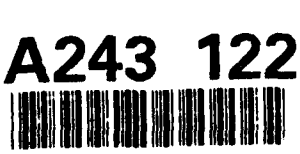

NAVAL POSTGRADUATE SCHOOL
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THESIS

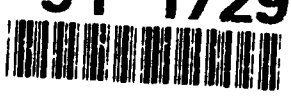
SELECTING A METHOD TO GATHER MANAGEMENT INFORMATION FOR THE NAVAL PLANT REPRESENTATIVE OFFICE AFTER CONVERSION TO A DEFENSE PLANT REPRESENTATIVE OFFICE

by

Craig J. Voth

March 1991

Thesis Advisor: Rodney J. Matsushima



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In 1989, the Defense Management Review (DMR) recommended the conversion of the Plant Representative Offices of each service into Defense Plant Representative Offices (DPROs). Once an office has been converted to a DPRO, it will be required to use the automated reporting system , Mechanization of Contract Management Services (MOCAS), as the organizational management information system. This thesis research was undertaken to recommend the most efficient method for a specific DPRO Commander to gather on-site management information to meet the organizational business goals after the conversion and also support the required use of MOCAS.

The results of the research indicate that MOCAS, while a necessary system for strategic management at levels above a DPRO, does not provide the level of detail required by the DPRO manager. Furthermore, the currently used Contract Administration Management Informatoin System (CAMIS) should be maintained and modified for use in conjunction with MOCAS by Navy offices that are converted to DPROs. This will support the new organization while continuing to support the needs of the existing customer base.

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Selecting a Method To Gather Management Information For The Naval Plant Representative Office After Conversion To A Defense Plant Representative Office

by

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Submitted in partial fulfillment
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ABSTRACT

In 1989, the Defense Management Review (DMR) recommended the conversion of the Plant Representative Offices of each service into Defense Plant Representative Offices (DPROs). Once an office has been converted to a DPRO, it will be required to use the automated reporting system, Mechanization of Contract Management Services (MOCAS), as the organizational management information system. This thesis research was undertaken to recommend the most efficient method for a specific DPRO Commander to gather on-site management information to meet the organizational business goals after the conversion and also support the required use of MOCAS.

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I. INTRODUCTION

A. BACKGROUND

The history of United States defense procurement is delineated by several important events in the late 1940's. Preceding this era, it was evident that coordination between the individual armed services was becoming increasingly important. The National Security Act of 1947 first established the Office of Secretary of Defense and The Armed Services Procurement Act of 1947 formalized procurement policy for defense. When the Department of Defense (DoD) was established in 1949 to coordinate the individual services, a major element of its mission was to coordinate and increase efficiency in the process of defense procurement. Since 1949, DoD has evolved through a series of changes and attempts to reform its procurement process. [Ref. 1:p. 2]

In the 1960's, a new set of defense procurement reforms were initiated by then Secretary of Defense Robert McNamara. These reforms centered on the dispersal of procurement responsibility to the lowest possible level with the top level of management reviewing and ensuring that all decisions and programs were consistent with one another. One result of this policy was the evolution of increased data reporting requirements by DoD activities that were monitoring civilian contractors. Due to several problems during the

implementation of these reforms, they met with much controversy and, over a period of time, resulted in a system of procurement that was excessively centralized. [Ref. 1:p. 8]

During the two decades which followed the McNamara initiatives, each successive Secretary of Defense (SECDEF) cited acquisition inefficiencies as the major problem facing the procurement process. In response, the Executive Branch, Congress and the Services added more layers of management to deal with the problems that caused the inefficiency. Increased oversight required increased reporting by DoD activities which in turn contributed to the centralization of procurement management. [Ref. 1:p. 12]

In 1986, the President's Blue Ribbon Commission on Defense Management (commonly referred to as the Packard Commission) reviewed the general management of DoD. The acquisition process was specifically studied in an effort to identify problems and recommend actions to stimulate procurement reform. They viewed cost growth, schedule delays and performance shortfalls as problems that could be rectified by:

- Integrated streamlining of the acquisition process.
- Better planning early in the procurement cycle.
- Encouraging more testing and prototypes. [Ref. 1:p. 7]

Despite efforts by each administration since 1961 to reform defense procurement by streamlining it and decentralizing its management, complete success has not been achieved. Meanwhile, the flow of management information has

increased by necessity to meet the demands of additional layers of defense management and the Congressional committees and subcommittees charged with defense procurement oversight. [Ref. 2]

In February of 1989, the newly-elected President, George Bush, charged Secretary of Defense Richard Cheney with reviewing defense management. In response, the Secretary of Defense (SECDEF) announced a plan for fully implementing the recommendations of the Packard Commission of 1986 and reforming the defense acquisition system. This response in July of 1989 was delivered in the Defense Management Report to the President (DMR). [Ref. 3]

One primary objective of the DMR was the streamlining and consolidation of the acquisition process between the various services. In an effort to reduce government overhead costs, the services' systems commands were reorganized to eliminate the layers of supervision that added little or no value to the process. Procurement functions that were accomplished by each individual service were identified for review and possible elimination. Redundancies in the purchase, management, payment and reporting of DoD acquisitions will be eliminated by forming one acquisition activity headed by the Undersecretary of Defense for Acquisition. When this is fully implemented, no contract administration office will report directly to its respective military service but each office will instead report to a Department of Defense organization

that supports all branches of the service. To further reduce overhead, the implementation of the DMR initiatives will consolidate these contract administrative services under the Defense Logistics Agency (DLA) rather than establishing a new management structure. [Ref. 4:p. 9]

The intended result of implementing these DMR recommendations is a uniform enforcement of policies and regulations and a streamlined organization which will generate savings primarily through manpower reductions. The DMR calls for a 15% reduction in logistics, distribution and related maintenance agencies by 1993. The projected increase in efficiencies will result in a personnel force by 1995 which is reduced by approximately 18,000 civilian and 24,000 military positions in acquisition management [Ref. 4:p. 9 - 10]. The aggregate cost savings from streamlining, improved management, and personnel reductions are estimated at $30 billion [Ref. 5: p. 5]. A further manpower reduction is planned by increased self-policing by business and industry. This will allow for a 25% reduction of government auditors at contractors' plants by 1995 [Ref. 6:p. 283].

When implemented, these recommendations constitute a major change in the data gathering and reporting requirements for contract administration offices that have historically reported via a chain of command strictly within the Army, Navy, or Air Force. Such offices previously received direction for data collection and reporting from the cognizant

branch of service for their office. However, after all contract administration offices begin reporting to DLA, the use of a standard automated system will be required.

Based on studies conducted in 1987 at the Army Plant Representative Office at the McDonnell Douglas Plant in Mesa, Arizona, the DMR implementation plan specified the DLA developed computer software called "Mechanization of Contract Administration Services (MOCAS)" as the standard for all procurement activities to use.

B. OBJECTIVES OF THE RESEARCH

The objective of this research effort was to recommend the most efficient method of gathering management information that would satisfy the requirements of the newly imposed MOCAS reporting system while still providing the degree of detail deemed necessary for effective on-site management of the contracts. While the two requirements are not totally incompatible, there are difficulties in meeting both goals with one system. This thesis will not analyze the need for the elements of information or the use of that information, but will examine the alternative methods of getting all the data elements considered by a DPRO Commander to be needed to meet internal and external management requirements.

C. RESEARCH QUESTION

In an effort to accomplish the objectives of this research, the following question was studied:

What is the most efficient method of gathering the information which is considered necessary for on-site management of a field level Navy contract administration office that is converted to a Defense Plant Representative Office (DPRO) considering that use of the automated reporting system, Mechanization of Contract Administration Services (MOCAS), is mandatory for reporting to management at a level above each field activity?

Answers to the secondary research questions support the conclusions reached by this research effort. The secondary questions are as follows:

- What items of information were collected under the NAVPRO Contract Administration Management Information System (CAMIS) model that are not required for MOCAS?
- What is the most effective and efficient method of collecting management information at the Defense Plant Representative Office at the Naval Systems Division plant of FMC Corporation (DPRO FMC), given that the reporting requirements of MOCAS have been imposed upon all Plant Representative Offices?
- What modifications would be required to MOCAS if it was to serve as the sole management information system of the managers at the DPROs?

D. SCOPE, LIMITATIONS, AND ASSUMPTIONS

The scope of this thesis is limited to one type of contract administration field office that is directly affected by the change in reporting requirements, the Plant

Representative Office. These offices are located at the site of civilian contractors and their purpose is to manage the contracts awarded to that contractor by the DoD contracting offices. The fundamental mission of all Plant Representative Offices is the delivery of a product conforming to the schedule, meeting the quality specifications and purchased at a fair and reasonable price. Therefore, the product of a Plant Representative Office is not a physical deliverable but rather the provision of a service which manages the successful delivery of the product. The accomplishment of the Plant Representative's task is dependent upon the frequent and accurate flow of information between the Contracting Office, the Payment Office, the Program Manager, the Contractor, and the Plant Representative Office. When these service-specific Plant Representative Offices become Defense Plant Representative Offices (DPROs), the mission will remain basically the same but the reporting requirements will change significantly.

