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# The Navy Industrial Fund and its applicability to the Naval Data Automation Command.

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Monterey, California. Naval Postgraduate School

# NAVAL POSTGRADUATE SCHOOL
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# THESIS

THE NAVY INDUSTRIAL FUND
AND ITS APPLICABILITY TO THE
NAVAL DATA AUTOMATION COMMAND

by

Richard Joseph Parish

December 1980

Thesis Advisor: R. A. Bobulinski

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# The Navy Industrial Fund and its Applicability to the Naval Data Automation Command

by

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Lieutenant Commander, United States Navy
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requirements for the degree of

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# I. INTRODUCTION TO THE STUDY

## A. INTRODUCTION

The Secretary of Defense was authorized by the National Security Act of 1949 to establish working capital (industrial) funds to finance certain business or commercial-type activities of the military departments. The industrial fund concept was part of an effort by Congress to streamline the Department of Defense (DOD) and promote efficiency and economy through the application of uniform budgetary and fiscal procedures. During the Congressional hearings on the National Security Act, it was stated that studies had shown a lack of adequate cost accounting in the industrial and commercial activities of the military departments and had also indicated the need for some means of simple and accurate cost determination. Prior to the National Security Act, DOD activities operated under appropriations which did not provide for the identification of costs to programs. Congress felt that appropriation accounting, while satisfactory for most administrative or military-type functions, was not adequate or desirable for industrial and commercial-type activities.

Under the federal budget and appropriation structure then in effect, programs undertaken by military activities were financed from multiple individual appropriations. These appropriations were normally controlled and accounted for by

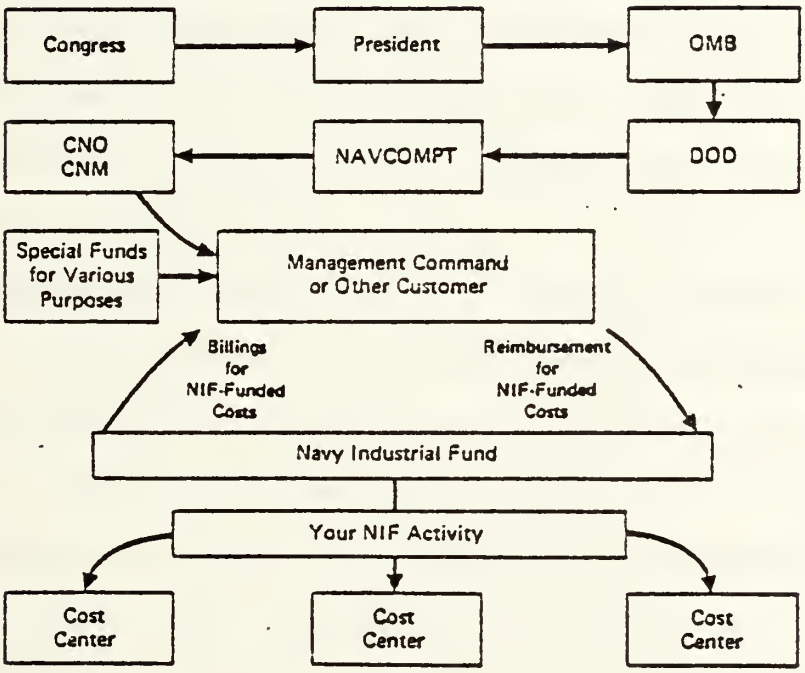
commands that were unrelated for organizational purposes and scattered over a wide geographical area. Congress felt that the use of proven cost accounting practices within a working capital fund would alleviate the need for financing the daily operations of activities from multiple appropriations and would promote greater economy, efficiency, and accountability [1:11-13].

The DOD implemented the industrial fund concept through the issuance on September 25, 1972, of DOD Instruction 7410.4 entitled "Regulations Governing Industrial Fund Operations" [2:1]. They established five industrial funds; one for each service and a separate DOD fund for the operation of agencies providing common user services across military departments. Under the industrial fund concept, Congress provides working capital to the DOD through an industrial fund appropriation which is then allocated to each service. Each service separately manages its activities approved for operations under DOD Instruction 7410.4. Figure I-1 illustrates the flow of funds down the chain of command to the NIF activities.

The Navy Industrial Fund (NIF) is a working capital fund designed to simplify the financing of naval activities which perform industrial and commercial-type services that can be charged to customers in a fashion similar to private industry operations. Industrial services include the production, construction, modification, conversion, rehabilitation, overhaul, and maintenance of ships, aircraft, missiles, weapons,

# APPROPRIATED FUND FLOW

## TO REIMBURSE NIF ACTIVITY FOR WORK AND SERVICES




Source: Professional NIF Managers Course.

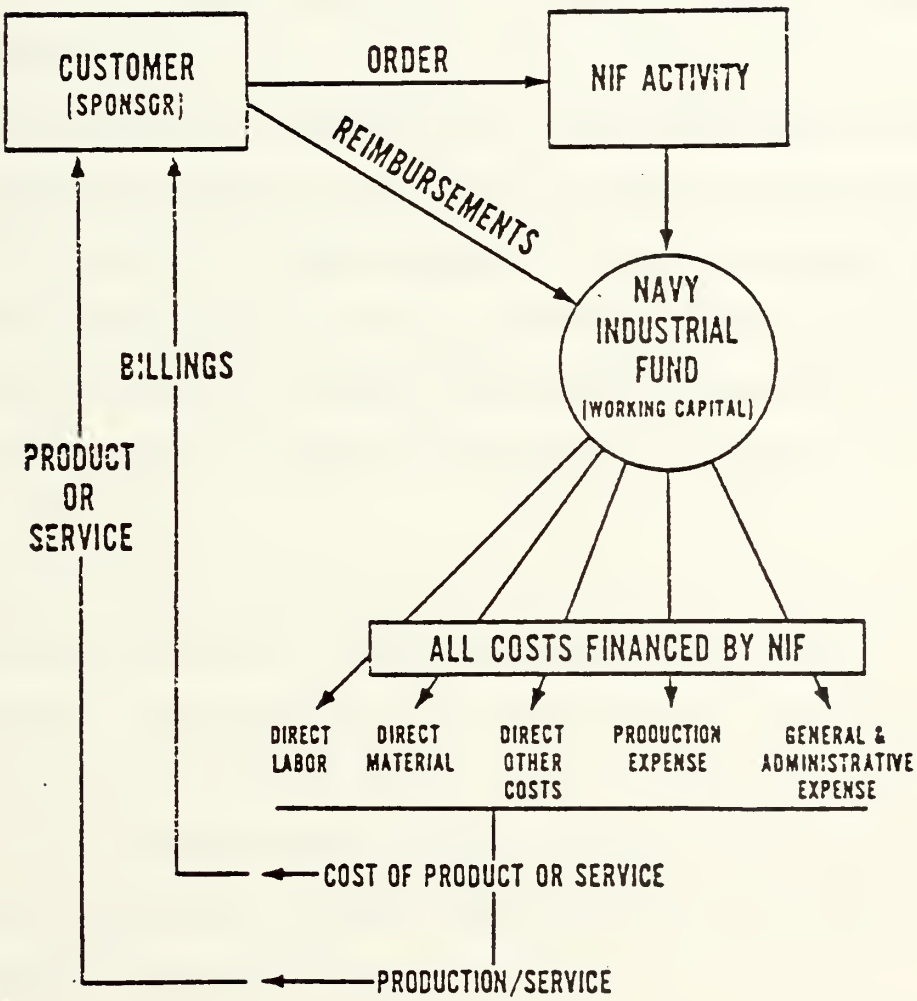
FIGURE I-1.

ammunition, vehicles, and other military equipment. Commercial-type services include transportation and port terminal services, base services, printing, research, development, and evaluation, engineering and logistics support, and automatic data processing services [1:10-11].

The major objective of a working capital fund is to charge customers for all services associated with their programs, in order to provide more visibility as to the true cost of these programs. The resources of the fund are used to finance the work or services performed by the activity and, when the job is completed, the customer is billed and the fund is reimbursed. The goal is total cost recovery, generating neither profit nor loss [3:3]. Figure I-2 illustrates the NIF cycle of operations.

The principal advantage in the use of working capital funds is the creation of a "buyer-seller" relationship between the producer of the service and the customer activity. The notion of "free" supplies and services is eliminated because the customer is required to justify the expenditure of funds in the budget, thus forcing the customer activity to be more cost conscious. Other advantages include simplified financing, greater flexibility in utilization of the workforce, and the avoidance of unnecessary duplication of facilities. In addition, a "cost-per-unit" of the commodity or service produced is established. Therefore, total costs should be lower

# CYCLE OF OPERATIONS
# UNDER NAVY INDUSTRIAL FUND FINANCING




Source: Professional NIF Managers Course.

FIGURE I-2.

because the customer is in a position to keep track of the service units received and complain if the billing is not correct [4:15].

To establish a NIF activity, the Secretary of the Navy must submit a formal request for a "charter" to the Assistant Secretary of Defense (Comptroller). The charter request must be prepared in accordance with DOD Instruction 7410.4 and include the following supportive information:

1. Complete justification of estimated working capital requirements.

2. Investments in inventories of supplies and materials.

3. Expected volume of business by type and character.

4. The source of reimbursements by customer agency and appropriation during the current and ensuing fiscal years.

5. Explanation of proposed furnishing of goods or services to agencies outside the DOD and the basis of charging for such services [2:1-7,8].

The issuance of the charter allows the Navy to capitalize and finance the activities as a separate operating entity.

In summary, the primary reason for placing a Navy commercial or industrial activity under the NIF is to create an atmosphere for business-like management with financial responsibility for producing required products and services at the lowest possible costs [5:1-7,8].

B. PROBLEM

On February 7, 1978, the General Accounting Office (GAO) delivered a report to the Congress entitled "Accounting for Automatic Data Processing Costs Needs Improvements". After studying the cost accounting practices of 26 Federal organizations, the GAO concluded that all of them were using accounting methods that were inadequate in some ways. The report stated that without accurate costs, computer center managers may choose uneconomical alternatives when replacing or adding to computer facilities, and may fail to appropriately charge users of computer facilities for services performed. Further, functional managers cannot make the best decisions when they are not aware of the total cost of implementing and operating their applications systems. The report concluded that the current "mission funded" concept was not adequate for the cost accounting necessary for computer operations.

The strongest point made in the GAO report was that the cost of ADP as reported by federal agencies often excludes major items of costs, such as military labor and overhead. ADP costs have traditionally been stated in terms of Operations and Maintenance, Navy (O&MN) costs, since these costs were the only ones billable to the customer under Resources Management System (RMS) accounting principles. The report indicated that an accounting system was necessary for ADP activities that would reflect the true cost of providing the ADP services.

One accounting system that could possibly alleviate the problem for the Naval Data Automation Command (NAVDAC) is NIF.

## C. THESIS OBJECTIVE

The objective of this thesis is to examine the Naval Data Automation Command (NAVDAC) and determine if it would operate more efficiently as a NIF activity than it does under the mission funding concept with its funding received primarily from the annual Operations and Maintenance (Navy) appropriations. The NAVDAC currently consists of seven Navy Regional Data Automation Centers (NARDAC) that provide data processing services to their respective geographical areas. Since the Navy's definition of commercial-type activities includes those providing automatic data processing services [6:1], and commercial-type activities are among those eligible to be operated under a NIF charter, the alternative of operating the NAVDAC and the seven NARDACs under a NIF charter is an option that NAVDAC desires to have studied [19]. In order to accomplish this objective, the following specific areas were researched:

1. A review of the NIF and its accounting features.
2. A review of the NAVDAC and its applicability to the tenents of a NIF application.
3. A review of the NARDAC, San Diego and its applicability as a potential NIF field activity.

## D. METHODOLOGY AND THESIS ORGANIZATION

The approach used in this thesis included a review of the literature pertaining to the NIF in general, NIF accounting,

the NAVDAC, and the accounting system currently used at the NARDACs; analysis of studies and Naval correspondence concerning the accounting system of the NARDACs; telephone discussions and on-site interviews with the Comptroller of the NARDAC, San Diego; on-site discussions with personnel at the Naval Air Rework Facility (NARF), San Diego, a NIF activity and a customer f the NARDAC, San Diego; and discussions with personnel in the Comptroller's office, NAVDAC, Washington, D.C.

The introduction provides a brief background of the Navy Industrial Fund, how the Navy determines which commands become Navy Industrial Fund activities, and the types of services that NIF activities provide.

With the above mentioned research accomplished, Chapter II provides a more thorough background of the NIF with special emphasis on the accounting features applicable to NIF activities.

Chapter III provides a background look at the NAVDAC and its organization and mission with an emphasis on the accounting system of the field level NARDACs.

Chapter IV provides a comparative analysis of the advantages and disadvantages that the NARDACs would encounter if they were operated under NIF, RMS, or the NAVDAC Chargeback System (NCS). The chapter concluded with the conclusions and recommendations reached by the author as the culmination of the research applied to the thesis objectives.

## II. THE NAVY INDUSTRIAL FUND (NIF)

### A. GENERAL

To be able to assess the feasibility of operating the Naval Data Automation Command (NAVDAC) in an NIF environment, it is essential to have a thorough understanding of the NIF system. This chapter attempts to provide the reader with that understanding by taking a background look at NIF and then discussing some of the important features of the NIF system. Included is a discussion on the NIF accounting and budgeting systems and a look at two recent developments in the NIF field, rate stabilization and fast payback capital investments.

### B. BACKGROUND

The NIF had its origin in 1949 when Congress authorized the Secretary of Defense to establish working capital funds for the capitalization of industrial and commercial-type activities. This concept was part of an effort by Congress to promote efficiency and economy of operations in the newly established Department of Defense (DOD) through the application of uniform budgetary and fiscal procedures.

The issuance of a NIF charter from the Assistant Secretary of Defense (Comptroller) allows the Navy to capitalize and finance the NIF activity as a separate operating entity. The activity then functions in a similar fashion to a commercial corporation, possessing its own assets, liabilities, and equity.

The equity of the NIF activity is called the corpus and represents the working capital of the activity.

