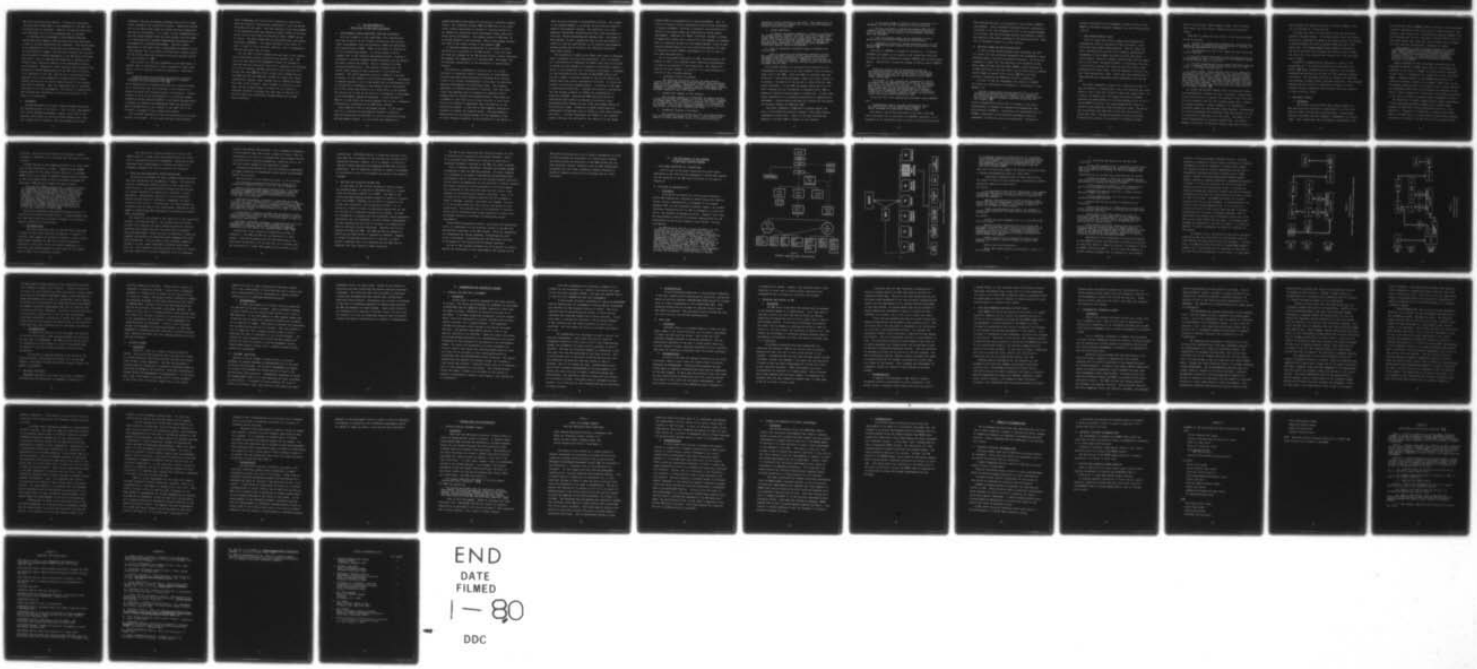
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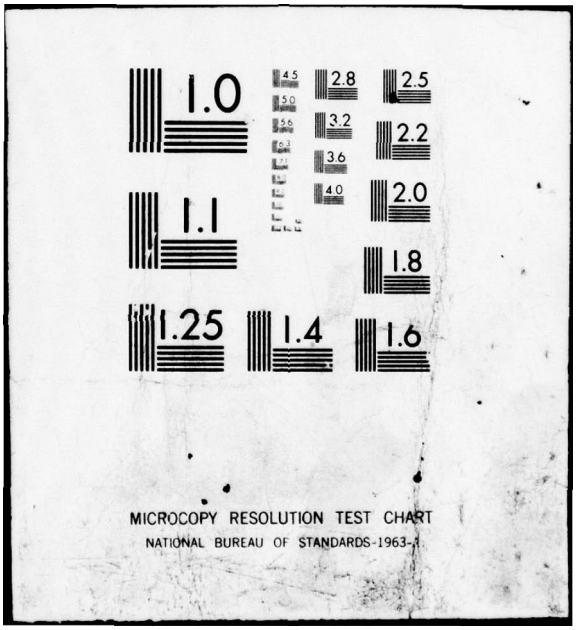
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(6) AN ANALYSIS OF THE MANAGEMENT OF NAVAL AIR SYSTEMS COMMAND TEST AND EVALUATION FIELD ACTIVITIES.

by

(10) Lawrence William Emery

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Thesis Advisor: J. W. Creighton

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An Analysis of the Management of Naval Air Systems Command Test and Evaluation Field Activities

by

Lawrence William Emery
Naval Air Test Center, Patuxent River, Maryland
B.S.E.E., Northeastern University, 1965

Submitted in partial fulfillment of the requirements for the degree of

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ABSTRACT

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I. INTRODUCTION

A. STATEMENT OF THE PROBLEM

In its role of Developing Agency for Naval aircraft weapons systems, including airframes, avionics equipment, the Naval Air Systems Command (NAVAIR) must maintain the capability to conduct test and evaluation (T&E) of the equipment it is developing. This has been accomplished through the establishment and development of a group of T&E field activities with differing responsibilities for the various areas of interest for which NAVAIR requires testing. The role of the T&E field activities is to provide the various groups at NAVAIR Headquarters with the testing services necessary to ensure that the various developmental programs are progressing satisfactorily and that they have a reasonable probability of success. Also, information must be provided to allow for correction of deficiencies as early as possible, particularly in advance of expensive production decisions. Testing after a production decision provides a form of quality assurance and helps to identify areas requiring further correction.

Managing the operation of the field activities, internally and at the Headquarters level, in the current environment of weapon system acquisition is complex and difficult. Several issues have developed which were discussed in a meeting of the NAVAIR Civilian Management Board and the Middle Management Council at Charlottesville, Virginia, in November, 1977. Some of these issues are listed below.

1. There is a lack of stated definitive "corporate" (NAVAIRSYSCOM) strategy related to roles of the field activities in the overall Naval Aviation Program. The absence of declared top level strategy makes it difficult to develop a unified corporate plan for field activity management and has resulted in a lack of clarity and definition in roles. [1]

2. There has been a succession of piecemeal efforts at dealing with many problems relating to field activity management and utilization (e.g., decentralization, distribution of civilian personnel, workloading, etc.) which result in operating in a reactive, non-integrated, and non-systematic mode. [1]

3. There are several inconsistent pressures effecting the effective and efficient management of field activities in the area of contracting for services (e.g., OMB Circular A-76, OMB Circular A-109, Congressional language on FY-1978 contracting policies, MAT-08 policies on the in-house prosecution of R&D). [1]

4. Issues relating to the modernity of the facilities and equipment of the field activities have not been adequately treated; maintenance and modernization of the physical plants and buildings are not treated in a pro-active mode. [1]

5. Uncertain institutional funding existed due to shortages, priority changes and unanticipated costs. [1]

6. Unproductive redundancy appeared to exist. Fostering this in part, was an inadequate communication process between the Naval Air Systems Command (NAVAIR) Headquarters and affected field activities. [1]

7. Different goals and values existed as a result of many varying perceptions and influences as well as too many field activity bosses (structural, functional). [1]

8. Deviations from assigned functional roles occurred due in part to the ready availability of resources outside assigned mission/function areas. These resources and the related tasks were viewed as tending to change the basic reason for which the activity existed and for which it was created. [1]

9. NAVAIR does not have adequate knowledge and control of workload (functions and tasks) performed by field activities. For example:

a. Headquarters has limited knowledge of the total work being performed by our field activities.

b. The capabilities of our field activities are not adequately defined.

c. The Navy Lab Program causes problems of prioritization and responsiveness due to the separation of administrative and technical management.

d. Field activities have no clear and disciplined statement of roles, missions, responsibilities, and actual functions.

e. It is difficult to tie responsibility/authority/accountability to field activities for programs.

f. Activities are performing functions for organizations other than NAVAIR, which interferes with our priorities.

g. Classification of activities as currently designated is confusing, and in some cases inaccurate. Example: PMTC is not really just a T&E activity. [1]

10. Functions and facilities at some field activities (particularly RDT&E activities) duplicate and overlap each other. Because of duplication of capabilities, our field activities compete for the same kind of work. For example Tactical software systems are spread among several activities causing duplication and waste. To further compound the problem the Navy Lab Program tends to duplicate SYSCOM and other field efforts. [1]

11. Management policies, systems and procedures are inadequate.

a. The separation of administrative and technical management in different groups within NAVAIR causes problems of prioritization and responsiveness.

b. There is inadequate coordination within HQ of field workload, funding and manpower resources and tasks.

c. There is a critical imbalance between resources and tasks.

d. We have no system to adjust ceilings at field activities or between field activities and Headquarters.

e. We have no system to balance facility requirements and workload at field activities.

f. NAVAIR has an inadequate workload control system and no means to discipline that system.

g. NAVAIR field management policies are unclear.

h. Headquarters provides field activities with inadequate guidance.

i. Our employees have set up informal, inappropriate networks to allocate tasks to field activities. [1]

Some of the issues above are overlapping; however, it should be clear that a myriad of areas exist where change is required. Some of these are spoken of in the past tense and policies have changed since November 1977, which would affect the management of the field activities, but most of the issues still exist. In addition to the issues cited by the Civilian Management Board and the Middle Management Council there are concerns relative to the roles of the T&E field activities and their relationships with the Operational Test and Evaluation Force (OPTEVFOR), problems associated with the designation of most of the T&E field activities as components of the Major Range and Test Facilities Base, and problems in the application of the Uniform Funding Policy to T&E field activity operation.

B. OBJECTIVES

The objectives of this thesis are to identify areas in the management of the NAVAIR T&E field activities where improvements are needed and to recommend changes to improve the system. In the discussion that follows, these areas of concern will be treated separately followed by recommendations for improvement in each area. Recommendations are briefly restated in the Summary of Recommendations. For the reader familiar with the areas discussed, the recommendations are identified separately so that the detailed discussion may be avoided if desired.

C. METHODS

To accomplish the objectives stated above, it is first necessary to examine the environment in which NAVAIR and its

T&E field activities must operate. Policies and procedures that have been established for the management of the T&E field activities must be discussed. Finally, the devices which have been developed to aid in the management must be analyzed.

