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SYSTEM INTEGRATION AT NAVY STOCK POINTS.(U)
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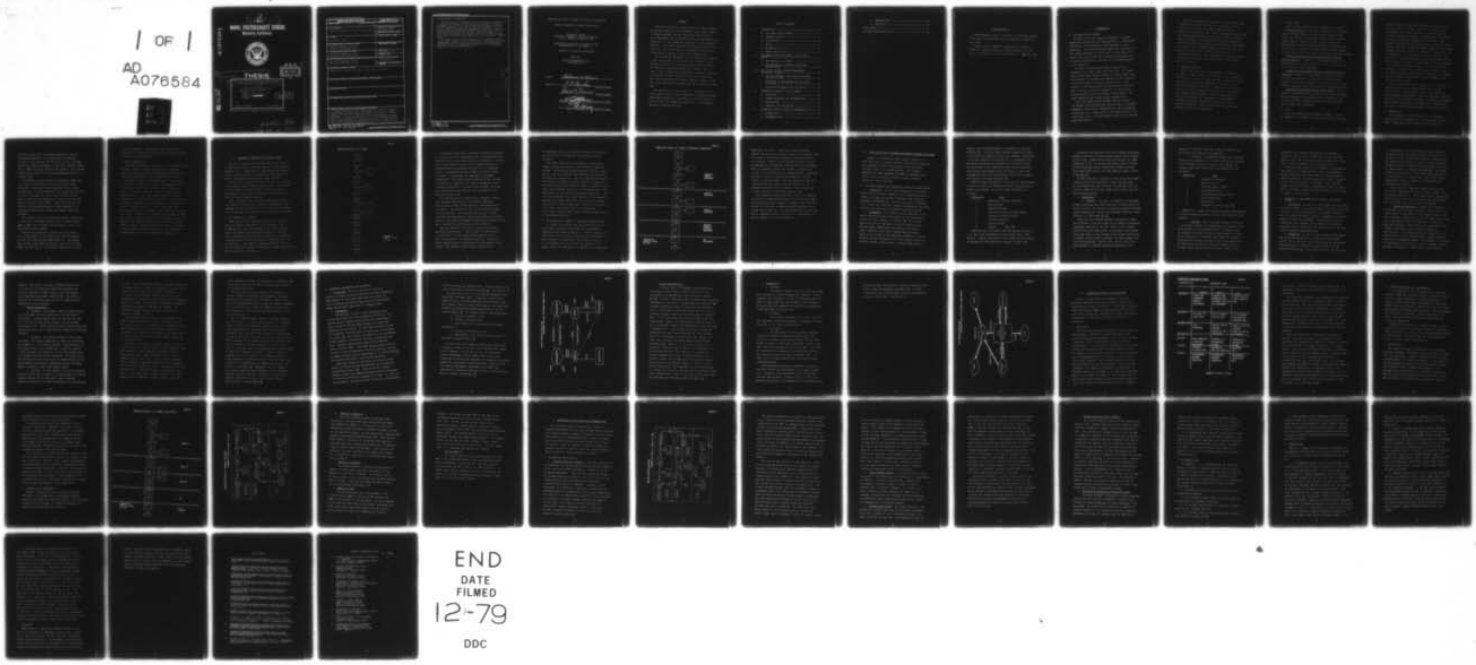

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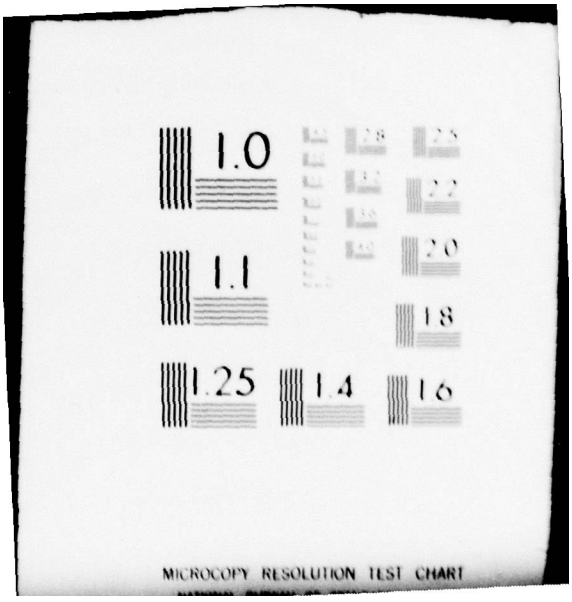
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Monterey, California

(9) Master's THESIS

(6) SYSTEM INTEGRATION AT NAVY STOCK POINTS.

by

(10) Richard W. Kline

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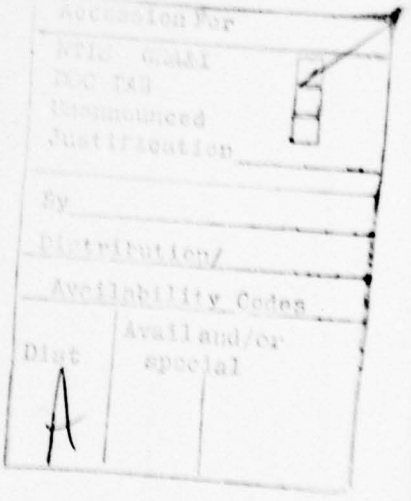
The main thrust of this thesis is to determine if the total logistic effort could be improved by integrating three independent systems into one production oriented system to better control the commercial acquisition of non-standard material at Navy Stock Points.



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System Integration at Navy Stock Points

by

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Lieutenant Commander, United States Navy
B.B.A., Temple University, 1969

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

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ACKNOWLEDGEMENTS

Acknowledgement is due to the Navy Fleet Material Support Office and the Naval Supply Center, Oakland for support of this study.

I should like to express my appreciation to CDR E. A. FINCKE, SC, USN who served as the major advisor for this study. I should also like to thank LCDR D. V. LAMM, SC, USN.

I. INTRODUCTION

A. THE NAVAL SUPPLY SYSTEM

The major job of all logistics personnel is to make operational availability as high as possible. (Operational availability is the percent of time equipment is "up", operating.) The factor affecting operational availability that supply personnel can affect most is mean supply response time (the average time elapsing from preparation of an end-use requisition to delivery of the needed material to the mechanic).

In order to minimize mean supply response time, customers (e.g. ships) carry their own stock. Of course these stocks cannot always include all needed items, therefore requests for material not available in the customer's inventory are sent to a nearby shore activity. Some fraction of the requisitions the shore activity receives must, for lack of stock, be passed to the next echelon, another stock point or an inventory control point. All these operations add to mean supply response time.

Thus, the supply system extends from the factory to the mechanic and includes many functions such as inventory management, acquisition, transportation, data processing, accounting, etc. A major link in this supply chain is the stock point, such as a Naval Supply Center or an Industrial Naval Air Station.

This thesis examines the separate but related functions performed at a stock point which contribute to the total logistic effort (e.g., inventory control, material acquisition, and accounting). These functions are associated with satisfying requisitions and can be thought of as production processes. The stock point receives a requisition and either issues the material from Navy stocks or purchases it, performs the necessary financial accounting, then completes the requisition. These functions need to be controlled through the use of management information systems to minimize mean supply response time while maintaining quality standards.

B. RESEARCH QUESTION

Navy Stock Points have three management information systems in various stages of development to aid in managing the inventory control, acquisition, and accounting functions. Although each system was independently designed for a specialized purpose, there may be opportunities for interaction since their underlying functions are interrelated. The research sought answers to the following question: What are the significant interfaces in the management information systems concerned with inventory control, material acquisition, and accounting and how might these systems be effectively integrated?

C. DEFINITIONS

The following terms are used throughout this thesis:

Navy Stock Point: Within the organization of the Naval Supply Systems Command there are activities whose major mission is supply; they are Naval Supply Centers and Naval Supply Depots. These activities along with Naval Air Stations are called stock points because they maintain and issue stocks of material to furnish balanced supply support to fleet units, shore activities, and overseas bases [1:11052].

Uniform Automated Data Processing System for Stock Points (UADPS-SP): UADPS-SP is a management information system designed to assist Navy Stock Points with financial and inventory accounting [2:12].

Automation of Procurement and Accounting Data Entry II (APADE II): APADE II is a management information system for Navy purchasing activities that automates document preparation and record keeping as well as provides on-line document tracking capabilities and report preparation [3:4].

Integrated Disbursing and Accounting (IDA): IDA is a financial processing system designed to use modern automated data processing and telecommunications techniques to consolidate the Navy's disbursing and accounting functions into a single data base [4:1].

D. SCOPE

Since the capabilities of UADPS-SP, APADE II, and IDA are complex it is impossible to explore, within a reasonable

amount of time, all possible interfaces of these systems as they relate to the many functions of a stock point. Accordingly, this study explores the opportunities for interface between the systems by examining how they process one type of operation, purchase action control. This operation was selected for three reasons: First, the timeliness of purchase actions has a direct impact on mean supply response time and therefore on operational availability. As a consequence, it is important that when a customer (e.g., fleet unit) submits a requisition requiring purchase action that a suitable information system keep both the purchasing activity and the customer abreast of all current status. Secondly, a purchase action enters the functional areas of all three information systems under consideration. Thirdly, the Navy channels a great deal of money through purchase actions at stock points.