DOD Instruction 7410.4, entitled "Regulations Governing Industrial Fund Operations", states that Industrial Funds are designed to:

1. "Provide a more effective means for controlling the costs of goods and services required to be produced by industrial activities, and a more effective and flexible means for financing, budgeting, and accounting for the costs thereof;

2. Create and recognize contractual relationships between industrial and commercial-type activities and those activities which budget for and order the end-product or services, in order to provide management advantages and incentives for efficiency and economy;

3. Provide to managers of industrial-type activities the financial authority and flexibility required to procure and use manpower, materials, and other resources effectively;

4. Encourage more cross-servicing among the military departments and among their operating agencies, with the aim of obtaining more economical use of facilities;

5. Support the performance budgeting concept by facilitating budgeting and reporting for the costs of end products, and thus underlining the cost consequences of decision making, including choices between alternatives in such terms."[2]

DOD Directive 7410.4 further lists 12 specific objectives, which are:

1. "To furnish managers of industrial and commercial-type activities with management tools comparable to those utilized by efficient private enterprises engaged in similar types of activities;

2. To provide an incentive for managers of industrial fund activities to improve cost estimating and cost control through use of cost standards by requiring a contractual relationship between producer and ordering agencies;

3. Require alert, forward looking financial planning at industrial and commercial-type activities by making them dependent financially on reimbursements received for goods and services furnished in fulfilling orders from customers;

4. Impel producers of goods and services to coordinate labor forces and inventories with workload generated. It is recognized that statutory and executive restrictions on the level of employment and the additions or reductions of personnel frequently limit flexibility and make difficult effective control over employment in relation to workload. However, producers must avoid the tendency to maintain a labor force without regard to workload levels, taking into consideration the balancing of skills to meet the anticipated workload;

5. To coordinate the financial aspects of detailed estimation and planning for job performance in terms of material requirements and labor operations, production scheduling and control, and procurement and inventory control, with budgeting and cost control;

6. To establish and use realistic cost standards as targets rather than detailed cost limitations;

7. Require ordering agencies to budget, control, and account for the cost of all goods and services ordered rather than allow them to obtain goods and services free. Conversely, at the industrial fund activity the objective shall be pursued of reducing the amount of goods and services not paid for from the industrial fund. Taken together these two statements establish the objective that the industrial funded activity will neither furnish nor receive "free" goods and services, nor will the activity enter into arrangements to "offset" services received and services furnished. This requirement is designed to instill in the officials of these agencies a greater sense of responsibility and self restraint in limiting their orders, and balancing the costs of specific goods and services to be ordered against the benefits and advantages of their procurement, especially in the light of alternative or competing demands;

8. To place ordering agencies in the position of critic of purchase prices (i.e., costs of performing activities) as well as quality and delivery speed of the goods and services ordered in consideration of relative costs of similar performing activities and outside agencies;

9. Provide meaningful bills to ordering agencies, clearly relating the goods and services furnished by a performing activity to the charges rendered, causing the ordering agencies

to assess their procurement practices and specifications in full awareness of the costs involved;

10. Enable ordering agencies to budget and account on an "end-product" basis (the same as when buying from commercial contractors), simplifying budget presentations, budgeting control, and accounting procedures for both producers and ordering agencies;

11. To establish, whenever feasible, predetermined prices for goods and services furnished by industrial fund activities, thus setting standard prices on performance and enabling ordering agencies to plan and budget more confidently;

12. To encourage management of ordering agencies to improve program planning and scheduling, in response to producers efforts to negotiate for orders as far in advance as possible." [2]

The corpus of the NIF activity is a working capital fund or a revolving fund that is used to finance the work or services performed for the customer activities. The customer activity is then billed, usually upon completion of the work, and the corpus is reimbursed out of the customer's appropriated funds. Some activities utilize "progress billing" and charge the customer for work accomplished up to the date of the billing, instead of waiting for job completion. Since the NIF is established as a non-profit operation, the goal is to recover all costs exactly and arrive at a break-even point at the end of each fiscal year. In reality, NIF activities

experience annual profits or losses each year which create yearly fluctuations in the corpus. The NIF system permits the rates for the subsequent year to be adjusted above or below the expected actual cost of the services to offset the previous years profits or losses and achieve a break-even point. The current break-even point in operations occurs at the end of a three-year cycle which provides for a zero gain or loss on a cumulative basis.

There are several advantages cited by proponents of the NIF system. The principal ones are as follows:

1. "It provides a more effective means of determining costs for goods and services as a basis for billing customers.

2. It provides a more effective and flexible means for financing, budgeting, and accounting for operations.

3. It provides a greater sense of responsibility and restraint in the ordering of goods and services based upon availability of funds.

4. It provides a more direct and rapid control of the quantity of support activities.

5. It provides a more complete consumption-type budget and accounting structure by which costs of goods and services furnished may be budgeted and accounted for under the program or function for which they have an end use." [13:206]

Overall NIF management, and the task of avoiding over-obligation of the corpus as a whole, is the responsibility of the Comptroller of the Navy (NAVCOMPT). NAVCOMPT establishes

accounting policies common to all NIF activities, which are published in Volume 3 of NAVCOMPT Manual. It also publishes a handbook for each type of activity which contains detailed procedures and regulations for that particular activity type.

Under the old federal budget and appropriation structure, military projects required financing from several different appropriations, controlled and accounted for by organizationally unrelated commands. The current NIF structure was established to eliminate the need for multiple appropriations to finance operations at industrial and commercial-type activities. Congress stated that NIF activities could utilize standard, accepted, and proven commercial practices of cost accounting and could assign costs to specific jobs on an accrual basis focusing on the use of resources instead of the outlays for resources emphasized under appropriation accounting. [12]

Customers place orders for work from the NIF activity through use of a project order or a work request, discussed in detail in Section D of this chapter. When the order is received, it is assigned a unique job order number, designed to identify this customer order from other orders and to facilitate cost accumulation for this job. The NIF activity performs the work based on the customer order, pays expenses out of the revolving fund, accumulates cost data to the job order number, and bills the customer for the work or services performed.

## C. RATE STABILIZATION

Prior to the 1970s, a climate of fairly stable economics existed [14]. Workloads were not significantly different from previous years so NIF activities were able to estimate their costs on a predictable basis. During the 1970s the economic situation became characterized by rapid inflation and shortages in petroleum and other materials. NIF activities were allowed to adjust their rates upwards on a quarterly basis to keep pace with inflation and cover their increasing costs. This was beneficial to the NIF activities in that they could adjust their costs four times a year to insure they operated on a "breakeven" basis. However, this was not very beneficial to the customers who had to obtain their funds in the form of appropriations from Congress. The end result was that appropriated funds were used up faster than expected and budgeted work was not being accomplished in the same fiscal year as programmed [15]. This had a direct affect on fleet readiness and was embarrassing to the customers who had to go back to Congress and request more money.

Faced with this situation and the knowledge that Congress would not approve any changes in their funding system, DOD managers determined that their best approach would be to have the NIF activities stabilize their prices and absorb the cost increases or decreases through their corpus. This concept was called Rate Stabilization. [7]

The Rate Stabilization program was implemented on July 1, 1975, for all DOD industrial funded activities. The stated purpose of rate stabilization was to give customers of NIF activities firm prices for goods and services prior to the fiscal year budget process, and to maintain those price levels throughout the year of budget execution. This would allow customers subject to annual appropriations to budget for cost escalation and thereby aid in solving the problem.

Therefore, a primary reason for implementing stabilized rates at NIF activities was to benefit the customers by giving them the ability to plan customer projects based on known rates rather than estimates. Secondly, it eliminated the adverse effects of cost growths to the customer during a fiscal year. Annual accounts are precluded by the Office of Management and Budget (OMB) from budgeting for costs escalation. They can, however, budget for stabilized NIF rates which do provide for inflation, and thereby include anticipated cost escalation in their annual account budgets.

Each activity establishes fixed rates which may be expressed as costs per man-hour, man-day, unit of output, unit of input, or any other manner which best suits the nature of the effort. An activity may have a single rate or as many rates as are warranted. The activity group commander, such as Commander Naval Sea System Command (COMNAVSEASYSCOM),

approves the number and kinds of rates to be established based on each activity's organizational structure, diversity of workload, and other management considerations.

In developing and establishing rates, each activity adheres to the principle of aligning rates to recover operating costs. An activity should devise a sufficient number of rates to ensure that the rate system is a reasonable model of the actual cost of performing the various categories of work or services covered by the rates. Stabilized rates are submitted by the activities at the outset of the annual NIF A-11 Budget cycle, discussed in detail in Section E of this chapter, which begins approximately 15 months prior to budget execution. The rates are reviewed and adjusted by the activity group manager to provide the necessary changes to offset the total prior year gains or losses, thereby achieving zero profit and loss in the Accumulated Operating Results Account of the activity group. Gains and losses will normally be fully offset during the year following their occurrance and will be reflected uniformly in the rates of the activity group. Changed conditions resulting from the Office of the Secretary of Defense (OSD) review of the activity group managers' A-11 Budgets, and changes in the customer programs occurring during the budget review cycle will result in stabilized rates being again reviewed and additional changes made where appropriate. The final stabilized rates are determined upon conclusion of the OSD/OMB review.

Rates established in compliance with NAVCOMPT Instruction 7600.23B dated June 6, 1978, and entitled "Rate Stabilization Program for Industrially Funded Activities", are expected to remain in effect for an entire fiscal year and are used to bill customers. Rate changes during a fiscal year are rare and may be made only upon approval of the Assistant Secretary of Defense (Comptroller). Requests for rate changes must be accompanied by appropriate justification. [7]

Any variance between stabilized rate billings and actual costs become profits or losses to the NIF activity and are absorbed by the corpus. By the time a profit or loss is realized, however, the next year's rates have already been established. Consequently, the initial year's profit or loss is not offset until the establishment of the third year's rates. This extends the NIF activity's operations from an annual to a cumulative triennial basis.

D. ACCOUNTING

The NIF had its roots in the accounting concept of "fund" theory. The National Committee on Governmental Accounting defined a fund as an independent fiscal and accounting entity with a self balancing set of accounts and other resources together with all related liabilities, obligations, reserves, and equities, which are segregated for the purpose of carrying on specific activities or attaining certain objectives in accordance with special regulations, restrictions, or

limitations [8:3-4]. The fund is a device to focus attention on the activities or operations of a particular management group and its associated accounting records.

The accounting system for NIF features double-entry bookkeeping, accrual accounting, internal control over all transactions, and integration of the cost records with the general ledger accounts. Costs are recorded in the official accounting records in the period in which they are incurred and revenue is recorded in the period earned regardless of when cash is paid out or received. This means that revenue is recorded when the customer is billed, not when the payment is received.

The cost accounting system is an integral part of the general accounting system. Cost accounting is a process of recording transactions in such a manner that costs may be determined by department, function, end-item, or any category desired. [8:3-4]

The purpose of a cost accounting system is to provide meaningful information that will facilitate intelligent and efficient administration of an activity including the administration of its internal operations and conduct of its external relationships. Cost accounting is not the end in itself but rather a means to an end and is worthwhile as far as it is useful in the administration of an activity [6]. According to NAVCOMPT, cost accounting is designed to furnish management with the information for:

1. Controlling the use of resources;

2. Controlling cost performance at all levels;

3. Developing standards, or norms, in terms of man-hours and costs, for the accomplishment of various work programs in order to improve the accuracy determining resource needs and allocation, accumulated costs, and assist in the determination of personnel requirements and workload distribution;

4. Developing or revising policies, plans, methods, and practices for the purpose of improving operations;

5. Preparing budget estimates. [6]

Basic to the understanding of cost accounting at NIF activities is the division of effort according to functional units known as cost centers instead of work centers. A cost center is an administrative unit selected for the purpose of budgeting, accumulating, and controlling related costs, whereas a work center is concerned only with the amount of work accomplished. A cost center has three important characteristics:

1. Each cost center consists of a natural grouping of men, machines, methods, processes, or operations;

2. Each cost center is made up of elements having common cost characteristics;

3. Each cost center has a single manager to whom can be assigned total responsibility and accountability. [5]

The term "cost center" is synonymous with "responsibility center" [5]. The single manager aspect provides the command

with one man to whom the responsibility for the men, money, and resources of a cost center or particular functional area is assigned. This individual is called the Cost Center Manager and is responsible for the budgeting, cost control, and proper administration of the cost center. The structure of the cost center provides for an accumulation of costs in such a manner that the Cost Center Manager can control the center and not be held responsible for costs that cannot be controlled. Cost centers are established with a view toward the natural points at which costs are collected as well as in conjunction with their distribution of overhead. Overhead is the expense involved in supporting the mission of the activity incurred in such a way that it cannot feasibly be related to any identifiable customer's order, so it must be equitably shared by all customers of the activity. Examples of overhead expenses include supervisory and administrative salaries, equipment rental costs, supplies, utilities, janitorial services, and other similar items.

There are two basic types of cost centers at NIF activities: Production (Direct) and General. The basic difference between the types is that they relate in different ways to the principal mission of the activity.

Production (Direct) cost centers are those cost centers engaged in and associated with the performance of actual productive work. Most of their effort is directly related to

identifiable customers or products and directly chargeable to the customers order.

General expense cost centers are primarily engaged in performing overall support service to the entire activity. They generate overhead, and the work they perform is in support of all cost centers including themselves. Examples of this type of cost center are the Comptroller Department, Public Works, Security, and Safety. [5]

The cost or expense incurred in the cost centers are of two basic types, direct and indirect (overhead), defined by their relationship to the final end product. Direct costs are those elements of productive costs which can be economically identified to specific job orders for customers or to a process under a process cost system. Again, indirect costs (overhead) are those costs incurred at an activity which cannot be directly identified and charged to a final product or service.

Overhead costs are further subdivided into two distinct types, production overhead and general and administrative overhead. Production overhead includes those indirect costs that can be associated with a direct cost center, such as direct cost center supervision, spoilage, set up time, and similar costs. These are costs incurred to support all direct work in a cost center which cannot be tied to a specific job order. General and administrative overhead is often called general expense and includes those costs that benefit

the whole activity and cannot be identified or allocated to a specific direct cost center, such as the Commanding Officer's staff expenses, guard services, road repairs, and operation of the civilian personnel office [5]. It is the expense incurred to support the overall mission of the activity.

Since overhead costs are indirect costs that cannot be directly identified with a specific job order or process, some method must be used to apply a fair share of the overhead to each job order. NIF activities allocate overhead expense to each job order on the basis of annually predetermined overhead rates based on direct labor hours, direct labor costs, machine hours, or other appropriate bases. In this manner, overhead is charged uniformly to customers throughout the year.

At most NIF activities, both production overhead and general and administrative overhead are allocated on the basis of direct labor hours. The predetermined overhead rates express the expense of providing overhead support for each man-hour of direct labor. A production overhead rate is computed for each direct cost center to allocate its internal indirect costs to the products or services produced within that cost center. This rate is determined by dividing the estimated annual total overhead expense within the cost center by the estimated annual direct labor hours for that cost center. This rate will be different for each

cost center. A single general and administrative overhead rate is developed for the entire activity to allocate this expense evenly to all products or services produced throughout the activity. This rate is deterimined by dividing the estimated annual total general and administrative overhead expense for the activity by the estimated annual direct labor hours for the activity. The applicable production overhead rate for the cost center plus the general overhead rate for the activity is applied to every direct labor hour worked on each product or service within the cost center. Figure II-1 illustrates the computation of overhead rates.

As stated earlier, overhead rates are calculated prior to the beginning of the fiscal year and are set for the entire year. All known factors, including previous years over or under absorbed overhead, are considered in the calculations with the goal being to absorb all expected overhead during the fiscal year. Because of the rate stabilization program discussed earlier in this chapter, the overhead rates can no longer be adjusted during the fiscal year.

