The functional area/required functional capability includes those billets that perform maintenance on the ground-support equipment as well as direct maintenance of particular aircraft. Table A-1 lists the functional categories used in SHOROC.

Within functional areas, tasks are more specifically categorized. These categories are the Required Functional Capabilities (RFCs), which are the specific tasks performed within functional areas. Within the aircraft-maintenance example, the RFC would be the performance of intermediate maintenance on twelve F-14 aircraft flying 20 hours per week. The parameters specifying the aircraft type and number, plus the flying hours, quantify the workload generated in performing the RFC.

The size of the SHOROC subsystem is substantial. As of January 1984, there were 72 functional areas and 6,068 required functional capabilities. When parameters are added to the RFCs, the complexity of the system is magnified.

The second part of the SHMD process is the staffing-standards subsystem. (See [8] for more detail.) SHOROC tasking information is used to estimate the relationship between workloads and manpower. The methodology most often used for developing staffing standards is regression analysis, with adjustments made to account for "additive" workloads. Additive workloads either fill special requirements or are unique to a particular location. Staffing standards may also be estimated using other work-measurement techniques. Staffing standards are most commonly developed at the level of the required functional capability, but may also be done for any other work center that performs a single type of workload.

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1. Reference [7] provides more detail on the topics discussed in this section.

The stated goal of the SHMD program is to apply industrial engineering and management analysis techniques to determine and document shore-manpower requirements. This is done through a process called an Efficiency Review, which is conducted by eight Navy Manpower Engineering Detachments (NAVMEC) dispersed around the U.S. Reference [9] details the steps required to conduct an Efficiency Review. Efficiency Reviews are time-consuming and costly, which partially explains why only 12 ERs were completed by the end of fiscal year 1986.[1]

Unlike the SMD and SQMD programs, the SHMD program is used solely for determining peacetime personnel requirements. The NAMMOS system uses the SHMD results and adjusts them for expected workload changes to get an estimate of mobilization requirements. The requirements for ships and squadrons, on the other hand, refer only to mobilization needs. Another difference between the ship/squadron requirements and the shore establishment is that the mobilization manpower needed for ships and squadrons will not vary much, if at all, from M+1 through M+12. The shore establishment, however, will increase substantially, which complicates the job of setting requirements because the appropriate time-phasing of the various workloads must be determined.

Setting shore-based requirements is made more difficult by the greater mix of manpower types that are available and used. Ship and squadron personnel must, by necessity, be military. The shore establishment, however, makes use of active and reserve military, permanent civilian employees, temporary civilian hires, and an array of civilian contractors. Consequently, a large percentage of the shore workload is performed by non-military personnel and sailors on shore duty. Although this makes the management of the shore establishment more complicated, it also provides much greater flexibility in response to changing workloads. It also makes the job of assigning active-duty personnel somewhat simpler because many of the shore billets are coded as either military or civilian.

A major deficiency in the management of the shore establishment is the weaker data bases available to keep track of civilian positions. For example, civilian peacetime positions (it is not accurate to call them requirements, since they usually represent what a sponsor is willing to pay for rather than what is required in a technical sense) are listed on the Civilian Position File (CPF), but the inventory of civilians is only available on an entirely different system--the Personnel Automated Data System (PADS). Merging data from the two systems is not a simple task because there is no single data base that the Navy can use to determine its current needs and what it actually has available in

1. The GAO claims that these ERs reduced manpower spaces by 1,098, at a savings of $46.3 million.

civilian manpower. Recent CNA studies ([10] and [11]) discuss some of the problems encountered in matching the CPF and PADS.

Since the SHMD program only sets peacetime requirements and even then does not have total coverage of the shore establishment, other procedures are necessary to estimate mobilization requirements. These are conducted through the NAMMOS system. The objective of the NAMMOS methodology for the shore establishment is to develop workload factors for each functional category. For many functional categories, mobilization needs are calculated from estimates of the relationship between peacetime manpower and workloads. By using data from peacetime operations, for example, it is possible to estimate the relationship between manhours needed to operate mess halls and the number of meals served. A mobilization scenario that provides for the increase in the number of people on a base will, therefore, indirectly describe the number of meals needed. Thus, the increase in manpower needed to run a mess hall can be identified for any reasonable scenario. In the majority of cases the relationship between manpower and workload is estimated by regression analysis.[1] The accuracy of the resulting requirements clearly depends on the reliability of the procedures for predicting the time-phased change in workloads for each functional category.