While reading this thesis it might help to visualize a requisition entering the supply system at a customer service desk at a Naval Supply Center, and subsequently being purchased commercially, received, delivered, and paid for, all as one continuous process. This paper will analyze the processes involved as a purchase action completes its life cycle in the automated systems at a Navy Stock Point.

E. METHODOLOGY

In the summer of 1978 the Director of the Regional Financial Services Department at the Naval Supply Center (NSC), Oakland perceived a potential problem with the

interface between his bill paying organization and the Purchasing Department. He anticipated an inadequate exchange of data between the IDA system and the new APADE system that was being designed by the Fleet Material Support Office (FMSO) and being tested at NSC Oakland. The director offered this problem to the Naval Postgraduate School for further study.

The Regional Financial Services Department (RFSD) had just recently become part of the Naval Supply Center; previously it had been the Navy Regional Finance Center, San Francisco. The new department was formed under the IDA concept by combining the accounting functions from the supply center with the disbursing function from the Navy Regional Finance Center (NRFC). After visiting both the RFSD and the Purchasing Department there appeared to be inadequate communication between the systems' users and designers.

The researcher next visited Mechanicsburg, Pennsylvania to observe the IDA/APADE interface at the central design agency, FMSO, and to examine the IDA system in use at the Ships Parts Control Center.

Data for this paper was collected on three levels; (a) field research at NSC Oakland and phone discussions with NSC San Diego and NSC Puget Sound, (b) discussions with central design agency personnel concerned with UADPS, APADE, and IDA, and (c) publication research as indicated

in the bibliography. Although all three methods were necessary, interviews with the personnel involved generated the most useful information.

F. THESIS ORGANIZATION

The format described in the table of contents was chosen because it seems to present the material in a logical sequence by defining the problem, gathering pertinent data, formulating alternatives, and recommending a solution.

The supply support process performed at stock points is described in Chapter II in terms of management control of three major functions: inventory control, material acquisition, and accounting. Chapter III describes the UADPS-SP, APADE II, and IDA systems designed to assist management in controlling these functions. Each system is discussed independently in sufficient detail to allow the reader to compare their objectives, backgrounds, and physical descriptions in general terms. Analysis of system objectives, compatability of hardware and software packages, and potential system interfaces are discussed in Chapter IV. Chapter V will present possible interfaces and the fundamental concepts of system design such as user involvement, top-level support, and sufficient time. The researcher's recommendations will also be advanced in Chapter V.

II. MANAGEMENT CONTROL AT NAVY STOCK POINTS

The flow of requisitions through a Navy Stock Point is a continuous production process, similar to an automobile assembly line. A requirement or order enters the process at one end and a product is delivered at the other after various intermediate processes have been completed.

Part A of this chapter describes the flow of a purchase action request through a Naval Supply Center. The process of a requirement flowing through a stock point can be depicted as continuous motion throughout the system much like oil moving through a pipeline.

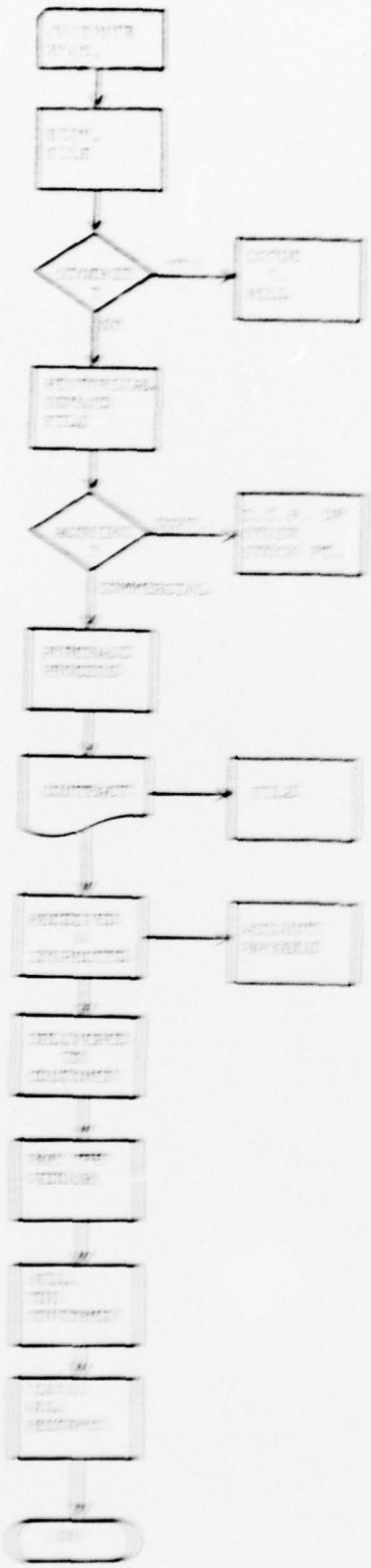
Part B describes the functional compartmentalization of the production process into specialized departments, and suggests that the continuous flow of oil may be interrupted like the pouring of oil from one functional drum to another.

A. THE PROCESS AS A SYSTEM

Navy Stock Points' major major mission is to provide goods and services required by their customers. They accomplish this using two methods, first by anticipating fleet requirements and stocking the material to satisfy these requirements, and secondly by reacting to individual customer requisitions by acquiring the items when stock is not available. This paper is concerned primarily with the second method, the process of satisfying customer requisitions, which is depicted in Exhibit 1.

EXHIBIT I

REQUISITION PROCESS AS A SYSTEM



The process begins when a customer's requisition arrives at a stock point; the requirement must be recorded and stock checked to see if the item is carried in inventory. In this case we will assume the item is not carried and must be acquired either from another stock point or a commercial source. A determination must be made as to which course to follow. Let us assume the item must be purchased commercially. The record keeping required so far includes a record of all demands by line item to determine future stocking requirements, a record of each document received, its current status and location, and an estimate of the expected delivery date.

The item must now be ordered from a commercial source. This requires identification of potential suppliers, solicitation of bids, source selection, and preparation of a contract. The contract as well as the requisition must both be monitored. This requires the ability to cross-reference the requirement by requisition number and contract number or Procurement Instrument Identification Number (PIIN), and to record the current status of the contract.

When the material is received it must be controlled physically and fiscally. First it must be identified to a contract so it can be inspected and approved, then it must be delivered to the requiring activity. Finally an account payable must be established to allow payment to the vendor. The material control process needs access to

outstanding contracts and requisitions and the ability to record receipt of the material and prepare shipping documents.

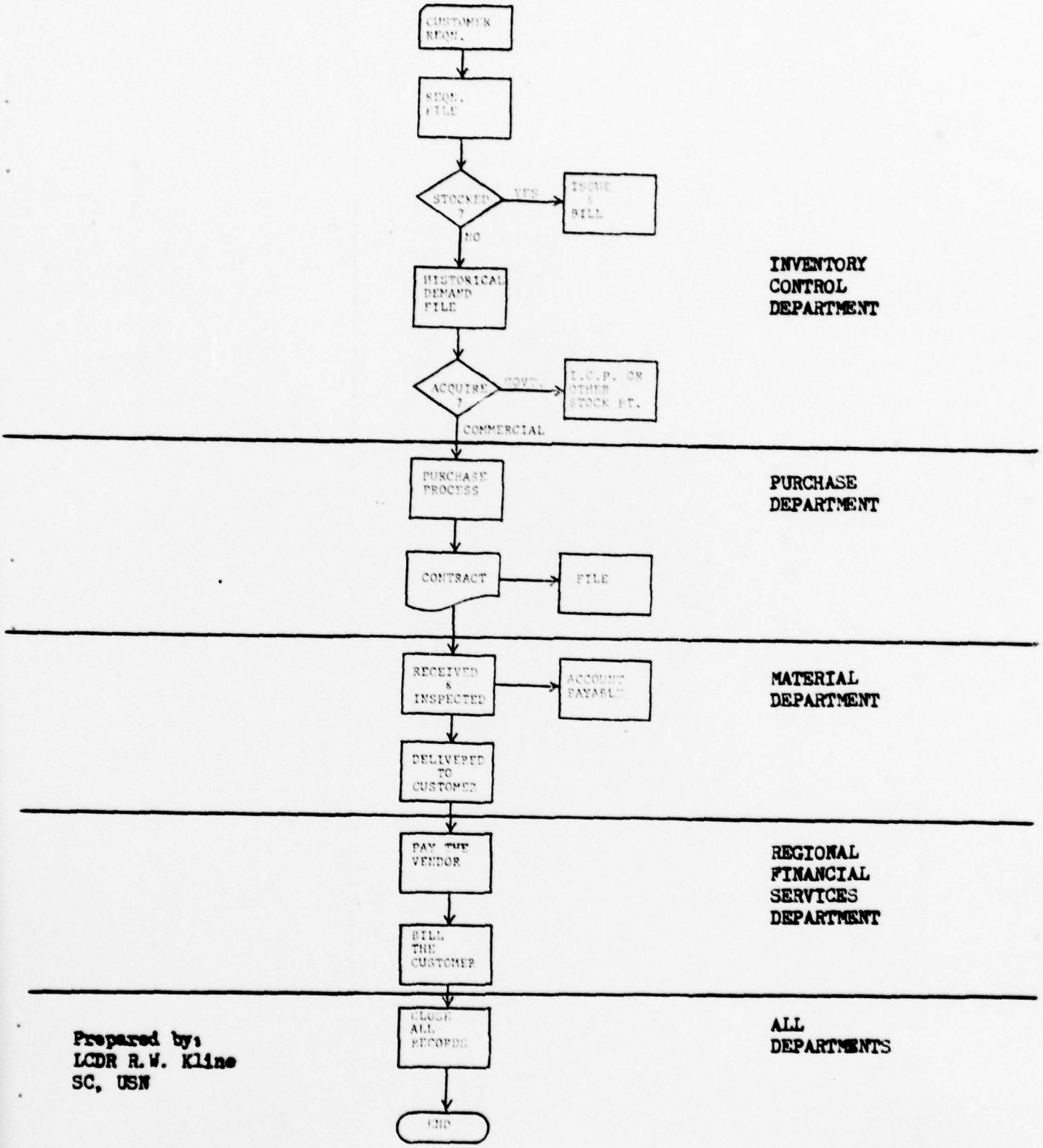
The final functions of this process are paying the vendor, billing the customer, and closing all applicable records. This requires matching material receipt, vendor invoice, and the contract; then disbursing the funds and recording the transaction. Also, the requisitioner must be identified and charged the correct amount. Finally, all records reflecting this transaction must be updated accordingly, which demands visibility of every work station that participated in processing the original requirement. These functions represent only a small portion of the management processes at a Navy Stock Point, but because the annual expenditure of funds through these acquisition functions is so large, they deserve special consideration. In Fiscal Year 78 Naval Supply Centers purchased $389 million of non-standard material.