To determine the environment in which NAVAIR operates, specifically with regard to T&E and field activity operations, a study of various publications was conducted. This was followed by an examination of the instructions and directives of NAVAIR, the Naval Material Command, and DoD which establish the policies and procedures for NAVAIR management of its T&E field activities. From this, a list of questions was generated to determine how closely actual operations adhered to the established policies and procedures. Responses to these questions were requested from personnel at NAVAIR Headquarters and the T&E field activities. It is important to note that this was not a survey because the questions did not lend themselves to simple multiple choice answers and only the few people closely related to the problem were asked to respond. Also, the questions were not uniformly applicable to all the respondents. The results of these efforts were analyzed and interpreted to allow the objectives of the thesis to be satisfied.

D. BACKGROUND

Although problems still exist, defense systems acquisition has improved greatly in the 1970's. Prior to this time emphasis was on total package procurement; however, about 1970 it was realized, particularly by the Blue Ribbon Defense Panel, that this concept was not working. This was largely due to over

optimistic cost and performance estimates and a lack of competition throughout the acquisition process. Competition existed only at the paper study stage but design and price competition were nearly non-existent. As a result of the recommendations of the Blue Ribbon Defense Panel and other groups, policies began to be developed which stressed demonstrated performance as a requirement for continued development. This was further emphasized in 1976 when Office of Management and Budget Circular A-109 stressed that "each agency acquiring major systems should provide strong checks and balances by ensuring adequate system test and evaluation." [2]

The policies of A-109 are implemented in the Department of Defense (DOD) by DOD Directive 5000.1 supported by 5000.2 and 5000.3, which is devoted to test and evaluation. DODD 5000.1 states:

> Programs should be structured and resources allocated to ensure that the successful demonstration of program objectives is the pacing activity. [3]

Since demonstration of program objectives will require testing it is obvious that test and evaluation in the allocation of defense resources has increased greatly in importance. Further evidence of this is the participation in all Defense Systems Acquisition Review Councils (DSARC) of the Deputy Undersecretary of Defense for Research and Engineering (Test and Evaluation) whose responsibility it is to report to the DSARC and to the Secretary of Defense on test planning and results.

The increased importance of test and evaluation has not been without its problems. In its report the Blue Ribbon Defense

Panel recommended that each service establish an operational test and evaluation organization independent of both the system developers and the users. This has resulted in the establishment of the Operational Test and Evaluation Agency (OTEA) by the Army and of the Air Force Test and Evaluation Center (AFTEC) by the Air Force. The Navy already had its Operational Test and Evaluation Force (OPTEVFOR). All report directly to the office of chief of staff of their services, assuring them of independence from the developers and the users.

Over the past 10 years changes have been made in the acquisition process which reduce concurrency and program risk. The price has been additional management reviews, an increase in required test and evaluation, more use of competitive prototyping; all of which greatly increase acquisition cycle time and cost. Gansler has cited [4] the effect in that older systems such as the NIKE AJAX and the HAWK were fielded in 6 years and 5 years respectively; whereas, newer systems such as PATRIOT and AEGIS will take 19 and 18 years. This increase in acquisition cycle time, and the ensuing efforts to reduce it, will result in continual pressure to minimize the time spent on T&E and will directly impact the relationship between NAVAIR and its T&E field activities.

II. THE ENVIRONMENT OF NAVAIR AND ITS T&E FIELD ACTIVITIES

A. DEVELOPMENTAL VERSUS OPERATIONAL TEST AND EVALUATION

With the formation of the operational test organizations, test and evaluation is now formally divided into two distinct areas, Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E). DT&E is that which is conducted by or for the Developing Agency. Its first purpose is as an integral part of the iterative development process. Testing is conducted to evaluate equipment design candidates and the results are used to modify the design. This is followed by further testing and modification. This process continues until the initial paper design has been converted to fully developed hardware. The second important function of DT&E is to provide information on the progress of the system development. Performance is measured against a set of time-phased cost and performance goals and objectives to determine if the system costs and performance are at the levels they should be at a given point in the program. The results can be used as the basis for continuation or adjustment to the development program as necessary. A third function of DT&E is to help assure the project manager that he has a reasonable expectation of succeeding in the OT&E which follows.

Early OT&E also aids in the design process. To the extent that it is conducted on developmental hardware it helps to identify operational deficiencies to allow for correction during the development process. It also allows the comparison of

system performance with goals and objectives to determine program status. The difference between OT&E and DT&E lies in the orientation towards operational as opposed to technical factors and the emphasis on predicting future performance rather than evaluating current performance. The primary purpose of T&E then, is to provide answers to the questions, "What is the program status?" and "What is the likely outcome of the program?" [5]

An important program consideration is the amount of scarce resources to be allocated to the T&E process. Since both time and money are consumed by the T&E process without visibly advancing the program, the temptation is to minimize T&E. The danger lies in fielding a system which is not technically or operationally suitable.

The problem is compounded by the fact that it is often difficult to categorize tests as operational or developmental. Policies have been established which discourage joint testing unless it is dictated overwhelmingly by the costs of conducting separate developmental and operational tests. The tendency, therefore, is towards duplication of testing. Since the operational test agencies have no obligation to minimize overall program costs or maintain the program schedule, there might be a tendency to over test and to be over critical in their evaluation of the results to aggrandize their own position in the acquisition process. In the case of developmental testing the situation is similar but slightly better. The developmental testers work for the program manager and are dependent on him for their funding; therefore, he has discretion in the amount of

funds and time allocated to developmental testing. The dilemma of the program manager is to decide how much time and money to spend on developmental testing. The temptation is to over-emphasize operational testing since he has little discretion in this area, thereby minimizing his testing costs. The danger in that approach is that a system that has not had the benefit of sufficient test and modification of the iterative developmental testing process may be killed by the sometimes overzealous operational testers.

The culmination of OT&E is the OPEVAL which must be completed prior to approval for full scale production. This is preceded by a Certification of Readiness for OPEVAL which must be provided to ensure that the system to be tested is sufficiently representative of the system that will ultimately be deployed. Procedures for the Certification are provided by NAVAIRINST 3960.2A and include a number of actions required by the various NAVAIR components under the overall coordination of AIR-05. In theory the process is relatively straightforward. In practice it has been a significant problem area. Problems have arisen in determining that the systems proposed for OPEVAL are representative of production systems. Because the DT&E inevitably points up deficiencies which must be corrected in production, major differences exist between the full scale development models and the production items. Correction of these deficiencies and configuration differences prior to OPEVAL is often time consuming and costly. A further requirement for OPEVAL is that logistic support, manning, and training for the operation of the system

during OPEVAL be representative of fleet deployment. This is often not possible without considerable delay because development of support equipment, training of personnel, and availability of spares in the supply system lag significantly behind system development. Readiness for OPEVAL, therefore, becomes a process of negotiation rather than a check-off of the elements as intended. This is a delicate process for the program manager, since he must balance program schedule and cost constraints against the risks of failing to satisfy OPEVAL requirements for lack of some of the items mentioned above.

One of the primary objectives of OT&E, and particularly the OPEVAL, is that it be conducted under conditions representative of those to be expected in field operations. The reasons for this are obvious; however, in practice it is often difficult to achieve for the following reasons:

1. Inadequate threat environment.

The operating conditions include the enemy weapons systems and their operational doctrine against which the system under test must operate. Simulations of these systems do exist, adequate for developmental testing; however, large scale networks adequate to simulate the complete operational environment are extremely expensive and do not exist.

2. Insufficient numbers of test systems.

For the same reasons it is desirable to operate against a large scale threat environment, it is also desirable to operate the system under test in conjunction with all the other systems it is expected to live with and in the manner it is expected to be operated. This is also extremely expensive and not generally done except for individual compatability tests.

3. Inadequate training of personnel.

The objective is to conduct the test utilizing personnel that will operate the system in the field. Since schools have usually not been established prior to a production decision,

adequately trained personnel do not exist. The systems must be maintained by persons of higher skill level than the operators, usually contractor personnel.

4. System immaturity.

In today's environment emphasis is placed on reliability. The systems tested; however, have been built by different techniques than will be used in full scale production. They will suffer from "infant mortality" problems which the mature system will not have. Also, with the limited number of systems and operating hours available, a statistically valid estimate of reliability usually cannot be determined.

5. Lack of production configured support equipment and publications.

This is related to the maintenance personnel problem. The support equipment designs and the publications cannot be determined until the production configuration of the prime equipment is fairly well defined. Therefore, they are usually not ready for testing in time and modified general purpose test equipment must be used.

For obvious reasons it is desirable that objectivity and independence be maximized in the test program. This is particularly true of the OT&E. Since the DT&E is conducted under the direction of the Developing Agency, biases are almost certain to be present. Evaluation of the results is often difficult under these conditions. In the OT&E the danger exists that "nice to have" features will be interpreted as necessary since OT&E is generally conducted without regard to system cost. Another less likely possibility is to minimize deficiencies in seeking early deployment. Factors which alleviate this problem are the checks and balances between the DT&E and OT&E.

Previously, emphasis on OT&E was at program stages just prior to the production decision because of the large funding commitment at that point. Lately it has been realized that emphasis on earlier OT&E is needed for four reasons.

1. In the early stages of system concept formulation it is necessary to know that the concepts are tactically sound.

2. To have any impact on system development OT&E must be conducted earlier than just prior to the production decision since by then most of the research and development resources have been expended.

3. Cost and schedule impact can be minimized by early detection and correction of operational deficiencies.

4. Commitment of funds for limited production prior to the major production decision requires earlier availability of test results. [5]

The role of OPTEVFOR is defined in Reference 6. It directs OPTEVFOR involvement in all phases of the acquisition cycle and provides for close coordination between OPTEVFOR and the developing agency. Specifically, during the program validation phase OPTEVFOR will:

> Establish liaison with the developing agency for providing operational planning assistance in determining the testing required for the current project, anticipated future testing requirements, and defining critical operational issues. [6]
>
> Participate in test planning and independently observe selected tests and demonstrations conducted by the developing agency, and examine test results. ---submit an assessment of this initial test and evaluation to the Chief of Naval Operations, and the developing agency, including comments and recommendations concerning future operational suitability of the system, progress to date, and operational issues requiring further examination. [6]

During the full scale engineering development phase OPTEVFOR will:

> Independently observe selected developmental tests and view the data from an operational viewpoint, to verify readiness for operational testing. [6]

From this it can be seen that much of the work of the T&E field activities will be evaluated by OPTEVFOR; therefore, it is necessary to be continually aware of their opinions and priorities.

Test programs may have to be adjusted to help satisfy OPTEVFOR requirements. Since ultimately responsibility for responding to criticisms of the test programs will fall to the program manager and his team, they should closely monitor the planning, conduct, and results of the tests conducted by the field activities. This will be discussed further in a later section.