For each direct labor hour of work on a given job order, there are three costs assigned: the wage rate of the worker, the production overhead rate of the cost center, and the general overhead rate of the NIF activity. The consequences of these three costs are different as the activity's level of business changes. The direct labor cost tends to vary

OVERHEAD APPLICATION

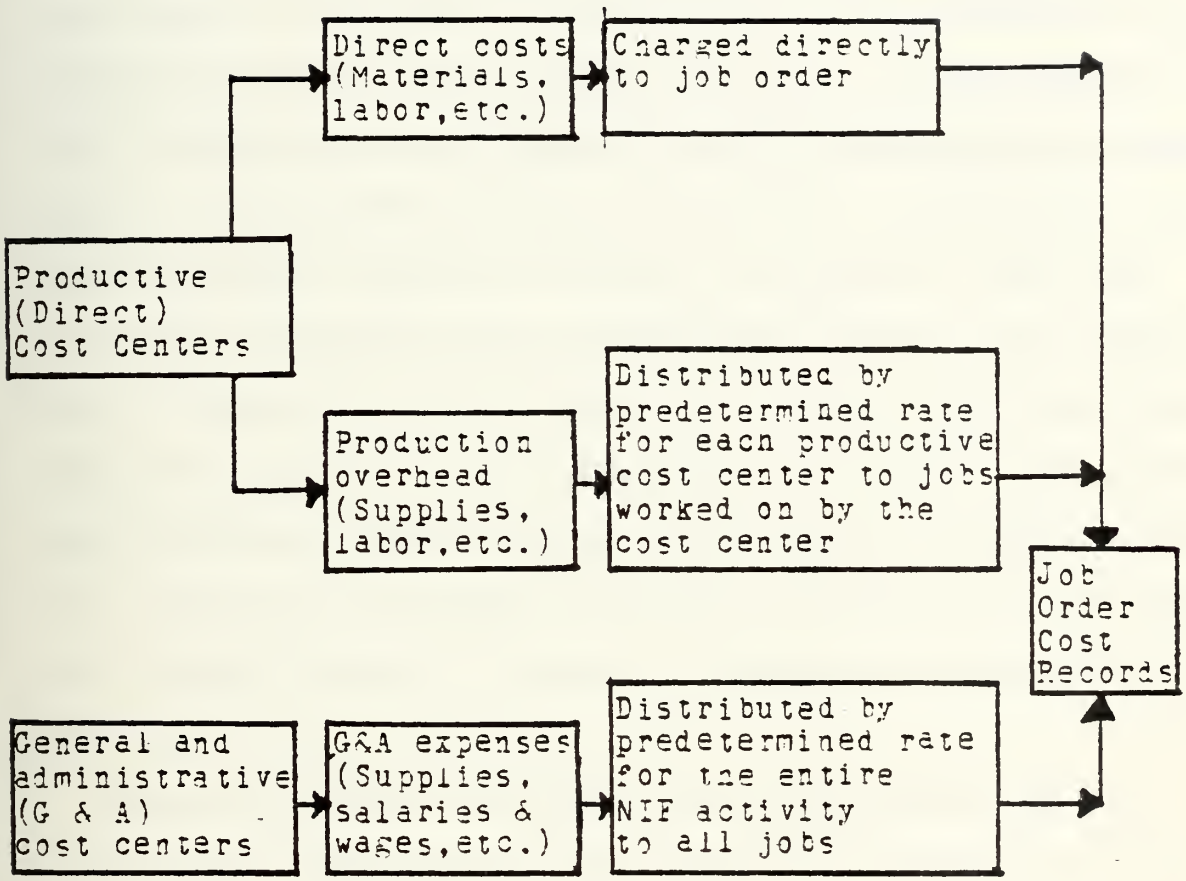



FIGURE II-1.

directly with the level of business, however the direct labor rate is fixed or constant irregardless of the level of business. Overhead costs do not tend to vary directly with business. The total overhead remains relatively constant regardless of the level of business while the overhead rate applied varies with the level of business. If the business level is lower than anticipated and the overhead costs remain constant, the overhead rate increases and, consequently, the cost-per-unit of service or product increases. Since the stabilized (billing) rate was developed based on the budgeted level of activity, the cost-per-unit will be higher than the stabilized rate, and this will result in a loss in the accumulated operating results account and a loss of working capital. This indicates that careful planning of the level of business over a budget cycle is necessary to properly control overhead costs. [1]

There are several unfunded costs associated with the operation of a NIF activity which must be accounted for but which do not result in any disbursement of cash by the activity nor are they charged to the normal customers. These unfunded costs are billed to the non-federal customers by means of a surcharge called a statistical rate which is a percentage of estimated annual unfunded costs to estimated annual funded costs for the NIF activity. The funded cost is multiplied by the statistical rate and that amount is billed. The purpose of the statistical rate is to recover

total costs from non-federal customers. Unfunded costs include the following:

1. Depreciation. Depreciation costs are determined on plant and equipment and are recorded in memorandum accounts for statistical purposes only and are not passed on to the customers.

2. Military Labor. NIF customers do not pay for military salaries, as these are paid for by the military personnel appropriations. The direct military labor hours are used to apply overhead but the costs are recorded statistically only.

3. Disability Compensation Expense. This expense is paid by the Department of Labor.

4. Rental of Building and Space. The costs of rental from another activity is not to be paid by the NIF customer.

5. Captial Investments. Capital investments are to be purchased with funds from the procurement appropriations designated for that particular purchase.

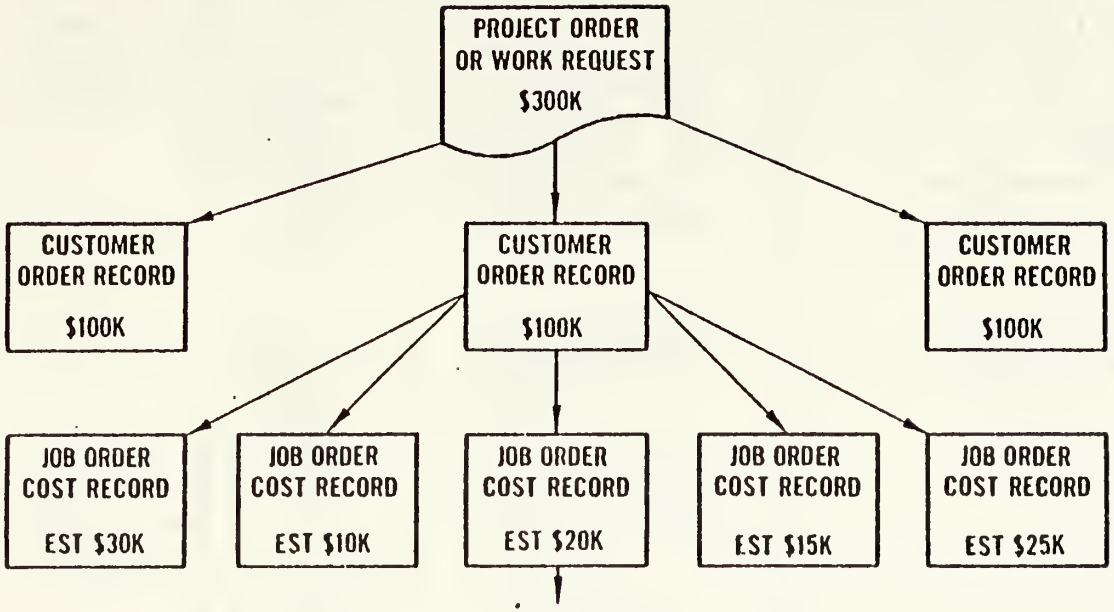
Accurate and reliable cost accounting is fundamental to the proper operation of a NIF activity because of the requirement to operate at a breakeven point without a profit or loss. Without a reasonable determination of costs involved in performing the required work the activity could not expect to meet this requirement. In order to charge breakeven prices for its work, the activity must be able to determine its costs accurately.

An essential element of the managerial accounting framework is the system of cost accumulation or collection. Actual costs must be made available for comparison with budgeted costs and billings using stabilized rates to facilitate cost control and variance analysis. Current cost data is also utilized in estimating costs in planning future operations. In addition, cost data must be accumulated for financial accounting purposes. Figures II-2 through II-4 illustrate the mechanism used by NIF activities for cost accumulation and the sequence of events that transpires from receipt of a customer order to the billing of that customer.

A customer order must be received and accepted before work or services are begun. Although there are provisions for doing work for customers outside the DOD, most work ordered from NIF activities is by Navy and other DOD activities through the use of reimbursable orders. There are several forms that customer orders can take:

1. Project Orders. DOD Instruction 7220.1 dated May 4, 1971, and entitled "Regulations Governing the Use of Project Orders", defines a project order as a specific, definite and certain order issued under the authority contained in 41 U.S.C. 23 for the manufacture of materials, supplies, and equipment, or for other work or services which, when placed with and accepted by a separately managed and financial Government-owned and operated establishment, serves to obligate appropriations in the same manner as orders or

## COST CONTROL AND JOB ORDER ESTIMATING




To Figure II-3

Source: Professional NIF Managers Course.

FIGURE II-2.

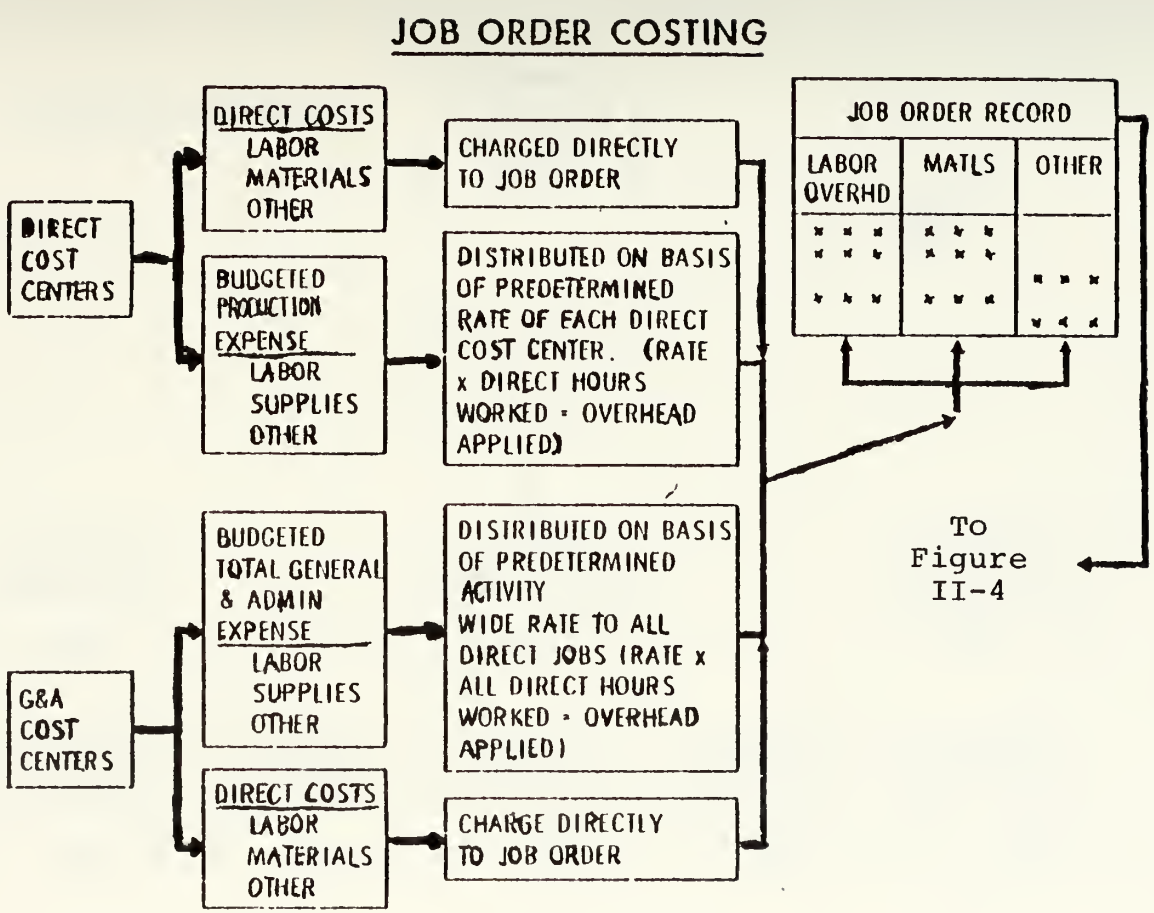



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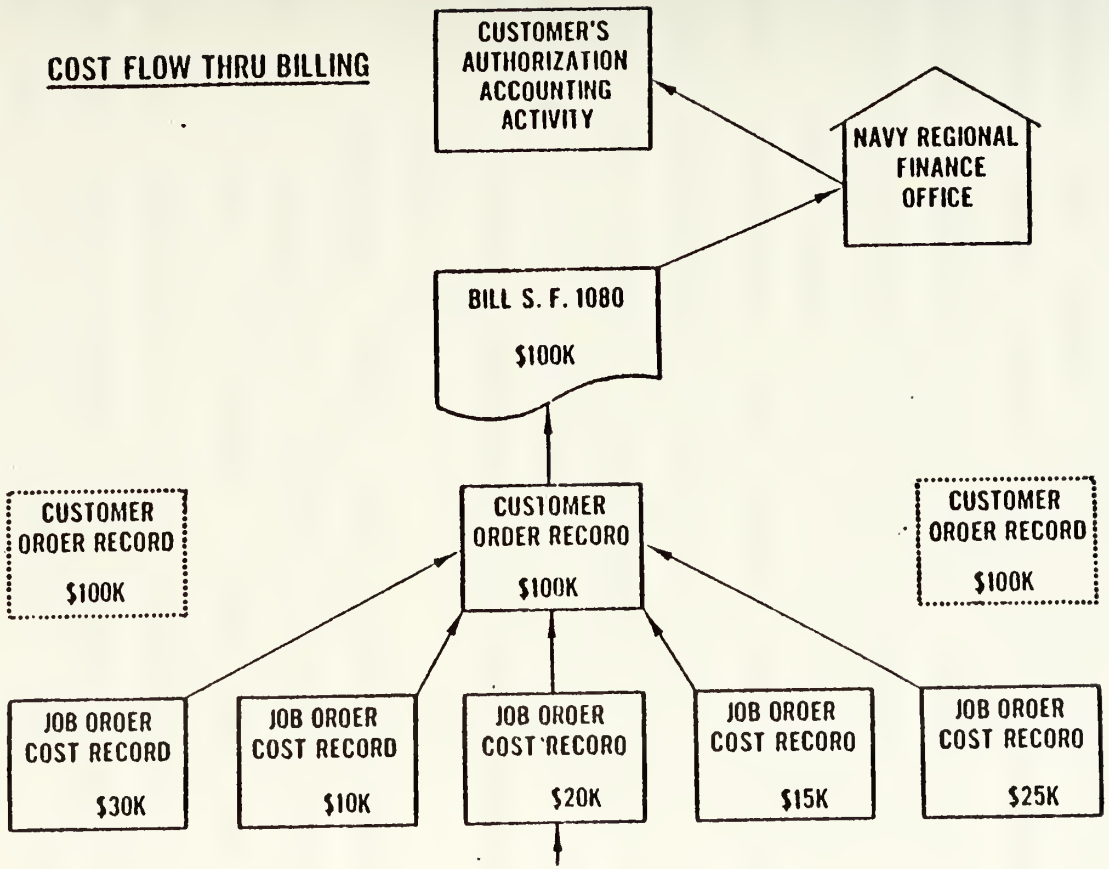
FIGURE II-3.




From
Figure II-3

Source: Professional NIF Managers Course.

FIGURE II-4.

contracts placed with commercial enterprises. Project orders obligate customer appropriations just like commercial contracts, the work is not time limited by the expiration date of the appropriation providing the funding, and the customer billing is limited to a maximum of the amount indicated on the order. Any document that contains all the requirements and conditions of a project order can be accepted as a project order provided the acceptance statement by the NIF activity states that fact to the customer. [5]

2. Work Request. All requests for work that cannot qualify as a project order, such as for continuing services or work required over a period of time, are ordered through use of a work request. Work requests are issued under the authority of the Economy Act, 31 U.S.C. 686, which requires orders to expire concurrently with the appropriation providing the funding. [5]

3. Commanders Orders. This type of order is only used when it is necessary to commence work of an emergency nature prior to receipt of an order. These orders are limited to a maximum expenditure of 250,000 dollars and must expire within 30 days of issuance. In addition the NIF activity must have assurance that an official order is forthcoming from the customer. [5]

All customer orders must be formally accepted by the NIF activity to ensure the adequacy of resources to accomplish the work in a timely fashion. The acceptance copy,

when received by the customer, represents a valid appropriation obligation for the customer. All orders are accepted on the basis of a fixed price or on a cost reimbursable basis. In either case, the estimated cost of work is based on the published stabilized rates for the product or service being ordered. Work performed on the basis of a cost reimbursable order is billed at the stabilized rate regardless of the NIF activities actual cost. Fixed price orders are billed for the total amount of the order regardless of the actual cost.

