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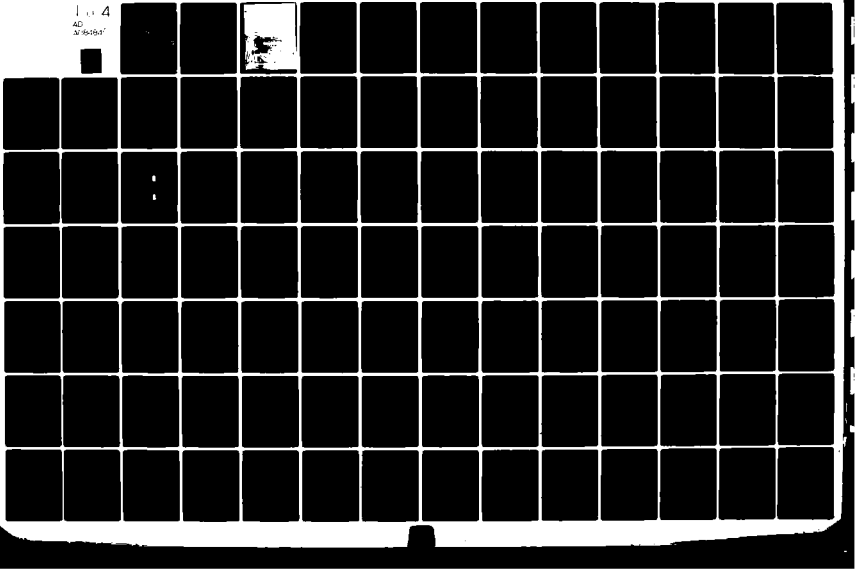

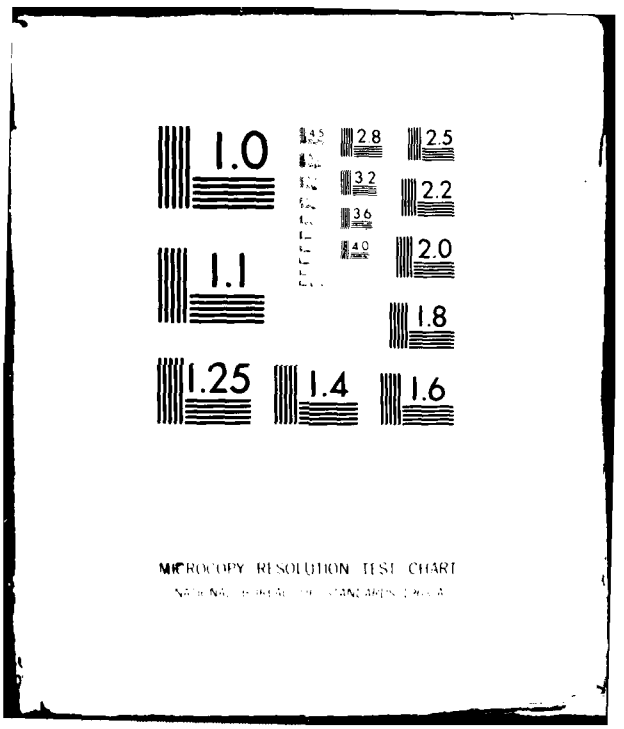
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The basic question addressed is whether or not it is feasible for Headquarters Department of the Army, (HQDA), to manage automated information as a resource. The study examined automated information from five approaches including senior top interviews, Army staff agency visists, investigation of selected information systems (14), reviews of 13 HQDA Data Processing Activities, and conduct of three case studies. The study recommended integrating eleven separately managed programs at HQDA into an overall information resource

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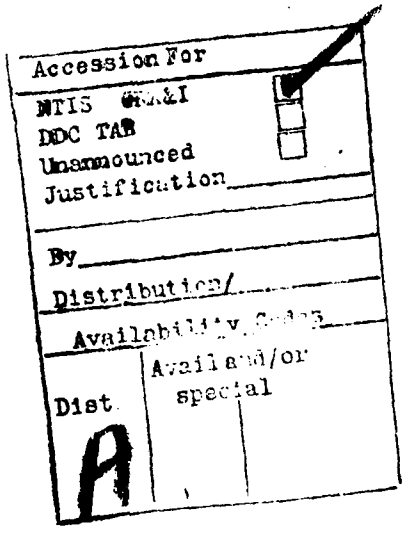
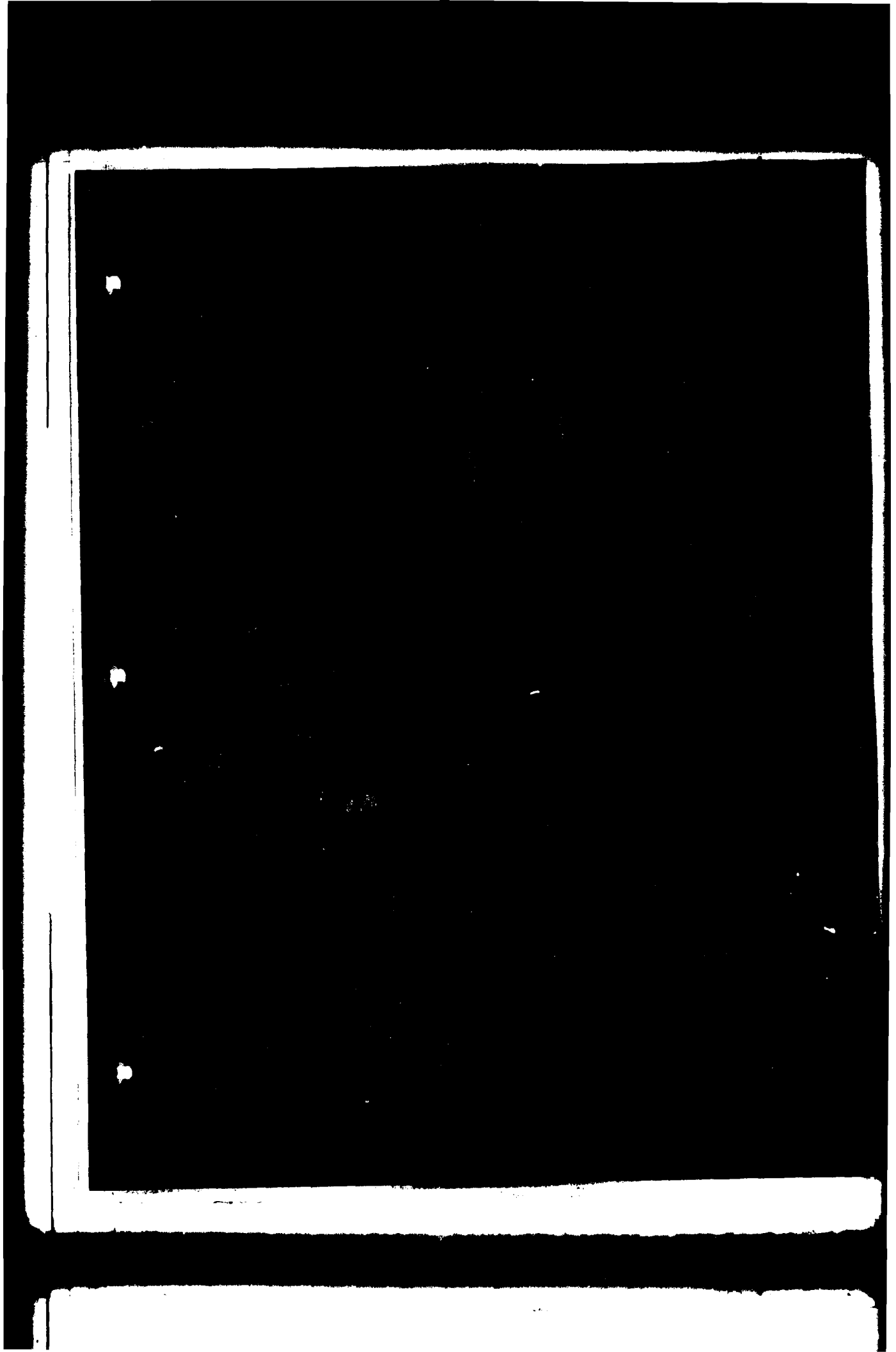
management (IRM) program. Eleven areas are (1) information policy, (2) information systems planning review and coordination, (3) information resource education, (4) information resource technology assessment, (5) metadata management, (6) data base administration guidance, (7) data standardization, (8) policy compliance audit, (9) forms management, (10) records management, (11) reports management. The study considered three organizational alternatives for implementing IRM at HQDA that were developed: (a) decentralized, (b) distributed, and (c) centralized. The study recommended the distributed approach whereby a small policy and program management office is established with program control over the individual IRM functions which are carried out in various organizational entities of HQDA.





June 12, 1979

Mr. Harold E. Gelfond, Chairman
Study Advisory Group
U.S. Department of the Army
Room BD 1033, The Pentagon
Washington, D.C. 20310

Dear Mr. Gelfond:

We are pleased to submit this Phase I Final Report which is a result of the HQDA review which we conducted during the period of November 27, 1978 to June 12, 1979. Our report is entitled An Information Management Study for Headquarters, Department of the Army. It contains our assessment of the requirements in HQDA for information management and our recommendations for establishing a program to manage the automated information resources of HQDA.

We wish to express our appreciation to the Department of the Army for the support and assistance which you and the members of the Study Advisory Group have provided during this phase of our effort. We are looking forward to a continuation of our excellent working relationship into Phase II.

If you or any other interested parties have any questions regarding this report, we would be more than willing to provide the necessary explanations.

Very truly yours,

ARTHUR YOUNG & COMPANY

By: G Mendenhall

Gerald Mendenhall
Partner

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I. INTRODUCTION

To manage is to plan for, to allocate, and to conserve resources. Information is a resource. It has the same characteristics of cost, value, and scarcity, as do the more familiar material, financial and human resources. As the recognition of the value and cost of information increases in the Army, the effective management of this resource becomes increasingly important to Headquarters, Department of the Army (HQDA). During the last twenty year period numerous computer systems have been installed throughout the Army and at HQDA to process ever increasing volumes of data. The expanding use of computers has provided a means to exploit the potential value of automated information resources and manage them in a manner never before possible.

Considering the size and complexity of Army operations, the management structure, and the impact of its decisions, the Army needs to have the best information available for decision-making. Effective management of information entails understanding what data is available, keeping track of where the data is, and knowing who is responsible for it. In a large organization, such as HQDA, this is extremely difficult. Each individual Staff Agency is capable of managing its own data, but there is no explicit management of the data that flows among groups. Furthermore, the individual groups each manage their own data in different ways, making the correlation of data at higher levels difficult or impossible. Who has access to the data, who actually uses the data, under what conditions are the data valid, when can it be released by an organization, when can it be removed or changed, how can it be shared among organizations, and how much does it cost to collect, store, and process the data are all questions relevant to the management of the information resource.

Such questions are, at best, difficult and, sometimes, impossible to answer consistently across HQDA. And yet, the answers to such questions are central to information sharing to achieve improved management reporting and more effective decision-making. To accomplish this objective, we believe HQDA must establish an effective program for information resource management. Arthur Young & Company has studied the need for, and the implications of such a program.

The problems associated with managing the information resource can be grouped loosely into two categories: management and technical. In the management category are the issues of setting information management goals and directions, of establishing information management policies and plans for achieving those goals, of managing the execution of the information management plan. The technical problems deal with the details of implementation. During the course of this study, Arthur Young & Company has addressed both types of problems for automated information.

The purpose of this introductory chapter is to acquaint the reader with this study and to summarize Arthur Young & Company's approach. In the remainder of this chapter we present the approach used to conduct Phase I of the Information Management Study for Headquarters, Department of the Army. The discussions are divided into three categories:

- Study Objectives
- Study Methodology Employed
- Scope of Study.

A discussion of each of these categories follows.

1. STUDY OBJECTIVES

The goal of this study is to develop the policy, concepts and directions, the administrative methodologies and procedures, and an organizational approach for use by the Department of the Army in accomplishing the management of automated information within HQDA and its supporting Data Processing Installations. The specific objectives of this study are:

- Determination of the requirements for effective automated information management among the HQDA organizational elements
- Development of an information resource management program to manage effectively HQDA's automated information resources
- Development of an information administration structure and the necessary policies and procedures required to administer that program
- Development of a time-phased plan for implementing that program.

The study is divided into two phases: Phase I - Program Requirements Definition; and, Phase II - Program Implementation Planning.

In Phase I we have concentrated on determining the requirements for information management and developing the conceptual framework for a program for managing the automated information resources of Headquarters, DA. In Phase II we propose to develop the program in detail and recommend a long-range approach for implementation. This Phase I Final Report presents our findings concerning the need in HQDA for a consolidated program for information management and presents our recommended conceptual approach to managing the automated information resource.

2. STUDY METHODOLOGY EMPLOYED

An overview of the methodology employed by Arthur Young & Company in Phase I is presented in Exhibit I-1. As indicated in the exhibit, the development of an effective information resource management program for HQDA was based upon initially developing a sound understanding of the current data standardization and information management environment. In order to understand this environment with limited resources, we employed a structured approach to gathering information. This approach entailed a broad look at most of the relevant activities in HQDA, with a more detailed look at selected organizations, at automated systems, and at management practices pertaining to information management. By using this approach, we obtained both the breadth and depth of information required for our analysis.

Initially, our attention was directed toward gaining a greater perspective on efforts in the Army and others to manage information.

- A review of current HQDA-wide information management activities was performed to determine current information management responsibilities, approaches, and problems. We reviewed existing policy and procedure guidance (both internal and external) with regard to information management, determined the roles of the different HQDA organizations currently involved in some aspect of information management, and assessed the status of the current information management program with a HQDA-wide perspective. Input to this effort was obtained through a series of interviews with Technical Advisors, Directors of Automation, and Data Standardization Managers, primarily from the organizations of ACSAC, TAG, and USACSC. The results of this analysis are contained in Chapter V of this report.

- A review of other efforts in information management was also undertaken to incorporate the experience in information resource management as described in publications from the government, private, and academic sectors. The topic of treating information as a resource is relatively new, and publications are just beginning to appear. In particular, the publications of the President's Federal Data Processing Reorganization Project, FIPS Task Group 17 of the National Bureau of Standards, and the Commission on Federal Paperwork provided a sense of the visibility of and the growing commitment to information resource management within the Federal community.

These initial efforts provided the background for our detailed data collection approach. Then detailed data collection included:

Headquarters, Department of the Army
Information Management Study Methodology

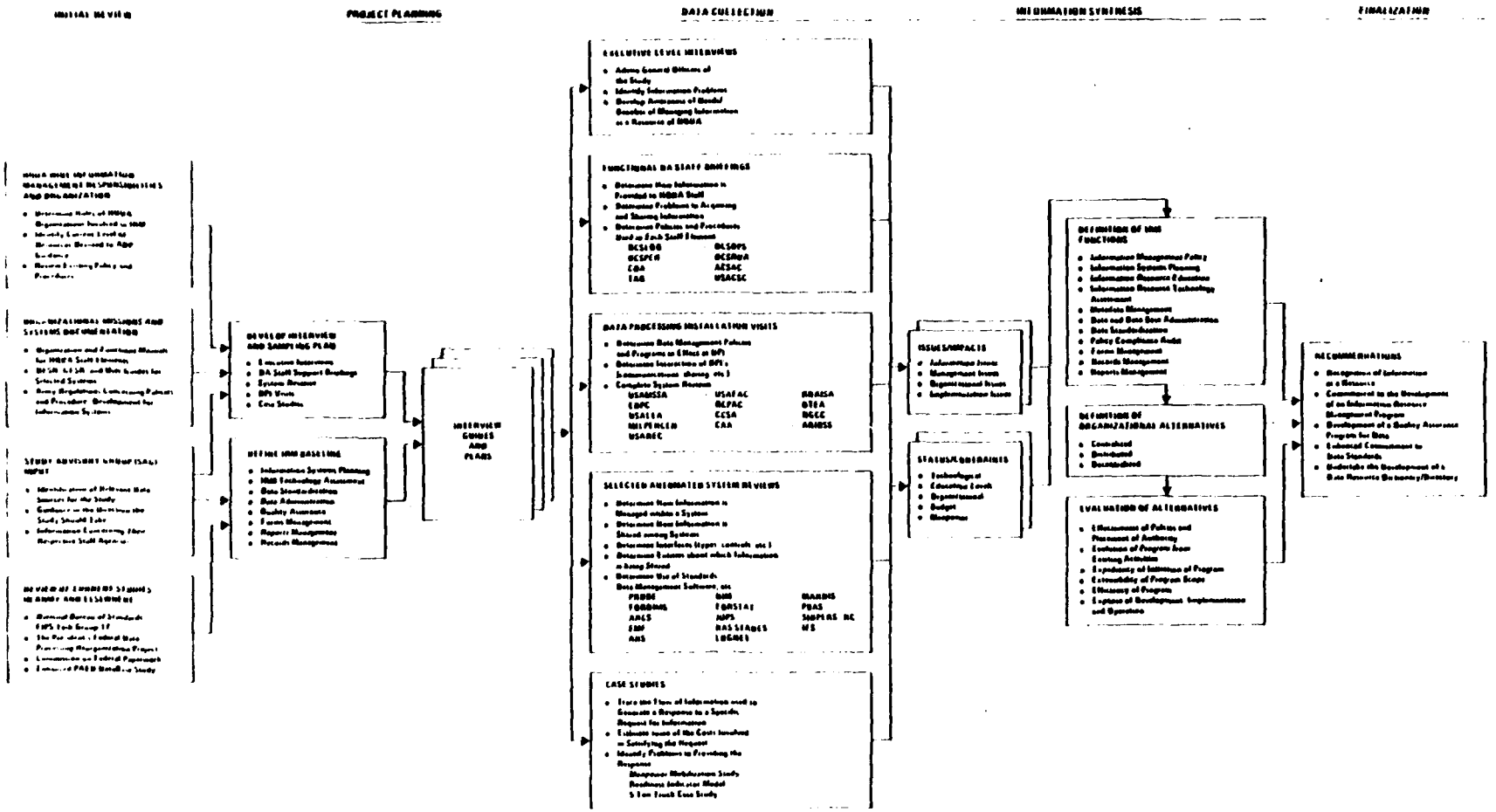

EXHIBIT I-1

(1) Executive Level Interviews

Selected members of the DA Staff were interviewed by the project team in order to understand more fully the information needs and functional relationships that exist among the staff elements. Executive interviews provided an opportunity to:

- Advise General Officers of the study,
- Identify existing information problems, and
- Develop an awareness of the need for and benefits of managing information as a resource of HQDA.

These interviews provided a forum in which information problems could be discussed and established a base for further investigation of the individual Staff Agencies. The results of these interviews are incorporated into our discussion of the Staff Agencies in Chapter IV.

(2) Functional DA Staff Agency Briefings

Less formal, group interviews were conducted with various members of the HQDA staff organizations in an attempt to understand their needs for information and their involvement in the Army's information management process. These staff support briefings helped to:

- Determine how information is provided to the HQDA Staff
- Determine problems in acquiring and sharing information
- Determine policies and procedures used in each staff element to manage information.

A variety of sources were utilized to accomplish this functional staff analysis relating to information management. Selected agency heads, action officers, SAG members, and selected non-HQDA personnel were interviewed with a focus toward:

- Mission and organization of the Agency
- Information requirements and automated support
- Role of the action officers in the organization and their needs for improved information management
- Status of the current information management program.

The information obtained from these briefings is contained in Chapter VI of this report.

(3) Data Processing Installation (DPI) Visits

We then reviewed 13 of the Data Processing Installations (DPIs) that supply automated data processing support to HQDA. Information obtained from the DPI visits included the organization, management, and specific data administration activities at each installation. Information was sought specifically in the areas of:

- Information management policies and programs in effect at the DPI, and the
- Interaction between the DPIs focusing on the need for communications and sharing of data.

Individuals consulted during our visits to the DPIs generally included the DPI Director, system managers, Data Administrators, Data Base Administrators, data standardization program managers, and other key personnel as selected by the DPI Director. Current approaches as well as future plans for operation and administration of the DPI were discussed.

The combination of site reviews and interviews has enabled the study team to formulate a consolidated overview of the HQDA DPI's and has given each of the DPI's an opportunity to comment on or participate in the study effort. The results of the DPI analysis can be found in Chapter VII of this report.

(4) Selected Automated System Reviews

The methodology employed in the review of the selected systems was to study available documentation and to interview system managers and user personnel as appropriate. The system reviews provided some depth of detail concerning the processes of information handling. The functional characteristics and data flows of each system were examined to find:

- How information is managed within a system
- The extent of, or need for data to be shared among several systems
- The amount of interface required among staff elements, data bases, files, and the characteristics by which these interfaces are provided (automated or manual)
- The degree of standards compliance in the implementation of the system

- The level of sophistication of data management software employed by the system.

The results of our analysis can be found in Chapter VIII of this report.

(5) Case Study Analysis

The objective of the selected Case Study Analyses is to determine through evaluation of specific events the actual impact of information management problems in the Army. The case studies focused on how requests for information resulted in problems in generating a response, how a coordinated information management program might have had a direct impact on answering these inquiries, and what costs were involved in satisfying the information request. The selection of individual case studies was based upon (1) the currency of the request to ensure the ability to trace the flow of information and problems involved and (2) the requirement of retrieving the data from two or more functional areas. Three cases were chosen involving requests for information concerning manpower, readiness, and materiel data, respectively. The results of this analysis are contained in Chapter IX of this report.

Each of the above-mentioned study data gathering activities provided input to the development of a program for information resource management, the analysis of alternative approaches to implementing the program, and the selection of our recommended approach. The requirements for this program are contained in Chapter X of this report, and the alternatives and recommendations are presented in Chapters XI and XII, respectively.

3. SCOPE OF STUDY

In order to understand the impact and direction of the recommendations developed in this report, it is important to clearly recognize the limited scope of the study:

- The goal of Phase I, as reflected in this report, is the development of a concept for managing information for HQDA
- The objective of the study is to develop a plan for managing automated information, not an automated management information system
- The reviews of current HQDA operations were conducted to allow Arthur Young & Company to determine what is needed and what is feasible for managing HQDA's automated information resource
- The study recommendations apply only to automated information.

These points are discussed here to assist the reader in understanding the material presented in the remainder of the report.

(1) Information Resource Management Concept

The goal of Phase I of this study is to determine what is needed by Headquarters, DA for managing its automated information and to recommend if appropriate, a conceptual program for managing that resource. The program that we recommend in this report for managing the automated information resource of HQDA has been developed in sufficient detail to allow an understanding of the concepts involved and the advantages of this approach. During Phase II, the following are to be developed in greater detail: overall organizational responsibilities for the program, organizational placement of the functions, staffing requirements, specific policy and procedure development, and implementation milestones and schedules.

The decisions to proceed with Phase II of the study involve a commitment to the concept of managing automated information as a resource and to the general management approach to be taken.

(2) Information Resource Management Plan

The objective of this study is to develop a management plan for HQDA to manage more effectively its automated information resource. The impact of this plan will be the promulgation of the philosophy of viewing automated information as a resource of the entire organization and the establishment of the necessary activities to manage that resource.

The outcome of the study will not be the development of a management information system or a single integrated HQDA data base. HQDA is much too large and complex an environment for the development of such a unified system, even with today's technology. Instead what will be recommended is the establishment of a managerial approach which can facilitate the creation of cooperative and coordinated data bases and management information systems through the establishment of appropriate policies, procedures, standards, and training.

(3) HQDA Reviews

To determine what is needed by HQDA to manage its automated information resource and what is organizationally feasible, Arthur Young & Company conducted a number of reviews of current HQDA information management operations. These reviews were designed to provide us with an understanding of HQDA's current approach to information management and to determine what problems HQDA is experiencing with its automated information.

The reviews did not focus on other potential problem areas such as mission management, ADP management, or specific system designs. We present the material obtained from these reviews as supporting evidence of the need for HQDA to begin to actively manage its automated information resources. It is not our purpose to single out specific organizations, individuals, or systems for criticism but rather to concentrate on information management practices found to be common across HQDA.

(4) Study Scope

The scope of this study, and consequently the information resource management program which we shall recommend, has been limited to the automated information used by Headquarters, Department of the Army to manage and plan the resources of the Army. Extensions of the concepts of information resource management to include manual information or data employed outside of HQDA have been considered in the conceptual design of the program, but verification of such extensions will require additional, specific study. We consider this restriction to be reasonable given the contractual constraints on time and resources for conducting the study. Further, we believe this is an appropriate first step, rather than trying to address the problem on an Army-wide scale. However, we have anticipated future expansion of the program by the Army and have incorporated such extensibility into our program.

Under this restriction of the program's scope we were specifically excluded from studying

- Compartmented intelligence information
- MACOMS, and field operations
- Relevant operations in OSD and in the Congress as end-consumers of some HQDA information
- Manual information collected on forms or reported on hand-written or typed sheets.

The reader is cautioned to keep this restriction in mind while reviewing the remainder of this report. All further references to information resource management or an IRM program should be taken as restricted to automated information. The evaluation of HQDA status and the development of an information resource management program are presented and meant to be interpreted under the terms of this restriction of scope.

Our findings from these interviews, briefings, reviews, and visits confirm the need for an Information Resource Management Program at HQDA. The functions that such a program might address and the organizational impacts of various management strategies throughout

HQDA are the subject of this report. In the succeeding chapters, general findings and issues related to Information Resources Management are presented for each activity comprising the study approach of Arthur Young & Company. In the next chapter we begin a discussion of the need within HQDA for a program to manage the automated information resource.

II. INFORMATION RESOURCE MANAGEMENT -- AN OVERVIEW

Information is a valuable resource of Headquarters, Department of the Army (HQDA). Specifically, information is vital to:

- Effective planning to achieve Army mission goals,
- Efficient execution of the plans, and
- Appropriate feedback from the execution into the planning process.

As the recognition of the value and cost of information increases, the effective management of this resource becomes increasingly important to the Army. The costs of automated data processing (ADP) in the Army are substantial and growing. More and more data is being automated, hence there is an ever-increasing reliance on automation for collection, processing, storage, and retrieval of vital information. Automation has done much to improve the responsiveness of HQDA Staff Agencies in processing data. However, as the size, number, and expense of HQDA automated information systems increases, Headquarters decision-makers find they still are not getting all of the information they need in a timely or consistent manner. Further, many Staff Agencies find that because they can process more data through automation, they do. Hence, some decision-makers in HQDA find themselves inundated with data while the data suppliers in the field are requested to provide even more. In the case of data automation, more is not necessarily better.

Effective use of information entails knowing what data is available, keeping track of where the data is, and understanding the meaning, accuracy, and validity of the data. In a single-user environment, where a single individual or small organization is responsible for data collection, processing, storage, and use, the details of data availability, location, meaning, accuracy, and validity are generally known to the user. In a more complex environment, however, such details may not be readily available to the entire user population. One organizational element may collect the data, another may process it, a third may store it, and yet a fourth may actually use the information to accomplish its mission objectives. In an environment such as this, typical of large organizations such as HQDA, the management of the information production process becomes essential to the effective use of information.

1. VIEWING INFORMATION AS A RESOURCE

Headquarters, DA is primarily a staff organization of the Department of the Army whose basic mission is to support the Army in deploying its forces in the field whenever and wherever necessary. In providing this support, HQDA is concerned with three groupings of fundamental management activities for the Army:

- Life Cycle Management of Systems (including requirements, development, acquisition, and maintenance)
- Management of Support Services (such as legal, health, administrative, communications, and data processing)
- Management of Organizational Resources (such as personnel, finances, or materiel).

Each of these groupings contributes to the overall support of the Army through the development of tools, the provision of services, and the establishment or coordination of plans, policies, and objectives for the troops in the field.

A fundamental activity of particular relevance to this report is resource management. The basic objectives of any HQDA resource management endeavor are to:

- Maximize the value and benefits to be obtained from the use of the resource in achieving the Army's goals and objectives,
- Minimize the cost of acquiring, processing, employing, and retiring the resource, and
- Fix accountability for efficient and effective use of the resource.

Thus, a large part of the policy setting and monitoring activities of a HQDA resource management program are geared toward optimizing the benefits of employing the resource vs. the cost of providing it.

It is important to note, however, that the management of a commodity as a resource is distinguished from the management of the commodity itself. Managing a commodity as a resource implies a focus on information about the acquisition, maintenance, and disposition of the commodity more so than on the actual use of that commodity. For example, the management of people as a resource is primarily concerned with information about people more so than with the individuals themselves. Thus, ODCSPER establishes policies and reports figures on manpower levels in the Army while the Field Commanders are responsible for the personal counseling and guidance and the evaluation of the individual soldier. Evidence (i.e., information) of such personnel management may be reported to ODCSPER, but ODCSPER's interest in this information is primarily in seeing that such transactions have taken

place according to DA policies and procedures, more so than in reviewing the contents of the report. This is not to say that no one in ODCSPER cares about people as individuals, but rather that the management of personnel as a resource is different from the management of people. Similar remarks apply to the management of the financial and materiel resources as well. It is the conclusion of this study that information may likewise be viewed and managed as a resource within Headquarters, Department of the Army. The details of such an approach are contained in this report.

A second fundamental activity of HQDA, and an essential aspect of resource management, is planning. Planning includes the goals to be accomplished, the identification of objectives to mark progress toward meeting the goals, and the development of specific steps to be followed to achieve the objectives. The goals may be externally generated, such as mission directives from OSD or manpower ceilings from Congress, or internally, such as improved management or better operational effectiveness. The recognition and acceptance of these goals then results in the development of a plan for achieving them.

Planning and Resource Management are often integrated. Plans are developed for managing resources, and resources are managed to achieve the goals and objectives of the Army's plans. The common raw material for planning and resource management is information. Information is vital to understanding goals and objectives, developing and communicating plans, and evaluating progress in following the plans. Similarly, information is vital to understanding the nature, potential, and limitations of the resource as well as monitoring the employment of the resource. Ultimately, information is the primary resource required by the HQDA Staff Agencies to perform their specific functions.

Many organizations in government and industry have recognized the vital nature of information to the functioning of their enterprise and are beginning to perceive the advantages of viewing information as a resource of their organization.

The Commission on Federal Paperwork in its Information Resources Management Report (September, 1977) has indicated that treating information as a resource implies a view of information as something:

- Of fundamental value (like money, people, or materiel)
- Having measurable characteristics (such as method of collection, utilities and uses, and a life cycle pattern with different attributes at each stage)
- Having an expense for which standard costs may be developed and cost accounting techniques used to control.

The Commission concluded (p. 14) that when viewed in this fashion, information, like other resources, should then be:

- Identified, measured, and costed at each stage in its life cycle
- Planned more explicitly to assure that requirements are realistic and receive top management attention
- Budgeted for, to assure that information costs are properly balanced against other resource costs, not buried in overhead
- Managed by balancing the value received from information used against the cost imposed on those from whom it is collected
- Accounted for and audited to assure that costs do not get out of line and that designated agency officers are held accountable for its effective and efficient use.

The basic premise of our study is that information is a valuable resource of Headquarters, Department of the Army. This resource should be actively managed to achieve its full potential and to permit the Army to control the costs associated with it. Viewing information as a resource of HQDA provides some advantages in the management of information:

- A horizontal view of information across functional areas to maintain a HQDA perspective
- A coordinated approach to resolving inter-organizational differences in the definition of the characteristics of information
- The fixing of responsibilities throughout HQDA pertaining to information collection, definition, manipulation, reporting, and retention
- A mechanism for identifying and controlling information redundancies and inconsistencies.

This view does not necessarily imply that a single person or organization should be placed in charge of all information for HQDA or that the various functional agencies should relinquish control over their individual data bases. What is implied is the need for coordination and cooperation in the management of information for the benefit of HQDA as a whole.

Information resource management does not imply a single, all-inclusive integrated data base of every data element used by HQDA. Such a massive HQDA data base is probably not technologically feasible nor organizationally desirable. Further, it is not necessary to the implementation of information resource management. What is necessary is the establishment of particular data bases containing information describing the characteristics of the individual data bases and files which themselves remain in the domain of the individual Staff Agencies.

2. PROBLEMS IN MANAGING INFORMATION

Exhibit II-1 presents an overview of the Information Resource Management (IRM) Approach. Several areas have been perceived as important to the Army and which pose obstacles to the effective and efficient use of information in HQDA. These areas are discussed in the following paragraphs.

(1) Limited Information Sharing

There is currently limited sharing of information among the functional staff agencies and their supporting data processing installations (DPI's). This situation is due in large part to the vertical "stovepipe" orientation of most staff agencies where data and information are collected at the bottom of the organizations, processed within the respective DPI's, and funneled upwards to fulfill the information needs of the General Officers and Staff at the top. Generally, there is limited use of data processed by other organizations and limited coordination of the definition, representation, processing, or storage of data to facilitate that use. The end results can be inconsistencies in the data reported to higher authorities from two different channels, difficulty in correlating information at the top levels of HQDA because the data is aggregated or represented differently, and unnecessary redundancies of information collection, processing, reporting, and storage across and within functional areas.

(2) Insufficient Awareness of Information Availability

In general, there is insufficient knowledge of what information is available, where to find it, how to access it, and what it means. Some tools currently developed (such as OPTIMIS) exist in rudimentary form, but do not satisfy current staff needs. There is no single central information locator facility which can assist action officers in obtaining access to the automated information they need to compile their action reports. Each individual Staff Agency relies primarily on a manual system of an informal action officer network to serve as the interface to the agency's information as well as to the information of other agencies.

The problem is not limited to the action officer. Within a given agency, there may be insufficient awareness of the agency's information resources as well. Typically, information is managed within an agency on a system-by-system basis and not as a resource unto itself. Thus, the knowledge of what information is contained in which system can pose problems within Staff Agencies as well as among them.

An Overview of the Information Resource Management Approach

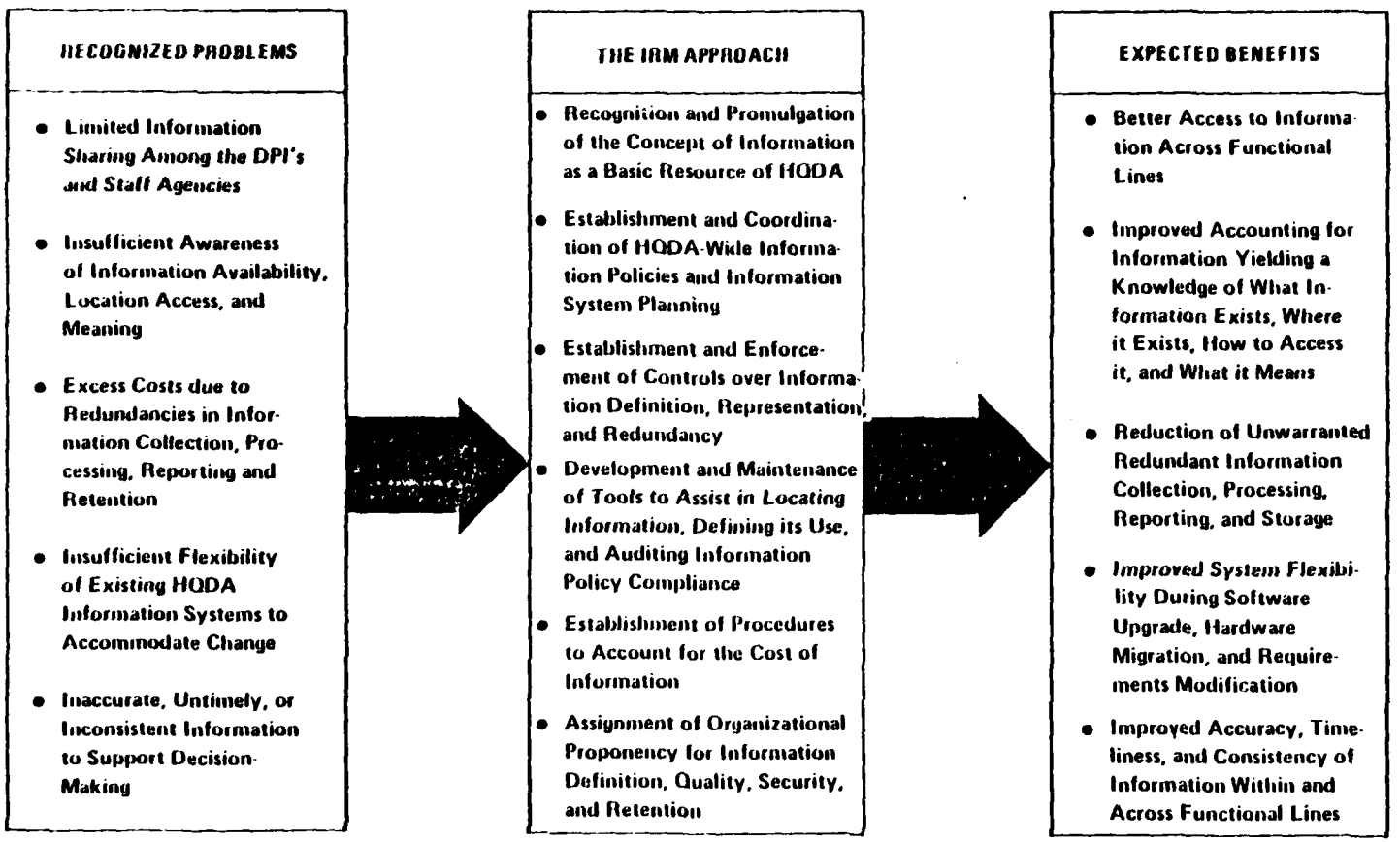

EXHIBIT II-1

(3) Information Redundancies

There are redundancies in information collection, processing, reporting, and retention fostered by the stovepipe environment. Of course, not all redundancies are necessarily inappropriate. Certain redundancies may be needed for back-up, comparison, or fulfillment of mission response requirements. However, such redundancies can present problems relating to inconsistencies among data bases maintained by the individual Staff Agencies, the need to update multiple copies of data which may be widely dispersed (or even unknown) throughout HQDA, and confusion over which copy or version of the information is "official".

Unnecessarily redundant collection, processing, reporting, and retention of information can also entail significant costs in terms of manhours spent in filling out similar forms, excessive computer power being required to handle information which is being similarly processed at other installations, time spent in poring over massive reports to obtain one or two pieces of pertinent information, and expensive storage facilities to retain copies of data that are maintained (and perhaps more up to date) elsewhere.

(4) Insufficient Flexibility of Information Systems to Accommodate Change

Existing HQDA information systems are generally not responsive to the change implied by the decision oriented HQDA environment.

One aspect of the HQDA information environment is the need to rapidly evaluate the impact of events such as budget cuts or new manpower ceilings. Current HQDA information systems generally do not provide adequate flexibility of the information itself to permit this evaluation. In situations where this exercise has been significant there has been a tendency to design a new information system to support it in the future. Unfortunately, the dynamics of the HQDA environment are such that the questions in the future are never quite the same, and so the new information systems are not quite sufficient. The results are either changes to the existing system or the development of yet another system. Information resource management can provide a mechanism for defining information separately from the systems which use it.

These systems typically do not require new information. The "entities" of the Army about which information is stored (e.g., units, soldiers, trucks, etc.) remain somewhat stable over time. The "values" which are stored (e.g., locations of units, number of soldiers, serial numbers of trucks), of course, will change frequently, but the entities themselves will not. Systems which bury the definition and description of the data in the application software code experience substantial conversion efforts when those programs must be altered. A fundamental concept of

automated data bases and the development of data base management systems is the concept of "data independence," i.e., the separation of the definition and the maintenance of the data from the application programs which access it. The notion of data independence is fundamental to treating information as a resource. The data, or information, is considered as having an existence independent of any individual use to which it might be put. To assure that the information is comprehensible across several applications which are each changing (and at different rates), the information must be defined and maintained independently.

(5) Inaccurate, Inconsistent, and Untimely Information

The information which officials use to manage the resources of the Army, to plan for the years ahead, and to report to OSD or Congress may, at times, be inaccurate, inconsistent, or not timely. The impact of such deficiencies can range from the cost associated with the extra manpower which must be expended with "stubby pencils" to get the data, to actual cuts in appropriations for certain programs because sufficient information could not be produced. In the area of managing the operations of the Army the impact of incorrect information can be much more severe.

Imperfect information is a fact of life for management everywhere, and it is doubtful that any large organization will ever be able to have all of its data completely in order. However, improvements can be made. In information management, this implies an organizational understanding of what information is available and where, under what circumstances it should or should not be used, who is responsible for it, when it can be destroyed, and more.

3. INFORMATION RESOURCE MANAGEMENT APPROACH

The information resource management (IRM) approach focuses on the management of the characteristics of information as a resource rather than the actual information values. Just as the management of the personnel resources requires personnel data, the management of the financial resources requires financial data, or the management of the materiel resources requires logistics data, so, too, the management of the information resource will require information data. To avoid confusion, this information data is usually termed "metadata," or data about data. Metadata is a fundamental raw material which an information resource management activity needs to manage the information resource, i.e., data about the data contained in the information resource. For example, how many data elements are maintained at HQDA, which Staff Agencies are the proponents for each, what are the characteristics of each (name, size, legitimate values, etc.), where is the official value for a given element to be kept, and where are copies of an element located throughout HQDA are all questions of interest to information resource managers. The answers to questions such as these comprise the metadata which the information resource managers maintain and employ.

Exhibit II-1, presented earlier, outlines the Information Resource Management Approach which could be applied to HQDA. The management of metadata is just one, although a basic part of an overall management approach to resolving some of the information-related problems described in the preceding paragraphs.

(1) Information as a Basic Resource

Fundamental to the IRM approach is the recognition of information as a basic resource of HQDA. This recognition must occur at all levels of the organization and must become an integral part of the way those organizations manage their mission responsibilities. The establishment and promulgation of this concept requires a substantial and ongoing educational and promotional effort.

(2) Information Policy Statements

A series of policies relating to information and information resource management should exist to provide the framework and direction for managing the information resource. Coordination among existing and future information system planning efforts is necessary to provide the information resource management perspective, such as checking for redundancies or inconsistencies across information systems and across functional areas, coordinating the resolution of conflicts, or providing guidance and assistance in information definition, location, or interpretation.

(3) Establishment and Enforcement of Controls

Controls should be established and enforced for the IRM policies. Consideration should be given to enticements, auditing procedures, and assistance relative to compliance with the information policies which HQDA determines are necessary. The implementation of such controls would require careful planning and coordination to avoid the perception of information resource management as revoking the individual Staff Agencies' prerogatives over their own information while providing sufficient power to keep the program viable.

(4) Information Management Tools

The management of information as a resource, like the management of other resources, will require a set of tools to assist the management process. Tools such as automated dictionaries, directories, data bases about forms and reports, and procedures for collecting metadata will need to be developed. Auditing policy compliance and altering the information automated management process itself, based on feedback from the users and information processors, will also need to be developed and institutionalized.

(5) Information Costs

Information is often regarded as a "free good", something which can be replicated wherever it is to be used or collected whenever it is needed. However, information is costly to collect, process, store, and maintain. Costs associated with information are generally not recorded explicitly but rather are often buried in the overhead of meeting a mission. Costs are more likely associated with the information handling equipment and media (computers, terminals, storage facilities, communication lines, paper, etc.) than they are with the effort involved in collecting, organizing, defining, searching, maintaining, reporting, or retaining data. Information, as a product of these efforts, can be a costly item, but such costs will remain unknown until some form of cost accounting for information is established. Furthermore, the individual collectors, users, and handlers of information should develop an awareness of the costs associated with information so they can better manage their operations.

(6) Responsibilities for Information

One of the primary goals of information resource management is to establish responsibilities for information throughout the organization. This does not mean that the information resource managers will necessarily take on such responsibilities, but rather that the IRM approach is to establish a forum whereby such responsibilities can be assigned at the appropriate level throughout Headquarters. Thus, there should be IRM roles for the Staff Agencies and information processing organizations alike.

Information resource management, then, is concerned with the knowledge and management of the composition, description, acquisition, dissemination, and flow of data or information where the information is held to be a resource of the entire enterprise. This does not imply that the management of these activities requires the execution of these functions by a single organization, nor that information resource management will control the collection, processing, or reporting of information. These activities may be performed at many locations throughout HQDA, but there is the need for some consistent direction and guidance.

Typically, management today focuses on the logistics of handling data and not on the data itself. Hence, there are organizations responsible for data processing, communications, word processing, forms control, reports control, records retention, etc. But these activities, while necessary, tend to focus on the medium of the information and not on the information itself. While this study has been limited to automated information, the general concept of information resource management encompasses the management of information irrespective of the medium on which it is stored, transported, or manipulated. In some environments, information may be incorporated in the information

resource regardless of its present form or mode of representation.

In our study, we have limited our investigation and the development of our program to the management of information which is stored, transported, or processed by automated means (i.e., computers). Such a limitation of scope is convenient for an initial study; and clearly, automated information provides a large and important nucleus for full-scope information resource management. Our purpose in conducting this study and the program which we recommend in Chapter XI are focused on getting HQDA started in the direction of managing its information as a resource. A program limited in scope to automated information is a step in that direction.

4. BENEFITS OF INFORMATION RESOURCE MANAGEMENT

The full benefits of information resource management (IRM) are long-range in perspective. The realization of these benefits may require ten years or more to develop fully. However, immediate substantial benefits may be obtained earlier through implementation of IRM policies, procedures, and methodologies which will result in a reduction of redundant collection, processing, and storage of data. The total impact of IRM will be seen as new information systems are developed and installed or as older systems are upgraded or replaced. Such changes, of course, may require years to accomplish.

Some expected benefits of IRM are listed in Exhibit II-1, presented earlier. Primarily, these benefits are improvements which address the recognized information problems we have discussed.

(1) Sharing of Information

Better access to and sharing of information across functional lines in HQDA can be accomplished through the organization and standardization of information terminology and representation for communication among organizations. IRM should reduce costs associated with excessive searching, translating, and getting data into a usable format for use in another system or another functional area. Individual information products such as reports, forms, summaries, or files can be reutilized across organizational boundaries where appropriate.

(2) Improved Information Awareness

Improved information awareness affords the benefit of reducing the time required, say, for an action officer to locate potentially relevant information, determine its appropriateness for his action, and employ it properly in his report. In addition, it obviates certain data elements as candidates for standardization by viewing the information apart from its respective system. It also provides the opportunity to recognize information products as complementary resulting in actions to combine them in ways to increase their overall effectiveness.

(3) Reduction of Unwarranted Redundancies

The reutilization of information can result in the reduction of unwarranted redundancies in information systems. The real benefit of identifying redundancies is not in the elimination of existing redundancies, where the cost of system modification may exceed the expected savings, but rather in the control of costly redundancies in future systems.

(4) Enhanced Ability to Manage Change

The management of change can be greatly enhanced by the incorporation of an "information point of view" to assess the impact of proposed system changes on the information resource as well as the impact of proposed changes in information on the current systems and organizations. More effective management of change can result in cost reductions in the overall life cycle of information systems by reducing the impact of change in the environment on the information resource.