In many cases, regression techniques are inappropriate for calculating manpower requirements. An example of this is the calculation of manpower requirements for work that is performed in shifts. A wartime environment will simply require more shifts or additional hours. Furthermore, some functions are unique to wartime, such as much of the medical care that will be provided. Alternative methods for calculating these requirements will be necessary.

The quantity of manpower needed will depend on factors other than the estimated workload. A crucial part of the requirements-determination process is determining manhour availability. Much time and effort has been invested in the attempt to determine how much time the typical sailor will actually be available for productive work, and the issue has also been the subject of GAO criticism.[2] The importance of this issue is immediately apparent when one considers that the length of the workweek, for example, acts as a multiplier for all Navy personnel, so that a difference of fractions of an hour can change total manpower requirements by hundreds. Also, it is reasonable to expect that upon mobilization all personnel will be required to work extra hours, especially in the beginning stages when alternate sources of manpower will be less available. Current Navy plans call for a 60-hour workweek for activities ashore during Phase I (M+1 and M+2 months) and 48-hour weeks for

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1. The technique for estimating mobilization requirements is similar to the method used to develop staffing standards in the SHMD program.
2. See [2] for a discussion of the amount of free time that sailors are expected to have at sea during wartime.

M+3 and beyond. As part of the methodology to determine manpower requirements, the expected productivity of personnel is adjusted downward to account for the effects of fatigue. For the 48-hour workweek, total output is expected to rise by 16.6 percent, versus the 20-percent rise in hours, and productivity for the 60-hour week is planned to increase by 41.5 percent from the 50-percent jump in hours.

BILLET STRUCTURING

The objective of the billet-structuring process is to take the requirements determined by the SMD, SQMD, or SHMD programs and place them into units. For active units, this is a straightforward procedure and is not discussed here. Once the requirements have been set, billet-specific data are placed into NMDAS. The NMDAS contains information on the BA, SELRES, and M+1 through M+12 manpower requirements. For the active-duty Navy, NMDAS provides a readily accessible source of information on both requirements and billet authorizations, which is used to manage all active-duty personnel actions such as accessions, promotions, and assignments.

For the Selected Reserve, however, the link between requirements, authorizations, and inventory is more complicated and the consequences more far-reaching. The principal complication occurs when the resource sponsor of an activity decides which requirements to buy for the active Navy and which to leave as a SELRES requirement. The following list contains additional complications.

- The requirements left for SELRES may be difficult for the reserves to fill due to demographic constraints.
- The collection of billets left to augment the active unit may be too small or may not have the right grade structure to create a complete reserve unit
- The residual requirement for the Naval Reserve may change too frequently for effective management of SELRES.
- SELRES authorizations are not resident on NMDAS, so that the sponsor does not have easy access to examine the authorizations that are being funded.

An example of a difficult requirement for the reserves to fill is the junior pay-grade requirement to augment ships and squadrons. This is basically composed of seamen, airmen, and firemen. These billets are difficult to fill in SELRES because reserve manpower often consists of Navy veterans, most of whom will be in higher pay grades. Non-prior-service personnel can be recruited and used to fill those billets but they are more expensive and can be better used to meet other hard-to-fill reserve requirements, such as the medical and construction ratings.

The problem of incomplete reserve units or inadequate grade structures can be corrected by creating administrative billets to fill the reserve unit. Although this solves the immediate problem, it is an unsatisfactory solution because such manpower could be put to better use filling mobilization requirements.