B. THE PROCESS AS A SERIES OF FUNCTIONAL ORGANIZATIONS

To control this process most Navy Stock Points have functionally separated the process into departmental organizations as shown in Exhibit 2. When the requisition enters the stock point the Inventory Control Department will determine if the material is available for issue. If it is determined that the item is not carried in the supply system, the requisition is passed to the Purchasing

EXHIBIT 2

REQUISITION PROCESS AS A SERIES OF FUNCTIONAL ORGANIZATIONS



Prepared by:
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Department for action. After the contract has been awarded, the next functions are receipt of the material from the vendor by the Material Department and distribution to the customer. Payment and accounting functions are then accomplished by the Regional Financial Services Department. When one department passes the document to another for action it is not absolved of its responsibility. Each must maintain a record to indicate what happened to every document it has processed. When the transaction has been completed every file reflecting the existence of the original requirement must be updated. This necessitates feedback through the functional organizations.

The homogenous system described in Part A is therefore controlled by compartmentalizing it into functional organizations and placing a manager in charge of each function. Chapter III describes information systems managers use to control these functions. In controlling their piece of the system, management must be careful not to suboptimize, but must be mindful of the entire process.

III. NAVY STOCK POINTS AUTOMATED MANAGEMENT INFORMATION SYSTEMS

Chapter II described the supply support process at a Navy Stock Point in terms of related functions and indicated that management control focused more on the individual functions than on the overall process. This chapter describes the three management information systems used to control three functions; inventory control, material acquisition, and accounting.

A. UNIFORM AUTOMATED DATA PROCESSING SYSTEM FOR STOCK POINTS

1. Objectives: The Uniform Automated Data Processing System for Stock Points (UADPS-SP) is a standard mechanized system for supply and non-Navy Industrial Fund financial management programs [5:7]. The main objective of UADPS-SP is to control and coordinate material requirements, inventory, receipts and issues within budgetary constraints [5:7].

2. Background: The concept of using computers to aid supply distribution was first applied at the Naval Supply Center, Norfolk, Virginia in 1956 [6:2-1]. The initial application was an experiment to see if a machine could process supply transactions and maintain stock record cards, tasks that previously consumed many man-hours. Based on the success of the experiment computers of various descriptions were installed at the Naval Supply Centers in Oakland, Bayonne, and San Diego, the Naval Supply Depot in

Newport, and the Naval Shipyard in Charleston in 1957 and 1958 [6:2-1]. The Naval Supply Systems Command then known as the Bureau of Supplies and Accounts (BUSANDA) established a full-time committee in February 1961 to standardize the mechanized procedures and equipment at Navy Stock Points. The objectives of the committee included minimizing system specification development costs, ADP analysis costs, and programming costs; and establishing uniform supply management policies and procedures [6:2-1].

UADPS-SP began development in 1962 when six participating stock points were each assigned particular applications to analyze and program. The initial eight applications included:

Application	Area
A	Requisition History and Status
B	Receipts/Dues
C	Demand Processing
D	Inventory Control File Maintenance
E	Financial Inventory Control
F	Stores Accounting
G	Cost Accounting
K	Payroll [6:2-2]

UADPS was born on 15 March 1963 when applications A, B, C, D, and E were implemented at Naval Supply Depot (NSD), Newport, Complete conversion to full UADPS was successfully accomplished at NSD Newport on 15 August 1963 [6:2-2].

To replace decentralized stock point program maintenance BUSANDA established the Data Systems Support Office (DASSO) in April 1964. DASSO would develop and maintain all UADPS programs [6:2-2]. The Systems Development Branch of DASSO located at Mechanicsburg, Pennsylvania became the Stock Point UADPS Task Force of the Fleet Material Support Office in 1965 [5:1].

By 1966 UADPS was in operation at all seven Naval Supply Centers and the Naval Shipyard on Puget Sound [6:2-3]. By 1970 UADPS-SP had been extended to Industrial Naval Air Stations, Naval Air Stations, Naval Supply Depots, and all Naval Shipyards [5:1].

3. Description:

a. Hardware: The heart of UADPS-SP is a Burroughs central processing unit (CPU) which was initially placed in service in 1972. The system as originally designed processes supply transactions "on-line" and processes financial transactions in a "batch-mode" [5:1].

There are four standard hardware configuration types. The difference in the four types is the number of peripheral equipments connected to the CPU. Type I is the largest system with eleven tape drives, two printers, four hundred forty mega bytes of disc storage, three hundred sixty bytes of memory, sixteen remote terminals, two card readers, and two consoles [2:23]. Types II, III, and IV utilize the same equipment in smaller quantities depending on the

operation. Currently there are nineteen equipment sites servicing thirty-eight activities [5:1].

b. Software: The UADPS-SP software was originally designed and programmed in the 1960's and has been improved "on a piecemeal, project by project basis" [5:1]. The original eight applications have been augmented by the following:

Application	Area
H	Management Information
I	Quality Control
L	Military Payroll (JUMPS)
M	Excessing/Disposal
N	Automated Ready Supply Stores
P	Record Maintenance
R	Repairables
Z	Personnel Accounting [2:23]

UADPS-SP is a large, very complex patchwork conglomeration of related programs designed to run on third generation ADP equipment.

c. Function: When a purchase request is received it is manually checked for completeness and accuracy before being entered in the Burroughs machine via punched card. The computer now checks the stock number against the stock record cards held in its memory and records the document in the Requisition Status File and the Historical Demand File. The Requisition Status File records all requisitions by document number and maintains the current status of each

requisition for automatic dissemination or response to inquiries. The Historical Demand File records the stock number of the item, the date and quantity requested. This file is used to determine future stocking policy.

The stock point inventory is recorded in the machine by both quantity of items and dollar value. An individual machine record for each item carried in stock maintains a perpetual inventory, reflecting receipts, issues, receipts due-in, balance on hand, or backorders. When inventory transactions are recorded a corresponding financial adjustment is recorded to maintain perpetual dollar value accounts by commodity classification.

B. AUTOMATION OF PROCUREMENT AND ACCOUNTING DATA ENTRY SYSTEM II

1. Objectives: Automation of Procurement and Accounting Data Entry (APADE) is a system designed to automate the routine functions of field purchasing such as document preparation and file updates and also to provide a management information system for acquisition managers. Historically field purchasing has been extremely labor intensive and therefore relatively slow in relation to the capabilities of existing automatic data processing machines.

2. Background: In April of 1975 Automation Procurement and Accounting Data Entry I, a research and development project, was initiated to see if existing manual procurement processes could be completed through the use of a minicomputer system [7:1]. This study pointed out the potential

(NSC), Oakland perceived a potential problem with the

for improvement in field purchasing through automation and paved the way for future studies in this area. In December of 1975, the Navy Fleet Material Support Office was tasked with reviewing the various locally developed automated systems at NAVSUP field procurement activities for development of a standard system [7:1]. This study revealed a wide variety of individual systems geared for a few functions on a limited scale, none of which were comprehensive enough to satisfy all procurement data processing requirements.

Fiscal year 1977 funds were granted under the Navy Productivity Enhancement Program to develop APADE II for system-wide application. Naval Supply Center, Oakland was selected as the test site for the prototype installation and thus APADE II was born in April 1977 [8:1].