A specific Plant Representative Office was studied in this thesis. The recommendations are therefore limited to the situation at this activity, DPRO FMC. This activity was chosen because, as a former Navy field activity reporting to the Naval Sea System Command (NAVSEA), it had already developed a creative and very effective automated system (CAMIS) for the collection of management information. Although the automated system satisfied the needs of

operational, tactical, and strategic managers at a Navy Plant Representative Office, it failed to fit the reporting framework required of DLA activities. The MOCAS system does not provide the same level of detail that is found in CAMIS but is nevertheless required. DPRO FMC was also chosen because it converted from a Navy activity to a DLA activity recently and is still in the process of evaluating its requirements and exploring the available options for meeting management information needs. The findings of this research may be applicable or helpful to other commands in evaluating their data collection methods after a similar conversion. However, conclusions and recommendations are command-specific and, although relevant during the time period in which the research was conducted, they may become obsolete as management priorities change and the organization continues to evolve.

E. RESEARCH METHODOLOGY

The majority of research in support of this thesis was completed by personal interviews with the Commander of DPRO FMC, the Contracts Division Head, the Contracts Branch Head, the Administrative Contracting Officer, Property Administrator, Industrial Specialists, Engineers, and Contract Administrators. Copies of all routine reporting documents for a given period were obtained from each functional division manager for subsequent review and analysis. Each routine report generated by CAMIS was compared to the corresponding report from MOCAS. Each data element that was collected by

either report as a transaction process was tracked to determine its use as management information. The specific data fields that were collected by CAMIS but were not found in MOCAS were discussed with the Division Head and DPRO Commander to verify the use and necessity of the data for the successful management of the activity. All data received through personal interviews was verified for accuracy with the immediate supervisor and summarized for discussion with the divisional managers.

The computer support staff of DPRO FMC was interviewed to get information on the background of CAMIS and to determine their staff role in the organization with respect to the collection of management information. Documentation for the divisional data bases of CAMIS was reviewed to verify the ability of management to respond to ad hoc queries. This information was compared to the ad hoc requirements described by the functional managers. A summary of these discussions was verified by the Support Staff Division Head and the Deputy Commander.

Information was also obtained from the Defense Contract Administration Region (DCASR) St. Louis' Transition Management Office and the Defense Systems Automation Command in St. Louis. Extensive MOCAS documentation and training manuals were reviewed to determine the flow and use of information collected by MOCAS. The transaction processing reports of MOCAS were compared to the summarized DCASR management reports

to trace the operational data elements and find how those elements were used by the top level of DCASR management for strategic decision making.

II. BACKGROUND AND DEVELOPMENT OF AUTOMATION AT DPRO FMC

A. INTRODUCTION

DPRO FMC is located in Fridley, Minnesota at an industrial plant operated by the Naval Systems Division of FMC Corporation. The primary mission of the command is the contract administration and facility management of the Naval Industrial Reserve Ordnance Plant (NIROP). Since 1940, the majority of production in the factory has been a result of contracts with the Department of Defense, foreign governments, or as a sub-contractor for other Defense Department prime contractors. The Naval Systems Division of FMC is the Navy's primary manufacturer of shipboard Guided Missile Launching Systems and medium and major caliber guns. Beginning in the 1960's, contracts were administered under the auspices of the Defense Logistics Agency (DLA). On 1 October 1982, the office was converted from Defense Contract Administrative Services Plant Representative Office located at Northern Ordnance Division of FMC Corporation (DCASPRO NOD) to NAVPRO MINNEAPOLIS and became an echelon three command reporting directly to the Commander, Naval Sea System Commands (NAVSEA). The name of the contractor's plant was subsequently changed from Northern Ordnance Division (NOD) to Naval Systems Division (NSD) in 1987. [Ref. 7]

B. BACKGROUND

Prior to the 1982 conversion, DCASPRO NOD reported to the Defense Contract Administrative Services Region (DCASR) St. Louis via the Mechanization of Contract Administration Services (MOCAS) system. After the DCASPRO was changed from a DLA activity to a Navy field activity, a new automated system for data collection was deemed necessary. However, the use of a standard automated system was not mandated by NAVSEA as was the case during the period of oversight by DLA.

NAVPRO MINNEAPOLIS was responsible for reporting contract administration activity directly to NAVSEA (Code SEA-028) which compiled the information for use by NAVSEA managers. The reports were consolidated with the data reported by the three other NAVSEA Plant Representative Offices and forwarded to the Assistant Secretary of the Navy for Shipbuilding and Logistics (ASN (S & L)). Specific elements of periodic activity and totals of contractual actions performed during the period were requested from each field activity on formatted reports. These figures were derived locally, summarized, and mailed to NAVSEA (SEA-028) at the end of each reporting period. Cut-off dates were established by field activities to allow time for compilation and transmission of reports to arrive by the monthly, quarterly or annual deadline. On-line systems were not used by any of the four Plant Representative Offices reporting to SEA-028.

The periodic reports consisted of total numbers of contractual actions and the dollar values for various groupings of the actions as dictated by NAVSEA. The method of data collection, whether manual, using automation, or a combination of both, was determined by managers at the field activity. Because of their familiarity and historical use of MOCAS, NAVPRO MINNEAPOLIS decided to develop an automated system for contract data collection.

C. DEVELOPMENT

The Contract Administration Management Information System (CAMIS) was developed by NAVPRO MINNEAPOLIS in 1982 to support the contract administration function. It was patterned after the portion of MOCAS that captured the number of contractual actions and the monetary values of these actions. Data was collected on each contract by contract number, order number, status of the definitization process (if that order was placed as an unpriced order), total dollar amount obligated, contractor's proposed dollar value, total value after definitization, and date of physical completion. Monthly reports were produced by NAVPRO MINNEAPOLIS on their centrally managed mainframe computer and the categorized totals were reported to SEA-028 under the signature of the NAVPRO Contracts Division Head. Then these categorical summaries were entered into a spreadsheet program on a personal computer by a procurement clerk working within the contracts division at NAVPRO. This spreadsheet would then be used to graphically

display the status of contract numbers and dollars, the values and numerical assessment of the contracts opened and closed during the period, and the workload accomplished by the division, as indicated by these numbers. All data entry was the responsibility of one procurement clerk who acted on information provided by the contract administrators. The contract administrators dealt almost exclusively with raw data from the hard copy which was maintained within individual contract folders.

From the beginning of the CAMIS life cycle, changes were required to keep the program current. Although requests for changes were not documented by the computer support staff, it is reasonable to expect that the causes for the requests were similar to those documented by other software development organizations.

Software development organizations typically find that approximately 20% of maintenance requests are for corrections to the source code. More importantly, approximately 50% are classified as perfective maintenance. I , fective maintenance is defined as work done on a successful software product to enhance capabilities, modify existing functions, or provide new user-requested capabilities. 25% of work can be expected for adaptive maintenance which is considered necessary for keeping pace with a changing environment and increased demands either internally or externally imposed. [Ref. 8, 9]

During 1982 to 1987, CAMIS required maintenance in all of these categories. Several new requirements were imposed by NAVSEA (SEA-028) to satisfy requirements of managers at NAVSEA. Some programming errors were discovered which caused inconsistent reporting. Local managers wanted more relevant data for workload accounting management and to provide fast responses for ad hoc queries. Unfortunately, the centrally managed nature of CAMIS caused problems in prioritizing and quickly implementing improvements to the system. By delaying the work, later maintenance efforts became more difficult and the organization eventually used all available resources to maintain the old software rather than develop new products to meet the new demands.

Although software maintenance can often account for over 60% of developmental costs, [Ref. 10] the limited NAVPRO maintenance resources were not budgeted for such extensive maintenance on CAMIS. In 1987, a moratorium was placed on all improvements to CAMIS until an ad hoc committee of NAVPRO employees could analyze the NAVPRO information requirements and recommend a strategic plan for development of a comprehensive management information system. The committee found that the command was dependent upon CAMIS and must commit to improving it for survival in the short term, because it was the only repository of summarized data. Raw data was intact in each contract file but there existed no other system to summarize, categorize, and collate data from the nearly

two-thousand contracts. The recommended strategic plan was to develop a fully integrated network of distributed databases on personal computers. Real-time information would be available in a detailed format for workers in each functional division (i.e., contract administrators, industrial specialists, property administrators, quality assurance representatives, etc.). Selected summaries could be provided to local managers and would also be the basis for external reports.