In cases where the reserves augment active forces, changes in the BA can create severe management problems for the Naval Reserve. This happens because the SELRES requirement is equal to M+1 minus BA for ships and squadrons. Therefore, any change in the BA, whether up or down, changes the SELRES requirement. If the BA changes frequently, the result is billet instability within the reserves, and drilling personnel may find themselves without billets. The situation is further complicated by the structure of the automated data-processing systems used for billet structuring. Currently, manpower requirements in NMDAS have a billet-sequence code for each rating/pay-grade combination within a unit, with separate counts for active and reserve requirements. The reserve requirements are then extracted by both the IRIS and the individual sequence codes given to each billet in the Selected Reserve. A change in the NMDAS coding sequence for any reason will affect the coding sequence used to structure reserve units, since any change in the numbering of the billet-sequence codes will change the coding sequence for the reserves even though the individual billets may not be directly involved.[1] These changes sometimes cause the reserve billets to disappear from the system.

A major deficiency in the process used to translate SELRES requirements into billets is that the resource sponsor cannot easily determine what requirements have actually been structured. This occurs because although the requirements are housed in the NMDAS system, which can be seen by the sponsor, the authorizations (or structured billets) are located on a separate system--the Reserve Unit Manpower Authorization System (RUMAS). Not only are the authorizations not housed with the requirements, but reserve program managers enact programming actions that result in authorizations unrelated to NMDAS requirements (e.g., the administrative billets used to provide for a proper grade structure within a unit). Although there are valid reasons for these programming actions, the result is that the sponsor has incomplete knowledge of both the billet authorizations assigned to him and the mobilization assets that are available in a contingency.

Following are the main problems with translating SELRES requirements into billets:

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1. Several policy initiatives are being discussed to resolve some of these difficulties. Included in the recommendations is a proposal to make billet changes only once or twice a year.

- Not all SELRES requirements from NMDAS get structured (or authorized), so there is not a one-to-one correspondence between requirements and structured billets.

- Some billets are structured to address reserve-management concerns and, therefore, do not meet mobilization needs. These billets do not show up in NMDAS.

- Because RUMAS cannot deal with future requirements, billets are structured in advance to allow for recruiting and training necessary personnel. These billets, coded with an Active Billet Sequence Code (ABSC) of 99XXX, are not on NMDAS and therefore are not necessarily known to the sponsor.

- Upon mobilization, personnel not filling mobilization billets will be detailed into the general-assignment pool and treated the same as Individual Ready Reservists. This is a misuse of trained and immediately available resources.

- ADP problems with the NMDAS-RUMAS interface are exacerbated by the inability of the reserve managers (OP-09R) to directly examine the NMDAS requirements.[1] Consequently, the glitches common to any large data-management system are not immediately obvious and tend to get transmitted through the system. As a result, many temporary billet changes in NMDAS are treated as permanent changes to SELRES requirements and force billet-structuring adjustments when there is no change at all in the underlying requirements.

- Because the 99XXX billet is managed outside the realm of the usual NMDAS-RUMAS interface, it is slow to respond to changes in future requirements. This causes some of these billets to remain in the system for years because there is little incentive to go back and remove unnecessary billets.

The best solution to these problems is to revise the NMDAS system to include all reserve authorizations in addition to requirements. In this way, program sponsors will have quick access to their authorizations, and will be more aware of the entire program and better able to economize manpower resources. To make this system work, however,

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1. It should be stressed that the NMDAS data base is immense and without on-line access it is extremely time-consuming to request data printouts for each question that may arise in day-to-day management of the Selected Reserve.

reserve managers in OP-09R must have on-line access to both the requirements and authorizations. This would provide more knowledgeable management of the reserves, reduce the amount of turmoil in reserve-billet structuring, and improve the contacts between program sponsors and reserve managers.

EXECUTION

This section of the paper examines how the Navy's planning systems would actually identify mobilization manpower and highlights areas in which those systems may be improved. The focus is on the overall operation of the process used by the Navy to execute its manpower plans, not on the details such as recruiting and assignment, so that manpower-mobilization planning can be investigated.

Mobilization manpower for the Navy can come from five sources: active military, SELRES personnel, Individual Ready Reserve, Standby Reserve, and retirees. This analysis focuses on active military and SELRES, although the other three sources will play important roles in any extended conflict.