Upon receipt of a customer order, the NIF activity will establish a customer order record which is a cost accounting record used to control costs and to serve as a billing record for the ordered work. Figure II-5 illustrates a typical customer order record for maintaining the minimal data necessary to control costs and billings.

A job order is the basic unit of the NIF cost accounting system and is used to collect and identify direct costs and to apply production overhead and general overhead to customer orders. A job order record is established for each of the operations necessary to complete a customer order. It also serves as authority to perform work and to incur costs. It is a cost accounting device used to specify to cost centers the task to accomplish and to provide identification to which labor, material, and overhead may be charged. It is also used to control costs through the establishment of

CUSTOMER ORDER RECORD

| Customer Order Record Number: | Reimbursable Order Number: |
|---|---|
| Customer Name and Address: | Billing Accounting Data: |
| Description of Work: | Completion Date: |

| DATE | AMOUNT AUTHORIZED / ALLOCATED | ACCRUED COSTS | | AMOUNT BILLED | | UNBILLED BALANCE |
|---|---|---|---|---|---|---|
| | | Current | Cumulative | Current | Cumulative | |
| | | | | | | |
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Source: Professional NIF Managers Course.

FIGURE II-5.

estimated costs for the resources required and through the subsequent comparison between cost estimates and actual costs incurred. Job order records are designed to accumulate costs at levels consistent with internal and external reporting requirements. Figure II-6 illustrates a typical job order record.

Daily transaction listings are normally prepared for labor, material, and other costs and are used to make the basic cost distribution to the applicable job order records. These listings are the basis for the accounting entries to record these incurred costs as an asset in a general ledger account entitled "Direct Costs". At month-end, these costs are transferred to the general ledger account "Work in Process". The balance of the "Work in Process" account represents unbilled costs which are partially completed products or services and also serves as an accounting control over the costs in the customer order records. The aggregate total of unbilled costs recorded in the customer order records must equal the ending balance of the "Work in Process" account each month.

All direct costs and overhead expenses are controlled in total through four general ledger accounts: 4400-Service Center Costs; 4500-Direct Costs; 4600-Production Expense; and 4700-General Expense. In order to gather financial data for external and internal management reporting requirements, it is also necessary to classify costs and expenses by element,

JOB ORDER RECORD

| Job Order No. | Customer Order No. | Completion Date |
|---|---|---|
| Description of Work | | Quantity Ordered |

| COST ESTIMATES: | Labor/OH | Material | Contractual | Other | Total |
|---|---|---|---|---|---|

| | ACCRUED COSTS | | | | |
|---|---|---|---|---|---|
| Transaction Date | Labor and Overhead | Material | Contractual Services | Other | Total |
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Source: Professional NIF Managers Course.

FIGURE II-6.

function, and performing and benefitting organizations. This is accomplished through the use of assigned numbers called cost and expense accounts which encode each cost or expense transaction. NIF handbooks for each activity group contain the respective numbering systems for these subsidiary accounts. [5]

The applicable subsidiary cost account is assigned to every direct cost transaction in addition to a job order number. Each overhead expense transaction is assigned the applicable expense account number only. Expense accounts are sometimes called "overhead job orders". [5]

Each cost center manager prepares an overhead budget approved by the activity commander. The direct cost center overhead budget represents authority to incur necessary expenses incidental to the productive effort. The general cost center overhead budget represents authority to incur overhead expenses necessary to perform a particular function in support of the entire activity. The financial data that emanates from the classification of expenses into subsidiary cost accounts can be directly related to the cost center's overhead budget. Therefore, expense accounts play a key role in assisting cost center managers to control overhead expenses.

E. BUDGETING

A budget is a planned program for a fiscal period in terms of estimated costs, obligations, expenditures, and sources of funds for financing including anticipated reimbursements and other resources to be applied [5]. The budgeting process translates manpower and technical resource requirements into time-phased financial resources. There are two types of NIF budgets - the annual A-11 budget and the operating budget.

1. NIF A-11 Budget

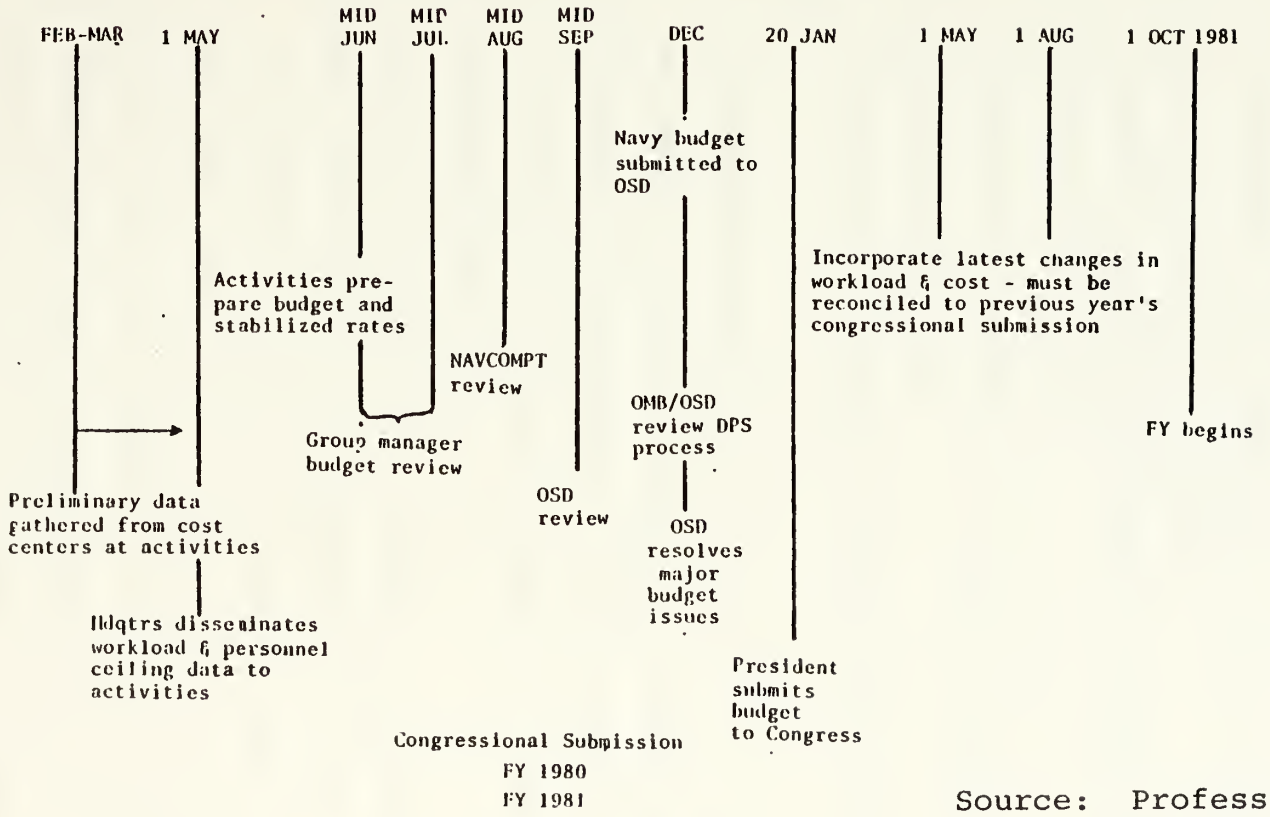
OMB Circular No. A-11 entitled "Instructions for the Preparation and Submission of Annual Budget Estimates" requires that an annual budget be prepared and submitted for all NIF activities. Each year when NAVCOMPT receives the Circular No. A-11 instructions, a budget call is issued. It promulgates the format content and due dates for the submission of budget data. Upon receipt of workload guidance and ceiling controls, the commanding officer of the NIF activity issues internal budgetary guidance and operational data to the various cost centers. It is at this point that the formulation of the NIF A-11 budget begins.

Each activity operating under an industrial fund prepares a three-part A-11 budget consisting of actual current year costs for three quarters and estimates for execution of the final quarter, operating cost estimates for the ensuing fiscal year, and estimates for the second following year. The budget is submitted via the activity's parent command

to NAVCOMPT. NAVCOMPT then holds preliminary hearings on the A-11 budgets. These hearings cover costs and sales forecasts, including relationship to customers' budget programs, working capital requirements, management and budgetary review and controls, and financial and accounting policies. The NIF budget in reality is the Navy plan for performing certain programs by Navy operated activities. Consequently, the NIF budget represents the amount of appropriate funds that its "customers" must obtain through the appropriation budgeting procedures.

After the review process, NAVCOMPT submits a NIF A-11 budget for each activity group to OSD. OSD holds joint hearings on the budgets with OMB where additional changes or "markups" are made. These changes usually relate to the proposed level of NIF operations, because proposed limitations on appropriations at the OSD/OMB level will affect the level of NIF activity. After acceptance by OMB, the NIF budgets are printed in the President's budget. The published budget contains the following statements and schedules: Balance Sheet (Statement of Financial Condition), Income Statement (Statement of Revenue and Expense), Program and Financial Statement, Object Classification Statement, and a Personnel Summary Statement [10]. Figure II-7 illustrates the procedures and events that occur in one complete NIF budget cycle.

TIMETABLE OF PREPARATION OF NIF FY 1981 BUDGET




Source: Professional NIF Managers Course.

FIGURE II-7.

2. Operating Budget

The second type of budget is the operating budget. Operating budgets are prepared by each NIF activity for the following purposes:

a. "To provide local management with a forecast of operating costs and financial condition;

b. To serve as operating guides to lower level management and department heads;

c. To serve as a basis for financial control over activities operating under NIF;

d. To provide the means to measure and evaluate performance;

e. To encourage analysis of variances and periodic reports on the results of such analysis. Variance analysis reflects the failure of management to achieve planned goals, the ability to surpass planned goals, and the ability of management to set realistic goals." [1]

The operating budget can be viewed as the primary "building block" for effective cost control by local management. It presents a cost and financial plan on both a quarterly and fiscal year basis, based upon the anticipated level of operation during that period. Over the course of the budgeted period the budget is compared with actual data to measure performance, and any significant differences or variances are analyzed to determine if corrective action is necessary.

NIF activity handbooks specify which specific statements are to be included in the operating budgets for various activity groups. In general, the following components are required:

a. "Justification. A narrative analysis of the factors considered in formulating the operating budget. This section explains, evaluates, and interprets major items of interest from a financial management viewpoint.

b. Production Budget and Production Overhead Budget. These show the estimated direct cost of the activity, classified by type of cost, responsibility, and type of product or service. These components are used in formulating the stabilized rates to be charged customers.

c. Projected Statement of Financial Condition. This is the projected balance sheet, showing all assets, liabilities, and capital projected at one future point in time.

d. Projected Statement of Income and Expense. This is the projected income statement, showing revenue, costs, and expenses projected over the budget period.

e. Summaries. These contain various projected expenses and cost distributions of specific interest to the managing command as well as a cash budget which projects the flow of cash during the budget period." [11]

The cost center manger is responsible for the preparation of the cost center budget. In order to prepare a realistic budget, the cost center manager must have a

thorough understanding of the objectives of a budget and of the techniques of estimating direct and indirect costs. The manager must also have detailed knowledge of the functions, capabilities, and limitations of the cost center and its programs. [5]

## F. FAST PAYBACK CAPITAL INVESTMENTS

The fast payback capital investment program is designed to improve productivity by allowing NIF activities to finance acquisition of tools and equipment costing between 1000 and 100,000 dollars from their corpus instead of the normal procurement process. These investments are expected to improve productivity to the extent that, within a two year period, the estimated savings would equal the cost of procurement and installation of the equipment. The NIF financing of these investments is derived from rates charged to the customer appropriations for work and services performed. The program was initiated with the goal of increasing productivity and decreasing operating costs by permitting earlier acquitision of fast payback capital investment items than would be possible through normal appropriation procedures.

The fast payback concept is not intended to supplement the normal procurement process but rather provide a means of obtaining productivity enhancing equipment in a timely manner. Activities are constrained by the specific qualifying cost criteria and by the funding level reflected in the approved

activity budget. There is a line item in the activity budget for fast payback projects, and a corresponding factor is included into the stabilized rates to ensure recoupment of total procurement costs.

To justify a fast payback proposal, the requesting individual needs to simply and logically display how the proposed procurement would generate real savings over a two-year period to equal the cost of procurement and installation. The commanding officer of the NIF activity can approve projects up to 5,000 dollars, activity group managers can approve projects up to 25,000 dollars, and OSD approval is required for projects up to 100,000 dollars. Projects estimated to cost more than 100,000 dollars but meeting all other requirements for the program must be submitted for consideration for financing from procurement appropriations.

The stabilized rates are predicated upon production costs using the old equipment and remain fixed during the fast payback period. Since the actual production costs should be lower than the stabilized billing, the net increase in cash ultimately restores to the NIF corpus an amount equal to the cost of the equipment. The rate is decreased promptly in the following budget year after total project costs are recovered. In the event a fast payback item does not achieve its anticipated expense reductions, the resultant decrease in accumulated operating results will generally not serve as a basis for increased rates. Since investments in fast payback items

are on a continuing basis, it is expected that actual operating expense reductions will sometimes be greater or less than those anticipated. This program envisions that the actual reductions should equal or exceed those anticipated in most cases. [5]

## G. SUMMARY

This chapter provided the reader with a look at the NIF system. It covered the rate stabilization process and how the NIF activities develop the annual billing rates. It discussed in detail the accounting system, with a special emphasis on the need for accurate cost accounting by a NIF activity. It also discussed how NIF activities account for overhead and apply the overhead to specific customer jobs. The NIF A-11 budget and the operating budget process were discussed in detail and the chapter concluded with a brief look at a new capital investment program, the fast payback program. With this chapter as a framework, the reader will now be able to assess the NAVDAC system in the subsequent chapters for potential NIF applicability.

## III. NAVAL DATA AUTOMATION COMMAND (NAVDAC)

### A. GENERAL

To be able to determine the best environment in which NAVDAC should operate, the reader must understand the events that led to the formation of the NAVDAC organization and the mission and purpose of NAVDAC. This chapter attempts to provide the reader with that understanding and also provides a brief look at the field activities under NAVDAC and the accounting system under which they operate.

### B. BACKGROUND

A 1975 General Accounting Office (GAO) report on Navy Automated Data Processing (ADP) was quite critical. The report says that the Navy was unstructured, highly decentralized, had lax enforcement, had excessive local commanders' prerogatives (too many local, unique ADP systems augmenting standard systems), and had "extensive" duplication of Central Design Agencies (CDA) and programmers [16]. Because of this report, along with pressure from the Assistant Secretary of the Navy for Financial Management (ASN(FM)), the Department of the Navy (DON) senior ADP policy official, the Navy developed an ADP Reorganization Study in 1976.

The Reorganization Study group found general agreement as to the major ADP problems besetting the Navy. The ten

major problems, as enumerated by the Vice Chief of Naval Material in 1976, were:

1. "ADP configuration management. There was no control over the use of computer capacity. In many cases, computer capacity was being used up by local-uniques.

2. Low thresholds. Everything had to be justified, therefore staffs were swamped with paperwork.

3. Improper support of new projects. CDAs were being assigned new projects without being given the additional resources necessary.

4. Requirement to economically justify by activity. This requirement frequently prevented standardization across command lines.

5. Lack of Navy-wide hardware standardization. This was again a command line problem created primarily by the differing timing of development of large scale systems.

6. Nonstandardization of systems. Again a command line problem where activities duplicate what other commands have already done.