A permanent committee was formed to analyze the requirements of a new, integrated system. It was composed of representatives from each functional division and chaired by the Division Head of Support Services, the only trained systems analyst on the committee. Following an enthusiastic start, the project lost command visibility when the committee chairman left the command in 1988. The project was soon abandoned due to the lack of support and trained leadership.

However, concurrent with committee planning for an integrated system, more personal computers were purchased and the use of them proliferated at the divisional work level. Over a two-year period, each division within the organization developed its own stand-alone database for day-to-day use. The contracts division was the last division to develop and transfer all data elements to an off-the-shelf database management system. In March of 1990, CAMIS became obsolete when all external reports were generated by the personal computer programs which were developed for use by the

procurement clerks and contract administrators as well as supervisors and management. The new personal computer system uses ENABLE software and is referred to by NAVPRO employees as CAMIS II.

III. BUSINESS OBJECTIVES OF THE ORGANIZATION

A. INTRODUCTION

When evaluating the automated information system of any organization, it is paramount that the business objectives are understood so that the gathering of information supports these objectives. The successful application of any information system is dependent upon the accurate assessment of how data elements are collected and for what purposes they are used. [Ref. 11:p. 40 - 41] This chapter concentrates on the use of the collected data to support the business objectives of the contract administration activities within DoD.

The broadest objectives of all levels in the contract administration cycle are the same. They are to ensure that the service/supply is acquired from the most appropriate source at a fair and reasonable price and delivered as specified in the contract. The functions performed by contract administration offices are those which conclude or complete the acquisition cycle. [Ref. 12:p. 16] In general, requirements have already been defined, funds have been committed, and the contractor has been awarded the contract. The contract administration office then is responsible for the management of contractor compliance to the terms and conditions of the contract. While the business objective is the same for all activities contributing to the acquisition

process, it is important to understand the method of implementation from the two perspectives that contributed to the development of the automated management information systems being used at the DCASR and at DPRO FMC.

B. IMPLEMENTATION OF MOCAS BY DCASR

With the creation of the Defense Logistics Agency in the early 1960's, a sub-agency was created to administer DoD contracts. This organization was called the Defense Contract Administrative Services (DCAS). DCAS was sub-divided into geographic areas of responsibility called DCAS Regions (DCASRs). Each region was further sub-divided into DCAS Management Areas (DCASMAs). The DCASMA was given area-wide responsibility unless the amount or complexity of government contracts at one contractor's plant required a dedicated work force. [Ref. 12:p. 17] Such dedicated teams were called DCAS Plant Representative Offices (DCASPROs).

After the DMR implementation is completed, all DCASPROs as well as the individual service Plant Representative Offices will become Defense Plant Representative Offices (DPROs). As all service Plant Representative Offices are converted to DPROs during the consolidation phase, they will report to the DCASR in whose geographic region they reside. DCASRs are also in the process of reorganizing into Defense Contract Management Regions (DCMRs) as part of the DMR initiatives but for the purposes of this research they will be viewed as DCASRs.

To "manage" a contractor's compliance to the terms and conditions of a contract is a very ambiguous and complex organizational goal. Management, as defined by Mary Parker Follett, is "...the art of getting things done through people." [Ref. 13:p. 7] While there are few places where this definition more aptly applies than in the contract administration/management field, it does not define the entire task that is involved. There is no universally accepted definition of management, but one commonly accepted description is that of a systematic way of planning, organizing, leading, and controlling to achieve the desired goals [Ref. 13:p. 8].

Using this definition as a basis, the DCASR must manage the people who ultimately provide the supply or service to the government. One widely accepted management method is Management by Objectives. This is done by setting goals for subordinate managers, allocating resources, providing the atmosphere that encourages accomplishment of goals, and evaluating performance to ensure th , goals are being accomplished.

Because of the inherent geographic distances between the DCASR and the contract administrators, this task has an added difficulty. A steady flow of information is necessary to keep the DCASR apprised of the status of contracts assigned to the commander at each activity. The data taken from MOCAS is summarized into reports which are used by DCASR management

personnel for future business planning and for evaluating performance against goals.

MOCAS was designed as a centrally operated system which would automate the requirements imposed by Military Standard Contract Administration Procedures (MILSCAP). MILSCAP is an external communication system directed by DoD which prescribes standard data requirements which govern the flow of contract administration data between DoD activities. As used by the DCASR, MOCAS is a repository of contract actions, delivery schedules, shipments, obligations, payments, and closeout status. This information is also used by regional functional divisions in support of engineering, production, quality assurance, finance, property, transportation, and payment offices. As part of MILSCAP, it also communicates with buying, payment, and receiving activities. [Ref. 14:p. 2]

Each DCASR operates its own MOCAS system on an AMDAHL 470/V8 mainframe computer with selected data downloaded to a microcomputer for on-line access by contract administrators and other activities. [Ref. 15:Appendix A, p. 41] Such a configuration is indicative of a highly centralized organization and provides the information necessary from the DCASR's management perspective. That is a perspective which includes the DCASR as the holder and maintainer of information. It is supported by the functional offices and shared with related services but centrally controlled by the DCASR.

Centralized computing facilities were driven by the state of technology in the 1950's and 1960's. Large spaces with specially trained technicians were devoted to support the bulky and relatively expensive equipment. For organizations that required tight control of information handling and a need for all work to be done in close proximity, the central computing facility matched the business objectives. However, for those organizations that are divided geographically with different divisions responsible for various data elements, the centralized system was usually implemented for economic and technical efficiency. This did not necessarily maximize the organization's effectiveness towards meeting their business objectives. [Ref. 16:p. 2 - 23]

When evaluating the effectiveness of MOCAS from an unbiased viewpoint, it can be seen as an effective way for the DCASR to achieve their primary business objective which is to manage the region's contract administration functions. As contracts are awarded and subsequent actions related to those contracts are documented, they are mainly input into MOCAS at one central location. [Ref. 14:p. 7] Based on information derived from this automation, decisions are made for the management of budget and human resources at the field activity level. To understand the impact of centralized control, the flow of information as it relates to the DCASR must be examined and understood.

When a contract is awarded, the Procurement Contracting Officer (PCO) distributes copies to the contractor, the Contract Administration Office (CAO), and the Payment Office. This is either done by sending written documents through the mail or by electronic transmission between activities that are so equipped. When the Administrative Contracting Officer (ACO) at the field activity issues an order or contract modification, the flow of information is the same except that it is originated by the ACO and mailed to the PCO. This constitutes the establishment of that contract in the MOCAS data base. When the contractor completes the requirements of a line item of the contract and the Quality Assurance Representative (QAR) accepts delivery, information from the hard copy of DD Form 250 is input into MOCAS. The system automatically generates a Shipment Performance Notice (SPN) for transmission to the Inventory Manager (or other ADP activity if so designated on the contract). If inspection and acceptance is at destination, the system transmits a notification of shipment with a request for acceptance via the Destination Acceptance Reporting and Tracking System (DARTS). When accepted at destination, a hard copy of DD Form 250 is mailed to the DCASR Comptroller Office for entry into MOCAS.

With each delivery of contract line items, an invoice is mailed to the DCASR for payment. When shipment and acceptance documents are matched with the contract and this invoice, payment is made. Checks are mailed to the contractor from the

DCASR Comptroller Office and Contract Payment Notices (CPNs) are transmitted to the appropriate funding office. Subvouchers are simultaneously mailed to finance centers to document payment against the designated appropriation account.

The DCASR is required to notify the PCO of any potential delinquencies. MOCAS tracks delivery dates in order to generate Delay in Delivery notices, DLA Form 1654. Revised Delivery Forecast (RDF) notices are generated by the field activity with recommended action for the PCO. A Contract Completion Notice (CCN) is sent to the PCO when significant events such as physical completion, final payment, or ACO closing of the contract occurs. If closeout cannot be implemented within the mandatory period allowed by DFARS Sup 2, the estimated closeout date and reason for delay is input into MOCAS for observance by the PCO.

Finally, MOCAS generates reports to recap actions that have occurred during given periods. Disbursement and accounting reports are mailed to finance centers for reconciliation of payments made and collections received during the period. Reports categorizing activity by each Contract Administration Office within the region are mailed to each activity for verification and reconciliation either daily, weekly, or monthly. [Ref. 14:p. 3 - 6]

The timeliness of mailing hard copies of contractual actions and reports to field activities and vice versa is considered insignificant if the data elements have been

captured for on-line viewing when they are needed by the DCASR level of management. Workload, evaluation, and staffing plans for each subordinate command can be determined by evaluating the number of contractual actions that were accomplished during the reporting period.