(5) Improved Quality of Information

Information quality stands to be improved by developing an awareness in each organization of the responsibilities it holds with respect to the information it shares with the rest of HQDA. IRM is not intended to interfere with individual mission accomplishment, but, where feasible, provide an awareness and coordination mechanism for improving data accuracy, timeliness, and consistency.

These several benefits of information resource management are longer range and will have signifiant impact on how the Army conducts its business. However, it is the operational impact of IRM which will be of most significance to the Army in the near term.

5. IMPACT OF INFORMATION RESOURCE MANAGEMENT

Information resource management is a management concept and approach which can have significant impact on the Army. This impact is directly on the Army's ability to manage its mission. Information management is not sufficient to improve management, but it is certainly supportive of better management. In this section we discuss some of the impacts which an information resource management program might have on the Army's ability to manage. These impacts include:

- More Effective Operational Decision Making
- Improved Planning and Resource Management
- More Cost-Effective Information System Development

- Reduced Overall Reporting Burden on the Field
- Increased Responsiveness to Requests for Information Based on Data Already Available
- Improved Posture for Transition to Future Environments

These impacts are discussed briefly in the paragraphs which follow and in greater detail throughout the remaining chapters of this report.

(1) More Effective Operational Decision Making

Managing information as a resource of Headquarters, DA can facilitate effective decision making by enabling the sharing of information on a more widespread basis throughout HQDA. Access to the most current and accurate information is important to effective decision making. This implies the need to know where relevant information can be found and the context under which it should be interpreted, that is the quality of the information.

(2) Improved Planning and Resource Management

Managing information as a resource of HQDA can improve the planning and resource management process by providing more relevant information focused on the needs of the Army through the coordination of reporting requirements. Establishing common methods of reporting information on resource requirements can facilitate the analysis of those requirements and, hence, the allocation of resources. The result can be reduced waste, cost savings, and more effective execution of plans. In addition, the flexibility provided by managing information, as opposed to managing systems, can contribute to improved planning through the support of "what if" drills and analytical models.

(3) More Cost-Effective Information System Development

Information is not free. There are substantial costs associated with the collection, transmission, processing, storage, and reporting of information. The costs of developing automated information systems are significant. An information resource management program can assist the planning process for information system development by establishing stable definitions for information, identifying alternative sources of information which may already exist, and providing a framework for the identification and verification of information system requirements. The result can be reduced duplication of information and development effort, reduced demand for computer resources to process essentially the same data, and a reduction in system redesign costs as changes occur in the system environment. An information resource management program can also provide a mechanism for identifying outdated information requirements and establishing the managerial framework for rescinding such requirements.

(4) Reduced Overall Reporting Burden on the Field

The identification and coordination of the information requirements of the HQDA Staff Agencies can effectively reduce the reporting burden on the field by consolidating information reporting channels. Thus, instead of reporting the same information to each of several agencies, the field commanders can report particular information to a designated agency, and the other agencies can obtain the information they need from that proponent. An information resource management program can create an increased awareness in the Staff Agencies of the reporting burden which their requests for information impose on the field.

(5) Increased Responsiveness to Requests for Information Based on Data Already Available

Headquarters, DA receives requests for information from a variety of external sources such as OSD, OMB, Congress, and the other Services. In addition, numerous Staff Actions and studies are initiated internally in the course of managing the Army. An information resource management program can increase the responsiveness of the staff agencies to these requests by providing information locator services to assist the Action Officers, by establishing the framework for sharing information among the various data processing installations and staff agencies, and by coordinating the reporting of information to control inconsistencies.

(6) Improved Posture for Transition to Future Environments

The implementation of an information resource management program can place the Army in a better position for evolving to the environment of the future. No one knows what the future will bring, of course, but extrapolation of current trends would indicate an increase in the use of on-line interactive information systems to support Headquarters decision making and planning. The development of such decision support systems is predicated on the availability and accessibility of information from a variety of sources. This information, to be useful, must be coordinated in a fashion which permits the application of automated technology. Such technology (for the forseeable future) will require a heavy emphasis on standardization and common representations which can be processed by automated means.

Common trends in the reduced cost of automation technology and the increased cost of personnel also portend a continued emphasis on automating portions of the information production process in the Army. More and more information can be expected to be automated in the years ahead. Implementation of an information resource management program now can establish the process of organizing and inventorying the Army's information to facilitate the transition to this environment of ever-increasing automation.

Of course, the implementation of information resource management within HQDA will not be without cost, itself. As we indicate in subsequent chapters of this report, there are several areas in need of development at HQDA to facilitate the management of information as a resource. The primary cost will be personnel costs associated with establishing and maintaining an IRM program. In Chapter XI we indicate some of the cost of staffing an IRM program, but these figures do not necessarily imply that new spaces will be required. Many of the activities of the IRM program discussed in Chapter X are already being performed in some aspect throughout the organization. What is lacking is coordinated direction of their efforts across the Staff Agencies.

Another significant cost item for the Army will be the development of an information system to maintain metadata pertaining to the various automated data bases spread throughout HQDA. Such a system will require a substantial development effort (perhaps phased over several years), but a metadata management system will provide considerable savings in the form of reduced staff time to locate relevant information, identification of potentially costly information redundancies, and improved effectiveness of selecting relevant and timely information in conducting studies and actions.

Other costs will be incurred as HQDA develops procedures, tools, and methodologies for managing information. Such activities are proceeding in the Staff Agencies and Data Processing Installations already and should not be considered as solely additional costs of implementing an IRM program. In fact, some cost savings should be expected through coordination of these individual and independent efforts.

The cost of implementing an IRM program at HQDA should not be understated. There will be some additional cost associated with establishing and maintaining the program. However, many of these costs may be offset through redirection of current HQDA efforts and the savings to be obtained by providing a consolidated program. In Phase II of our study we shall investigate further the costs associated with information resource management at Headquarters, Department of the Army.

In this chapter, we have provided a description of the problems of managing information in the Army and indicated some of the costs and benefits of managing information as a resource. In the next chapter we present a discussion of the philosophies and concepts which contribute to this developing management process.

III. INFORMATION RESOURCE MANAGEMENT -- PHILOSOPHIES AND CONCEPTS

Information resource management (IRM) has been introduced in Chapter II as a philosophy or basic managerial approach to dealing with information in a large organization. We identified several fundamental aspects of this approach which included:

- Viewing information as a basic resource of HQDA
- Developing policies relating to information and information management
- Establishing and enforcing certain control procedures relating to the management of information
- Developing a set of tools to assist in the management process
- Identifying and monitoring the costs associated with information
- Assigning distinct responsibilities for information and information management.

In this chapter we elaborate and develop further some of the concepts related to this approach. These concepts center on

- The origins of information resource management
- The information resource environment
- Some relevant terminology and functions of information resource management.

Finally, we conclude with a discussion of some of the related trends in the Federal Government toward information resource management which may impact the Army.

1. ORIGINS OF INFORMATION RESOURCE MANAGEMENT

The philosophy and concepts of Information Resource Management are an outgrowth and a merger of philosophies and concepts prevalent in a number of management domains. Exhibit III-1 depicts these contributing fields which include:

- Data Management
- Paperwork Management
- Information Sciences Management

Disciplines Contributing to Information Resource Management

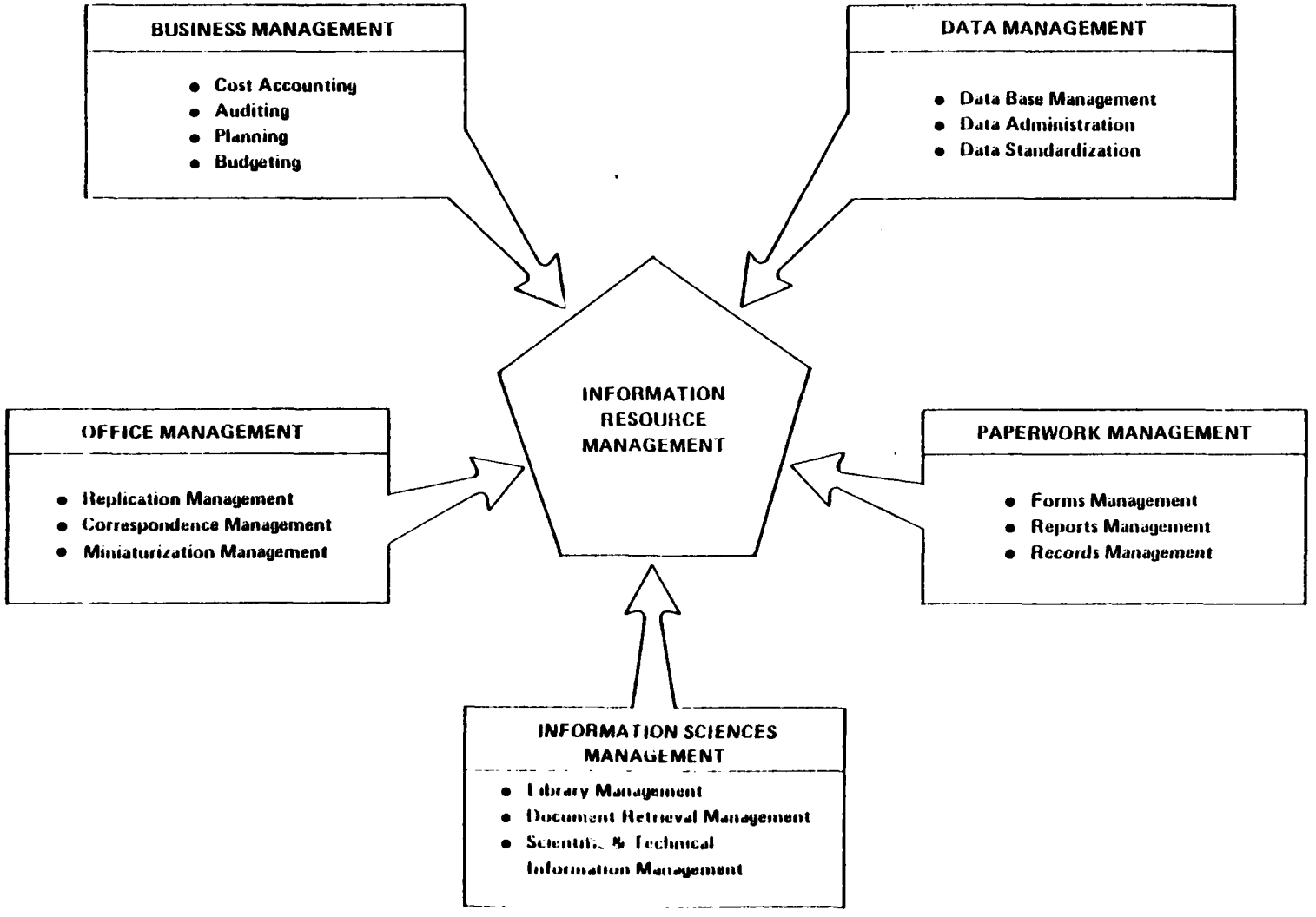

EXHIBIT III-1

. Office Management

. Business Management.

The purpose of this chapter is to provide a conceptual framework and discussion of information resource management (IRM). An understanding of the evolution of this important concept and its related implications is needed to set the study issues, observations, and recommendations in proper perspective.

Our presentation in this section includes a discussion of each of the five contributing fields cited above. The discussion begins with the subject of data management.

(1) Data Management

The subject of data management deals with the domain of automated data processing (ADP) and the development of mechanisms or approaches to facilitate the definition, use, and maintenance of data which is to be processed by computer and stored in machine-readable form. Historically, data management is an outgrowth of attempts to improve upon the traditional file-oriented data processing mode of each computerized application program being responsible for all aspects of the data which it manipulates. These improved approaches included the establishment of:

. Corporate Data Bases

. The Data Base Administration Function

. The Data Administration Function

. A Data Standardization Program.

Each of these topics is discussed in the paragraphs below.

a. Corporate Data Bases

In the late 1960's there began a movement to establish corporate data bases: integrated collections of data with a single control or administrative mechanism to manage the data base for the common good. This interest in integrated data bases in large part grew out of disappointments in earlier attempts to develop comprehensive management information systems that would supply "all the information management needs at the punch of a button." The developers of these early MIS's discovered, unfortunately, that the integration and correlation of this information from a variety of independent sources (which were created for other, operational reasons) was impossible. Common coding schemes and single data element occurrences were deemed necessary. The solution: a corporate data base.

The establishment of large, complex data bases necessitated the creation of correspondingly large and complex software systems to manage the data base: data base management systems (DBMS). Many in-house efforts to develop DBMS were initiated, and many failed - some at enormous expense. The few survivors gave rise to the idea of sharing these software products with other installations (for a fee). Spin-off companies were established to develop, market, and support these complex systems, and today's commercial DBMS marketplace was begun.

A data base management system, however, proved not to be enough. Commercial products were too general, in-house products were too expensive (and many times did not work). Furthermore, there was a human side to the management of data which DBMS software could not fulfill: the design of the data base itself, the establishment of policies concerning its use, and the maintenance and tuning of the performance of the data base and attendant software. Out of this need was born the concept of the Data Base Administrator (DBA).

b. Data Base Administration

The DBA was in charge of everything that involved the data base: designing its structure, creating its files, loading its data, directing its use, controlling access to it, monitoring its performance, improving its organization, enforcing policies related to it, and educating the general agency or firm personnel in its benefits and proper use. The DBA's domain and functions were clear, but the limits of his power were undefined.

It became apparent that the role defined for the DBA was too large for one person to fulfill, and organizations found great difficulty in locating personnel who qualified as:

- a technician,
- a manager,
- a diplomat,
- an educator,
- a legislator,
- a policeman, and
- a consultant.

The role was broken up into several functions, and offices of data base administration were created consisting of several people who specialized in the individual functions. But in some environments even a DBA office was not enough.

In very large organizations, it was discovered that a single data base was neither adequate nor appropriate. Multiple data processing installations required multiple data base management systems, often from different manufacturers. Each of these systems managed one or more data bases, and each data base required

data base administration, so multiple DBA offices were developed. The individual data bases were organized around a common set of applications with similar interests, but occasionally the need would arise to share or correlate data from more than one data base. It was then discovered that the individual data bases were in conflict over certain data element names and integrity constraints.

c. Data Administration

The solution this time was to declare all data or information to be a resource of the entire organization and to direct its management from an office of data administration. The data administrator was given a very high-level, policy setting position within the organization with authority over the custodianship of all the data resources. This is not to say that the data administrator "owns" the data, any more than the Comptroller owns the financial resources of the firm. Rather, the data administrator is responsible for ensuring that the data resource is maintained in a fashion that is beneficial to the organization as a whole.

The data administrator's role was distinguished from that of the data base adminstrator similar to the way top management's role is distinguished from that of line management. The data administrator set the policies, established the direction for data resource management, coordinated the activities of the various DBA's, maintained the definition of the data resource, acted as a user liaison in answering questions about where certain data might be located, and served as the focal point for interchange of information with external firms or agencies. The individual Data Base Administrators retained a technical role of design, maintenance, application development, policy enforcement, documentation, operations, and performance improvement. There may be many DBA's in a large organization, each oriented toward a particular data base. Where clusters of data bases served a common organization or set of organizations, the DBA's were then responsible for carrying out the policies established by a single data administrator.

d. Data Standardization

One of the more important functions of data management is the development and enforcement of data standardization. Throughout the Federal Government and the private sector, there is evidence that increased emphasis is being placed on data standardization. It has become widely recognized that, in order for an organization to manage its data resources efficiently and effectively, a high degree of standardization of its data elements, data management procedures, and the documentation that supports the development and utilization of the information components is needed.

Data Standards programs have been in existence for many years in the Federal Community and in the Department of the Army. They have met with limited success in establishing standard data elements and codes, standard operational systems, and standard procedures for information system development and documentation. The establishment of data standards facilitates data sharing among multiple systems and contributes to the reduction of system life cycle costs during development and maintenance.

Data management (the management of automated data and data bases) is typically the driving force behind the trend toward information resource management. The high costs of ADP and the somewhat disappointing performance of most management information systems generally tend to focus management attention on needed improvements in data managment. But data management is not the only discipline moving toward or contributing to information resource management. The trend is apparent in other domains as well.

(2) Paperwork Management

The term paperwork management traditionally entails the functions of forms, reports, and records management. FIPS Task Group 17 has defined these terms as follows.

- Forms Management - those activities related to planning, controlling, organizing, training, and other management activities involved with respect to the design, control, standards and procedures, approval, identification, stocking, and distribution of (empty) forms within an organization.

- Reports Management - those activities related to planning, controlling, evaluation operations and performances, organizing, training, and other managerial activities involved with respect to the processes by which data or information for a report is collected, organized, transmitted and retained by an organization.

- Records Management - those activities related to planning, controlling, directing, organizing, training, promoting, and other managerial activities involved with respect to records creation, records maintenance and use, and records retention and disposition by an organization.

Traditionally, forms, reports, and records have existed primarily on paper; thus, paperwork management was synonymous with information management. Controlling the flow of paper (or perhaps, microfilm) meant controlling the flow of information within an organization. However, with the advent of computers and electronic communications, such is no longer the case. Today, large volumes of data in HQDA (as elsewhere) are stored, processed, and communicated by electronic means. The media have changed, but the problems and the need for management have not.

One must be careful not to assume that paperwork management is a dead or dying art. First, the paper medium is still very much in use throughout HQDA (as in most large organizations) and will undoubtedly remain a useful mode for recording and corresponding (especially with individuals outside the organization) for decades to come. Second, current legislation specifically requires paper copies of certain official records be retained or transmitted to the individuals involved. Until such legislation is amended, paper will remain an important final medium for information. Third, paperwork management functions (forms, reports, and records management) apply in principle to electronic and other means of storing information just as much as they do to paper. Thus, in HQDA we find the traditional paperwork management functions (administered by The Adjutant General) being applied to automated data - and necessarily so.

By and large, in HQDA, as elsewhere, traditional paperwork management is moving in the direction of automated data management, and data management is discovering the need to incorporate the principles of paperwork management. Both disciplines provide important concepts for the management of information as a resource.

(3) Information Sciences Management

A third discipline which deals with information of a different form is the area of text books, documents, and formal reports. This area is typically referred to as Information Sciences Management. Here, the concepts of Library Management, Information Storage and Retrieval, and Scientific and Technical Information Management are similarly moving in the direction of Information Resource Management.

The Library Sciences, once relegated to Dewey Decimal Systems and card catalogues, are now branching out to embrace the concept of information centers. Whereas libraries at one time only dealt with the books and periodicals on their shelves, now they are beginning to address the information contained in the texts as well. Libraries are becoming question-answering services and not just book loaners. In HQDA, libraries can become an important aspect of an action officer's search for information providing him with historical information and established techniques.

Automated Information (or Document) Storage and Retrieval Systems are being developed to provide assistance in the selection and access of texts, documents, and reports. The Defense Documentation Center is an example of such existing capabilities and trends. The management of documents to be contained in such systems entails the establishment of standards for the page size and physical layout, the list of index terms that may be used to reference a report, and the format of a request. They may also apply some cost controls by charging the recipient for the search

service. Typically, there are no controls issued over the information contained in the documents or how the information is to be used.

Scientific and Technical Information (STI) deals with the large body of knowledge that has been developed relating to science and technology in a vast number of areas or disciplines. Leaders in the Scientific and Technical Community have come to recognize this vital body of knowledge as significant to the success of our R&D and education efforts nationwide. A few are beginning to see STI as having many of the characteristics of a resource itself, requiring policies, an infrastructrure, and the assignment of roles within the public and private sectors. A recent publication by the Subcommittee on Science, Research and Technology of the House Committee on Science and Technology, U.S. House of Representatives (October 1978) indicates a trend toward the concepts of information resource management as being applicable to the problems the nation is facing with scientific and technical information today. In HQDA, ODCSRDA is currently charged with the management of the scientific and technical information program of the Army.

The techniques being developed in the realm of information sciences management both portend the need for information resource management and contribute to its definition and technical support. Commercial data bases and information search services are becoming increasingly available and increasingly useful to the Army. As their use proliferates, problems of incompatibility, incompleteness, and unavailability will need to be addressed.

(4) Office Management

Certain concepts in the realm of Office Management also lend a contribution to the development of the discipline of information resource management. The management of replication (copy reproduction and printing), correspondence preparation and mailing, and miniaturization (micrographics) each have developed policies and procedures which deal with certain aspects of information and the management of the information resource. In HQDA, the Adjutant General has been involved with the development of such policies for the Army. Here again, information technology has played a large part toward automating many office activities. Remote facsimile, electronic mail, computer output to microfilm, and other technologies have drawn the ADP world and the world of the office closer together. The purpose, of course, is to enhance office effectiveness through improved information production, processing, communication, and retention.

One technology which has had a large impact (and which is still growing) has been word processing: the development of typewriters or CRT devices with microcomputers capable of capturing, storing, and reproducing keystrokes in the preparation,

editing, and production of a memo, report, or document. The technology of word processing equipment (and microcomputers in general) portends a tremendous upswing in the automation of information and the decentralization of information resources throughout HQDA. As more and more minicomputers, microcomputers, or word processors are distributed throughout the organization (as current price trends indicate is inevitable), more and more individual data files and data bases will be developed in the respective Staff Agencies (beyond word processing applications).

The management of this dispersed information will undoubtedly become a problem for each individual Agency as well as for HQDA in general. Policies relating to information stored on these devices will definitely be required. For example, a data base on a single floppy disk that can be accessed by only one type of device can cause some significant problems if the device suddenly becomes unavailable. Further, the exchange of individual data bases on an office-to-office (or even person-to-person) basis will become technologically feasible (by exchanging floppy disks) but will require managerial controls to assure proper comprehension and interpretation of the data. Information resource management can provide the mechanism for assisting the individual Staff Agencies and office managers in managing their individual information resources.

(5) Business Management

The fifth area influencing information resource management is the discipline of Business Management. Here, the concepts of planning, budgeting, auditing, cost accounting, and others have been developed with regard to the effective and efficient management of the resources of an enterprise. HQDA has established many such policies and procedures with respect to personnel, financial, and materiel resource management. The discipline of information resource management draws upon these established concepts and applies them to the management of the information resource as well. In this way, the cost of information can be more clearly represented to the User Community, and to Management as well, thus emphasizing the need for assigning and accepting responsibilities with regard to the information resource.

Recent trends in government and industry show a movement toward viewing ADP as a resource; thus, we find references to "computer resources" and "charge-back schemes for data processing." Similar concepts apply to viewing information as a resource and many of the business management procedures are directly transferable.

Richard L. Nolan, in the Harvard Business Review (Mar/Apr., 1979), identifies six stages of growth for data processing which are basic to any organization: initiation, contagion, control,

integration, data administration, and maturity. Nolan discusses the stages of growth and presents guidelines for management action which include:

- Recognize the fundamental organizational transition from Computer Management to Data Resource Management
- Recognize the importance of the technologies which enable data resource management (data base management, distributed processing, mini and micro computers, and data communications)
- Benchmark the organization's stage and the stage of each component subunit (Staff Agency) and develop measures for tracking status and development toward maturity
- Develop a multi-level data processing (or data resource) strategy and plan
- Make the Senior Management Steering Committee an essential (and active) ingredient for effective use of data processing in the advanced stages (data resource management).

The work of Nolan and others indicate an active trend in the data processing industry toward developing and applying fundamental principles of investment analysis and sound business practices to the use of computer and data resources. Much work remains to be done in this developing area.

Within each of the individual disciplines there have been attempts to overcome problems related to data and information management. Many of these earlier efforts, while progressive, were not in themselves complete. Information Resource Management, then, attempts to blend the disciplines of:

- Data Management,
- Paperwork Management,
- Information Sciences Management,
- Office Management, and
- Business Management

among others, into a consistent philosophy and approach to managing information as a resource of HQDA. The development of IRM will draw upon tools and technologies developed in these respective areas to support its management process. The impacts which IRM will have in return upon these disciplines will vary depending upon the scope of the program implemented at HQDA. One trend is clear, the first four areas are moving toward their own limited form of information resource

management out of necessity. A full-scale IRM program can pull together these related management activities with a focus on the information they process rather than the processing itself. In fact, an IRM program focused on automated information can go a long way toward bringing these disciplines together because of the current and continued trend toward automation in each area.

2. THE INFORMATION RESOURCE ENVIRONMENT

The information resource environment is depicted in Exhibit III-2. There are three relevant communities of people or organizations shown in the chart:

- The Information Resource User Community,
- The Information Resource Handling Community, and
- The Information Resource Management Community.

Each community has its own mission and its own role with regard to the other communities and the information resource.

(1) The Information Resource User Community

The Information Resource User Community is responsible for the information contents of the information resource. In a sense, they may be viewed as the "owners" of the information: those members of HQDA for whom the information is being collected, processed, or stored. The User Community consists of three generic classes:

- The Proponents,
- The Consumers, and
- The Sole Competent Source

of the information.

The proponent is the individual or an organization who is responsible for determining or defining a subset of the total information resource (such as force structuring or manpower allocations). A subset may be defined by subject matter, by organizational element, or by any criteria which HQDA deems relevant. The proponent is generally the primary consumer of a given information subset (which often explains his interest in being the proponent). The proponent defines the contents of the information subset (the data elements, the allowable values, etc.), grants access rights to other users of this subset, controls the updating of data values, and determines the conditions for retaining the data. Under the information resource philosophy, the proponent has a clearly defined responsibility to the

The Information Resource Environment

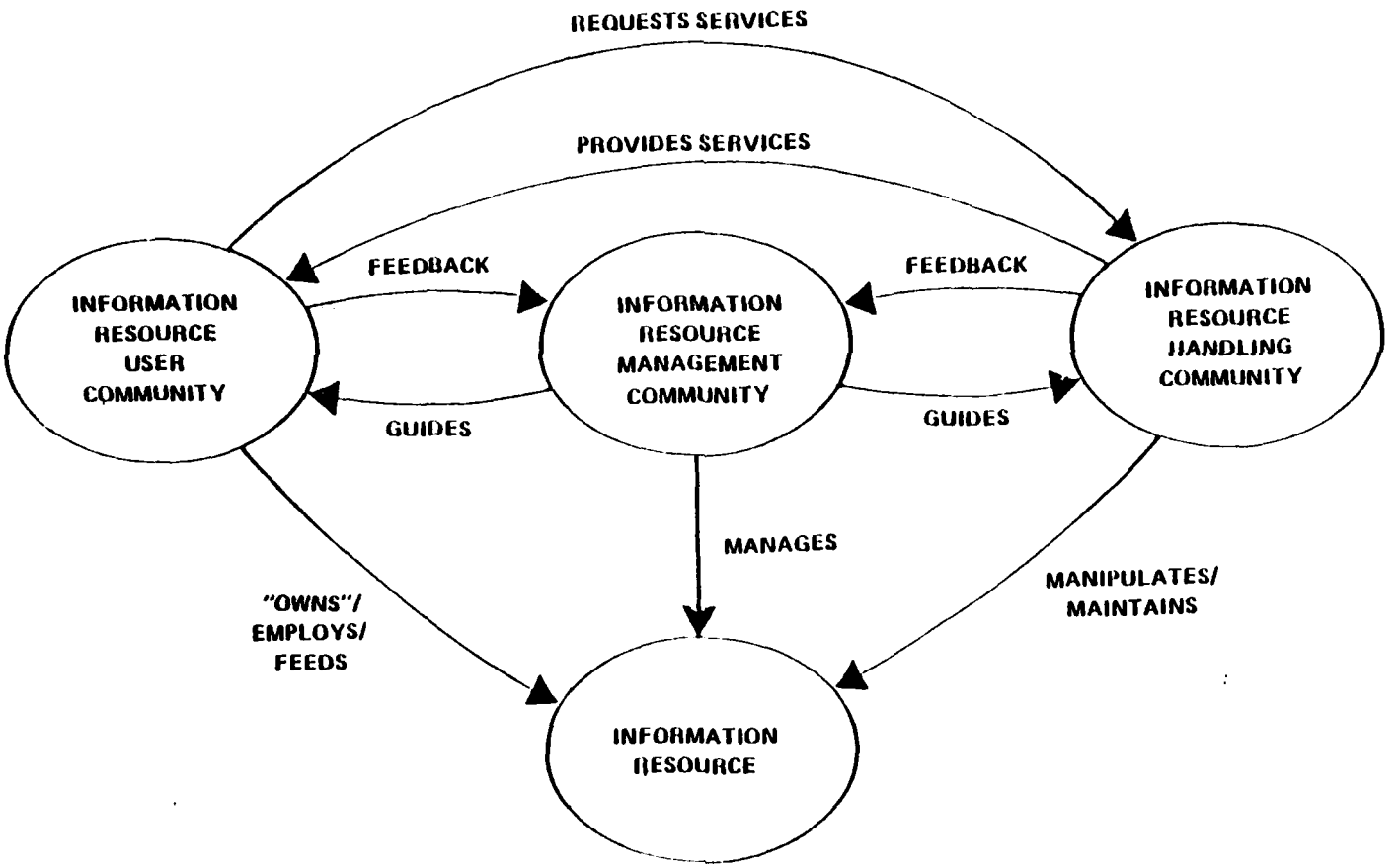

EXHIBIT III-2

remaining user population and to HQDA in general to coordinate his actions for the benefit of all concerned with the subset of information under his proponency. Thus, the proponent owns the information but must act responsibly towards the user population at large.

The consumers of the information resource may employ several subsets having different proponents. The consumers use the information to accomplish their respective missions and therefore have a vested interest in the accuracy, validity, timeliness, availability, consistency, and usability of the information. The consumer accesses the information, manipulates it for his own mission objectives, requests new data to be collected, seeks permission to access other existing data, and identifies inconsistencies within and between various information subsets. The consumer works with the proponent to establish his needs and to coordinate access to the information resource.

The sole competent source for an information subset is the individual or organization designated as the provider or the collector and keeper of the official version of the information. This concept is especially important where multiple redundant copies of data files or data bases may be replicated throughout HQDA for purposes of back-up, effective response, or convenience. In many instances, the sole competent source will be the proponent for the information. In other situations, the designation of a sole competent source may depend on the perspective of the viewer (ODCSLOG may view ODCSPER as the sole competent source of Personnel Information, but ODCSPER may view MILPERCEN as its sole competent source, and MILPERCEN may view one of its suborganizations as its sole competent source, and so forth). The designation of a sole competent source for an information subset establishes a single HQDA authority for that information and contributes to consistent information reporting.

(2) The Information Resource Handling Community

The Information Resource Handling Community is responsible for the maintenance and manipulation of the information resource in response to the requests expressed by the User Community. Typical activities contained in the Information Resource Handling Community include:

- Data Processing
- Word Processing
- Telecommunications
- Systems Management
- Records Storage
- Forms Supply.

The Information Resource Handling Community is concerned with hardware, software, communications lines, and other devices used to collect, store, process, or transmit information.

In HQDA, these functions are currently within the purview of ACSAC, TAG, CSC, and the DPI's, among others. Some of the functions of information resource management which are defined in this report are currently being performed by the Information Resource Handling Community as a necessary outgrowth of the need to manage the information which the technology is handling.

The Information Resource Handling Community plays a vital and active role with respect to the information resource. They are collectively responsible for maintaining the information resource in a ready state for the User Community. They interact directly with the user group to provide services in terms of information storage, retrieval, or transmission. They operate under specific guidelines offered by the Information Resource Management Community with regard to the information resource, and they interact with this community to provide feedback on the viability and advisability of these information guidelines.

(3) The Information Resource Management Community

The Information Resource Management (IRM) Community serves as an interface between the mission-oriented User Community and the technology-oriented Handling Community. It is the community of particular interest to this study. This community is not currently well defined within HQDA, with various aspects and responsibilities often blurred with the other communities and across organizational boundaries. Information resource management does not have a sense of community within HQDA at the present time. However, this is not to imply that a single, separable organization for information resource management is necessarily desirable or needed. The IRM approach seeks to establish a sense of community for IRM, the widespread adoption of the information resource philosophy, and the commitment to work together to share and manage that resource.

The IRM Community is responsible for the management of the information resource (as opposed to the use or the handling of the resource). The IRM Community performs the activities cited previously as relevant to information resource management which includes maintaining knowledge and managerial oversight of the:

- composition,
- description,
- acquisition,
- dissemination, and
- flow

of the information resource.

The Information Resource Management Community typically will operate in three fundamental levels:

- Executive
- Administrative
- Operational.

These three levels will differ in their roles, focus, and activities with regard to the management of the information resource.

The Executive level of IRM is concerned with policy and direction of the information resource management activities. The Administrative level of IRM is concerned with enforcing and controlling the information resource management activities. The Operational level of IRM is concerned with executing and monitoring the information resource management activities. These three levels of the Information Resource Management Community provide for the authorization, approval, development, execution, monitoring, and control of the information resource management activities.

An analogy might be helpful in clarifying the roles of the three information resource communities. Consider the water supply of a major city. The water supply itself can be viewed as a resource of the city: it is valuable, it is measurable, and it has an expense. The Resource User Community are the residents of the city who pay for the water and expect it to be available when they want it and in a form which they can use. The Resource Handling Community are the people responsible for the reservoirs, pipes, and faucets which store, transport, and present the resource to the users. The Resource Management Community are responsible for monitoring the quality of the resource, assuring that adequate supplies will be on hand, determining the charges to be assessed for use of the resource, and sometimes requesting the user community to limit their consumption (such as in times of drought.)

Just as each community is important and necessary in the water resource environment, so do the analogous communities have essential and distinct roles in the information resource environment. Dependence upon individual sources of the resource (e.g., private wells or private files) may be practical on an individual basis, but may not make economic sense for the city (or HQDA) at large. In times of crisis (e.g., a city fire or a mobilization effort), the proper management and handling of the resource becomes essential to sharing the resource and to the continued survival of the user community. Just as water may be viewed as an essential resource of a city requiring management, so too, does the information resource at HQDA need to be managed.

In the preceding sections we have tried to relate the historical background of disciplines which have contributed to the concept of information resource management and to describe the relationships to be established among the users, handlers, and managers of the

information resource. In the next section, we present an overview of some of the terminology used in describing the management of information as a resource.

3. RELEVANT TERMINOLOGY OF INFORMATION RESOURCE MANAGEMENT

In the chapters which follow in this report we describe in some detail the current status of information management at Headquarters, DA. In particular, we review

- Organizations which serve an information management function for all of HQDA
- Individual mission-oriented staff agencies which employ information
- The Data Processing Installations which store and process the automated information for the HQDA Staff Agencies
- Selected information systems which execute at the DPIs
- Specific case studies which trace the flow of operations necessary to supply information in response to particular requests.

Many of the terms used in the chapters which follow in describing the current status of HQDA information management have been presented earlier. To assist in understanding the discussions to follow, we present an explanation of some specific terminology which will be used in those chapters. These terms include:

- Information Systems Planning
- IRM Technology Assessment
- Data Standardization
- Data Administration
- Quality Assurance
- Forms Management
- Reports Management
- Records Management

and are discussed below.

(1) Information Systems Planning

The IRM Community will need to address the review of plans for developing information systems with attention focused on the information to be provided or used by such systems. This review would include:

- Overall coordination of information system plans
- Consideration of the use of existing or alternate data sources,
- Evaluation of the potential for consolidation of data or function,
- A HQDA-wide perspective for information acquisition and sharing.

(2) IRM Technology Assessment

There will be a role for the IRM Community to work closely with the Information Resource Handling Community in assessing the current capabilities of the DPI's to obtain and support the technological tools associated with information resource management. Automated information will need to be managed, regardless of whether it resides in relatively simple files or in complex, integrated data bases; but the more structured the data is and the more independent its definition from the application programs which use it (see Chapter II), the more straightforward will be the technical management process. The existence of tools such as Data Element Dictionaries at the various DPI's facilitates the organization and inventory of the information resource.

A related function is the assessment of the state-of-the-art outside HQDA with regard to information technology (hardware, software, and information resource management approaches and techniques). Again, the IRM Community will work closely with the Information Resource Handling Community to keep apprised of technology and techniques which may be applicable to the HQDA environment.

(3) Data Standardization

Data Standardization deals with the development, maintenance, and enforcement of data element (name) and data item (value) standards for use in information systems. The implementation of data standards can promote information sharing between systems and among organizational entities by focusing on agreed upon terminology and representations. It can also facilitate the development of new systems or the maintenance of existing systems by establishing common terminology among system designers, developers, users, and maintainers.

The data standards program is an integral part of information resource management. The management of the data standards activity involves the following responsibilities.

- Determine the areas requiring standardization
- Develop the data standards
- Develop implementation and conversion plans for data standards
- Establish data standards enforcement procedures
- Establish maintenance responsibilities and procedures for data standards
- Develop an education program for training concerning data standards
- Work with standards groups external to HQDA (such as DOD, NATO, and NBS)

(4) Data Administration

Data Administration concerns the development and enforcement of policies relating to information resource management, the coordination of user requirements with system capabilities, and the education and training of the User Community on the contents and access procedures of the information resource. The focus of data administration is on policy and user interface. The related term Data Base Administration, is typically limited to the more technical aspects of data base design, the development of computer programs to access the data base, and the maintenance of data element definitions and data base structural relationships.

A primary function of Data Administration and Data Base Administration is the management of metadata (data describing the characteristics of the data contained in the information resource -- see Section 2 of this chapter). A key tool in the management of metadata is the Data Element Dictionary/Directory which defines and locates various data elements.

(5) Quality Assurance

Quality Assurance with respect to information includes the editing aspects of data validation and verification as well as the coordination of information consistency within and among the various Staff Agencies. Information Resource Management is concerned with the establishment of policies and procedures regarding data quality and with the auditing of Headquarters activities to determine that these policies and procedures are being executed effectively. In essence, the quality assurance

function is a check on the success of the IRM program and a measure of the improvement in information quality fostered by the active management of the HQDA information resource.

(6) Forms Management

The Forms Management activities of IRM relate to the design, control, standards and procedures, approval, identification, stocking and distribution of empty forms to be used for data collection. Coordination of forms is necessary to control the proliferation of forms and the burden on the individuals required to fill in the form. Forms management addresses the possible use of alternative forms, consolidation of existing forms, and retention or purging of outdated forms. The forms management function will impact system designers as well as the Sole Competent Sources of information within the User Community.

(7) Reports Management

Reports Management involves the management activities relating to the processes by which data or information for a report is collected, organized, transmitted, and retained. Coordination and review of reports provides a control over voluminous redundant reports, identifies outdated reports, and provides information on the existence of potentially useful reports. The reports management function will require coordination with the consumers and system developers of the User Community.

(8) Records Management

Records Management includes the management activities relating to official records creation, maintenance, use, retention, and distribution. These official records could pertain to legal archival records (of Army retirees, say) as well as to official working records (such as the Active Personnel record or the Reservist Record). The execution of the records management function will directly involve the proponents in the User Community as well as the data processers in the Handling Community.

4. RELATED FEDERAL TRENDS AND CONCLUDING REMARKS

It is important to note that the concept of information resource management is relatively new but not original to this study. The concept has been growing and developing in Government and Industry over the last 5 years. We have taken the philosophy of treating information as an organizational resource and attempted to translate that philosophy into a meaningful program for Headquarters, DA.

Several pertinent activities outside of HQDA bear mention as indicative of the trend in the Federal Government today and potentially having an impact on HQDA and the way it manages its information.

(1) The Federal Commission on Paperwork Management

The Federal Commission on Paperwork Management in its Information Resources Management Report to the President (September, 1977) concluded that "information is a vital resource to the public and private enterprise alike" (p. 12) and "if the Federal Government is to gain some measure of control over the factors that precipitate paperwork and red tape -- growth, proliferation and fragmentation of data and information, the rising costs of data and information, etc. -- information resource management must be started now" (p. 16).

Further, the Commission has stated:

> "Thus, management of information resources requires that specific attention be given to the quality and reliability of information products and services within an agency as well as to the effectiveness and efficiency with which various information handling technologies are employed to help the agency achieve its objectives. The basic concept of information resource management is directed at bridging the gap in these activities and introducing a sense of coordinated management of information systems and the physical products and services, within the context of the agency's broader lawful responsibilities and missions. The concern with information values, and with information costs and burdens, represents the key idea that suggests why the concept of information resources management can be so significant and vital. Unless we learn properly to define, measure, account, budget, plan, organize, and evaluate information as a resource, we will continue to use up valuable resources for information production, use, and handling, with no clear sense of the utility of the information thus generated. To continue with these wasteful and ineffective practices is unacceptable" (pp. 40-41).

(2) The Federal Information Processing Standards Task Group

The Federal Information Processing Standards Task Group 17 of the National Bureau of Standards in a series of draft reports (September 1977) attempted to define the concept of Data Resource Management (i.e., Information Resource Management) for Government Agencies. In particular, the Task Group concluded in its Executive Guide that "Data is a major resource to a government agency . . . This point of view demands a fresh analysis of management vis-a-vis data, and leads to the conclusion that many of the problems that plague government management today are soluble if one works from this premise" (Introduction). In its Guidelines for the Management of Data Resources the Task Group stated "Data resource management is an idea whose time has come . . . The authors are confident that the data resource management programs envisioned on these pages will soon be in existence not only in government, but wherever data handling is a significant factor in an organization's activities" (Preface).

(3) The President's Reorganization Project

The President's Reorganization Project for Federal Data Processing concluded in its draft Consensus Report of December, 1978, that "The Federal Government is, in general, mismanaging its information technology resources and has not developed a plan for exploiting the opportunities of the future with respect to investment, service delivery, protection of citizens, or national security" (p. 2) and that this state is principally caused by ". . . Abdication by program agency management of its responsibility for managing information technology as a mission-oriented resource" (p. 3).

Among its recommendations, the President's Reorganization Project suggests that "The Office of Management and Budget should establish an Office of Information Resource Management (IRM) at the Executive Associate Director level" and further, that "The OMB should require each department or agency of Government to establish an Information Resource Manager as an assistant to the agency head . . ." and that a National Council for Information Technology Policy, Plans and Programs be established, chaired by the Executive Associate Director for Information Resource Management of the OMB and comprised of the Information Resource Managers from the various departments or agencies (pp. 6-7).

More specifically, the National Security Study Team of the President's Reorganization Project for Federal Data Processing in its draft Summary Report recommended that "An OSD-level executive should be charged immediately with overseeing the entire spectrum of use of the information technology program... It is visualized that this office will play a staff and policy role, and will not be an operational management function trying to control day-to-day operations," and, further, that "This step should be complemented by consistent and related actions on the part of each Military Service" (p. A-17).

(4) Office of Personnel Management (U.S. Civil Service Commission)

The Office of Personal Management has under consideration a proposal to create a new occupational series for Information Managers. This proposed series includes "all classes of positions the duties of which are to advise on, administer, supervise, or perform professional information management work relating to the transactions of government, quasi-governmental, or private business organizations. The work ordinarily is concerned with the planning, design, development, installation, operation, maintenance and control of both manual and automated information systems; and provide information management advice and assistance to both management levels, user groups and individual users" (The Information Manager, March/April, 1979, p. 35).

These four specific instances, while not yet Federal policy, portend of the trend in the Federal Community toward recognizing information as a valuable resource and organizing to manage that resource. Headquarters, Department of the Army, in adopting this philosophy has the opportunity to become a leader in the Federal Community in this domain and to work with the Federal policy makers in establishing policies and guidelines for information resource management.

In this chapter we have presented the basic premise of information resource management: information is a valuable resource of Headquarters, DA and must be managed. In Chapters IV-IX we present our findings with regard to the status of the management of automated information in HQDA today and discuss some of the problems that are inherent with that management process. We advocate the development of an information resource management program for HQDA to employ in managing its automated information, and in Chapters X and XI we present more detail about the definition of an initial management program. Chapter XII contains our recommendations for how HQDA should proceed with regard to managing its information resource.

IV. HQDA INFORMATION ISSUES

As we indicated in Chapter I, our approach to determining what is needed by HQDA to manage its automated information consisted of a series of interviews, briefings, and visits with a selected sample of Headquarters General Officers, Staff Officers, and Technical and Administrative Personnel. In addition, we reviewed considerable documentation on policies, procedures, organizations, automated systems, and historical reports. This chapter begins a discussion of our findings with regard to the effectiveness of information management in Headquarters, DA and the corresponding impact on the Army's management and decision making procedures. In the chapters which follow we present current HQDA efforts at managing automated information, discuss the information management environments at the Staff Agencies and Data Processing Installations, assess the effectiveness of current information management programs as evidenced in selected automated information systems, and indicate the impact of the current HQDA approach to information management as demonstrated by three case studies.

The purpose of the present chapter is to discuss current HQDA information issues in order to develop an understanding of the information environment in which Headquarters, DA operates. Our presentation includes the following subjects:

- Information Concerns at HQDA
- External Information Requirements
- The Role of the Action Officer
- Study Issues and Observations.

The information presented in this chapter is an amalgamation of our findings from sources at several levels but which pertain to problems or functions which are common across the Army Staff. To establish a perspective, we briefly indicate the information concerns at HQDA.

1. INFORMATION CONCERNS AT HQDA

There is a clear need in HQDA for information relative to the plans, needs, and activities of the Army. During the course of our interviews with selected General Officers, several recurring concerns about the information environment at HQDA were voiced. These include concerns about:

- The reporting burden placed on the field by HQDA information requirements.
- The need to rapidly identify and efficiently locate information pertinent to a specific need.
- The continued growth of data bases (and reporting) in response to one-time requests or special needs rather than actual long-term information requirements.
- The impact of inconsistent and inaccurate information on HQDA decision-making and public image.
- The need for information to collectively support the inter-functional decision making processes of HQDA.

Each of these concerns is explained in the paragraphs which follow.

(1) Reporting Burden

The field, at times, perceives as excessive and redundant the reporting requirements levied upon them by HQDA. These reporting burdens can take either of two forms: requirements for new and additional information beyond those presently established; and, requirements to report the same data to multiple recipients which ultimately increases the burden on the field due to the duplication of reporting required. There are numerous instances (as with personnel and financial data) where the same information is reported up through parallel, but distinct channels to Headquarters, DA. This information is then used by the various Staff Agencies to manage their individual programs and is often not shared across functional areas.

While this parallel flow of information may be efficient or effective for the individual Staff Agencies, it can impose a tremendous burden on the commanders in the field by causing them to supply essentially the same information to each of several Headquarters agencies. This reporting burden is of real concern to the General Officers on the Army Staff, but the needs of the Staff Agencies for information must still be satisfied. HQDA lacks an effective mechanism for monitoring and controlling this reporting burden.

A further consideration is that at times the information requested by Headquarters is not integrated by the field commanders into their local management operations. Thus, the information requested by Headquarters is viewed as overhead and a burden. There is apparently inadequate feedback of the information which HQDA collects to assist managers in the field.

One contributing cause to the heavy reporting burden is the tendency for Headquarters management and staff to focus on report

formats and not on the information contained in them. In many instances information is viewed as the reports themselves rather than the contents of the report. Such a view leads to the generation of parallel requests for information in order to receive it in a more convenient structure. An organizational focus on the information per se would lead to the development of multiple report formats from the same information base.