3. System Implementation: APADE II was designed to be implemented in four phases or modules. Module One is the establishment and maintenance of procurement files. This module requires installation of the CPU, memory discs, tape unit, high speed printer, the CRTs and of course, the applicable software. Module Two is the production of procurement instruments, such as purchase orders and modifications. This module requires the addition of low speed printers in the purchase section. Module Three is production of management reports. All hardware is available for deployment of this module, but at the present time the software is incomplete. Module Four is the interface

segment. This module is purely a software problem; with the objective of interfacing APADE with financial and inventory programs in UADPS as well as the Procurement Accounting Reporting System (PARS) [7:8]. This module is still in the conception stage due to the complexity and importance of the interfaces.

4. System Description:

a. Hardware: The hardware used for APADE consists of an Interdata 7/32 minicomputer with 256,000 bytes of core memory. Original design calls for one 1600 BPI tape unit, one 600 line per minute printer, and two external disc memory units. Larger applications may require additional capabilities which can be facilitated by adding more ancillary equipment.

b. Software: The system software is still being developed. The central design agency, FMSO, has contracted for completion of the software package. Decentralization of the design function, by introducing a contractor, appears to have increased the complexity of the vital communication link between the users and the designers. The system users are now faced with the possibility of communicating with the wrong designer or having to communicate through one design agency to another to have their desires known.

c. Function: To best describe the field purchasing function and the use of APADE II, the processing of a typical purchase request will be discussed. When a purchase request is received it is first processed by the pre-purchase

section. Here the purchase request is reviewed, placed in the proper priority folder and assigned to a buyer. This is where initial entry will be made into APADE II. A transcript of the purchase request and the buyer code assigned will be entered via CRT terminal into the Purchase Master File (PMF). At this time a Procurement Instrument Identification Number (PIIN) will be assigned. The original purchase request can now be referenced by requisition number or PIIN.

The purchase request folder is now forwarded to the Small Business Specialist for small business set-aside review and then on to the purchase section supervisor who must examine buyer workload and assign a new buyer if necessary. If a new buyer is assigned, a data input form is submitted for entry into the mini-computer indicating the new buyer code.

Now that a buyer has the purchase request for action, the next stop is to find a source of supply; manually this would require a search through old purchase orders or departmental files. APADE allows the buyer to query the Commercial Source File (CSF), a list of all vendors who have successfully completed contracts filed by commodity. The buyer merely inserts the item to be purchased into the CRT and a list of possible sources is displayed in real time. If the buyer wishes to make a change to the CSF he prepares a local form which will be entered on the CRT.

If the purchase is delayed for some reason a transcript memo is sent and entered on the CRT to ensure current status in the purchase master file.

When the buyer places an order for the material a buyers' worksheet is prepared and forwarded to document preparation for typing of the instrument. APADE II will allow the Purchasing Division to input the buyers' worksheet into the CRT which will update the Master Purchase File; the computer will then print the purchase document on the high speed printer.

Prior to APADE, document control of purchase requests was left entirely to a hand carried system. If a manager wanted to check on an important purchase action he had to either guess where the documents were in the system or personally trace the path of the documents to see who was holding the hard copy. Now with a real time inquiry on the CRT the manager has an instant status report that not only tells him where the purchase request is but its entire history, including length of processing time at each station. On request the manager can receive a report of work in progress which is a listing of all purchase requests in house sequenced by response due date or receipt date. All categories of documents will be summarized by buyer code, section or branch [7:19]. Management can also request a procurement production report showing totals of purchase requests received, cancelled, referred, on solicitation, awarded, maintenance actions, buyer actions, and all remaining work in progress [7:19].

C. INTEGRATED DISBURSHING AND ACCOUNTING

1. Objectives: The main objective of IDA is to establish a single integrated data base for Navy accounting. Establishment of this single data base will reduce the flow of hardcopy documents between activities and promote timely and accurate compilation of financial data.

2. Background:

Historically the Navy's cash disbursement and accounting systems have been independent activities. The process had not changed significantly since World War II; when in order to provide prompt payment to contractors supporting the war effort, invoices were processed through the disbursing function prior to accounting for the transaction [4:1-3]. Each invoice was matched to an established account payable, certified for accuracy, documented, and paid. Payments were generally made by Navy Regional Finance Centers (NRFC). Each NRFC would maintain detailed records of these disbursements and render periodic reports to higher authority and the Department of the Treasury [9:1]. This process was purely a cash accounting system.

Funds were obliged by individual activities holding funds, but the accounting was performed by an Authorized Accounting Activity (AAA). When an activity ordered material a hard copy obligation document would be forwarded to the AAA to record the obligation of funds. To close out this obligation the AAA would wait to receive a disbursement

notification from the paying office. This was known as the cost or accounting financial system [9:2]. (See Exhibit 3)

The major deficiency of the system was geographic and functional decentralization. There were thirteen Navy Finance Offices, Five Navy Regional Finance Centers, and a Navy Finance Center for cash accounting and two hundred and seventy-five Authorized Accounting Activities for cost accounting [4:1-3]. The problem areas of this system were:

a) multiple recording of data,

b) untimely financial data,

c) high support costs associated with hardcopy documentation,

d) multiple reconciliation, and

e) approximately a two billion dollar balance of undistributed payments [4:1-5].

In fiscal year 1970 Haskins and Sells was commissioned to conduct a study of the Navy's accounting system. Based on the findings of this study in 1972, the Integrated Financial Management System (IFMS) Project Office was established to develop and implement an integrated accounting system and a procurement accounting system. Also in 1972, the Financial Management Improvement Plan (FMIP) was established to provide centralized control over the development of financial systems [10:4].

PRE-IDA FINANCIAL PROCESSING
Reproduced from the IDA General Design Manual

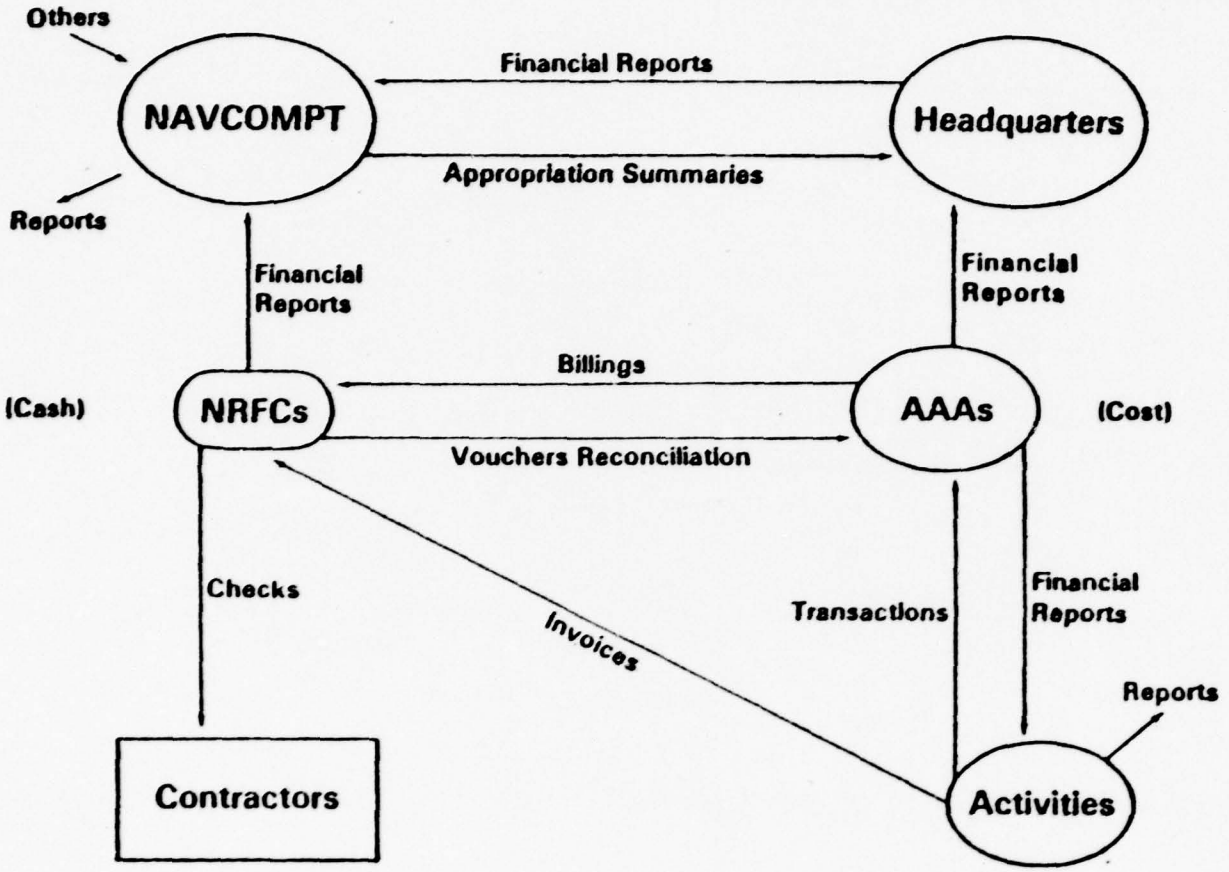


EXHIBIT 3

3. System Implementation:

In fiscal year 1975 NAVCOMPT tasked NAVSUP with developing an IDA process for Navy Stock Points: the development and implementation was divided into phases [10:8]. In Phase I hardcopy source documents were redirected from NRFC's to the AAA's. The AAA would then send the NRFC automated transaction data for entry into the Automated Public Voucher System (APVS) which would pay the bill and generate a magnetic tape for the AAA showing all payments made. Now the AAA could adjust accounts payable and post expenditures. Phase I was implemented at NSC San Diego in July 1975 [10:8]. Phase IA was implemented at NSC San Diego in January 1976, it was a transitional step introducing automated check issue and reimbursable SF 1080 billings. Phase II A, introduced in fiscal year 1978, improved the check issue procedure and added mechanized disbursing reports [10:8]. Phase II B, initially installed as a prototype at NSC San Diego in April 1975, provided an on-line Cathode Ray Tube (CRT) capability to capture and validate transactions in the Job Order Reference File, Document Control File, Funds Control File, General Ledger, and the Job Cost File [1:2]. Phase II C which is still being developed will allow updating the accounting system on a twenty-four hour cycle and will provide expanded remote access capabilities. Phase III will physically consolidate the accounting and disbursing operations [10:11].