Many of the data elements collected by MOCAS are necessary for generating notices and ensuring timely payments. These are called the functional elements. For example, if a line item is past the delivery due date and no shipment or acceptance has been documented, certain actions must follow. The use of functional elements by managers is generally in the form of summarized or compiled data. It becomes management information as opposed to functional data when managers review summarized data for the detection of trends that may or may not support the business objectives. If no delinquent line items are reported, management might reward those responsible or possibly focus dedicated resources to other areas. If the trend is one of increasing delinquencies, the symptoms alone cannot be treated but the root problem must be ascertained and corrected. Managers may need to restructure resources to rectify the problem.

The management information that is gleaned from MOCAS is of this latter type. It shows some trends when compared to performance of the same event during previous time periods, but more importantly it shows comparisons between activities. In order to plan, organize, lead and control, the DCASR looks

at the following types of summarized information which are derived by totaling the number of actions documented in MOCAS during the period.

1. **Overaged Contracts**

The percentage of overaged contracts compared to total contracts at each activity within the DCASR are listed. The same figures aggregated for the whole region are then compared to DLA goals. The performance is then reviewed by the current fiscal year juxtaposed against the past fiscal year. Undefinitized contractual actions for the region that are overaged are also compared to the previous fiscal year and the DLA goal. Using standards that estimate the effort required to complete unaccomplished tasks, the number of work years needed by the DCASR to meet DLA goals is computed.

2. **Open Contracts**

The most significant data reported at the DCASR level is the basic number of open contracts held within the region during the months of the current fiscal year. These open contracts are then quantified by tot , dollar value and sub-divided by obligated value and unliquidated value. The same information is broken down by each activity within the region. This provides the DCASR with a snapshot view of the workload at each subordinate command and how they compare to one another.

3. Pricing Reviews

The responsibility to arrive at a fair and reasonable price to the government often lies with the contract administration office. The metric used to measure attainment of this goal is the number of cases that are reviewed by the price analysts. Therefore, the DCASR is concerned with the goals and accomplishments of pricing reviews and the value of savings that are recommended by reviews of the contractors' pricing proposals. Reports are generated from the MOCAS data base that document the numbers of proposals that were reviewed each month and compare it to previous fiscal years. The difference between a contractor's proposed price and the final negotiated price is referred to as a recommended saving, and these savings are then totaled for each quarter and compared to quarterly goals set by DLA.

4. Delinquency Rate

Since a major goal of contract administration is the delivery of products or services when and where they are needed, those items which fail to meet the delivery date criteria are of great interest to upper management. The number of delinquent line items compared to the total number of line items delivered during the period is monitored and compared between each activity. The sum of these delinquencies is totaled for the DCASR and then compared against all other regions for that month.

5. Engineering and QA Workload

The functional divisions of Engineering and Quality Assurance are monitored by the number of actions they performed in specified areas. Engineering Change Proposals (ECPs) are counted for each activity and also for the region, as are the dollar savings expected from Value Engineering Change Proposals (VECPs) during the period. Quality Assurance is measured by the number of contracts with QA actions required and the shipments processed by the QA division for the month as compared to previous fiscal years. The dollar value of shipments released and the value of products in-process is tabulated for the month and reported by each activity as well as for the whole region. These metrics of accomplishment are compared to the number of QA work years consumed for each month and the trend is plotted for this fiscal year against the past year. An important facet of the DCASR concern for accomplishments at the field activity is the number of Material Review Board (MRB) actions taken during the reporting period for the region and broken down for comparison between each activity. The volume of activity is evaluated for actions reported on Quality Deficiency Reports (QDRs) for the same period and compared by activity.

6. Support Office Activity

The DCASR also retrieves information from MOCAS that is necessary to coordinate activities between supporting offices. This data is not broken out by actions that can be

directly related to activity at specific field offices and therefore is unlikely to be used by the commanders of the contract administration offices. Examples of activities which are external to the DCASR but support management decisions at the regional level are the Office of Comptroller, Office of Policy and Plans, Office of Civilian Personnel, and Office of Telecommunications and Information Services.

C. IMPLEMENTATION OF CAMIS AT DPRO FMC

When the Department of the Navy assumed command of the former DCASPRO NOD, a decision had to be made concerning the method of data collection. As a NAVPRO reporting to the Naval Sea Systems Command (NAVSEA), no standardized management information system was required for use by all NAVPROs. When faced with the choice between continuing to use MOCAS and reimbursing DLA for the services they provided or developing an independent system, the NAVPRO Commander decided to create a new and more responsive automated system. This new system was designed to collect data elements that were used specifically for supporting Department of Navy needs. Although the system was originally designed to predominantly support the Contracts Division by use of a mainframe program, it has evolved into a system of several loosely related divisional programs on personal computers. Because these diverse data bases are all intended to support the Administrative Contracting Officer (ACO), this stage of development will be referred to generically as CAMIS II.

The discussion thus far has assumed that the majority of strategic planning and management decisions are accomplished at the DCASR level and that the commander of each DPRO makes decisions which equate to a tactical level of management. The functional divisions (Quality Assurance, Engineering, Industrial Specialists, and the Contracts Division) would comprise the category of operational employees if viewed from the DCASR's perspective. This perspective is a reflection of the centralization of control at the regional level and supports the rationale that the DCASR requires the greatest access to the output from the automated data collection system to set goals and objectives for the DPROs. The DPRO Commanders are the implementers of tactical plans to achieve the strategic goals as set forth by the DCASR.

The four NAVPROs that reported to NAVSEA were given great flexibility and acted somewhat autonomously in analyzing and developing their information systems. The support that was required of each NAVPRO by the customers (i.e., program managers, item managers, in-service engineering activities, etc.) was defined and documented in the mission statement of the NAVPRO. The degree of support and the best way to provide the support was determined at the field level by the Plant Representative Office acting within the constraints of the financial limitations imposed by NAVSEA. With the setting of goals and means of implementation more liberally delegated, NAVPRO commanders functioned to a greater extent as the

strategic planners while the functional division heads acted as the middle managers making the tactical decisions. [Ref. 17:p. 24 - 26]

The life of a system evolves through a series of stages which comprise the system life cycle. The general stages of a system life cycle consist of the definition of the need, system development, installation, operation and obsolescence (the phase during which a system is retired) [Ref. 18:p. 55]. The system developmental stage is the most important stage of the life cycle for all software projects because of the effect it has on other stages of the life cycle. The developmental stage was especially important to the implementation of CAMIS II because the end users were allowed to work independently and without the constraints of a schedule or the requirement to deliver a product to a customer. The other four stages of the life cycle of CAMIS II are of no less importance but have been or will be largely determined by forces beyond the control of NAVPRO MINNEAPOLIS.

The definition of a need for CAMIS was a de facto determination in 1982 that NAVPRO MINNEAPOLIS would continue collecting data just as it had before its conversion from DCASPRO NOD. No analysis of the requirements was documented, but a program was hastily written to collect the data elements necessary for the new reporting requirements imposed by NAVSEA (SEA-028). The installation of CAMIS in 1982 was driven by schedule considerations and involved no end users' inputs.

CAMIS II is currently in the operational stage of the system life cycle. This stage is of major importance because it is the longest phase in the life of a system. If CAMIS II is considered as an enhancement of CAMIS I rather than a new system, the operational stage of the life cycle has been continuing since 1982. However, it is more likely that all of the stages were repeated for CAMIS II and an abbreviated life cycle plan was followed within each division even though it was not documented. The success of the installation and operational phases are both dependent upon the success of the development phase. Therefore, the primary emphasis of the discussion which follows deals with the implementation of CAMIS with respect to the development phase. The last stage, obsolescence or retirement, will be evaluated after the conversion to DPRO FMC is complete.

The most critical aspect to consider when developing an information system is to ensure that it effectively meets the stated business objective of the organization. The secondary factors that contribute to the system's success are related to building a flexible and maintainable system while ensuring its integrity and reliability. [Ref. 18:p. 33]

Several important lessons were learned from the implementation of CAMIS I. Although these were never explicitly stated, they became the "common sense" that contributed to the success of CAMIS II. Several basic concepts were incorporated into the development of CAMIS II

which helped guarantee accomplishment of both the primary and secondary critical success factors. The system was originally developed by the end user. Applications were written by operational level employees using the Menu Generators and Macro Command functions of ENABLE software. Because the end user created the data base and application programs, all necessary data elements for the operational level were included. The results were frequently presented to supervisors and managers who directed that relevant changes and enhancements be incorporated. This ensured that the raw data used for transaction processing was properly manipulated to produce useful management information. The iterative approach was very successful in ensuring all requirements were met to support the NAVPRO's goals. By dividing the project into several unique divisional data bases, the development teams had a clear understanding of the requirements and goals. As each division developed its portion of the project, small samples of data were used for modeling each process. Managers reviewed each model to ensure that both transaction processing and management information was accurate and useful. The iterations of changes, review and feedback continued until a mature system had evolved. It cannot be overstated that these successful principles of development were not consciously adhered to but rather were done intuitively based on the experience gained from the development of CAMIS I and by

producing prototypes for management review. [Ref. 18:p. 36 - 39]

The evolution from MOCAS (pre-1982) to CAMIS II is a direct result of the NAVPRO Commander viewing the NAVPRO as a microcosm of the larger acquisition process. The automated system changed because the NAVPRO shifted the emphasis from transaction processing and the transmission of raw data, to a system that provided management information to be used by managers in support of the local strategic planning and evaluation process. The relative importance of data elements changed significantly during this period. Typically, individual contract data elements had been summarized only into groups that showed the numbers and dollar values of total contracts. The emphasis was changed and after CAMIS II was operational, the raw data could be used to provide detailed reports and real-time information for operational employees and tactical managers.