(2) Information Awareness

Several General Officers expressed concern that while the information flows in their own organizations were sufficient for their current needs, problems immediately arose when their staff needed information from another Staff Agency. Under these circumstances, it was often not clear where to look to find all (and the latest) information pertinent to the request. There is no automated central reference service in HQDA to assist in this operation, although the Adjutant General's Office does provide an informal service through its Statistical Clearance Office. The result is a substantial burden on the Staff Action Officers to manually locate relevant information, increased time spent responding to action items, and potentially reliance on inaccurate or incomplete information.

The difficulty in determining what information is available (and where), especially in automated systems, is due, in part, to the current "stovepipe" approach to information systems development. The stovepipe approach is a vertical development of information systems to serve individual functional area needs. Vertical systems are typical of the information systems at HQDA. The ODCSLOG develops logistics-oriented systems, the ODCSPER develops personnel systems, etc.

The General Officers indicated that, although the stovepipe systems were needed and effective within the individual staff organizations, horizontal integration in systems planning would be of great benefit to the Army as a whole. Such a horizontal approach that cuts across the functional areas in determining system requirements is rare in Headquarters today. Some attempts are being made to develop "crosswalks" between systems (especially in the personnel and financial areas), but this has been difficult to achieve in the current organization.

(3) Rapid Growth in Data Bases and Reporting

A third area of concern voiced by the General Officers concerns the tendency in HQDA to develop automated systems to support one-time ad hoc requests which may or may not be asked again. Thus, HQDA receives requests for information from organizations external to the Army and may expend considerable resources in developing the response. Quite often in order to reduce the cost of answering that same question again (should it

be asked), an automated system is developed or selected data elements are added to a current system so they will be ready the next time.

Unfortunately, there is no guarantee that the same question will ever be asked again to warrant the expense of developing and maintaining the automated system. Further, additional reporting requirements are levied on the staff or the field to provide data in the event it is needed. Once instituted, such systems or reporting schemes have an inertia which is difficult to control, and the "requirement" persists even though the need may stop.

The Management Information Control System of TAG is an attempt to identify redundant and unused reports, but it currently does not address the individual data items contained in each and every automated system. It falls upon each individual Staff Agency to police itself and determine the necessity for all the data contained in its systems.

The persistence of information requirements in systems is really a symptom of the actual problem. The fundamental problem is that the Staff Agencies cannot get the data they need when they need it, so there is a tendency to develop and retain local information systems in anticipation of future need. For example, TAG, DCSPER, and DCSOPS each have developed casualty reporting systems to satisfy their individual needs because no one of the three systems provides the data required within each organization. Situations such as this contribute to the proliferation of data bases and the resultant additional costs required to collect, store, and maintain this data.

(4) Impact of Information Inconsistences and Inaccuracies

The higher one goes in the organizaton the more complex are the decisions. Yet, the General Officers indicated that the more complex the decision, the less reliable (and more incomplete) the information is to support the decision. The decision-makers at HQDA are aware that they are receiving inaccurate or incomplete data from their automated systems, but they cannot quantify this drop in reliability or completeness except they believe it is significant. In essence, they do not have the pertinent data concerning data available to them which describes some of the factors contributing to the validity of the information contained in their systems. The officers expressed a common desire for a quantitative way of assessing how much confidence they can place on the information they receive.

Inconsistencies in information obtained from more than one system also were a source of concern. The current HQDA information systems do produce inconsistent data, partly because of their functional orientation and lack of standardization. The

inconsistent data that might be released to external organizations could be a source of embarrassment to the Army. Inconsistent data must also be reconciled, resulting in an expensive manual reconciliation effort. In addition, the use of inconsistent data can afflict Army operations. Because of the many interrelationships of functions among the various staff agencies, data that is inconsistent can upset these relationships and potentially affect overall Army operations.

Establishing single sources of data and proponencies for information is a difficult task in the HQDA environment because so many different agencies have an interest in a particular item of information (although from different perspectives). The Army has attempted to institute data proponencies for certain classes of data but has met with both situations of competition to become the proponent and inability to find any organization willing to accept the responsibility for a set of data to be available to the whole of HQDA.

(5) Decision Support Systems

A fifth area which was common to most of the General Officers interviewed was the need to support rapid decision making: exercises to determine the impact of selected changes in the environment (such as budget cuts or mobilization). The Officers indicated that "what if" type questions frequently arise and the current method of gathering information is slow and frequently unresponsive.

Most current HQDA information systems were not designed to support an environment of changing parameters. Most of these systems simply accept data, process it, and produce reports. Parameters cannot be altered without program modifications. Information to support "what if" type drills is now usually the result of a manual process. What the HQDA executive would like to have is the ability to interact with the system, change the parameters and see what happens.

These five concerns were a common theme throughout the Executive Interviews of the General Staff Officers. Other comments will be presented in Chapter VI where we discuss the individual functional staff areas.

As the discussion of this section has indicated, there are two broad categories of information requirements at Headquarters, DA: externally generated (e.g., inquiries from Congress or OSD) and internally motivated (e.g., accounting for resource expenditures or tracking mission progress). The next section explains the generation of external requirements and the actions necessary to support them.

2. EXTERNAL INFORMATION REQUIREMENTS

External information requirements are requests for information placed on HQDA by organizations or individuals outside of the U.S. Army. These include statutory requirements of the Congress, the Office of Management and Budget, and the U.S. Treasury as well as regulatory requirements received from the Department of Defense and the other military services. The satisfaction of these information requirements consumes a considerable amount of Army resources and creates many processing requirements for Army information systems to fulfill. External information requirements have become major considerations in the development of management information systems both at HQDA and in the field. While the primary purpose of HQDA is to support and direct the Army in the field, it cannot afford to ignore or be non-responsive to requests from resource appropriators. A major form of support which HQDA provides the Army is the identification and defense of program resource requirements to OSD and Congress.

Statutory information demands are required to support public laws and other legislated affairs. The Army must not only report to the Congress on the way it plans to conduct its business (the Army Budget) but also support and define its objectives and conduct to the appropriate oversight committees. For example, the Office of Management and Budget (OMB) possesses statutory powers in its requirement that each Federal agency must follow certain guidelines in preparing its annual budget. The Army must justify specific proposals to OMB and is required to defend to OMB its submission to the overall U.S. Budget. Another example is the reporting requirements to the U.S. Treasury which involve the monthly reporting of all appropriated funds disbursements and expenditures. This information requirement is transmitted from the United States Army Finance and Accounting Center to the U.S. Treasury.

Meeting the statutory external information requirements described above involve both manual and automated reporting processes. In the case of the financial information and the processes connected with justifying the Budget estimate to Congress and OMB, there are organized procedures for summarizing and compiling the information. The major problem in the financial and budgetary areas lies in being able to be responsive to additional requests for information which are not normally connected with the budgetary cycle of information processing. These requests for justification often involve manual searches for information involving committee meetings, and telephone conversations to coordinate the information.

The second type of external information requirements are regulatory and primarily involve the interrelationship of the Army with other branches of the service and the DOD. The requirements are supported by both automated and manual processes and involve a variety of information to include Financial, Command and Control, Research and Development, Logistics, and Personnel categories. Examples of information reporting problems in satisfying regulatory information requirements at HQDA, as discussed in later chapters, include the following:

- Lack of common data standards, conventions, and definitions
- Lack of common formats
- Misunderstanding of information requirements
- Nonexistent specific data in automated systems.

The information used to respond to external requirements and to support Army decision makers at the highest levels involves two primary categories: actions and studies. Staff actions, which constitute a major portion of staff activity at HQDA, are information requests on a wide variety of subjects that are coordinated and answered by an individual or an organization. The role of the action officer in satisfying a request will be discussed in detail in the next section of this chapter. These requests may come from a variety of sources including Congress and DOD as well as Army top management. Recently, HQDA has been cataloging staff actions in an automated system (OPTIMIS); however, because of action uniqueness and the current limited availability of the system, most information searches are still done manually.

The second category of satisfying information requirements is studies. HQDA conducts numerous staff studies on a wide variety of topics. These activities usually involve the formulation of a study panel or committee and the appointment of an action officer, usually a member of top management. Studies and actions are both interrelated and use the same information gathering procedures, again, usually manual. Certain analytical studies, such as those performed by the Concepts Analysis Agency, do employ automated information. In addition, the Defense Documentation Center provides some automated support to study efforts through its index and retrieval capabilities. However, very little central information exists on the conduct of studies at HQDA, and the information gathering process of the study panel is largely on a personal contact basis.

3. THE ROLE OF THE ACTION OFFICER

In addressing the information issues of the HQDA staff, the role of the action officer is important to understand. The action officer is a major user or conduit of information in HQDA. In order to understand the key role the action officer plays in the information area, a description of the duties which the action officer performs, the type of information requests he receives, the sources of his information and his role in the decision-making process are presented.

(1) Responsibilities and Duties

One of the major roles of the action officer is support of the informational needs of the General Officers. The action officer performs research, develops reports, and suggests alternatives and a recommended course of action. In light of

these responsibilities the action officer must frequently gather a large variety of information to assess the cost and operational implications of the "actions" he processes. The action officer is expected to be fully versed in his particular area of expertise and must be able to explain the limitations of the current and proposed procedures. During the action evaluation process external considerations may have to be addressed. The action officer spends much time solving or evaluating complex problems and proposals. Usually, the action officer is expected to write an after-action report.

(2) Types of Information Requests

The types of information requests that the action officer receives can best be described as varied. The nature of the information request depends on the specific action officer and the organization he supports. The action officers queried in our study stated that the types of information requests showed little recurring structure or form. Normally, the types of questions deal with the action officer's organizational responsibilities. The following recent action officer information requests are provided as examples:

- DCSOPS - How could TRADOC use the information contained in the TAADS to distribute training publications that related to soldier skill areas?
- DCSLOG - What effect will the Teamster strike have on the Army's ability to distribute essential material?
- COA - Provide a response to the Defense Resource Management Study

Some actions can be answered within the action officer's organization but very often he must gather information from other organizations and from external sources.

(3) Information Sources

Frequently, the most difficult problems facing the action officer are knowing precisely what information is available and knowing where and how to secure this needed information. Action officers stated that they spent much of their time attempting to find out what information was available and where it could be found. For discussion purposes, the information sources available to an action officer can be divided into five basic categories:

- OPTIMIS - OPTIMIS is a data base of prior action reports. The OPTIMIS system allows retrieval of these action reports through key word retrieval methods from its data base, through terminals strategically located throughout the Pentagon. Discussions with action officers indicated that,

in many instances, due to the somewhat unique informational needs surrounding each action, the OPTIMIS system did not contain the type of information necessary to respond to the action and generally was found to contain insufficient information. Therefore, although there are many OPTIMIS terminals available, little use was being made of them by the action officers surveyed.

- Automated Reports - Although automated reports are frequently consulted during the action process, they may not contain the type of information required to complete the action. Automated reports usually contain information required on a recurring basis, while action officer information is usually non-routine. The action officer needs to browse through a variety of information sources and follow a trail of information from one report or file to another.

- Informal Action Officer Network - In an attempt to deal with the information gathering problems facing most action officers, an informal action officer network has evolved. Action officers frequently develop informal, manual lists of authoritative information sources. These "sources" are frequently shared within the action officer network in an attempt to establish a manual "information directory" to enable the action officer to determine what information is available and where the information is located.

- Committees - Frequently, committees are convened to identify the information resources needed to complete an action paper. The purpose of the committee is to gather information for a particular action from numerous sources, frequently with different perspectives. Although this method of information gathering can be effective because of the ability of each committee member to interact with other members, the committee approach tends to be an expensive method of information gathering. For these reasons, the use of the committee method is usually reserved for critical actions that require extensive coordination and when an answer to a specific question is not needed immediately.

- Other - This category contains such generally non-automated information sources as:

  - Newspaper
  - Congressional Record
  - Other DOD activities
  - Professional publications, etc.

Action officers rely on this category of information sources very heavily. Action officers are frequently required to assess the impact of external factors when analyzing their assigned actions. The action officer, because of the nature of his function, is required to stay current in his particular area of expertise. Keeping current is frequently best accomplished by gathering information concerning his subject area via these other information sources.

(4) Participation in Decision Making

The action officer generally is not the decision maker but he can influence the decision process. The action officer receives information, processes it, and then provides information to the decision makers. The action officer influences the decision making process by the way the response to the action is structured, the source of information used, the other action officers who were consulted, and the amount of time consumed by the action officer in generating his response.

To sum up the role of the action officer, he is a primary user or conduit of information. He is required to provide responses to a wide spectrum of information requests. A myriad of information sources face the action officer with no formal method for him to precisely identify what information, both manual and automated is available and where it may be found. In addition, partly because of the nature of the Army personnel rotation system and through normal attrition, action officers' are constantly changing. It takes some time for an action officer to "feel" his way around the information environment and frequently he is transferred or leaves taking his knowledge of information location with him. Incorrect or incomplete data collected by the action officer may result in a decision being made without complete cognizance of the total impact of each alternative by the formal decision maker.

The role and function of the action officer makes him a prime beneficiary of an information management program. Because of his key role in processing information, as both a user and provider of information, any steps taken to make the information retrieval process more efficient for the action officer should provide substantial benefits to the Army as a whole. The information gathering process of the action officer can be improved by providing him with information on what data is available, where it is located, and circumstances pertinent to its use. By streamlining the information gathering process for the action officer, the response time for actions could be reduced and an increase in the quality and completeness of the data should result, facilitating the decision-making process.

4. STUDY ISSUES AND OBSERVATIONS

The last section of this chapter will focus on key issues and observations relating to our overview of the HQDA information environment.

(1) Findings

- Action Officers Are A Primary Intermediate Source And User Of Information. The Action Officer is typically the General Officer's interface to information systems. Although he is not necessarily the decision maker, he can influence the decision making process.

- There Is Concern About The Reporting Burden Placed On The Field By HQDA. The field sometimes is requested to report the same information up through more than one channel to HQDA. Much of the information the field supplies is redundant and viewed as overhead by the field commanders.

- There Is A Lack of Knowledge As To What Information Is Available At HQDA. There is not an adequate central source for locating HQDA information that is current and accurate. Existing mechanisms concentrate mainly on cataloging reports, not on indexing information.

- Decisions Are Frequently Made On Inaccurate Or Uncoordinated Data From Automated Sources. Decision-makers know that their data is inaccurate or out of date, but they currently have no way of determining the extent of the lack of quality.

- Users Focus On Report Formats And Not Information Presented. Some of the current lack of information sharing is attributable to the inability to use the information in the format of someone else's report.

- Many of The Current HQDA Data Collection and Reporting Activities Have Been Developed in Response To Demands From External Activities. HQDA must respond to a variety of information requirements that it cannot control. Some of the largest and most cumbersome information problems are created by external requirements.

(2) Impacts

- Incomplete and inaccurate data can affect the quality of the executive level decisions. A decision made using incomplete or inaccurate data may result in a decision without complete cognizance of the total impact of each alternative by the decision maker. Poor information can lead to poor decisions.

- Excessive reporting requirements increase the cost of data processing in the Army. The current vertical approach to systems development at HQDA often requires the field to submit the same data numerous times to "field" separate HQDA systems. Reporting this data more than once increases the costs of data processing.

- A lack of data sharing increases the cost of the data processing function. Each time a specific information need is identified, the data is collected or re-collected or a new report is prepared, and the cost of data processing in the Army is increased.

- The development of information to respond to external information demands is expensive. In addition to being expensive, the information that is collected is often of little use for local management, therefore, there is little or no benefit accruing to the Army.

V. CURRENT HQDA-WIDE INFORMATION MANAGEMENT ACTIVITIES

The discussions in this chapter are intended to provide the framework for an understanding of the current state of information management from the HQDA perspective. Previous efforts at information management are also discussed since these prior activities can provide a context for understanding the efforts currently in process throughout the Army. Discussions follow for each of the topics listed below.

- Historical Background for HQDA Information Management
- Existing Policy and Procedure Guidance
- Roles of Organizations Involved in Information Management
- Status of HQDA-wide Information Management Program
- Recent HQDA Resource Management Study
- Information Management Cost Accounting Study
- Executive Level Concerns
- Summary of Issues and Observations

1. HISTORY OF CENTRALIZED MANAGEMENT FOR HQDA AUTOMATED INFORMATION

The history of centralized management of automated information systems at HQDA can be broken down into two distinct periods of development: AIDS to MISD (1963 - 1975) and MISD to ACSAC (1975 - present). The history depicts a dynamic organizational environment as the Army analyzed ways of organizing itself to manage its automation and management information systems more effectively.

(1) Special Assistant to the Chief of Staff for Army Information and Data Systems to the Management Information Systems Directorate (1963-1975)

The first attempts at executive level management of information in the Army began in 1963 when the Office of the Special Assistant to the Chief of Staff for Army Information and Data Systems (AIDS) was created. This organization was established to:

- Raise the Automatic Data Processing Management Information Systems (ADP-MIS) function to the Chief of Staff Level

- Establish disciplined development procedures for major ADP-MIS projects

- Provide centralized control for ADP equipment acquisition.

The AIDS jurisdiction, however, excluded many headquarters and command sponsored projects, as well as command and control, communications, weapons, and intelligence systems.

In 1967, the Army Staff reorganization established the Management Information Systems Directorate (MISD) in OCSA to provide automated systems in response to commanders' and managers' requirements. At that time the Comptroller of the Army was given authority as the senior Army Staff policy official for ADP, that is, the responsibility for all ADP hardware, software, training and career management. At the same time, the U.S. Army Management Systems Support Agency (USAMSSA) was established as the data processing installation (DPI) to support the HQDA Staff.

Because of the organizational split in the ADP-MIS function between MISD and the Comptroller, and because of the increasing complexities involved in automated information management, a study of Management Information Systems Support (SOMISS) was conducted in 1968. Major SOMISS recommendations that were implemented include:

- Transfer of authority for ADP hardware, software, training, and career management from the Comptroller to MISD

- Establishment of Information Systems Offices (ISOs) in the Staff Agencies and Management Information Systems Offices (MISOs) in the field commands to act as single responsible ADP-MIS elements for their organizations

- Assignment of the responsibility to the HQDA Staff Agencies for management of automated systems designed to meet their requirements

- Assignment of the U.S. Army Computer System Support and Evaluation Command (USACSSEC) to MISD as a Class II activity. The command was redesignated in the 1974 Army Staff reorganization as the U.S. Army Computer Systems Support and Evaluation Agency (USACSSEA). It is responsible for evaluating and acquiring commercial computer equipment.

- Establishment of the U.S. Systems Development Command (USASDC), designated in 1969 as the U.S. Army Computer Systems Command (USACSC), as the central design agency for multicommand MIS.

The SOMISS recommendations established centralized management of the ADP-MIS function, a disciplined approach to the

ADP-MIS function, and a visible automation, ADP-MIS management structure through the placement of MISD in OCSA and ISOs/MISOs in HQDA staff and field organizations. However, SOMISS provided only limited control through AR 18-1 for policy formulation, planning, and resource management for automation in command and control, weapons, intelligence, and communication systems.

(2) The Management Information Systems Directorate to the Assistant Chief of Staff for Automation and Communications (1975 - Present)

In late 1975, a series of reviews were scheduled to provide an intensive examination of the direction and purpose of the totality of Army automation. The Tactical Automation Appraisal (TAA) held at HQ TRADOC in July 1976, focused high level attention on automated tactical command and control and the lack of a focal point of the Army Staff to coordinate automation matters.

The House Appropriations Committee Report on the FY 1977 DOD Appropriation Bill, June 8, 1976, proposed that a single office for automation be created in each Defense component to avoid unproductive overlap, gaps, or duplication of effort. OSD policies established a management methodology for computer resources in major defense systems and extended the definitions of computer systems to include automation components of weapons, command and control, communications, business process control, and scientific and engineering systems.

In August, 1976, the Vice Chief of Staff directed the Management Directorate, OCSA, to develop a charter and implementing directives for the central manager of Army automation in the Office of the Chief of Staff. That directive led to the conduct of the Army Automation Management Study in February 1977. That study provided the following findings:

- Automation policy responsibilities are fragmented and duplicated
- Automation planning by functional proponents is incomplete and not appropriately integrated
- Automation resources are not clearly defined or controlled during the programming, planning, and budgeting cycle
- Functional proponents in OSD and OCSA provide their Army Staff counterparts guidance and directives which contain automation policy that is not integrated into overall Army automation policy
- The Army Staff Committee Structure provided no high level forum to discuss and resolve issues pertaining to automation management.

The charter for the Director for Army Automation (DAA) was developed following the study. The DAA would have overall authority and responsibility for Army-wide automation management. The DAA would manage Army automation through macro-level policy, master planning, and resource management responsibilities specified in the DAA charter and implementing documents. Specifically the new DAA function would serve as:

- Principal Army automation focal point
- Chairman of the Army Automation Steering Committee
- Full-time member of the Program Guidance Review Committee and Budget Review Committee
- Member of the Research Development and Acquisition Committee
- Member of the Army Staff Council
- Member of the Army Command and Control Steering Committee
- Policy developer for the Automation Management Office (AMO) structure and functions
- Head of the procuring activity for USACSSEA.

During 1978 the DAA function was reviewed and a reorganization was undertaken to change the Director of Army Automation to Assistant Chief of Staff for Automation and Communication (ACSAC). The ACSAC was established as a general staff agency created out of the Army Automation Directorate of OCSA and the Telecommunications Command and Control Directorate of DCSOPS. The reorganization of these two directorates under one organization in October of 1978 was a further effort to provide one overall responsible authority for Automation and Communications for the Department of the Army and to comply with the spirit of the House Appropriations Report. The ACSAC was to be the central manager (the functional director) of all ADP resources management and the program director for programs 3C (communications) and 30 (other). The organization and functions of the ACSAC will be described in a later section of this chapter

With this background, a discussion of the current HQDA-wide information management environment follows.

2. EXISTING POLICY AND PROCEDURE GUIDANCE

Considerable policy and procedure guidance exists on automation and related activities at HQDA. The major organizations concerned with HQDA automated information management policy are the Assistant Chief of Staff for Automation and Communications (ACSAC), The Adjutant General (TAG) and the United States Army Computer Systems Command

(USACSC). Each of these staff activities has a major part to play in the overall HQDA automated systems and information management process. These roles will be discussed in the next section of this chapter.

The study team reviewed many, but not all, of the prevalent DOD, DA and related publications and documents concerning information policies and procedures. In particular, we reviewed documents in the series associated with AR 18, TB 18, AR 310, AR 335, AR 340, DOD 4100, and DOD 5000. The search and inquiry activities failed to completely identify and locate many local policy documents believed to exist, and therefore a cohesive, all-inclusive document analysis was not possible. There is no single overall proponent currently for all information management related guidance. Normal staffing procedures are the current mechanism for assuring that all of the organizations proposing guidance interrelate or complement one another. Overall HQDA policy (regulations) do not currently exist in the areas of data administration and quality assurance. However, guidance does appear for these activities at lower organizational levels.

In summary, there are a number of policy guidance organizations regarding information management at HQDA. The guidance is developed at several organizational levels, with normal staff procedures to assure coordination among the various regulations affecting information management at HQDA. There also are a number of studies and memoranda that enter into the process of formulating guidance; however, a composite list of all HQDA information management guidance is not currently available.

3. ROLES OF ORGANIZATIONS INVOLVED IN INFORMATION MANAGEMENT

The purpose of this section is to describe the roles of each of the various organizations that are involved in the management of information at HQDA. The functions of information management are currently distributed across several organizations. A number of these organizations are performing similar activities, but in the context of their various missions.

(1) The Army Automation Steering Committee (AASC)

The Army Automation Steering Committee (AASC) is a subordinate committee of the Select Committee (SELCOM) which considers and advises on Army automation matters. The AASC is one mechanism to insure that critical automation decisions or issues are brought to the attention of the HQDA Staff for resolution. A review of committee minutes indicated that the AASC last met on September 8, 1978, a factor that could imply t the committee may not be the ideal mechanism for addressing information management policy issues on a timely basis.

The Chairman of the AASC is the Assistant Chief of Staff for Automation and Communications (ACSAC) and the committee i composed of General Officers or their representatives from each

major organization at HQDA. The functions of the AASC are in part:

- To consider automation issues, insure that systems and development efforts which cross functional or technical lines are appropriately integrated, and to arbitrate staff disagreements on automation

- To make recommendations on resource allocation for automation

- To review other Army automation matters referred by the Chief of Staff and Army Staff Agencies

- To disapprove programs that are not consistent with Army automation objectives.

(2) The Assistant Chief of Staff for Automation and Communications (ACSAC)

The Chief of Staff approved a proposal to realign and integrate automation and communications management on the Army Staff on May 31, 1978. The ACSAC was formally established in October of 1978. Exhibit V-1 depicts the policy responsibilities of the ACSAC. Policies relating to automated information management include: standardization, systems integration, and planning.

In addition to the policy responsibilities mentioned above the ACSAC also has several other responsibilities that are relevant to automated information management. These are:

- Provides programming and budgetary guidance for the Army automation and communications program requirements

- Develops and maintains the Army Automation Planning, Programming and Evaluation System (AAPPES)

- Chairs the Army Automation Steering Committee (AASC) and provides representation for the Program Budget Committee (PBC), Army Staff Council, Army Command and Control Steering Committee, and other selected automation and communications policy committees and work groups

- Coordinates and monitors the development of comprehensive plans and procedures for the acquisition, fielding and support of automation and communications transmission, special systems, switching, processing components, and functional system aspects

- Develops automation and communications planning models, analytic methods, measurement procedures and models for

Current IRM Policy Responsibilities of The Assistant Chief of Staff for Automation and Communications (ACSAC)

Policy	Includes	Interface with Other HQDA Organization
Automated Systems	Those systems classified to process data or information in support of management or mission functions.	HQDA Staff, Automation Steering Committee
Automatic Data Processing Equipment	The automatic data processing components and the equipment systems created from them, regardless of use, size, capacity or price, that are designed to be applied to the solution of processing of a variety of problems or applications.	U.S. Army Computer Systems Selection and Acquisition Agency, U.S. Army Computer Systems Command, U.S. Army Communications Command, TAC
Automation/Communications Standards	International National (Federal or Industry), DOD or Army standards which apply directly to the design, production, or operation of automation and/or communications (A/C) components, systems or networks.	U.S. Army Computer Systems Command, NBS, DOD Standards, NATO Standardization Manuals and HQDA Staff, U.S. Army Communications Command
Automation/Communications System Integration	Responsible for insuring that automation/communication systems are designed, adapted, employed or managed so as to satisfy objectives, requirements and constraints of larger, more broadly defined teleprocessing, information or automation and communication support systems. The objective of these policies is to achieve interoperability, economy, affordability, improved performance and timely fielding and maintenance of systems.	HQDA Staff
Automation/Communications Management	Overall management of army automation and communications through developing comprehensive planning and resource requirements and evaluation of the conduct of policy and programs.	HQDA Staff

EXHIBIT V-1

improving the evaluation of automation and communication services supporting Army missions.

In essence, the ACSAC is the current focal point for Army Automation Management. The organization is responsible not only for policy but also for resources control. The ACSAC currently possesses several of the functional responsibilities for automated information management as an outgrowth of its automation responsibilities.

(3) United States Army Computer Systems Command

The United States Army Computer Systems Command (USACSC) is responsible for the development and maintenance of multi-command standardized systems. As a designated Assigned Responsible Agency they develop, integrate, program, test, install, and maintain standard system software and documentation. In this role they also maintain inventories of ADPE and software. In addition, USACSC is the program manager for the Army Standardization program as well as the program manager for the Army Data Standard Dictionary (RAS STADES) Program.

As the Army Standardization program manager, USACSC has responsibility for the maintenance of the Army Catalogue of Standard Data Elements and the coordination of candidate data elements. In USACSC's documentation role, it has the responsibility for the implementation of DOD documentation standards and the development of Army documentation standards. As the Army program manager for RAS/STADES, USACSC's responsibilities include answering user inquiries about the dictionary package and providing technical assistance to systems groups as they install that dictionary system.

USACSC has a subordinate organization known as the Army Institute for Research in Management Information and Computer Science (AIRMICS). AIRMICS is the major Army activity currently concerned with ADP technology assessment. A discussion of AIRMIC's role will occur at a later point in this chapter.

(4) The United States Army Computer Systems Selection and Acquisition Agency (USACSSAA)

USACSSAA, which is under the operational control of the ACSAC, provides technical and legal support services to the staff and major commands. The Agency is responsible for selecting and procuring high dollar value ADPE items and services which require a data processing acquisition from GSA. It also provides on-site technical assistance to Army staff and field activities. and systems analysis and support to HQDA Staff activities.

(5) The Adjutant General

The Office of the Adjutant General (TAG) is one of the oldest organizations at HQDA and is responsible for all Army matters concerning administrative management. In recent years TAG has become increasingly involved in information management and information handling activities.

TAG is responsible for Army records management including archival and filing procedures. In this responsibility, the TAG prescribes the procedures for supervision, disposition, production and storage. TAG is also responsible for forms management. This includes the approval and coordination of the Army's data gathering forms. Information requirements management is also a TAG function. In this role, TAG must oversee the management, cataloging and disposition of Army information requirements while the addition or deletion of information requirements is a user responsibility.

The TAG's responsibilities also involve some of the automated aspects of information. For example, the TAG has Army-wide responsibility for word processing and for micrographics management. Any use of micro-reduction equipment is the management responsibility of the TAG.

(6) The Deputy Chief of Staff Research, Development and Acquisition

The Office of the Deputy Chief of Staff Research, Development and Acquisition has been assigned responsibility for managing the Army's scientific and technical information inventories. The Chief of Research and Development, HQDA, under the provisions of AR 70-45 is responsible for the Army portion of the DOD Scientific and Technical Information (S&TI) Program. He is also responsible for insuring that the latest research and development efforts conducted by Federal agencies and contractors in ADP hardware, software, and information technology are exploited and applied to Army S&TI requirements.

The S&TI Program provides for the effective interchange and availability of scientific and technical information required in support of the management and execution of the Army RDTE Program. The program includes all efforts devoted to the collection, analysis, evaluation, storage, retrieval, and dissemination of S&TI by any and all means.

Specifically, heads of major Army commands and developing agencies are required to insure that S&TI activities are coordinated with the management information systems staff of the command or developing agency, and, interface with the Army Data

Management Program. The Army Materiel Command has responsibility for planning, programming, managing, and operating the S&TI program of the Army R&D Information System, and related data bases.

From the preceding discussion it is clear that responsibilities for managing automated information are spread throughout HQDA. Various current organizations have different orientations and sometimes overlapping responsibilities. No single organization has a clear overall responsibility for automated Information Management.

4. STATUS OF HQDA-WIDE INFORMATION MANAGEMENT PROGRAM

The purpose of this section is to discuss the status of information management from a HQDA-wree perspective, which looks across and provides guidance to HQDA agencies in the management of information contained and reported by existing automated systems. As previously discussed in this chapter, several organizations have HQDA-wide roles related to information management. In this section we focus on the following aspects of information management:

- Information Systems Planning
- Data Standardization
- Data Administration
- Technology Assessment
- Quality Assurance and Compliance Audit
- Forms, Records, and Reports Management.

Our discussion centers on how each of these information management functions is currently assigned and performed for HQDA.

(1) Information Systems Planning

Systems planning is being performed by a number of activities. The ACSAC has responsibilty for automation and communications planning, planning the integration of tactical and non-tactical communications and automation plans, and relating those plans to overall Army goals and objectives. The DCSOPS is responsible for the tactical aspects of systems planning, and the DCSRDA is responsible for the research and development aspects of system planning.

Army Regulation 18-1 describes in detail the current planning process for Army automated information systems. This regulation discusses requirements for submission ato an overall MIS Master Plan and a structured process for systems approval. However, primary emphasis is placed on hardware and software

considerations in this approval process. Planning efforts tend to focus on procurement actions. Very little attention is given to information requirements and related data collection and storage, systems integration and data sharing.

(2) Data Standardization

The Army Data Standardization program has been in various stages of activity at HQDA for many years. Currently, the Standardization Program Manager is located at the United States Army Computer Systems Command. The ACSAC provides overall program policy and guidance for the Army Information Processing Standards Program (AIPSP) and directs the enforcement and use of automation standards throughout the Army. The Computer Systems Command as program manager is responsible for:

- Establishment of procedures and criteria for: the management and operation of the information standards program; Army participation in international, NATO/CENTO/SEATO, FIPS, DOD, OJCS, and other joint services data standardization programs; and identification, classification, development, documentation, and coordination of proposed Army automation standards.

- Control and monitoring of the Army data standardization activity including: serving as the Army participatiog activity of the Defense Standardization Program; designating responsibilities for standardization efforts; and reviewing and coordinating proposed new/revised Feder[illegible] Information Processing Standards (FIPS) and American Nat[illegible]nal Standards Institute (ANSI) standards within the Army, and preparing an Army response.

Outside the Computer System Command the Army staff agencies and major commands are responsible for:

- Maintaining and enforcing the use of ADP and data element standards within their areas of responsibility

- Developing proposed Army ADP and data element standards related to their areas of responsibility and providing them to USACSC for review, evaluation, and approval as Army standards

- Participating in the development of Army and higher level ADP and data element standards through review and committee involvement.

General guidance is provided in both the AR-18 and the TB-[illegible] series publications. The Catalogue of Standard Data Elements [illegible]des AR 18-12[illegible] briefly describes the policies outlined [illegible] TB 18-11[illegible] specifically breaks out these responsibilities

by major organizations. It is interesting to note that as of January 1979, the Army had 3200 data elements that were standard. Of that number, 2800 are quantitative (mathematical) while only 400 were non-quantitative. During our review of the Army data stnndards program it was indicated that only a few activities are submitting data elements for standardization. Some of the factors identified as contributing to the low level of participation by HQDA agencies in the standards program include:

- The process is too cumbersome and time consuming
- The process requires manpower spaces which are in short supply
- Concern with anticipated impacts on existing systems and documentation
- Concern with anticipated impacts on proposed systems and documentation.

It is also important to point out that there are a variety of standardization programs for the Army to follow, yet there is no agreed upon hierarchy of which standard takes precedence. The following represents a listing of the data element standard programs to which the Army must subscribe: NATO; SEATO; CENTO; FIPS; DOD; JCS; and ARMY.

The net effect of all of these information standards programs is that users are unclear regarding which standards to follow. For instance, the Army has location codes which are differenct from the JCS location codes. Systems that use these codes require cross indexed tables in order to identify the proper codes with the proper organization. The same situation exists for country codes and numerous other codes. Several officials also stated that NATO Standards are not fully integrated in botorJCS and Army level systems, which makes interoperability difficult. As a result, the absence of a standardization hierarchy has made the current information standards program difficult to manage and confusing to the implementers of information systems.

(3) Data Administration

Data administration involves the coordination of user requirements with system capabilities, the education of the information user community regarding the contents and availability of information, and metadata management which includes a data element dictionary/directory that defines and locates various data elements stored in information systems. There is currently no formal HQDA-wide data administration program. Data administration tools such as data resource dictionaries/directories have not been developed at this organizational level. However, a number of DPI's have been

employing data administration concepts in the management of their organizations and related information systems. Data dictionaries have been created for a number of these systems.

Most information searches at the Headquarters, DA staff level are done on a manual basis. The action officer and related informal networks are used to satisfy information requests. One tool which is related to data administration and the location of information is project OPTIMIS. This is a catalogue of various staff actions which can be used to obtain information needed for new staff actions.

(4) Technology Assessment

The Army Institute for Research in Management Information and Computer Science (AIRMICS) is the information management technology assessment agency of the Army. Organizationally, AIRMICS reports to Computer Systems Command; however, its budget and program must be approved by DCSRDA. AIRMICS has been involved in projects that concern areas of interest related to information management such as advances in data base management, information requirements specification and distributed processing environments.

AIRMICS, while reporting to USACSC, has the mandate for Army-wide (including HQDA) information systems research. The Agency receives input from other Army commands and activities via its technical conferences and programs. The Agency has not yet worked in the area of horizontal information management activities but is preparing to study the functions of a Data Administrator.

The remainder of information management technology assessment that is accomplilshed in the Army is scattered across the Staff Agencies' DPIs. These assessment efforts are generally more directly connected to individual Staff Agency information systems planning.

(5) Quality Assurance and Audit

Quality Assurance is usually releegated to individual users and DPI's at HDQA. There are no information quality assurance guidelines above the functional staff/DPI level. However, some Army-wide programs are operated from the DPI level. For instance, the United States Army Finance and Accounting Center (a DPI) has a quality assurance program that covers information and software that applies to financial applications Army-wide.

It is important to note that there are organizations at HQDA which have a strong audit role. These include the Army Audit Agency and the Inspector General. These organizations may review systems, but they tend to concentrate on specific problem areas. However, the Inspector General does perform regulatory compliance

reviews. For instance, it is within the Inspector General's authority to review the Army Standardization Program.

(6) Forms Management

The Forms management function has long been a responsibility of the Adjutant General (TAG) and is being performed throughout the Army. Forms Management is basically the review of all HQDA forms to ensure that information is not redundant and that forms remain useful. No organization in the Army can initiate a new form for gathering information without approval of the Agency forms management officer. HQDA forms are approved by the responsible activity in TAGO.

(7) Records Management

Records management is also under the control of the Adjutant General. The records management program provides for the control, filing and disposition of all manual and automated records of the Army. TAG has the responsibility of prescribing records classification, archival procedures, and maintaining records until they may be destroyed. To assist in the management of records throughout the Army TAG is also responsible for all micrographics management activities, inlcuding policy formulation concerning micrographics.

The records mangement activities of organizations are normally reviewed by organization administrative personnel (records mangement officers) and deficiencies noted and required to be corrected. The Inspector General reviews the records management program for TAG.

(8) Reports Management

The Reports Control or Management Information Requirements Control Program is the information requirements management and analysis program in the Army. All HQDA level organizations are required to have a Management Information Requirements Control Officer (MICO) who is responsible for coordinating information requirements reviews and adding or deleting reporting requirements in accordance with TAG promulgated regulatory guidance.

Each MICO is required to maintain an Information Requirements Catalogue (AR 335-11) which lists the information requirement. An information requirement is considered to be applicable to the program if it occurs with a predefined frequency. Specific exceptions may be made but only by the MICOs. All requirements are reviewed bi-annually. The Inspector General and other personnel make periodic reviews to ensure that the program is working.

The Requirements Control Program includes both manual and automated information and also controls new information requirements as they are developed. In essence, no new HQDA system can be developed without a requirements symbol being affixed to its reports or products.

The Requirements Control Program often lacks the necessary resources to be effective. Usually, there is only one individual per functional area (i.e., DCSOPS, etc.) who is responsible for the program. The dynamic nature of information requirements and the process of requirements justification, when coupled with the limited resources of the current program, limit its effectiveness. There is also a lack of doctrine, tools, and command emphasis in the Requirements Control Program area. Under the current circumstances, it is almost impossible for the MICO to do a comprehensive review of reporting requirements and actually question the user's need for a specific report. This is compounded by the rapid growth of data bases and related reports.

5. RECENT HQDA RESOURCE MANAGEMENT STUDY

A Resource Mangement Study was completed during July, 1978 by the Chief of Staff to analyze the resource management capability of the Army Staff as presently organized. The primary purpose of the study was to evaluate the applicability of a Deputy Chief of Staff for Resource Management (DCSRM) to the HQDA Staff structure, to consider alternatives to both existing and DCSRM organizations, and to recommend changes needed to provide optimum HQDA Staff capability for effective resource mangement.

The study resulted in several recommended changes to the existing HQDA staff structure and functions. Of particular interest to our HQDA Information Management Project was the creation of a Resource Management Policy Office in the Comptroller of the Army's organization. This new office's broad mission includes the development of Army-wide policy for the effective management of resources.

Other related Resource Mangement Study findings in the information system and reporting areas inlcude:

- ADP systems which currently support manpower management are managed by staff agencies which are forced into a detail-level operator role versus that of an Army-policy-maker. Incorporation of all manpower related information systems in a single Staff Support Agency (SSA), charged to support the manpower manager as well as other agencies, would remove much of the complex detail from the Staff and contribute to a broad management focus by the manpower manager.

- Manager information systems for supporting many DA Staff (personnel, supply, etc.) are not designed for use during war time.

- There is an immediate need to improve the manpower reporting system. Manpower data was reported in manpower utilization reports to DCSOPS, numerous personnel reports to DCSPER and MILPERCEN, updates to the COA managed Civilian Budgeting System (CBS), and as part of periodic USAFAC reports, to include JUMPS. There is possible duplication between many of those separately managed systems/report mechanisms. A first step in improving the data flow to assist management should include determination of what report data is required and in what form it is currently available. Crosswalks between reports appears necessary, not an expansion of required reports.

- Initial FORDIMS implementation plans do not incorporate Army-wide civilian and military manpower utilization data within what is purported to be an integrated management system.

- PROBE Interface Study recommendations that an Army PPBS data base be developed and a data base administrator be designated are critical to the conduct of effective, integrated DA Staff resource mangement. The Resource Management Study findings seem to indicate a need to improve the management of Army resources through high level coordination and assignment of responsibilities. Similar remarks apply to the management of information as a resource.

At this point in time it is unclear what role this resource management policy will play in a HQDA information management program. However, future directions and development in this area must be made with full consideration of the scope and responsibilities of this new office.

6. INFORMATION MANAGEMENT COST ACOUNTING STUDY

On August 24, 1977 the GAO delivered a draft report to DOD entitled, Accounting For Automatic Data Processing Costs Needs Improvement. The report was the result of a survey of twenty-six Federal organizations providing data processing services (including DOD). The survey found that basic cost components like utilities, space rental, cost of transmitting data from one place to another, and military salaries were frequently omitted from reports of total ADP costs. The GAO concluded the survey by stating:

> "Without accurate costs managers (1) may choose uneconomical alternatives when replacing or adding to compter facilities and (2) may fail to appropriately charge users of comparable facilities for services performed."

On November 3, 1977 the Assistant Secretary of Defense, Comptroller sent a letter back to GAO stating that DOD agreed that cost accounting for ADP needed improvement. A DOD-wide ADP Cost

Accounting Joint Working Group would consider the new GAO Guidelines in its systems development efforts. That Working Group approved the GAO Guidelines and required implementing schedules from each of the Branches of the services by October 1, 1978.

The GAO Guidelines required the following costs to be captured: Personnel, Equipment, Computer Software, Space Occupancy, Supplies, Contracted Services, Services from other units or agencies, and Intra-Agency Services and overhead.

In our efforts to identify information management related costs we found it very difficult to obtain this type of data. The current accounting has not been designed to provide the level of detail needed to perform this task. Improvements are needed by HQDA in this area so that costs of information activities can be fully considered in the management decision making process.

7. EXECUTIVE LEVEL GUIDANCE

During the conduct of our study, selected General Officers on the HQDA Staff were interviewed. We have inforporated much of the guidance received during these interviews into our assessment of the status of information management at HQDA and the design of a program for managing information as a resource. The following discussion will focus on the perceptions of the HQDA General Officers. Although some officers have different perspectives, some issues mentioned in several interviews are highlighted in this section.

Some of the officers' comments pertaining to problems and concerns with information have been discussed in Chapter IV under the Information Needs of HQDA. In this section we highlight some of those remarks and comments which were made relative to the organizational aspects of implementing an information resource management program at HQDA.

The concept of established organizational domains was cited as a potential roadblock to the implementation of an IRM program. Information is often equated with power in an organization, and the perception of an information resource management program as somehow exercising control over the information of the various staff agencies would not be favorably received. The centralization of information across HQDA was generally deemed undesirable, as non-effective and counter-productive in the HQDA environment.

Information resource management, as we have explained in this report, focuses on the view of information as a resource of HQDA and the need to manage that resource. This does not imply that a central collection of this resource is necessary, or even desirable. Instead, the information resource concept focuses on common ways to manage this resource which can be implemented across all the staff agencies. The information used in this management endeavor is metadata, not the actual data itself.

There was no consensus of a feasible information resource management organization. There were widely varying opinions of the necessity for a central organization to manage automated information ranging from the opinion that it already exists to the opinion that the function should not be centralized. Basically, though, there was general agreement on the need for improvements in the way HQDA manages its automated information.

In developing our initial program for information resource management which is presented in this report, we have carefully weighed the comments and guidance of the General Officers and determined what we believe is a viable approach to initiating such a program. This approach is presented as a first step in what is envisioned to be a long and evolutionary process wherein HQDA can move from its current environment to one of managing information as a resource.

The Army, like most organizations, is continually faced with competing demands for resources. At Headquarters, the size of the Army Staff is shrinking so that additional personnel for new programs is unlikely. This implies that the development of a program for information resource management should carefully consider its resource requirements. Indeed, requests for resources to implement the program will be competing with other Army programs for priorities. Hence, the various staff agencies must be convinced that an information resource management program is in their best interest.

We have attempted in this report to demonstrate the need for information resource management throughout HQDA. We have been careful in the design of the program to develop a process which will assist the Army (and each staff agency) in accomplishing its mission and not merely add another layer of regulation and bureaucratic overhead.

In summary, the General Officers indicated an environment exists at HQDA which is in need of improvements in its information management but which is faced with resource and organizational constraints on implementing a program. This information provided valuable input to our study and helped formulate our recommended approach which is presented in Chapter XII of this report.

8. SUMMARY OF ISSUES AND OBSERVATIONS

During the course of Phase I of our study we interviewed numerous executive level officers, staff agency and DPI personnel. The purpose of this section is to provide a summary of issues and observations related to HQDA-wide information management that were developed as a result of our data collection proces.

(1) Findings

- The activities pertaining to HQDA-wide information management are performed by a number of staff agencies. No single organization has been assigned overall management responsibilities for automated information management.

- There is a sense of a lack of direction from HQDA in the information management area. Each staff agency and DPI has approached their information management problems more or less independently of any coordinated policy or guidance. The problems are real and pervasive, but localized solutions are being developed.

- A central information management authority does not exist to review system designs or provide technical guidance and support of information management. Primary emphasis at the HQDA level has been placed on hardware and software requirements and not on system information content.

- The role of the Assistant Chief of Staff for Automation and Communications (ACSAC) is not clearly perceived. This has been caused in part because of the recent creation of the ACSAC in October 1978 and the subsequent ongoing efforts to define objectives, develop plans, and set the overall direction for this new office.

- There appears to be a lack of support for the Army Information Processing Standards Program. Only a minimal amount of effort is being directed at this program by HQDA as reflected in the limited participation by staff agencies in having data elements submitted for standardization.

- It is difficult to define costs associated with current standardization and information management efforts. Limited cost data is available in this area. The HQDA accounting system does not identify these costs in individual categories.

(2) Impacts

- A fragmented approach to automated information management had developed at HQDA. Because of the proliferation of vertical information-systems, usually developed internal to the functional organization, data sharing is extremely difficult.

Each of these issues and observations has been incorporated in our analysis of the current HQDA environment and used in the development of the information mangement requirements definition. The findings indicate the Army currently focuses its attention on managing ADP resources, not its information resources. Specifically, there is not a focus on Information Resource Management as an independent activity.

VI. INFORMATION MANAGEMENT WITHIN THE HQDA FUNCTIONAL STAFF

The purpose of this chapter is to describe information management within the HQDA functional staff organizations. In the course of our study, we gathered information concerning this topic primarily from formal staff briefings, executive level interviews and relevant documents. Our data collection and analysis was also directed, in part, by the Study Advisory Group (SAG).