B. THE MAJOR RANGE AND TEST FACILITY BASE

In 1970 the Blue Ribbon Defense Panel recognized the need for better test and evaluation management and recommended a major DOD-wide study of test and evaluation facilities. The study was completed in August 1971 and resulted in the formation of the Major Range and Test Facility Base (MRTFB), which consisted of 26 T&E activities of the Army, Navy, and Air Force with a combined annual budget in excess of $1 billion. [7] The activities currently comprising the MRTFB are listed in Appendix A.

Policies for the use, management and operation of MRTFB activities are established in Reference 8. The mission of the MRTFB is to:

> Provide a broad range and test support base to all DOD Components responsible for development, test, evaluation and operation, as applicable, of material and weapon systems, and to other Federal Government Agencies having need for that support. [8]

Overall responsibility within DOD is assigned to the Deputy Undersecretary of Defense for Research and Engineering, Test and Evaluation (DD(T&E)). Authorities and responsibilities for DD(T&E), Secretaries of the military departments, Facility commanders, and Facility users are established. Reference 9

assigns responsibility for management of Navy portions of the MRTFB to the NAVAIR Assistant Commander for Test and Evaluation (AIR-06).

C. THE UNIFORM FUNDING POLICY

Prior to fiscal year 1975 no single policy existed for assessing the costs of operation of test facilities. Some activities were funded institutionally. That is, money for their operations was provided from a separate appropriation independent of any program utilizing the test facilities. A second method, industrial funding, required that facility users pay all the costs, including overhead, of operating a facility. A third policy required that users pay only the direct costs associated with their tests, with the remainder of costs to be paid from institutional funds. There were also combinations of these methods which sometimes varied depending on who was the user.

The study completed in August 1971, noted that because of the differences in funding policy, test site selection was often based on cost to the user instead of test site capabilities. As a result, in January 1973, the Deputy Secretary of Defense directed the establishment of a Uniform Funding Policy at 18 of the 26 MRTFB activities, with users paying direct costs and indirect costs being paid from institutional funds. The policy was incorporated into DODD 3200.11 and went into effect in fiscal year 1975. The Navy activities to which the Uniform Funding Policy applies are the Naval Air Propulsion Center,

Naval Air Test Center, Naval Weapons Center, Pacific Missile Test Center, and the Atlantic Undersea Test and Evaluation Center.

DODD 3200.11 states that the intent of the Uniform Funding Policy as follows:

1. Provide for interservice compatability, efficiency and equity, without influencing technical decisions on testing, nor inhibiting legitimate and valid testing.

2. Reimbursement for use of the ranges and test facilities will be required.

3. All the costs of the range or test facilities which are not reimbursed by users will be funded by the management agency of the particular range or facility.

4. All DOD Components and other Federal Government agencies --- will reimburse the ranges and test facilities for direct costs, --- excluding military labor.

5. Direct Costs. Those expenses which can be immediately and directly identified with a specific User program (usually documented by a job order). These costs include direct labor, direct material, minor construction, special purpose equipment and other like costs. They include all such expenses that can with reasonable effort be identified consistently and uniformly to specific User programs. The direct cost for labor includes a load factor covering items such as leave and contributions to the retirement program. [8]

In concept the Uniform Funding Policy is relatively simple. The implementation, however, has led to problems. Historically it has been difficult to predict the workload of test activities with any accuracy, even for the following fiscal year. Without an accurate estimate of direct funding it is impossible to accurately budget the institutional funds required. Expenditures for civilian personnel are relatively fixed and priority for use of institutional funds must be in this area. The impact is on capital expenditures for new test capabilities. An orderly program is difficult to establish because funds must be held in

escrow against the possible shortfall of direct funding. This will be discussed in a later section.

Problems also result for the users of the test facilities because of program delays. If the user plans a test for a given fiscal year, allocates the money to the test activity, and because of system problems the test is delayed beyond the end of the fiscal year, the program manager finds himself at the end of the fiscal year with the allocated test funds he can no longer use and he still must provide test funding out of the following year's budget.

Increases in administrative workload as a result of the implementation of the Uniform Funding Policy have been documented. [9] These increases were due largely to the increased budgeting requirements and the need for more detailed estimates and reports. The increased workload has largely been absorbed with existing, already limited, personnel resources. The increased workload was not limited to comptroller personnel, but also affected technical personnel and detracted from their attention to their technical duties.

D. THE BUDGET PROCESS

1. Discussion

The process by which NAVAIR must prepare budgets for T&E field activity operations is complicated by the fact that they are funded from multiple appropriations. Institutional funding is provided from the Category V, Management and Support, funds. User funding may come from Research, Development, Test

and Evaluation, Navy (RDT&EN) funds or from one of the procurement accounts, depending on the actual project being prosecuted. The problem, then, becomes one of balancing the amounts budgeted from each appropriation to avoid violation of Section 3678 of the U.S. Code which states that funds must only be spent for the purpose for which they are appropriated. Reference 10 states:

> Apportionment of funds includes an amount for unfunded reimbursements expected to be earned during the fiscal year. The allocation of these anticipated reimbursements must not exceed the expected year-end gross unfunded accounts receivable. --- Work supported by reimbursable orders is to be financed within the subhead under which the order is accepted.

Budget estimates for Navy procurement appropriations are submitted by NAVAIR to NAVMAT where they are consolidated and submitted to the Office of Budget and Reports/Fiscal Management Division which is responsible for formulation of the total Navy budget. Budget estimates for the RDT&EN appropriation are submitted by NAVAIR, usually by a different office than for the procurement appropriations, to the Deputy Chief of Naval Material for Development where they are coordinated and submitted to the Office of Naval Research for consolidation and ultimate submission to the Office of Budget and Reports/Fiscal Management Division.

The separation of budget responsibilities makes consolidation of the various appropriations budgets into a single budget estimate for T&E field activity operations difficult, if not impossible. Paragraph 7 of Reference 11 requires that NAVAIR users of the T&E field activities submit written fiscal planning information to AIR-6103, the T&E Field Activity Support Branch

of AIR-06. This would help alleviate the problem; however, responses to questions do not indicate that the policy is being followed.

Another problem in the budgeting process is the time limitation on the availability of funds. Congress enacts RDT&EN appropriations for two years but Navy policy is "to program RDT&E effort on an annual incremental funding basis as opposed to the fully funded basis on which procurement programs are developed." [11] The Navy Comptroller Manual states:

> Although the RDT&EN appropriation is legally available for obligation for 2 fiscal years, the objective is to use these funds during the initial year of availability. The budget should be formulated to reflect this funding objective. --- However, if the award of a planned new contract, or the issuance of a reimbursable order, is not possible until the second year of availability, --- the preferred action is to restructure the funding plan to utilize the original funding in the first year of availability for urgent deficiencies elsewhere in the program and to use the following year's appropriation to fund new contracts or orders. [11]

This policy exacerbates the problem mentioned earlier in reference to the Uniform Funding Policy. Program managers need not lose their funds due to program slippages if the money is legally available for another year.

2. Recommendations

The policy requiring users of the T&E field activities to submit written fiscal planning information to AIR-6103, if followed, would improve the ability to prepare accurate consolidated budget estimates for T&E field activity operations. Adherence to this policy should be further emphasized as it would help give NAVAIR managers a better grasp of the overall costs of T&E in the acquisition process.

The policy which requires obligation of all of the RDT&EN funds of a fiscal year appropriation within the first year of availability should be reexamined. There may be more advantages than disadvantages in allowing the money to be obligated throughout the full two years it is available.

E. MAJOR AND LESS-THAN-MAJOR SYSTEM ACQUISITIONS

Policies and procedures for major systems acquisitions have been well established and documented at length. This area has received considerable attention because of the large sums of money involved. For less-than-major systems the sum involved in a single acquisition is smaller and, therefore, of less importance. Nevertheless, when all of the less-than-major systems acquisitions are considered in aggregate the amount involved is not trivial. Unfortunately, for these systems the procedures have not been as well established, particularly with regard to establishing T&E requirements and planning to satisfy those requirements.

One reason for the problem is the volatility of the acquisition process. DOD Directive 5000.1, the document that prescribes policies and procedures for major system acquisition, has been rewritten twice within the last five years and is currently being rewritten again. Below the level of DODD 5000.1 there are numerous instructions and directives which implement the broad policy guidelines. When the major policy document changes as rapidly as it has, these subordinate documents almost never catch up. This results in directives which are often in conflict with each other and it is often impossible to be in compliance

with all the current instructions. Also, programs are generally of such duration that they outlast changes in policy. This is particularly true when it is realized that many programs consist of derivatives of existing programs and, therefore, do not fit into the current phases of the acquisition process.

Policies and procedures for test and evaluation established by higher authority are implemented within NAVAIR by NAVAIRINST 3960.2A which states:

The provisions of this instruction apply to the following:

All acquisition projects including those classified as Acquisition Categories (ACAT) I, II, III, and IV projects.

Projects involving significant modifications to existing systems and equipment whose Research, Development, Test and Evaluation (RDT&E) and Procurement Appropriation Funding Requirements and other criteria would qualify them as ACAT I, II, III, or IV projects.

Individual subsystems, equipment or components developed as a part of a major system such as a radar equipment, a computer, acoustic processor, etc. which are susceptible to separate T&E and which are required by competent authority to be the subject of a separate Test and Evaluation Master Plan (TEMP) or Test and Evaluation Plan (TEP).

"Off-the-shelf" commercial systems and equipments or significant modifications thereof when the program decision authority approves this alternative in lieu of new development to meet an established mission need.

Individual subsystems, equipment or components which are not developed as a part of a major weapon system and which are susceptible to separate T&E and are required by competent authority to be the subject of a separate TEMP to TEP. [12]

Definitions of the Acquisition Categories are given in Appendix B. The TEMP and TEP will be discussed in a later section. From the statement above and the definition of the Acquisition Categories it can be seen that it is unlikely that the provisions of a formal T&E program would not apply to most

acquisitions. NAVAIRINST 3960.2A is relatively new and it will take some time to determine if the policies are followed for all acquisition projects; however, if it is applied, it will go a long way towards improving the budgeting of T&E field activity operations. This is especially important in today's environment of conversions in lieu of procurement and service life extension programs.

F. THE TEST AND EVALUATION MASTER PLAN

To help make the T&E of major systems an orderly process, the program manager is required by OPNAVINST 3960.10 to submit a Test and Evaluation Master Plan (TEMP). The TEMP is the controlling T&E planning document prepared by NAVAIR in collaboration with NAVMAT, OPTEVFOR, and the Board of Inspection and Survey, when applicable, and is approved by OPNAV. 12 It serves as a contract between the Developing Agency and the user for the T&E to be conducted throughout the program. Included are information on program goals and milestones, system parameters, performance and cost thresholds, and test resource requirements. The test schedule and the level of testing to be conducted are keyed to the major project milestones. Separate sections are provided for DT&E and OT&E. The DT&E section is prepared by NAVAIR and the OT&E section is prepared by OPTEVFOR. Emphasis is placed on resolving issues prior to submittal to OPNAV; however, sometimes this is not possible and the TEMP must be submitted with open issues for OPNAV resolution.