There are many examples of changes developed for CAMIS II which improved the level of support and service provided by the NAVPRO. Some specific changes that were implemented in CAMIS II by the functional divisions at NAVPRO are discussed below.

The first significant change developed for the CAMIS II data base was the level of detail into which each contract was sub-divided. MOCAS and the original CAMIS were designed to break down a contract into units called line items. Line

items are generally individual parts, systems or services but can also be groupings of related parts, systems or services. A data element that categorizes items or services into related groupings is insufficient to track individual deliverables.

CAMIS II provides for tracking of all part numbers included in a line item. This allows the Administrative Contracting Officer (ACO) to affect notification before the actual delinquency date of the line item. If a delivery date is going to be missed, a notice is automatically generated by CAMIS II. The ACO informs the Procurement Contracting Officer (PCO) of the impending delinquency and may make a recommendation to change the contract. Simultaneously, a letter is generated for the ACO's signature which requests consideration from the contractor in return for the government's acceptance of a delinquent product. It also serves notice to the contractor that no rights of the government are waived by acceptance of the delinquent item and further actions may be taken by the PCO. The Industrial Specialist (IS) annotates the data base with the reason for the possible delinquency so that managers can take action to avoid similar problems in the future or to evaluate trends that appear over time. This documentation and notification process is especially important if the government is responsible for the delay or if the responsibility is in question. The reasons for the delinquency are independently evaluated by the contractor's planners and also by the

government's IS Division. The analysis is provided to the IS manager and the ACO, and it is forwarded to the PCO if the ACO determines that this is appropriate.

This information is available on-line in CAMIS II for ad hoc queries by the IS Division. Raw data is entered by IS Division personnel and the data base is maintained on personal computers physically located in the IS Division office. Routine reports displaying summarized data are generated by the IS Division and the information is grouped by individual contracts and weapon systems.

A second significant change made during the development of CAMIS II was the creation of an automated data base to support the Property Administrator. Property administration plays a vital role in the management of contracts at DPRO FMC. In addition to maintaining accounts for property assigned to active contracts and providing disposition instructions prior to a contract being closed, the Property Administrator at DPRO FMC also manages the government owned facilities. As a Naval Industrial Reserve Ordnance Plant (NIROP), the government owns approximately 80% of the plant and equipment at FMC-Naval Systems Division. The predominance of production at FMC-Naval Systems Division since 1940 has been the result of contracts with the Department of Navy. Some residual parts, tools, equipment and machinery from past production are kept to ensure that an industrial base is maintained in the event of a national emergency. The volume of records and the

complexity of assigning ownership has created a special need for management of the contractor's systems that account for government owned material purchased and/or produced during this period. Without a complete and comprehensive data base that associated the contract number and type to specific pieces of government owned property, the Property Administrator would not be able to monitor and evaluate the contractor's responsibility to maintain accurate and detailed records of government owned property.

The Property Administrator must also be able to answer ad hoc queries that are frequently made by members of organizations external to the DPRO (i.e., item managers, program managers, purchasing agents at supply centers, etc.) requesting information regarding the availability of government owned spare parts. Special tools and equipment as well as residual and excess government owned property are tracked by several criteria that affect its disposition. Criteria such as the type of contract which ordered the material, specific clauses included in the contract, special agreements between the PCO and the contractor, the degree of completion to which parts were manufactured and the level of testing accomplished may determine the use of government owned property.

For example, Type Commanders may receive a Casualty Report (CASREP) requesting a non-standard replacement part for a weapon system manufactured by FMC-Naval Systems Division. A

call to DPRO FMC could determine whether the specific part was available in a stock room at FMC. If the part was available, ownership would need to be determined. The Property Administrator could ascertain if the part was government owned by simply reviewing the data base. If the part was maintained as residual material for a cost-type contract, it belongs to the government. If the contracting activity has maintained cognizance of parts residual to their contracts, that contracting activity must give permission for shipment of the requested part before satisfying the CASREP with the government owned material. The data base must provide all of this data as well as information pertaining to the condition of the part (i.e., partially completed, completed but untested, date of last physical inventory, etc.) and the part's storage location.

In the same example, if the part requested was available but was excess to a firm fixed-price contract, it must be referenced to a weapon system so the cognizant program manager can be contacted. If the part is , the manufacturing process, a sale order number would be required to possibly divert that part to satisfy the CASREP. This information would be required before calling the item manager for the weapon system to place an order to procure that part from FMC.

When the Property Administrator is notified that the government Quality Assurance Representative (QAR) has accepted the contractor's final delivery for a contract, the course of

action that is required depends upon some or all of the criteria discussed above. Through the CAMIS II data base, parts and contract line items can be associated with the correct weapon system, contract type, contracting activity, item manager and other cognizant external activities for those parts. Because of the historical relationship between the government and production at FMC-Naval Systems Division, property management is very complex and requires a more detailed system to augment MOCAS. CAMIS II has successfully automated the cumbersome manual filing system that was first used with MOCAS and then with CAMIS I after the conversion to NAVPRO in 1982.

While CAMIS I was in use, the contracts division was the sole point of data input into the system. CAMIS I was used almost exclusively for generating external reports and was reviewed by the division head for useful management information. Some of the functions that could have been possible with CAMIS I were not used because of the lack of access to the system and the slow response time caused by the centralized location of the computer hardware that ran CAMIS I. Computer reports were generally produced monthly and only one procurement clerk had on-line access.

CAMIS II has been developed by the end users and has therefore become a dynamic and more effective operational tool. Although CAMIS II provides all of the benefits that were possible previously, it is accessible to the end-users

and managers within the division for real-time use. Because it encompasses CAMIS I (which was modeled after MOCAS), much of the CAMIS II information is a duplication of that which is currently available from MOCAS. However, the accessibility and flexibility of CAMIS II provides additional support to all of the government activities that interact with DPRO FMC. It therefore serves as a vital management tool for the people administering the contracts and is not just an information tool for top management.

A third major service that the ACO can provide to the PCO as a result of the development of CAMIS II is the ability to track the Contract Deliverable Requirements List (CDRL). Because MOCAS subdivides a contract no lower than to contract line items, a CDRL may appear on a MOCAS report to look the same as one deliverable piece of hardware. In reality, the CDRL is likely to be a myriad of paper reports or deliverable documentation that the contractor is required to deliver to the government. The contract line item that contains the CDRL will appear delinquent as long as any one of the many CDRL items is delinquent. CAMIS II gives the ACO the ability to isolate which specific CDRL item or items are missing or delinquent, evaluate their impact and advise the PCO, who can then make the determination if the delinquent CDRL item is of such material importance as to warrant remedial action. It may be in the best interest of the government to modify the contract by deleting that single item or to seek consideration

from the contractor commensurate with the missing or delinquent item. This feature of CAMIS II not only provides a valuable service that MOCAS does not provide, but it also potentially saves time and money for the government by enhancing the management of those deliverables that are really necessary, useful and timely while expediting the closing out of contracts that are substantially but not technically complete.

The broad goal of CAMIS II is the same as that of MOCAS. That goal is to provide information which will lead to the acquisition of the best product for the government at a fair and reasonable price and meeting the terms and conditions of the contract. Although MOCAS is the designated Management Information System for the Defense Contract Management Command activities, the management information provided by MOCAS does not allow the same level of service and detail that is currently provided through the use of CAMIS II at DPRO FMC. The information that is adequate for management at the DCASR level is not necessarily the best information for the DPRO Commander to plan, organize, lead and control the resources within the subordinate command.

If MOCAS is the only automated system used for transaction processing and managerial decision making, the broadest objectives of the DPRO could still be realized. However, the quality and timeliness of responses to external ad hoc queries would not be maintained without CAMIS II. The detailed advice

and support provided by DPRO FMC to the PCO would also decline without the use of CAMIS II.