The functional staff agencies included in this review are primarily the offices of

- The Deputy Chief of Staff for Logistics
- The Deputy Chief of Staff for Operations and Plans
- The Deputy Chief of Staff for Personnel
- The Deputy Chief of Staff for Research, Development, and Acquisition.
- The Comptroller of the Army
- The Adjutant General

In addition to interviewing high ranking officials and responsible individuals in these organizations, we conducted executive interviews with

- The Vice Chief of Staff
- The Director of the Army Staff
- The Director of Management
- The Director of Program Analysis and Evaluation
- The Assistant Chief of Staff for Automation and Communications

Further, we conducted interviews or received briefings from responsible members of the offices of:

- The Chief of Engineers
- The Assistant Chief of Staff for Intelligence
- The Surgeon General

as well as various Field Operating Agencies. The information which we received from these interviews is incorporated into many chapters of this report. This chapter focuses on the above-named functional staff agencies and their current approach to information management.

To provide an understanding of the information resource management environment present in the HQDA functional staff organizations we have divided this chapter into the following sections:

- The role of the Automation and Information Systems Offices
- Status of Information Management Activities
- Summary of Issues and Observations.

Our discussion of each of these subjects follows.

1. ROLE OF THE AUTOMATION AND INFORMATION SYSTEM OFFICES

In order to develop an understanding of staff agency information management activities, it is important to first discuss the concept and role of the automation and information system offices. The implementation of these organizational approaches has had a direct impact on what information management activities currently exist in the HQDA staff agencies and how they are executed.

Army Regulation 18-1 designates the head of each HQDA staff element as being responsible for automation and information system activities. An Army staff agency automation management office (AMO) or information systems office (ISO) office normally performs or monitors the following functions and provides the staff with a point of contact for Army management information systems and related activities.

- Assuming proponency for Class A1 Army Management Information Systems (AMIS) and approving designations in the GFSR of proponents for other Class A and Class B AMIS within their functional area of responsibility
- Formulating statements of General Functional System Requirements (GFSR)
- Proposing Detailed Functional System Requirements (DFSR)
- Preparing and submitting economic analysis to support information systems proposals
- Performing Army staff level supervision and continuing evaluation of management information systems and data processing activities under their jurisdiction through staff reviews within their functional areas of responsibility

- Insuring the coordination and or review of all ADP and data element standardization actions

- Monitoring the development and publishing of adequate functional user manuals, training user command instructor cadre, and developing training requirements for programs of instruction in the Army service schools and training centers to insure a flow of functionally trained replacement personnel from the Army training base during the life-cycle of the syste

The workload, functions, and responsibilities of these offices vary considerably among the staff agencies that we interviewed. This variance exists because each functional agency was given the authority to staff the activity according to perceived need. As a result, some functional agencies currently have more personnel spaces allocated to the AMO function than others. As might be expected, there are some differences among agencies as to what the roles and functions of the AMO are in practice since there is no central DA guidance currently in existence which describes and defines the AMO functions. These factors, when combined, create an operating environment in which the full implementaton of the AMO ISO concept may not be feasible.

During the conduct of our study, we have found that the AMO ISO are the key organizations and individuals in the information management process. The extent to which information management functions are being performed in the HQDA staff is directly dependent on the degree to which the AMO ISO concept has been implemented. Future plans and directions in the information resource management area give full consideration to the experiences, successes, and problems of AMO ISO staff agency functions.

2. STATUS OF INFORMATION MANAGEMENT

The discussions in this section focus primarily on the information management activities of the individual functional staff organizations at HQDA, and to a limited extent the support which the staff agency receives from its various DPI's. More detailed discussions of specific DPI information management functions are contained in the next chapter of this report. The following discussions provide a general review of the status of information management for these staff agencies. They should not be construed as a comprehensive evaluation of ongoing staff agency mission management and operation.

The responsibilities and duties of the AMO and ISO, where they exist, will be highlighted, because of their key role in current information management activities. This discussion will concentrate on the various organizational entities within the respective functional staff agency.

(1) Information Systems Planning Review and Coordination

The information systems planning, review and coordination function, varies by HQDA organization with both centralized and decentralized approaches implemented. For example, the review of information system plans within the DCSPER is highly centralized as an AMO function. The DCSPER-level AMO resides in the Plans Division of the Manpower, Plans and Budget Directorate. Each DCSPER DPI and activity also has an AMO responsible for information systems planning. All system change requests (SCRs) and new system specifications are reviewed by the appropriate DPI or activity AMO. Usually, at the GFSR stage, the DCSPER-level AMO becomes involved in all systems development efforts and retains approval authority for all DCSPER systems.

A decentralized approach to information systems planning is utilized by the DCSOPS. This function is not being performed at the DCSOPS level, but instead is performed jointly by the system proponent directorate and the DPI involved. The remainder of the functional staff agencies lie somewhere in the middle on the centralized/decentralized scales. For example, the DCSLOG relies on USAMSSA for this function for HQDA-internal systems. The DCSLOG also assigns an action officer to each field system for planning, review and coordination. In the case of the COA, they have retained the responsibility for systems planning but assigned the authority to USAFAC. TAGO has taken the committee approach to planning. An Administrative Systems Steering Committee has been organized to oversee the system planning function in an attempt to ensure TAGO coordination and consideration of alternate data sources, the potential for data sharing, etc.

Staff agency developments are handled in accordance with AR 18-1. The actual approach taken by staff elements ranges from a decentralized, to a committee approach, to a centralized approach, to the use of an external DPI approach, and finally to a retention of responsibility but a delegation of authority approach. Functional users get involved in the process as well as DPIs and AMOs. Although AR 18-1 is the common thread that binds the effort together, the specific approach taken varies as widely as the number of staff agencies involved in the process.

The predominant approach taken by many of the staff agencies is to focus on systems planning and automation activities (as opposed to information planning). In essence, the staff agencies concentrate on the system specifications more so than on the information aspect in the MIS planning process.

There was some evidence new trends may be developing. Within the DCSPER community a study is currently in progress: Personnel Community Plan (PERCOP). The study originated within MILPERCEN but is being raised to the DCSPER level in an attempt to define agency functional information requirements for the entire DCSPER community. This approach promotes intra-functional coordination

for the recruiting, active, reserve, and civilian component personnel community. Ideally, the process could be taken one step further to integrate DCSPER requirements with those other DA agencies, i.e., COA and DCSOPS, which directly interface with DCSPER for personnel data.

(2) Data Standardization

Little effort at the HQDA functional staff level is being devoted toward data standardization. With the exception of TAG, and its world-wide terminology system for reports and forms control, the functional staff agencies rely on the DPI's for the standardization function. In some cases, the standardization function has been formally delegated to a supporting activity as in the case of DCSPER to MILPERCEN and CIVPERCEN, as well as COA to USAFAC. But in other staff organizations it is simply assumed that the DPI is performing this function.

Most of the functional staff agencies are aware of the benefits of a standardization program, but little effort is underway at the staff agencies in instituting and auditing a standardization program. DCSPER has recognized that their supporting DPI's do, in some cases, use different data elements for the same items. Related to this problem, there is a current attempt to coordinate standardization among the organizations involved. In fact, DCSPER and COA are involved in an effort to coordinate the standardization of common data elements.

Approximately one year ago, the DCSRDA conducted a study that revealed the use of approximately 5,000 different data elements within the RDTE portion of the DCSRDA community. This study also identified some overlaps and redundancies in these data elements, but no action has yet been taken because of the complexity of the problem.

Although most functional staff agencies are aware of redundancies in data elements, they frequently do not take the necessary action regarding standardization because of their perceptions of the tremendous amount of manpower required. If the present trend continues in reducing the size of the HQDA functional staff available to work on a standardization program, it appears that a minimal effort will continue to be devoted to this important activity in the future.

(3) Data Administration

The full data administration function is not being performed by any of the functional staff organizations. A few aspects of this function are being performed by the various agencies, or performance of this function is being planned for the future. In some instances, the supporting DPI's are performing some part of this function.

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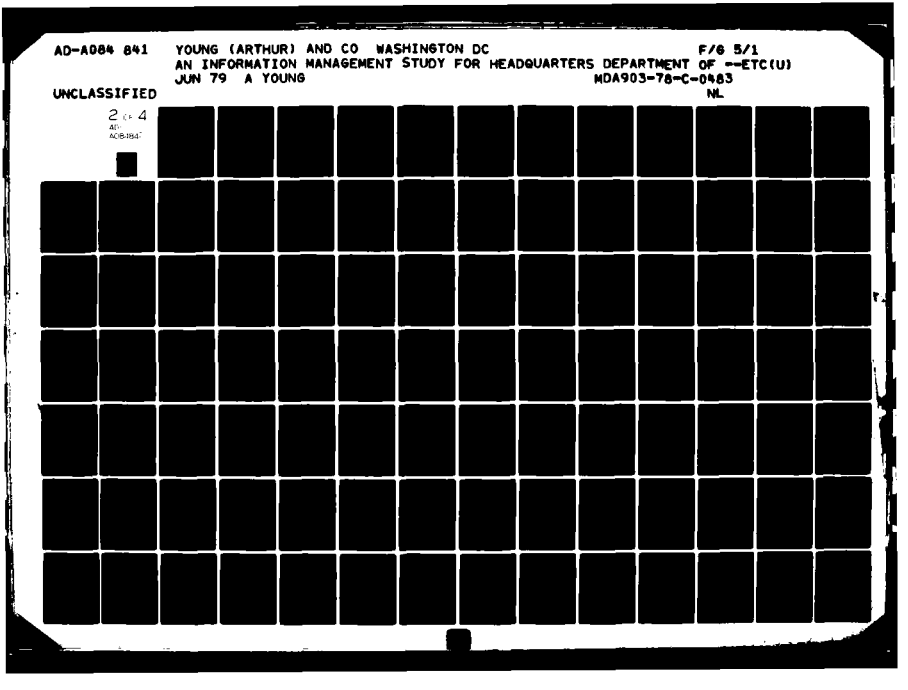

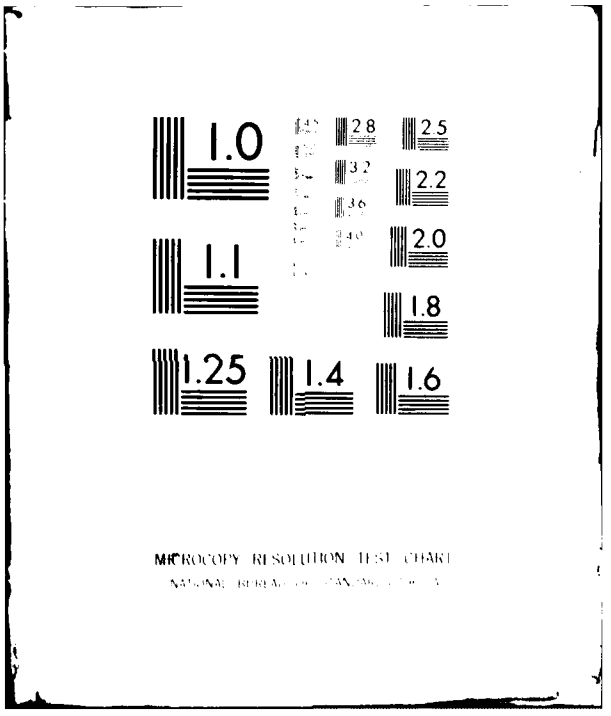
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MICROCOPY RESOLUTION TEST CHART

TAG is currently planning to establish a data administration function in the near future, while COA, through USAFAC, is currently trying to define the specific functions of a data administrator. DCSRDA has developed user-oriented courses to acquaint the users with the contents and capabilities of MARDIS and the procurement data bases.

Some efforts have been devoted to the development of data element dictionaries (DED). For example COA, through USAFAC, is currently building a DED for PBAS and JUMPS, while DARCOM maintains a logistics DED for DCSLOG. Although TAG currently does not have a DED, one of the duties of the planned data administrator would be the development of this TAG dictionary.

To summarize, minimal effort is being devoted to the data administration function within the HQDA functional staff organizations. Plans are currently underway to establish or define this function in a few organizations, but primarily at the DPI level. There are a few DEDs in existence, but they tend to be systems oriented.

(4) Technology Assessment

From an information management standpoint, little or no effort is being devoted to the technology assessment function within the HQDA functional staff organizations. The efforts that are being performed in this area reside primarily at the DPI level, but most DPI technology assessment efforts focus on hardware acquisition. For example, DCSRDA, through RDASIA, has developed a ten-year ADP plan but its principal orientation is hardware. In the case of the COA, the USAFAC AMO organization has developed a long-range accounting systems functional plan in an attempt to assess trends in information requirements which may impact USAFAC's ability to fulfill these needs. TAG, at the HQDA level, through the Administrative Systems Steering Committee, is assessing IRM technology as it applies to administrative systems for which TAG has overall DA-wide responsibility. There is some evidence that more emphasis is placed on evaluating technology impacts on Army Standard Systems than on HQDA functional systems.

(5) Quality Assurance

The information management quality assurance function can be divided into two basic components, i.e., quality assurance pertaining to data and information management policy and procedures compliance. The quality assurance of data, such as editing and validation is usually performed at the DPI. But policy and procedures compliance auditing are traditionally performed by a higher level organization.

The data editing function is resident within the various application systems but the overall responsibility for information quality frequently rests with the user of the information or reports. The user must decide whether the information is accurate and contact the DPI if it is not, so corrections or explanations can be made.

Both USAFAC and MILPERCEN have a data quality assurance program. In fact at USAFAC, it is a dual function, i.e., the Deputy Commander for Automation provides application program quality assurance and the Director for Quality provides data quality assurance as well as quality assurance planning. The MILPERCEN quality assurance function entails the auditing of certain data elements in an attempt to determine their accuracy.

Because there is little evidence of integrated information management policy and procedures, an active audit program has not evolved in this area. The primary reason for including this function in this discussion is to highlight the need for this function at the HQDA staff agency level. Given that the Army does embrace the IRM concept, and policies and procedures are established in this area, the audit activity can supply management with information concerning deviations from established policies, as well as providing an incentive for systems developers to design such policies into their systems since they know this compliance will be periodically checked.

(6) Forms Management

TAGO has overall responsibility for DA-wide forms management. TAG has developed policies and procedures relating to this function and has promulgated this policy through Army regulations. The forms management function for standard, DOD and DA forms, within the HQDA function staff organizations, is performed routinely, in compliance with these regulations.

The management relating to locally developed forms varies by organization. Most of the functional staff organizations manage forms through an administrative office. In fact, DCSOPS has developed locally forms management procedures to avoid duplication of forms within the DCSOPS community. COA has also developed local forms management policy and conducts periodic reviews of locally developed forms to exclude duplication and to review for compatible information.

Although all functional staff organizations provide the forms management function, the primary efforts in the area focus primarily on the form itself rather than the individual data elements within these forms. For example, little effort is devoted to standardization of the data elements contained on forms.

(7) Records Management

The responsibility and authority for overall DA-wide official records management policy and procedures rests with TAG. TAG promulgates this policy and procedures through Army regulations. As in the case of forms management, records management within the functional staff activities is in compliance with these regulations.

Some local effort has been devoted to the records management function within the HQDA functional staff organizations. For example, the DCSOPS has devised a local records management program, managed by the Assistant Executive for Administration. This DCSOPS organization sets local policy on retention and distribution of records within DCSOPS and conducts periodic inspections to determine compliance with policy.

(8) Reports Management

As with the functions of forms and records management, TAG has Army-wide authority and responsibility for the records management function. TAG executes this responsibility through the Management Information Control System (MICS). The objectives of MICS are to ensure that information requirements and products provide information which is: adequate, accurate, timely, cost efficient, and useful. TAG promulgates policy and procedures relating to reports management via Army regulation. TAG also administers the HQDA-level program.

Compliance with reports management-oriented regulations by the functional staff organizations can best be described as being within the letter of the regulations but not necessarily within the spirit of the regulations. The benefits of MICS are not being fully realized.

By Army-wide policy and direction reviews of local reports management programs are being conducted within the HQDA functional staff organizations and at their supporting DPIs. The DCSOPS Assistant Executive for Manpower, Management and Budget has catalogued all internal DCSOPS reports. Each report is assigned an action officer and all changes to the reports are reviewed by him and the DCSOPS reports register is updated. In accordance with TAG policy, all reports are reviewed periodically to ensure they continue to meet user's need.

COA has also developed a catalog of reports. This catalog is maintained by the Management Support Office. In conjunction with report cataloging, periodic user reviews are conducted to ensure that reports continue to meet the user's need for information. In the case of the DCSLOG Maintenance Reporting Management System, report users can routinely control the reports they receive and the number of copies they receive via a coded

card system. The DCSLOG is attempting to install an "only as required" basis for most report generations.

3. SUMMARY OF ISSUES AND OBSERVATIONS

The remainder of this chapter will sumamarize the key issues and observations relating to information resource management when viewed from the HQDA Staff perspective.

(1) Findings

- The AMO/ISO are important elements in the information management process.

  The extent to which information management functions are being performed in the HQDA staff is directly dependent on the degree to which the AMO/ISO concept has been implemented.

- The current approach to information systems planning varies by organization.

  The performance of the information systems planning function ranges from a centralized to a decentralized approach across the staff agencies.

- Little effort has been devoted to data standardization at the HQDA staff level.

  In some cases, the data standardization function has been delegated to a supporting activity. But in some staff organizations it is simply assumed that the DPI is performing this function.

- Data administration is generally not performed at the HQDA functional staff agency level.

  A few aspects of the data administration function are being performed by the various staff agencies or performance of this function is being planned. In some instances, the supporting DPI's are performing some aspects of this function.

- Minimal effort is being devoted to the technology assessment function.

  Most AMOs are familiar with the technology assessment function, and are aware of current IRM technology. However, the relationships of this function to information management are not well defined and consequently have had little influence on actual information management.

- The staff agencies comply with the forms, records, and reports management of TAGO.

  The actual approach to and emphasis on forms, records and reports management varies by organization but generally is in compliance with Army regulations.

- There is no consensus on a feasible organization for information resource management.

  The staff generally agrees that the Army needs to improve its information management, but there is no widespread agreement on how to meet that objective organizationally.

- There will be competing demands for resources to establish an IRM program.

  The authorized strength of the Army Staff is declining so that new programs must be carefully scrutinized before they are allocated resources.

- There is not widespread understanding of the IRM concept.

  HQDA staff are generally not used to thinking about information as a resource of the organization.

(2) Impacts

- The AMO/ISO should be considered during IRM implementation.

  Future plans and directions in the information resource management area must be made with full consideration to the experience, successes, and problems of the AMO/ISO staff agency function.

- The current approach to forms, records, and reports management may accommodate some IRM functions.

  Although the specific approach to forms, records and reports management varies by organization, the framework for uniformity exists. Building on this basic framework to perform the forms, records, and reports management function will be less disruptive and less costly than attempting to transplant these functions into another area.

- Education and demonstrated success are key elements to the implementation of an IRM program.

  The success or failure of any attempt to implement an IRM program hinges on the level of commitment to managing information as a HQDA resource. The best approach available to secure widespread acceptance of the IRM concepts is through education and demonstrated success.

VII. HQDA DATA PROCESSING INSTALLATION ENVIRONMENT

The HQDA command and functional staff are provided automated data processing support by thirteen (13) geographically dispersed DPIs. During Phase I of this study, all thirteen DPIs were visited to obtain an overview of the current HQDA DPI operating environment. Selected DPI personnel were interviewed to assess the current status of information management activities at the DPIs. In addition, the study teams conducted on-site follow-up reviews of the fourteen major systems selected for review during this study (described earlier in Chapter VIII).

The combination of site reviews, system reviews, and interviews has enabled the study team to formulate a consolidated overview of the HQDA DPIs and has given representatives from each of the DPIs an opportunity to comment on or participate in the study effort. Summaries of the DPI operating environment are presented below under the topics:

- DPI Hardware and Software Environment
- Systems and Applications Environment
- Status of Information Management Programs at HQDA DPIs, and
- Summary of Study Findings and Impacts.

Each DPI was visited and reviewed to determine how its current operating environment characteristics might impact information management. The objective of the reviews was to determine which information management activities were currently being performed by the DPIs. The study team was interested in determining what impact the current hardware and software environments had upon the effectiveness of DPI efforts to implement the information resource management related functions.

A listing of the DPIs visited is presented in Exhibit VII-1, which follows this page. An overview of the HQDA DPI hardware and software capabilities is presented in the section which follows.

1. DPI HARDWARE AND SOFTWARE ENVIRONMENT

Each of the DPIs has developed and evolved independently and grown in size and capacity based upon the level of support it was authorized to provide its functional proponent. As might be expected, the resources committed to data processing support by any individual DPI varies widely due to differences in missions, organizational functions, the nature and volume of data processed, etc. Likewise, the level of data processing technology for hardware and software installed at any DPI is based upon past ADP planning processes; the definition,

HQDA Information Management Study
DPI Participants

DA STAFF ORGANIZATION	DPI ACRONYM	DATA PROCESSING INSTALLATION IDENTIFICATION	DATES VISITED
CSA	USAMSSA	U.S. ARMY MANAGEMENT SYSTEMS SUPPORT AGENCY	DECEMBER 18-19, 1978
CSA	OTEA	OPERATIONAL TEST AND EVALUATION AGENCY	APRIL 24, 1979
COA	USAFAC	U.S. ARMY FINANCE AND ACCOUNTING CENTER	JANUARY 31 – FEBRUARY 1
COE	EDPC	ENGINEER DATA PROCESSING CENTER	FEBRUARY 23
DCSLOG	USALEA	U.S. ARMY LOGISTICS EVALUATION AGENCY	MARCH 7-8
DCSPER	MILPERCEN	U.S. ARMY MILITARY PERSONNEL CENTER	JANUARY 22-23
DCSPER	USAREC	U.S. ARMY RECRUITING COMMAND	FEBRUARY 6-7
DCSPER	ARIBSS	ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES	MAY 4
DCSOPS	CCSA	COMMAND AND CONTROL SUPPORT AGENCY	FEBRUARY 8-9
DCSOPS	CAA	CONCEPTS ANALYSIS AGENCY	FEBRUARY 13-14
DCSRDA	RDAISA	RESEARCH, DEVELOPMENT, AND ACQUISITION INFORMATION SYSTEMS AGENCY	FEBRUARY 14-15
NGB	NGCC	NATIONAL GUARD COMPUTER CENTER	APRIL 24
TAG	RCPAC	RESERVE COMPONENTS PERSONNEL AND ADMINISTRATION CENTER	JANUARY 31 – FEBRUARY 1

justification, and approval of requirements; and the levels of funding allocated to procure and install varying types of hardware equipment and software programs. Summaries of the DPI environment are discussed below under the topics:

- Hardware Environment
- Software Environment
- Telecommunications Environment.

(1) Hardware Environment

Exhibit VII-2 presents a breakout of the major computer mainframes currently installed at the HQDA DPIs. Also indicated are planned upgrades where identified by a DPI. The chart illustrates the wide variety of installed computer mainframe equipment which represents several generations of computer hardware. Differences in vendors, as well as differences in models within any vendor product line, are evident.

The variety of DPI mainframe equipment and its inherent range of technological features directly influences the degree to which the DPIs can, collectively, implement a HQDA information resource management program. For example, the degree to which the DPIs can standardize on equipment is influenced by the regulations governing the equipment procurement process. The regulatory process limits the DPIs' ability to select equipment of preference. Several DPIs have identified the need to upgrade their hardware (such as, USALEA, USAREC and USAFAC). However, the type of equipment approved is subject to the competitive procurement process or the equipment re-distribution process, and as a result, the type equipment to be received is not always predictable or known. The National Guard Bureau (NGB) has initiated the procurement process to replace its field IBM 1401 computers with state-of-the-art minicomputers. The NGB, however, is also dependent on the competitive bid process and must await the selection of equipment prior to making decisions regarding applications and software. In a related way, the Army has not standardized on data base software because of the diversity of hardware, i.e., certain commercial DBMS will not run on current DPI hardware. However, the Army has taken steps to address this problem and is in the process of developing requirements for standard DBMS.

Because of these factors, standardizing on hardware may not be a feasible approach for HQDA to take, initially, to facilitate information sharing. The option to standardize on hardware could only be exercised if a consolidated and coordinated major procurement were planned and approved. Therefore, the economies resulting from the installation of common hardware may not be fully realized. However, hardware standardization alone does not

HQDA DPI Hardware Summary

MAINFRAME TYPE	NUMBER OF MAINFRAMES												
DPI	EDPC	USALEA	MILPERCEN	USAREC	USAFAC	NGB	ARIBSS	RCPAC	CCSA	CAA	RDAISA	USAMSSA	OTEA
CDC 3300					2		1						
HONEYWELL L66/20	1												
HONEYWELL G437	2												
HONEWELL 6000									2				
IBM 7094 MODEL II		1											
IBM 1401		1											
IBM 360/40												1	
IBM 360/50								1					
IBM 360/65						1		1					
IBM 370/165 MODEL II												1	
IBM 370/155		*											
IBM 3033												1	
UNIVAC 494					5								
UNIVAC 3301								1					
UNIVAC 1108			13	2						1	2		
UNIVAC 1182					*								
COMMERCIAL TIMESHARING	X		X				X					X	X

* Planned Upgrade

address many of the problems of managing information in a distributed environment as discussed in this report.

Several DPIs have installed third generation mainframes whose inherent design capabilities provide the DPIs greater flexibility for applying information management techniques. It is easier for DPIs with newer equipment to implement more software aids (data dictionaries, directories and Data Base Management Systems) due to hardware architectural design and available technological features. User demands have established the trend toward more on-line access, which DPI managers have perceived as inevitable.

Conversely, several DPIs have reached a point in their evolutionary development in which theircurrent configurations inhibit their ability to fully satisfy their user communities. However, they must address user community pressure for additional service. They, too, are aware of the trends developing and acknowledge that a transition to newer equipment is imminent. These DPIs are in the process of identifying their future requirements and some have already initiated the administrative procurement procedures to acquire the next hardware replacements.

The nature of the current HQDA DPI hardware environment places some constraints on the development of a HQDA-wide information resource management program. Standard hardware and software will continue to be investigated by the Army, but, in all likelihood, current procurement policies and regulations will continue to constrain hardware (and, therefore, software) standardization for the foreseeable future. The diversity of system capabilities at the various DPIs will also constrain the type and sophistication of IRM software tools which can be installed at each DPI.

The impact of the diverse hardware environment upon a HQDA initiative to implement an information resource management program is significant. An evolutionary approach to implementation will be required, and support of the IRM program should be considered as individual hardware upgrades occur. The diverse hardware environment reinforces the need for a comprehensive managerial program. Technical approaches alone will not provide a solution.

(2) Software Environment

Given the nature of the diverse hardware environment, the study team identified that an even wider diversity of operating system software, locally developed specialized software, and commercial software packages are installed for use at the DPIs. A partial inventory of software currently installed is summarized in Exhibit VII-3. The summary is intended to be representative in nature, and does not attempt to identify every software package owned, leased, or used by the DPIs.

HQDA DPI Software Examples

A/O May 23, 1979

OPERATING SYSTEMS	TELEPROCESSING MONITORS	DATA BASE MANAGEMENT SYSTEMS	RETRIEVAL SOFTWARE	TIMESHARING SYSTEMS	DATA DICTIONARY/ DIRECTORY
OS 1100 GCOS RSX -- 11M OS EXEC - 8 HISI CQE MASTER 4 OMEGA DOS	ENVIRON/1 ROSCOE WIN TSO CICS	DMS 1100 TOTAL SYSTEM 2000 IDS NOMAD FOCUS WWDMS GIM II	FINDER SCORE ASKIT MIRADS ASI-ST	TYMESHARE INFONET NCSS BOEING GRUMMAN BATTELLE UCC EDGEWOOD ARSENAL	HAS/STADES DATA MANAGER

EXHIBIT VII-3

Bearing in mind this study addresses information management, the discussion will focus on DBMS software. The diversity of software indicates that the DPIs have not been able to standardize on common DBMS software on a HQDA-wide basis. As a result, the DPIs have begun to support and maintain a wide variety of DBMS software. In failing to standardize on DBMS software, some economies that might be achieved due to centralized maintenance or maintenance of single vendor software are not realized. In the current HQDA DPI environment each DPI must train and maintain the staff required to support this wide diversity of software. This situation is perpetuated even as the DPIs move forward towards installing DBMS software. Seven different DBMS packages have been identified for the seven DPIs currently implementing DBMS capabilities. Two DPI managers (at USAREC AND RCPAC) indicated they currently experience staff shortages of required personnel, or shortages of assigned personnel with the essential data base software skills required to support the DBMS implementation efforts.

To make the situation even more complicated, DPIs within one functional area, as well as DPIs supporting closely related functions, have not standardized completely on software (or hardware). Their ability to share and/or exchange data using automated techniques is severely restricted due to both hardware and software incompatibilities. For example, within the personnel community, MILPERCEN utilizes UNIVAC 1108 hardware and the System 2000 DBMS; USAREC utilizes UNIVAC 1108 hardware and the System 2000 DBMS; but, RCPAC utilizes IBM 360-65 hardware with the Total DBMS. The NGCC, which exchanges reserve component personnel data with RCPAC, utilizes IBM 360-65 hardware but does not have a DBMS, as yet.

As one would expect, in an environment as diversified in capability and as large as that of the HQDA DPIs, the range of service and support the DPIs can provide their functional proponents or related functional areas varies significantly. Some DPIs are still very much batch and remote batch oriented, some have installed multiprogramming and multiprocessing capabilities, while the more advanced DPIs have developed on-line, interactive systems employing large functional data bases.

The management of certain DPIs, such as USALEA, USAFAC and ARIBSS, indicated their ability to provide enhanced automated data processing services is currently restricted, or will be in the near future, because of their inability to install software aids such as DBMS or data dictionaries.

In a more positive sense, the study team found that several DPIs (USAMSSA, EDPC, RDAISA, CCSA, USAREC) have made significant evolutionary progress to enhanced operating environments that have brought them closer to the state of the art in data processing. The majority of DPIs have selected data base

management software systems and are currently at different stages of actual implementation in the systems life cycle sense. Some DPIs are evaluating DBMS software for selection; some have selected the DBMS software and are designing and installing the capability; others are in the process of building or loading the data base; and, several have completed the installation phase and currently support operational data bases. Only in rare instances have DPIs developed what the industry would describe as a totally integrated data base.

By providing these advanced capabilities, the DPIs have been able to render higher levels of service to their user organizations, and thus bring data to decision makers more efficiently. However, this does not necessarily imply more effective information is produced. Other factors such as quality of data, proper identification of requirements, etc., would contribute to the value of the information.

The software aids that support an IRM concept can create positive and negative impacts on the organization. From a positive viewpoint the objectives of installing these software aids are to provide:

- Greater flexibility for the user through interactive query and report generator software
- Enhanced data independence through data base software, thereby improving the potential for data sharing and increasing the flexibility of application systems
- Improved management and control over data through data dictionary and directory software.

There are, however, negative aspects as well. DPIs with limited hardware capability cannot readily install commercially developed aids for various technical reasons. Internal development of similar aids may be uneconomical or infeasible because hardware upgrades are imminent.

While these packages can provide the individual data management support needed by each DPI, the variety of systems will pose some problems in the future. Because the DBMS structure their data bases differently, data sharing among the DPIs will not be easy. Direct access to data bases at other DPIs with different software packages will require significant technological developments. More likely, the individual DPIs will continue to exercise control over access to their data bases by making available specific releases of data bases or generating periodic magnetic tape files and hard-copy reports.

One objective of an IRM approach is to curb the proliferation of DBMS by avoiding local optimization and by standardizing on

DBMSs, if feasible. This may not be completely feasible for HQDA, but some limitation should be established to curb excessive proliferation. While the selection of a single DBMS may be both inappropriate and infeasible, a policy recommending selected DBMSs based on hardware considerations may be warranted, thus limiting a particular choice of DBMS for a line of vendor equipment. Currently, no central policy has been established to provide Army-wide guidance in such matters.

(3) Telecommunications Environment

In reviewing DPI telecommunications capabilities the objectives of the study team were to determine the degree to which the DPIs can share data from two basic perspectives:

- Horizontally, across functional boundaries, especially at the DPI and HQDA level
- Vertically, through organizational boundaries within and beyond the functional area.

The reviews of the DPIs indicated that the HQDA DPIs have not collectively developed, nor have they been directed to develop, an integrated and cohesive telecommunication capability that takes advantage of current technology and that fully supports the current information needs of the HQDA staff.

Viewing each DPI independently, the study team found that each DPI has developed its current telecommunication capabilities, to satisfy its local needs. Many have developed capabilities to facilitate the access and retrieval of data. The capabilities, for the most part, are directly related to functional activities, with little or no inter-functional support provided. One DPI, USAREC, in support of MEPCOM, is conducting a field test in which several terminals, model UT400, have been installed. The newer terminals provide the users the capabilities to edit data at the source of entry, temporarily store data for future transmission, and generally assure higher validity of source data, etc., which supports the Command's internal effort to improve its information management posture. Once the prototype test is completed a procurement will be initiated to complete a MEPCOM-wide installation of the tested terminals to upgrade the entire AFEES system.

Viewing the DPIs collectively, the study team found that a nearly identical philosophy for telecommunications has been adopted in satisfying the requirements for the transfer of data between DPIs. Where the requirement to share data between one or more DPIs has been identified, the DPIs involved have worked out an approach for sharing data acceptable to each party. In many cases this is a less than desirable solution because of the operational implications. A DPI capable of utilizing automated

interface techniques cannot effectively implement the automated interface with a DPI that does not possess the same capability. Therefore, the use of punched cards and mailed magnetic tapes occurs. In many instances, the receiving DPI cannot utilize the exchanged data until the data undergoes some transformation process such as conversion or reformatting. Technical considerations aside, one DPI (ARIBSS) indicated it must often overcome problems related to sensitivity or confidentiality of data (related to privacy more so than security) before it can obtain data from another HQDA DPI and eventually prepare it for re-utilization.

Analysis of the data collected supports the conclusion that the collective DPI level of development of telecommunications capabilities is still in the very early stages of growth. There is, as yet, a very heavy use of punched card, and magnetic tape exchanges. There is evidence that data transfer is accomplished in some areas through the use of Autodin, dial-up and dedicated communications lines. An even higher level of data transfer is evident in the WWMCCS system where CCSA is linked with other participants in the WWMCCS Intercomputer Network (WIN). The trends indicate there is an increased demand for improved telecommunications.

Some DPIs (for example, USAFAC, OTEA, AND ARIBSS) have expanded their computing environment to include contractor-supplied timesharing services. We did not collect data on the extent of use of such commercial facilities in HQDA, but the trend for increased use of external computing resources is apparent. This trend indicates that further problems of incompatability and data sharing can be expected as the variety of commercial services used by HQDA increases. HQDA will have to address the proliferation of applications run on commercial systems and establish policies (and perhaps standards) with regard to the management of information stored on these facilities.

2. APPLICATIONS ENVIRONMENT

During the DPI reviews the individuals tasked with providing user support were interviewed to obtain an overview of each DPI's major application systems inventory. The DPI approaches to application systems management were discussed to ascertain how the individual DPIs design, develop, and maintain systems in the process of satisfying user requirements. The reviews were not solely limited to the user support provided to the DPI functional proponent, but included analysis of DPI activity required to support other functional staff organizations. The interrelationships are extremely complex because the DPIs share, exchange and distribute their data with many entities within and beyond their functional proponent organizations.

Summarizations of the findings made at each of the DPIs related to the applications environment are discussed in the sections titled:

- Inventory of Major Application Systems
- Summary of Application System Management Approaches
- Analysis of Current DPI Activity.

(1) Partial Inventory of Major Application Systems

One objective of the study team was to ascertain the nature, amount and complexity of application systems currently run at the DPIs and to determine how they interrelate to support the functions of the HQDA staff. Another objective of the study was to assess how the systems manage the information they collect, process and distribute. Preliminary inquiries revealed that many of the DPIs, in characterizing their major systems and applications, tended to label groups of related applications programs as one application or system. By doing so the scope and breadth of activity or types of data processed actually performed by the DPI is unintentionally masked. To appropriately reflect the primary data processed at the DPIs, the major systems applications were identified for comparative purposes. The DPI application inventories were consolidated to highlight the major functions, types of data processed and important similarities and differences. Exhibit VII-4 page presents, for each DPI, the major HQDA staff functions supported, the types of data processed, and the major system name to provide an overview of the HQDA-wide applications inventory.

Viewing the inventory summary collectively, some of the predominant similarities, as well as specific uniquenesses of data processed are evident. Several DPIs process personnel data in one form or another to support force structure and personnel accounting; i.e., DCSOPS/USAMSSA for manpower authorization data; DCSPER/MILPERCEN and DCSPER/USAREC for active force strength data; and, TAG/RCPAC and NGB/NGCC for reserve component strength data. Several DPIs process data to perform officer career management, i.e., MILPERCEN, RCPAC, EDPC and the NGCC. Nearly all DPIs process budget data. These commonly processed types of data supporting similar functions establish many of the requirements for data sharing between two or more functional areas.

The chart further demonstrates that many unique data processing requirements exist for which there may be a low requirement to share data internally within HQDA, but a higher requirement to share the data externally, i.e., water quality data for EDPC; equipment field test data for OTEA; and behavioral and social science research data for ARIBSS.

The nature of the systems identified provides a sample of the type and nature of data processed by the HQDA DPIs. It demonstrates the current high potential for data sharing within and beyond HQDA. Feedback from DPI managers indicates the demands

Partial Inventory of Major Applications Systems by DPI

DPI	RESPONSIBLE STAFF AGENCY	FUNCTIONS SUPPORTED	TYPE OF DATA PROCESSED	SYSTEM TITLE
EDPC	OCE	Finance and Accounting Personnel Administration Resource Allocation Project Management Construction Facilities Maintenance	Water Quality Personnel Resources Facilities Mgmt. Engineering	COEMIS OCE Career Management System Civil Works Information System FS Contractor Supported
USALEA	DCSLOG	Contingency Planning Readiness Planning Distribution of Equipment Supply Transportation Maintenance	Personnel Strengths Equipment Authorizations Employment Locations Activities Manpower Utilization Project Status Work Force Scheduling	Simulation and Gaming Methods for Analysis of Logistics LEA Management Information System Logistics Network
MILPERCEN	DCSPER	Personnel Procurement Personnel Training Personnel Distribution Personnel Sustainment Personnel Separation Strength Accounting Career Management Mobilization Planning	Force Structure Personnel School Reservations	Officer Master File Enlisted Master File PERSACS Civilian Personnel Information System
USAREC	DCSPER	Personnel Procurement Recruiting Management Advertising Market Analysis Production Management Force Management Records Management	Health/Test Data Recruiting Quotas Accessions Personnel	Armed Forces Entrance and Examining Station Reporting System USAREC Data Base
USAFAC	COA	Finance and Accounting Payroll Budgeting	Personnel Budget Expenditures Pay	Joint Uniform Military Pay System Program Budget and Accounting System
RCPAC	TAG	Personnel Management Records Management Personnel Training Mobilization	Personnel Force Records Location Mobilization	Reserve Personnel Information Reporting System The Standard Installation/Division Personnel System - USAR The Individual Reserve Personnel Information System
DCSA	DCSOPS	Contingency Planning Mobilization Deployment Readiness Management	Nuclear Detonation Unit Effectiveness Force Status Readiness Location Data Contingency	Joint Operations Planning System Unit Identification/Force Status and Identity Reporting System Army Residual Capability Assessment System
DAA	DCSOPS	Readiness Force Structuring Development of Doctrine, Organizations and Material Requirements Maintain Rapid Response Capability	Battle Model Locations Authorizations	Combat Simulators Force Structuring Models Combat Support Mobility Models Readiness Indicator Model
RDAISA	DCSRDA	Material Procurement Management Emergency Support RDAC	Capital Expenditures RDTE Procurements Schedules Performance	Standard Army Research Development and Acquisition System Modernized Army Research and Development Information System Research, Development, and Acquisition Committee Support System
USAMSSA	ACSAC	Reports Control Program/Budget Force Composition	Location Data Force Structure Budget Reports	Force Development Integrated Management System Program Optimization and Budget Evaluation System Army Reports Control System SIOPERS SALES
NGCC	NGB	ARNG Mobilization Support State ARNG Support Finance and Accounting Personnel Management Logistics Command and Control Pay of Personnel	Personnel Budgeting Financial Force Pay	Standard Installation/Division Personnel System - NG VTAADS - NG Force Status - NG Standard Financial System - NG JUMPS - NG
OTEA	CSA	Operational Testing	Operational Test Data	Unique Data Bases Designed for Each Piece of Material Under Evaluation
ARIBSS	DCSPER	Behavioral Science Research	Behavioral Survey Experimental Research	No Management Reporting on a Recurring Basis. Each Experiment is Unique

for data are rising rapidly and that the requirements to share data are continually increasing. A mechanism for measuring and evaluating the impact of such new data requirements currently does not exist and should be considered in the development of an information resource management program. Obstacles to sharing the data efficiently have been identified (based on hardware, software and applications incompatibilities) which can only be overcome through coordinated planning.

(2) Summary of Application Systems Management Approaches

Using AR 18-1 as a basis, the DPI reviews were designed to investigate the roles of the DPIs in systems development; how the DPIs are currently organized to support their functional proponents and maintain systems in the AMIS life-cycle environment; and what, if any, organizational changes are occurring to include or incorporate information resource management functions. Each is discussed below.

The Role of the DPIs in Systems Development

In reviewing the systems management approaches which the individual DPIs follow, it was determined that throughout the DPI community each performs one or more of several common roles which are listed below and described in the paragraphs which follow:

- The DPI serves as the central design agency for its functional area
- The DPI designs, develops and maintains functionally unique systems run at that DPI only
- The DPI designs systems which later may be adopted as Army standard information systems (to be developed and maintained by Computer Systems Command), which are run at Army-wide DPIs throughout the world.

Several DPIs indicated they have been designated as central design agencies for their respective functional areas: the NGCC for the National Guard Bureau; USAFAC, for the Comptroller of the Army; and, EDPC, for the Corps of Engineers. Within the Comptroller area, the USAFAC DPI has adopted a centralized approach related to information systems. The systems which are developed are run at USAFAC and also at selected locations throughout the Army. They are not categorized as standard systems, since they are not run at all Army DPIs. The EDPC performs an identical role for the Office of the Chief of Engineers, and, the NGCC functions similarly for the NGB.

For the second role identified above, nearly all the DPIs perform systems analysis, design and development activities to respond to functional user requirements. The nature of the

systems are such that they process functional data, primarily intended for use within the functional area. In most instances, the systems developed are run and maintained at the individual DPI only. Some DPIs (USALEA, OTEA and ARIBSS) currently do limited or no systems development, but do maintain those systems currently operated by the DPI. USALEA is maintaining current systems only and is not developing any major systems; CTEA designs data bases used to facilitate the gathering of test data for Army materiel undergoing test and evaluation; ARIBSS primarily gathers data for specific laboratory research projects, therefore, its computer usage for management information systems reporting to HQDA amounts to only four hours of computer processing per month.

As a result of earlier HQDA attempts to standardize systems wherever possible, several of the DPIs designed standard systems for Army-wide use, e.g., SIDPERS. Under the standardization concept the DPIs supporting the functional proponents designed the systems for Army-wide use, then, transferred the responsibility for system development and maintenance to Computer Systems Command.

Current Organizational Structures of the DPIs

An analysis of how the DPIs are organized to carry out the management responsibilities for new systems, via AR 18-1 guidelines, concluded that the DPIs are organized differently to manage two primary resources: systems and programming support, and data resources. The organizational structures and approaches will be discussed in the paragraphs which follow.

In several DPIs (MILPERCEN, RCPAC, and NGCC), the analysis indicated that the DPI emphasizes support of independent data resources. Within these organizations, the major systems and applications which have been developed were designed to provide direct support in narrowly defined areas. That is, systems demonstrate a single application orientation. To accomplish this task, independent data systems applications and files have been developed. Systems analysts and programmers have been dedicated to develop and maintain those capabilities within defined boundaries.

To avoid the limitations and constraints inherent in an organizational structure which is functionally oriented, several DPIs are organized to consolidate their systems and programming support in order to provide independent users a pool of resources. In this environment the user data resources remain application oriented, yet the systems analysis, and programming capabilities become consolidated to provide an increased level of support.

In the first type of organization, the undesirable feature of the vertical, functional orientaton is that it inhibits cross-functional data sharing. In the second organization, greater

collective knowledge about systems requirements and contents is achieved through the consolidation of the systems analysis and programming resources, thus promoting the concepts of data sharing and systems integration.

Evolving Organizational Structures of the DPIs

Another type of organizational support has evolved recently in some DPIs that incorporates the most advantageous features for both the data resource and systems programming function. In these organizations, the systems and programming staffs have been consolidated, and the data resources have been consolidated or integrated, at least in a partial sense. The system analysis, design and programming support has been reorganized into a central support capability implementing integrated data base systems. In a parallel way, application oriented data files are being replaced by integrated data bases.

A significantly high number of DPI management personnel indicated that their organizational structures have been modified and policies have been formulated to provide the DPIs greater centralized control of the systems management functions. Many stressed they were emphasizing the designation of system proponents, and a concurrent assignment of responsibilities giving the proponent more authority regarding approaches and sign-offs on systems related decisions.

Within HQDA this evolutionary growth is viewed favourably and provides evidence of the growing need for migration towards fully integrated multi-functional data bases rather than non-integrated single function applications. As the technology for implementing these approaches improves, the complexity increases proportionately. The major impact for the HQDA DPIs will be the challenge of effectively managing this constantly changing activity. The IRM concept can provide a logical structure and format for this process.

(3) Analysis of Current DPI Activity

Upon inspection of the automated data processing support provided the HQDA command and staff, the close relationship between any DPI and its functional proponent becomes immediately evident. Each of the functional DPIs is organizationally responsible to its functional proponents. For twelve of the DPIs, there is a one-to-one relationship between the DPI and the functional Staff Agency each supports. The major exception being USAMSSA, which is tasked with supporting HQDA as a whole and is organizationally responsible to the CSA and ACSAC. While USAMSSA's primary proponent is ACSAC, the DPI has a one-to-many relationship with the HQDA Staff Agencies, providing automated support to multiple staff organizations, many of which have identified the need to interrelate and share data.

When the HQDA is viewed from an external source, it appears that the intra-functional concentration is predominant, that is, the functional proponents are closely linked to their supporting DPIs and that data sharing across functional areas is difficult to observe although it is evident. From an outside view the "stove-pipe" effect is easily distinguishable. However, when USAMSSA is viewed independently a perception of data sharing across functional lines becomes apparent. By its charter, the USAMSSA DPI has vested interest in more than one functional area and, therefore, supports systems that cross over functional boundaries.