4. Description:

a. Hardware:

IDA Phase I through IIB are all basically batch post systems run on the Burroughs 3500 computer. A mini-computer, the Interdata 7/32, will be introduced prior to Phase II C [10:11] in an interim Phase II BE (enhanced). The prototype mini-computer is scheduled for installation at NSC San Diego in October 1979.

b. Software:

The software for Phases I, I A, II A, and II B are completely written and installed. Software for Phases II BE and II C is still being developed.

c. Functions:

The IDA concept revolves around 16 regional Financial Information Processing Centers (FIPC) that report to a Central Accounting and Finance Office (CAFO). A FIPC is formed by combining a disbursing activity (e.g., NRFC) with an accounting activity (e.g., AAA). Each FIPC is to provide both disbursing and accounting services to the customer activities in their geographic area. The FIPC's will be linked together and to the CAFO through telecommunications.

Consolidating accounting and disbursing allows one-time data capture and establishment of a single document file. Obligation and disbursement can be accomplished from the same document. Another function of IDA is the maximum utilization of telecommunication and automated data

processing (ADP) technologies to achieve a responsive and timely financial management system [4:10]. A single, on-line data base should improve financial reporting and control at all levels. (See Exhibit 4)

IDA FINANCIAL PROCESSING

Reproduced from the IDA General Design Manual

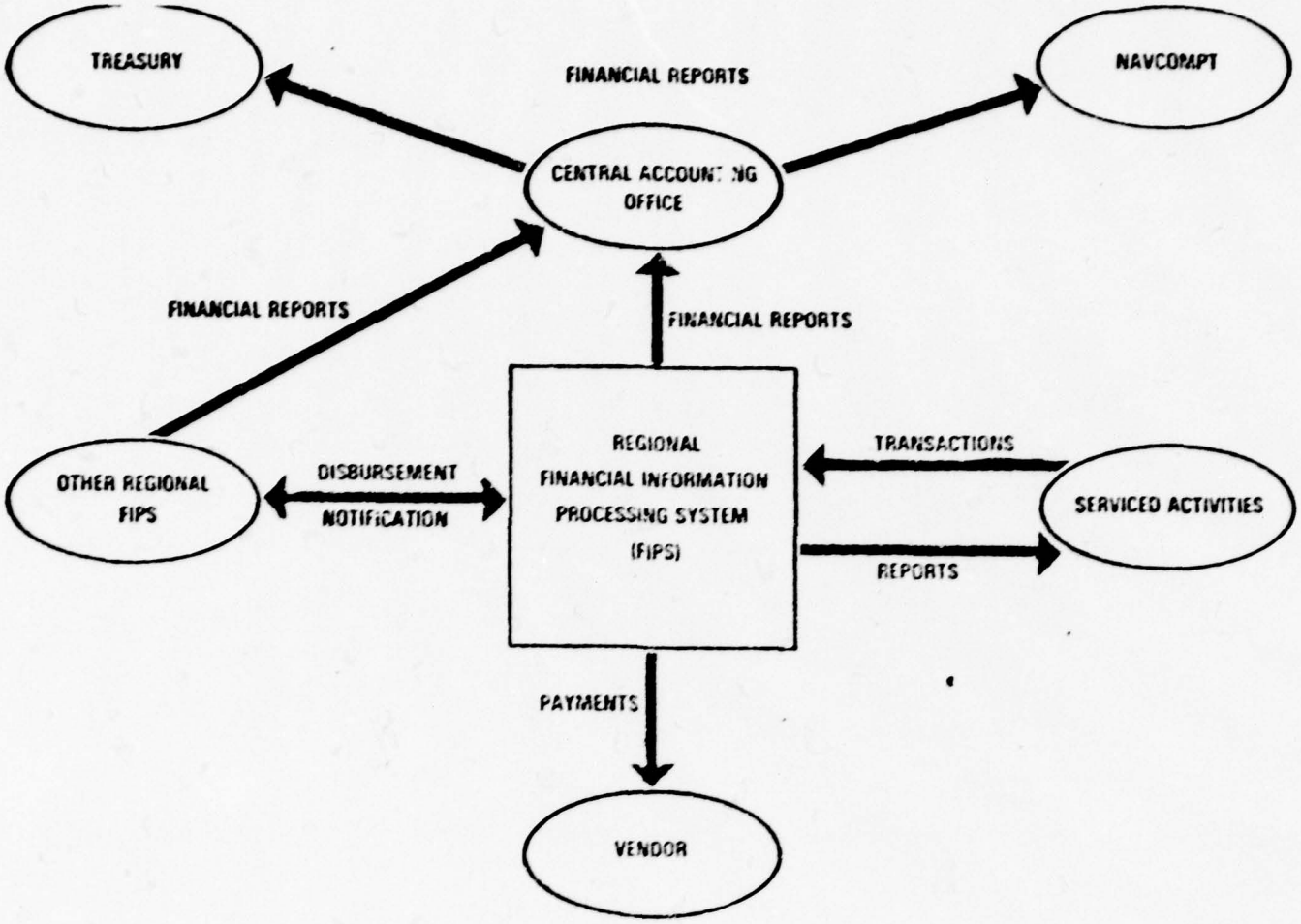


EXHIBIT 4

IV. COMPARATIVE ANALYSIS OF THE SYSTEMS

Chapter III described three seemingly autonomous mechanized systems at Navy Stock Points in terms of the characteristics listed in Exhibit 5. This Chapter analyzes these systems with regard to those characteristics (e.g., objectives, backgrounds, implementation plans, and physical descriptions) to determine if there is potential for integration.

A. OBJECTIVES

There are some strong similarities in the objectives of these systems. UADPS-SP is concerned primarily with controlling material requirements. This not only pertains to physical control of material but also the flow of documentation. It is this flow of documentation that winds through the stock point and ties these systems together. For example, as illustrated in Exhibit 6, when a requisition for non-standard material is received at a stock point it first enters UADPS-SP. Here customer identification and material description data are recorded. When it has been determined that commercial acquisition is necessary, the hardcopy requisition is passed to the Purchasing Department where it is entered into APADE II. Now customer identification and material description data are entered again, as well as the financial accounting data needed to prepare

COMPARISON OF INFORMATION SYSTEMS

EXHIBIT 5

CHARACTERISTIC	INFORMATION SYSTEM		
	UADPS-SP	APADE II	IDA
OBJECTIVES	CONTROL AND COORDINATE MATERIAL REQUIREMENTS	AUTOMATE LABOR INTENSIVE TASKS, DOCUMENT VISIBILITY FOR MANAGEMENT	SINGLE DATA BASE, TIMELY FINANCIAL DATA
BACKGROUND	1962 THRU 1972 SUPPLY BASIS	1975 TO PRESENT PURCHASE BASIS	1975 TO PRESENT ACCOUNTING AND DISBURSING BASIS
IMPLEMENTATION	FULLY IMPLEMENTED	MODULES I AND II COMPLETE, MODULES III AND IV IN PROGRESS	PHASES I, IA, IIA, IIB COMPLETE, PHASES IIC AND III IN PROGRESS
DESCRIPTION			
HARDWARE	THIRD GENERATION ON-LINE AND BATCH MODES	INTERDATA 7/32 MINICOMPUTER, ON-LINE	INTERDATA 7/32 MINICOMPUTER, ON-LINE
SOFTWARE	PATCHWORK 16 APPLICATIONS	INCOMPLETE, FMSO AND COMMERCIAL	INCOMPLETE, FMSO
FUNCTION	RECORDKEEPING, DOCUMENT PREPARATION	RECORDKEEPING, DOCUMENT PREPARATION	RECORDKEEPING, PAYING VENDOR BILLS

Prepared by LCDR R.W. Kline

the contract. Next the contract, which contains all the information provided by the requisition, is passed to the IDA system.

Both UADPS-SP and APADE II are concerned with monitoring customer requisitions but at different stages of the production process. IDA, the third system under consideration, has as one of its objectives, establishment of a single data base for both the disbursing and accounting functions. The data forming this data base originate from the same requisitions residing in the other two systems. All three systems have a similar basic objective of capturing data from customer requisitions for processing or monitoring of progress.