IV. CONFIGURATION OPTIONS AND ANALYSES

A. INTRODUCTION

This research recommends the most efficient method of collecting management information for on-site management by DPRO Commanders. Without ignoring the importance of all phases of a complete analysis, this thesis is limited in scope to the evaluation of existing options which minimize the use of DPRO resources while providing the benefits currently available from MOCAS and CAMIS II.

The analysis of alternatives must begin with an understanding of the requirements. An evaluation then compares each alternative by its ability to meet the requirements. The system that achieves those goals and is most advantageous to the organization is therefore the alternative most highly recommended. [Ref. 19:p. 5-2]

Defining the requirements of a management information system that combines decision making and transaction processing for an organization the size of a Defense Contract Administration Services Region (DCASR) is a formidable task. If the goals are accurately defined for one level of management, they must be reviewed to ensure that they meet the needs of the other management levels. This is necessary because of the complexity of the relationships with external activities and internal layers of management. The level of

management represented by the customers of the DCASR may be satisfied with the information provided by MOCAS. However, the requirements of the DPRO's customers are significantly different and may require the collection of different data elements.

The organization defining the requirements of a management information system must view the requirements from the perspectives of the strategic and the tactical managers. MOCAS was retained by the Defense Logistics Agency because it meets the strategic management information needs of the DCASR and the activities with which it interacts and to whom it provides support. These activities include the funding office (i.e., Navy Regional Finance Center), the contracting office (i.e., Naval Sea Systems Command), and the consignee (i.e., Naval Supply Centers). Each DPRO merely provides data for input into the MOCAS system and is not a customer of the DCASR as are the interacting activities and supported activities that define the data elements which must be collected by MOCAS to accomplish their missions. The tactical level of management, DPRO, had to define the requirements of its customers (i.e., the program manager, the in-service engineering activities, item managers, the DCASR, etc.). These requirements were defined by the NAVPRO and were satisfied by CAMIS II before MOCAS was available. It is important to evaluate the requirements of each customer of the DCASR and DPRO in an effort to assess the value of those

requirements, but that is beyond the scope of this discussion of optimal data gathering methods. Since there is no indication to the contrary, an assumption is made that MOCAS meets the management requirements of the DCASR and CAMIS II provides the degree of support necessary for management of DPRO FMC.

Two further assumptions must be reiterated. First, technical feasibility of the required hardware and software for each alternative system was not analyzed. However, the alternatives discussed are limited to those systems which are either in place, are combinations of existing systems, or are minor enhancements to the existing systems, MOCAS and CAMIS II. The implementation of each alterative can be accomplished with negligible impact on the DPRO FMC resources or current operations. A second assumption is that the cost difference between the alternatives is insignificant. Most hardware and software costs associated with both systems are now sunk costs.

The costs of the operational phase of the life cycle cannot be compared to the benefits unless the requirements are explicitly defined and evaluated for each activity and each system. The vast number of data elements and the number of activities supported by DPRO make even a rough estimate of the cost and benefits to the government beyond the scope of this research. However, if individual data elements were assigned a monetary value, it would be possible to compare the expense

borne by the DPRO to maintain and provide that information against the value of the information to the customer. For example, if DPRO FMC stopped tracking CDRLs, each activity that depended on DPRO FMC's support would have to determine the cost incurred by the government due to the lack of that information. If the service provided by DPRO FMC was so valuable that the customers could not operate without the information, each supported activity would have to bear the cost of developing and maintaining its own system. Future research may assign values to each of the data elements used by the customer commands, but this discussion assumes that all support provided by DPRO FMC is necessary and will continue.

By realistically limiting the alternatives to those options that do not differ in implementation cost, the best alterative will be judged by a single criterion. The configuration which captures all data elements needed to meet the business objectives of the DPRO while using the fewest DPRO resources will be the recommend alternative. The discussion of alternatives will concentrate on the advantages and disadvantages of maintaining and accessing management information under each configuration.

Finally, MOCAS is a mandated system. No viable alternative for a DPRO Commander includes the elimination of MOCAS reporting requirements. Each alternative must therefore include maintaining MOCAS. The research for this thesis explored the possibility of making changes to the MOCAS system

to include the additional tasks performed by CAMIS II. However, discussions with the DCASR St. Louis Transition Management Office (TMO) indicated that no changes to MOCAS have been approved, and that there is only one minor change request presently under review.

Three alternatives meet the criteria of maintaining MOCAS and still providing the level of support that is currently available through the use of CAMIS II.

- Use MOCAS as the only automated system (with manual systems used to accomplish the information processing tasks of CAMIS II)
- Maintain the status quo
- Use MOCAS and enhance CAMIS II with a local area network

B. ALTERNATIVE ONE -- USE MOCAS EXCLUSIVELY

A realistic alternative is to maintain MOCAS as required and eliminate the use of any other automated system at the DPRO. If the current process of contract data entry continues, MOCAS will be the only automated system that contains a complete data base on each contract. Currently, new contracts are entered into the MOCAS system, but not into CAMIS II, as they are awarded. When the contract closeout procedure is complete for currently active contracts (which are only maintained at the DPRO in the CAMIS II system), they are deleted from the CAMIS II data base. Natural attrition will eventually make CAMIS II obsolete unless a decision is made to continue entering new contracts into CAMIS II (in

addition to MOCAS). If no such decision is made, within several months MOCAS will be the only system available to the DPRO.

This alternative must also be considered because it is used in many contract administration offices with apparent success. Prior to its conversion to a Navy activity, DPRO FMC relied solely on MOCAS as its automated information system. All Defense Logistic Agency Contract Administration Service offices have continuously used MOCAS to successfully manage contracts assigned to their commands. Prior to the DMR initiatives, three Army Plant Representative Offices had already adopted MOCAS as their automated information system. This would imply that some Plant Representative Offices can successfully fulfill their mission through the use of MOCAS alone.

1. Advantages

The entry of data into MOCAS for most contractual actions is done centrally by the DCASR. Few changes to the data base are allowed to be entered by the field activities. Only administrative data such as codes designating responsible personnel at the DPRO and the date and number of DD Form 250's that are signed by the Quality Assurance Representative (QAR) can be entered into MOCAS by DPRO personnel. With MOCAS as the only data base, the need for data entry personnel at DPRO FMC would be greatly reduced.

Information could be tightly controlled by centralizing the flow of input and output. One benefit of controlling the information would be realized through the contractor claims process. Monetary settlements are sometimes awarded to the contractor by the government because conflicting information is provided to the contractor by different activities within the government. If all activities within the government could speak with one voice (because the information came from a central source), many contractor claims against the government could be avoided. It would also provide a buffer between DPRO employees and influences from outside the normal chain of command such as civilian companies contracted by the government to assist in the management of specific contracts. In such cases, if MOCAS was the only repository of management information, less time would be spent by DPRO employees interacting with other commands who had access to MOCAS.

Any future move toward integration of automated acquisition systems is predicated upon the establishment of some standard system which must be implemented by each participant in the acquisition process. A major goal in standardization is realized by the acceptance of MOCAS for use by all contract administration offices within the Defense Logistics Agency. With a standard in place, integration is easier to achieve between MOCAS and the various mechanized systems of other government agencies and the private sector

(such as Ships Parts Control Center's automated tracking system for government parts being repaired under contracts with civilian contractors). [Ref. 15:p. 3-4]

All efforts to establish the interface between MOCAS and DPRO FMC have been completed. Therefore, the amount of resources and personnel that are devoted to CAMIS II maintenance and training will no longer be required.

All of the advantages that would be realized by using MOCAS exclusively relate to the efficient use of resources by the DPRO Commander. Using MOCAS as the only automated management information system would not improve the method of collecting the data elements which are necessary for the management information needed at the DPRO.

2. Disadvantages

While MOCAS accomplishes the reporting of contract status at each field activity, it does not have the flexibility to respond to ad hoc queries from internal or external sources. Responses to ad hoc queries are requested from DPRO FMC by many sources. For example, ad hoc queries could be received from a deployed ship calling for the current status of a repair part or from a DPRO manager requesting the number of Material Review Boards conducted during a given period. Assuming that all of the ad hoc queries satisfy legitimate requirements, some method of maintaining that data is required. If MOCAS contained the data needed to respond to ad hoc queries and could provide these responses in a timely

manner, it would presently be used as the system of choice by the activities initiating the queries. Further, the workload of DPRO FMC would be diminished if answers to such queries were available in MOCAS. Unfortunately, even those data elements which are available in MOCAS are not always easily accessible because of the urgency of the requests and the delay in response from MOCAS.

Data entry is accomplished primarily by the DCASR. The DPRO managers do not have a means to control the timeliness and accuracy of the data used for routine decision making at the DPRO. Thus, the DPRO Commander takes action on information that appears to be current in MOCAS. Unfortunately, there is no mechanism to report the delay in entering the data after an event has occurred. Therefore, the DPRO Commander has no control over the timeliness of the information in MOCAS which is used for managing the DPRO.