In effect, USAMSSA is one of the few design activities that provides direct support for the multi-functional staff. In executing this responsibility USAMSSA has been involved in the creation of multi-functional common data bases, data administration efforts, and the design of HQDA management systems.

The study teams reviewed the intra-functional and inter-functional data flows that exist for the DPIs and determined that their operating environments are changing. Requirements exist for the individual functional DPIs to process, exchange and report data within and outside their functional area. The external requirements are increasing, placing higher demands on the DPIs to share data. The nature and complexity of these relationships will be discussed under the topics:

- Intra-functional data flows
- Inter-functional data flows
- Intra/Inter-functional data flow complexity.

A summarization of specific observations related to data flows, exchanges, sharing, etc., will also be presented.

Intra-functional Data Flows

In the first analysis, each DPI was reviewed from its intra-functional perspective. In this way the functional orientation was examined to include the major data processing activities the DPI was engaged in to support its functional proponent(s). This general relationship is graphically represented in Exhibit VII-5, which follows this page. Focusing on the intra-functional flow only, data flows from units in the field (any source below HQDA) to the functional DPI, undergoes some process, and then is made available to the functional proponent on the HQDA staff, and may eventually be passed beyond HQDA to DOD, OMB, Congress and/or other agencies. The graphic, further, represents the nature of the data transmission medium. Inputs from the field may be hardcopy, cards, magnetic tapes or electronic transmissions (Autodin, dial-up or dedicated circuit transmissions, etc.). At the DPI a filtering process occurs and data is made available to

Intra Functional Data Flow
Conceptual Overview

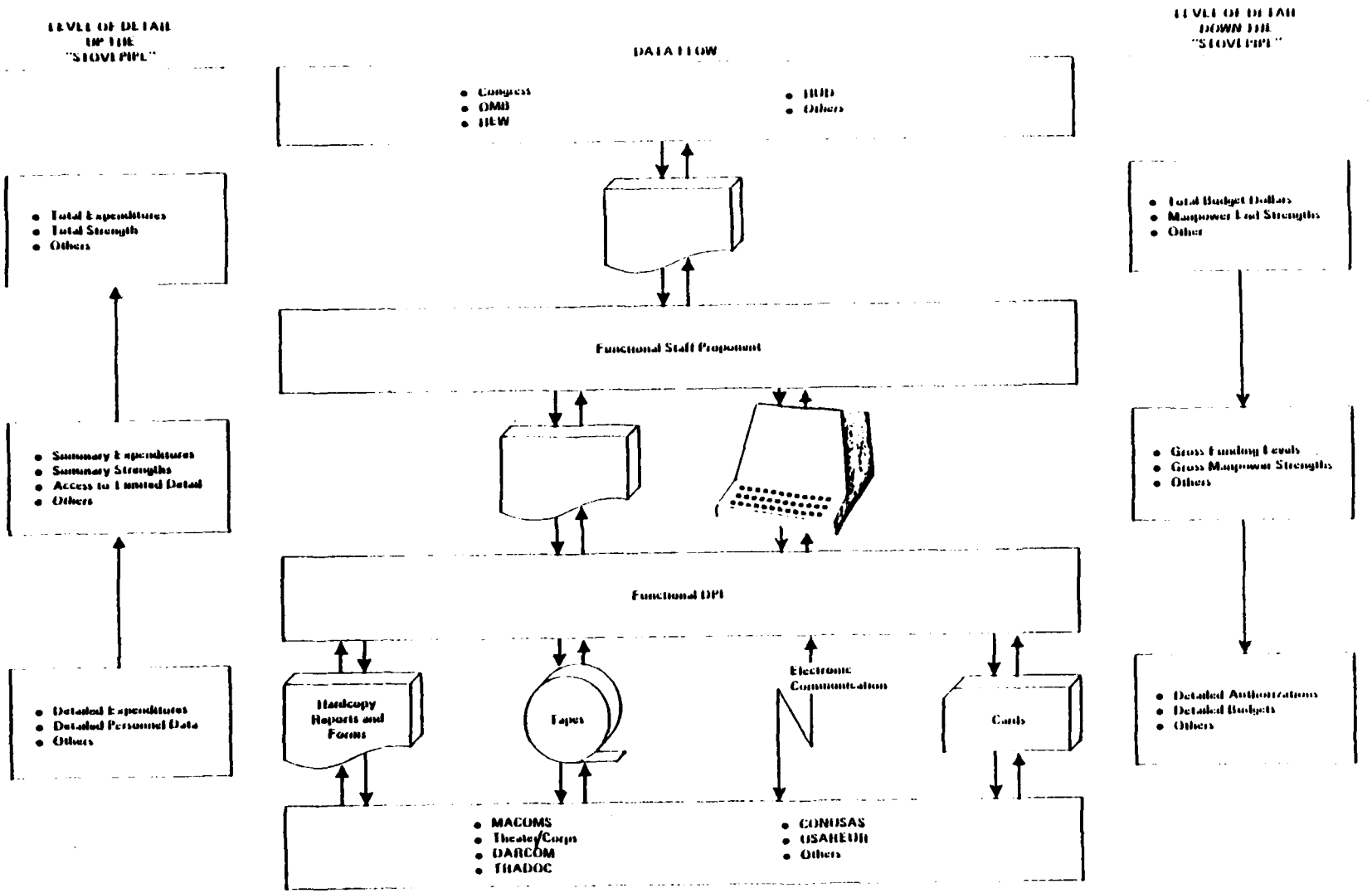


EXHIBIT VII-5

the functional proponent via hardcopy reports, or in some cases, through on-line terminals. Data passed beyond HQDA generally is transmitted via hard copy reports. This functional orientation has been the basis for the existence of the functional DPIs in the past.

Inter-functional Data Flows

In the second analysis, each DPI was reviewed from an inter-functional perspective. The DPI data processing activities were examined to determine the extent to which the DPI functional boundaries were crossed, either to accept inputs or create outputs at varying levels of support. For the inter-functional relationship the study team found that the DPIs receive data in the form of inputs from several levels: upward from the field; laterally from other HQDA DPIs; downward from other HQDA functional staff; and downward from organizations external to HQDA. The same level of data sharing resulted for outputs, i.e., the DPIs created outputs (in variable forms) for all of the corresponding organizational levels. The evidence is strong to support the conclusion that the DPIs are heavily involved in inter-functional activities.

Intra/Inter-functional Data Flow Complexity

In the last analysis, the level of complexity of these inter-functional relationships was examined. It was immediately evident that the combination of levels of inter-functional support for all 13 DPIs was, without doubt, highly complex. A common approach used throughout the study has been to examine samples of activity within the HQDA environment for analysis. The complexity of the inter-functional data relationships that exist in two sample DPIs (CCSA and USAFAC) are demonstrated in Exhibits VII-6 and VII-7 which follow. Exhibit VII-6, on the following page, depicts a majority of the direct and indirect interfaces or relationships that exist for the Command and Control Support Agency (CCSA) automated systems. There are four categories of interfaces; Government Agencies, Department of Defense Activities, Combined and Joint Commands, and U.S. Army Activities. The legend at the top of the Exhibit depicts the type of interface.

The columns indicate the most direct interface with the listed activity receiving input and providing output from CCSA systems. CCSA interfaces with a majority of HQDA DPIs and with almost every HQDA staff agency. Government agencies which are not a member of WWMCCS receive only indirect interface. A majority of all interfaces are directly due to the nature of the Command and Control Reporting System. Also shown are the direct computer-to-computer interfaces established through the WWMCCS Intercomputer Net (WIN). Using WIN and the interconnecting Army terminals throughout the U.S. Army units and overseas, almost every major Army Command and HQDA Staff activity interfaces with CCSA Command and Control Systems.

Interfaces with CCSA Systems

AGENCY	TYPE OF INTERFACE: AUTOMATED — Computer to Computer (With)	COMMAND AND CONTROL — Agency Submits Input to CCSA	COMMAND AND CONTROL — Receives Output from CCSA	COMMAND AND CONTROL — Output Causes an Indirect Interface	COMMAND AND CONTROL — Agency Submits Input to CCSA	COMMAND AND CONTROL — Receives Output from CCSA	OTHER — Output Causes a Indirect Interface
GOVERNMENT AGENCIES							
Department of State							X
Central Intelligence Agency							X
United Nations							X
U.S. Coast Guard							X
Federal Aviation Administration							X
National Security Agency		X	X		X	X	
DOD ACTIVITIES							
HQ, Department of the Navy		X	X		X	X	
HQ, Department of the Air Force		X	X		X	X	
HQ, U.S. Marine Corps		X	X		X	X	
National Military Command Center	X	X	X		X	X	
Alternate NMCC	X	X	X		X	X	
Defense Communications Agency	X	X	X		X	X	
Defense Intelligence Agency		X	X		X	X	
Defense Mapping Agency		X	X		X	X	
Defense Nuclear Agency		X	X		X	X	
Defense Security Assistance Agency		X	X		X	X	
Military Traffic Management Command		X	X		X	X	
COMBINED AND JOINT COMMANDS							
U.S. Atlantic Command	X	X	X		X	X	
North American Air Defense Command		X	X		X	X	
U.S. European Command		X	X		X	X	
U.S. Southern Command		X	X		X	X	
U.S. Pacific Command		X	X		X	X	
Strategic Air Command (USAF)		X	X		X	X	
U.S. Readiness Command	X	X	X		X	X	
Military Air Lift Command	X	X	X		X	X	
U.S. ARMY ACTIVITIES							
U.S. Army Europe		X	X		X	X	
U.S. Army Forces Command		X	X		X	X	
U.S. Army Communications Command		X	X		X	X	
DARCOM		X	X		X	X	
Eighth U.S. Army		X	X		X	X	
U.S. Army Japan		X	X		X	X	
TRADOC		X	X		X	X	
U.S. Army Health Services Command		X	X	X	X	X	
Military District of Washington		X	X	X	X	X	
NGB		X	X		X	X	
USALEA		X	X		X	X	
RCPAC		X	X		X	X	
MILPERCEN		X	X		X	X	
USAMSSA		X	X		X	X	
USACSC		X	X		X	X	
RDAISA		X	X		X	X	
CAA		X	X	X	X	X	X
USAREC		X	X		X	X	
USAMMC			X	X		X	X
U.S. Army War College		X	X		X	X	
Intelligence Command		X	X		X	X	
U.S. Army Operations Center		X	X		X	X	
DCSOPS Activities		X	X		X	X	
DCSLOG		X	X		X	X	
Depot Systems Command		X	X		X	X	
TAG		X	X		X	X	
U.S. Army Logistics Center		X	X		X	X	
U.S. Army INSCOM			X	X		X	X

EXHIBIT VII-7

Interfaces with USAFAC Automated Systems

AGENCY	TYPE OF INTERFACE: JUMPS — Agency Submits Input to USAFAC	JUMPS — Agency Receives Output from USAFAC	JUMPS — Output Causes an Indirect Interface	ACCOUNTING — Agency Submits Input to USAFAC	ACCOUNTING — Agency Receives Output from USAFAC	ACCOUNTING — Output Causes an Indirect Interface	OTHER — Agency Submits Input to USAFAC	OTHER — Agency Receives Output from USAFAC	OTHER — Output Causes an Indirect Interface
NON-GOVERNMENTAL									
Financial Institutions		X	X						
Vendors							X		X
Dependents		X	X						
Transportation Carriers							X		X
GOVERNMENTAL (NON-DOD)									
General Accounting Office	X	X	X		X	X			
General Services Administration				X			X	X	X
Internal Revenue Service	X	X			X		X	X	
Veterans Administration	X	X			X				
Social Security Administration	X	X			X				
Civil Service Commission	X	X			X				
U.S. Treasury Department		X	X	X	X			X	
Department of Labor				X	X		X	X	
Department of Health, Education, and Welfare				X	X				
Office of Management and Budget					X				
Executive Office of the President	X								
Congress	X				X				
U.S. Coast Guard					X		X	X	
Department of State				X					
Agency for International Development				X					
Federal Reserve Banks		X							
Congress				X	X				
DEPARTMENT OF DEFENSE (NON-ARMY)									
Department of the Air Force	X			X	X		X	X	
Department of the Navy	X			X	X		X	X	
Defense Logistics Agency				X	X		X	X	
Defense Contract Administration				X	X		X	X	
Military Airlift Command				X			X	X	
Military Sealift Command				X			X	X	
Military Traffic Management Command				X			X	X	
Office of the Secretary of Defense				X	X		X	X	
Defense Preparedness Agency				X	X		X	X	
Marine Corps	X			X	X		X	X	
Defense Contract Audit Agency					X				
Army Board for Correction of Military Records	X								
Defense Supply Agency				X	X		X	X	
DEPARTMENT OF THE ARMY									
Office of the Secretary of the Army					X				
DA Staff Appropriation Directors				X	X				
DA Staff Program Directors				X	X				
Other DA Staff Elements				X	X		X	X	
MILPERCEN	X	X							
USAREC	X	X		X	X				
MACOMS				X	X			X	
Major Army Subordinate Commands				X	X			X	
Accounts Offices				X	X				
CONUS Finance and Accounting Offices (FAOs)	X	X		X	X		X	X	
Non-integrated Disbursing Offices	X	X		X	X				
Overseas Integrated FAOs	X	X		X	X		X	X	
Class B Agent Finance Offices	X	X							
Reserve Component Input Stations	X								
Reserve Component Units		X							
Retired Service Members	X	X							
Retired Annuitants	X	X							
Minimum Income Widows	X	X							
Active Army Service Personnel		X							
Reserve Component Personnel		X							
Military Dependents		X							
Installation Transportation Office							X	X	
Civilian Payroll Offices				X					
Internal USAFAC Operations	X	X		X	X		X	X	

Exhibit VII-7 on the following page, depicts a majority of the direct interfaces with USAFAC Automated Systems. There are basically five categories of interfaces; Non-Governmental, States and Territories, Governmental (Non-DOD), DOD (Non-Army) and Army. The legend at the top of the Exhibit depicts the nature of the interface by each type of system - Payroll (JUMPS), Accounting, or other.

The columns indicate the most direct interfaces with the listed activity providing both input to and receiving output from USAFAC systems. In the governmental area, the nature of this relationship is primarily in the use of payroll data and accounting data for statutory reporting requirements.

USAFAC has a great number of DOD (non-Army) interfaces primarily in the Accounting and Tranportation area. These interfaces are generally transactions for other DOD agencies, in the case of the accounting interface, and payments for movement of goods, in the case of transportation interface. It should be noted that there are limited payroll interfaces at the DOD level.

The Army interfaces to USAFAC are the most predominant. These interfaces are primarily in the area of payroll information and accounting transactions. Exhibit VII-7 depicts the nature of these interfaces with each major Army activity. One direct interrelationship of data noted during the DPI review process was between personnel and payroll. These activities use similar data elements such as date of service, promotions, separations, etc. The Army has tried in the recent past to collect both payroll and personnel data at one point in a consolidated operation. The project was never implemented, but served to demonstrate the close interrelationship between payroll and personnel functions.

The two foregoing examples demonstrate the high level of complexity related to data for CCSA and USAFAC. Supporting data collected for the remaining DPIs indicates that the environment is as complex for many of the other DPIs as well.

As might be expected, these numerous interfaces and data sharing requirements are not all satisfied via automated interfaces. Many methods of data sharing technology are utilized, ranging from the least sophisticated (hard copy) to the most sophisticated (intercomputer transmissions). As stated earlier the DPIs have coordinated each interface requirement as the requirement emerged and satisfied each within the constraints of the least sophisticated participant.

The DPIs reported a wide variety of problems that exist which must be worked out. These problems are associated with the HQDA DPI community's inability to employ the more recent technological capabilities due to hardware limitations and in many cases are due to the use of non-standard data elements and

codes, making systems interfaces impossible due to incompatibilities. Data conversions and special handling and processing are often required to make exchanged data reusable.

In this section the topics discussed have focused on several aspects of the HQDA applications environment: a summary inventory of the HQDA applications systems; a summary of application system management approaches; and, a summary of DPI activity required to support the HQDA staff organizations. The discussions have demonstrated the high level of complexity that exists relative to information management and information systems at the HQDA level. The subjects presented allow the reader to visualize a small portion of data processing activity but in reality the total applications environment is hidden from view by the current scope, magnitude and complexity of all operational systems. The need to control and manage this every increasing complexity is continually reinforced.

3. STATUS OF INFORMATION MANAGEMENT PROGRAMS AT DPIs

Earlier in Chapter III of this report, a concept for a comprehensive information resource management program was presented. Within such a comprehensive program several major functions have been identified that ideally must be performed at various levels for the program to be effective, e.g., IRM policy, education, data standardization, data administration, metadata management, forms management, etc. Some aspects of the IRM functions were discussed in Chapter III, previously.

More detailed discussions of all the functions identified are presented in Chapter X. Using the entities described for the comprehensive IRM program as an ideal model, the DPIs were reviewed to determine which of the functions they were performing (and to what extent) and to determine whether an IRM philosophy has been adopted. The summarized findings are discussed below under the topics:

- Information Systems Planning, Review and Coordination
- Data Standardization
- Metadata Management, Data Administration, and Data Base Administration
- Technology Assessment
- Quality Assurance
- Forms Management
- Records Management
- Reports Management

(1) Information Systems Planning, Review and Coordination

Inquiries were made at the DPIs to investigate the manner in which information systems planning, review and coordination activities were performed. The responses, in nearly every case, were that systems were planned and reviewed in a manner that satisfied the requirements for systems designs as outlined in AR 18-1. The study team explained the IRM concept and sought to determine if anyone reviewed the plans for an information system with regard to use of existing data bases, potential for consolidation of data, identification of data duplication, etc. The overall objective was to determine if individual systems plans were viewed in a context of fitting into the big picture.

Most DPIs have not yet installed a review process of this type, however, a few have identified the need for this type of review in the future. Several DPIs have begun to address this need, somewhat indirectly, through the appointment and designation of data base administrators, the definition of data base activities and functions, etc. In a practical sense, the DBA movement has begun to deal with the information issues, but mostly at the technical level rather than at the management level. Very few DPIs have taken the step to identify a data administration function or install a Data Administrator to deal with information management, policy and related issues.

Several DPIs reported that the level of command interest in information systems planning was increasing, and that Commanders were becoming more informed about the need to better manage information.

Those DPIs that have developed a sensitivity for the information resource management concepts have begun initiatives to evolve the organizational transformations essential to implement such a concept. The DPIs have, in many instances, begun to focus on:

- Formulating systems development efforts which incorporate the information resource management approach.
- Performing integrated functional requirements studies, identifying horizontal information needs
- Involving the user community more completely in information planning
- Assigning users proponency for systems, inputs and outputs.

Across all HQDA DPIs the level of information systems planning, review and coordination that takes place is highly variable. While conclusive evidence of a full scale implementation of this function is absent, the study team did determine that some DPIs

have already begun to implement the concept, and some are planning to implement the concept in the near future. They have, in effect, recognized the need for such a concept and are creating the demand for it. The tendency however, is for each DPI to embark on an implementation program, on its own, independent of the remaining DPIs. This apparent pitfall can be avoided if the DPIs change their perspective from the vertical orientation to the horizontal orientation regarding information.

(2) Data Standardization

When addressing the subject of standardization at the DPIs, the objective of the study team was to concentrate on data element and data item standardization. Specifically, the study team wanted to explore several aspects of the subject:

- Which set of standards does the DPI follow?
- Is there a data standardization officer?
- Has the DPI submitted data elements to Computer Systems Command for standardization?
- Are currently published DA standard data elements used in new development efforts?
- Are costs associated with data element standardization collected or maintained?

The information collected on the data standardization subject for all DPIs was analyzed and the results are presented below under the subject categories:

- Data Standardization Policy
- Data Standardization Programs
- Data Standardization Issues.

It should be noted that emphasis was placed on data standardization. ADP standards related to hardware and software are not addressed.

Data Standardization Policy

AR 18-1 establishes several data standardization policies to promulgate the development and use of DA standard data elements and codes. The reviews indicated some DPIs do not adhere in all cases to DA standards policy for data elements and codes as set forth in AR 18-1. The relevant findings are:

- Data elements, used in more than one system often are not typically forwarded to CSC for standardization

- Currently approved DA standard data elements are not always incorporated in new systems

- There are numerous key data elements used in several systems which have not been standardized

- Common data element names are defined differently in different systems.

The data element, Unit Identification Code, for example, is used in a variety of systems (SIDPERS, FORSTAT, FAS, TAADS, etc.), however, the coding scheme differs among systems. Currently the data element, Unit Identification Code, has not been approved for DA-wide use by Computer Systems Command. Coding schemes for the data element, Education, differ for two systems that treat the data as significant, i.e, the ARS and REQUEST systems which support the Army recruitng effort. One system codes education numerically, while the other use alphabetic descriptions.

Several systems recently developed or currently in the development stage contain non-standard data elements. Examples of such systems are FORDIMS, VFIDMIS, and PBAS. The primary reason offered for the use of non-standard data elements was that the time to submit data elements proposed for system use to CSC was too lengthy. To avoid delay in systems development, decisions have been made to continue development by including non-standard data elements.

The study team examined the operational concerns of the DPIs for implementing or failing to implement data standardization policy. Many DPI managers commented that the DA standards program, under CSC purview, was extremely cumbersome. Their primary views were:

- The process to submit data elements for standardization was time consuming and too lengthy a process

- CSC produces too much paper, most of which DPIs cannot take time to comprehend

- CSC requests for comments regarding future documents about to be published do not allow enough time for review and analysis, therefore, comments are not prepared for submission to CSC.

In related findings, the DPIs indicated that in their perception, the DA standards program lacks enforcement, and minimal incentives to follow the program exist. They also reported, almost unanimously, that the DPIs lack sufficient resources to conform to DA standards in the context of full participation.

The obvious impacts of a proliferated use of non-standard data elements and codes are: the inability to easily make systems compatible; and, the extensive use of resources required to convert, reformat or otherwise re-handle data to make it reusable. Both result in inefficiency of operations and non-efficient consumption of resources. The concept does not propose converting all developed systems to some standard, but rather, intends to influence future system developments so that higher levels of standardization are achieved and data sharing is more easily accomplished.

Data Standardization Programs

The study team found that the intensity and completeness of data standardization programs varies by DPI, and fall within three basic classifications:

- Limited programs
- Passive programs
- Active programs.

A few DPIs have no organized data standardization program, whatsoever. Several have passive programs, i.e., they have defined the functions of the program and designated offices responsible for performing the function, but minimal resources are allocted to perform the function. Several have active programs, i.e., they have defined the functions, designated the responsibility, and allocated moderate resources to perform the functions. The programs, though, are still not comprehensive. For the most part, they concentrate activity in certain areas: data element standardization, documentation standardization, or systems design and programming standardization.

Management Issues Related to Data Standardization

Discussion with the DPI personnel and analysis of the data collected regarding the data standardization efforts at the DPIs indicate that several issues must be addressed by various levels of HQDA management before the data element and code standardization effort becomes more effective, HQDA-wide. The issues are identified as follows and summarized in the paragraphs below:

- Management emphasis on data standardization would facilitate future data sharing and system integration
- DPI data standardization programs could be improved by acquiring and using automated techniques to streamline existing processes

- Data standardization efforts require higher levels of coordination to reduce the uneconomical use of resources

- Data standardization must be embedded in the information systems planning process and users must see a value in implementing them.

The DPIs perceive that the DA standards program is not uniformly enforced, and that inadequate resources have been allocated to comply with the intensity of standardization suggested in DA guidance. Since the data standardization activity at any one DPI is perceived as inadequately funded the program receives low priority. Closely related is the fact that without accounting information the cost impact of data standardization or non-standardization is not known. In many DPIs the responsibility for implementing data standards was difficult to pinpoint because of this lack of funding. Very few personnel had been assigned data standardization duties as primary work. Nearly all indicated that staff members integrated standards activity as part of their regular duties.

In several instances DPI personnel indicated that current systems under development were not incorporating current DA standard data elements and codes. Two basic reasons were given: emphasis was placed on getting the system operational as soon as possible; and, the DPIs have not developed a sense of urgency or conviction that the DA standards program is worthwhile. Of course, not every system needs data standards. Small, short-lived systems which do not interact with other systems may not warrant the effort necessary to implement standard data elements. However, the life span of a system is not always known during its development stage. DPI and system managers need appropriate information to make conscious decisions regarding implementing data standards. There can be a tendency to sacrifice the long-term gains (standardized systems) for a quick payback (operational systems). In this environment the DA-wide objective of "system interoperability" may be compromised.

In order to streamline the existing data element standardization effort, the HQDA DPIs could take advantage of automated technology. The study team concluded that each DPIs' data element inventories are very extensive. However, only a few DPIs have installed automated data dictionaries to make the coordination of the effort more efficient. At many DPIs screening and classifying data elements is still a labor intensive exercise.

Because the DA standardization program is somewhat less than successful, the systems currently being run (and some currently under development) are characterized by the use and proliferation

of non-standard data elements and codes. The incompatibilities that result have severely restricted the transfer and use of data through efficient automated interfaces. As a result, substantial resources are required in many DPIs to:

- Convert data for re-utilization
- Validate data for accuracy
- Manually coordinate and resolve data errors.

In addition to both computer resources and personnel resources consumed because of standardization inconsistencies, the failure of functional users to adequately define their functional information needs has caused duplicative storage, processing and reporting of data elements from multiple data bases.

(3) Metadata Management, Data Administration, and Data Base Administration

The DPIs were reviewed to determine what level of activity they currently devote to managing data, per se. The findings are summarized in the paragraphs which follow.

Metadata Management

The study team's objective was to determine if any of the DPI's were performing the function of metadata management, in its truest sense, i.e., were any of them managing metadata separately from data? If so, were automated tools such as dictionaries or directories used, and what were the characteristics of the tools which were in use, and how were they being used? The general consensus among the DPIs was that metadata management is required, however, few of the DPIs demonstrated any particular expertise in performing the function. No DPIs had developed full-scale data directories (a directory contains information about what data exists and where it is located and generally includes information about automated and unautomated data). One DPI has developed a limited directory for local use. Four DPIs have developed limited data dictionaries (a dictionary contains descriptive information to provide identification of what the data is, i.e., definition, name, code structures, etc.). Several indicated they are examining vendor commercial dictionary packages for use.

In September 1978, HQDA designated the Navy data dictionary RAS/STADES as a possible standard for Army-wide use. MILPERCEN and CCSA are have adopted RAS/STADES for use and USAFAC is currently evaluating it. RCPAC and USAMSSA are continuing to use DATAMANAGER for local applications.

In this instance, the trends imply a proliferation of data dictionary software may occur. If such a situation materializes the DPIs are creating situations that reduce the opportunity for compatibility between DPIs, introducing yet another obstacle to be overcome in data sharing. The study team did not evaluate RAS/STADES but explored current DPI experience with the aid. Several DPI managers did make comments: some questioned the adequacy of the aid for their environment: some were dissatisfied with it; and others have installed it for use. Because of the lack of agreement on the suitability of RAS/STADES, we expect that the DPIs will continue to experiement with and employ a variety of dictionary software packages.

Data Administration

Data administration is generally perceived as a policy setting role as opposed to data base administration which focuses on a technical role. The interest of the study team was to determine if the DPIs did, in fact, distinguish between the two and did they develop the data administration function and appoint a Data Administator. Of concern also, was the mechanism the Data Administrator used to educate users and systems personnel regarding established policies and contents of the data base.

Very few DPIs make the distinction between data administration and data base administration. Only one DPI, EDPC, had formally identified the data administration function and taken action to staff it. Several (CAA, USAREC, and USAMSSA) had identified the difference and were at varying stages of defining what the function ought to be in their DPI and to what level it should be staffed.

Data Base Administration

Eight of thirteen DPIs had defined data base administration functions and appointed Data Base Administrators (DBA). Concurrently the eight have installed or are in the process of installing some commercial version of DBMS software. As is the case throughout the HQDA DPI environment there is a wide and diverse interpretation of what data base administration is, what the functions are, and what the duties are of the DBA. The definitions vary, and depend greatly upon the nature of the DPIs data base(s) and organizational structure(s). They currently range from single data bases (with special purposes) to multiple data bases and/or fully integrated data bases.

(4) Technology Assessment

This section deals with the degree to which the current and planned hardware and software supports the functions of an IRM program and how the DPIs are using the technology that they have available.

Several of the DPIs have at least one DBMS and some have two that operate on in-house equipment. In addition, other DBMS packages may be employed on the various timesharing services used by the DPIs. The general problem with the DBMS approach throughout the HQDA DPIs has been a lack of technically qualified data base personnel. This is first evident with the initital decision as to which package would help them the most. Once the package is installed, there has then been a long learning curve for the technical personnel.

With the exception of EDPC, which has three DBMS' available, those DPIs that have more than one DBMS, are primarily using one and beginning to gain experience with the newer DBMS as time permits. Once again the problem has been lack of technically qualified systems personnel. As experience is gained, the use of the newer DBMS may become more prevalent.

Several DPIs, of course, have not installed data base software either because the hardware will not support a DBMS or because they have not yet committed themselves to adopting a DBMS approach.

Few of the DPIs have an automated data dictionary/directory. Once again, the reason has been primarily a lack of personnel resources to evaluate the packages available, even though several DPIs indicated that a dictionary/directory would be helpful to them.

Information technology assessment is generally performed by the DPIs on a random or ad hoc basis. This generally occurs when the DPI realizes that on-site software will be unsatisfactory in meeting future requirements. Several individuals stated that they were unaware of any central source for information about what IRM technology was available and what would suit their needs best, but that, when necessary, each DPI performed its own assessment of available technology.

(5) Quality Assurance

The quality assurance function in an information resource management program concentrates on several factors primarily centered around the audit and enforcement functions. Specifically, a quality assurance program should include the following items:

- Compliance testing of standards and procedures
- Enforcement of standards and procedures
- Audit and enforcement of data accuracy.

The DPIs were reviewed to ascertain what efforts were being made in this area and what level of effort existed.

As in the other IRM areas, the degree of quality assurance at the DPIs depended on the size of the organization's data base and the relative value placed on the information in the data base. That is, those DPIs that have a large number of records to maintain and process tended to have a more stringent quality assurance program than the smaller DPIs which did not have a heavy data base orientation.

An example of a more extensive program was found at RCPAC. RCPAC has a separate Quality Assurance Division within the Comptroller's Office. The Division develops and administers a quality assurance program for the center to assure product quality. Some of the activities performed are:

- Conducting sample verifications and audits of computer stored information
- Inspecting end products to verify accuracy
- Pre-screening of scheduled computer products and recommending the release or rejection of the outputs.

In addition to the regular sampling of all outputs, an audit of the master files is conducted semi-annually in which a complete match against hard copy files occurs.

Other DPIs such as USAREC and MILPERCEN also perform some quality assurance audits. Both USAREC and MILPERCEN periodically perform comparisons of data items that are common to two systems.

The two DPIs that perform somewhat unique functions, OTEA and ARIBSS, place high levels of quality control on the data they process. Because they require high rates of accuracy they monitor closely the validity of data collected. Likewise, their statistical calculations require the use of valid data to support results achieved based on tests and evaluations conducted.

The smallest DPI, USALEA, has not identified the need for a formalized quality assurance program due to the nature of its processing operations. It is primarily a secondary processor of data, since most data it receives comes from other DPIs. It receives no data directly from field units. In this case, USALEA depends on the quality control exercised by the originating source.

Generally, enforcement of standards and procedures is done in an informal manner throughout each of the DPIs. There is little evidence of written enforcement policies. However, in several DPIs compliance statistics are reported to the Commanding Generals.

There was little evidence to indicate units are reviewed to check for compliance with AR 18-12. Compliance checks with the forms management and records management programs are made by the responsible officers by conducting annual surveys. The results of these surveys are reported to TAGCEN.

(6) Forms management

Forms management policies and procedures are included in AR 310-1. The primary objectives of the program are to ensure that all forms are essential to the operation for which they are developed, approved standards are used, proliferation of forms is curbed through use of approved forms, duplicate or non-essential forms are eliminated, and, similar and related forms are consolidated. HQDA staff agencies and major and subordinate commands are responsible for the operation of the program within their respective areas of jurisdiction. The forms management officer in each agency or command is the individual responsible for the operation of the program within that agency or command.

All DPIs have programs to comply with AR 310-1. The forms management officer is usually located in the Comptroller's Office of the DPI. In some DPIs that are heavily records-oriented, the officer is a member of one of the operational sub-elements. For example, the RCPAC Support Operations Directorate performs the forms management functions. Generally, individual data elements are not checked for duplicate collection, but the information to be collected is examined for duplication at a macro level.

(7) Records Management

Policy for the management of records is developed by the Records Management Division of the Administrative Management Directorate of TAGCEN. The policies are based upon two Federal laws, The Records Disposal Act of 1943 and the Federal Records Act of 1950. These policies are promulgated in the AR 340 series regulations for hardcopy records.

The AR 340 regulations define what is meant by records and specify that enforcement of the policies is to be made by Records Management Officers (RMO). A RMO is located at every DA Staff Agency and at each installation.

The Regulations are followed by each of the HQDA DPIs visited. However, the extent of involvement with the function is closely tied to the function of the DPI. RCPAC, as the primary records maintenance center for all Reserve Components and retired Army personnel, is involved with the management of many personnel records. Records management functions are performed by the Support Operations Directorate. The Directorate conducts the required annual surveys and training in all areas of the entire Records Management Program, including the Army Functional Files System.

Although each DPI performs records management in varying degrees and the location of the RMO is different, the program is working and the regulations are being followed.

(3) Reports Management

Policy for reports management is developed by TAGCEN's Headquarters Administrative Systems Directorate. The policies are developed under the Management Information Control Program (MICP). The functions were established by DOD Directive 5000.19 and are implemented by AR 335-15. The major functions include:

- The evaluation and review of HQDA recurring information requirements,
- Assisting the Army Staff in locating existing management data, and
- Providing policies and procedures for Army-wide evaluation and review of management information.

Each Staff Agency has a Management Information Control Officer (MICO) whose functions are to assist the Army Staff in the development of information requirements and the revision of such requirements, to analyze and approve or disapprove information requirements as implemented by the Army Staff in response to requirements of other agencies, and to conduct periodic reviews of both automated and non-automated information systems as specified in AR 335-30.

As in both forms management and records management, the Army regulations are followed by the various DPIs. However, the extent to which the DPI carries out the spirit of the regulations differs. Most of the DPIs carry out the MICP in a manner similar to RCPAC. The RCPAC MICO is located in the Comptroller's Office. The MICO is responsible for the overall policy enforcement. However, there is an individual in the data processing area who acts as the MICO for automated reports. New requests for information come into this person who decides whether or not existing reports can meet the need and if not assigns a Product Control Number which is used internally in maintaining a product register. This MICO then determines who is responsible for satisfying the requirement.

Schedules for recurring requirements reviews are set up by the Comptroller MICO and, if an automated requirement, the review is actually managed by the data processing MICO, who in turn contacts the report proponent(s) for review decisions.

The USAREC DPI is in full agreement with the spirit of the regulations and goes beyond the letter of the regulations when performing reports management functions. The Command had developed a general reports management philosophy which focuses

on the role of the recruiter and emphasizes that the recruiter should not be required to gather and provide the information used to manage their efforts. The feeling is that automated systems should provide the data (it is already collected), thereby freeing the individual to spend the maximum time recruiting.

An MIS Task Force at USAREC has defined a set of reporting criteria and developed a detailed analysis process which:

- Inventories all existing reports and data requirements,
- Tests each report against the report criteria,
- Identifies reports for elimination that do not meet the criteria, and
- Standardizes reports for essential information.

Based on the approach the Command has taken, more reports are being eliminated than are being created. Further, User Guides are available which tell how to use the report data, why the report exists, what the data reliability is, how to interpret the data, what the data sources are, etc.

A part of the review of recurring information products includes the exploration of conversion of the outputs to microforms. Several of the DPI's have reported success with the conversion efforts during testing and do plan to increase usage of COM for system outputs.

4. SUMMARY OF DPI STUDY FINDINGS AND IMPACTS

The discussions presented in this chapter have provided an overview of the HQDA DPI operating environment. The focus was on the DPI system hardware and software environment, the applications environment, the current approaches to systems management, and, the status of information management programs. The objective was to present summarizations of observations that describe DPI activity, as it is, highlighting items of importance. In this section the major findings are consolidated and the impacts of the findings are summarized.

(1) Findings

Hardware and Software

- There is a wide variety of computer mainframe equipment installed throughout the HQDA DPIs. Many different vendors are represented; and, many different models within a vendor product line are installed. Several generations of ADPE are operated: some DPIs cannot adequately fulfill user requirements; and, others have adequate capability.

- An extensive and diverse inventory of operating system software, commercial software and specialized software is installed at DPIs. Based on a variety of mainframes, multiple vendor operating systems, as well as versions of operating systems, must be maintained. Seven different DBMS software packages have been selected and are being installed. Several versions of commercial data dictionary packages have been selected for use.

- The HQDA DPIs do not have an integrated and cohesive telecommunications capability that takes advantage of current technology and that fully supports the current information needs of the HQDA staff. Individual DPIs concentrate on solving their independent needs for sharing data. The DPIs do not have sufficient automated interfaces. The level of current technology for sharing data is not uniformly adopted by all DPIs. They still transfer data in many forms (hard copy, cards, magnetic tape) that are inefficient.

Data Sharing

- Hardware and software incompatibilities make systems interfaces difficult to achieve. Non-standard hardware configurations require multiple technological considerations to implement system interfaces which, though complex, can be managed. However, in many cases overcoming the hardware aspects is insufficient as systems contain non-standard data elements and codes, making efficient interfaces nearly impossible.

Organizational Considerations

- Multiple DPIs process similar and related data, and perform similar, related functions. Personnel data is processed by several DPIs to support various HQDA functions such as force structure planning, manpower management, readiness planning, etc. In a related example, the function of Officer Career Management is performed within several DPIs.

- There are a wide variety of DPI organizational structures in existence, some of which are inappropriate to support planned DBMS environments. Several DPIs were still organized to provide support for functional users within the proponent organization; some were consolidated to provide general support; and, many are evolving and reorganizing to support DBMS operating environments.

- The requirements for inter-DPI activity should continue to increase significantly. The dynamic nature of the HQDA environment has caused increased demands for data by sources other than the DPIs functional proponent. DPI managers envision ever increasing requests for data.

Information Systems Planning Review and Coordination

- The information systems planning review and coordination function is not universally performed throughout the DPI community. Some DPIs have adopted an IRM or quasi-IRM approach to systems planning in which any planned system is evaluated in a context of fitting into the big picture. Information issues are being dealt with at the technical level, more so than at the management level.

Data Standardization

- Uniform adherence to a DA-wide data standardization program has not been achieved. In many instances DPIs fail to follow current DA standardization policy. The level of effort committed to implementing standards is less than adequate to achieve DA standardization goals. Additional management attention, as well as additional resources, are required to implement a program in the spirit of the regulations.

Data Administration

- Very few DPIs demonstrated any particular expertise in performing the metadata management function. Metadata management (the management of data about data) is in its infancy in the HQDA DPI family. Directories are virtually non-existent; some attention has been given to the development of data dictionaries; and, some DPIs have installed data dictionary software.

- Very few DPIs perform the function of Data Administration. Few, if any, DPI managers among the larger DPIs have defined a need for the data administration function to address issues related to information management and policy.

- Information management is being addressed at the technical level. Many DPIs have selected DBMS packages to address the information management problem. They have created and defined the functions, named data base administrators, and are installing data bases.

Technology Assessment

- DPIs are performing the technology assessment function on a random or ad hoc basis. None of the DPIs are staffed to assess state-of-the-art technology on a permanent, recurring basis. Some technology assessment occurs in the ADP long-range planning process if new equipment replacements are anticipated.

Quality Assurance

- Limited Quality Assurance programs are evident in many DPIs. The emphasis is placed on quality of output data. There is some emphasis on input data where control can be exercised, but the evidence of formalized programs to monitor input data is less substantiative than those for output data, where control is easier to apply.

Forms, Records and Reports Management

- The DPIs have instituted local programs to comply with existing DA regulations for forms, records and reports management. Where necessary, several DPIs have expanded the DA-wide programs by augmenting them with enhanced local programs. The thrust of these programs focus internally and programs which evaluate the interrelationships of forms, records and reports management between functional areas were not observed.

(2) Impacts

Hardware and Software

- The DPIs are unable to accrue the benefits that result from standardizing on hardware and software. The resources required to support non-standard hardware and software operating environments are greater, especially when there are extensive requirements to exchange data between organizations. The magnitude of incompatibilities is much more complex requiring multiple unique solutions to repetitive problems.

Data Sharing

- Additional resources are being expended to make exchanged data more usable. In the current environment the use of hardcopy, cards and tape exchanges have disadvantages which include requirements for special handling, use of mail and courier services, acceptance of time delays, and the inability to efficiently support expanding requirements. Similar disadvantages are experienced at the point of receipt. In many cases additional resources are needed to reformat or convert the data prior to re-utilization.

- Increased emphasis on sharing data will require comprehensive planning and attention to systems integration concepts. Any system planned for development will have to be reviewed in the IRM sense to assure its interface requirements are adequately satisfied. A higher level of coordination than currently exists must be achieved.

- The requirement for sharing data is increased as DPIs process similar data and perform like functions. For example,

multiple organizations or Staff Agencies perform the function of Officer Career Management (e.g., DCSPER, USAR, NGB, COE, etc.). Likewise, each supporting DPI (MILPERCEN, RCPAC, NGCC, and EDPC) processes Officer Career Management data. In order to centrally aggregate data of this type, processed on a distributed basis, cross-functional coordination is required to insure similar systems include standard data elements and codes, consider automated system interface requirements, etc., or efficient data sharing will not result.

Organizational Considerations

- Evolution to data base oriented operations may cause organizational turbulence. Reorganizations will result due to a redefinition of functions and responsibilities. Similarly, the types of skills required by the organizational staff will also change. Since a shortage of trained personnel is prevalent, the DPIs will have to plan for extensive training and education programs. User education will also have to be stressed to make a smooth transition for the organization as a whole.

- DPIs must plan to increase the level and scope of services provided. In order to efficiently satisfy new requirements, the DPIs will, of necessity, have to install newer more efficient and reliable data transfer technologies. Processed data will have to be more effectively managed to be responsive to increases in both volume and content of information requested.

Standardization

- DPI managers will be required to make stronger commitments to implement and adhere to DA standards. This initiative will require emphasis to establish effective policy, define programs, create and follow procedures, and streamline an existing laborious process. The notion of embedded belief in the concept rather than unilateral enforcement must be fostered.

Data Administration

- To facilitate better metadata management, automated capabilities will have to be developed such as directories and dictionaires. To satisfy this requirement the DPIs will have to acquire the necessary personnel with attendant skills, and select software aids that meet their needs.

- Data management problems will have to be addresed at both the management and the technical level. The complexity of operations at many DPIs will not necessarily manifest itself

in highly complex organizational structures. The differentiation will be at the function level, where one individual may perform one or both functions. Ideally the functions should be independent to separate the policy aspect from the technical aspects.

Technology Assessment

- HQDA needs to develop the capability to assess current technology, as the rate of change in technology is rapidly accelerating today. The function can be performed locally at each DPI, or collectively by a single group external to the DPIs, but closely linked to the DPIs for guidance, evaluation and support.

Quality Assurance

- Quality and validity of data are dependent on programs that enforce quality control at the source. Since the majority of data processed by the DPIs is received from sources outside the DPIs, each DPI in effect forfeits control over data quality to the originating party. Partial control can be regained through more effective quality control programs. A greater level of enforcement of these programs will be necessary.

VIII. SELECTED APPLICATION SYSTEMS ANALYSIS

The HQDA command and staff receive information support form both manual and automated information systems of varying complexity. Currently, the DPIs operate and maintain thousands of application programs designed to satisfy information requirements. To gain a perspective of the nature and complexity of these systems, fourteen major systems were selected for an in-depth review for this study.

The results of the systems reviews are presented below under the topics:

- Objectives of Analysis
- Application Systems Selected for Analysis
- Summary of Systems Descriptions
- Application of IRM Methods and Technology
- Summary of Findings and Impacts

In the next section the objectives of the systems reviews are summarized.

1. OBJECTIVES OF ANALYSIS

The objective of the individual systems analysis was to identify examples of HQDA's need for Information Management through a review of 14 representative systems and to look across those systems for common attributes. The systems were initially identified by the Study Advisory Group (SAG) and final selection was based primarily on an evaluation of their diversification and visibility in HQDA, as well as ensuring that each of the functional staff agencies was represented.

The systems reviews consisted of consulting the available system documentation and conducting supporting interviews with the appropriate HQDA system managers. The purpose of these reviews was to:

- Determine how information is managed within a system
- Determine how information is shared among systems
- Determine the interfaces (types, controls, etc.) among systems

- Determine the entities about which information is being stored

- Determine the extent of the use of data standards, data management software, etc.

The result of this process is an approximation of HQDA's current level of Information Management activities at the systems level. These are not generalizations about all of the HQDA systems, but rather an in-depth look at particular systems to verify findings from other aspects of the study.

2. APPLICATION SYSTEMS SELECTED FOR ANALYSIS

A major problem the study team faced was that of limiting the domain of possible systems that could be reviewed. In this section we present the methodology for selecting the sample systems.

(1) Application Systems

The systems chosen for analysis are identified in Exhibit VIII-1. The Data Processing Installations that are associated with each of the systems can be seen in Exhibit VIII-2. As seen in these exhibits, the systems are representative of the thirteen data processing installations which support the HQDA staff agencies.

(2) Rationale for Selection

The decision-making process at HQDA is supported by a wide variety of systems. The systems selected for analysis were chosen because they represented systems that interrelate with various staff sections, support individual functional areas, and also support activity which crosses functional and organizational lines of authority. Some systems at the HQDA level are supported by feeder data provided by operations and systems in place at lower levels of command, such as those in the budgeting and execution areas. Other HQDA systems operate in support of activity which impacts field operations.

3. SUMMARY OF SYSTEMS DESCRIPTIONS

The systems selected for review are representative of the broad range of management information systems supporting HQDA. The information requirements supported range from functional area, specific vertical reporting of status or inventory type data to models which are used to analyze and develop policy alternatives. The diversity of the systems selected is discussed below, and shown graphically in the series of exhibits which follow.