The TEP is the controlling T&E planning document for ACAT IV projects and is approved by the Deputy Commander, NAVAIR. It is prepared within NAVAIR and contains the same type of planning information contained in the TEMP for larger programs.

Prior to seeking a Milestone I decision the program manager is required to have the T&E plan prepared. For major programs it is required as an annex to the Decision Coordinating Paper, the document used as the basis for the Defense Systems Acquisition Review Council recommendation and the Secretary of Defense decision. The initial version is to avoid specifics of the test program and concentrate on the broad test plan and the critical tests required for satisfying major project objectives. Also, it is to identify the total resource needs for the test program in terms of manpower, material, facilities and funding. The plan is to be revised during the life cycle to add details as they become known. The revision prior to the Milestone II decision should contain sufficient test program specifics to ensure that the planned testing is sufficient to demonstrate program requirements.

Within NAVAIR Headquarters AIR-05, the Systems and Engineering Group, is responsible for the technical content of the T&E plan and technical direction of the T&E program. AIR-06 is responsible for integrating the various elements, coordinating the staff review of documents, coordinating with the T&E field activities and arranging for the required AIR-06 managed resources.

The use of T&E planning documents has the potential to greatly improve the forecasting of user requirements and funding for the

T&E field activities and to aid in overall forecasting of field activity workload and requirement for institutional funding. The effectiveness and efficiency of the TEMP process has not been optimized, however, because it has not been sufficiently integrated with the other information systems available to provide a composite picture for all projects and all field activities.

III. THE RELATIONSHIP OF THE ELEMENTS OF T&E FIELD ACTIVITY CONTROL

A. APPLICABLE DIRECTIVES AND INSTRUCTIONS

A list of most of the major directives and instructions applicable to the structure and management of NAVAIR T&E programs and the operation of the T&E field activities is included in Appendix C.

B. DIVISIONS OF RESPONSIBILITY

1. Discussion

Policies and procedures for planning and conducting NAVAIR T&E programs are contained in NAVAIR Instruction 3960.2A. Overall project responsibility is delegated to the program managers (PMA) for the individual programs; however, the primary functional responsibilities for T&E are delegated to AIR-06 and AIR-05, the Systems and Engineering Group. Figures 1 and 2 show the relationship of NAVAIR with external organizations and the relationship of the various elements within NAVAIR. Quoting from 3960.2A:

> The MATACQ Group (AIR-05) is line responsible for the performance of the full set of acquisition functions within the matrix project management concept except for those specific program areas assigned to other Headquarters Groups (e.g., Target Systems). Accordingly, Air-05 is responsible for coordination of the implementation of the comprehensive T&E programs and the planning, execution, and technical evaluation of the DT&E and PAT&E (except for BIS Acceptance Trials) elements thereof. The T&E Group (AIR-06) is the designated single point of contact for NAVAIR T&E program matters and as such is line responsible for the interpretation and implementation of all T&E policies and procedures. AIR-06 functions to develop

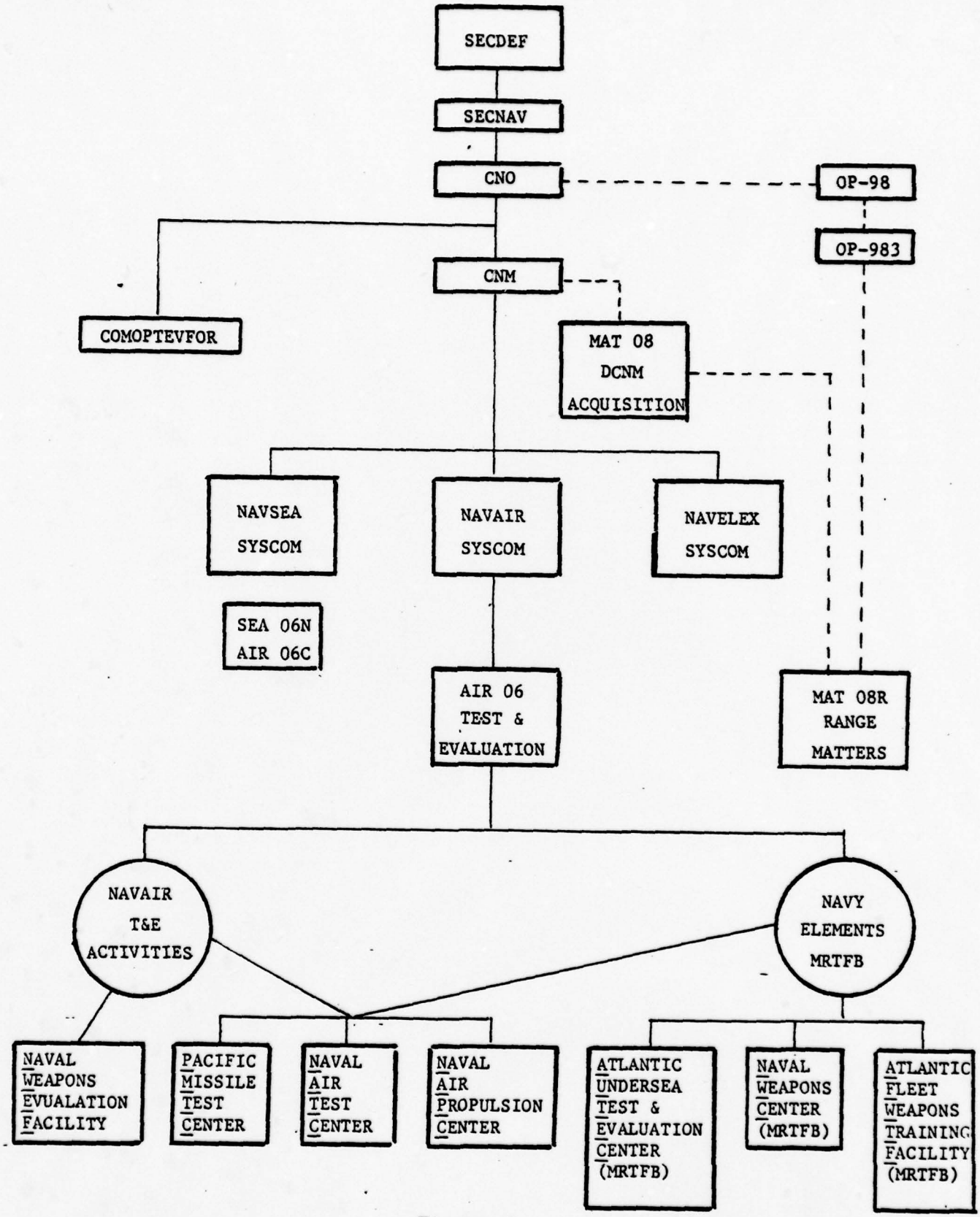


Figure 1

External Organizational Relationships

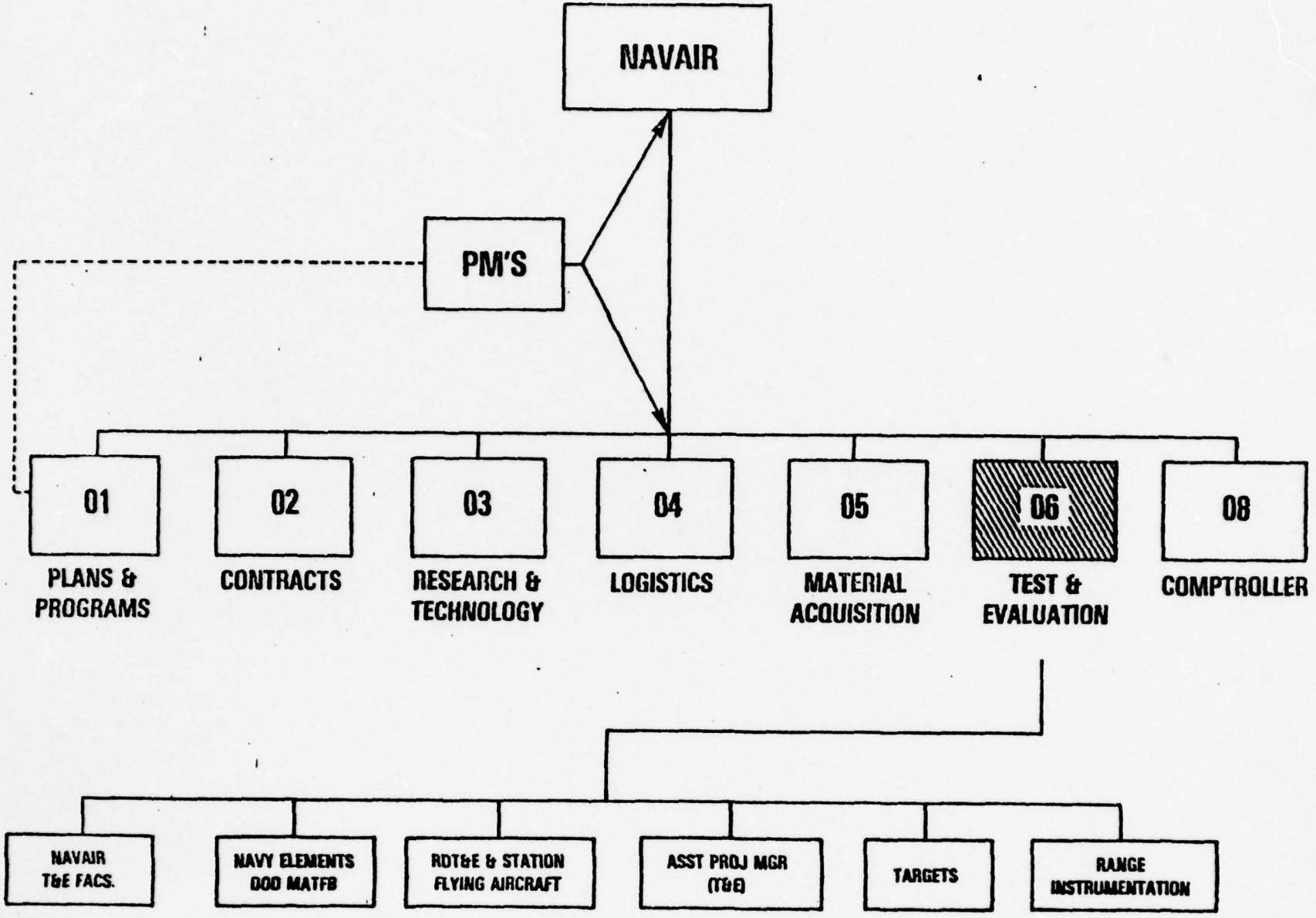


Figure 2

Internal Organizational Relationships

and promulgate appropriate NAVAIR policies and procedures to provide T&E guidance and assistance to all organizational units within NAVAIR. AIR-06 also provides NAVAIR and Navy-wide management of specifically assigned NAVAIR T&E field activities and Navy elements of the DOD Major Range and Test Facility Base (MRTFB).