Three significant tasks are currently required for managing contracts at DPRO FMC but are not supported by MOCAS. These tasks are:

- The sub-dividing of Contract Line Item Numbers to enable the monitoring of individual parts.
- The identification of contract deliverables by the weapon system to which they pertain.
- The ability to monitor Contract Deliverable Requirements Lists as individual deliverables.

These three tasks are required to support the DPRO mission and must be accomplished by some manual information system if

MOCAS is the only automated information system available to the DPRO.

MOCAS does not provide timely information for the management of resources at the DPRO. Summarized reports can be requested but are not delivered on a real-time basis. Requests for summarized reports are typically filled by the following work day, but the length of the delay depends upon the DCASR staff workload. Trend analysis in specific areas and relationships between various factors are not accomplished because of the delay in response time and the lack of sufficient detail in the MOCAS reports themselves.

C. ALTERNATIVE TWO -- MAINTAIN THE STATUS QUO

Both automated systems (MOCAS and CAMIS II) can continue to be fully maintained. This configuration depicts the status quo.

1. Advantages

MOCAS contains all of the information needed to meet the requirements of the managers at the regional level. CAMIS successfully meets the requirements of the on-site managers and operational employees. Maintaining both MOCAS and CAMIS ensures that all requirements would be satisfied and maximum flexibility would remain to enhance CAMIS II for future requirements.

Maintaining and updating MOCAS is less labor intensive when the data is duplicated in CAMIS II. For example, when MOCAS prints the Production Administration Delinquency Report

(PADR) for DPRO FMC, it is given to an Industrial Specialist who reviews the details of the delinquent contract line item. The Industrial Specialist will immediately query CAMIS II to review the facts pertaining to this delinquency. The divisional manager can query CAMIS II to look for trends of delinquency within that contract, the specific weapon system, the business unit of the contractor's plant, or even the performance of the Industrial Specialist responsible for tracking the delinquent line item.

The dual systems serve as complements to each other when used in this manner. CAMIS II can be used to update MOCAS while MOCAS is used by the Industrial Specialist to verify information and assure the accurate documentation of each transaction. To illustrate this point, consider the following specific transaction. The PADR from MOCAS of 6 September, 1990 showed that a Blast Shield ordered by contract N00104-88-G0162 Line Item 0001 AA was delinquent. However, CAMIS II did not show this delivery as being delinquent. Upon closer examination, it was found that the contract had been modified during the previous month and that the line item had been canceled at no cost to the government. CAMIS II provided this real-time information which helped monitor the input of changes into MOCAS. The information flow and data entry to MOCAS lagged to such a degree that the PADR was not accurate in this case.

If the end user of an automated system is evaluated by criteria which are within his or her control, then he or she has a personal stake in the accuracy and maintenance of the data. In the preceding example, the Industrial Specialist used CAMIS II as a tool to prevent delinquent deliveries. Reports from MOCAS are used to evaluate the performance of an individual employee because the MOCAS data base is the responsibility of several employees and commands. The dual system alternative places the responsibility for accuracy of the data base with the people who most affect the data and therefore contribute to meeting the objectives of the command.

Although CAMIS II and MOCAS are technically reliable systems, Alternative Two includes CAMIS II which, as a subset of MOCAS, offers additional reliability and accessibility. If the MOCAS system is unavailable because of hardware or communication problems, data can still be manipulated to satisfy the need of the customers. This alternative meets every requirement for effectively managing the field activity.

2. Disadvantages

Without completing a comprehensive cost analysis, it is impossible to assign a cost associated with maintaining dual systems. However, it is intuitively certain that entering data repetitively is less productive than entering it once. The effort to maintain CAMIS II is intensive at the DPRO level. Most of the data elements that comprise MOCAS are entered at the regional level or at other commands, so if

CAMIS II did not exist, there would be minimal data entry done by DPRO FMC personnel.

Whenever data fields are duplicated between systems or within a single system, there is a high risk that some data will be inconsistent [Ref. 16:p. 202]. If there exist inconsistencies between CAMIS and MOCAS, they are resolved by reviewing periodic reports. However, each division of the DPRO maintains an autonomous part of the CAMIS data base. Many of the data fields are duplicated by each divisional data base and this redundancy increases the chance of erroneous input or the simultaneous representation of the same event at different periods of time. For instance, when delivery is accepted by the Quality Assurance Representative (QAR), it is immediately entered into the QA data base for CAMIS II. An ad hoc query by any other division would not indicate that the item was delivered until the DD Form 250 had passed to each division for entry into that division's data base. Therefore, the primary disadvantage of Alternative Two is the inherent loss of efficiency caused by multiple entries of identical data.

D. ALTERATIVE THREE -- ENHANCE CAMIS WITH A LOCAL AREA NETWORK

All of the functional divisions of DPRO FMC maintain sections of CAMIS II. All divisions are currently connected via a local area network (LAN), with the exception of the Quality Assurance Division which is scheduled to be connected

presently. It is now feasible to turn CAMIS II into an integrated, distributed data base.

1. Advantages

All of the advantages of Alternative Two can be realized by the configuration described as Alternative Three. In addition, every user will have access to real-time data between divisions as well as within the division. The flow of hard copy documents (i.e., DD Form 250's, Property Clearance Reports, etc.) can be minimized by assigning responsibility for the entry of critical information to one division and then allowing the system to update all related files that are affected by the entry of that data.

Data that is currently entered multiple times can be entered once. For example, when a new contract is awarded, basic information would be entered concurrent with the distribution of the hard copy of the contract by the Contracts Division procurement clerk. The contract number, contract type, applicable weapon system, line item numbers and delivery dates would already be available when the contract is reviewed by each functional division. As data is entered by the responsible personnel, the information would be available immediately for anyone authorized to view it. As the QAR documents the delivery of line items by entering the DD Form 250 date and number, the schedule used by the Industrial Specialist to track delinquent contract line items would immediately be updated. The ACO would see that the item was

accepted by the QAR before the hard copy was routed to the contract file where it must be filed and retained as the legally binding documentation. When final deliveries are documented, the Property Administrator would be notified of the physical completion and start the actions necessary to close out the contract. The Contracts Division monitors closeout procedures and all supporting actions could automatically update the closeout data base. Accurate and real-time status of all closeouts would be available for management review.

The level of detail that is currently maintained to meet customer requirements would be available with this configuration. All benefits realized from the CAMIS II data base would continue to be of service. However, timeliness and accessibility would be increased with this option while the manpower required for data entry would decrease.

2. Disadvantages

Increased management oversight is required for the implementation of a successful distributed system. While the strength of CAMIS II lies in innovative development by the end users, tighter control must be exercised for a distributed system. The implementation and operation of a distributed data base requires knowledgeable leadership to control access and integration, to manage resources and to ensure efficiency of operation [Ref. 16:p. 197 - 209]. However, the current computer support staff has successfully accomplished these

tasks before. The current operation of the LAN shows that they have the requisite knowledge and training to provide the necessary coordination to effectively administer the configuration described as Alternative Three.

E. SUMMARY OF ALTERNATIVES

Three alternative configurations can meet the needs of the DPRO management by using existing systems and resources alone or in combination. Each option must include the mandated system of MOCAS.

Alternative One evaluates the use of MOCAS alone. This option reduces the DPRO resources necessary to maintain an automated system but does not provide additional automated tools to assist the DPRO Commander in meeting the goals of the command. Some services that are currently provided to customers would no longer be offered by an automated system, so this alternative does not fully meet the requirements of the command.

Alternative Two combines the use of MOCAS and CAMIS II as it is presently maintained. While retaining the advantages of standardization discussed for Alternative One, this option meets all of the requirements for the command to support its customers. It serves the operational level employee who controls the data for transaction processing, and the same raw data is processed to provide information for the tactical and strategic levels of management within the command. However, the current system is inefficient and introduces the

unnecessary risk of providing inaccurate information for the DPRO management by duplicating the entry of data within each division.

Alternative Three is the status quo with improvements provided by use of the existing LAN. All of the benefits from Alternatives One and Two would be realized but the disadvantages associated with duplicate entry would be eliminated. Increased management would be required, but this could be accomplished by redirecting available resources rather than creating additional workload.

V. CONCLUSION AND RECOMMENDATIONS

A. INTRODUCTION

The objective of this research was to find the most efficient method of collecting information for the management of a Naval Plant Representative Office (NAVPRO) after conversion to a Defense Plant Representative Office (DPRO). An efficient method is defined as the means of achieving stated criteria using the least amount of resources. Efficiency, as opposed to the effectiveness of a system, is not judged by the determination of which data elements should be collected but by the way in which the predefined data are gathered and maintained. [Ref. 17:p. 213]

The research conducted in support of the following recommendations was limited to the most productive (efficient) way of collecting management information using existing resources. As stated in Chapter One, it is assumed that all data elements are necessary (effective) in accomplishing the mission of the command. To gather the current data elements in the most efficient manner, it is recommended that Alternative Three, maintaining MOCAS with an enhancement of CAMIS, be pursued. MOCAS provides necessary functions at the regional level and CAMIS contributes the services required by the customer of DPRO FMC.