If the Navy were to mobilize, its manpower data systems must be able to:

- Identify all available manpower, by rating and pay grade, along with information on the billets (if any) they are currently filling

- Assign available personnel to billets according to greatest need, so that the most critical positions are filled first and non-essential billets are eliminated.

Although these two tasks appear relatively simple, there are enormous complications that must be solved before they can be executed. To identify all available manpower, for example, requires that the data bases have immediate access to all personnel in the Navy, including those on active duty and in the Selected Reserve.[1] Moreover, it is mandatory that the system be able to distinguish between individuals who are already filling critical needs and those that will be available for reassignment. It is in this area that the Navy's systems are lacking.

The Navy currently has about 508,000 enlisted billet authorizations, 226,000 of which are either in the individuals account or in the shore establishment. Many of these billets will not be needed in wartime, or at the very least can be filled by personnel other than USN or

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1. The problems in mobilizing other manpower sources, such as civilians and Pre-Trained Individual Manpower (PIM), are ignored here in the interest of brevity.

SELRES. A good mobilization data base should identify those billets and have information on the individuals filling them so that they can be made available for immediate reassignment. Currently, the Navy's billet files do not clearly identify those billets that are non-essential in a wartime environment.[1] Furthermore, even if those billets were coded for ease of identification, the link between the requirements files and the inventory files is insufficient to allow simultaneous identification of the manpower resources that will become available. In other words, the Navy does not currently have a data-processing system that will rapidly and accurately provide up-to-date information on the number of billets that will not need to be filled upon mobilization and the available manpower that currently resides in those billets. Implementation of such a system will have two desirable effects: first, it will provide accurate counts of the Navy's manpower availability as it relates to wartime needs; second, it identifies the magnitude of the Navy's true reserve requirement because it eliminates the reserve requirement to backfill non-essential billets.

The number of people available for reassignment from peacetime-only billets may be quite large. In an estimate that includes only those activities with Activity Readiness Codes (ARC) that identify them as peacetime-only, a total of 7,763 sailors were counted. Many of these were in critical ratings such as ET and MM. If some of the billets used for sea-shore rotation purposes were included, the total number available would be much higher. A billet-by-billet analysis will be necessary in order to identify those specific positions that will not require active-military personnel upon mobilization. In the future, the Navy would greatly benefit if all billets in the NMDAS system were coded to identify peacetime-only status. This would allow the Navy to rapidly estimate manpower availability and actual mobilization requirements.[2]

Another major problem with the Navy's manpower-mobilization plans is the method used to determine manpower requirements. As discussed previously, the Selected Reserve requirement is based on the difference between the mobilization requirement and the BA. This estimate is used to program resources to meet the reserve requirement. In many cases, however, the inventory of active-duty sailors is insufficient to meet the BA, and billets either go unfilled or are occupied by people without

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1. The difficulty of identifying available manpower was emphasized in the recent NAMMOS zero-based review, which attempted to count the manpower shortfall when all all available sources are included: active, TAR, and SELRES. In a true mobilization scenario, the Navy will not have three months to identify its manpower deficiencies.
2. The ARC codes used in the calculation of available manpower are QR, RH, RI, RP, RU, RV, SQ, SR, ST, SU, and SV. Most of the billets in these categories are reserved for sea-shore rotation management.

the required rating or NEC.[1] If the Navy mobilizes, however, this residual will not get filled by SELRES personnel because it is not considered a SELRES requirement. This creates a deficiency in the Navy's mobilization plans that is currently not adequately addressed.

The Navy is aware of this problem, at least in regard to its ships and squadrons. The Emergency Fleet Augmentation Plan (EFAP) identifies shortfalls in the onboard strength of fleet units and increases the fleet strength to C-1 readiness levels by reassigning personnel from the shore establishment. Although this is a solution to the problem of bringing fleet units to full warfighting capability, it does not address the need to program the resources needed to fill that requirement. EFAP simply provides a means by which personnel can be moved to critical billets, but does not ensure that there will be an adequate number or quality of personnel to fill all the Navy's requirements. Even with its limited scope, the viability of EFAP for ships and squadrons is still unknown, since the system has not been fully tested to ensure that it will carry out its function in an emergency.