Systems Investigated

ACRONYM	NAME
PROBE	Program Optimization and Budget Evaluation System
FORDIMS	Force Development Integrated Management System
ARCS	Army Reports Control System
EMF	Enlisted Master File
ARS	Armed Forces Entrance and Examination Station Reporting System
RIM	Readiness Indicator Model
UIS/FORSTAT	Unit Identification/Force Status and Identity Reporting System
JOPS	Joint Operation Planning System
RAS-STADES	Record Association System/Standard Data Element System
LOGNET	Logistics Network
MARDIS	Modernized Army Research and Development Information System
PBAS	Program Budget and Accounting System
SIDPERS – RC	Standard Installation/Division Personnel System-Reserve Components
IFS	Integrated Facilities System

EXHIBIT VIII-1

Systems Investigated

SYSTEM	OPI												
	USAMSSA	MILPERCEN	USAREC	CAA	CCSA	USALEA	HQDISA	USAFAC	HCPAC	EDPC	NGCC	HIBSS	OTEA
PROBE	X												
FORDIMS	X												
ARCS	X												
EMF		X											
ARS			X										
RIM				X									
UIC/FORSTAT					X								
JOPS					X								
RAS-STADES					X								
LOGNET						X							
MARDIS							X						
PBAS								X					
SIDPERS-RC									X		X		
IFS										X			

(1) Systems Characteristics

Various types of systems were selected for review. These systems can be characterized by their use; as a data base system, a data management system, a vertical reporting system, an analytical system or a decision support system. A data base system is one which is used to provide data to a wide range of users. The EMF is a large masterfile which is the primary source of enlisted personnel data for the Army, and is used by a wide variety of users and systems. Data management systems are those whose objective is to support some kind of data management activity. In our sample, ARCS supports reports control and RAS-STADES supports data element management. A vertical reporting system is one which supports an official vertical reporting requirement. An analytical type system is one which performs a significant amount of processing and calculations, though it may also serve reporting requirements or support the management decision process. A decision support system, as described here, is a system which directly produces inputs to the decision-making processes of HQDA. These definitions, or use descriptions, are not mutually exclusive. In fact, many of the systems are best characterized by a combination of these attributes. The systems selected for review are characterized by these use descriptions in Exhibit VIII-3. This exhibit shows that the systems selected for review are representative of the broad range of types of systems which support HQDA.

Our study found that the systems selected for review were in various stages of development. The LOGNET system, for example, is still in the conceptual design stage. The EMF, on the other hand, has been in use for many years. A large system may have one subsystem which is operational, another in the final stages of testing and implementation, and another which has not yet been designed. An example of a system described by these characteristics is FORDIMS. In Exhibit VIII-4, the systems selected for review are characterized as either being designed, being implemented, or fully operational. For the purposes of this comparison, a system is considered to be in the "Being Designed" stage until the detail design is completed or until the DFSR is completed and approved. A system is characterized by this exhibit as being in the Operational stage if the original development process has been completed. In this stage the System Evaluation Test or Prototype Evaluation Test is complete, and the only development activity is ongoing maintenance and system change requests. A system is characterized as Being Implemented if it is somewhere between the other two stages, that is, if it is being coded and tested. Systems with multiple subsystems may be characterized by being simultaneously in any combination of stages. Exhibit VIII-4 depicts that the systems selected for review are in the complete range of developmental stages.

Systems Reviewed Characterized by Type of System

TYPE OF SYSTEM / SYSTEM	Data Base	Data Management	Vertical Reporting	Analytic	Decision Support
PROBE	X		X		X
FORDIMS	X		X		X
ARCS		X	X		
EMF	X		X	X	X
ARS			X	X	X
RIM				X	X
FORSTAT	X		X		X
JOPS	X				X
RAS-STADES		X			
LOGNET	X				X
MARDIS			X		X
PBAS	X		X		
SIDPERS-RC			X		X
IFS			X		

EXHIBIT VIII-4

Systems Reviewed Characterized by Stage of Development

SYSTEM \ STAGE OF DEVELOPMENT	Being Designed	Under Implementation	Operational
PROBE	X	X	X
FORDIMS	X	X	X
ARCS			X
EMF			X
ARS			X
RIM			X
FORSTAT			X
JOPS			X
RAS-STADES			X
LOGNET	X		
MARDIS			X
PBAS	X		
SIDPERS-RC	X	X	
IFS	X	X	

The systems selected for review were also found to vary greatly by the number of automated management information systems interfaces. The Army Reports Control System, (ARCS) for example, is a completely standalone system with no automated interfaces. The data in the system does identify other systems and reports, but the information itself is manually entered into ARCS for use by ARCS alone. MARDIS and RAS-STADES are systems with various intrasystem interfaces. MARDIS data bases report up into higher echelon data bases, and various installation RAS-STADES systems feed a central RAS-STADES system. However, there is no automated exchange of data with any other system. We also found that RIM requires data from many systems, and FORDIMS provides data to many systems. Other systems have a limited number of automated interfaces, and receive data from, or provide data to only one or two systems. The degree of interaction with other automated management information systems can be seen in Exhibit VIII-5. This exhibit shows that systems selected had considerable diversity in the number of automated interfaces with other HQDA management information systems.

The foregoing discussion of systems characteristics is meant to demonstrate that, measured along various dimensions, the systems selected cover a wide range of possibilities. Based on the information in Exhibits VIII-2 to VIII-5, our findings concerning information management activities, as they impact HQDA automated management information systems, are not particular to the policies and procedures of any one DPI, of systems in a particular stage of development or of one particular type of system. Further, our observations, and ultimately the alternatives and recommendations presented later, are sensitive to the requirements and operational considerations of systems which operate within the HQDA environment. However, as representative or typical as this sample of fourteen systems may be, it is nevertheless a sample of only fourteen from among thousands of automated management information systems supporting HQDA.

(2) Systems Life Cycle and Management

The Army Management Information System life-cycle encompasses three separate and distinct but complementary phases: Systems Planning and Definition; Systems Development; and, System Installation, Operation, and Maintenance. Each phase requires definitive and increasingly explicit systems documentation, review, and management, as outlined in AR 18-1.

. Systems Planning and Definition

The systems planning and definition phase encompasses all documentation and procedures, from concept formulation through requirements formulation. It provides for definition of these concepts and requirements in terms of

Systems Reviewed

Degree of Interaction with other Automated Management Information Systems

SYSTEM	NUMBER OF INTERFACES			REMARKS
	NONE	LIMITED	MANY	(INPUTS FROM, OR OUTPUTS TO OTHER SYSTEMS)
PROBE			X	Many Interfaces Among Subsystems and Related Data Bases, Including PPBS Data Base.
FORDIMS			X	Input: VFAS, VTAADS, TRADOC, TOE Output: SACS, VFASS, ACS, SIDPERS
ARCS	X			Data in System Points to Various Automated and Manual Systems
EMF			X	Inputs: CAP III, SIDPERS, ARS
ARS			X	Outputs: EMF, USAREC Data Base, and Other Service Personnel Systems
RIM			X	Inputs: FAS, PMDL, AESRS, DLOGS, ARDMA, AMP, MAPS
FORSTAT			X	Receives Input from Various Army and DOD Sources
JOPS			X	Receives Input from a Variety of Army and Non Army Systems and Sources
RAS STADES	X			Some RAS STADES Systems Feed a Central Data Base Under a Central RAS STADES System
LOGNET			X	Input: SAMPAM, TAADS, JOPS, CBS X, CCSS, MRM, Others
MARDIS		X		Various Mardis Sites Reported to Mardis Data Base at the Next Higher Echelon. Outputs: DDC, RDTE Data Base
PBAS		X		Inputs: Will be from Various Automated and Manual Installation Financial Systems
SIDPERS RC			X	Inputs: THPERSINS, (Others from NGCC, RCPAC, MILPERCEN, FORDIMS) Outputs: Jumps RC, THPERSINS, (Others NGCC, RCPAC)
IFS		X		Inputs and Outputs RPT/BIS, Installation to HQ Interface

specific systems objectives. The key documents products produced in this phase are the General Functional System Requirement (GFSR), Management Information System Economic Analysis (MISEA), Organization and Personnel Plan (OPP), Detailed Functional System Requirement (DFSR) Guidance, Assigned Responsible Agency (ARA) assignment, the DFSR, the Project Master Plan (PMP) Guidance, and, if required, recommended ADPE specifications. During this phase, the MISEA is updated as a result of DFSR preparation.

- Systems Development

The systems development phase encompasses all documentation and procedures subsequent to approval of the DFSR through the prototype evaluation. It may include the procedures for acquiring ADPE to support the systems during test, evaluation, and operational life. The key documents products produced in this phase are the project guidance document, ADP systems specifications, ADP system software and documentation, Systems Integration Test Report, systems development package, Prototype Evaluation Report, and System Extension Plan. Also produced, as required, are the ADPE guidance document and documents supporting the selection and acquisition of ADPE. During this phase, the MISEA is again updated. Specific approvals control progress.

- Systems Installation, Operation, and Maintenance

The systems installation, operation, and maintenance phase encompasses all procedures for installing, operating, maintaining, and modifying the system. This phase starts with approval to extend the system and continues until the system is phased out by a replacement system or otherwise terminated.

In reviewing the various selected systems, a number of management approaches were discovered. The management and coordination activity during systems design, development and maintenance phases were found to be accomplished through a variety of mechanisms. In some cases, this activity was primarily accomplished by the development group at the DPI which was developing the system, as with FORDIMS, RIM, and PROBE. For the WWMCCS systems, FORSTAT and JOPS, a JCS activity was the proponent and responsible agency. Hence, these systems are subject to WWMCCS long-term planning requirements. For ARS, a system primarily used by DOD, the joint service command MEPCOM is responsible for determining how the system should be run. Some organizations use system advisory groups (SAGs) or standing committees to manage and coordinate systems activities, as with SIDPERS-USAR and LOGNET. Others involve users through semi-annual working groups (ARS), or through local control groups (MARDIS).

The common thread found between these systems and management approaches is the adherence to, and application of, AR 18-1 policies and procedures. This was evidenced through the development of the documentation required for the different systems, which in turn required that the systems development efforts include various considerations. The documentation for many systems included GFSR, DFSR, and a MISEA. Although a particular system may have combined the GFSR and DFSR, or developed two DFSRs due to extensive design modifications, the systems do adhere to a common development process. This process is described in AR 18-1, and covers requirements for design, development, test, evaluation and maintenance of various classes of management information systems.

Army management information systems policy is outlined in AR 18-1, and covers not only systems, but also management and support of systems. In general, systems are classified by size and application. Each class of systems has general policies governing configuration management, documentation, and design and development. Support policies prescribe program languages for different applications and management policies cover ADPE configuration, replacement and location.

Systems design and development in HQDA can be characterized as the design of unique functional systems, which are generally the result of locally defined requirements. Many of the systems were developed and designed using functionally dedicated hardware. The systems evolved in response to specific functional and mission requirements which has resulted in an environment that is fragmented and not the product of a planned and integrated effort. Frequently the systems overlap and the same data may be captured in different formats in response to these functional requirements. The IRM findings relating to the systems investigated are found in the following sections.

4. APPLICATION OF IRM METHODS AND TECHNOLOGY

Earlier in Chapter III of the report several Information Resource Management concepts were introduced. Using those concepts as a basic model, the systems selected were reviewed to determine which of the concepts were taken into consideration during each system's development stages, and the ensuing implementation and operational stages. The summarized findings are grouped under the subjects:

- Information Systems Planning and Review
- Data Standardization
- Data Base Administration/Data Element Dictionary
- Technology Assessment

- Quality Assurance

- Forms, Records, and Reports Management

The discussion which follows summarizes the level of information systems planning and review activity observed for the sample systems.

(1) Information Systems Planning and Review

Systems design and development is characterized by the design of unique functional systems. Based upon our analysis, we found very little joint planning, review and coordination which takes place for the systems across functional areas. The systems tend to be developed strictly to meet individual staff agency requirements. These systems are the result of locally defined requirements, and tend to evolve in response to specific functional and mission requirements. The result is a systems environment that is fragmented and not the product of a planned and integrated design effort.

We have also found that system development varies in degree from very little guidance, to the use of a systems advisory group for guidance in the systems development cycle, such as that in the SIDPERS-RC system. According to several systems developers, some of the systems were designed with only short-term goals in mind, while others were designed subject to long-term information planning considerations, which can be seen in the WWMCCS community systems.

In order to have systems that cross functional areas, system objectives should be determined by coordinating functional requirements. However, there tends to be a lack of coordination between system developers. A survey of requirements can enable system planners to develop systems which meet current and future needs. Although some systems planners did conduct surveys to determine requirements, others had not conducted recent surveys nor had they reexamined old requirements to ensure that they still were, in fact, current requirements.

(2) Data Standardization

Successful information resource management programs have found that data standardization is vital to a successful program, and should be a part of the development and implementation of a system. There appears to be a renewed emphasis on data standards in the systems we reviewed. This can be seen in the EMF system which is developing a plan for compliance with the Army Standardization Program. Most systems personnel expressed the concern that the current data standardization process is extremely long and time consuming. As a result, the systems tended to be developed without regard to standard data elements, as evidenced in the FORDIMS system, which is an integration of data from four systems into a single data base.

Data element standardization is necessary for the sharing and utilization of information found in system files. However, our review found that data transfer and exchange efforts were not easily facilitated, which caused a need for the establishment of requirements for data element conversion to other forms or interpretations before utilization. This resulted in slow information access time and poor data quality with many errors across systems. For example, users in the personnel area report that a lack of data standardization between personnel systems inhibits data exchange. Further, RIM developers expended considerable effort in developing preprocessing routines, and in editing and validating data sources. RIM was investigated as a case study and is covered in more detail in Chapter IX.

Currently, costs that are associated with the standardization of data within an individual system are generally not collected by systems personnel. There are no specific budget line items associated with data standardization, and as a result no specific allocation for this effort.

(3) Data Base Administration/Data Element Dictionary

The data base administrator functions were generally not defined uniformly across the systems reviewed. We found that the administrator's function could be that of strictly technical file administration, as in RDAISA, or the function could combine both the technical and administrative policies into one functional description, such as the DBA at USAREC. Along with responsibility differences, we found locational differences as well. A local system control group might act in the data administrator role, as in the MARDIS system, or there might be a division or branch within the data processing installation that was specifically tasked to do the data administration functions for several systems, as at MILPERCEN for the EMF system.

The systems we reviewed generally did not have an associated automated data element dictionary/directory. However, several systems personnel indicated that they had plans for the development of a DED/D in the near future. PBAS is an example of such a system.

It was recognized by the systems personnel that a DED would provide a means to establish common definitions across HQDA related systems and would also help in identifying data location and system linkages.

(4) Technology Assessment

The systems that we reviewed made use of various software application packages. Some of the systems used commercially available data base management systems such as System 2000 and TOTAL. There were also data base management systems that were

developed in house by the systems personnel which were tailored to fit the direct functional requirements.

Of the data base management systems that are being used, some of them have on-line query and update capabilities while others run inputs and updates against their files in a batch mode. The software applications and hardware configurations for the sample systems can be seen in Exhibit VIII-6.

The software applications shown in Exhibit VIII-6 currently run on a wide range of hardware configurations. There is not a standard configuration that is used by all of the systems, as can be seen in the exhibit.

(5) Quality Assurance

Compliance audits are an essential part of an effective information management program. A quality assurance program should be an ongoing function with periodic audits conducted and improvements made. In order to restore confidence in data and improve its quality it is necessary to clean up data already in files and also determine causes of poor quality.

Several of the systems we reviewed had developed internal Q/A routines to spot check data, such as the PROBE system. The input data was fully edited and placed in temporary files for independent analysis and reports were produced showing input which is sent to the originator for verification. However, other systems had only manual verification for data quality with manual checks made on actual data, as in the JOPS system.

The general lack of data quality was attributed to installation level data bases upon which many systems were dependent. In some cases, the lack of confidence in the data is well founded because the data contained in several of the sample systems is incomplete, inaccurate, or out of date. This poor data quality has been attributed to the data entry point where there is a lack of incentive on the part of those entering the data, as well as a confusion on content or format of what data is required. A lack of effective software edit capabilities has also led to poor quality data and a low level of confidence in the data.

(6) Forms, Records, and Reports Mangement

Formulation of policy for forms, records and reports was generally done through one centralized office at the DPI, for each of the sample systems. Management of this policy function was either the responsibility of a central office which the systems report to, or is the responsibility of the systems functional user, as in FORDIMS. For several of the systems, forms were supplied and maintained by an outside office, such as USACSC

EXHIBIT VIII-6

Comparative Software and Hardware Configurations

SYSTEM	SOFTWARE	HARDWARE
PROBE	TOTAL DBMS DATA MANAGER	IBM 370/3033
FORDIMS	TOTAL DBMS	IBM 370/3033
ARCS	STANDARD FILES	IBM 370/3033
EMF	SYSTEM 2000 STANDARD FILES	UNIVAC 1108
ARS	SYSTEM 2000	UNIVAC 1108
RIM	STANDARD FILES	UNIVAC 1108
FORSTAT	IDS, WWDMS	HONEYWELL 6000
JOPS	ISP, WWDMS	HONEYWELL 6000
RAS-STADES	DATA DICTIONARY PACKAGE	HONEYWELL 6000
LOGNET	UNDER STUDY	UNDER STUDY
MARDIS	STANDARD FILES	UNIVAC 1108
PBAS	DMS 1100 USAFAC DED	UNIVAC 1182
SIDPERS-RC	TOTAL DBMS	IBM 360/65/50
IFS	NOMAD DBMS	NCSS TIMESHARE

for the MARDIS system. The outside office conducts reviews to ensure that duplication does not exist in reports and reporting requirements. Screening is also done to check for compatible information.

5. SUMMARY OF FINDINGS AND IMPACTS

The significant findings developed during the analysis of the sample systems are summarized in the paragraphs which follow.

(1) Findings

Multiple Data Bases

- The existence of multiple copies of the same data base has caused problems for users and developers of several of the systems we reviewed. It is difficult to control the update and synchronize multiple copies of the same data base. For instance, multiple copies of the Armed Forces Entrance and Examination Station Reporting System (ARS) exist. Users report there are instances where synchronization between data bases was a problem. Another related issue is simple duplication of data. The purpose of a data base management system is to serve multiple users/applications yet in the ARS case a copy of each data base is used by each functional user instead of centralizing the data base.

Data Sharing

- Among the application systems we reviewed we noted in several cases that a lack of standardization of data elements inhibited data sharing. For instance, the data element Education is defined differently in ARS than in the systems with which it must interface. The result of this definition is numerous error listings that must be manually reconciled between systems. Non-DA standard data elements also exist between JOPS and FORSTAT, in PBAS, PROBE and in a variety of other systems. Each time a non-standard or otherwise incompatible data element is searched by the system manual labor has to be expended to reconcile the definitions.

- The systems reviewed exhibited a great deal of data sharing between applications. In no case did we observe any application of the 14 systems reviewed directly accessing the data base of another application for information. Most of the sharing was in the form of passage of magnetic tapes back and forth. Passing tapes, while a long-standing practice, is not free of problems. Incompatibilities between hardware make various tapes difficult to read. Tapes become outdated while still in transit and the construction of data contained on a tape (records per block, parity, etc.) differs from tape to tape. The lack of direct data base

query is indicative of several problems the Army must cope with which are:

- The level of technology in communication devices which are currently in use (limited high speed transmission capability)
- The psychological barrier against letting another organization use any data base
- The evident lack of standard data elements that can be used for mutual communication.

Technology Assessment

- Each of the applications we reviewed, exhibited a different consideration for existing hardware and software technology. A variety of the applications reviewed concerned themselves with usage of data base management systems for data retrieval. Others were concerned with use of teleprocessing equipment to share information with a variety of users. Others concentrate on the provision of several statistical packages to a community of users. The important point demonstrated is that none of the applications we reviewed are tied together by a common concern or objective of sharing information from the easiest accessable source or the most technology efficient source.

- Each of the systems we reviewed depicted various considerations for communications technology. The current ADP planning process emphasizes the importance of integrating communications with systems. Many applications we reviewed were dependent on designs that were oriented toward existing AUTODIN I communications. In essence, advanced communications concepts were not being considered. The WWMCCS community applications (FORSTAT and JOPS) indicated a consideration for high speed data transfer. The remainder of the applications are currently limited by existing AUTODIN equipment. Many of the systems personnel we interviewed stated that information management in the context of their application would be limited by current communication devices. Little direct access across functions via teleprocessor is evident, tapes are frequently mailed instead of transmitted, and message formats are still card image oriented instead of being more efficiently transcribed. The applications we reviewed indicate that current communications considerations may inhibit information management across functions.

Quality Assurance

- The systems we reviewed highlighted the lack of an official or uniform quality assurance program employed on the data in the systems reviewed. We found data quality problems in a variety of systems (RIM, IFS, MARDIS, EMF) and currency of information problems in systems (EMF, MARDIS, ARS). Data quality control procedures that were in evidence concentrated more on program quality control rather than information quality control. We found users of these applications distrustful because of limited or non-existent procedures for quality assurance of input data.

Forms, Records and Reports Management

- Forms Management, Reports Management, and Records Management Considerations were not evident in much of the systems documentation that we reviewed. These functions are often considered administrative and not related to information processing and systems development activities. Concern for forms and reports management would detect problems of duplication of existing data and interest in records management would assist in limiting the size of tape libraries. The documentation we reviewed indicates that these functions are largely ignored in systems development and maintenance, however, they are integral to any information management process.

- Based on our review of systems in different functional areas it is apparent that the management information control system is not uniformly adhered to throughout HQDA applications. For example, RIM develops forms for which some organizations would require a Requirements Control Symbol (RCS) for any request for information on a recurring basis. Other organizations were either unconcerned or applied the program to one time requests. Among the other applications we reviewed RCSs or Product Control numbers were not always assigned nor were program exemptions present. The lack of uniform application of information control procedures limits the effectiveness of any effort at location or reutilization of existing information.

Data/Systems Management

- In reviewing the various systems, a number of management approaches were discovered, none of which were coordinated by HQDA nor were there indications of recurring reviews of the systems management process. The planning mechanism for HQDA is outlined in AR 18-1. However, many of the planning activities are required to be responsive to higher level organizations such as DOD and JCS. Systems such as FORSTAT, JOPS and ARS are subject to higher level planning authorities which may not directly integrate with Army planning. It is important to remember that an agreement between all

activities to perform a similar planning process ensures an orderly and coordinated approach to information management. The Army must determine how applications which are controlled by higher authorities can meet the Army's information objectives.

- Each of the applications we reviewed exhibited different considerations in information integration. Systems design and development in the Army has been characterized as the design of unique functional systems. We found the designs of the applications that we reviewed supported this characterization. Limited consideration was given to normal recurring information sharing or extraction of information from other data bases. System interfaces appeared to be specifically designed and the appearance of general interfaces that could be used by a variety of applications is limited. Each of the system data bases that were reviewed were functionally oriented rather than cross functionally oriented which further limited information integration. The design activities represented did not report to a similar source nor was integration of information across functions a specific responsibility of one organizational activity in a majority of the applications.

- The use of data base technology and the data base administrator functions were not defined uniformly across the applications that we reviewed. For instance, some data base administrators were being used as strictly technical file administrators while other data base administrators would be both technicians and policy administrators. In other cases, a data administrator was present who would prescribe data management and use policies and interface with data base users. The variety of activities and technology observed indicates that there is no common thread of understanding among management as to how data base technology or data base management can be employed in the context of existing Army applications. This is the result of a lack of g idance on information management from HQDA and also indica ive of the level of technical understanding of a relatively new concept to the Army.

- There was no uniform use of data dictionaries/directories across organizations or systems that we reviewed. The applications we reviewed represented the last ten years of Army ADP technology. Therefore, many of these applications were associated with software concepts that are dated. The use of data dictionaries with specific DBMS/applications has been considered new technology for many of the systems we had reviewed. Therefore, there are varying concepts of employment of data dictionaries with various application systems. None of the systems that we reviewed had preprocessors with interfacing active dictionaries - in this

case input data would have to pass a dictionary edit and the dictionary would control data in the data base. In most cases where dictionaries were in evidence systems personnel recognized that the dictionary was a means to provide common definitions across HQDA related systems but had not attempted linking data by location. Limited guidance on the employment of dictionaries was evidenced nor was there organizational/application consideration being given to linking dictionaries.

- Existing documentation covering the systems we reviewed is in various stages of completion and may be characterized as usually incomplete, usually outdated, and usually unavailable. Documentation is the activity associated with development that is usually deemphasized when resources become constrained, yet many managers we interviewed agreed that it is one of the most important tools to understand a system. All of the applications we reviewed exist in a dynamic processing environment where changes to the system are made daily. The existent documentation, however, is less flexible. Much of the documentation is constructed to get a system approved by management and therefore concentrates on show rather than function. Once the system is approved the documentation is shelved or not periodically updated. In the absence of data sharing or knowledgeable personnel the documentation is the main location device for acquisition of data. If the documentation is not updated acquisition efforts are very frustrating.

(2) Impact of Systems Findings and IRM Concepts

A summarization of the impacts of the system analysis findings, and the relevant impacts of IRM concepts are presented below:

Multiple Data Bases

- The duplication of data bases consumes additional ADP resources. However, the problem with duplication represents a much larger issue than inefficient use of resources. The duplication of data bases is indicative of an environment that does not capitalize on the advantages of single source data (capturing data once) or which is opposed to using someone else's data on a recurring basis. Some managers duplicate data bases to "functionalize" the data. When this is accomplished, data base update becomes difficult as each copy of the data base must be updated. The duplication of data bases may also indicate that intersystem communication may be a problem. This is not to say that a single, integrated data base of all of HQDA's data is desirable or even feasible. There currently is little management control over the duplication of data bases to determine if the redundancy is warranted in light of the cost and the potential for data inconsistencies.

Standardization

- Standardization has been an issue in systems design for some time. Many HQDA design activities do not see the benefits of using standard data elements in systems design and regard the standardization program as one more hurdle that must be overcome before systems approval. There are other aspects to the problem. Without a central comprehensive approved list of standard data elements, and without an enforcement mechanism, the standardization program may simply continue its downward trend. With the state of Army functional applications as they are, standardization is one of the primary tools of improving data sharing.

Data Sharing

- The data sharing that is evident at HQDA is encouraging, but the process is very cumbersom. Many activities that we visited recognized the need to share data and were doing their best to pass tape back and forth to reconcile files and to serve as input to their own applications. The problem is that each DPI has its own set of information management procedures and, therefore, tapes require special handling when they are received in-house. The broader issues are the psychological barrier against letting another organization access a data base and the existent state of Army communications which makes passing information back and forth a cumbersom process. Data sharing should be encouraged, but managers should also be given the tools to facilitate the process. Under existing technology and management procedures, data sharing has become a frustrating activity.

Quality Assurance

- Information Quality Assurance is a significant problem for the Army, but it is probably one beyond the scope of authority of systems personnel. Systems managers are held accountable for the effective functioning of the application software and that is one aspect of the overall quality assurance problem. The data quality assurance function should concentrate on the data originating sources and data transcription personnel (key punchers, etc.). The lack of an overall quality assurance procedure that defines the responsibility of each party in an information processing system ensures that there will be overlaps, or gaps, or both. The executive level interviews we conducted confirmed top management's concern for data quality. A comprehensive quality assurance policy is one mechanism to gain the confidence of top management.

Forms, Records and Reports Management

- Forms Management, Records Management, and Reports Management are all important processes in systems development and maintenance. In the systems documentation which we reviewed we did not find evidence that consideration of these activities was integrated into the system design process. This apparent lack of planning for forms, records, or reports management can, at times, result in costly additions or modifications to systems to bring them in compliance with existing Army policies. Incorporation of these considerations early in the planning and design processing can result in a more efficient system development process.

Information Systems Planning Review and Coordination

- The variety of information system planning proponents at HQDA makes the integration of information management objectives difficult. Many of the application systems we reviewed have to be responsive to both the Army planning authority (ACSAC) and a higher level planning authority (JCS or DOD). Normal coordination mechanisms did exist for approvals of system software improvements. However, few coordination mechanisms existed for the macro-level information planning considerations. These mechanisms must exist to ensure minimal planning redundancy or policy overlap. In addition, Army information planning objectives will, by necessity, have to include all applications supporting HQDA. Mechanisms are needed to assure appropriate adherence to overall objectives.

- The wide variety of considerations for information integration among the applications we reviewed indicate a strong functional perspective in information sharing. The absence of general interfaces or usage of existing data bases by a variety of functional areas limits the effectiveness of information sharing. Design activities should be encouraged to use a variety of information sources instead of simply duplicating information from another functional area.

Data Administration

- The variety of applications of data base technology and the various means for using a data administrator among the systems we reviewed indicate the absence or the failure to adhere to existing information guidelines. The systems we reviewed all indicated different considerations for data base technology which made it difficult to determine the common objectives for information management among the systems that we reviewed. The need for overall guidance in this area is apparent to insure that activities become concerned about cross-functional integration.

- The lack of uniform use or consideration of cross-functional linking of existing data dictionaries/directories makes the process of information location time consuming and difficult. Among the applications we reviewed and within those applications actively using data dictionaries/directories, there was little evidence that consideration was given to either linking dictionaries or otherwise interfacing information flows via dictionaries in areas of high information transference. In essence, dictionaries/directories are functionalized and limit their location capabilities to that particular staff support area. Again, this is a strong indication of a parochial interest in information that limits the more efficient cross-functional use of information.

- Communications technology is a significant problem for information management to overcome. Many of the application systems we reviewed depended heavily upon existing communication facilities for functional communication while cross-functional communication tended to be more in the form of mailed tapes. The effect of this existing environment is that full advantage of cross-functional information sharing cannot occur with less than optimal communications equipment. Current communications software is too cumbersome for report data transfer and consideration of this contraint on the information management environment should lead to the development of more efficient means of communication that will enhance sharing.

- Documentation needs to be improved to facilitate information location efforts. Most of the applications we reviewed possessed poor to average systems documentation. Developing an understanding of an application was more a function of finding the most knowledgeable person rather than reading existing documentation. The need for functional and timely documentation cannot be overemphasized if locating information is to be made efficient.

This chapter has provided an overview to the nature of HQDA information systems through an in-depth review of fourteen major systems currently operated at the HQDA DPIs. The systems reviews provide one source of input to determine how information is currently managed at HQDA and highlights some of the information management problems that pervade the systems management environment. In the next chapter we explore the information management subject via three individual case studies.

IX. INFORMATION MANAGEMENT CASE STUDY ANALYSIS

The scope of this information resource management study considers the entire HQDA information environment. In order to obtain a representative cross-sectional view, several structured data gathering methodologies were developed. In this chapter we summarize the case study data collection approach. The case studies were selected to provide the study team with a basis for observing specific implications of an IRM program in the Army.

1. CASE STUDY OBJECTIVES

The evaluation of particular cases of information management problems was viewed as a means of measuring or evaluating the impact of an IRM program by focusing the concept on actual situations. To analyze the cases, the study team formulated the following objectives for each case:

- Select an example of a typical HQDA activity which involves the use of automated information
- Trace the process involved in supplying information to support the activity
- Identify the information management issues which might impact the activity
- Determine resources associated with supplying the information
- Identify problems in the information supplied
- Indicate how improvements in information management might alleviate problems and reduce resources expended.

Candidate cases were proposed by individual SAG members, HQDA staff individuals and study team members. The potential cases were evaluated and a formal selection process was conducted, with voting by SAG members. The three cases selected were:

- The Readiness Indicator Model Case Study
- The 5-Ton Truck Case Study
- The Manpower Mobilization Case Study.

To facilitate presentation, each case summary is presented in the pages which follow. The consolidated summary of case findings and the related impacts on Information Resource Management concepts are presented immediately following the last case study.

READINESS INDICATOR MODEL
CASE STUDY

1. INTRODUCTION

The Readiness Indicator Model was selected for a case study because it deals with mobilization planning and readiness measurement, issues of vital importance to the Army; because it represents an activity which required the aggregation of information from multiple functional areas; because it is an activity which is typical of many such efforts performed on a continuing basis; and, because it is of major importance and visibility to top management in the Army.

The Readiness Indicator Model (RIM) was developed at the United States Army Concepts Analysis Agency (CAA). In support of its missions, CAA performs a wide range of studies and analyses. Frequently these efforts are supported by an automated model or simulation. This case study concerns the development of one such model: The Readiness Indicator Model (RIM), which grew out of the Readiness System Study.

2. STATEMENT OF THE PROBLEM

A definition of readiness has been a long standing problem for the Army. Definitions do exist; however, very few of the existing definitions are able to quantify an adequate measure of readiness. The relationship between resources and readiness has also long been a problem. The Readiness Indicator Model (RIM) is one concept that has been used to attempt to quantify readiness. RIM, as yet, is not officially approved as the Army standard definition for readiness, nor has the relationship between resources and readiness been developed.

This case study reviewed the development of the Readiness Indicator Model (RIM), which was created in support of the Readiness System Study, from an information management perspective. The major functions considered include requirements analysis, data acquisition, data management and maintenance. Three kinds of information were collected: inventory data, schedules for personnel training and material production, and decision rules. Much of this information was obtained manually, and required a great deal of coordination among functional staff elements.

3. BACKGROUND OF THE READINESS INDICATOR MODEL

A readiness report, provided as part of a previous study, described the development of a concept to estimate unit availability based on personnel, equipment, and training shortfalls. This concept was partially tested using only personnel shortfalls to determine the impact on unit availability of a selected group of units. The results revealed that more realistic unit availability data to improve force

capability analysis was indicated. Accordingly, CAA was tasked to begin a readiness system study utilizing the concept developed as a starting point.

(1) Phase I Readiness System Study

In Phase I of the readiness system study, the study team developed the detailed functional logic of a technique for measuring the capability of deploying Army units to be available for deployment, and for measuring the capability of nondeploying support units to be available for CONUS employment. The logic of the technique was demonstrated to be feasible by manually performing all technique calculations for a small number of Army units. As a result of the Phase I effort, the sponsor directed that the Phase II effort should concentrate on the automation of the technique.

(2) Phase II Readiness Indicator Model Prototype Development

In Phase II of the readiness system study, the study team developed a working prototype model which incorporates all programs and operations required to produce readiness measurements for each unit of the force. The prototype utilizes 31 different preprocessing programs to create the files required by five subroutines of the model. The prototype computes the readiness of units in a given force based on the capability of these units to meet deployment requirements, supplied as inputs to the model. The model then calculates the capabilities of the force units to meet specific time requirements in relation to M-day to be at a specified location, manned, equipped, and trained to prescribed levels. The RIM also computes the difference between a unit's deployment requirement and its deployment capability. The difference is a measure of readiness which is called a Unit Readiness Indicator (URI). A unit with a positive or zero URI cannot meet its deployment requirement. The degree that the unit is over-ready or under-ready is indicated by the number of positive or negative days reflected by the URI.

An abbreviated force list was used in the prototype test. The list was extracted from the Post Mobilization Development List (PMDL) supplied by the sponsor to use in the test. The model produced unit readiness indicators in accordance with the technique specifications for each unit in the force. The output also included a listing of the principal cause of deployment delay for each unit.

(3) Phase III - The Readiness Indicator Model (Implementation)

The Final Phase of the Readiness Indicator Model will be to expand the RIM prototype, document the model and assist the potential recipient of the model.

4. INFORMATION RESOURCES

The developments in the RIM concept from problem definition through conceptual design and implementation have dictated the consideration of a wide variety of information requirements. This discussion will focus on the identification of data sources and then the related management of data within the model concept.

(1) Data Sources

The initial identification of data sources in the Readiness Indicator Study (Phase I) involved the analysis and description of the major processes involved and document flow surrounding the readiness environment. Eight processes were reviewed. They were:

- Program Objective Memorandum (POM) Force Development Process
- Budget Development Process
- Current Force Employment Requirements Process
- Current Force Deployment Assignment Process
- Current Force Deployment Capabilities Process
- Unit Structure Requirements/Authorization Process
- Materiel Resource Allocation and Distribution Process
- Readiness Measurement Process

These processes were examined to provide input to the formulation of the deployment capability measurement technique. This process is important because it is responsible for the information requirements of RIM. The deployment capability measurements technique, and the sources of the information required, are discussed below.

Deployment Capability Measurement Technique

The analysis of these processes and review of their related documentation led to the development of the Deployment Capability Measurement Technique. The purpose of the Deployment Capability Measurement Technique was to:

- Assemble in a systematized approach various planning factors, availability data, and specified requirements, uniquely associated with units in a specified force.
- Process the data thus gathered to permit the calculation, manual or automated, of the time required by each unit to meet the deployment requirement.

Exhibit 1 depicts the major data sources identified in RIM.

It took approximately 36 man months of effort to develop the RIM Definition and the formulation of the information concepts to make up RIM. It took another 44 man months to develop and test the model prototype. It is interesting to note that in the 80 man months it took to develop RIM into a working prototype approximately 50 percent of the total project time was spent defining and acquiring the RIM data elements from various systems. It is also important to point out that this data was not originally created for RIM but was already available from other systems as depicted in the Exhibit on the data sources for the model. In essence, the majority of this effort was spent searching for data that was present somewhere within HQDA.

Current Information Sources Identification

It has been mentioned throughout this case study that RIM continually goes through a process of information revision. Users request RIM to be run for a particular study or action and the model assumptions and inventory of data elements are input into the model. Based on the outputs that are produced the model data elements are continually revised or updated before reports are produced. In essence, running RIM is an iterative process that constantly involves trying new sources of data.

A current listing of RIM data elements may be found at Exhibit 2. The Exhibit depicts four major types of data elements. These are:

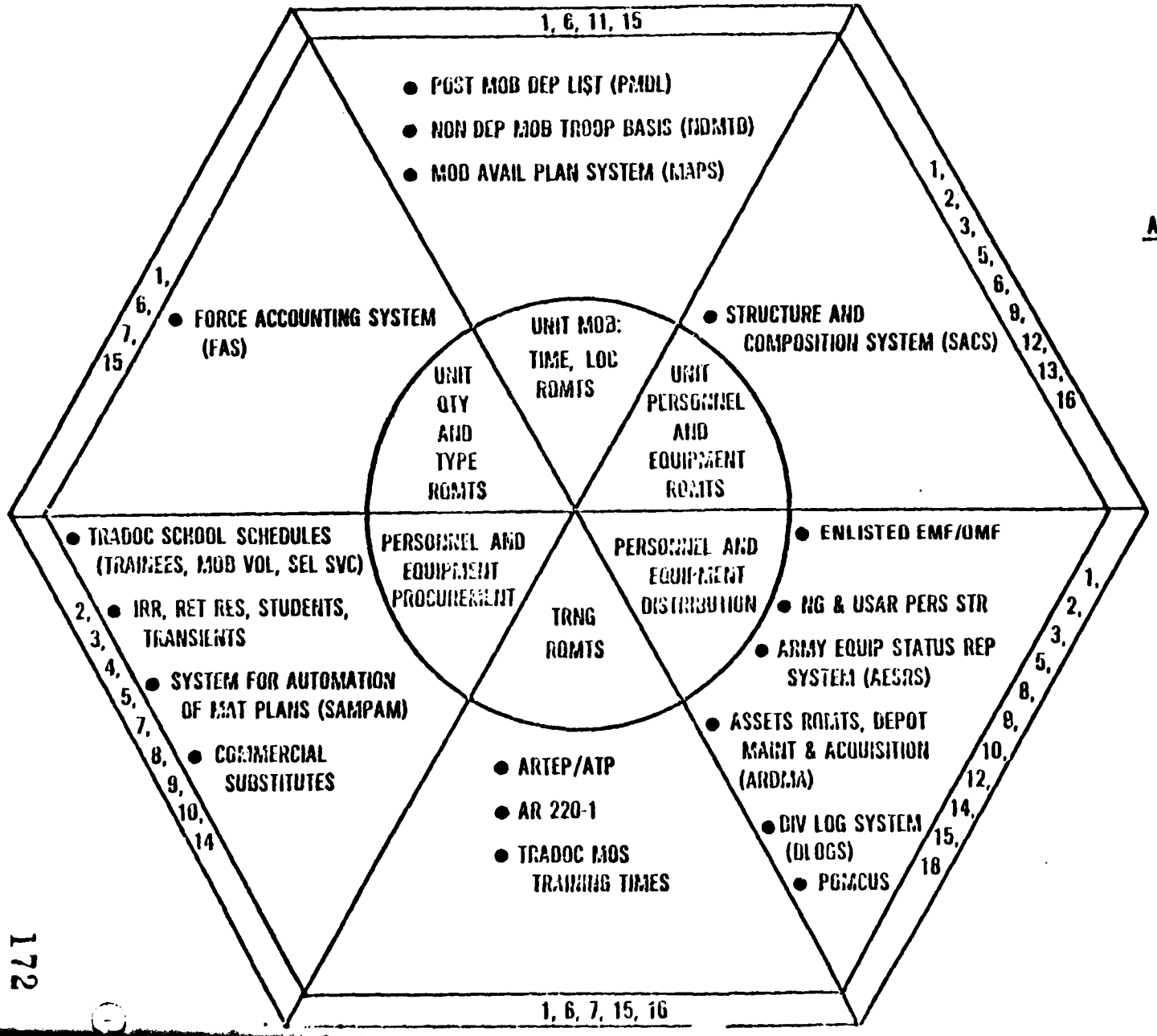
- RIM Planning Assumptions - information for which there are few automated sources. These are decisions which either the model proponent or model user must make. These also represent Army policy decisions to be made in time of crisis.

- Show Rules and Times of Availability - these are also largely from automated information sources and are decisions which users of the model must make. This information is not centrally catalogued or maintained

- On Hand Status - much of this information is similar to data elements run during Phase I and II. These data elements are mostly from automated sources and represent a major portion of the RIM data base.

- Current Schedules in this information are all automated and have been continually revised since RIM's development.

Data Sources - RIM



ARMY MANAGEMENT

1 DCSOPS
2 DCSLOG
3 DCSPER
4 DCSRDA
5 DARCOM
6 FORSCOM
7 TRADOC
8 MILPERCEN
9 DESCOM
10 RCPAC
11 MTMC
12 NGB
13 USAR
14 COM CMDS
15 CINCs
16 UNIT CMDS

EXHIBIT 1

DATA SOURCES ANALYSIS

REM

ORGANIZATION	SYSTEM	DATA SOURCE HAVE
		REM PLANNING ASSUMPTIONS
DCSOPS DSMC	JOPS	WAR PLANS
DCSOPS	DOCUMENT	M-DAY RELATION TO D-DAY
DCSOPS/USER	FAS	UNITS TO BE FENCED
DCSOPS/USER	FAS	UNITS TO BE DUMPED
USER	FAS/JOPS	UNIT TO BE MEASURED IN REM
ARMY MOBILIZATION MGMT.	FORMIS	REM UNIT REQUIRED FILL LEVELS
USER	JOPS/FAS	REM UNIT REQUIRED FILL TIMES
USER	DOCUMENT	DRAW DOWN OPTIONS
CAA	DOCUMENT	BATTLE LOSSES
ARMY MOBILIZATION MGMT.	DOCUMENT	FILL PRIORITIES
DCSPER/MILPERCEN/ TRADOC	DOCUMENT	TRAINING BASE CAPACITY
DARCOM/DCSRDA/ DCSLOG	SAMPAM	PRODUCTION BASE CAPACITY
USERS/CAA	CAA MODEL	POST MOBILIZATION UNIT TRAINING REQUIREMENTS
USER	DOCUMENT	MOS LEVEL OF DETAIL FOR FILLING
ARMY MANAGEMENT	DOCUMENT	UTILIZATION OF EXCESS PERSONNEL
PARTIALLY AVAILABLE	DOCUMENT	MOBILIZATION REQUIREMENTS FOR TDA UNITS
		SHOW RATES AND TIMES OF AVAILABILITY
DCSPER, MILPERCEN/TRADOC	EMF/OMF	STUDENTS
TRADOC	DOCUMENT	TRAINEES
DCSPER	RCPAC	INDIVIDUAL READY RESERVE
DCSPER	RCPAC	RETIRED RESERVE/STAND-BY RESERVE
DCSOPS	DOCUMENT	MOBILIZATION VOLUNTEERS
CONGRESS	DOCUMENT	SELECTIVE SERVICE DRAFTEES
DCSPER	DOCUMENT	DELAYED ENTRY PROGRAM PERSONNEL
DCSPER, DCSLOG	SACS	PERSONNEL AND EQUIPMENT FROM DUMPED UNITS
DCSPER, DCSLOG	MODEL CALCULATION	PERSONNEL AND EQUIPMENT EXCESS IN UNITS
CAA	MODEL CALCULATION	PERSONNEL AND EQUIPMENT FROM DRAW DOWN UNITS
MOBILIZATION MGMT	DOCUMENT	NATIONAL GUARD AND RESERVE COMPONENT PERSONNEL
DCSLOG	DOCUMENT	POMCUS UNIT AND LEAVE BEHIND EQUIPMENT
DCSLOG	DOCUMENT	EQUIPMENT IN DEPOT MAINTENANCE DEPOTS
DCSLOG	DOCUMENT	EQUIPMENT IN PRODUCTIVE BASE
DCSLOG	DOCUMENT	EQUIPMENT FROM COMMERICAL SOURCES
USER	DOCUMENT	EQUIPMENT FROM COMMERICAL SOURCES PERMISSABLE SUBSTITUTES

DATA SOURCE ANALYSIS

RSU Cont'

ORGANIZATION	SYSTEM	DATA SOURCE NAME
		IN HAND STATUS
MILPERCEN	EMF/CMF	PERSONNEL USAREUR
DESCOM	AESRS	EQUIPMENT USAREUR
MILPERCEN	EMF/CMF	PERSONNEL CONUS
DESCOM	AESRS	EQUIPMENT CONUS
NGCC	PERS STR.	PERSONNEL CONUS NATIONAL GUARD
DESCOM	AESRS	EQUIPMENT CONUS NATIONAL GUARD
RCPAC	PERS. STRENGTH	PERSONNEL CONSU RESERVE UNITS
DESCOM	AESRS	EQUIPMENT CONUS RESERVE UNITS
RCPAC	IRR	PERSONNEL INDIVIDUAL READY RESERVE
RCPAC	SSR	PERSONNEL STAND BY RESERVE
RCPAC	RET. RES.	PERSONNEL RETIRED RESERVE
RCPAC	STUDENTS	PERSONNEL STUDENTS
RCPAC	DOCUMENT	PERSONNEL DELAYED ENTRY PROGRAM
USSA	DLOGS	EQUIPMENT POMCUS STOCKS
DESCOM	ARDMA	EQUIPMENT DEPOT STOCKS
DCSLOG	DOCUMENT	EQUIPMENT THEATER PWRMS
MILPERCEN	EMF/CMF	PERSONNEL - CONUS TDA UNITS
DESCOM	AESRS	EQUIPMENT - CONUS TDA UNITS
		CURRENT SCHEDULES IN
DCSRDA	SAMPAM	PRODUCTION BASE
TRADOC	DOCUMENT	TRAINING BASE
DESCOM	ARDMA	DEPOT MAINTENANCE

The development of these current categories of information has been an offshoot of earlier data source analysis. Since much has been learned about the source of this data, the time to acquire this data is not representative of the heavy resource requirements needed during the initial steps of RIM development.

(2) Data Collection

Earlier sections of this case study have discussed some of the processes that were carried out to develop and collect the information for RIM. It is important at this point to bring out several factors pertinent to RIM that would be impacted by an Information Resource Management Program at HQDA. These factors are:

- The RIM data collection effort for Phase I and II comprised almost 50 percent of total man months devoted to the RIM concept
- The most difficult part of the entire data collection effort was the location of information or data - in very few cases did RIM cause the creation of new or specifically defined data
- Some of the data which was the result of integrating a vast amount of mobilization data represented gaps in information between two functional areas. This was largely information about processes for which there was more than one functional proponent. These were known as RIM Planning Assumptions
- The most frequent problem with the data that was readily available was the lack of common recurrent formats, header instructions, and file layouts which resulted in considerable preprocessing for the models
- A final set of information (Show Times and Rates of Availability) represented data over which there was little collection or analysis. Much of this data concerned the war time role of the U.S. Army.