7. Insufficient overhead to properly madage ADP. Personnel cutbacks tended to reduce the management and planning staffs.

8. Lack of Navy-wide telecommunications planning.

9. Lack of standard procedures for requesting ADP services and managing systems development.

10. Lack of technical standards and enforcement of them, Programs often could not run on different activities' computers even if the hardware was the same brand and model." [16]

The study resulted in the formation of the Naval Data Automation Command as a command of the Chief of Naval Operations (CNO) effective January 1, 1977. NAVDAC reports to the Director, Command, Control and Information Systems, Division OP-942 (OP-942) under the CNO, who also serves as the Director, DON ADP Management (DIR DONADPM), with an associated staff responsibility to the ASN(FM) in that officer's capacity as the senior ADP policy official. This structure allows the Navy to fulfill all its responsibilities within both the CNO and SECNAV chains of command. Figure III-1 illustrates the Navy ADP organization structure.

NAVDAC became operational in October 1977 and consisted of a headquarters staff located in the Washington Navy Yard and field activities situated throughout the country in areas of high Navy concentration. These included six regional data processing centers, known as Navy Regional Data Automation Centers (NARDACs), as well as the ADP Selection Office (ADPSO) and the Department of Defense Computer Institute (DODCI). Figure III-2 displays the NAVDAC headquarters staff organizational chart.

In a letter to the Commander, NAVDAC (COMNAVDAC) on September 13, 1978, the ASN(FM) said the following:

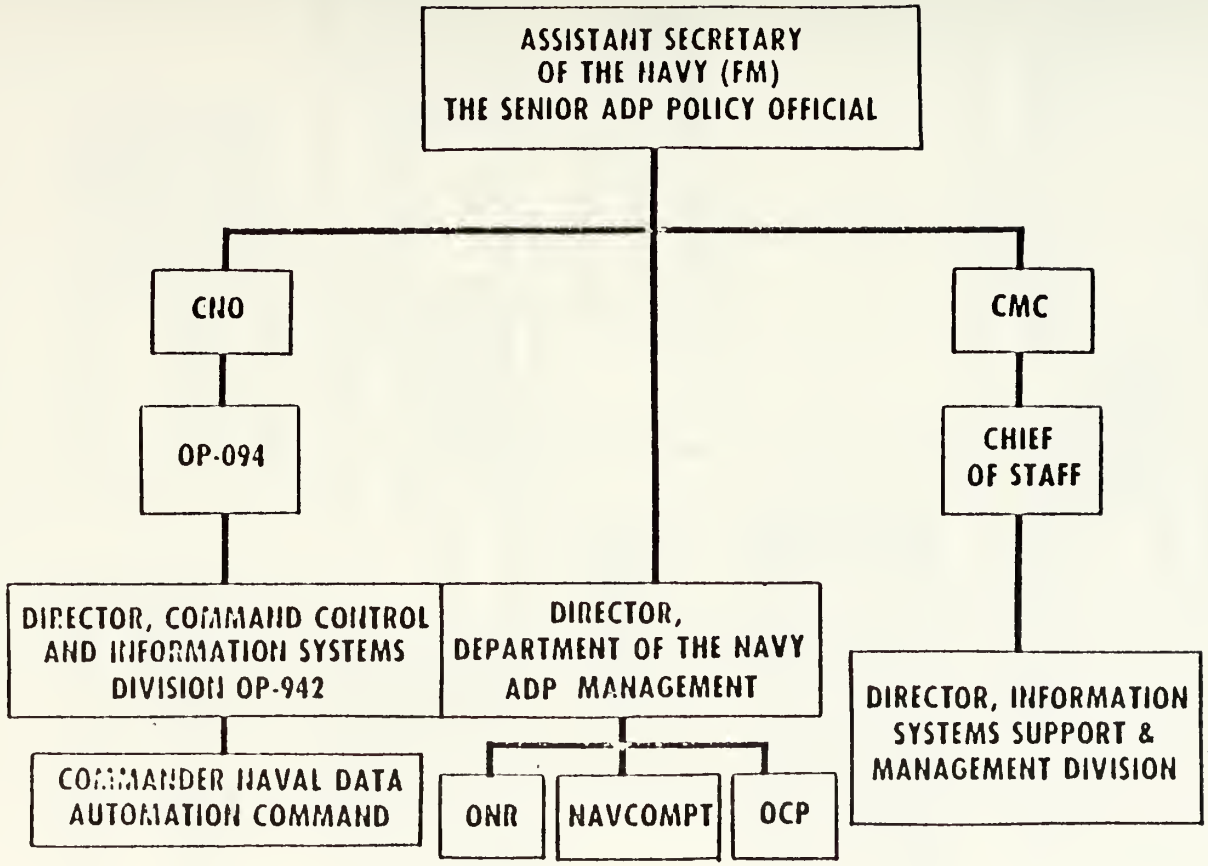

ASSISTANT SECRETARY
OF THE NAVY (FM)
THE SENIOR ADP POLICY OFFICIAL
CNO
CMC
OP-094
CHIEF
OF STAFF
DIRECTOR, COMMAND CONTROL
AND INFORMATION SYSTEMS
DIVISION OP-942
DIRECTOR,
DEPARTMENT OF THE NAVY
ADP MANAGEMENT
DIRECTOR, INFORMATION
SYSTEMS SUPPORT &
MANAGEMENT DIVISION
COMMANDER NAVAL DATA
AUTOMATION COMMAND
ONR
NAVCOMPT
OCP

FIGURE III-1.

NAVDAC HEADQUARTERS
STAFF ORGANIZATION

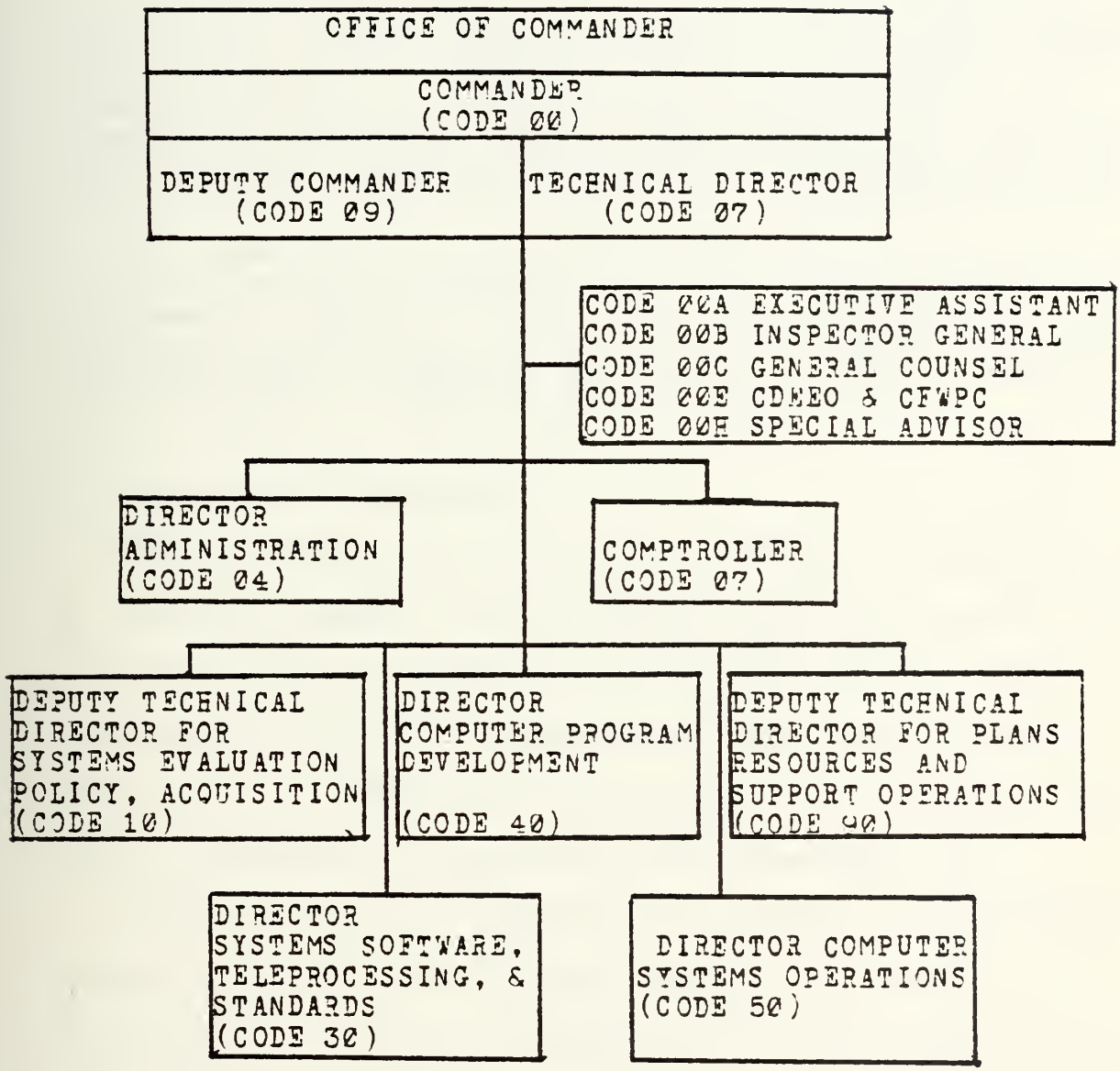



FIGURE III-2.

"Navy's operational and management processes, as you are aware, have become computer-dependent. Because of this, ADP has taken on a new and significant role and the ADP community must now share responsibility for ensuring that Navy's vital missions continue to be accomplished.

The President's Reorganization Task Force on ADP has provided us with several challenges including the challenge to provide improved support to users and to further improve the management and control of Navy's ADP resources. In this connection, a concerted effort on the part of all ADP personnel, Navy-wide, will be required in order to formulate and implement effective ADP policies, objectives and plans to provide the means for resolving key management issues.

The important new role of computers offers a real challenge to the total Navy community and also to the new Naval Data Automation Command. I look forward with optimism and confidence that the Naval Data Automation Command will provide the additional leadership and momentum needed to assist the ADP community in meeting this challenge." [17]

## C. MISSION AND FUNCTIONS

NAVDAC's principal objectives, as defined by the Secretary of the Navy (SECNAV), are to improve the effectiveness of ADP systems in support of Navy operations, to exploit all the potentials of ADP and teleprocessing technology in multi-command and multifunctional ADP systems, and to improve the overall management of the Navy's ADP resources. [16]

NAVDAC's mission, as approved by the CNO, is to administer and coordinate the Navy non-tactical ADP program. This responsibility includes collaboration of ADP matters with all Navy ADP claimants; development of policy and procedures; approval of systems development, acquisition, and utilization of ADP equipment and service contracts; sponsoring of ADP technology; and career development and training of ADP personnel. [18]

OPNAV Instruction 5450.200, dated December 27, 1978, and entitled "Mission and Functions of Naval Data Automation Command" promulgates the functions to be performed by NAVDAC and includes the following:

1. "Provide staff support to the CNO in all ADP matters. This support in many instances is in furtherance of CNO staff support to the Senior ADP Policy Official (ASN(FM)) and DIR DONADPM.

2. Develop for approval by the CNO, and subsequently by the ASN(FM) or the DIR DONADPM, ADP policy, goals, and objectives in support of ADP guidance issued within DON or by external authorities such as the Office of Management and Budget (OMB), the General Accounting Office, and the Office of the Secretary of Defense (OSD).

3. Develop, in consonance with policy guidance from the CNO and other higher authority, concepts, objectives, plans, and procedures relating to ADP and information systems.

4. Provide programming and budgetary guidance and support for Navy ADP program efforts, including review and defense of the Navy ADP budget, dollars, and manpower requirements. Manage the ADP Computer Acquisition Program (CAP) for the Navy.

5. Initiate projects to carry out goals and plans and monitor their accomplishment.

6. Based on approval thresholds, review and approve ADP equipment, software, and service specifications.

7. Based on designated approval thresholds, review and approve or recommend to CNO for approval automated data systems plans, including requirements for hardware, software and services; monitor progress of these plans; and initiate corrective actions as may be required.

8. Review and make recommendations to CNO on research and development relating to ADP and perform technology assessments for Navy-wide use.

9. Provide technical guidance and staff assistance in ADP matters to OP-942.

10. Assist ADP claimants to monitor and evaluate operation of Navy ADP systems.

11. Coordinate ADP systems to minimize duplication of reporting and/or processing effort.

12. Initiate action for the development of standard automated systems throughout the Navy.

13. Prepare ADP technical standards for use by all Navy activities; coordinate the Navy data element standardization program.

14. In coordination with the Commander, Naval Telecommunications Command prepare ADP teleprocessing requirements and plans.

15. Coordinate Navy-wide the control and maintenance of vendor-provided systems and utility software.

16. Manage the command's computer system operations program.

17. Establish and monitor implementation of performance measurement program for all Navy ADP activities." [18]

NAVDAC's goals include better planning and coordination Navy-wide to anticipate, budget for and satisfy ADP requirements before rather than after they become critical; standardization of systems and consolidation of facilities where it makes good sense; more aggressive and consistent exploitation of computers and teleprocessing; career development of ADP professional personnel; and the formulation of more responsive, up-to-date policy and procedures for the acquisition and management of ADP resources. [16]

## D. NAVY REGIONAL DATA AUTOMATION CENTERS

The Navy for many years has espoused a philosophy of centralized policy and decentralized management and operation [27]. In many cases, even today, this appears to be a workable concept and one that suits numerous major functions performed in the Navy. In some areas, however, and particularly in nontactical data processing, the concept appears to the Navy ADP Reorganization Study Group to have been less than satisfactory. Persistent problems in the management and operation of the Navy's nontactical ADP program were noted by the study group, and serious concern has been voiced by critics external and internal such as GAO. Concern has surfaced at the Congressional and DOD levels; it has been echoed by Navy managers and by users receiving ADP support services. [27]

The Navy ADP Reorganization Study, discussed in Section B of this chapter, proposed a series of regional data automation centers be established under NAVDAC to serve the Navy's nontactical data automation needs. As part of the overall reorganization of the Navy's nontactical ADP resources and management, each NARDAC was formed from existing facilities and operations in a particular geographical area, of which the former Data Processing Service Centers (DPSCs) formed the nucleus. The NARDACs have a broader mission than the DPSCs had, and in all cases the NARDACs have been expended in scope and responsibility, including assignment of Navy-wide areas of ADP technical-management responsibilities.

There are currently seven NARDACS, located in Washington, Norfolk, Jacksonville, Pensacola, San Francisco, San Diego, and New Orleans, and they control about 25% of the Navy's ADP assets. These activities are designed to provide a full range of data processing services to their respective geographic areas. The goal is to provide the Navy with "centers of excellence" that will be able to provide data processing services, programming support, technical expertise, trouble shooting, telecommunications networking, distributed processing, and other ADP related services [28]. For example, through the NARDACs, the Navy expects to economically bring timesharing services inhouse, promote standardization of systems and programs for a variety of Naval activities, offer an automation alternative to activities not now utilizing

automation, and extend to small activities the opportunity to fully utilize effective ADP capabilities. [28]

Through geographically separate from one another, each NARDAC was organized under a standard structure patterned upon NAVDAC. Figure III-2 displayed the NAVDAC organization chart. The NARDACs have a similar organization and correspond directly with their equivalent codes at headquarters. The NARDACs maintain close professional and operational relationships with one another, the NAVDAC headquarters, and the resource users. In assimilating diverse resources of several elements within their respective regions, the NARDACs inherited a variety of computer hardware and software, much of it technically obsolete and incapable of providing responsive support [27]. One of NARDAC's first challenges was to get standard equipment configurations into the NARDACs and to establish standard operating procedures for all the NARDACs to follow. Better support to existing customers had to be achieved before an effort could be made to take on more customers.