(The title of AIR-05 was changed from Material Acquisition Group to Systems and Engineering Group on 2 April 1979.)

Significant responsibilities of AIR-05 and AIR-06 in the control of field activity operations, as specified in NAVAIR Instruction 3960.2A are listed below.

For AIR-05:

In collaboration with AIR-06---participate in the surveys of candidate T&E field activities---to assess their individual availability, capability, and applicability to accomplish the planned T&E programs---.

Ensure---coordination with AIR-06 on matters of T&E policy, T&E resource requirements, selection of supporting T&E field activities and contractors and funding estimates for support of the DT&E and PAT&E programs.

Prepare and coordinate with AIR-06, the AIRTASK and contract work assignments for NAVAIR T&E field activities and contractors.

For AIR-06:

Provide executive management for all of the NAVAIR T&E field activities.

Maintain working interfaces with all available T&E activities including Navy, Army, and Air Force elements of the DOD MRTFB, as well as the Navy laboratories and appropriate industrial concerns, in order to establish an awareness and understanding of the T&E resources available for selection to support NAVAIR T&E programs.

Conduct surveys for the selection of field activity sites for the conduct of specific acquisition project T&E programs---.

Approve test site selections---.

Render T&E program support and assistance to PMA's---in the following:

(d) Expediting T&E reports from the T&E field activities.

Provide T&E representation to the NAVAIR Change Control Boards to---enable planning for T&E resource support for the T&E of the modification programs at the AIR-06 managed field activities.

Responsibilities of the T&E field activities are as follows:

Provide assistance to AIR-05 and to OPTEVFOR and BIS when appropriate in structuring the T&E programs for acquisition projects and in planning the elements thereof.

Provide budgetary estimates for the accomplishment of T&E workload scheduled for their respective activities.

Identify T&E resources required to support approved T&E plans (TEMP's and TEP's).

Provide representatives for site survey teams when requested by NAVAIRHQ (AIR-06).

Perform T&E directed by NAVAIR AIRTASK/Work Unit Assignments.

Provide test reports on a timely basis to support the project decision making process at milestone points identified in the approved test plan.

Advise NAVAIR (AIR-05/06) promptly of actual or threatened slippages in the completion of work assignments which may impact the scheduled key project milestones shown in the approved test plan and provide recommendations for dealing with the causes thereof.

Advise NAVAIR (AIR-05/06) promptly when test results indicate major deficiencies which will require system or equipment redesign to enable meeting the T&E program objectives stated in the applicable TEMP or TEP or which are likely to result in the breaching of performance, schedule and funding thresholds stated in the applicable DCP/NDCP.

Responsibility for introducing the controlling workload at Navy MRTFB activities (the T&E field activities plus portions of other Naval Material Command activities) is assigned to AIR-06 by NAVMAT Instruction 3960.10. As such, they are required to perform workload management and be responsive to the technical

guidance of workload sponsors (primarily AIR-05). Workload sponsors are required to provide timely notification of workload assignments to activity commanders to ensure proper support. The responsibilities of various organizations and the flow of documentation required are shown in Figures 3 and 4. [11] Figure 3 applies to workload sponsored by NAVAIR; whereas, Figure 4 applies to workload sponsored by organizations external to NAVAIR. It should be noted that the project estimate is broken into direct and institutional funds. To provide for advanced planning the instruction requires that fiscal planning information for the next five fiscal years be provided to AIR-06 by 1 May of each year. The MRTFB activities are to submit workload plans for all work assigned. As was mentioned in the section on the Uniform Funding Policy, it is difficult to forecast the work of a T&E activity even one year in advance. Forecasting for five years is extremely imprecise. This is particularly true because the forecasting is being done by the T&E activity itself rather than the users. Even knowing what programs are scheduled for the next five years, it is often not possible to predict requirements the users will generate for T&E support.

In Figures 3 and 4, the portion of the project estimates submitted by the field activities for institutional funds are used primarily for improving facilities and equipment. Unfortunately, no formalized provisions exist for tying these elements together into a coordinated plan for updating the facilities of the field activities separately or collectively. An Improvement