These problems indicate that the data describing mobilization is not managed by an overall integrated (horizontal) method but rather is a summarization of a wide variety of integrated systems. The result of these problems appears in the considerable effort undertaken to integrate the information to correspond with a major management process at HQDA.

(3) Data Maintenance, Preprocessing and Verification

RIM includes 31 preprocessing programs and 5 subroutines which actually implement the logic of the RIM readiness

measurement algorithm. The extensive data preparation effort includes simple tape conversions, code validations and conversions, and the like. A part of this process has also been a manual check of the data for accuracy and "reasonableness" by the project team. Problems in maintaining and updating the model's data are being solved as the process is refined.

(4) Resources Required

The development, information acquisition and maintenance of RIM consumed over 7 1/2 man years of effort at CAA. The previous discussions have pointed out that over one-half of this time was devoted to data collection and acquisition. The entirety of resources available to develop and maintain RIM was not available to the study group. However, the information given our study group indicates that the integration of information for RIM did require a considerable amount of Concepts and Analysis Agency resources. The resource information we did receive is presented in Exhibit 3, which follows this page.

It is not possible to determine the dollars or man-months that could have been saved had some sort of data location capability existed at HQDA. However, based on our conversations with RIM personnel and the man-months breakdown made available to us, a savings would be considerable if it could be computed.

Two points are important to make regarding resources required for RIM. The first point is that RIM information is continually being changed as new sources are discovered for information. The lack of a central location of information at HQDA makes this iterative process necessary because sources must continually be indicated. In all, the information collection process for RIM is the most resource intensive process of the entire model, i.e., data must be collected from critical systems which are not coordinated.

The second point to make is the lack of normal integration of mobilization data as demonstrated by RIM impacts other Army resources since management procedures have to be developed on Running Assumptions and Rates of Availability. In essence, the cost of RIM is probably higher than the cost CAA has incurred because of its impact on the way mobilization information has been traditionally managed at HQDA. Additional resources have to be spent in developing information for which there was no source in the past or opportunity costs calculated in not locating the information available.

5. ISSUES AND OBSERVATIONS

Our analysis in support of the RIM case study has focused on the management and coordination of the process of bringing together and making usable the data necessary for the Readiness Indicator Model.

Manpower Resources Required to Develop RIM Phase I and Phase II

	Problem Definition Formulation of New Readiness Measurement Concept Phase I	Readiness Indicator Model Prototype Development, Test Phase II
Acquisition & Analysis of Input Information (Readiness Environment Analysis & Model Input Data Acquisition)	20*	20
Development of Model Logic (Measurement Concept Automation Specifications)	16	24
Maintenance of Data Base	0	6
Test & Operation of Model, Output Demos.	0	6

* Manmonths

Hence, the findings of the case study concern the management of information about readiness and mobilization policies which is spread throughout HQDA. The findings made concerning information management, as a result of this case study, are identified below. Impacts of these findings and Information Management are then considered.

(1) Findings

The major findings concerning RIM which were discovered during this case study are primarily concerned with difficulty in locating desired information, difficulty in resolving questions of authority over information to reconcile conflicting data, and the poor quality of the data in the systems which provide input to RIM.

- There Was No Easy Way to Identify the Source of the Information That RIM Needed

  Identifying information sources was difficult during RIM development, in part, because there is no one Army authority for all of the defined components of mobilization policy. For example, the Surgeon General makes decisions in mobilization of doctors, the Selective Service in mobilization of draftees, the DCSRDA in production equipment availability, the DCSOPS in force mobilization, and DCSLOG in logistics support. As a result, one of the most time consuming tasks associated with RIM was the identification of sources for information.

  No central directory of information existed during RIM's development for identification of the sources of information concerning mobilization of an organization. Data was located for RIM by informal contacts. Conferences were held to determine the rules for providing data to RIM. In addition, the various MOBEX exercises at HQDA have pointed to the lack of availability of information to support a planned mobilization. RIM has shown that the data can be found if sufficient effort is expended. The problem, however, is finding the data in a timely manner and making the data available to a community of users.

- RIM Has Demonstrated That There are Multiple Authorities for Information Resulting in Confusion and Inconsistency

  The cost of developing a model like RIM is largely a function of this integration process. Such costs and timing make responses to similar questions asked during a MOBEX prohibitive.

  The RIM study has identified various decision or planning assumptions for which there are multiple organizations responsible. Examples of the topics of information with multiple authorities are:

- Uncovered POMCUS
- Use of Mobilization Volunteers
- Selective Service Show Dates
- Trainee Availability Show Rates
- Unit Required Fill Levels and Priorities
- Post Mobilization Unit Training requirements
- Utilization of Excess Personnel
- Mobilization Requirements of TDA Units

There are many examples which RIM has provided concerning multiple authorities. For instance, the Surgeon General and the DCSOPS disagreed at one point on the mobilization policy affecting doctors. The Tank Force Management Office and the Army Equipment Status Reporting System are in disagreement over the number of tanks in Europe. Different activities have plans for use of Uncovered POMCUS in Europe, and different organizations have plans for the mobilization of the Individual Ready Reserve. RIM has been used in the following studies which in some part have been concerned with multiple authority for information:

- Personnel Resource Availability Study (DCSPER DCSOPS)
- Reserve Mobilization Capability 1978 (OSD)
- Review of Guard and Reserve (OSD)
- MOBEX 79 (DCSOPS)
- POMCUS Increase Impact on Readiness (ICAF)

The existence of multiple authorities for information is a problem that was encountered frequently during the development of RIM. It represents a problem which contributes to confusion in locating and reconciling data, and is a problem that Information Resource Management must address.

Poor Data Quality in Systems Providing Information to RIM Has Been a Significant Problem

Throughout the development and continuing through the maintenance of the model, quality assurance of RIM data has been a problem. The Concepts Analysis Agency closely monitors the quality of their analysis (study

methodologies), but as a secondary user of data, CAA must accept the information given to them by HQDA activities. A considerable amount of activity is expended each time the RIM data base is updated. Much of the preprocessing effort in RIM is devoted to screening the data for problems. Examples of the types of errors include:

- Errors in MTOEs - entire files must be purged. Some units had no MTOE, others had numerous MTOE.

- Units not in PMDL - they found that the USAREUR people were not filling out the PMDL correctly.

- Air Defense units were reporting equipment and personnel at different levels of detail. Several asset files had no units attached to them

- MOS changes were not being updated across the VTAADS and SACS systems causing MOS mismatches and file dumps

- Equipment Status reports were not in agreement which caused program interrupts

- Equipment was missing in files such as the M-48's in the ARDMA tape file and the Vulcan equipment. Users forgot to record equipment, and site confirmation was required to correct the errors.

- Depot maintenance reports were frequently in error. DARCOM did not insure that NICPS were reporting materiel or depots were reporting receipt of assets

- No mobilization station for several units in scenarios

- Formats on the same tapes would change between updates without notice to RIM personnel. Files would come in without identification or the orders of files would be changed without notice.

The Vertical Management Information at HQDA Created Problems for RIM, Which Required Horizontal Integration of Information

Many of the information systems supplying data to RIM were designed to satify the vertical reporting requirements of a particular functional area. Drawing data from a variety of such systems together to produce a meaningful information product was difficult. For instance, an earlier finding stated that there were multiple authorities for a variety of information requirements in the RIM. The emergence of these multiple authorities is largely due to the functional orientation of Army systems. For instance, who is the

functional proponent for utilization of excess personnel, the DCSOPS who is responsible for mobilization or the DCSPER who is responsible for personnel? The lack of a horizontal interaction of mobilization information has allowed this information duplication to exist since this type of duplication can only be seen when information is integrated by a meaningful concept.

(2) Impacts

- The inability to identify the information sources for RIM in a timely and effective manner caused the expenditure of substantial manpower in finding the information and developing the data for use in RIM. The lack of a mechanism for the location of data at the HQDA level makes every study a cumbersome process when information location must be accomplished. RIM serves to demonstrate that the existence of information was not so much a problem as the location of that information. RIM developed the same mechanisms used by action officers or studies to collect data i.e., informal contacts, mass telephone use, and committee meetings. The location of data is a learning process with limited tools available to assist the manager. RIM demonstrated that the lack of a location capability means that information has to be manually located at great cost of manpower and time.

- The existence of multiple authorities over the same information is indicative of information redundancy or duplication or both. RIM demonstrated that if an overall definition of mobilization were developed (a horizontal look at information) many of the functional redundancies of information would become apparent. In essence, RIM showed the danger in "stovepiping" information between functional areas with similar responsibilities. The problem with RIM's duplicate information was that different information was given out by different organizations for the same subject. For instance, two organizations at HQDA disagree over the number of tanks in Europe. Two organizations disagree over the major end items in the production base. Two or more organizations disagree on when trainees will show after mobilization. Many organizations disagree over how long it will take to train CONUS units after mobilization.

- RIM has demonstrated that poor data quality is a problem for many Army studies. The data quality problems that RIM pointed out were the direct result of the absence of comprehensive quality assurance procedures on mobilization information. The Army applications that support mobilization may have good software, however, RIM has shown that if the quality of inputs is not controlled the quality of systems products will be suspect. Quality has an impact on resources. Poor quality information is wasted productive

effort if RIM managers suspected the information was not good and decide not to use it. The other aspect of quality of information is that it impacts the management of resources. If RIM were used as part of a functional desired support system, what reserve employment decisions would be made? Making a management decision on inaccurate data would waste the Army's constrained resources.

6. CONCLUSIONS

RIM, as a case study, demonstrates some of the problems that exist when a horizontal integration of information about a management process occurs at HQDA. The focus of existing information systems on the vertical management process makes difficult horizontal, or cross-functional, information integration. Information of poor quality and conflicting authority is also seen to adversely affect management.

5-TON TRUCK CASE STUDY

The 5-ton truck case study is provided as an example of the efforts required of HQDA functional staff organizations to manage the 5-ton truck program, assisted by the current management information systems. The management of 5-ton trucks include the assessment of requirements, development, procurement, and ultimate distribution of these trucks. It should be noted that our discussion will focus on information management not the management of the 5-ton trucks themselves.

The results of the case study analysis are discussed below under the topics:

- Statement of the problem
- Background
- Information problems and issues
- Summary of case findings and potential impacts

The information management methods supporting the management of 5-ton trucks are typical of the methods used at the HQDA staff level to manage the entire tactical wheeled vehicle (TWV) fleet and similar to the methods used to manage most major items of Army materiel.

1. STATEMENT OF THE PROBLEM

The Army has recognized that tactical wheeled vehicle management information systems are not fully integrated and are not fully responsive to fleet managers. In addition, these shortcomings in wheeled vehicle information management have affected the Congressional perception of the validity of the Army's expressed requirements for these vehicles, resulting in a potential reduction in program funding and partially contributing to the current suspension in procurement of these vehicles.

The problems associated with the Army's TWV management informaton systems have contributed to the declining credibility of Army information as perceived by Congress. On 16 February 1979, a report of the House Appropriations Committee stated:

"Due to DA management and data base deficiencies, the validity of any DA determined requirements is considered suspect. Consequently, DA truck needs based on a comparison of on-hand assets to even a reduced AAO are not viewed with any degree of confidence."

The ramifications of continued deferment, such as production lead time lost, may ultimately result in a serious problem in maintaining a satisfactory readiness posture.

2. BACKGROUND

The 5-ton trucks under examination are wheeled, tactical transport vehicles. This truck series comes in seven body styles: cargo, dump, tractor, wrecker, van, stake and bolster. The 5-ton truck is one of the Army's military design workhorse vehicles. The missions performed by these vehicles are numerous: it hauls ammunition and heavy general cargo; it acts as a tractor prime mover for various semitrailers; it provides transport of headquarters command posts, management information systems, and communications and electronic systems; and it is the principal wrecker recovery vehicle for the wheeled vehicle fleet.

The Army had approximately 34,000 5-ton trucks in its inventory as of 30 September 1978, 10,000 short of the FY80 Army acquisition objective. Present HQDA concerns center around a severe shortage of selected vehicle body styles and an aging fleet coupled with diminishing authorized resources for the timely acquisition of replacements. This situation has become acute in view of reduced funding levels for tactical wheeled vehicle procurement over the past several years. Funding for the wheeled vehicle fleet has been reduced drastically. Factors such as these have placed a greater emphasis on the information systems which support the management of the asset.

The management of Army tactical wheeled vehicles is accomplished within the functional management structure of the Army Staff, and the staffs of major Army commands. The functional alignment provides a clear division of responsibility for the management of materiel throughout its life cycle. The requirements for initial or upgraded mobility are the responsibility of the Deputy Chief of Staff for Operations and Plans (DCSOPS) in coordination with the U.S. Army Training and Doctrine Command (TRADOC).

The need for a specific capability triggers the detailing of a conceptual approach which leads to the establishment of a required operational capability statement and introduction of the need into the Army's materiel research, development, test and evaluation community. The Deputy Chief of Staff for Research, Development, and Acquisition (DCSRDA) has primary Army Staff responsibility for managing the procurement of materiel to meet the stated capability. A primary document used by the DCSRDA to distribute information to the Materiel Readiness Commands (MRC) concerning requirements and procurement objectives is the Research and Development Acquisition Committee (RDAC) worksheet.

The transition of developmental equipment to service use involves a coordinated shift in responsibility from the acquisition community to the utilization and support community. The Deputy Chief of Staff

for Logistics (DCSLOG) assumes Army Staff responsibility for management of maintenance and transportation support, logistic planning, materiel readiness, and the management of attendant resources. An information source for DCSLOG concerning authorized equipment and disribution is the Total Army Equipment Distribution Plan (TAEDP) report.

3. INFORMATION PROBLEMS AND ISSUES

The remainder of this case study will concentrate on issues and observations related to the management of information concerning the 5-ton truck program. Management of the 5-ton truck program includes the efforts of the HQDA staff to gather needed information to assess requirements and plan for the procurement and ultimate distribution of the Army's 5-ton trucks, assisted by the currently available management information systems.

A major problem with the TWV management information systems is that responses to questions posed by analysts in OSD, OMB, and Congress regarding composition and distribution of the TWV fleet frequently cannot be provided in a timely or accurate manner. Data coming into one of the HQDA MIS's is not necessarily available to another MIS, is portrayed in a different manner, or reflects a different cutoff date.

The primary observations made during the analysis of the information management activities for the 5-ton TWV fleet are discussed below under the topics:

- LOGSACS Data Base
- Use of the RDAC Worksheet
- DCSRDA and DCSLOG Expansion of the LOGSACS Data Base
- Equipment Distribution Planning
- Budget Formations Based on LOGSACS Data Base
- Budget Limitations Inherent in Current MIS
- Mission Oriented 5-Ton Trucks
- Distortion in Vehicle Requirements Caused by Vehicle Substitution

The current use of the LOGSACS data base is described in the section which follows.

(1) LOGSACS Data Base

The central informational building block from which the RDAC worksheets and the TAEDP reports are built is the Logistics

Structure and Composition System (LOGSACS). LOGSACS is composed of a series of procedures and programs which tie together four data bases and a manual system to manage requirements and authorizations for equipment. Exhibit 1 depicts the relationships between the various files and processess.

The user's manual that currently exists for LOGSACS is out of date and, therefore, inadequate to support user needs. The current manual was last updated in 1970. Since that time the system has evolved to a point where the nine year old manual is considered obsolete and ineffective. Because of the use of LOGSACS data as inputs to other systems (RDAC worksheets and TAEDP, to name a few), a lack of understanding concerning LOGSACS has developed, with the resultant potential for misuse of LOGSACS data. As understanding of LOGSACS declines with attrition of personnel, knowledge of how LOGSACS data is derived is lost, and there is an increased potential for misuse of LOGSACS data.

The increased use of LOGSACS data by other Army organizations is an obvious attempt to defray the costs of developing the same data for their own internal use. However, data sharing requires substantial knowledge of the nature of the data being received. This knowledge is not readily available with LOGSACS. The users of LOGSACS data have no formal mechanism to familiarize themselves with the strengths or weaknesses of LOGSACS data, or with the precise meaning of the shared data elements because system documentation is not current and doesn't provide the user with that type of information.

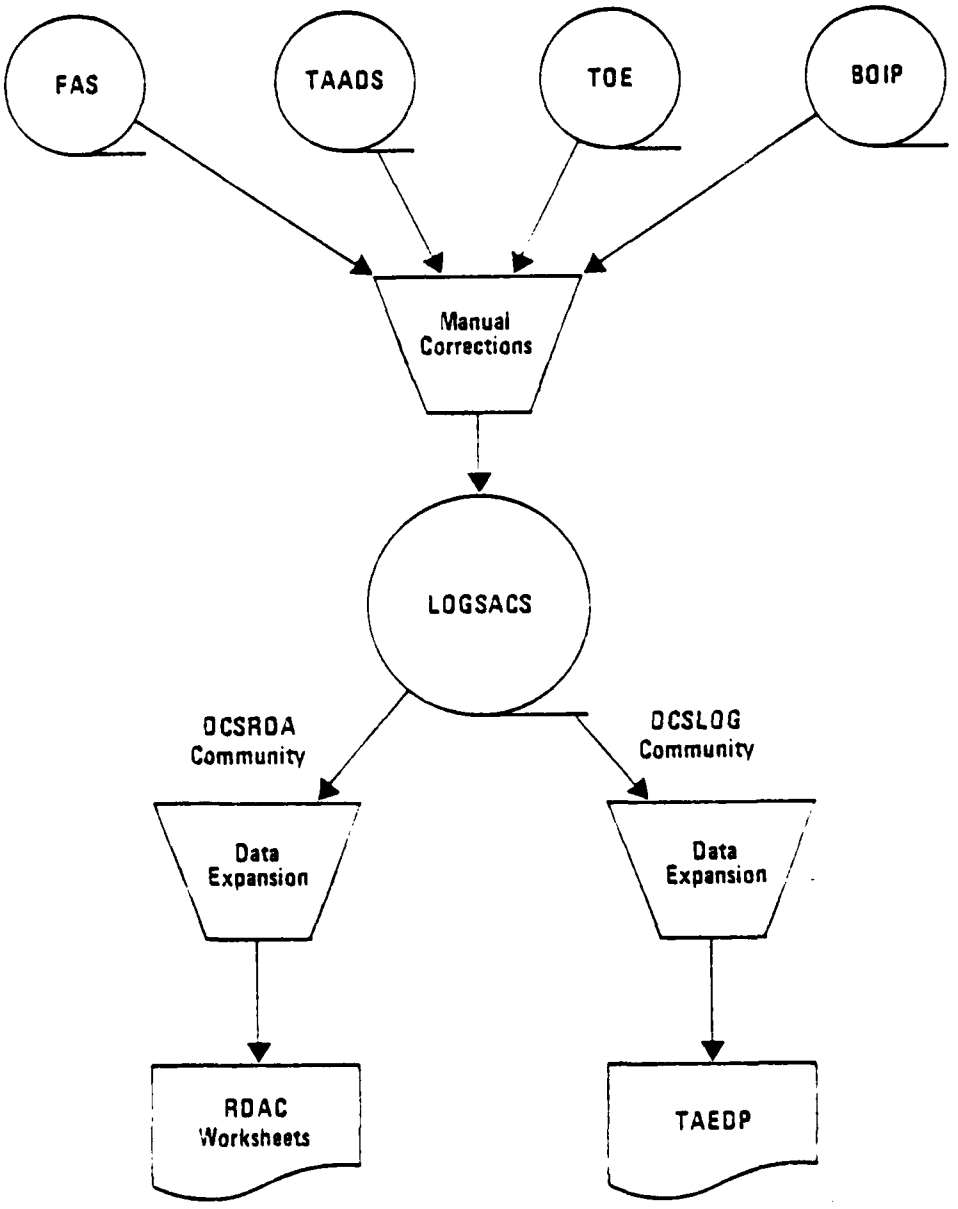
Due to the apparent proliferation of LOGSACS use, it would be extremely beneficial if all users were aware of what the shared data actually portrayed. This awareness would not necessarily alleviate all problems concerning sharing LOGSACS data. This awareness should, at a minimum, allow the user to understand the reasons for any discrepancies in data. It could also permit the users to concentrate their efforts on corrective action to reconcile differences, rather than the current situation where users can only guess at the reason for discrepancies making corrective action difficult, if not impossible.

(2) Use of the RDAC Worksheet

The DCSRDA, through the RDAC worksheet, consolidates information concerning 5-ton trucks, by all-body-types (ABT); therefore, the procurement planning is by ABT. On the surface it would appear that the DCSRDA is fully justified in utilizing this consolidated data. But upon closer examination, this ABT roll-up can distort the true asset postures for 5-ton trucks when displayed on documentation to be used in hearings that defend the program and budget.

5 Ton Truck Case Study

Relationship of LOGSACS — RDAC — TAEDP



Since there are seven body styles of 5-ton trucks, it is possible that a severe shortage of one body type, but a corresponding excess of another body style can occur. Therefore, when aggregated figures are presented, it is possible for these excesses and shortages to balance out. Without greater resolution of particular body types, it is difficult to justify procurement actions.

It should be pointed out that a special DCSRDA project identified this problem. Recently developed RDAC listings do reflect data on specific body type vehicles. The "Action-Planning Conference for Tactical Wheeled Vehicle Management" recommended the continuation of this detailed RDAC listing to facilitate program and budget justification to the RDAC/OSD, OMB and Congress. Although it appears this issue has been solved, the presence of an IRM program could have identified this problem during the information systems planning, review and coordination (ISPR&C) process. During ISPR&C an attempt would be made to coordinate information user requirements, both internal (DCSLOG) and external (Congress), to ensure the resultant system provides the necessary information. In other words, an IRM program can provide a more comprehensive look at information requirements, rather than the more prevalent "stovepipe" approach to systems development currently being used by many Army organizations.

(3) DCSRDA and DCSLOG Expansion of the LOGSAC File

The 5-ton truck on-hand asset balances as portrayed by the RDAC worksheets and TAEDP reports, reflect different figures as of the same date. As of September 30, 1979, the RDAC worksheet projects a balance of 9,196 5-ton cargo trucks worldwide, while the TAEDP projects only 8,591, a difference of 605 trucks, or 7% discrepancy. But as the planning horizon lengthens, so does the discrepancy between the data. By September 30, 1981 the discrepancy between the RDAC and TAEDP projections has increased to 22%. The RDAC worksheet projects 10,727 as of the end of FY 81, but the TAEDP reports 8,808 as of the same date, a difference of 1,919.

Recalling that the DCSLOG is required to distribute and support the trucks procurred by the DCSRDA, this inconsistency in data has an obvious impact on the integrity of the DCSLOG plans. Another impact of this inconsistent data, is the potential loss of credibility with higher level organizations, i.e., OSD, OMB and Congress, as they become aware of these inconsistencies. In fact, as we gathered information concerning this case study, we attended a House Appropriations Committee hearing where the Chairman indicated that the committee has been given conflicting data concerning the number of 5-ton trucks currently in the Army inventory. This potential loss of credibility with the HAC and other higher level organizations can have an adverse impact on the Army. The inconsistent data can also cause coordination problems between the DCSRDA and the DCSLOG.

The cause of this inconsistency in data can be traced to the process where the DCSRDA and DCSLOG manipulated LOGSACS data differently to arrive at RDAC worksheet and TAEDP figures. The divergence between the RDAC and TAEDP increases in outyears since FY80 figures are predicated on FY79 figures, and figures for succeeding years are predicated on the year previous. It was indicated during interviews that the probable cause of the inconsistency is the different methods employed by the DCSRDA and the DCSLOG in handling equipment losses, i.e., peacetime losses, washouts and sales.

Users of both systems, RDAC and TAEDP, felt that separate reports were required, due to differences in the DCSRDA and DCSLOG functions. But, notwithstanding separate reports, they expressed a need for consistent data between these reports.

The primary cause of this asset inconsistency appears to be a lack of front-end planning and coordination for information to support the 5-ton truck program. The presence of an IRM program could have surfaced these inconsistencies early during the system development stages, or at least identified then during the quality assurance process. Either method could have potentially led to an earlier detection of these inconsistencies, identified the cause, and corrective action could have been taken.

(4) Equipment Distribution Planning

The DCSLOG is responsible for the materiel distribution planning function. One of the primary tools used by the DCSLOG is the TAEDP. Currently, the TAEDP deals only in authorized equipment. New items of Army materiel coming into the Army inventory, but not yet type classified, are not included in the TAEDP. Since the DCSLOG is required to plan for distribution for five years into the future, many new items of Army materiel are expected to be included in the Army inventory, and the distribution of these items should be planned. But the TAEDP cannot consider these items because they have not yet been type classified. Therefore, distribution planning for these new items requires a manual process resulting in the expenditure of considerable manpower.

It should be noted that the Army is aware of this situation and is taking steps to include items not yet type classified, but expected to be in the next five years, in the TAEDP. The expected completion date of this project is June 1980.

An effective IRM program could have highlighted this obvious oversight during the systems development stages of the TAEDP. Although an IRM program in itself would not have eliminated this situation, it could have been identified earlier and taken into consideration during the original development stages rather than the retrofit approach now currently required.

(5) Budget Formations Based on the LOGSACS Data Base

The DCSRDA uses the December LOGSACS to prepare the 5-ton truck procurement budget (as well as other procurement budgets). The DCSLOG uses LOGSACS data from June of the following year. The data contained in the December and June LOGSACS is different. Recalling the close relationship between procurement and distribution, i.e., the DCSLOG distributes what the DCSRDA procures, it appears as though overall 5-ton truck management would be enhanced if both activities used the same basis for the development of their respective plans. From a 5-ton truck truck program perspective, the DCSLOG in planning to distribute a different amount of trucks than the DCSRDA is planning to buy.

Because of the close coordination required between the DCSRDA and DCSLOG communities, it would be of obvious benefit to the 5-ton truck program as well as to the Army as a whole, if the same planning basis were used by both activities. An IRM program could address these inconsistencies that cross organizational lines and possibly a single basis could be employed by both activities, either through mutual agreement of both parties or by direction of a higher authority.

(6) Budget Limitations Inherent in Current MIS

Periodically, the development communities fail to qualitatively and quantitatively identify support equipment requirements during the acquisition cycle. As a result, programming/budgeting actions for support equipment may lag the primary item and lead to potential support equipment shortfalls, program delays, and unanticipated needs for additional funds. Conversely, "hidden" support equipment requirements may be approved and generate an increase in procurement quantities without detailed knowledge of the requirement being available.

The Basis of Issue Plan (BOIP) system is the established procedure for identifying and reporting support equipment requirements. In the opinion of the Action Planning Conference for Tactical Wheeled Vehicle Management, the BOIP "...system is adequate, however, disciplined enforcement of the system has varied widely." Lack of awareness and education may be a major contributing factor.

In light of the fact that there already is an adequate system in place (BOIP), the apparent cause of the problem lies in the lack of a consistent enforcement program to ensure the required information is input into the BOIP system. Since the development communities are required to input support equipment information already, the quality assurance function of an IRM program could pinpoint violations of this requirement for information. The quality assurance aspect provides an incentive for the development communities to routinely comply with this information

requirement since they know this compliance will be checked periodically.

(7) Distortion in Vehicle Requirements Caused by Vehicle Substitution

Currently, no methodology exists to reflect the impact of substitute vehicles on the requirements for a specific vehicle. For example, if a unit required five "wrecker" 5-ton trucks, but the 5-ton trucks were not available and five other trucks were substituted, the current requirement for 5-ton "wrecker" trucks would not be recognized because of this substitution. This inability of the current information systems to adequately address substitute items can result in a false status of assets on hand. MIS roll-ups, that include substituted items, would reflect a greater than actual number of items on hand. This distorted data is part of the information presented to OSD, OMB, and the Congress as procurement backup information.

The Army is aware of this situation and a study is being conducted by the Army Logistics Management Center. Solutions are being recommended which would enable the TAEDP to reflect this information correctly. Although IRM would not have necessarily corrected this situation, the presence of an IRM program could possibly have facilitiated the identification of this problem and corrective action could have been taken earlier. Through an education process concerning the characteristics of the data an organization is using, situations such as this could be highlighted and possibly prevented in the future.

In the foregoing sections, the major information management problems related to the 5-ton TWV management program have been described. In the next section the case findings are summarized and the impacts are described.

4. SUMMARIZATION OF CASE FINDINGS AND IMPACTS

An objective of this case study is to evaluate the relevant findings of the case in terms related to the information resource management topics, previously outlined in Chapter III. Viewed in this manner the current and future impacts of requirements to provide Army materiel data for both internal and external requests can be evaluated.

The findings of the case, and their associated impacts, are discussed in the next section.

(1) Findings

The significant information management findings of the case are summarized below.

- The current LOGSACS manual is out of date. The current user manual was last updated in 1970, making the manual absolete and ineffective.

- Different levels of detail data are used by DCSRDA in compiling similar reports. The DCSRDA, in the RDAC worksheet, consolidates data by all-body-type (ABT) for procurement planning. This ABT roll-up can distort the true asset posture of 5-ton trucks. In the aggregate hidden excesses and shortages balance out, therefore excessive overages or shortages in the inventory are masked.

- Inconsistant data results when LOGSACS data is manually manipulated. DCSRDA and DCSLOG start with LOGSACS data, but each manipulates the data manually for its own use. The two staff agencies produce inconsistent data, which when re-utilized becomes more distorted.

- The materiel distribution planning activity can not easily accommodate new equipment coming into the Army. The system provides for handling authorized equipment only.

- The DCSRDA and DCSLOG each use different versions of the LOGSACS data base for budget planning. DCSRDA uses the December LOGSACS and the DCSLOG uses a version produced in June. Data is different in both files, resulting in inconsistent budget planning.

- Current MIS do not accurately identify support equipment requirements during the acquisition cycle. The apparent cause of the problem lies in the lack of a consistent enforcement program to ensure required information is entered into the Basis of Issue Plan system.

- Current systems cannot distinguish the impact of substitute vehicles on the procurement process. Currently subsittute vehicles are accounted for in the aggregate, thus masking potential critical shortages for the vehicles for which they were substituted.

(2) Impact of Case Findings and IRM Concepts

A summarization of the impacts of the case findings, and the relevant impacts of IRM concepts are presented below:

- A lack of current user documentation creates a high potential for misuse of LOGSACS data. The user manual is designed to explain the nature of the data in any system, and defines characteristics that allow the user to interpret and use the data accurately. Two IRM functions collectively address this subject to reduce the potential for a misuse of data. The standardization function incorporates the

responsibility for document standardization and procedures, and helps establish the format and content guidelines for constructing user manuals. The metadata management function helps control and manage the timely update of user documents.

- Continued use of ABT roll-up data makes justification for procurement action difficult By masking the extreme overages or shortages, the Army staff has inaccurate data when justifying procurement actions. More importantly the potential for procuring the wrong type of truck exists. The IRM function of Information Systems Planning, Review and Coordination could assist in resolving problems of this type. A proper definition of requirements for managing the TWV fleet would incorporate appropriate levels of detail for asset analaysis, therein making the data more accurate. The metadata management function could manage the problem of code representation and reduce the amount of manual manipulation of data caused by the ABT roll-up procedure.

- The integrity of data, and plans based upon it, are questionable when inconsistent data is used When DCSRDA and DCSLOG use inconsistent data for planning purposes the discrepancies between plans get larger as the planning horizon lengthens. The DCSLOG begins to plan for the distribution of vehicles the DCSRDA plans to procure. If DCSRDA plans are in error, the DCSLOG plans are also based on error. The primary cause of this type of inconsistency appears to be a lack of front end planning to support the 5 ton truck program. The IRM function of System Planning Review and Coordination can establish a procedure for reducing these inconsistencies. The Quality Assurance function can assist in assuring better quality and accuracy of data and the Audit Compliance function can verify that exchanged data is properly utilized, and not inadvertently or deliberately modified to create erroneous data.

- Distribution planning for new items of equipment requires a manual process resulting in the use of considerable manpower The need for including new equipment to be introduced in the near term years must be considered for 5 year planning. The IRM function of information system planning provides the basis for integrating requirements into current and planned systems and could lend itself to resolution of planning problems like this one.

- The potential for error in coordinating procurement and distribution of 5-ton trucks is increased. Under the present situation the DCSLOG is planning to distribute a different amount of trucks than the DCSRDA is planning to buy. An IRM program could address these inconsistencies that cross organizational lines and arrive at a single basis for budget planning.

- Inaccurate data in the Basis of Issue Plan system can result in buying too few amounts of equipment or in some cases buying too much equipment. Since the development communities are required to input support equipment information currently, the quality assurance function of an IRM program could pinpoint violations of this requirement for information. Such a program, Quality Assurance, provides an incentive to enter good data if the notion of compliance checking also exists.

- The inability to adequately address data about substitute items can result in a false status of assets on hand. Because of this inadequacy rolled-up data reflects a greater than actual member of items on hand. Although IRM would not have necessarily corrected this situation, the presence of an IRM program could possibly have facilitated the identification of this problem and corrective action could have been taken earlier. Through an education process characteristics about data and its use can be promulgated throughout an organization.

In this section the major case findings were summarized and potential impacts of those findings were demonstrated. Because the information issues presented in this 5-ton case study are representative of similar issues for the tactical wheeled fleet and the Army's major materiel management arena, many of the concepts described here could also be applied throughout the materiel community.

MANPOWER MOBILIZATION CASE STUDY

This case study is an examination of the process by which the Headquarters, Department of the Army responded to a Congressional inquiry for personnel strength data. The inquiry was directed towards an analysis of the Army's ability to successfully mobilize its forces.

The significant factors relating to the case will be presented, by topic, as follows:

- Case Overview
- Response Preparation
- Summarization of Case Findings and Impacts

This case is representative of a typical external request for information to which the Army staff must frequently respond.

1. CASE OVERVIEW

Within the context of the Federal establishment, the Department of Defense and the Department of the Army, in particular, are required to respond to requests for information from external sources, such as the White House, Congress, OMB, etc. In this case study, a typical Congressional request for information was analyzed in detail. The specific requirement for information was established, then the processes and resources required to respond to the requirement were analyzed.

Congressman Robin Beard requested information about the Army's ability to successfully mobilize its forces if commanded to do so under present conditions. He requested data to be forwarded in report form, which was then subjected to hearings held before Congress. The inquiry asked for six different categories of data analysis. The specific categories of data are shown in Exhibit 1. Where estimates were necessary, the Congressman requested the judgments to be "the best possible judgements made by the Army staff and field commanders, without DOD or other political influence." A response time of approximately five weeks was requested.

2. RESPONSE PREPARATION

The Congressman's letter was sent to the Secretary of the Army who forwarded it to the Office of the Chief of Legislative Liaison (OCLL). OCLL, in turn, tasked the ODCSPER to provide the responses. The ODCSPER tasked the Manpower, Plans and Budget Directorate, who, in

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AN INFORMATION MANAGEMENT STUDY FOR HEADQUARTERS DEPARTMENT OF --ETC(U)
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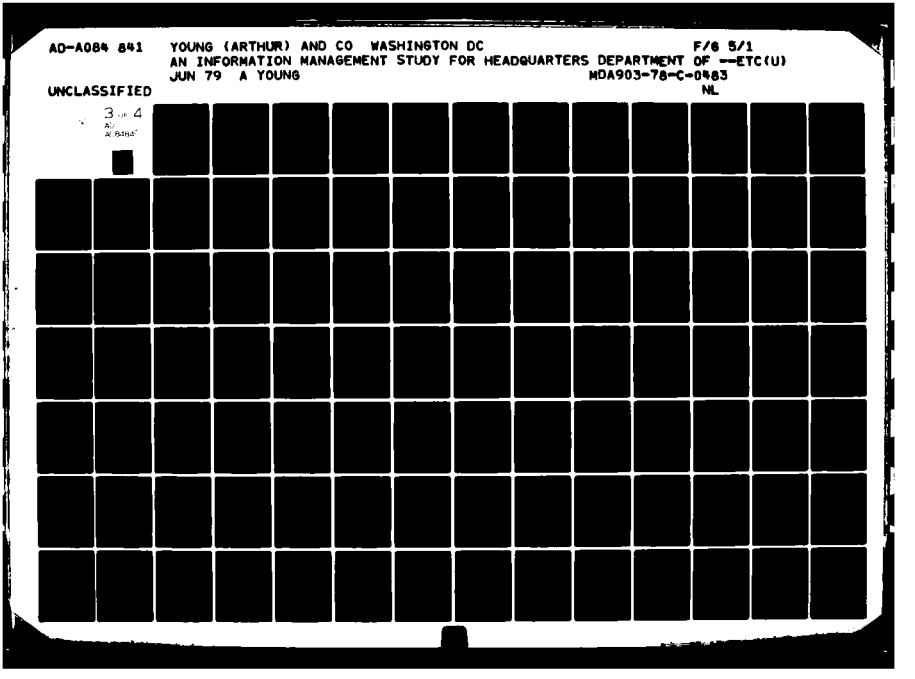

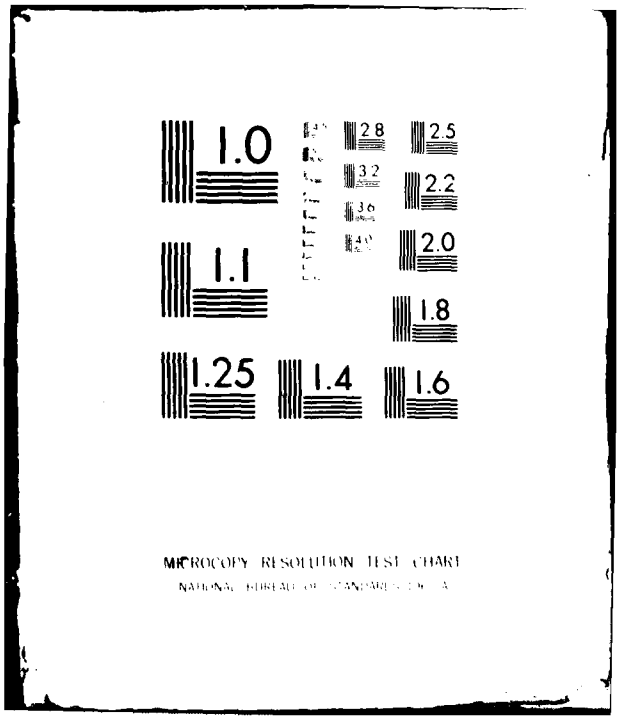
1.0
1.1
1.25
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1.6
MICROCOPY RESOLUTION TEST CHART

EXHIBIT 1

Manpower Mobilization Case Study
Statement of Original Information Requirements

1. The overall manpower shortfall reports, based on military occupational specialty (MOS) requirements for the Army, as follows:
   - Overall Trained Military Manpower (TMM) shortfall
   - TMM shortfall by major commands of the active force
   - TMM shortfall for the reserve components combined
   - Based on the combined TMM, Forces Command, and USAREUR categories, provide a detailed analysis of the five most critical MOSs within each Career Management Field (CMF), to contain Army-wide authorizations and shortages, overall training time, and other related management data that the Army considers pertinent in analyzing these shortages, especially as they impact mobilization planning
   - A current chart reflecting all MOSs, by title and number within each CMF.
2. Demographic data using a format provided
3. Data regarding the number of sole parents in the Army
4. Data regarding the number of pregnant women in the Army
5. The judgments of the Army staff as to the percent of reserve component personnel that would be able and willing to respond to a call for mobilization within thirty days after notification
6. The judgment of the Army staff as to the percent of reserve components personnel that could be considered as falling into the combined "unsatisfactory participation" and "ghost" categories.

turn, tasked the Plans Division and then the Personnel Mobilization Team. The primary Action Officer assigned responsibility for compiling a response was a member of this team. The activities performed in response to the Congressman's request are summarized, by major tasks under the headings:

- Requirements Definition
- Tasking of Assignments
- Data Compilation by Task
- Report Consolidation

In the paragraphs which follow the key factors for each area of activity are discussed.

(1) Requirements Definition

Based on the original requirement, the Action Officer had to decide who had the data, in what form the data was recorded, and what data the Army could provide. Individuals from eleven distinct organizations within and outside the HQDA staff were asked to attend a planning meeting to discuss the requirement and issues relating to the fulfillment of the requirement. A total of three meetings were held (including the initial meeting) and numerous phone calls were made to address two major concerns: defining the information requirements that needed to be satisfied; and, coordinating the data collection efforts.

With the exception of the first requirement, there were minimal problems in determining what data could be provided. After considerable discussion it was decided the following data would be provided for requirement (1).

- The peacetime manpower status for the active Army by CMF separated by Officers, Warrant Officers, and Enlisted categories
- Full mobilization manpower status ninety days after mobilization (M+90) by CMF separated by Officers, Warrant Officers, and Enlisted categories
- The peacetime manpower status for the active force for nine major commands by CMF separated by Officers, Warrant Officers, and Enlisted categories
- A combined report for the reserves
- Based on TMM, Army-wide, the five most critical MOSs in each CMF

- A current chart showing all MOS in each CMF.

Prior to actually collecting the data, several problems had to be resolved before the requirements could be fulfilled. There were definitional problems for terms and data elements. There were problems locating data sources and determining what data reporting formats were available. Some specific examples are cited below:

- The original request for seven character MOS data had to be clarified as the Army does not maintain seven character MOS data (it maintains five character MOS data)

- The term MOS only applies to Enlisted and Warrant Officer personnel. Officers have a Specialty Skill Indicator (SSI)

- Providing data by MOS would be too time consuming so overall strength figures would be shown by CMF. That is, there are only 31 CMFs and over 1200 MOSs (five character)

- The location of required data had to be determined and responsibility assignments for providing it had to be made.

(2) Tasking of Assignments

The Offices assigned responsibility for each of the six tasks are listed in Exhibit 2. The exhibit shows that over fifteen offices took part in gathering information. 104 manhours were spent in the requirements definition and tasking areas by the Primary Action Officer only. The hours expended by meeting attendees are accounted for within the aggregate resources expended by each of the offices assigned responsibility for providing information.

(3) Data Compilation by Task

To support the analysis of the overall case, individuals in each of the offices assigned to provide data were interviewed to determine the following:

- Was the data available?

- What sources were used?

- What form was it in?

- What processing had to be done?

- What problems were encountered? and

- How much time was spent?

Manpower Mobilization Case Study
Task Assignments

REQUIREMENTS	OFFICE ASSIGNED
(1) The World-Wide Peacetime Manpower Status for the Active Army • Officers • Warrant Officers • Enlisted • JAG • Medical • Chaplains	• DAPC–MSO • DAPC-OP • DAPC-MSO • DAPC-EPF-A • JAG • TSG • OCC
The Peacetime Manpower Status for the Active Forces for Nine Major Commands, Separated by: • Officers • Warrant Officers • Enlisted	• DAPC-MSO • DAPC-OP • DAPC-MSO • DAPC-EPS
A Combined Report for the Reserve Components • USAR • ARNG	• DAPE-MBM • NGB
Full Mobilization Manpower Status at M+90 by CMF	• DAPE-MBM
Based on TMM, Army-Wide, the Five Most Critical MOS's in Each CMF • Active Army Enlisted • USAR • ARNG	• DAPC-EPF-A • DAPC-MSO • DAPE-MBM • NGB
A Current Chart Showing All MOS's in Each CMF	• DAPC-MSO
(2) Demographic Data • Officers • Enlisted • ARNG • USAR	• DAPE-MPO • DAPE-MPR • NGB • DAPE-MBM
(3) Number of Sole Parents in the Army	• DAPE-MPE, Distribution and Readiness Branch
(4) Number of Pregnant Women in the Army	• DAPE-MPE, Structure and Sustainment Branch
(5) Best Judgment as to the Percentage of Reserve Components Willing and Able to Respond to a Call for Mobilization Within 30 Days After Notification.	• FORSCOM • OCAR • NGB
(6) Best Judgment as to the Percentage of Reserve Components that Could be Considerd as Failing in the Combined "Unsatisfactory Participation" and "Ghost" Category	• FORSCOM • OCAR • NGB

The data collected from multiple sources and interviews within an office for each of the requirements was then analyzed in detail by the project team. Samples of the type of analysis activity for two such offices have been included in our report to provide the reader with an understanding of the processes used to arrive at the eventual aggregate total of resources required to satisfy the entire inquiry.

The specific data gathered for the sample offices is described in the sections which follow. The first description is for an office where the data was available but there were problems in data manipulation. It satisfied one part of the first requirement. The second sample office provided available data but some additional data collection was required. It summarizes the activity necessary to satisfy the fourth requirement for pregnancy data.

. DAPC-EPF-A

A summary chart showing the processing required by the Personnel Inventory and Analysis Branch of the Enlisted Personnel Management Directorate is shown in Exhibit 3. The Branch was responsible for developing the Army-wide statistics for Enlisted personnel.

- Inputs

The COPO45 part 6 which contains aggregate authorized and assigned strengths by MOS (9/30/78) was used. The COPO45 part 21 which contains strengths by command and MOS (9/31/78 and 10/31/78) was used for error correction.

- Processes

The authorized and assigned strength figures for each MOS had to be transcribed to separate worksheets for each CMF. After this was completed, each worksheet was totalled in order to get the CMF strengths.

An error was noticed (by another division) in the authorized figures for TRADOC. Although it affected only TRADOC for the command breakout, it affected all of the statistics generated for the Army-wide summary. The differences in the authorized strengths between the September and October COPO45 part 21 reports for each MOS had to be applied to the worksheets by CMF. New totals were calculated and percentages of fill were calculated for each MOS within a CMF to determine the critical MOSs.