The ADP capability of all the NARDACs is being upgraded, modernized, and standardized with the installation of UNIVAC ADP equipment (ADPE). The newly acquired ADPE will provide the NARDACs with the means to respond more readily, more efficiently, and more economically than ever before to the requirements of their "customers", the functional users in the field who depend on increased ADP support in the face of diminishing resources. [19]

Included in the NARDAC support are a series of data automation facilities called NAVDAFs which satillite from the NARDACs in order to broaden the geographic scope of the ADP support. These sites are located in such areas as Corpus Christi, Newport, and Great Lakes, and provide onsite support to major Navy commands and activities in areas not otherwise supported by NARDACs or having special support requirements. The NAVDAFs also have a standard organizational structure, and their hardware and software is being modernized and standardized, as appropriate. In general, their capabilities are being increased to make modern ADP services available to the broadest spectrum of Navy users.

The NARDACs service a myriad of customers. Figure III-3 displays the 1980 end-of-year budget for NARDAC San Diego, broken down by dollar value and percentage for each customer and subtotaled for reimbursable and mission-funded customer.

In the past, the Navy has not had very many workable alternatives to computer support, and every activity essentially had to go its own way. The NAVDAC/NARDAC concept is to provide the necessary alternatives, in a standardized fashion, from similarly configured, operated, and managed NARDACs, each of which has a standardized range of support in operations, applications programming, and technical support, besides being a center of expertise in some application or technical support area in its own right.

NARDAC SAN DIEGO
FY 1980 BUDGET

| COMMAND | DOLLARS (000) | PERCENT |
|---|---|---|
| NAVAL AIR REWORK FACILITY, SAN DIEGO | 2939 | 31.06 |
| NAVAL AIR LOGISTICS COMMAND | 535 | 5.66 |
| NAVAL SEA SYSTEMS COMMAND | 27 | .29 |
| NAVAL COMPTROLLER | 27 | .29 |
| PACIFIC MISSILE TEST CENTER | 933 | 9.86 |
| NAVAL AIR REWORK FACILITY, JACKSONVILLE | 29 | .31 |
| NAVAL SEA SYSTEMS COMMAND, WASHINGTON | 8 | .08 |
| REIMBURSABLE SUBTOTAL | 4498 | 47.54 |
| COMMANDER NAVAL AIR FORCES, PACIFIC | 586 | 6.19 |
| COMMANDER NAVAL SURFACE FORCES, PACIFIC | 846 | 8.94 |
| SHIPS INTERMEDIATE MAINTENANCE ACTIVITY | 441 | 4.66 |
| NAVAL AIR STATION, NORTH ISLAND | 1608 | 16.99 |
| NAVAL AIR STATION, MIRAMAR | 404 | 4.27 |
| NAVAL STATION, SAN DIEGO | 68 | .72 |
| FLEET ACCOUNTING & DISBURSING CENTER | 984 | 10.40 |
| FLEET TRAINING CENTER, SAN DIEGO | 15 | .16 |
| PROPULSION EXAMINING BOARD, SAN DIEGO | 11 | .12 |
| MISSION-FUNDED SUBTOTAL | 4963 | 52.46 |
| TOTAL | 9461 | 100.00 |

FIGURE III-3.

E. ACCOUNTING

There are three basic purposes for all accounting in the Navy:

1. "To report the use of funds under the various appropriations granted to the Navy by Congress. Appropriations are made by major purpose, such as Operations and Maintenance, Navy (O&MN) or Military Personnel (MILPERS), are subdivided by categories of major programs, and are provided to activities in the form of operating budgets. The accounting system provides for gathering information, by purpose, for each layer of funding authority.

2. To control the obligation and expenditure of funds and thus to prevent their exceeding the limitations imposed by Congress. Activities are required to maintain records which show the balance of funds granted, funds obligated or expended, and funds available for further obligation or expenditure, all within specified time limits.

3. To provide analyses of the costs of maintenance and operations, construction, and procurement. It is on the basis of this cost information that all management decisions must be made." [13]

In 1955 an examination of the Defense Department management was made by the Hoover Commision and it was found that effective fiscal management had been hampered by overdetailed and cumbersome allotment structures. The effect of trying to control operations through such a system placed emphasis

upon the ability of organizational units to expend no more than predetermined ceilings. The commission stated that the ability to live within such ceilings was no real gauge of performance, and that accounting systems which disclose all costs are a prime requisite to effective management. [13]

The commission made the following major recommendations for changes in accounting and budgeting procedures:

1. "The executive budget continue to be based on functions, activities, and projects but be redesignated as a "program budget". This program budget should be supported by information on program costs and accomplishments, and by a review of performance by organizational units where they do not coincide with program budget classifications.

2. That the agencies take further steps to synchronize their organization structures, program budget classifications, and accounting systems.

3. That for management purposes, cost-based operating budgets be used to determine fund allocations within the agencies.

4. That Government accounts be kept on the accrual basis to show currently, completely, and clearly all resources and liabilities and the costs of operations.

5. That reliance be placed upon appropriate accural and cost accounting techniques as a primary means for aiding the effective management of Government activities.

6. That in the DOD the accounting procedures be revised to include military pay as an element of cost of support activities of an administrative or service nature." [13]

To overcome the problems found by the commission, the DOD adopted a total resource approach to management. Under this approach, managers are to be responsible for the use and cost of all measurable resources employed in accomplishing their assigned mission. This approach was called Resource Management Systems (RMS), and consisted of a series of subsystems designed to promote better management throughout the DOD by providing managers with improved means of obtaining and controlling the resources required to accomplish missions. RMS included all procedures for collecting and processing recurring quantitative information that relates to resources and is for the use of managerment. Resources were further defined as men, materials, services, and money. [13]

The RMS subsystem of primary interest in this thesis is for the management of resources for operating units. This subsystem involves the Operations and Maintenance, Navy appropriation. The objectives of this subsystem are as follows:

1. "Focus on outputs and resources used: i.e., expenses and obligations including reimbursable work and unfilled order amounts (gross adjusted obligations).

2. Focus on managers who are responsible for effective and efficient use of resources.

3. Focus on actual performance in relation to planned performance.

4. Use expense operating budgets and accounting as primary aids in management control at each organizational level.

5. Use working capital to hold resources in suspense between the acquisition of the resources and their comsumption." [13]

To improve the management of resources for operating units, the Navy implemented Project PRIME (Priority Management Effort). Basically PRIME sought to modify programming, budgeting, and accounting procedures so that they would be more useful, and to permit the use of operating budgets as the main tool for managing consumable resources of all DOD activities. The primary changes brought about by project PRIME were:

1. "All DOD activities now use operating budgets, expressed in full-cost, program-element terms, as the tool for obtaining, managing, and accounting for the consumable resources, including military personnel, required in the performance of their mission.

2. Appropriations were purified, using Project PRIME definitions of expense and investment, so that current expense items are funded from the annual O&MN appropriation, and long-lived investment items are funded from the multi-year investment appropriations.

3. A uniform chart of operating expense accounts has been developed for budgeting and accounting that is consistent with the program element structure, thus ensuring compatibility of data throughout the system and among DOD units.

4. Activities are now charged with all their consumable resources at the time of consumption, rather than when purchased or paid. In other words, accounting for these resources is on an accrual basis.

5. To increase the reliability of available expense data, a disciplined method for their collection is employed, with directly accountable costs separated from allocated costs.

6. Operating costs are now accumulated by "budget classification code (BCC)", "functional categories (FC)", and "elements of expense (EE)", and are further identified to major programs, and elements of these, in the Five Year Defense Program (FYDP).

7. The use of working capital funds is being extended to hold the costs of operating resources in suspense between the time they are purchased and the time they are issued for consumption." [13]

Field activities are divided by the Comptroller of the Navy into three classifications: industrial-commercial, modified industrial, and nonindustrial. NIF activities were discussed in detail in Chapter II. Modified industrial activities are Naval Ship Engineering Centers and Ship Repair Facilities. All activities not included in the above

two categories, such as NARDACs, are considered nonindustrial activities [20]. All field activities, except NIF units, are financed by O&MN funds appropriated for the purpose of supporting the mission of the activity.

The RMS accounting system for field activities developed for Project PRIME, features double-entry bookeeping, accural accounting, internal control over all transactions, and integration of cost accounting records with the general ledger accounts. These are the same features that the NIF accounting system employs and were discussed in Section D of Chapter II. RMS accounting utilizes cost centers and job orders in the same manner as NIF accounting. The accounting systems are similar in many ways, as would be expected of any two basic accounting systems, but there are several differneces, primarily in the cost accumulation and overhead distribution areas.

Figure III-4 displays the methods of accounting and distributing overhead at the three types of field activities discussed at the start of this section. Of particular importance is the fact that all nonindustrial activities use a standardized cost accounting system, while the NIF activities are required to have a cost accounting system "custom built" for its operation [13]. Also worthy of note is the degree of cost accumulation necessary to permit accurate overhead distribution in NIF activities to arrive at a true "full cost" figure to charge for their services. In addition,

ACCOUNTING AT FIELD ACTIVITIES

| TYPE OF ACTIVITY | COST ACCOUNTING SYSTEM | OVERHEAD DISTRIBUTION | FINANCING MEDIUM |
|---|---|---|---|
| INDUSTRIAL-COMMERCIAL | Commercial type system adapted specifically to the activity or type of activity | Distributes overhead by cost center in such manner as to recover all costs of operation through reimbursement for product | NIF |
| MODIFIED INDUSTRIAL | Appropriation type system adapted to accomplish the degree of overhead distribution desired | Distributes overhead through adjustment of labor charges | Annual appropriation |
| NON-INDUSTRIAL | Appropriation type system adapted to account functionally for use of funds | Does not distribute overhead | Annual appropriation |

FIGURE III-4.

NIF accounting systems are set up to provide periodic Statements of Operating Results and Balance Sheets for individual cost centers, similar to statements utilized in private industries to measure performance. RMS accounting systems provide periodic performance reports comparing actual expense data to budgeted expense data for the period.

The last major difference between the two accounting systems was brought about by the development of stabilized rates for NIF activities. The RMS accounting system only provides for the recovery of actual costs through charging for reimbursable work. The stabilized rate, as discussed in Chapter II, is developed for the entire fiscal year based on estimated cost data, and is then adjusted to offset prior years' profits or losses. All work performed by NIF activities is billed at the preset stabilized rate and not at the actual cost of the work performed. Under the RMS accounting system, this would not be allowed. [20]

## F. SUMMARY

This chapter provided the reader with a look at the NAVDAC organization. It covered the problems that led to the formation of NAVDAC, its mission and goals, and the field activities established within the NAVDAC organization to accomplish its mission. The chapter concluded with a look at the RMS accounting system under which the NAVDAC

organization currently operates and a comparison of this system to the NIF accounting system discussed in Chapter II. With these chapters as background, the reader will now be able to assess the advantages of NIF to the NAVDAC system.

# IV. ANALYSIS

## A. GENERAL

The Department of the Navy (DON) is not free to make unilateral policy decisions concerning accounting systems for Automated Data Processing (ADP) facilities. It must conform to the policy issued by the Department of Defense (DOD) and by other agencies, especially to directives issued by the Office of Management and Budget (OMB) and the General Accounting Office (GAO). In this chapter, the reader is presented with the official positions on ADP cost accounting and costing guidance from GAO and OMB. In addition, the reader is presented with a look at the Naval Data Automation Command (NAVDAC) Chargeback System (NCS). NCS is a test program implemented in an attmept to comply with the accounting guidelines of GAO. The chapter contains a brief discussion of alternative types of chargeback systems and a comparative analysis of the advantages and disadvantages of the Navy Industrial Fund (NIF) accounting system as opposed to the Resource Management System (RMS), and the NCS. The author's conclusions and recommendations are then presented to finalize the thesis.

## B. ADP COSTING GUIDANCE

The General Accounting Office is the investigatory arm of the Congress and was given the responsibility by the

Budget and Accounting Procedures Act of 1950 to ensure that the accounting and internal control systems of each executive agency "conform to the accounting principles, standards, and related requirements prescribed by the Comptroller General of the United States in accordance with that law." [21]

The GAO viewpoint is that cost accounting should be an integral part of an agency's management control and accounting systems. This cost accounting system should identify and report ADP costs quickly and economically to enable agency managers to:

1. "Compare costs among organizations, activities, operations, and projects;

2. Make informed investment decisions by facilitating: (a) estimates of the cost of implementing proposals for new systems and facilities, (b) preparation of cost-benefit analyses, and (c) cost comparisons with commercial and other alternatives;

3. Establish the cost of work done and measure productivity;

4. Measure the cost of performance of responsible officials;

5. Make end users and top management conscious of the cost of data processing systems and services;

6. Provide the accounting basis for proper charging of appropriation, allotment, and program accounts, as well as the billing for services;

7. Provide the accounting basis for budget justifications and reports to the Congress, Office of Management and Budget, and the public on the cost, custody, and use of the ADP resources." [22]

In 1978, the Comptroller General of the United States stated that "in addition to the general lack of ADP cost accounting, a related problem was that many agencies account for costs by programs. Data processing is seen as a part of the cost of the program, not as a separate item for which costs should be reported. Such agencies may have good cost data for programs, but be unable to separate those costs that apply to ADP. We believe that ADP cost data is so significant that it too is needed and that cost records should be structured so that costs for both data processing and the agencies programs can be identified."[23]

The GAO has issued guidelines for accounting for ADP costs which state that "all significant elements of cost directly related to acquiring computers and associated assets and to performing data processing functions should be collected and accounted for in ways useful for management, budgeting, and external reporting. Organizational boundaries and differences in financing methods should not prevent reasonable compilation of all ADP-related expenses in cost accounts" [23]. The categories of cost which GAO states consitute "full cost" are:

1. "Personnel. Salaries and fringe benefits for civilian and military personnel who perform and manage ADP functions; ADP-related custodial services, security, building maintenance, and contract management.

2. Equipment. Nonrecurring expenditures for acquisition and recurring costs for rental, leasing, and depreciation of computers and associated online and offline ADP equipment.

3. Computer Software. Nonrecurring expenditures for acquisition, and conversion and recurring expenses for rental, leasing, and depreciation of all types of software -- operating, multipurpose, and application.

4. Space Occupancy. Funded and unfunded costs for: (a) rental, lease, and depreciaiton of buildings and general office furniture; (b) building maintenance; (c) regular telephone service and utilities; and (d) custodial services and security.

5. Supplies. Expenditures for noncapital office supplies and general-purpose and special-purpose data processing materials.

6. Inra-agency Services and Overhead. The costs of normal agency support services and overhead, either billed or allocated, and the costs of central management, policy, and procurement services.

7. Contracted Services. Any of the above services if procured contractually." [23]

Furthermore, GAO contends, then, that all direct and indirect costs (overhead) associated with the operation of an ADP facility, including depreciation, should be identified and reported. It stated that "accounting for depreciation of ADP assets is required to obtain full reimbursement of costs and is important for management users who need to know the full cost of ADP services" [23]. It discusses that failing to provide agency management with full costs results in "imprudent decisions" [22]. Some of these imprudent decisions include not choosing the least expensive method of procuring ADP services, continuing projects which should have been terminated, not encouraging cost consciousness in users, and not eliminating sub-marginal uses of data processing resources and services.

GAO firmly believes that users should be made aware of the costs of ADP services which they consume. This should be a primary objective of the cost accounting system, for "by fully accounting for ADP costs, agencies can inform users of the costs of services furnished to them. Thus, made conscious of costs, users can determine whether work done by the computer is worth the cost." [22]

In its guidelines for accounting for ADP costs, GAO states that "a primary objective in accounting for ADP costs is to identify the software and computer processing costs attributable to individual user applications. Such cost information is needed in comparing and predicting costs and in reporting

and billing costs to users" [23]. In its report, "Accounting for ADP Costs Needs Improving", GAO further states that "the full cost of providing ADP services should be aggregated and billed to the using organization's account." [22]

Considering the above two references together, GAO seems to be implying that the "full costs" of ADP services should be accumulated both for management control and for customer billing.