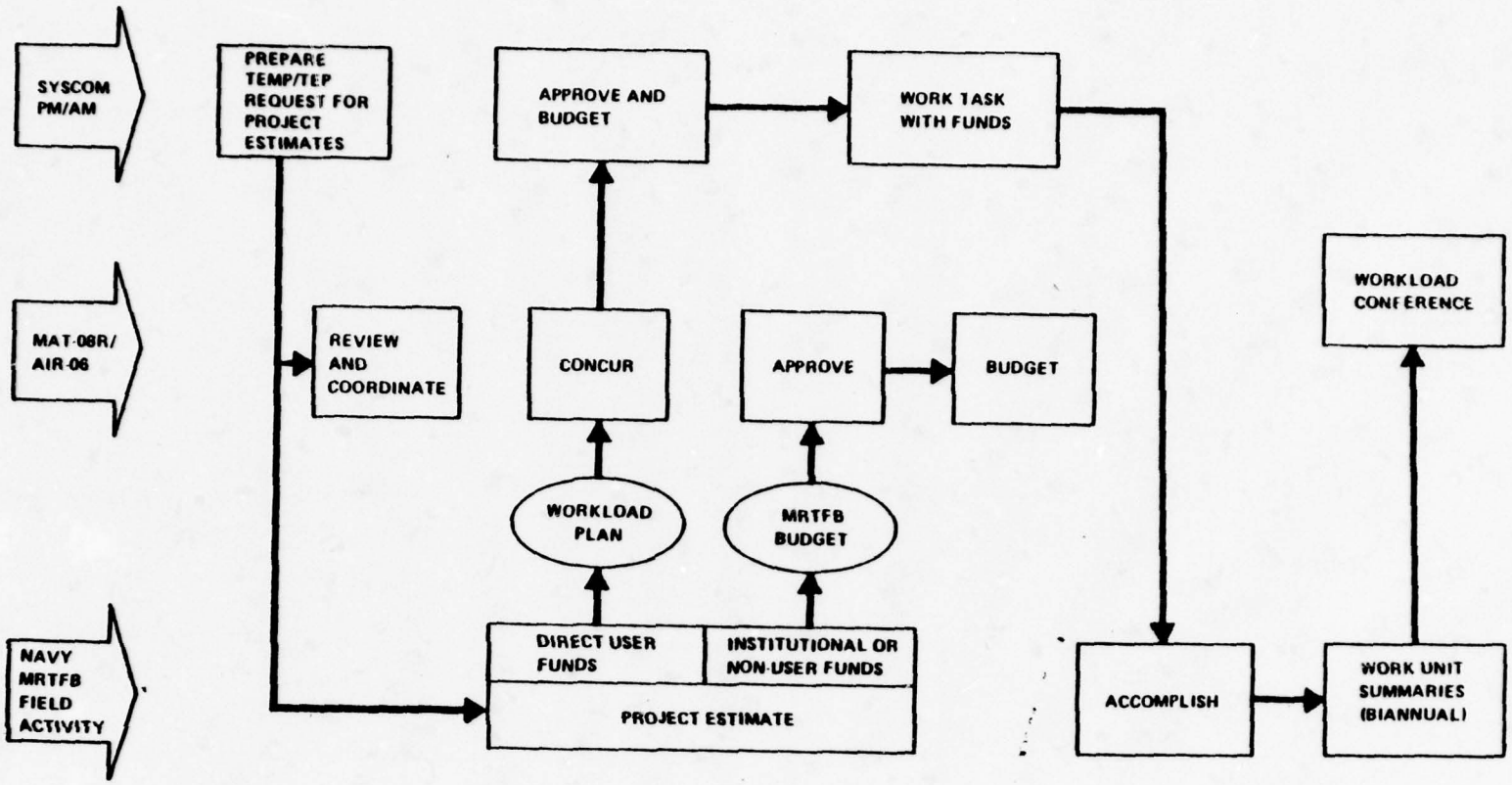


Figure 3

Workload Flow Chart

Systems Command Test & Evaluation Long Range Workload

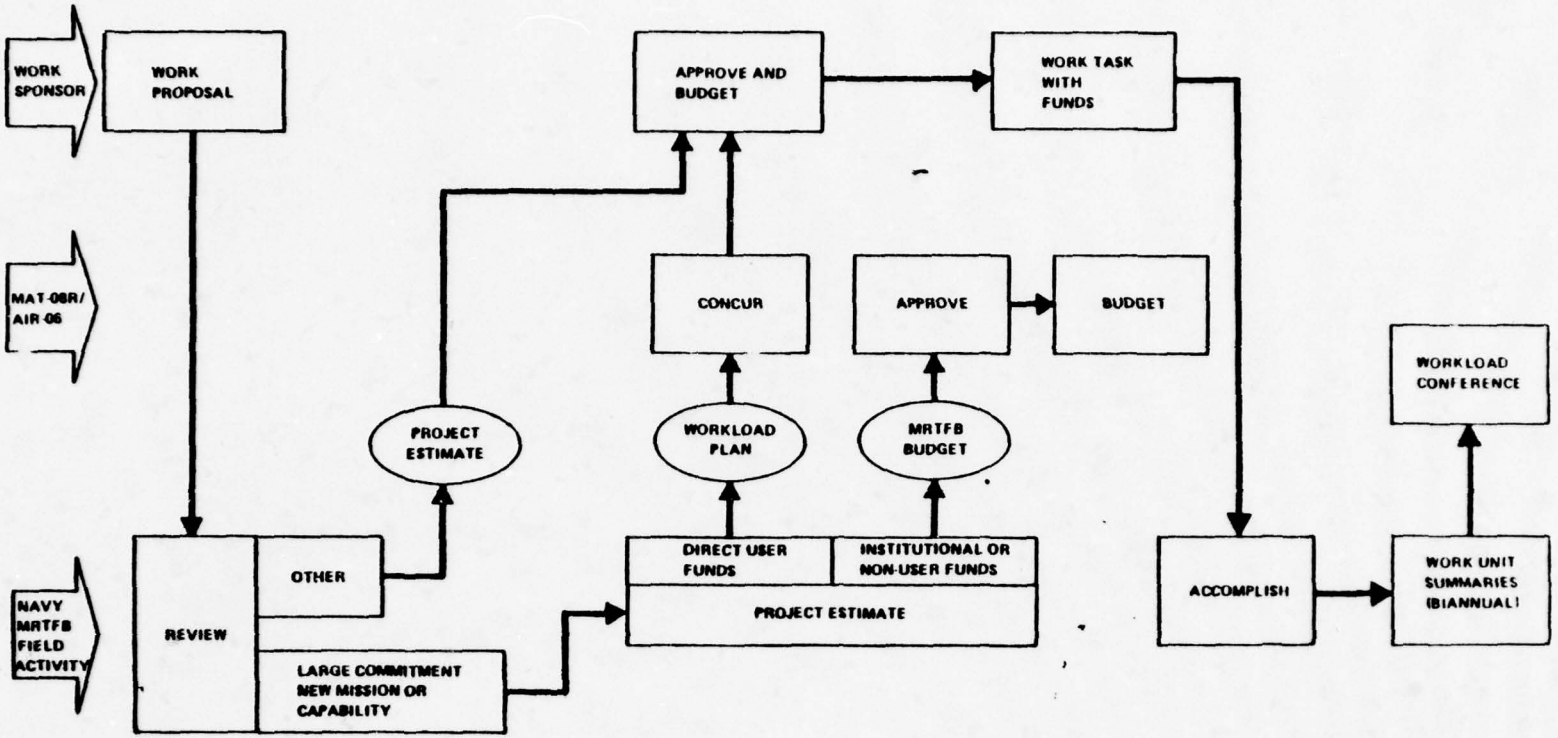


Figure 4

Workload Flow Chart

All Other Workload

and Modernization (I&M) program has been established by AIR-06 in an attempt to improve this situation. Various efforts such as Project 20 have required the field activities to project their facilities and equipment improvement needs so that planning for these requirements can be done in a centralized, logical manner. Provisions for incorporating into these projections requirements for general facilities improvements that are not directly tied to projects have been inadequate. Funding in this area has been very uncertain, probably due to the fact that insufficient justifying information is available to secure the funds. Institutional funds for this purpose are usually what is left after all other needs have been satisfied and are inevitably insufficient.

2. Recommendations

To improve the ability to plan and budget the workload of the field activities, closer dialogue between the activities and the users is recommended. The T&E field activities should be considered to be and treated as a part of the NAVAIR team, not subject to the arm's-length relationship required with contractors.

To provide for required updating of facilities at the field activities, efforts should continue for a strong I&M program. This should include both direct, project related, and general requirements.

C. THE FIELD ACTIVITIES

Management guidance at the field activities is primarily concerned with the preparation of aggregate information on

operating budgets and workload. Another area of concern is assignment of personnel ceilings. Project work is nominally assigned to a single point of contact at the field activity. In actuality, however, the primary project interface is between the operating personnel at the field activity and the "users" at Headquarters. Because of this, the operating people are serving two different, and often conflicting, masters. The degree to which this is a problem probably varies between field activities for a variety of reasons, but particularly the size of the organization and the degree to which management and operating people are separated. A result of the disconnect between the management and operating personnel is that while management is seeking additional resources to perform existing work, operating personnel are often seeking additional work for existing resources.

D. PRIORITY SYSTEMS

1. Discussion

Currently, there is no overall priority system for NAVAIR. Field activities establish their own priorities based on informal guidance from various sources and their own perceptions of what is most important. This has the advantage of allowing them the flexibility to respond to situations based on first-hand knowledge of the situation. Efficient scheduling is allowed without micromanagement from Headquarters. On the other hand, under this system, priorities tend to be more dependent on the dollar value of the test program than on its overall

urgency and value to fleet operations and National defense. Also, local establishment of priorities may tend to ignore Life Cycle considerations and the requirement to complete certain testing prior to a scheduled Milestone Decision.

2. Recommendation

To date, the absence of an overall priority system has not resulted in any major problems. This is primarily because no major program has been delayed significantly due to lack of T&E resources. As the requirements for T&E programs become more formalized and the length and complexity increase this situation can be expected to change. Reductions in resources will exacerbate the situation and delays will be incurred. When this happens it will be imperative that a single priority system is able to establish the order of precedence of the various programs. The problem has been recognized and AIR-610 has been working with AIR-620 and AIR-59 to develop a priority management process. These efforts should continue until a workable system has been devised and implemented.

E. PERSONNEL REDUCTIONS

Because of policy changes in recent years a continuing pressure for reduced personnel at Headquarters and at the field activities has developed. The Office of Management and Budget in Circular A-76 stressed the contracting out of work to the private sector when practical. Congressional pressures to reduce the average grade level of civilian employees has been increasing in recent years. In response to these pressures the level of review for filling of jobs, particularly at the middle and upper

management levels, has been raised. Quotas on the filling of vacancies have been established and several positions have been downgraded. The result has been that the number of positions occupied has decreased much more rapidly than ceiling point reductions would indicate. Furthermore, all of this is occurring in the face of increasing complexity of systems being acquired and T&E requirements for these systems. Since little relief of the situation can be expected in the near future, the only hope for solution is to use the remaining resources more efficiently through even greater centralization of controls to Headquarters.

IV. DOCUMENTATION AND INFORMATION SYSTEMS

A. AIRTASKS AND WORK UNIT ASSIGNMENTS

1. Discussion

Project work is currently assigned to the field activity by Airtask. The policy and procedures for AIRTASKS are established by NAVAIRINST 3900.8A. [13] The AIRTASK, generally no more than two pages in length, represents an outline of the work to be performed. It includes background information, detailed requirements, source and disposition of project equipment and aircraft, reports required, and a funding estimate. The background information discusses events leading to the project and estab the need. The detailed requirements provide a list of the specific functions to be performed. These are usually very broad and provide maximum flexibility for interpretation as the project progresses and the perception of the details of the requirements change. The source and disposition of project equipment and aircraft usually only states that existing assets should be used, that they will be provided, or that requirements should be coordinated with the NAVAIRSYSCOM Aircraft Custodian. The reports required may vary greatly but usually include, as a minimum, a final report and recently, a detailed project plan to be submitted early in the prosecution of the project. The funding estimate states the amount of money to be provided for the project by separate correspondence, usually a work request, from Comptroller to Comptroller.

Work Unit Assignments are subordinate elements of an AIRTASK for the performance of a specific task within the scope of the previously assigned AIRTASK. The same form (NAVAIR 3930/1) is used for both AIRTASKS and Work Unit Assignments.

To help ensure efficient utilization of resources NAVAIRINST 3900.8A requires that all assignments involving T&E be coordinated with AIR-620, the T&E Projects Division of AIR-06. This is an important step in centralizing the control of field activity operations and promoting optimum use of their resources. On the other hand, it reduces the authority of the technical managers to deal directly with the field activities for work to be performed. For this reason the policy is followed reluctantly, if at all.

The AIRTASK/Work Unit Assignment includes a section for detailed requirements. Quite often this section receives inadequate attention so that there is not a clear understanding between the originator and field activity personnel of what is required. This may be alleviated somewhat by referencing a work unit plan which has been generated by the field activity. This is satisfactory only if the person directing the work has read and understood the work unit plan and concurs in what it proposes. This is not always the case. Another method which may be used to promote understanding of the requirements is to require the field activity to submit a detailed program plan. Unfortunately, the instruction does not stress that this should be an iterative process, continuing until an agreement has been reached. All of this may be time consuming and may be intolerable on urgent projects.

2. Recommendations

To avoid misunderstanding and to help preclude completion of the test program without satisfying the objectives, discussions should be held and proposed AIRTASKS/WORK UNITS should be reviewed prior to formal promulgation of the AIRTASK/WORK UNIT. This procedure should also be followed for detailed project plans when they are required. The discussions should include the user, the field activity, and AIR-620 representatives.

B. TEST PLANS

1. Discussion

Currently there is no standard method or format for test plans common to all field activities, nor is there a requirement to submit the test plan for review. This allows the field activities maximum latitude to establish procedures. This is particularly important in the area of flight safety where each activity assumes accident reporting responsibility and, therefore, must have the authority to establish their own safety procedures.

2. Recommendations

In spite of the need for maximum flexibility at the field activities, there is also a need for closer control by project personnel at headquarters. Field activity personnel are not always aware of important considerations which must be emphasized in the test program. To help ease this problem a base line format for test plans should be established which the field activities could modify to suit their own individual requirements. Test plans should be required by the AIRTASK/Work Unit Assignment to

be submitted for review. However, this provision must be used carefully to avoid loss of field activity flexibility and independence and to maintain an objective test program.

C. REPORTING THE RESULTS OF T&E

1. Discussion

For T&E to be of any value the results must be reported to the decision makers in a timely manner. Also, they must be reported in such a way that they may be easily and rapidly understood by someone who does not have a great deal of time to read lengthy reports. In the case of discrepant performance, the sooner the discrepancy is reported and action is taken to correct it, the less costly the correction is likely to be. The further the development or production process proceeds before a discrepancy is discovered, the more that must be corrected once it is discovered.

No standard procedures have been established for reporting the results of T&E by the various field activities. Reports have been late and of little value because of the lateness. Information that has been used has been passed through briefings, letters, and messages. The report has only served as a record of what has been accomplished and is used very little as the basis for decisions. Under this system, only major discrepancies are reported in a timely manner. Minor problems, which taken together may have major impact, are generally not reported until the test program is complete when, in some cases, it may be too late to correct them.

Procedures have not been developed at Headquarters to process incoming reports and make them readily available to anyone who needs them. They go to the code sponsoring the work and other codes designated by the field activity originating the report, but not necessarily to all offices requiring knowledge of the test results. No system exists that can be accessed by anyone needing the information to tell if a report has been submitted on a project, and, if so, how to locate the report.

Field activity emphasis has been on current testing with reports being written and reviewed as the schedule allows. This is as much due to the reluctance of personnel to do the writing as it is due to any established policies. To overcome this reluctance, methods could be devised to make the writing simpler and shorter. The use of deficiency reports is a good example of this. The deficiency reports are brief enough so that they can be easily generated with minimum detail and be modified as more is learned by submitting additional reports. They are submitted as problems are noted, not at the end of the test program. The use of deficiency reports, however, greatly increases the number of reports which must be tracked, including the actions taken as a result of the reports. This increases the requirement for a system to record all reports so that they may be accessed rapidly.

2. Recommendations

To improve the usefulness of T&E reports, standard procedures should be established for their submission. This should include a standard report format and should be based on

a system similar to that currently used for deficiency reports. Reporting requirements must be kept brief to allow timeliness. As a part of an overall T&E information system, procedures should be established to track all reports for easy access and to track actions taken as a result of the reports.