B. CONCLUSIONS

The findings of the secondary research questions support the conclusion that management information is most efficiently collected by a dual system of MOCAS and a modified CAMIS. The following discussion answers the three secondary research questions.

1. Finding One

What items of information were collected under the NAVPRO Contract Administration Management Information System (CAMIS) model that are not required for MOCAS?

- MOCAS is not designed to differentiate contract deliverables by weapon system. The MOCAS automated system cannot effectively be used by an organization which is intrinsically structured in a manner similar to the matrix organizational plan. Although functional divisions of DPRO FMC are permanently established, members of each division are assigned to specific project teams. This is the same as the organizational structure of the contractor and several of the government activities to whom DPRO FMC routinely provides support. In the absence of CAMIS, some type of a data base that associates a contract number to a specific program would still be necessary to meet customer needs. An auxiliary system could be implemented to support the ACO with very little effect on the productivity of the DPRO employees. However, to provide the current level of support to the Program Managers, in-service engineering activities, item managers, etc., a significant amount of effort would be required to maintain an auxiliary system. All deliverables, dollar values, government owned property and line items would need segregating by weapon system to respond to most ad hoc queries.

- MOCAS is deficient in its ability to track Contract Line Item Numbers (CLINs). Contracts are sub-divided into categories delineated by numeric CLINs and sub-line items designated by alpha characters. This is only adequate for the tracking of single deliveries which correlate to single sub-line items. For example, a CLIN could be for a single, major acquisition such as the delivery of one completed weapon system. In this case, the CLIN is

readily identified as corresponding to a system that may even be designated by a unique serial number. However, a CLIN could also be for several small repair parts and even the sub-line item could be a grouping of several items that are defined only by the manufacturer's part numbers. If any individual part requires attention, MOCAS does not adequately differentiate one part from another at an acceptable level of detail. If MOCAS generates a report requiring action on a specific CLIN and sub-line item of a certain contract, there may be no way of responding without a detailed data base that tracks and assigns part numbers to CLINs and sub-line items. The contract file contains a reference to each item but the volume of parts requiring action warrants an automated data base to administer the contract efficiently. CAMIS tracks the progress of each manufacturer's part number as it is listed in the contract. Without a detailed data base like CAMIS, it would be an extremely labor intensive task to update the MOCAS data base in response to DCASR queries that don't identify the sub-line items by individual part numbers.

- MOCAS does not record and track Contract Deliverable Requirements Lists (CDRLs) individually. There is a definite value to the government if CDRLs are pro-actively managed by the ACO. CDRLs cannot be pro-actively managed unless they are identified and tracked individually. Frequently, individual items become obsolete if not delivered on scheduled. The contractual delivery dates are often complex and are based upon the delivery of a prior line item. Basically, no management of CDRLs is possible unless each deliverable item is monitored individually. As an example, the documentation for a piece of hardware may be listed as a CDRL deliverable. Its delivery date could be dependent upon the delivery of the hardware. The government is allowed a fixed number of days to review the documentation before it is returned to the contractor for incorporation of the changes directed by the government agency. The date of return to the contractor is the basis for another milestone specified by the CDRL. If the next deliverable was the completed documentation with the changes incorporated, the delivery date would be a fixed number of days after its return from the government review. A schedule for a complete training plan and several follow-on items could be dependent upon that delivery. However, if a government representative returned the document to the contractor and failed to record the action with the contract administrator, the entire CDRL would continue to be reported as undelivered. Even after all hardware was delivered to the government and put into operation, it

would still be recorded as physically incomplete due to the lack of documentation for that one item within the CDRL. The total CDRL would appear delinquent on MOCAS with no means of tracking which individual deliverable caused the delinquency or which activity was responsible for that item.

2. Finding Two

What is the most effective and efficient method of collecting management information for DPRO FMC, given that the reporting requirements of MOCAS have been imposed upon all Plant Representative Offices?

The government-wide advantages of conversion to the MOCAS system cannot be understated. However, the greatest benefits of the MOCAS system are realized at the levels of management above the DPRO Commanders. CAMIS or some form of an auxiliary data base must be maintained by the DPROs to cope with the deficiencies described in the previous section. When the benefits of MOCAS and CAMIS are both realized, the automated systems are operating effectively. There will be duplication of effort for data entry when identical data elements are input at the regional level and again at the field activity. However, this can be minimized to promote efficiency by developing CAMIS into an integrated system connected via the current LAN, so the data elements input into CAMIS will only be entered once at the DPRO level.

3. Finding Three

What modifications would be required to MOCAS if it was to service as the sole management information system of on-site managers of DPROS?

Major modifications to MOCAS could provide the information required by on-site managers at all field activities. However, to meet the diverse need of each activity within the newly formed Defense Contract Management Command by modifying MOCAS is not a realistic solution based on the limited number of changes that are being considered for approval by the DCASR.

C. RECOMMENDATIONS

1. Recommendation One

DPRO FMC should redirect the necessary resources to ensure that CAMIS is maintained. The CAMIS system will be used for the next several years if only to administer the currently active contracts which were not entered into the MOCAS system. However, some local method of augmenting MOCAS will always be necessary and CAMIS presently does this task effectively.

All contracts assigned to DPRO FMC as the contract administration office since the conversion to the MOCAS system should be entered into CAMIS. Management information is more efficiently gathered from CAMIS than from MOCAS because it is more timely, provides faster response time, it is more flexible and, most importantly, is controlled by the end users. The level of support that is currently provided to customer commands will either be unavailable or require establishment of additional independent data bases within the command if CAMIS is not maintained.

2. Recommendation Two

CAMIS should be enhanced by integrating the data base between all functional divisions. By exploiting the value of the existing LAN, a logically distributed data base could be instituted to minimize the effort expended on raw data entry. This would also maximize the use of transactional data as management information by providing all managers with current and consistent output from all the DPRO's divisions.

3. Recommendations Three

Although changes to MOCAS were not recommended as a solution to the immediate problems facing Plant Representative Offices, a long range plan warrants consideration by DPRO Commanders. The adoption of MOCAS for all contract administration functions has attained the goal of creating a standard system among related offices within the acquisition process. Increased emphasis can now be placed on system integration between these offices. [Ref. 15:p. 3-4]

Currently, each DCASR processes information which is provided from various sources. Some of the sources are on-line and others rely on the transmission of data via hard copy. If information was processed at the input location and at the time that the raw data was entered and then transmitted to the DCASR, the business objectives of all levels of the organization could be accomplished in a more efficient manner. As computing power becomes more accessible and decreases in cost, communication costs gain relative importance in the

evaluation of automation strategies. Resources which are located where they are most frequently used and where the data is processed will minimize communication requirements while maximizing the use of available processing power. [Ref. 16:p. 233 - 238] This efficiency can be realized by the distribution or placement of data processing functions at the local command and defining an interchangeable format to transfer the information between commands. As one future option, the information collected at the operational level of the administration activity could be summarized and uploaded to the DCASR each night. Real time information at the payment office (which is necessary for routine operation at the office) could be summarized in a daily data transfer to meet the requirements of most commands. This configuration would keep relevant information active and current at the level where it is used operationally while providing appropriate periodic summaries to other levels of management. Managers would still have access to all data by query, but the bulk of the data passed to them would be in the form of reports formatted in the most useful style for that manager (i.e., summarized transactions, exception reports, graphical displays, etc.). While this appears to limit the control exercised by a central office such as the DCASR, it would still provide all of the information currently used by the DCASR but would filter out the data irrelevant to management

at that level. By transferring only the information actually used by the DCASR, efficiency would be increased.

This configuration would give total autonomy to the field offices in the initiation of their automated systems to fulfill each command's individual needs. If all data was of the type and in the format required by the DCASR system, requested data could be up-loaded periodically and thereby accomplish the goals of all levels of management with one automated system. Although the description of this configuration does not provide a solution to the current research question, it may be a feasible alternative in the future. In May of 1988, the Deputy Secretary of Defense directed the use of American Nation Standards Institute (ANSI) X.12 Electronic Data Interchange as the standard for all business related exchanges of data between DoD and contractors. This contributes to the possibility of one day implementing a system that is an integral part of all participants in the defense acquisition process. The Assistant Secretary of Defense (Production and Logistics) is charged with oversight of several committees to coordinate and attain such a goal. [Ref. 15:p. 2-7 - 2-11]

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