In apparent agreement with GAO, the OMB issued a draft circular in 1979 entitled "Cost Accounting, Cost Recovery and Inter-Agency Sharing of Multi-User Data Processing Facilities." The purpose of the circular was to establish policies requiring Federal agencies to "account for the full cost of operating multi-user, general management ADP facilities, and recover the costs by charging user organizations for the services provided" [24]. The items to be included in the "full costs" of operating an ADP facility are the same as those listed above in the GAO guidelines. The OMB circular states that agencies "...shall share their ADP facilities..." and that the providing organization shall obtain "...reimbursement for the full costs of providing services." [24]

In an undated memorandum to the Assistant Secretary of Defense (Comptroller), the Assistant Secretary of the Navy (Financial Management) (ASN(FM)) stated that "the Navy concurs generally with the concepts contained in the OMB circular."

C. NAVDAC CHARGEBACK SYSTEM (NCS)

In the Short-Range Plan for ADP (FY 76-77), the DON set as one of its goals to move toward operating ADP as a cost support center with users paying direct and indirect costs for services. This Short-Range Plan also stated that the Data Processing Service Centers (DPSC), now called Navy Regional Data Automation Centers (NARDAC) as discussed in Chapter III, would be operated on a reimbursable basis with users budgeting and paying for all ADP support provided. In order to meet this goal, the ASN(FM) established the DPSC Chargeback Test Steering Group and tasked them to examine the feasibility of converting the DPSCs from mission funding to reimbursable funding.

In planning for this DPSC project, the Office of Chief of Naval Operations (CNO OP-91), at that time the organization responsible for the Navy's ADP program, stated that "the performance and economic benefits attainable from a DPSC are not likely to be realized if its services are furnished free of charge. The center should be operated on a fully reimbursable basis. Total costs of operating the center (salaries, equipment, rental, supplies, etc.) should be reflected in a billing and accounting system which permits customers to be billed promptly for fair and accurate costs of all services received. This procedure will allow all ADP support costs to be related directly to both the customer activity and the function supported." [25]

During the Navy reorganization that formed NAVDAC, the steering group was renamed the ADP Chargeback Steering Group, and they tasked NARDAC Washington to develop a standardized chargeback billing system to embrace the following attributes:

1. "Accuracy. The system must accurately compute customer charges.

2. Repeatable. The cost of a job must not be contingent on the system load, e.g., it should cost the same to run job "A" on a completely empty system as it would if job "A" was running with numerous other jobs.

3. Equitable. All charges should be based on use data gathered by the system, with each customer billed only for resources used.

4. Understandable. With minimal training, the customer should be able to determine how the charges for his job were computed.

5. Promote Efficient Use of Hardware. The system should encourage customers to use the computer system efficiently.

6. Auditable. Outside sources should be able to track each billing charge to its proper customer and ensure fair and equitable charges.

7. Cost Recovery. The system, to operate effectively, should recover the cost of operating the computer center."[26]

The general nature of the NCS is financial management information. It gives each NARDAC the capability to provide

chargeback data to each of its customers for computer and labor resources expended on its behalf. Even though the NCS is not a cost accounting system from a formal accounting viewpoint, the system makes it possible for a Navy ADP organization to set up a series of cost accounts which will meet the GAO guidelines in all respects.

The objectives of the ADP chargeback system are:

1. "To improve ADP cost accounting;

2. To increase efficiency of the ADP activity management resulting from a cost-oriented perspective;

3. To increase customer awareness of ADP costs;

4. To cause the customer to critically evaluate their ADP requirements based on the economic value of requested services." [25]

NCS provides for the ongoing measure of resource usage by each customer. The system is designed to provide an equitable and accurate method for charging ADP costs to ten resource pools, made up of nine hardware systems and one labor pool. Individual rates are established for each measurable component of the various resource pools to allow for equitable cost recovery from each customer based on its ADP applications. Users of the resource pools are charged their proportional share of these costs through the use of a billing algorithm. The billing algorithm will develop an Account Charge (AC) by transforming resource usage into the equivalent

economic value in terms of ADP Resource Units (ARUs). ARUs represent the total cost of providing the ADP services in an NIF environment. Figure IV-1 explains the algorithm.

The chargeback system test will be conducted under the accounting procedures for the Resource Management System under the Operations and Maintenance, Navy (O&MN) appropriation. Since chargeback is utilizing RMS, all costs, as computed in ARUs, are not billable to customer activities. Billable costs are computed based on a reimbursable pool constant. This constant represents the percentage of the total pool costs which is legally reimbursable from the customer under RMS accounting procedures as modified for the chargeback test. Therefore, the AC in ARUs will be multiplied by the reimbursable pool constant to develop the actual customer charge. Travel and dedicated equipment charges will not be processed through the billing algorithm but will be charged directly to the customer account.

The RMS procedures pertaining to valid billable reimbursable costs have been modified for the chargeback test to permit the charging of certain overhead costs. Examples of these costs are: costs for indirect support, e.g., salaries for above first line supervision, tape librarian, schedulers, and maintenance personnel; non-dedicated machine rental and maintenance costs; and non-dedicated telecommunication costs. Other modifications to the RMS procedures for the chargeback

## NCS BILLING ALGORITHM

$$AC = \left[ \sum_{j=1}^{k} AFj \left( \sum_{i=1}^{n} Ui * UCi \right) \right] + ( TD * UCFs )$$

AC = Account Charge

AF = Run Category Adjustment Factor. Jobs are charged from 10 to 1000 percent of the basic job charge depending on their priority and time of day they ran.

j = index which varies to include all jobs run using resources.

i = index which varies to include all resources used for a particular job. Values of i represent CPU time, memory time, cards read and punched, pages printed, etc.

k = total jobs run using computer resources.

n = total resources used for a job.

Ui = utilization of resource i in appropriate units.

UCi = unit charge rate for resource i.

TD = file space assigned to the account in track days.

UCFs = unit charge for file space.

FIGURE IV-1

test includes: billing for programmer military labor hours expended; and customer billing based on pooled rates.

Under current RMS procedures, the hourly cost for military labor is considered a non-chargeable reimbursable cost for billing federally funded government activities. However, this procedure has been slightly modified in order to provide an equitable method of charging all customers for programming support provided by NARDACs. Programmer military labor hours expended on behalf of a customer activity will be charged at the applicable labor pool rate. The labor pool rate for programmers will be established based on total available labor hours (military and civilian), but will not include the actual cost of military labor. The final modification of billing at pooled rates deviates from the normal RMS procedures of billing actual cost associated with reimbursable work performed. The employment of pooled rates in the chargeback system allows for equal distribution of the shared ADP resource costs to all users based upon the consumed utilization. [25]

Each fiscal year NARDAC will establish a table of standardized rates at NIF activities, for each operational resource pool. The preparation of these rates for shared computer resources involves the analysis of past utilization and prediction of future changes in system loads. These rates will be established in sufficient time to allow customer activities to adequately plan and budget their ADP requirements for the ensuing fiscal year. To facilitate the

execution phase of the budget, the rates published by NARDACs will remain in effect for the entire fiscal year, thereby permitting customers to determine the impact of increased or reduced ADP requirements on their budgets. Because the NCS relies on fixed rates rather than zero-balancing of costs to reimbursements, customers can rely on their charges being a function of the amount of NARDAC resources utilized. [29]

The chargeback system contains a feature which allows NARDACs to charge premiums or grant discounts based on the customer's job priority and the shift during which the job is run. The feature permits NARDACs to do "load leveling", that is, encourage customers to run their jobs on other than prime shifts with high priority turn-around time. These premiums/discounts are computed based on a run category adjustment table, which is a matrix of percentages by run priority and shift during which the job started. After the basic job charge has been computed, it will be multiplied by the appropriate percentage adjustment to obtain the final job charge. These priority/shift adjustments are not currently authorized. [25]

The chargeback system provides a monthly report to each customer, called the Customer Chargeback Report (CCR). The CCR has been designed to provide the customer with a detailed account of the monthly ADP resource utilization data and the associated charges by resource pool and customer application.

This report is the basic document which shows the resources used by the customer and how charges are developed. The CCR will enable customers to monitor and control the costs for development, maintenance, and production of their job applications [25]. Figures IV-2 through IV-4 display a typical chargeback report.

The NCS was implemented on a test basis at NARDAC San Diego in April 1978. During the initial phase of the chargeback test, statistics were gathered on usage of NARDAC San Diego's resources by its customers. The second phase was designed to provide chargeback reports to all customers and bill these customers based on this report. At present time, the system has been modified to provide the report to all customers but only bill the reimbursable customers based on this report.

## D. FLEXIBLE PRICE CHARGEBACK SYSTEMS

The NCS is an example of the most common type of chargeback system, the average cost system [30]. Under the average cost approach, the estimated total cost of operating the ADP facility for the next period is divided by the estimated utilization for that period to produce a flat rate charge. Part of the reason for the wide use of the average cost chargeback system is that the Federal Government has mandated its use for all cost reimbursement contracts.

CUSTOMER CHARGE REPORT
AUG 1980

REPORT NO. KCH06R01
CUSTOMER: NAVAIREWORKFAC(OA)

PROG VER. 3
REPORT DATE 80090

| JOB ACCOUNT | POOL | RESOURCE | AMT USED | RATE | | ARU | TOTAL ($) |
|---|---|---|---|---|---|---|---|
| | ***** TOTAL FOR SUB-ACCOUNT AZO - MISCELLANEOUS | | | | | 239.10 | $202.68 |
| BAO | B4700 | BATCH JOBS | 20 | .3000 | PER JOB | 6.00 | |
| | | CPU-TIME | .0486 | 168.9242 | PER HOUR | 8.21 | |
| | | MEMORY TIME | .3569 | 4.5425 | PER HOUR | 1.62 | |
| | | I-O TIME | .2219 | 38.2653 | PER HOUR | 8.49 | |
| | | PAGES PRNTD | 351 | .0060 | PER PAGE | 2.11 | |
| | | TAPE MOUNTS | 3 | 1.0000 | PER TAPE | 3.00 | |
| | | TEMP DISK | 1.0200 | 2.1658 | PER K-SEG-HOUR | 2.21 | |
| | | BATCH ABORTS | 2 | .3000 | PER JOB | (.60) | |
| | | CPU-TIME | .0005 | 168.9242 | PER HOUR | (.08) | |
| | | MEMORY TIME | .0067 | 4.5425 | PER HOUR | (.03) | |
| | | I-O TIME | .0062 | 38.2653 | PER HOUR | (.24) | |
| | | PAGES PRNTD | 9 | .0060 | PER PAGE | (.05) | |
| | | TEMP DISK | .0200 | 2.1658 | PER K-SEG-HOUR | (.04) | |
| | | TERM JOBS | 4 | .3000 | PER JOB | 1.20 | |
| | | CLOCK TIME | .0630 | 1.9020 | PER HOUR | .12 | |
| | | CPU-TIME | .0031 | 168.9242 | PER HOUR | .52 | |
| | | MEMORY TIME | .0333 | 4.5425 | PER HOUR | .15 | |
| | | I-O TIME | .0302 | 38.2653 | PER HOUR | 1.16 | |
| | | PAGES PRNTD | 60 | .0060 | PER PAGE | .36 | |
| | | TEMP DISK | .0100 | 2.1658 | PER K-SEG-HOUR | .02 | |
| | | TERM ABORTS | 4 | .3000 | PER JOB | (1.20) | |
| | | CLOCK TIME | .1858 | 1.9020 | PER HOUR | (.35) | |
| | | CPU-TIME | .0012 | 168.9242 | PER HOUR | (.20) | |
| | | MEMORY TIME | .0181 | 4.5425 | PER HOUR | (.08) | |
| | | I-O TIME | .0169 | 38.2653 | PER HOUR | (.65) | |
| | | PAGES PRNTD | 16 | .0060 | PER PAGE | (.10) | |
| | | | | | BASE ARU | 35.17 | |
| | | | | | ADJUSTMENTS | 0.00 | |
| | | | | | POOL TOTAL | 35.17 | $31.08 |
| | EAH | BLOCK JOBS | 176 | .5000 | PER JOB | 88.00 | |
| | | CLOCK TIME | 262.5328 | 18.4184 | PER HOUR | 4,835.43 | |
| | | | | | BASE ARU | 4,923.43 | |
| | | | | | ADJUSTMENTS | 0.00 | |
| | | | | | POOL TOTAL | 4,923.43 | $1,194.75 |



FIGURE IV-2.

CUSTOMER CHARGE REPORT
AUG 1980

REPORT NO. KCHO6R01 PROG VER. 3
CUSTOMER: NAVAIREWORKFAC(OA) REPORT DATE 800909

| SUB ACCOUNT | POOL | RESOURCE | AMT USED | RATE | | ARU | TOTAL ($) |
|---|---|---|---|---|---|---|---|
| BAO | LABOR | PROG/ANALYST | 30.00 | 17.1658 | PER HOUR | 514.97 | |
| | | | | | BASE ARU | 514.97 | |
| | | | | | ADJUSTMENTS | 0.00 | |
| | | | | | POOL TOTAL | 514.97 | $422.28 |
| | OCR | BLOCK JOBS | 62 | .5000 | PER JOB | 31.00 | |
| | | CLOCK TIME | 12.9332 | 41.9504 | PER HOUR | 542.55 | |
| | | | | | BASE ARU | 573.55 | |
| | | | | | ADJUSTMENTS | 0.00 | |
| | | | | | POOL TOTAL | 573.55 | $511.63 |
| | PPS | BLOCK JOBS | 1 | .5000 | PER JOB | .50 | |
| | | PAGES | 111 | .0191 | PER PAGE | 2.12 | |
| | | | | | BASE ARU | 2.62 | |
| | | | | | ADJUSTMENTS | 0.00 | |
| | | | | | POOL TOTAL | 2.62 | $2.44 |
| | U1100 | BATCH JOBS | 537 | .3000 | PER JOB | 161.10 | |
| | | CPU-TIME | 13.8669 | 198.4689 | PER HOUR | 2,752.43 | |
| | | MEMORY TIME | 344.3399 | 11.8542 | PER HOUR | 4,081.87 | |
| | | I-O TIME | 39.9459 | 45.6478 | PER HOUR | 1,823.44 | |
| | | CARDS READ | 107,156 | .0001 | PER CARD | 10.72 | |
| | | CRDS PUNCHED | 200,164 | .0020 | PER CARD | 400.33 | |
| | | PAGES PRNTD | 136,822 | .0060 | PER PAGE | 820.93 | |
| | | TAPE MOUNTS | 1,090 | 1.0000 | PER TAPE | 1,090.00 | |
| | | TEMP DISK | 92,518.7000 | .0210 | PER TRACK-HOUR | 1,942.89 | |
| | | BATCH ABORTS | 8 | .3000 | PER JOB | ( 2.40) | |
| | | TAPE MOUNTS | 29 | 1.0000 | PER TAPE | ( 29.00) | |
| | | TERM JOBS | 36 | .3000 | PER JOB | 10.80 | |
| | | CLOCK TIME | 10.1230 | 7.2983 | PER HOUR | 73.88 | |
| | | CPU-TIME | .0497 | 198.4689 | PER HOUR | 9.86 | |
| | | MEMORY TIME | .7064 | 11.8542 | PER HOUR | 8.37 | |
| | | I-O TIME | .1099 | 45.6478 | PER HOUR | 5.02 | |
| | | CARDS READ | 532 | .0001 | PER CARD | .05 | |
| | | PAGES PRNTD | 206 | .0060 | PER PAGE | 1.24 | |
| | | TAPE MOUNTS | 11 | 1.0000 | PER TAPE | 11.00 | |
| | | TEMP DISK | 44.3600 | .0210 | PER TRACK-HOUR | .93 | |
| | | PERMANENT DISK | 337,514 | .0050 | PER TRACK DAY | 1,687.57 | |



FIGURE IV-3.