D. WORK UNIT SUMMARIES AND FIELD ACTIVITY PLANS

Navy MRTFB activities are required by Reference 11 to submit Work Unit Summaries for all current and expected projects to AIR-06 for use in planning and preparing the MRTFB budget and in the management of direct workload at the MRTFB activities. Included are appropriation and project information and estimates of the manpower and funding requirements of the project. Also, included is information on the background, objectives and progress of the project. Reference 11 also directs that workload sponsors provide written fiscal guidance to AIR-06 and the MRTFB activities. If the system works properly, the Work Unit Summaries should reflect this fiscal guidance. It has been the author's experience that this is rarely the case; however, the instruction is relatively new and the situation may improve with time.

Detailed back-up information for the manpower and cost estimate of the Work Unit Summary is provided by the Field Activity Plan. The manpower estimates are broken down by functional area and by type of personnel (military or civilian). The cost estimates are broken into manpower, material, flight hours, travel, contract, and funding to other activities. Obviously, this information must be balanced against the fiscal

guidance from the workload sponsors and, theoretically, the fiscal guidance should reflect the cost estimate if there is to be any agreement on what is to be done for how much. Again, there is little indication that this is the case, but hopefully the situation will improve.

E. COMPREHENSIVE INFORMATION SYSTEM

1. Discussion

Many of the problems discussed to this point result from poor information flow. Much of this could be improved with revision and integration of the information systems used for T&E field activity management into a unified comprehensive information system.

It is, therefore, worthwhile to examine the environment in which such an information system must operate, existing systems, and the feasibility of establishing an information system which will allow efficient management of resources at the Headquarters and field activity levels.

Currently various systems have been established at the field activities, primarily to manage their own internal resources and to provide accounting for the funding allocated for various projects. In terms of the overall NAVAIR organization these are primarily operations control systems with some lower level management control applications. To better control the test and evaluation process the TEMP is required for each major acquisition project. The TEMP outlines the testing required, the schedule, and required resources. Field Activity Plans and Work Unit Summaries outline the financial, manpower, and equipment

resource requirements and the approach to be taken. None of these documents, however, provides a complete picture of the capabilities, resources available, resources required, and workload of each of the field activities individually or in aggregate. The feasibility of establishing such a system should be investigated.

The groundwork has now been established for the examination of the environment of such a system in the NAVAIR organization. Size of the organization does not appear as a deterrent to establishment of an information system. In fact, just the opposite is true. The large and diverse nature would seem to dictate that an information system be established if adequate planning of resource allocation and utilization is to be accomplished.

The organizational structure of NAVAIR and its field activities may represent one of the most formidable barriers to the establishment of an effective information system. The organization is extremely decentralized. Each of the field activities has its own command structure with its own motives which in actuality may or may not align with the overall NAVAIR goals. Further the field activities report to no single authority within headquarters. Nor do headquarters personnel deal with single points of contact at the field activities. Different headquarters offices are involved depending on whether the matters in question are associated with the conduct of individual projects or overall administrative control and support. The headquarters personnel associated with specific project areas

generally deal directly with field activity personnel who will be working on their projects. Because of these factors an extreme amount of coordination and cooperation would be required if a usable information system is to be established.

Several factors effect the time frame within which an information system would need to be constructed. NAVAIR, in its role as developing agency, must deal with continuous change. Technology is changing rapidly and continuously, but also the regulations regarding systems acquisition and thus the methods that are required to be used are also continually changing. This often dictates that the interface with the field activities change from time to time. These changes, however, are usually relatively minor, and the relationship between NAVAIR and its field activities has not changed substantially in several years. Field activity control can probably be made more efficient and effective through the use of an information system; however, time constraints do not appear to be such that pressure exists for a development project that must be rushed to the exclusion of adequate planning.

The organization in which the information system must operate is somewhat difficult to define. There are organizational segments which clearly have a large role as the prime contributors and users. However, there are other segments of the organization that will impact the operation whose participation is not clearly defined. The prime headquarters users of the system would be AIR-06; however, since a large portion of the interface between NAVAIR and the field activities includes the assignment of work by other parts of the organization, their inputs to the system

are also required. The relationships between these organizational components is undergoing changes which will take some time to settle into focus. Until this occurs the organization cannot be considered mature and this must be recognized as a possible stumbling block to the establishment of a successful information system.

NAVAIR Headquarters does not have in-house hardware or personnel to be utilized for the development and operation of the information system. Hardware and many of the personnel assets required exist at the field activities. Hardware could probably be made available on a time-sharing basis; however, whether or not personnel could be made available for the project would require some study. Also, it may be undesirable to have any one of the field activities established as the central location for information system data storage and analysis. A possible alternative is to contract the development and operation of the information system to an outside consulting organization. This is attractive since contractual mechanisms could be used to help control cost and schedule. The real problem arises in finding sufficient funding to adequately support the effort. Since the field activity control task is currently being performed without major difficulties being apparent at levels controlling the funds, a major effort will be required to sell the benefits of the system. One possibility to accomplish this might be to cite examples of past inefficiencies and their associated costs which could have been avoided with the proposed information

system in operation. A side benefit of this would be to help define the areas toward which the information system should be directed.

Attitudes about information systems are, unfortunately, generally hostile. Too often the same data have been required to be submitted several times in different formats to satisfy different information systems only to have the results of considerable effort go unused for any significant decisions regarding the operation of the organization. Expectations for an information system would probably be low; therefore, any demonstration of successful operation would probably come as a welcome surprise. One of the biggest problems is convincing the operations level people who make most of the inputs to the system that it is worth their while to spend the time and effort to make the inputs accurate. This could be significantly aided if the same information is required only once and if past information submitted may be easily reviewed and updated without complete resubmission. Also, it is necessary that they be convinced that the results of their efforts serve some useful purpose. For these reasons it is important that the managers who are potential users of the system be convinced that it is worth their effort to stay involved in the development of the system beyond the establishment of the initial requirements.

Assuming that in spite of the draw backs cited in the preceding paragraphs, it is decided that an information system for the controlling of field activity operations is worth the effort, it is possible to look at what might be some of the

elements of the information system target. At least, the definition and some of the planning stages can be examined.

Various systems have already been established at the field activity or operational level which may be modified or used intact as inputs to the information system. Some direction from headquarters as to the type of information required in the system is also required. For these reasons the parallel approach of Reference 14, where operational systems and planning and control systems are developed simultaneously, seems to be appropriate for this information system development. Top down is ruled out because it would probably require more top management support than is available. This would be particularly true when attempting to integrate information from the various parts of the matrix organization. On the other hand, bottom up would be easier to accomplish, but due to differences between the field activities it is doubtful that a system with sufficient integration to be useful could be attained this way.

There is little requirement for the field activities to exchange information between themselves; therefore, there is no requirement for a high degree of integration at this point. They should, however, be able to pass the same information in the same formats to headquarters for further aggregation and analysis. Although this is desirable it does not mean that nothing useful can be gained treating the information received from each of the field activities by itself. For example, aircraft requirements for current and future projects can be analyzed for each field activity individually. On the other hand, requirements for

funding for new instrumentation and facilities must be compared for all activities to establish priorities for allocation of extremely scarce resources.

Because of the psychological climate in which the system must operate, innovation and the attendant risk should be kept to a minimum. It is important to achieve early, if modest, successes to maintain and improve support for the system. One area where some innovation may be allowed is data base management. This technique offers considerable appeal in terms of establishing the system such that a given piece of data information needs to be entered into the system only once, which will make the system attractive to those who must feed it.

2. Recommendation

The priorities, specific functions, and goals of the projected information system require considerable in-depth investigation beyond the scope of this thesis. These could be developed using the preceding discussion and discussions with personnel who would be involved in the operation and use of the system. A study should be established involving, as a minimum, representatives of AIR-05, AIR-06, and the T&E field activities. High level attention must be maintained to ensure proper support for the system instituted as the result of this study. In the establishment of the information system a consultant familiar with the establishment of information systems should be hired to prevent many of the pitfalls which might not be seen by someone unfamiliar with the process of establishing an information system.

Emphasis in the development should be placed on ease of submission and updating of information and information requirements should be limited to those for which a valid use has been identified.

V. PROBLEM AREAS AND OPPORTUNITIES

A. ACTIVITY MISSION STATEMENT OVERLAP

1. Discussion

There are four T&E field activities, listed in Table 1, under the administrative control of AIR-06. In addition significant NAVAIR T&E functions are performed at the Naval Weapons Center and the Atlantic Undersea Test and Evaluation Center, although they are not NAVAIR field activities. The missions of the field activities are stated in NAVAIR Instruction 5451.82. Some areas are clearly within the mission of only one of the field activities. In other areas, however, there is considerable overlap in the stated missions. As an example, the mission statements of the two largest field activities, the Naval Air Test Center (NATC) and the Pacific Missile Test Center (PMTC) are quoted below. For NATC the mission is:

> "To conduct tests and evaluation of aircraft weapons systems and their components." [15]

For PMTC the mission is:

> "To perform development test and evaluation, development support, follow-on engineering, logistics and training support, for naval weapons, weapons systems and related devices; provide major range, technical and base support for Fleet users and other DOD and government agencies." [15]

This is only one example. There are overlaps with other activities also. NAVAIRINST 5451.82 also states the specific functions to be performed by the field activities in the accomplishment of their missions. Here there is further overlap.

Table 1

NAVAL AIR SYSTEMS COMMAND

TEST AND EVALUATION FIELD ACTIVITIES

Naval Weapons Evaluation Facility, Albuquerque, N.M.

Naval Air Propulsion Center, Trenton, N.J.

Naval Air Test Center, Patuxent River, MD.

Pacific Missile Test Center, Point Mugu, C.

The result of this overlap is a certain amount of wasteful duplication of facilities and capabilities and the competition between field activities cited by the Civilian Management Board/Middle Management Council [1] and discussed in the Introduction. Certainly, some of the duplication is necessary. All test ranges must have position measurement, communications, and data gathering and processing systems. Also, a certain amount of competition is inevitable and, in fact, beneficial because it helps to keep the field activities efficient and responsive to the needs of Headquarters. The key to whether the duplication is wasteful or not is in the amount of marketing done by the field activities for work and the degree to which the capacity of the field activities, as a group, is utilized. The marketing that accompanies the competition between the activities often results in waste because work is performed that is not really necessary. This would seem to indicate that capacity is not being utilized efficiently and some wasteful duplication does exist. This is paradoxical because in many

cases the field activities claim to be overworked, underfunded, and understaffed, yet the inertia of the system causes them to continue to seek new work. In fact, at different levels in the organization there exist different perceptions of what the work level really is. One level of management may be actively pursuing new projects while another level is trying to discourage them.