The solution to the problem of shortfalls between BA and inventory is not straightforward because the difference between the USN inventory and the BA constantly changes. Therefore, the shortfall between BA and inventory should not be a formal, structured Selected Reserve requirement because such requirements should be predictable to allow for recruiting and programming. It may be possible, however, to give the Selected Reserve greater flexibility in meeting such needs by creating a general flexible personnel account. Such an account can be used by the Selected Reserve to recruit and train individuals who do not fill a formal requirement but who would be needed in any conflict. In addition, this personnel account will be entirely consistent with the reserve's traditional role as a repository of trained manpower.

An additional area that requires improvement is the matching of individual skills with the billets those individuals are filling. This problem is especially acute within the Selected Reserve due to the difficulty of recruiting and retaining personnel within small geographical regions. The recruiting and retention problems are aggravated by the billet-instability and data-processing problems that make management of the reserve community so difficult. But these issues must be addressed if the Navy is to ensure that it will be able to mobilize its reserve units with a full complement of trained, competent personnel with the required skills. To accomplish this task will require a greater commitment of effort and resources by the resource sponsors.

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1. As of 30 April 1987, the shortfall between ship BA and personnel assigned was 9,400.

At any particular time, the Navy has thousands of people who are not filling billets but are in the Individuals Account (for active duty) or In-Assignment Processing (in the Selected Reserve). This is an invaluable source of manpower that must be tapped in any mobilization contingency. Thus, it is mandatory that the Navy create data-processing systems that can quickly identify and reassign personnel not already assigned to mobilization billets.

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APPENDIX

NAMMOS FUNCTIONAL CATEGORIES

APPENDIX

TABLE A-1

NAMMOS FUNCTIONAL CATEGORIES

Functional category title	FUNCAT code
Advanced base functional components	ABF
Advanced underseas weapons detachments	AUW
Afloat staffs	AFS
Aircraft maintenance--depot level	ARF
Aircraft maintenance--intermediate level	ACM2
Aircraft maintenance--organizational level	ACM1
Aircraft squadrons	SQD
Amphibious support	AMP
Antisubmarine warfare	ASW
Automated data processing	ADP
Cargo handling battalions	CHB
Chaplains	CHP1
Combat camera support	CCS
Commissary services	CST
Communications	COM1
Correctional centers	COR
Cryptology	CPY
Dental DEN	
Environmental support	ENV
Explosive ordnance disposal	EOD
Facilities support--facilities maintenance	FAC2
Facilities support--family housing	FAC1
Facilities support--transportation	FAC3
Finance offices	FIN
Firefighting	FIR
Fleet composite operational readiness groups	FCG
Fleet introduction teams	FIT
Fleet training groups	FTG
Flight support groups	FSS
Headquarters/operational staffs	HQS
Human resources management programs	HRM
Individual account	TPS
Inshore undersea warfare	IUW
Intelligence	INT
Legal services	LEG
Medical	MED
Military entrance processing	MEP
Military sealift command	MSC
Mine warfare	MWF
Mobile diving salvage units	MDS
Mobile fleet boat pools	FBP

TABLE A-1 (Continued)

Functional category title	FUNCAT code
Mobile technical units	MTU
Naval bases	NAB
Naval construction forces	NCF
Naval control of shipping	NCS
Naval investigative services	NIS
Naval reserve program	RES
Naval systems commands	SYS
Navy bands	BAN
Navy exchange services	NEX
Navy petroleum support	PET
OSD/other agency support	OSD
Personnel mobilization teams	PMT
Personnel services	PER
Personnel support--civilian personnel admin	PER1
Personnel support--messing and berthing	PER2
Personnel support activities	PSA
Port services operations	PSO1
Port services operations--deguassing/deperming	PSO2
Public affairs	PAO
Recruiting	RCT
Reserve overhead	ROV
Security--physical security	SEC1
Security--shore patrol	SEC2
Ship repair--depot level	SRP
Ships SMD	
Shore intermediate maintenance activities	SIM
Supply support	SUP1
Technological support	TES
Training	TRA
USMC support	USM
Weapons support	WEP