CUSTOMER CHARGE REPORT
AUG 1980

REPORT NO. KCHOGR01
CUSTOMER: NAVAIREWORKFAC(OAI

PROG VER. 3
REPORT DATE 800909

| SUB-ACCOUNT | POOL | RESOURCE | AMT USED | RATE | ARU | TOTAL ($) |
|---|---|---|---|---|---|---|
| | | | | BASE ARU | 14,892.43 | |
| | | | | ADJUSTMENTS | 0.00 | |
| | | | | POOL TOTAL | 14,892.43 | $13,209.02 |
| | ***** TOTAL FOR SUB-ACCOUNT BAO - PREP OF OPERATING DOCS | | | | 20,942.17 | $18,371.23 |
| CAO | EAM | BLOCK JOBS | 102 | .5000 PER JOB | 51.00 | |
| | | CLOCK TIME | 123.5506 | 16.4184 PER HOUR | 2,275.60 | |
| | | | | BASE ARU | 2,326.60 | |
| | | | | ADJUSTMENTS | 0.00 | |
| | | | | POOL TOTAL | 2,326.60 | $1,982.25 |
| | FICHE | BLOCK JOBS | 96 | .5000 PER JOB | 46.00 | |
| | | MASTER FILM | 8 | .1220 PER FRAME | .98 | |
| | | MASTER FICHE | 294 | 3.2699 PER FICHE | 961.35 | |
| | | DUP FICHE | 1,136 | .1189 PER FICHE | 135.07 | |
| | | | | BASE ARU | 1,145.40 | |
| | | | | ADJUSTMENTS | 0.00 | |
| | | | | POOL TOTAL | 1,145.40 | $963.24 |
| | LABOR | PROG/ANALYST | 183.00 | 17.1658 PER HOUR | 3,141.34 | |
| | | | | BASE ARU | 3,141.34 | |
| | | | | ADJUSTMENTS | 0.00 | |
| | | | | POOL TOTAL | 3,141.34 | $2,575.91 |
| | OCR | BLOCK JOBS | 38 | .5000 PER JOB | 19.00 | |
| | | CLOCK TIME | 19.2337 | 41.9504 PER HOUR | 806.86 | |
| | | | | BASE ARU | 825.86 | |
| | | | | ADJUSTMENTS | 0.00 | |
| | | | | POOL TOTAL | 825.86 | $736.68 |



FIGURE IV-4.

There are drawbacks to the average cost method. Since "the cost per unit time of owning and operating a computer is fairly constant over its life and depends only slightly on the amount of work done" [31], the utilization is going to drive the chargeback rate. As utilization of the computer increases, the rate to be charged decreases because of the relatively fixed cost of computer ownership. This decreasing rate may induce users to request more services, perpetuating the spiral. A decrease in utilization causes the opposite spiral as rates go up and usage goes down. Because of this fact, under an average cost system, it is possible for a customer to use fewer hours of computer time and find his charges going up because of a decrease in total computer utilization.

The average cost system can be used successfully to attain a goal of cost recovery. However, if the goal of the chargeback system is resource allocation or to affect resource utilization, which are also common reasons for instituting chargeback systems, the average cost system is not as effective. Since the average cost system is based on the cost of furnishing services, it can not be used to affect resource utilization.

It should be noted that, when the goal of the charging system is more than just the recovery of costs, there need be no direct relationship between the cost of providing a service and the price charged the user. Price can be based

upon the economic demand for the resource: the scarcer the resource, the higher its price. "If demand for a good is low, its price may well fall below cost, transmitting information to the producer that demand is inadequate. Unless price is permitted to fall below cost, the proper information about demand may never be obtained, and the allocation of resources can never adjust properly to the unprofitability of that good." [33]

If ADP resource utilization is the main concern of management, a system of flexible pricing based on the economic value of the resource rather than average cost should be utilized. "If some resource is constrained in the amount that can be obtained, then it is priced according to its economic value, not according to its cost" [32]. In that way, the different prices charged for different resources can affect their utilization.

Another important aspect of flexible price chargeback systems is that they recognize that there is a difference in value among different levels of service or turnaround time. Because the prices do not have to be based on cost, under flexible pricing systems, different prices could be set for several different service levels (e.g., Level 1 is a turnaround time of one hour; Level 2 is a turnaround time of four hours; etc.).

If Central Processing Unit (CPU), or any other resource, is congested during a particular shift, flexible pricing can

be used very effectively to help smooth out the peaks. By making the price for CPU use an increasing function of time (e.g., cost for the second five minutes is twice that of the first) during busy shifts and a decreasing function of time during under-utilized shifts, users will have a strong economic motivation to run long jobs during slack periods. [20]

The consensus of opinion in the literature reviewed by the author is that flexible price systems are superior for resource allocation and resource utilization to average cost systems, even if the latter is supplemented by a priority system [30]. A modified average cost system developed by separating variable costs from fixed costs in computing the charge rates has the potential for fulfilling the goal of resource allocation. This would probably require a modification to the Navy's budget allocation system. Flexible price chargeback systems can be used to satisfy all three mentioned goals of chargeback systems. Their chief drawback is that, because they are more elaborate than other systems, they are more expensive to program, run, and administer.

There is another self-imposed drawback that pertains only to Government activities. It is the opinion of NAVCOMPT counsel (in an undated memorandum) that, pursuant to the Economy Act, 31 U.S.C. 686, charges to user activities should reflect only actual costs incurred [20]. Therefore, neither variable prices nor shift differentials are allowable, because they are based upon the economic value of the services, not

the cost of operating them. Thus, the goal of cost recovery can be met by Navy chargeback systems, but, since an average cost system must be used, the goals of resource allocation and utilization cannot be met.

## E. COMPARATIVE ANALYSIS OF NIF, NCS, AND RMS

As a summary of the information presented in the previous chapters, the author's perceptions of the comparative advantages and disadvantages of NIF, NCS, and RMS are presented in this section. These perceptions are summarized in a decision matrix presented as Figure IV-5. No attempt has been made by the author to rank the characteristics in any order.

Since NCS is designed to present the total cost of providing ADP services in an NIF environment, many of the benefits of NIF will also apply to NCS, though not necessarily at the same level. However, one must remember that NCS is not a formal cost accounting system, and is only a test system designed to meet the GAO guidelines for ADP cost accounting within the existing RMS accounting system. In addition, under the current NCS, only about 50 percent of NARDAC San Diego's services are reimbursables. The other customers are provided a CCR for information purposes only.

It is also the author's perception, based on the literature reviewed on NIF and chargeback systems in general, that NIF activities utilize a basic "average cost" chargeback system in their accounting principles, and, therefore, the

COMPARATIVE ANALYSIS OF NIF, NCS, AND RMS

| CHARACTERISTIC | NIF | NCS | RMS |
|---|---|---|---|
| 1. Cost Accumulation | ++ | + | – |
| 2. Cost Recovery | ++ | + | – |
| 3. Facilitates Management Decisions | ++ | + | – |
| 4. Resource Allocation | – | – | – |
| 5. Affects Resource Utilization | – | – | – |
| 6. Effective & Efficient ADP Utilization | ++ | + | – |
| 7. Meets GAO Guidelines | ++ | + | –– |
| 8. Presents Data on Program and ADP Basis | ++ | + | Ø |
| 9. Stabilized Rates | ++ | + | – |
| 10. Fast Payback Program | + | Ø | Ø |
| 11. Cost Accounting System | ++ | Ø | – |
| 12. Indication of ADP Demand | ++ | + | – |
| 13. Implementation Costs | –– | – | ++ |
| 14. Organizational Change | –– | – | ++ |
| 15. Flexible Pricing | – | – | – |
| 16. Working Capital Funds | + | – | – |

Legend:

++ = big advantage
+ = advantage
Ø = neutral
– = disadvantage
–– = big disadvantage

FIGURE IV-5.

basic advantages and disadvantages of chargeback systems found in most literature on the subject apply also to NIF. Therefore, since NIF and NCS both utilize a basic average cost chargeback system, the primary differences in a comparative analysis between the two will be in the levels to which they achieve their common objectives.

The characteristics presented in Figure IV-5 are discussed below:

1. Cost Accumulation. Under RMS, only the direct costs of a job are accumulated. Under NIF, the "full cost" of providing ADP services is accumulated through allocation of the indirect costs (overhead) to individual jobs. This presents management with a better understanding of the true cost of providing ADP services. Under NCS, NAVDAC had to get a modification to the RMS accounting system to allow them to charge overhead back to individual jobs. These modifications allow NCS to accumulate a truer picture of full costs, but it is still not as inclusive of the indirect costs as NIF.

2. Cost Recovery. As opposed to RMS, under NIF and NCS, activities are allowed to charge the customers for the "full cost" of jobs based on the accumulated costs from the cost accounting system. However, NCS has been modified to furnish informational reports only to about 50 percent of the customers, while the other 50 percent is actually billed for their ADP usage.

3. Facilitates Management Decisions. Under NIF and NCS, management has the cost data necessary to make decisions about the future. Accurate cost data will enable management to avoid "imprudent" decisions. Under RMS, without "full cost" data available, management does not have sufficient information to make cost-benefit decisions.

4. Resource Allocation. None of the above systems effectively meet the goal of resource allocation. A flexible pricing system would.

5. Affects Resource Utilization. None of the above systems effectively meet this goal. A flexible pricing system would.

6. Effective and Efficient Utilization of ADP Resources. NIF and NCS force end-users to be conscious of the cost of services because the users are not paying for these services from their budgets. Under these systems, customers are provided with cost data, and then they make their own ADP requirements decisions and justify these requirements in the budget process. This also creates a "buyer-seller" relationship and forces the ADP management to be efficient.

7. Meets GAO Guidelines. NIF meets the published guidelines in their entirety. NCS was designed as an attempt to meet the guidelines while still utilizing the RMS system. The reason the guidelines were promulgated was because of how poorly GAO felt the cost accounting was under RMS.

8. Presents Data on Program and ADP Basis. Under NIF and NCS, cost data is accumulated both on a program basis from the customer's budget, and on an ADP special interest basis from the NARDAC budgets.

9. Stabilized Rates. The use of stabilized rates under NIF enables the users to budget on an "end-product" basis. They know in advance the price of the services, and therefore can plan on receiving all of the work they had planned for at the cost they had budgeted for. NCS utilizes standardized rates which permit similar benefits, but it has no mechanism to adjust rates for prior year profits or losses like NIF does.

10. Fast Payback Program. The new Fast Payback Program for NIF activities provides another avenue for smaller procurements not available under RMS or NCS. This could be extremely beneficial to ADP facilities by allowing procurement of more efficient hardware and software to streamline services.

11. Cost Accounting System. NIF utilizes a "tailor-made" cost accounting system for each type of activity, instead of the general cost accounting system utilized by all activities under RMS. NCS is not a formal cost accounting system, but is an attempt to modify the RMS system to allow accumulation of "total costs" in cost accounts established for the test. It does not fit into any established accounting system but is a hybrid of RMS that approximates NIF.

12. Indication of ADP Demand. Under NIF and NCS, management receives a true indication of the demand for ADP services, and thereby is able to prevent the acquisition of unneeded hardware. This also provides management with the economic justification for new procurements.

13. Implementation Costs. Implementing any new system costs money. There is a basic changeover cost to any change. This would include changing the accounting records and training personnel in new procedures. There is no increase in real income while real costs are incurred. These costs would be necessary to continue implementation of NCS or, to a greater extent, to switch to NIF.

14. Organizational Change. NIF would be a change from the current system, and all organizations have a natural resistance to change. Both customers and ADP facilities are used to the present system, and it would require a "break-in" period before a new system could operate as effectively. Since NCS is a modification of the current RMS system, the resistance to NCS would not be as great as to NIF.

15. Flexible Pricing. None of the systems afford the opportunity to utilize flexible pricing, and NAVCOMPT has indicated that flexible pricing would not be authorized if the mechanism were available.

16. Working Captial Funds. NIF is the only one of the three systems that operates under working capital funds and is therefore relatively free from the annual appropriation cycle.

In spite of the arguments against NIF and chargeback systems in general, the subject of utilizing chargeback systems for ADP facilities is not nearly as controversial now as it was in the late 1960s and early 1970s. The majority of authors and ADP management personnel feel that a well thought-out, carefully implemented chargeback system more than pays for itself [20]. The only question they leave unanswered is what type of chargeback system to utilize.

## F. CONCLUSIONS AND RECOMMENDATIONS

This study concerned NAVDAC and the appropriate accounting system under which it should be operated. A review of NIF and NAVDAC were presented as background for the study. Then discussions of the current literture on chargeback policies and the GAO and OMB positions on ADP cost accounting were presented. A summarization of this data was presented in a decision matrix comparing NIF, NCS, and RMS.

From the above discussions, it appears to the author that the impetus in the future within the Federal Government, from both the Legislative (GAO) Branch and the Executive (OMB) Branch, will be towards ADP accounting policies which are more in keeping with those of commercial service bureaus than those which are currently promulgated by DON.

The major conclusion reached by this study is that RMS is not the appropriate accounting system under which the NAVDAC/NARDAC family should be operated. This is the apparent

message that GAO and OMB have been trying to get across to DON with their guidelines and discussions on ADP costing policies. DON even published this as one of their goals in the FY 76-77 Short-Range Plan for ADP.

The DON attempt to implement this goal and meet the GAO and OMB guidelines was the NCS. The NCS was a good concept and has been effective in partially meeting these goals, considering the limitations imposed by remaining within the RMS with several modifications. The biggest stumbling block in the way of NCS, however, is acceptance from the users. All customers, whether reimbursable or mission funded, receive the statistical cost data reported in the CCR, and therefore have the opportunity to utilize this data in making their ADP decisions. However, the incentive to analyze the cost data in the CCR and utilize this data to improve the effectiveness and efficiency of their ADP utilization is not the same for the mission-funded customers as for the reimbursable customers. Until all of the customers are on a reimbursable basis, this author contends that they will treat the CCR as another piece of paper to be filed away instead of analyzing the variances from previous reports and looking for ways to trim their ADP costs and maximize efficient utilization.

At the 1979 CNO Financial Management Conference, the Comptroller for the Commander in Chief, U.S. Pacific Fleet (CINCPACFLT), announced that CINCPACFLT will only support a

statistical chargeback system and will not concur with a "live" chargeback system, or one where their subordinate commands would become reimbursable customers to the NARDACs. This implies that, while the CCR might be a good management tool, the customers do not want to have to justify their own ADP budget and streamline their ADP costs. This is a prime example of the "organizational resistance to change" that must be overcome before NCS can become truly effective. This author contends that, even though the benefits to the system are apparent, all the customers can see is a potential for additional responsibility for themselves and not the potential monetary savings they can acrue.

This example points out what the author considers the primary advantage of NIF over NCS, that under NIF every customer is a reimbursable customer. By converting NARDACs to NIF field activities, one circumvents the power struggle that will develop over which customers should be reimbursable and which ones mission funded.

It is important to note that this study made its conclusions based on the guidelines and directives promulgated by higher authorities concerning chargeback systems. These directives indicated that flexible pricing chargeback systems would not be permitted at Government activities. The author feels that the goals of resource allocation and of affecting resource utilization are too important to be eliminated from consideration for Government activities and recommends that

further studies be conducted to make authorities aware of the benefits from a flexible pricing chargeback system as opposed to the standard Governmental average cost system.

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