There are some definite dissimilarities among the systems' objectives that need to be recognized. While processing all requisitions, UADPS-SP is primarily concerned with requirements for standard items held in the supply system. Items requiring purchase action receive relatively little attention from the UADPS-SP system. APADE processes only purchase actions, disregarding the majority of requisitions that call for standard items. IDA overlaps both UADPS-SP and APADE II because it processes all financial transactions regardless of the material source. The dissimilarity arises because UADPS-SP and APADE II are concerned with material requirements; IDA is concerned strictly with the financial data off the same documents previously processed by the other two systems.

B. SYSTEM BACKGROUNDS AND IMPLEMENTATION

The backgrounds of the three systems are relatively diverse. UADPS was developed primarily between 1962 and 1972 as a supply transaction recordkeeping system. The system is large, established, and completely operational. APADE II was conceived after UADPS-SP was fully in service and is wholly a purchase oriented system. IDA was developed since 1975 and is therefore a relative newcomer to the scene. IDA is descended directly from disbursing and accounting forefathers.

UADPS-SP has matured; it is flexible enough to accept modification, but can be considered completely implemented. APADE II and IDA are both still very young, growing systems in mid-evolution. Neither has had its total design completed, let alone tested or implemented.

C. DESCRIPTIONS

The hardware utilized by UADPS-SP is third generation Burroughs equipment; not exactly state of the art technology, but still functional. APADE II and IDA will both be using Interdata model 7/32 modern minicomputers. While APADE II and IDA equipment use identical machines that can be hard-wired together, their interface with UADPS-SP on the Burroughs machine will have to be via magnetic tape batch posting. Daily batch posting is not as effective an interface as hard-wire, but should prove acceptable until the

Burroughs machines are replaced with more modern equipment that can handle an on-line system interface.

The software should prove very adaptable for any potential interaction. UADPS-SP, as we know it today, evolved by sequential patching together of 16 individual applications. This type of system would lend itself to modifying an existing application or adding a new one. Since APADE II and IDA are still in the design stage, potential system interfaces could still be included in the fundamental designs (with relative ease).

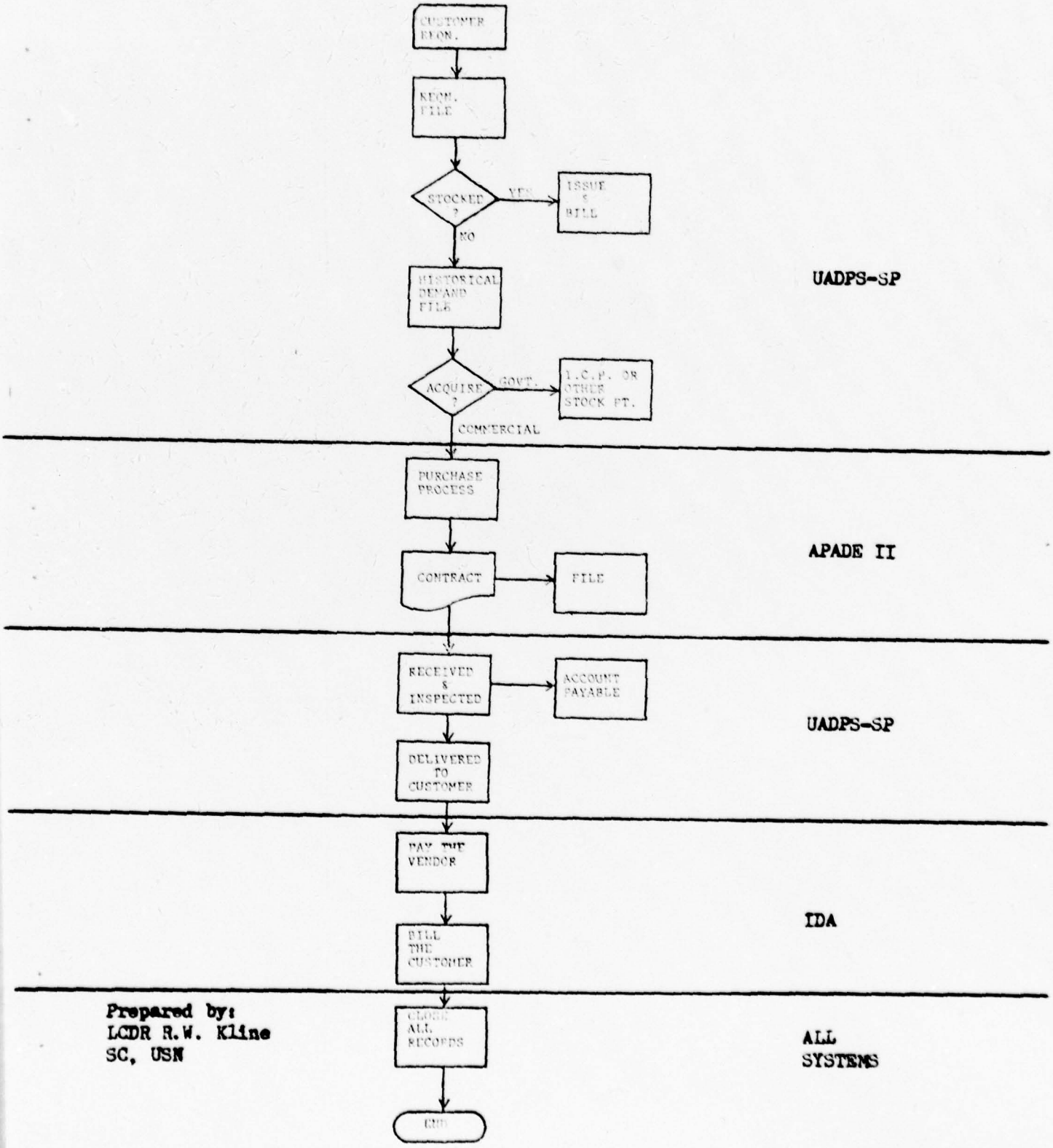
The functions of the three systems are similar in that they all perform some process based on the customer's original requisition. Exhibits 1 and 2 showed the management control processes and the functional compartmentalization of those processes respectively. Exhibit 6 shows how the production process of a Navy Stock Point flows between the three systems under discussion. These systems are not autonomous devices but interrelated components of a large system, supply processing at a Navy Stock Point.

D. POTENTIAL FOR INTEGRATION

Exhibit 7 depicts the flow of data and the files affected in the systems when a non-standard purchase request is processed at a Navy Stock Point. The interfaces between the three systems, as currently designed, are described below and depicted in Exhibit 7.