2. Recommendations

It would appear that one way to decrease the wasteful results of competition is greater centralization of T&E project control in AIR-06 where a greater knowledge of the overall capabilities and workloads of the field activities exists. However, it is unlikely that this would work for two reasons. First, there are insufficient personnel in AIR-06 to assume the added responsibility and it is unlikely that additional personnel are available. Second, this is a reduction in the flexibility and authority of AIR-05 and would meet strong resistance from that quarter. The best solution is probably merely to encourage greater awareness of the problem and greater cooperation between AIR-05 and AIR-06 through the policies established in NAVMATINST 3960.10 and NAVAIRINST 3960.2A. Proposals have been made for the establishment of a facilities and capabilities handbook which could be used to increase the awareness of all T&E facilities users, and particularly AIR-05, of the areas of expertise of the various T&E field activities. This would improve the situation and such a handbook should be published.

B. PLANNING AND BUDGETING FACILITIES IMPROVEMENTS

1. Discussion

The Uniform Funding Policy and NAVMATINST 3960.10 require that facilities improvements that support a specific project be paid for by funds from that project and that general improvements in capabilities be paid for by the MRTFB budget. In practice it is often difficult to place a given improvement in one category or the other. The result is that the "user" refuses to pay to improve the overall capability of the activity and AIR-06 refuses to pay for improvements to support a project and needed improvements are not accomplished. Further, there is no provision for facilities improvements which cannot be justified by an immediate application. This precludes long range planning and efficient modernization programs because accurate predictions of future projects are not available.

The other difficulty with funding facilities improvements from the MRTFB budget, mentioned earlier, is the low priority of facilities improvements when compared with other demands for MRTFB funds such as salaries and other operating expenses which are relatively fixed and must be paid. When user funding falls short of budget estimates it is the facility improvements which inevitably suffer. Even when user funding is adequate, MRTFB funding must be held in escrow against possible shortfalls. This results in hurried spending at year end instead of a balanced program throughout the year.

2. Recommendations

To alleviate these problems and allow facilities improvements to be based on a coordinated long range plan, the funding of facilities improvements should be exempted from the Uniform Funding Policy and funded entirely from MRTFB funds except when large dollar value improvements are being considered for a specific project. In this case, "user" funding might be used to supplement MRTFB funding. The negotiation for "user" funding should be between AIR-06 and the program manager. The field activities should not be involved. Further, the I&M portion of the MRTFB budget, which funds the facilities improvements, should become a separate allocation not subject to other uses. This would result in a reduction in the flexibility of the field activities to utilize the MRTFB funds as required but it would help to ensure that needed improvements would be provided.

VI. SUMMARY OF RECOMMENDATIONS

The recommendations which have been made generally fall into one of three categories; changes in operating procedure, changes in budgetary procedure, and emphasis on implementing existing policies. These recommendations are summarized in the sections that follow.

A. OPERATING PROCEDURE RECOMMENDATIONS

Dialogue between users and the T&E field activities should be increased. Field activities should be considered a part of the NAVAIR team rather than as contractors.

A single integrated priority system for T&E field activity support should be established.

Detailed discussions should be held to review AIRTASKS/WORK UNITS and detailed program plans prior to their promulgation.

A standard format should be developed for test plans and they should be submitted for review by the work sponsor.

Standard procedures should be developed for reporting the results of T&E. These should be based on simplified requirements which minimize the effort involved in preparing the report, which would improve timeliness. A report tracking system should be established at Headquarters to provide easy access to the reports and status of required actions.

A study effort should be instituted which would result in the establishment of a NAVAIR T&E information system.

A facilities and capabilities handbook should be prepared to improve awareness of users of areas of expertise of the various T&E field activities.

B. BUDGETARY PROCEDURE RECOMMENDATIONS

The requirement to obligate all RDT&EN funds within the first year of their availability should be reexamined to determine if it causes more harm than good.

Funding of facilities requirements, except in rare cases, should be paid for entirely from MRTFB funding.

The I&M portion of the MRTFB budget should be a separate allocation, not subject to other uses.

C. POLICIES WHICH REQUIRE FURTHER EMPHASIS

Users of T&E field activities should submit written fiscal planning information to AIR-6103 per NAVMATINST 3960.10.

Efforts for a strong I&M program should continue.

To minimize wasteful duplication of facilities and capabilities and competition between T&E field activities, policies of NAVMATINST 3960.10 and NAVAIRINST 3960.2A must be followed more closely.

APPENDIX A

ELEMENTS OF THE MAJOR RANGE AND TEST FACILITY BASE [8]

NAVY

- Pacific Missile Test Center
- Atlantic Undersea Test and Evaluation Center
- Naval Air Test Center
- Naval Air Propulsion Center
- Naval Weapons Center
  (T&E Portion Only)
- Atlantic Fleet Weapons Training Facility

AIR FORCE

- Eastern Test Range
- Space & Missile Test Center
- Satellite Control Facility
- Arnold Engineering Development Center
- 4950th Test Wing
- Tactical Fighter Weapons Center
- Flight Test Center
- Armament Development and Test Center
- Air Defense Weapons Center

ARMY

- Cold Regions Test Center
- Tropic Test Center
- Yuma Proving Ground
- Jefferson Proving Ground

White Sands Missile Range

Kewajalein Missile Range

Dugway Proving Ground

Aberdeen Proving Ground

NOTE: The Naval Weapcns Evaluation Facility is a NAVAIR T&E field activity not included in the MRTFB.

APPENDIX B

DEFINITIONS OF ACQUISITION CATEGORIES [12]

ACAT I: Projects designated by the Secretary of Defense (SECDEF) or Deputy Secretary of Defense (DEPSECDEF) having a nominal dollar value in excess of $75M RDT&E or $300M Production and such other lesser programs as may be so designated by SECDEF or DEPSECDEF.

ACAT II: Projects designated by a Defense Systems Acquisition Review Council (DSARC) principal, SECNAV or CNO having a nominal dollar value in excess of $20M RDT&E or $50M Production and such other lesser programs as may be recommended by the Chief of Naval Material (CHNAVMAT), OP-090, OP-098 or the program sponsors (DCNO/DMSO).

ACAT III: Projects designated by the OPNAV sponsor, having a nominal dollar value in excess of $5M RDT&E or $20M Production and such other lesser programs recommended by CHNAVMAT, OP-090, OP-098, or the DA. Programs below the ACAT III threshold will normally be designated ACAT III if they:

(a) Directly affect the military characteristics of ships, aircraft or other combat units;

(b) Require Operational Test and Evaluation (OT&E) to support key program decisions; or

(c) Require Fleet RDT&E support.

ACAT IV: Projects not designated as ACAT III or higher which meet any one of the following criteria:

(a) Have a unit cost of more than $10,000, not including management and support costs;

(b) Have a total project cost of $1M (R&D plus production) excluding shore based training devices and shore support equipment not used in direct support of deployed systems;

(c) The hardware required formal approval for service use (ASU).

APPENDIX C

DIRECTIVES AND INSTRUCTIONS

DOD Directive 3200.11, Use, Management and Operation of Department of Defense Major Ranges and Test Facilities, June 18, 1974.

DOD Directive 5000.1, Major System Acquisition, January 18, 1977.

DOD Directive 5000.2, Major System Acquisition Process, January 18, 1977.

DOD Directive 5000.3, Test and Evaluation, January 1, 1973.

SEC NAVINST 5000.1, System Acquisition in the Department of the Navy.

OPNAVINST 3900.25A.

OPNAVINST 3960.10, Test and Evaluation.

OPNAVINST 5440.47D, Mission and Functions of Operational Test and Evaluation Force (OPTEVFOR), 6 March 1973.

NAVMATINST 3910.15A.

NAVMAT INST 3960.6A, Test and Evaluation.

NAVMATINST 3960.8, Land-Based Test Site (LBTS) Selection Policy, 1 September 1976.

NAVMATINST 3960.10, Policy and Procedures for Workload Management at the Navy Major Range and Test Facility Base (MRTFB) Activities, 3 February 1978.

NAVMATINST 5450.31, Consolidation of Navy Ranges, Test Activities, and Target Test Resources, 29 March 1976.

NAVAIRINST 3900.8A, AIRTASK and Work Unit Assignments to Field Activities, 22 March 1977.

NAVAIRINST 3960.2A, Test and Evaluation, 11 August 1978.

NAVAIRINST 5451.82, Naval Air Systems Command (NAVAIR) Test and Evaluation Activities; Mission and Functions of, 16 December 1975.

REFERENCES

1. Draft report of results of NAVAIR Civilian Management Board/Middle Management Council meeting 13-16 November, 1977, Charlottesville, Virginia.

2. Office of Management and Budget Circular A-109, "Major System Acquisitions," April 5, 1976.

3. Department of Defense Directive 5000.1, "Major System Acquisitions," 18 January 1977.

4. Gansler, Jacques S., "A New Dimension in the Acquisition Process," Defense Systems Management Review, Vol. 1, No. 4, p. 8-12, Fall 1977.

5. Lotz, LGEN Walter E., USA (Ret.), "Test and Evaluation in the Department of Defense," Defense Systems Management Review, Vol. 1, No. 5, p. 1-5, Winter 1977.

6. OPNAVINST 5440.47D, "Mission and Functions of Operational Test and Evaluation Force," 6 March 1973.

7. Cooley, John W. and Saylor, James W., "New Funding Policy Established for Test & Evaluation Activities," Defense Management Journal, p. 15-19, April 1974.

8. Department of Defense Directive 3200.11, "Use, Management and Operation of Department of Defense Major Ranges and Test Facilities," June 18, 1974.

9. Schneider, John R., LCOL USAF, T&E Uniform Funding Policy, An Appraisal of the Fiscal Year 1975 Experience, Study Project Report, Defense Systems Management School, May 1976.

10. Navy Comptroller Manual, NAVSO p-1000, Volume 7, Budgeting p. 4-150, 4-146-4-148.

11. NAVMATINST 3960.10, "Policy and Procedures for Workload Management at the Navy Major Range and Test Facility Base (MRTFB) Activities," 3 Febraury 1978.

12. NAVAIR INSTRUCTION 3960.2A, "Test and Evaluation," 11 August 1978.

13. NAVAIR INSTRUCTION 3900.8A, "AIRTASK and Work Unit Assignment to Field Activities," 22 March 1977.

14. Ein-Dor, P. and Segev, E., Managing Management Information Systems, p. 23-62, D.C. Heath & Co., 1978.

15. NAVAIR INSTRUCTION 5451.82, "Naval Air Systems Command (NAVAIR) Test and Evaluation Activities; Mission and Functions of," 16 December 1975 (with subsequent changes).

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