EXHIBIT 6

REQUISITION PROCESS AS A SERIES OF ADP SYSTEMS



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LCDR R.W. Kline
SC, USN

PRODUCTION PROCESS AS CURRENTLY PERCEIVED

Prepared by LCDR R.W.Kline, SC, USN

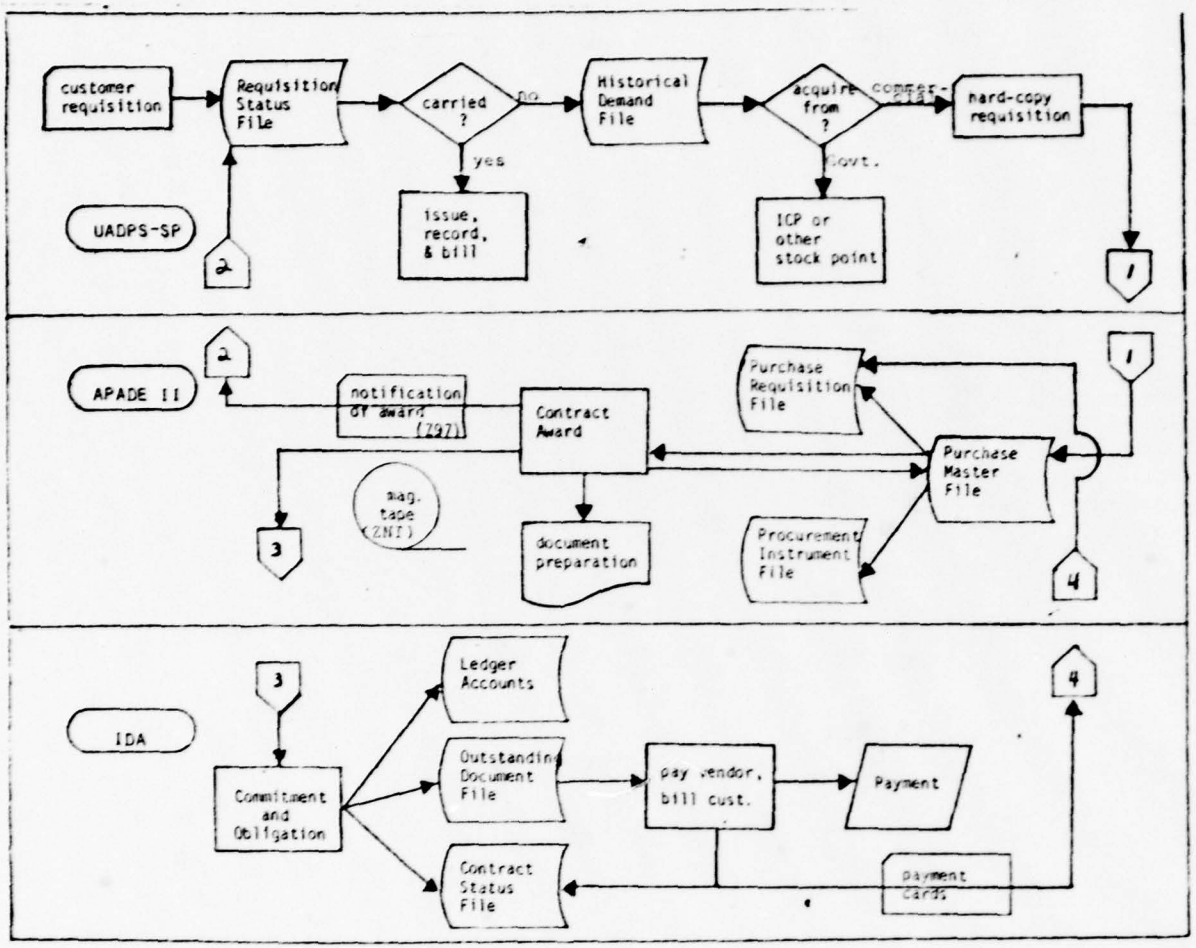

EXHIBIT 7

1. UADPS-SP to APADE II

The first interface between the systems under discussion occurs when hard-copy requisitions are passed from UADPS-SP to APADE II. At this point in time, the Requisition Status File (RSF) in UADPS-SP contains a record of the requisition number, the item description, requisitioner, quantity, and priority identification data. When the purchase request is received in Purchasing, this same data plus additional data elements are entered into the APADE II computer from the hard-copy document. After this initial interface, all data contained in the Requisition Status File in UADPS-SP is duplicated in the Purchase Requisition File in APADE II.

2. APADE II to UADPS-SP

The second interface occurs after Purchasing has awarded a contract when a punched card produced by the computer is sent back to UADPS-SP. This card is called Z97 and is used to enter the PIIN and the estimated delivery date in the RSF. This data is already recorded in APADE II in the Procurement Instrument File.

3. APADE II to IDA

The third interface also follows award of the contract; here a magnetic tape called ZNI transfers an image of the contract to the IDA system. The data elements on this tape are taken from the Procurement Instrument File (PIF), which holds every data element from the contract and is used as the source for preparing the contract

document. IDA enters the data from the ZNI tape in the Outstanding Document File (ODF) and the Contract Status File (CSF). The ODF records contract data filed by requisition number. Cross reference is made to Contract Line Item Number (CLIN), PIIN, and Accounting Cross Reference Number (ACRN). The primary purpose of this file is to facilitate billing the original requisitioner. The Contract Status File records the terms, contract clauses, dollar value, and accounting data filed by PIIN. This file keeps track of all payments made against the contract.

4. IDA to APADE II

The fourth interface occurs after payment has been made to the vendor when payment cards are physically delivered to Purchasing to update the PRF. Basically data is being read from the CSF in IDA to the PRF in APADE II. It seems logical that to complete the cycle of the production process that the RSF in UADPS-SP should be updated at this time; this is not the case, however.

V. ALTERNATIVE APPLICATIONS AND RECOMMENDATIONS

The preceeding chapter described the interfaces currently programmed into the three systems under discussion. This chapter presents alternative proposals for these interfaces as part of a comprehensive plan to most efficiently utilize the ADP resources available at Navy Stock Points. The reader is asked to compare the production system as currently perceived (Exhibit 7) with the revised production system (Exhibit 8), while reading this chapter.

A. ALTERNATIVE APPLICATIONS

1. Initial entry into APADE II: The first interface is the passing of the entire hard-copy documents from UADPS-SP, in the Inventory Control Department, to APADE II, in the Purchasing Department. There are two alternative methods for accomplishing this interface. One is to have all non-standard requisitions flow directly to purchasing, eliminating any entry into UADPS-SP. A benefit of this alternative is elimination of duplicate records since the documents would be recorded only in the Purchase Requisition File and not in the Requisition Status File; this eliminates one interface. The major argument against this approach is that there is no single record that reflects all requisitions, thereby requiring a search of two files located in separate computers in order to obtain the status of a given requisition.

REVISED PRODUCTION PROCESS

Prepared by LCDR R.W. Kline, SC, USN

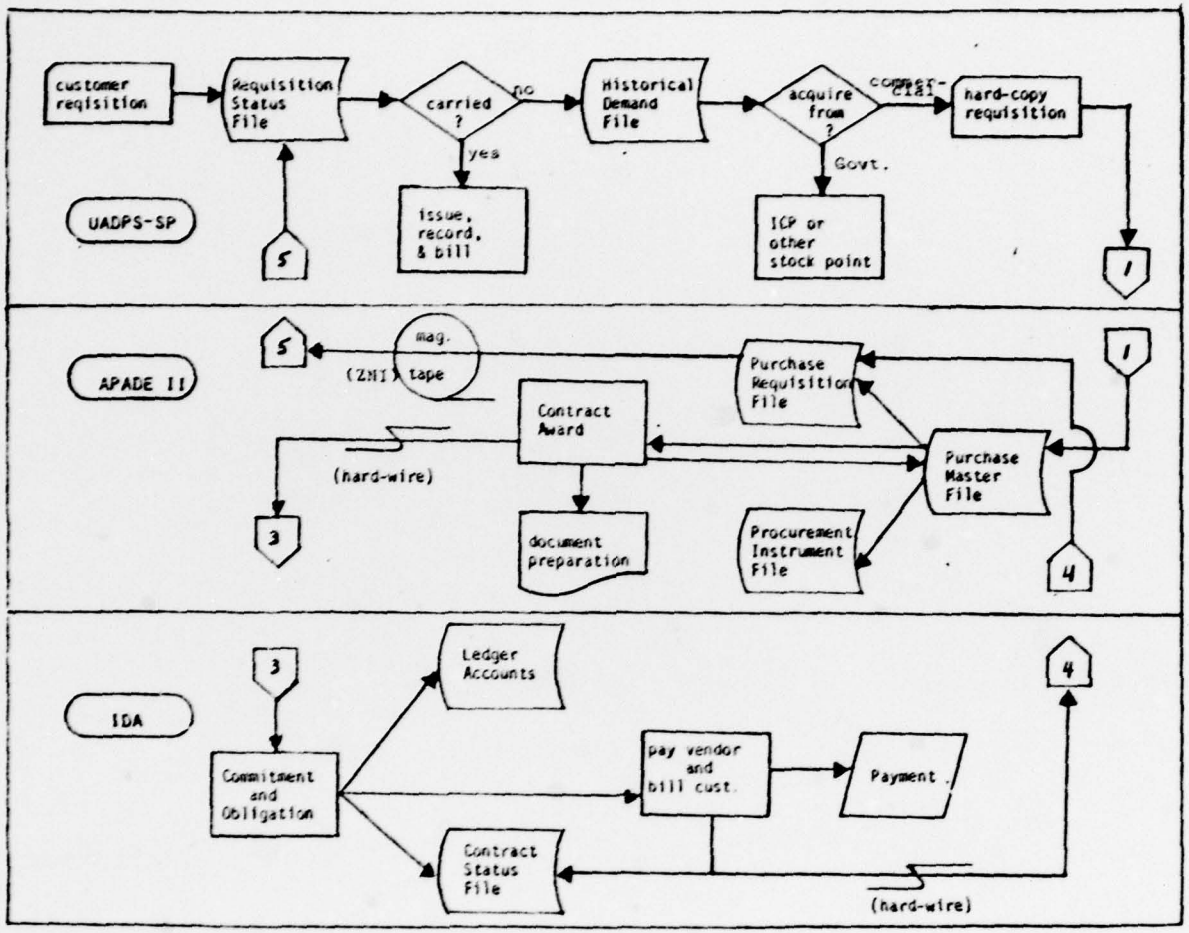

EXHIBIT 8

The second alternative is to modify the existing method, (e.g., Inventory Control Department maintain status of all requisitions in the RSF) by passing control of all purchase actions to the Purchasing Department. Under this option, when a requisition requiring action is received at a stock point, only the document number and an indication that complete control of that document has been passed to Purchasing will be recorded in UADPS-SP. All status inquiries will be directed to APADE II for direct reply to the customer. The first interface would now consist of hard-copy requisitions and follow-up documents to be entered via CRT terminal into APADE II.

There are two main benefits of this approach: First, the only duplicated data would be the requisition number. Secondly, the monitoring of purchase requests would be centralized in one department (e.g., Purchasing) and one computer system (e.g., APADE II). This allows the requisitioner direct access to the data base that contains the most current and accurate status of his requisition. The current interface design calls for a customer follow-up to be answered with a "BV" status card from UADPS-SP showing merely the date the requisition was passed to Purchasing. This same status would continue to be provided until an award was made, when a contract number and estimated delivery date would be supplied. Any additional information needed by the requiring activity, such as the vendor's name, mode of shipment, or point of contact, could

only be obtained via message request or phone call which require manual research and response by stock point personnel. Since APADE II is designed to monitor purchase actions it could respond directly to the customer's follow-up with the data available in its data base without going through UADPS-SP. This modification would require a clerk to enter the follow-up inquiry into APADE via a CRT terminal and time on the high speed printer to prepare a reply. Adoption of the second proposal is recommended since it relieves the Inventory Control Department of any responsibility for monitoring purchase requests and provides more timely status to stock point customers, because an on-line computer system is now monitoring the purchase actions and responding directly to follow-ups.

2. First UADPS-SP Update: The second interface can be eliminated if all purchase action monitoring is accomplished by APADE II. Currently a punched card is passed from purchasing to inventory control to update the RSF in UADPS-SP when a contract is awarded. If the RSF is not used to monitor purchase requests this update is not required. Eliminating this interface will save man-hours by removing one daily batch-mode posting and will reduce the response time on follow-up requests.

3. Contract Data to IDA: The third interface is the transfer of contract data from the Procurement Instrument File (PIF) in APADE II to the Outstanding Document File (ODF) in IDA via the ZNI tape. This transfer records the

same data in a second file creating unnecessary redundancy. Logic would dictate maintaining only one file of contract data. There are two possibilities; first, hard-wire APADE II and IDA together and eliminate the ODF in IDA. When IDA requires contract data it could interrogate the PIF in APADE II, since this file contains every data element contained in the contract. The benefits of this approach would include reducing total processing time by replacing batch posting with on-line interface, and reducing ADP storage requirements by eliminating duplicate records. The cost of this proposal is the initial introduction of a hard-wire interface between APADE II and IDA. There is presently a study being conducted, under the auspices of the Naval Supply Systems Command, to determine the applicability of a hard-wire interface between APADE II and IDA, and other computer networks used by the Navy.

The second alternative for this interface would be to eliminate the PIF in APADE II and retain the ODF in IDA. This alternative would accrue the same benefits and costs as the first alternative, however, since the PIF is prepared before the ODF in the production process it seems logical to retain the original file and eliminate the duplicate. This would also reduce reprogramming costs since the existing programs are written to extract data from the PIF to build the ODF.

4. Payment Data from IDA to APADE II

The fourth interface occurs after IDA has paid the vendor's bill; computer generated punched cards are passed from IDA to APADE II to update the Purchase Requisition File. This interface is important as it is the only way to communicate completion of the contract back to APADE II. In addition to punched cards this interface could also be accomplished by magnetic tape or a hard-wire connection. Since both cards and tape are batch-mode posting methods that require approximately the same processing time and degree of human effort to transport them between the systems, there is little advantage of one over the other. However, a hard-wire connection provides on-line processing that requires no human supervision and produces instantaneous results. If the recommendation for interface three is accepted there would be no additional costs since the same hard-wire connection could be utilized. The benefits in terms of reduced costs would be reduced man /hours for transporting and entering batch postings, and fewer input/ output device rental or maintenance charges.

5. Purifying the Requisition Status File (RSF)

The final interface is required to remove completed requisitions from the RSF in UADPS-SP. Currently this function is being accomplished by monthly purgings of the active RSF. No current data is received by UADPS-SP to indicate whether or not a requisition has been completed. Depending on the age of a document and its issue group,

various time criteria are applied to determine when a requisition is moved to the inactive file. This type of guessing game seems unnecessary when accurate completion data is readily available in the APADE II data base.

It is recommended that completed transactions be batch posted to UADPS-SP from a tape provided by APADE II. The data would be readily available in the Purchase Requisition File as received from IDA when final payment was made to the vendor. This final interface would complete the production cycle of a non-standard requisition through a Navy Stock Point.

B. RECOMMENDATIONS

To summarize, it is recommended that the following series of changes be implemented at Navy Stock Points to integrate the capabilities of UADPS-SP, APADE II, and IDA to improve purchase action control. Because the three systems are part of a continuous process, it is imperative that system integration deal with the entire process. (See Exhibit 8)

1. Purchase action requisition monitoring should be centralized in APADE II.

2. All interfaces between APADE II and IDA should be accomplished via hard-wire connections.

3. All contract data should be centralized in APADE II with on-line interface with IDA.

4. An interface should be established between APADE II and UADPS-SP to purify the RSF.

To best implement system integration at Navy Stock Points a single focal point must be established within the Naval Supply Systems Command to oversee systems' development as it relates to the stock point process. There has been too much sub-optimization of individual systems and too little concern for their meshing within the production process as a whole.

C. PREREQUISITES

Before any change can be successfully introduced into a management control system, such as the production system at a stock point, certain logical prerequisites must be met.

1. Top management support and active involvement are prime preconditions that must be accomplished if any change is to be successful [12:317]. In the case at hand, the top management is NAVSUP Headquarters; their involvement is important because they are the first level of management that has visibility and control of all Navy Stock Points. In the past, decentralized decision making has characterized the development of the production control system. This local autonomy has led to almost as many variations of the system as there are stock points. NAVSUP also has the influence necessary to ensure an effective system integration program could be adequately designed and properly implemented throughout the Navy. A good method to oversee such a program would be to establish a program management organization with a Navy Supply Corps Captain as program manager. The

organization should be a matrix, drawing its technical expertise from the resources already available at NAVSUP Headquarters.

2. Support of outside agencies is another essential precondition [12:318]. In this case the two main players would have to be NAVSUP and NAVCOMPT; NAVSUP because it is responsible for the Navy Stock Points and two of the systems involved, NAVCOMPT because it is responsible for the IDA system. Stock point customers must also be included in this cooperative effort to ensure their needs are being met. A committee, chaired by the program manager, made up of NAVSUP and NAVCOMPT people, major claimant representatives, stock point personnel, and central design agency people would be a good vehicle to promote outside agency support and user involvement.

3. Adequate design staff is another necessity [12:319]. The Navy Fleet Material Support Office (FMSO) must be given the resources required to devote competent designers in sufficient quantity to allow a "total system" application of the integration program. In the past each system had its own dedicated staff who due to personnel constraints, were unable to consider the stock point as a single integrated production process. It was the old "could not see the forest because they were looking too closely at the trees" syndrom. Adequate staffing should relieve this problem.

4. Sufficient time is yet another prerequisite for success [12:320]. Enough time must be allotted to allow proper development, education, and implementation. For the case at hand it is necessary that all systems and system interfaces are fully operational before any application is attempted at a stock point. This should be accomplished by developing and debugging a full-scale prototype at FMSO before any operational applications are tried. This of course requires time; it is impossible to determine at this point how much time is sufficient, but if the "fly before you buy" principle is applied sufficient time will be when the total system works as it was designed to work. One might ask if this approach would not take too long? The response is no. Navy Stock Points are currently operating without integrated systems (not as efficiently as they might) and could continue to operate. As seen in the descriptions of the basic systems' implementation plans in Chapter III, haste in implementation places a tremendous burden on the field activities who must divert their efforts from fleet support in order to help debug a new system.

D. CONCLUSION

NAVSUP should no longer allow UADPS-SP, APADE II, and IDA to be considered as independent systems under a common roof at Navy Stock Points, but must institute a program to promote system integration. The management control systems at Navy Stock Points must be integrated into a single system capable of providing the support needed by a total logistic

effort. Integration of the capabilities of UADPS-SP, APADE II, and IDA into a single production oriented system should promote increased efficiency at Navy Stock Points and improve their ability to satisfy fleet requirements in a more timely fashion; thus mean supply response time and operational availability should be improved.

BIBLIOGRAPHY

1. Naval Supply Systems Command Manual, Volume I, Navy Department, Naval Supply Systems Command, Washington, D.C.

2. Uniform Automated Data Processing System for Stock Points Course, A-8B-0027, Chief of Naval Technical Training, Navy Supply Corps. School, Athens, Georgia.

3. Automation of Procurement and Accounting Data Entry II, Functional Description, Fleet Material Support Office, Mechanicsburg, PA.

4. Integrated Disbursing and Accounting, General Design, Department of the Navy, Office of the Comptroller, Washington, D.C.

5. Uniform Automated Data Processing System for Stock Points ADS Plan, Naval Supply Systems Command, Washington, D.C.

6. Uniform Automated Data Processing System for Stock Points Executive Handbook, Fleet Material Support Office, Mechanisburg, PA.

7. Automation of Procurement and Accounting Data Entry II, Navy Fleet Material Support Office, Mechanisburg, PA, 15 July 1977.

8. NAVSUP System Policy and Concepts for APADE II, Naval Supply Systems Command, Washington, DC, April 1977.

9. Kline, J. C., LCDR, SC, USN, "A Review of the Navy's Integrated Disbursing and Accounting System as a Management Information System," Naval Postgraduate School.

10. Integrated Disbursing and Accounting Uniform Resource Management System Functional Description, Naval Supply Systems Command, Washington, D.C.

11. Integrated Disbursing and Accounting Data Exchange System, System Specifications, Fleet Material Support Office, Mechanicsburg, PA.

12. Anthony, Robert N. and Herzlinger, Regina E., Management Control in Nonprofit Organizations, Richard D. Irwin Inc., 1975.

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