Manpower Mobilization Case Study

Summary of Data Flow and Activity for Requirement (1)

Personnel Inventory and Analysis Branch

Time Estimate: 126 Person-Hours

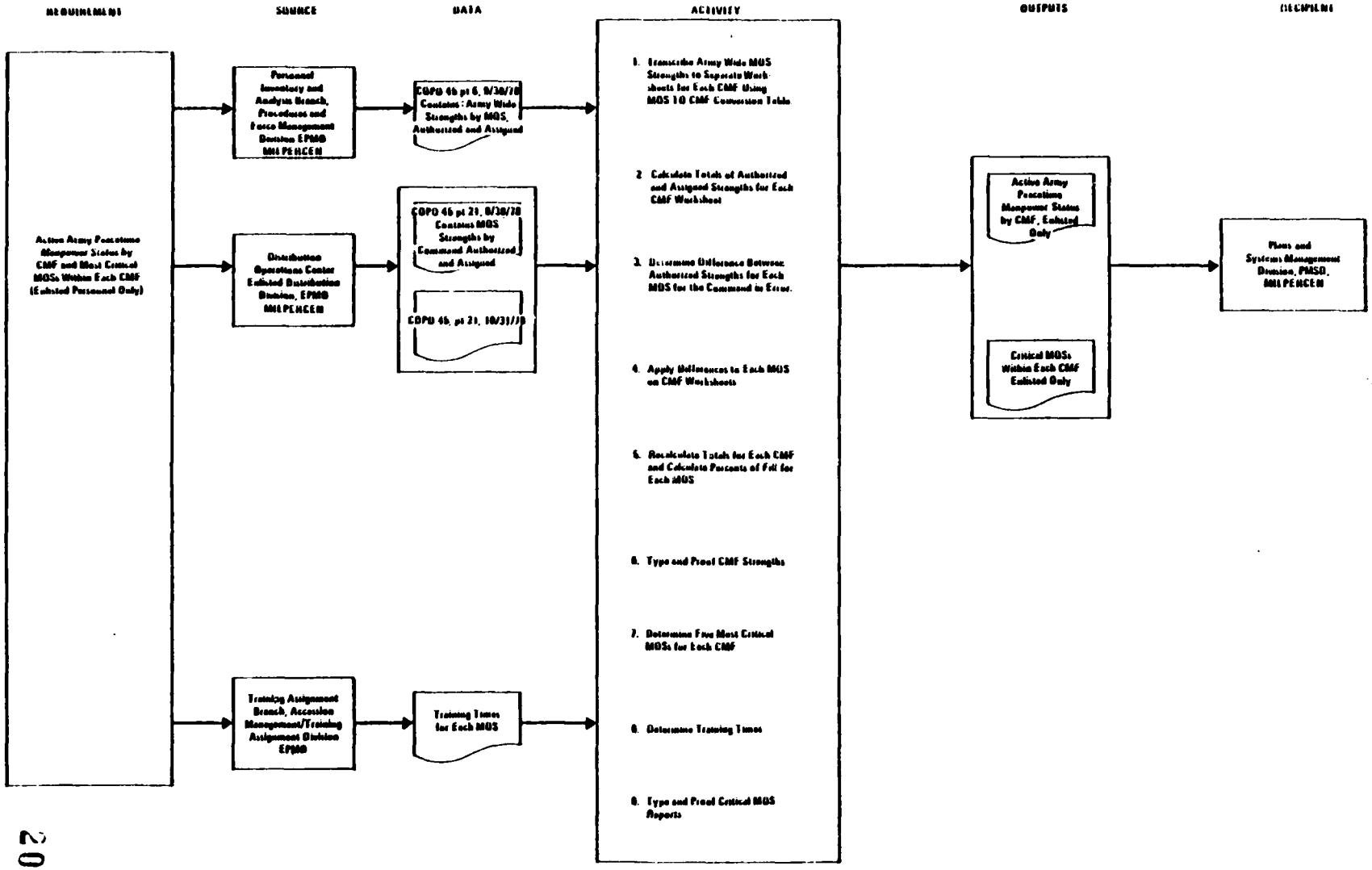

EXHIBIT 3

Training times were obtained for each critical MOS from the Trainee Branch.

- Outputs

One output was provided. The output listed the world-wide strengths for enlisted personnel for each CMF and the critical MOS's for each CMF.

- Problems

After the initial calculations had been made, the error in the TRADOC authorizations was noticed. A recompilation was then performed.

The format required a manual roll-up using existing reports because no report contains data aggregated to a CMF level. One report did, but was eliminated during a review of recurring requirements.

- Resources

The data compilation required the following resources:

54 manhours at the professional level
4 manhours at the clerical level

An additional 72 manhours were required to recompute statistics after the TRADOC error was determined.

DAPE-MPE

A summary chart is shown in Exhibit 4. The Structure and Sustainment Branch of the Enlistment Division of the Military Personnel Management Directorate was responsible for providing a response to the pregnancy questions.

- Inputs

.. TAGCEN Statistical Clearance Office

.. Health Services Command, Biomedical Statistics Division, Special Projects Branch

.. Separation Branch

- Processes

TAGCEN was contacted to see if they had any data. None was available. Since a similar question had been asked previously, the Structure and Sustainment Branch already had data for the first three quarters of FY 78.

Manpower Mobilization Case Study
Summary of Data Flow and Activity for Requirement (4)
Structure and Sustainment Branch

Time Estimate: 23.5 Person Hours

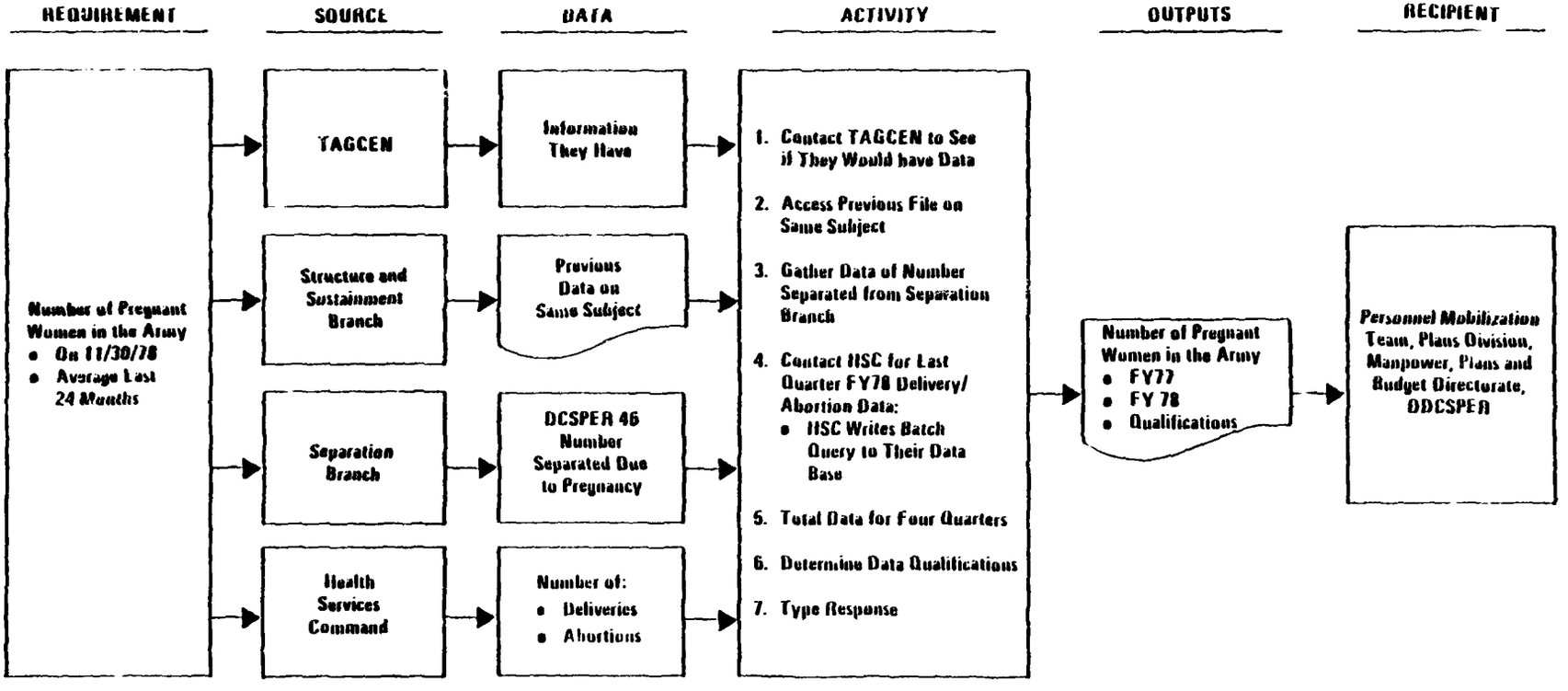

EXHIBIT 4

The Branch gathered the remaining quarter's data from the two sources used previously: the Health Services Command, and the Separation Branch of DCSPER. The Surgeon General's Office had referred the Branch to the Health Services Command.

The Health Services Command, Biomedical Statistics Division, Special Projects Branch runs a series of computer programs which are fed by all service medical treatment facilities and all civilian medical treatment facilities that are funded to treat military medical patients. The Branch produced quarterly reports containing pregnancy statistics. A request to the Branch was made via telephone for the last quarter FY 78 statistics for abortion and delivery data. The Special Projects Branch made a query to their data base for the two statistics.

A third category of data was provided by the Separation Branch of the Enlisted Division. This Branch provided the number of personnel separated due to pregnancy. The separation data is provided in the DCSPER46, Strength of the Army report, and contains a separate code for separation due to pregnancy.

The data for the number of personnel having abortions, deliveries and separations were then totalled for four quarters to come up with an annual figure. Data for the previous fiscal year was already available from the previous time the question had been asked.

Two statistics were provided to the Plans Division: the total number of pregnancies for FY 77 and FY 78.

- Outputs

A typed response was provided. A copy was provided to TSG for informational purposes. No coordination was necessary with TSG.

- Problems

The data in the exact form asked for was unavailable. It is unknown and probably impossible to determine the number of pregnancies in any one month or as of a particular date.

This was the second time a question of this nature had been asked. The first time, the Branch had to start from scratch and determine what data elements could be used to provide the information. The three categories of abortions, deliveries, and separations seemed to satisfy their needs.

The Branch has identified a need for this type data from the Health Services Command; however, at the time of inquiry, it had not completed the coordination necessary to be included on the distribution list for the HSC reports.

The data for each of the quarters for each category were totalled manually. A minimal amount of time was required for this data manipulation.

- Resources

12 manhours at the MAJ level for collection
8 manhours at the MAJ level for meetings and administration
3 manhours were required of the Health Services Command
5 manhours at the LTC level

Statistics on the computer time required for responding to the data base query were not available. The time was estimated to be minimal as compared to most of the processing and queries that the Health Services Command makes.

These two samples were included in our discussion to present an overview of the type of analysis and data gathering activity the study team performed for each of the six original data requirements. They represent examples of how two of the six offices, tasked to provide the data, responded to their individual requirement.

(4) Report Consolidation

Outputs from all the data gatherers were provided to the Personnel Mobilization Team Action Officer who was responsible for assembling all of the reports into a coherent package.

- Activities

Report consolidation activities included retyping where necessary, checking of completeness, statistical clearance by TAGCEN's Statistical Clearance and Policy Group, and ensuing corrections.

- Problems

The Personnel Mobilization Team encountered no major problems in gathering the reports into a coherent package. (The case study team was unable to gather any data on the involvement of TAGCEN's Statistical Clearance and Policy Group and, therefore, their specific activities are not included in this report).

- Resources

  The resources expended in report consolidation were as follows:

  180 Manhours at the LTC level
  40 Manhours at the clerical level
  160 Manhours for statistical clearance (estimated)

  The TAGCEN Statistical Clearance and Policy Group's level of effort was estimated. No records by action are kept of their time spent in clearing actions. The Group treated the action like any other and could recollect neither the time nor the specific problems encountered in reviewing the response.

3. SUMMARIZATION OF CASE FINDINGS AND IMPACTS

Responding to the Congressman's request for information required considerable personnel resources throughout HQDA. The consensus among the individuals whom we consulted in conjunction with the case is that the requests from Congress will probably continue to be dissimilar to the recurring automated reports. However, the problems highlighted in this case study are typical of problems to be expected with other requests. The study team does not intend to infer that problems of this nature should be solved through the development of new systems or reports, but rather that techniques incorporated in the concept of management of information as a resource could provide a forum for the resolution of some of the typical problems that arise in responding to external queries for data.

Highlights of problems and major activities required in the compilation of a response are shown graphically in Exhibit 5 on the following page. The chart summarizes the problems and activities in the three areas of:

- Definition of requirements
- Data Acquisition
- Data Processing

For each of these categories, the major problems and activities are highlighted for each of the six requirements. An appraisal was made by the project team as to the relative effort involved in solving the problem or performing the activity. For example, determining the data source for requirement (1) was a major effort, whereas the special computer run for that requirement required little effort and played only a small part in satisfying the overall requirement.

Manpower Mobilization Case Study
Highlights of Problems and Activities

RELATIVE EFFORT INVOLVED *

REQUIREMENT	Problems Related to Definitions: Terms	Problems Related to Definitions: Data Elements	Problems and Activities Related to Data Acquisition: Source Unknown	Problems and Activities Related to Data Acquisition: Data Not Previously Collected	Problems and Activities Related to Data Acquisition: Access to Historical Records	Problems and Activities Related to Data Acquisition: Access to Microforms	Problems and Activities Related to Data Acquisition: Access to Hardcopy Reports	Problems and Activities Related to Data Acquisition: Access to Computer Files	Activities Related to the Processing of the Data Once Accessed: Estimates Required	Activities Related to the Processing of the Data Once Accessed: Data Had to be Manually Reformatted or "Rolled Up"	Activities Related to the Processing of the Data Once Accessed: Data Inaccuracies Had to be Corrected	Activities Related to the Processing of the Data Once Accessed: Data Had to be Converted	Activities Related to the Processing of the Data Once Accessed: Special Computer Runs Made	Form of Response: Text Form	Form of Response: Structured Form
(1) Overall Trained Military Manpower Shortfall	●	●	●	◐	●	◐	◐	○	◐	●	●	◐	○		X
(2) Demographic Data			◐		●		◐			◐					X
(3) Number of Sole Parents	◐		○	○	○		○		○					X	
(4) Number of Pregnant Women		◐	○	○	○		○	◐	○				◐	X	
(5) Percent Reserve Components Willing and Able to Respond to a Call for Mobilization			◐	◐					◐					X	
(6) Percent Reserve Components Falling into the Combined "Unsatisfactory Participation" and "Ghost" Category			◐	◐					◐					X	

*: ● Major

◐ Medium

○ Minimal

EXHIBIT 5

(1) Findings

The major findings resulting from this study are presented in Exhibit 6 on the following page. These findings are explained in the paragraphs which follow.

- Problems exist in interpreting terms and requirements and in the definition of data elements. The original letter asked for the overall manpower shortfall in terms of MOS. However, the MOS applies only to Warrant Officer and Enlisted personnel not Officers. Further, the full MOS is only five characters long and the Action Officer had to decide whether the Congressman really wanted specific MOS data or some other data. While this problem was encountered in satisfying the request, this type problem may not always be solved by an IRM approach. In a previous request for sole parent data, there was a problem in defining what available data, if any, would satisfy the request. Although the EMF contains a data element indicating the number of dependents, it does not differentiate between adult and juvenile dependents. In providing the pregnancy related data, since the data was not available directly in the EMF and OMF, a decision had to be made as to what combination of available data elements could be used to satisfy the need for the pregnancy statistics. For these types of data items automated dictionary aids could support the resolution of problems associated with meaning and location of data.

- For each of the requirements, the source of data was not known immediately. Several meetings were held and numerous phone calls were made in order to determine who could provide the data. The location of the required data had to be researched and determined before the data could be assembled for analysis. Most of the planning time was spent in determining the tasking. Furthermore, for most of the requirements, many individuals had to be consulted, each providing specific pieces of data to satisfy the requirement.

- In several instances data had not been collected previously nor was not part of a normal collection process. The question of sole parentage had been asked once before and a field survey had to be initiated to provide an answer. However, the results of the survey were invalidated. Revised questions about sole parentage are included in a new field survey. Since a requirement to collect this data had not been established the data had to be estimated or obtained from a sample survey. In order to determine the number of pregnant women in the Army, data had to be collected from several sources. There are no centralized personnel data bases that maintain this information.

Manpower Mobilization Case Study
Findings

- PROBLEMS EXIST IN INTERPRETING TERMS AND REQUIREMENTS AND IN THE DEFINITION OF DATA ELEMENTS
- FOR EACH OF THE REQUIREMENTS THE SOURCE OF DATA WAS NOT IMMEDIATELY KNOWN
- IN SEVERAL INSTANCES, DATA HAD NOT BEEN PREVIOUSLY COLLECTED OR IS NOT PART OF A NORMAL COLLECTION PROCESS
- ACCESS TO COMPUTERIZED FILES WAS MADE IN TWO INSTANCES ONLY
- FIVE OF THE SIX REQUIREMENTS REQUIRED SOME ESTIMATES BECAUSE DATA WAS UNAVAILABLE
- THE FORMATS OF AVAILABLE REPORTS DID NOT CONTAIN DATA AGGREGATED TO A DIRECTLY USABLE LEVEL
- AUTHORIZATION DATA FROM SOURCE REPORTS WAS INACCURATE
- DATA CONVERSION WAS REQUIRED
- ORGANIZATIONS DO NOT MAINTAIN RECORDS REGARDING PERSONNEL EXPENDITURES FOR PROVIDING INFORMATION

EXHIBIT 6

- Access to computerized files was made only in two instances. A conscious decision had been made to perform most of the necessary manipulations manually. The prime reason given was the shortage of time. The decision necessitated spending over 500 hours manually rolling up hardcopy reports. In the first instance, where access was made to computer files, MILPERCEN ran a special request program for the TRADOC Systems Analysis and Nuclear Agency (TRASANA) model. The model was already available and is run periodically; the only difference was in the input data which MILPERCEN already had. The second access was through a batch query to the Health Services Command data base.

- Five of the six requirements needed estimates because data was unavailable. For the strength data, estimates had to be applied to the mobilization SACS data and reserve components mobilization data to determine time phased requirements for personnel. Data for sole parentage had to be estimated because the survey data previously collected was invalid and the personnel master files do not have a sole parent-indicator. The pregnancy statistics provided had qualifications and did not include pregnant women in several categories. The final two estimates were made to satisfy requirements (5) and (6) which asked for judgments and therefore asked for estimates.

- The formats of available reports did not contain data aggregated to a directly usable level. Most of the strength related reports contained data aggregated only at the MOS level and had to be rolled up to the CMF level. The reports used for enlisted personnel in the active Army formerly contained data rolled up to the CMF level. However, that portion of the report had been eliminated in a periodic review of the recurring management information requirements. In most cases strength data was culled from one report and the assigned and qualified data came from another.

- Authorization data from source reports was inaccurate for one command. PERSACS data used in the generation of the September 30 COPO45 report was inaccurate, and, when the inaccuracies were detected, initiated a large amount of recomputation time.

- Data conversion was required. There were several instances where the end of month authorization and assigned strength files contained new MOSs in one file and still had the old MOSs in the other requiring user conversion.

- Organizations do not maintain records regarding personnel costs involved in providing information. None of the organizations involved keeps track of the time required to satisfy outside information needs.

(2) Resources Expended

The resources expended in compiling a response for the Congressman are listed in Exhibit 7 on the following page. The total person hours required to prepare the report were estimated to be 1090 hours. It must be pointed out that the resource estimates were re-constructed after the fact. Because offices typically do not account for hours and other resources expended in responding to inquiries of this nature, the actual costs may be higher than the estimates derived.

The next section provides an overview to those IRM concepts which could aid in making responses to these type inquiries more efficient.

(3) Impact of Case Findings and IRM Concepts

A summarization of the impacts of the case findings, and the relevant impacts of IRM concepts are presented below:

- Failure to utilize automated aids in resolving data element definition and location problems will result in an inefficient use of resources. Applying an IRM concept, the use of a data dictionary would have provided an automated aid in identifying the appropriate data element(s) in the Army inventory to satisfy some parts of the requirement, such as sole parent data and pregnancy data, and referenced the source of the data, as well. Considerable manhours devoted to manual search and comparison efforts could potentially be saved in responding to similar ad hoc requests in the future if the staff could facilitate locating data aided by automated capabilities.

- If the demands for data are not controlled, the reporting burden on the field and the staff can become excessive. The request asked for data related to sole parentage and female pregnancy. This data was not currently stored in a central data base nor was it readily available. These inquiries represent unique requests for data, some of which have not been previously collected. Similar requests will again arise in the future. The Army must determine if and how the data should be collected, stored, processed, etc. Applying the IRM concept of Information System Planning and Review, an effective function of this type can make the determination through decision processes of whether the actual data must be collected, or whether statistical estimates should be provided.

- The continued reliance on the use of estimated data reduces confidence in the validity of the data. The requirement requested the Army estimate using "best judgment" the "ghost" and "unsatisfactory participation" of Reserve

Manpower Mobilization Case Study
Resources Expended

TASK	PERSON HOURS
• OVERALL MANPOWER SHORTFALL REPORTS	521
• DEMOGRAPHIC DATA	12
• SOLE PARENT DATA	1
• PREGNANCY DATA	28
• PERCENT RESERVE COMPONENTS WILLING AND ABLE TO RESPOND TO A CALL FOR MOBILIZATION	40
• PERCENT RESERVE COMPONENTS CONSIDERED "GHOST" AND "UNSATISFACTORY PARTICIPATION"	
• REQUIREMENTS DEFINITION, INTERPRETATION, TASKING, REPORT CONSOLIDATION, AND STATISTICAL CLEARANCE	488
TOTAL	1090

Components in time of mobilization. It further directed coordination with DOD would be avoided. Analysis indicated that the Congressman doubted the DOD figures and requested best judgments from the Army for the data. Two IRM related functions could impact this situation, the Information System Planning and Review function and the Quality Assurance function. The first would aid in determining whether the data should be collected, and how; and, the second would apply the quality control features necessary to assure consistent and accurate data is released by category.

- Failure to adequately control system change policy can potentially create uncontrolled data inconsistencies. Failure to properly identify all systems that contain a data element results in data inconsistency if any characteristic of the data element (definition, code scheme) is changed but the change is not made in all systems. In this case out-of-date MOS codes were contained in some files requiring manual conversions to current codes prior to supporting the CMF roll-up compilations. The IRM concept of metadata management serves to reduce these incompatibilities through managing systems change policy and by using automated dictionary/directories to identify data elements and system associations. Therefore, the impact of changing any data element can be assessed before the change is made and all affected systems can be identified.

- The failure to effectively control and monitor the quality of data can require additional resources to make data re-usable. Data provided for one requirement was in error, which had not been detected, but was used in the original computations. The quality assurance function emphasizes control of data quality as near to source of origination as possible. Under this approach the chance for error is reduced and overall data quality is improved. The function also includes validating data for accuracy prior to release for re-use. When this function is not performed adequately, the potential for distributing erroneous data increases.

The implementation of several of the IRM activities, described in Chapter III of this report, can provide a forum for the resolution of some of the problems mentioned in the findings and impacts summarized above. The implementation of these activities would not necessarily resolve all problems related to ad hoc or external requests for information. While some effort will always be needed to interpret the meaning of external requirements, the IRM concept can aid the staff in reducing inconsistency for internally maintained data.

2. SUMMARY OF CASE FINDINGS AND IMPACTS

In this section, we present a summary of the major findings that have a commonality among the three case studies. Detailed findings were stated in the individual case study descriptions. These findings are explained in the paragraphs which follow.

(1) Findings

- The cases demonstrated that requested data often does exist, however, the major problem was locating the sources of data. This was true for both the RIM system development and the manpower mobilization case studies. For the RIM development, a major undertaking was determining what the information sources were. In the manpower mobilization case, several lengthy meetings were held and numerous phone calls were made in order to identify who was responsible for providing subsets of data, and in what form that data could be provided.

- An excessive amount of time was spent reconciling conflicting figures purporting to display the same information. Examples of data inconsistencies were found in all three case studies. These inconsistencies were caused by several conditions, such as poor data quality; different systems being updated with the same data, but at different times; reports generated from different versions of the same data base; and multiple differences in data element names, definitions and code representation.

  Poor data quality has been indicated in PERSACS data. The PERSACS data base contains authorized strength data for all major commands, however, the source data for the compilation did not contain authorized data for one major command.

  For the RIM study, there are continually instances where one of several conditions arise, such as, there are no mobilization stations for units, units have no MTOE, and units have multiple MTOEs. Valid MOS codes were changed. However, the codes were not changed at the same time in all systems. This required a manual conversion effort in the manpower mobilization case study where the PERSACS data files had been updated, but the personnel master files had not been updated. In the RIM study, the same problem occurred with TAADS and SACS.

  Different versions of the same data base were used in the budget preparation for 5-ton trucks. The result was that the DCSLOG planned to distribute a different number of trucks than the DCSRDA was planning to procure.

- There is a potential for misuse of data due to a lack of understanding as to what the data means. The lack of a

current user's manual for LOGSACS has promoted a lack of understanding as to how the data is developed and an increase in the misuse of the data for purposes other than intended. Many changes have occurred to LOGSACS since the last update to the user manual nine years ago.

- Current mangement information systems cannot keep up with the changing requirements for the data maintained by the systems. In the 5-ton truck study, there was a problem with the use of TAEDP data by DCSLOG. The TAEDP deals only with authorized equipment and new items are included only if they have been "type classified" in the inventory. Distribution planning for these items requires a manual process resulting in the expenditure of considerable manpower.

  Also identified in the 5-ton truck case study was the fact that data regarding multi-mission equipment is not identifiable by specific missions in the present HQDA management information systems. The result is that the impact of a budget cut cannot be readily identified with a specific mission and therefore an inability to properly define equipment requirements occurs.

(2) Impacts

The major findings presented in the previous section impact the development of an Information Resource Management Program for HQDA. These impacts are explained in the paragraphs which follow.

- Without improved capabilities to more efficiently locate and access data, excessive personnel resources will be consumed and excessive time delays will occur. Information about the information resource should be available to Headquarter's personnel in order to help them locate information sources. As stated in the findings, most of the time the data was available; the problem was locating it. Although the informal personal contact network method of locating data is generally effective, it is time-consuming and often does not exist for new Action Officers.

- The data user, data handling, and data management communities require continuing education and orientation to effectively utilize the Army's information resources. HQDA personnel need to be educated as to why information is a resource to be managed. The level of data sharing is significant and the importance of controls over data quality, data sharing, and constraints needs to be stressed. The education should make users aware of what shared data actually portrays.

- The Army staff will be required to change current practices if more efficient cross-functional information sharing is

to occur. The level of data sharing among functional areas is increasing and changes to systems' files are being made without coordination among all users of those data files. This has created unplanned delays in processing data. The review and coordination can include an evaluation of the potential for consolidation of data or function. The rate at which requirements change indicates that systems planning must be carefully reviewed with respect to the information to be provided by the system.

- In order to make information policy effective, a mechanism or process must be established to execute and enforce existing policies and procedures. Data administration can help to resolve the data inconsistencies that have appeared in the case studies. The organization can provide improved data consistency by ensuring that data element changes are effected in all systems using a data element in the same time period. Further, the organization can examine why inaccurate data is being generated and recommend steps to prevent future occurrences of similar inaccuracies.

This chapter has provided an examination of three case studies conducted to determine how information is managed at HQDA and where the problem areas are in actual situations. As in the previous chapters, the examination has indicated a need for a comprehensive Information Resource Management program. The next chapter presents the requirements for such a program.

X. HQDA AUTOMATED INFORMATION RESOURCE MANAGEMENT PROGRAM REQUIREMENTS DEFINITION

In Chapters II and III we have discussed the concept of managing information as a resource of Headquarters, Department of the Army. In Chapters IV-IX we have described the characteristics of HQDA's current approach to managing its automated information and some of the resulting impacts on HQDA. In this chapter we present the requirements and related considerations for an automated information resource management (IRM) program for HQDA.

Our discussion includes the following program design elements:

- Summary of Issues
- Overall IRM Program Requirements
- General Design Requirements
- Functional Requirements
- Organizational Considerations
- Implementation Considerations.

1. SUMMARY OF ISSUES

In the previous chapters we have presented a series of issues which have an impact on the method in which HQDA manages its information. A summary of the major issues developed in those chapters is presented in Exhibit X-1. Three logical groupings of issues are presented which summarize the issues developed as a result of the various data collection efforts conducted during Phase I. These groupings are:

- Information Issues,
- Management Issues, and
- Organizational Issues

The summarized findings should be viewed as a collective grouping, by category, and are not intended to relate to the associated IRM Program Impacts on a one-to-one basis. The Findings, collectively, are considered to have the impacts indicated. Several of the more important issues are discussed in the paragraphs which follow to establish a common ground for understanding the overall IRM program requirements presented in this chapter.

Information Issues

Findings

- ACTION OFFICERS ARE A PRIMARY INTERMEDIATE SOURCE AND USER OF INFORMATION
- THERE IS INCOMPLETE KNOWLEDGE AS TO WHAT INFORMATION IS AVAILABLE
- DECISION PROCESSES ARE DIFFICULT TO SUPPORT WHEN AVAILABLE DATA IS INACCURATE OR INCONSISTENT FROM AUTOMATED SOURCES
- USERS FOCUS ON REPORT FORMATS AND NOT ON INFORMATION PRESENTED
- THERE IS A PROLIFERATION OF FUNCTIONAL LANGUAGES WHICH INHIBIT COMMUNICATION AMONG FUNCTIONAL AREAS
- INSUFFICIENT ATTENTION HAS BEEN PAID TO DEFINING INFORMATION REQUIREMENTS FOR SYSTEMS
- THERE IS A SIGNIFICANT AMOUNT OF INCONSISTENT DATA ELEMENT DEFINITION AND CODING
- THERE IS A PERCEPTION OF EXCESSIVE, REDUNDANT REPORTING REQUIREMENTS LEVIED UPON THE FIELD

Impact on the IRM Program

- INFORMATION RESOURCE MANAGEMENT SHOULD FOCUS ON ACTION OFFICER SUPPORT
- EDUCATION ON THE INFORMATION RESOURCE IS ESSENTIAL TO DEVELOP AWARENESS
- ADP SYSTEM DESIGN METHODOLOGIES SHOULD TREAT INFORMATION AS A RESOURCE
- INFORMATION TRANSFER SHOULD FOCUS ON INFORMATION AND NOT THE FORM OF PRESENTATION
- THE BASIC DIFFERENCES IN THE BUSINESSES OF VARIOUS FUNCTIONAL AREAS MUST BE CONSIDERED
- THE VERTICAL FOCUS OF CURRENT MANAGEMENT WILL INHIBIT DATA SHARING
- RECONCILIATION/ANALYSIS REQUIRES SUBSTANTIAL MANUAL EFFORT

Management Issues

Findings

- THERE APPEARS TO BE A LACK OF SUPPORT FOR THE ARMY INFORMATION PROCESSING STANDARDS PROGRAM
- ARMY-WIDE POLICIES REGARDING STANDARDS ARE NOT FOLLOWED UNIFORMLY
- EACH INDIVIDUAL MANAGER TENDS TOWARD LOCAL OPTIMIZATION OF AVAILABLE RESOURCES
- THERE IS A SENSE OF LACK OF DIRECTION FROM HQDA
- THE ROLE OF ACSAC IS NOT CLEARLY PERCEIVED
- IT IS DIFFICULT TO DEFINE COSTS ASSOCIATED WITH CURRENT STANDARDIZATION AND IRM EFFORTS
- THERE ARE VARYING DEGREES OF WILLINGNESS TO ACCEPT RESPONSIBILITY FOR DATA PROPONENCY
- MUCH OF HQDA DAILY ACTIVITY SEEMS REACTIVE, NOT PLANNED
- SOME DPI'S ARE PROCEEDING TO DEVELOP THEIR OWN INFORMATION MANAGEMENT PROGRAMS INDEPENDENTLY

Impact on the IRM Program

- MANAGEMENT COMMITMENT TO INFORMATION RESOURCE MANAGEMENT IS ESSENTIAL FOR SUCCESS
- THE INFORMATION RESOURCE PHILOSOPHY, POTENTIAL BENEFITS, AND THE NEED TO MANAGE DATA AS A RESOURCE MUST BE UNDERSTOOD THROUGHOUT HQDA
- ENFORCEMENT OF DATA STANDARDS WILL REQUIRE AUTHORITY AND COOPERATIVE EFFORT
- INDEPENDENT INFORMATION MANAGEMENT PROGRAMS MAY RESULT IN CONFLICTING POLICIES
- VALID COST ESTIMATES WILL BE DIFFICULT TO DERIVE
- ESTABLISHING DATA PROPONENCY WILL BE A SIGNIFICANT STEP FORWARD

Organizational Issues

Findings

- THERE IS NO CONSENSUS ON A FEASIBLE INFORMATION RESOURCE MANAGEMENT ORGANIZATION
- THERE IS MINIMUM SUPPORT FOR A DATA CZAR OR IRM BUREAUCRACY
- AN INFORMATION MANAGEMENT AUTHORITY DOES NOT EXIST TO REVIEW SYSTEM DESIGNS HORIZONTALLY OR PROVIDE TECHNICAL GUIDANCE AND SUPPORT FOR INFORMATION MANAGEMENT
- THE ACTIVITIES PERTAINING TO INFORMATION RESOURCE MANAGEMENT ARE SPREAD THROUGHOUT HQDA
- THE SIZE OF THE ARMY STAFF IS SHRINKING
- OCSA IS UNDER CONSTANT SCRUTINY TO REMAIN STREAMLINED
- AUTHORIZATION FOR NEW GENERAL STAFF COMMITTEES IS DIFFICULT TO OBTAIN

Impact on the IRM Program

- INFORMATION RESOURCE MANAGEMENT WILL REQUIRE SIGNIFICANT RESOURCE COMMITMENT
- THE CENTRALIZATION VS. DECENTRALIZATION ISSUE MUST BE CAREFULLY BALANCED
- INDEPENDENCE IN DATA OWNERSHIP WILL BE DIFFICULT TO OVERCOME
- IRM MUST ASSIST THE MISSION OF DA NOT MERELY REGULATE
- STRUCTURAL RECOMMENDATIONS MAY IMPACT SEVERAL EXISTING ORGANIZATIONS
- NEWLY CREATED IRM ACTIVITIES WILL BE DIFFICULT TO STAFF
- ANY IRM OFFICE AT THE OCSA LEVEL SHOULD BE INITIALLY SMALL AND REVIEWED PERIODICALLY
- ANY IRM COMMITTEE SHOULD BE ESTABLISHED BY EXPANDING THE SCOPE OF AN EXISTING COMMITTEE

(1) Information Issues

- There is incomplete knowledge as to what information is available. This broad finding carries through to several levels. We found that there was an ignorance of what data elements exist among Headquarters, DA data bases, a lack of knowledge as to where specific elements reside, the format in which they are stored, and the process required to access the information. The impact on Army management has been duplicate collection and maintenance of files containing similar information among the different functional areas. This inhibition of data sharing extends not only to information held at DPI's but also to data needed in support of applications systems at HQDA. Data may be held and maintained independently because the user is unaware that it is being collected, stored, and audited by a source that is closer to the origin of the information. As the number of efforts made to gather similar data increase, the ability to assure the quality and timeliness of the information declines. The impact of these findings in HQDA center around the need for education and tools that develop an awareness for the quantity and quality of information that is the Army's resources.

- Decision processes are difficult to support when available data is inaccurate or inconsistent data from automated sources. The limited degree of data sharing among the functional areas creates a "stovepipe" or vertical flow of information to Army management. When Staff elements report information which conflicts, substantial efforts must be made in order to reconcile or justify the variances. These conflicts not only force the integrity of the data to be questioned but cause much manual manipulation and effort in justification which might be spent more productively. In cases where inconsistent data is supplied to external organizations such as OSD, OMB, and Congress, the Army's management and credibility may be questioned. Lacking a coordinated effort to manage information as a resource of HQDA, the vertical focus of current managmeent could continue to inhibit data sharing and force the expenditure of efforts to reconcile conflicting information.

- There is a significant amount of inconsistent data element definition and coding. During our examination of applications systems, examples of inconsistent data element definitions and coding were gathered during interviews of systems personnel. It was found that some data elements had the same names but were defined differently and conversely instances where identical information was being called by different names. This can cause a problem when the systems attempt to use the same data in performing similar functions. Through properly defined data mangement policies and

procedures, data element manipulation and usage can be controlled, thereby insuring that each staff element in HQDA uses the data consistently and information generated using the same base data elements can be compared and meaningful developed.

(2) Management Issues

- There appears to be a lack of support for the Army Information Processing Standards and Army-wide policies regarding standards are not followed uniformly. While some systems were developed in compliance with the Army Information Processing Standards, no DPI has been using the standards in all systems for which the regulations are intended to include. Standardization has not been considered an integral part of information systems planning by all Agencies. Only a minimal amount of effort is being directed at this program by HQDA; no DPI has taken an active role in having data elements submitted for standardization, in part because of long delays involved in the standardization process. Further, the current policies contain no provision for compliance auditing and enforcement. The key objective of data standardization is to promote compatibility among systems and the lack of adherence to the standardization policy has resulted in systems being developed using non-standard data elements. This has resulted in inefficient and costly data sharing among systems.

- Some DPIs are proceeding to develop their own information management programs independently. While the DPIs are realizing the need for an improved managment of the information, they are developing independent programs. The uncoordinated development of information management can result in conflicting policies.

(3) Organizational Issues

- There is minimum support for data czar or IRM bureaucracy. HQDA staff activities are concerned that a data czar will emerge from an IRM program. Furthermore, most of the HQDA executives felt uncomfortable with a data czar approach, but were in general agreement that a horizontal approach could be of benefit to the Army as a whole. However, to accomplish this horizontal approach to information management; it was generally agreed that someone must be put in charge. The impact of this is that the centralization vs. decentralization issue must be carefully balanced.

- An information management authority does not exist to review system designs horizontally or provide technical guidance and support for information management. The dynamic nature of the HQDA environment has caused increased demands for

data by agencies other than a DPI's functional proponent. Further, the technical assessment function is performed on a random and ad hoc basis and each DPI performs its own assessment. The increase in demands for data sharing will require a greater emphasis on a horizontal review and coordination of information systems planning. However, IRM must assist the mission of DA and not merely regulate.

- The size of the Army Staff is shrinking and OCSA is under constant scrutiny to remain streamlined. These findings were brought up by several of the HQDA executives interviewed. The impact on the development of an IRM organization will be that newly created IRM activities will be difficult to staff and that any office recommended at the OCSA level should be initially small and reviewed periodically.

2. IRM PROGRAM REQUIREMENTS

The overall requirements of an automated information resource management program (IRMP) need to be stated in terms of the objectives, scope, authority, and responsibility associated with the program. This program definition is required so that HQDA Management has a full understanding of the major aspects and related implications of IRM. After receiving program concurrence, these essential program elements can be used as the basis for developing the policy statement establishing IRM for HQDA.

(1) Program Objectives

The overall goal of developing an information resource management program (IRMP) for HQDA is to establish the process through which the Army can begin to address some of the many problems it currently faces with regard to its information resource and to place itself in a better position for resolving those problems in the years ahead. Such a process does not formally exist in Headquarters today. Many of the relevant functions of information resource management are scattered throughout the various staff agencies with little or no cohesive direction for resolving inter-agency conflicts or sharing and correlating information.

The first objective of an IRMP in establishing this process is to develop an understanding of the concept of information as a resource of HQDA and to promulgate this philosophy throughout the organization. This education process will be widespread and on-going throughout the early years as the program is developed. Widespread understanding of this philosophy is fundamental to the accomplishment of specific objectives and the attainment of the possible benefits through better management of the Army's information resource.

A second major objective related to the establishment of the process for information resource management is the identification of responsibilities for the resource throughout HQDA. As we indicated in Chapter III, responsibilities must be clearly developed and understood for the

- Information Resource User Community,
- Information Resource Handling Community, and
- Information Resource Management Community.

The process of effective information resource management will need to focus on the relationships among these three communities and how their individual roles can contribute to better information for HQDA.

In particular, the Information Resource Management Community should provide through an IRMP a horizontal look across staff agencies with a focus on the information which the Information Resource Handling Community processes and provides to the Information Resource User Community to support their mission. The IRM Community should provide a focal point or a forum for

- resolving conflicts within the User Community with regard to information
- establishing consistent information management policies and direction
- facilitating communications and understanding between the User Community and the Handling Community
- coordinating plans across HQDA for information systems with regard to information reutilization
- providing an educational service to the User Community regarding information awareness
- identifying the costs associated with information so that HQDA can weigh these costs against the benefits obtained.

(2) Scope of Program

There are many dimensions to the development of a program for information resource management. Three dimensions of special significance to our study are:

- the discipline,
- the subject, and

. the level of the information to be managed.

As we indicated in Chapter III, there are several disciplines which are moving in the direction of information resource management for the information generally considered under the purview of that discipline (data processing; paperwork or administration; textual, scientific and technical information; clerical or correspondence activities; etc.). In the Headquarters, DA environment there are a number of staff agencies with individual missions related to specific disciplines (such as OACSAC, TAGO, or ODCSRDA). One dimension of the scope of the IRMP concerns the discipline(s) to be integrated into the program and the organizational impact such integration would have.

A second dimension of an information resource management program is the subject of the information to be included in the scope of the program (financial, personnel, logistical, force structuring, etc.). Thus, an initial program might be defined to manage only the financial information resources or only the personnel information resources. In fact, parallel programs for individual subjects could be established and merged sometime in the future as conditions dictate, given they were initially established subject to common direction.

A third dimension is the level of the information to be considered, and thus the range of the management activities throughout the Army (e.g., Headquarters, MACOMS, Field Operations, etc.) Headquarters, DA is a staff organization for the Department of the Army. Many of the resource management functions which it performs it does for the entire Army (e.g., ODCSPER establishes personnel policy for all Army personnel). But HQDA is a sizable organization unto itself with its own resources to be used for its own operations. These resources, too, must be managed. In most instances, the organization which manages the resources for the Army also manages those resources for HQDA (e.g., Headquarters personnel come under the same policies as field personnel). Occasionally, however, Headquarters may wish to limit its scope for a resource to just that portion of the total Army resource which is directly involved with HQDA. In the case of information, it is possible that HQDA may wish to limit the scope of its initial information resource management program to just that information which HQDA employs in carrying out its staff activities for the Army.

Our study has been limited to reviewing the management of information which has been automated for use by HQDA. As a consequence of this focus of scope, the program requirements which we have developed and present in this chapter are to be interpreted as applying to the management of automated information only at the HQDA and its supporting DPI level. Expansion of the scope of the automated information resource management program to include manual information, word processing

activities, textual or scientific and technical information, or information processed and used by the MACOMS and field activities are considered natural extensions of the concept of viewing information as a resource. However, the requirements in these extended areas have not been fully investigated during this study. Additional study will be needed to determine the feasibility of such expansions in scope for an automated information resource management program.

Our study did investigate automated information management activities across all the major Headquarters Staff Agencies (with the exception of compartmented intelligence information in ACSI). While a complete study of every automated information system was not possible under the resources of our contract, a representative sample was investigated to provide an understanding of what information has been automated by the Army and how current information management policies and procedures have been put into effect. The study did at times address manual information where it interfaces with automated systems. We also considered to a limited degree the information used in the field as it is reported up to HQDA Staff Agencies.

The focus on automated information is a natural first step in the development of an information resource management program of larger scope. The intentional decision to limit the scope of this study to automated information was based on several key factors:

- automated information processing is a well-developed and recognized discipline
- data management doctrine and philosophies are already established
- software aids to assist in managing automated information have been developed
- metadata about automated data is more readily available
- the automated subset of HQDA's information offers a realistic domain for implementing an IRM program.

While many problems occur in the manual processing of information, it is when information is automated that the need for precise definitions of terms and standards for data names and representation becomes most apparent owing to the precise and generally inflexible nature of current automated data processing equipment. This fact, coupled with the large volumes of information which has been organized for processing by automated means at HQDA, make the domain of automated information an important and natural place to start in developing a nucleus of information resource management at HQDA.

With the understanding that our study and recommended program are to be interpreted as applying to the limited scope of automated information used by HQDA and its supporting DPI's, we shall not reference scope limitations, in general, throughout our remaining discussion of the Army's requirements for information resource management.

(3) Authority and Responsibility

The efficient use and management of information is the responsibility of everyone in HQDA. The current stovepipe orientation of information flows, however, tends to narrow the focus of responsibilities of the individual Staff Agencies. At present, there are few individuals or organizations in HQDA with a broad perspective of information management across all the staff agencies. As the agencies progress in their development of information systems they are beginning to formalize the need to share information across functional areas and they are becoming aware of the need to manage information better to facilitate this sharing process.

The sharing of information requires cooperation, coordination, and a commitment on the part of the sharing parties. Within a staff agency there are typically mechanisms for achieving this coordination, cooperation, and commitment commensurate with the mission and resource management activities of the agency. Among agencies, information sharing needs and problems can be worked out by mutual agreement but may often be limited to a system-by-system basis. Under these circumstances individual agencies find themselves sharing information in one form (or on one basis) with a given agency but, perhaps, in a different form (or on a different basis) with another agency. Conflicting unilateral or bilateral policies may then arise.

Information Resource Management will establish a mechanism for resolving problems on a Headquarters-wide basis and developing a consistent set of policies with regard to information management (proponency, retention, naming, representation schemes, coding, permissible values, etc.) To be effective, this IRM mechanism must have the cooperation and commitment of the individual Staff Agencies to

- participate in its development,
- abide by its policies, and
- contribute to its operation and improvement.

In addition to Staff Agency commitment there must also be leadership and direction for the establishment of the program from the Office of the Chief of Staff in terms of a Headquarters commitment to

- improved management of its information resources
- allocation of other resources to support this management process
- expectations for individual staff agencies to participate in the process.

Such a commitment would involve the declaration that automated information is to be considered as a resource of HQDA and the assignment of specific IRM responsibilities to selected organizations. The designation of authority and responsibility for IRM will also require the allocation of resources sufficient to execute the program. The magnitude of these resources is indicated in Chapter XI of this report and will be developed in greater detail in Phase II of this study. While top management (OCSA and Staff Agencies) commitment and direction is essential, an Information Resource Management Program also requires the commitment and participation of the individual information users, processors, and system designers. It is these people (e.g., Action Officers, Data Base Administrators, System Planners and Implementators) who must abide by the policies to make the program effective; and it is they who stand most to benefit from the stability associated with information resource management.

3. GENERAL DESIGN REQUIREMENTS

An information resource management program is the coordinated, directed mechanism whereby an organization can put information resource management into effect. Specifically, at HQDA an information resource management program will be:

- A philosophy which must be made prevalent throughout HQDA
- A set of policies and procedures to impart the philosophy and to govern the program
- An organizational structure to develop, implement, monitor, and execute the policies and procedures and the program itself
- A set of tools to assist the development, implementation, monitoring, and execution process.

The need for such a program has been described in Chapters IV-IX of this report. Further, the issues brought forth in the previous chapters and restated in Section 1 of this chapter must be considered in the general design of an effective IRMP for HQDA. The program, itself, is developed conceptually in this chapter and in Chapter XI. Detailed development of the program is scheduled for Phase 2 of our contractual effort.

(1) Philosophy

The fundamental philosophy that information is a valuable resource of Headquarters, Department of the Army and that this resource needs to be managed has been discussed at length throughout this report. Here we stress the need to promulgate this philosophy throughout HQDA to gain:

- an organizational understanding at all levels
- top management commitment, direction, and allocation of resources for an effective program
- middle management agreement with the principles of IRM and a commitment to abide by the philosophy to obtain mutual benefits
- supervisory and operational level understanding of the concepts involved, awareness of individual responsibilities, and the development of the technological sophistication necessary to implement and maintain the program.

The promulgation of this philosophy will entail a substantial and long-term educational effort, but one which is necessary to the development and continued maturation of the program.

(2) Policies and Procedures

The set of policies and procedures governing the program will be developed over the years as HQDA more clearly defines the IRM program which is best suited to its needs and capabilites. In general, policies will need to be established regarding:

- Program purpose, direction, and scope
- Program authority, monitoring activities, and enforcement sanctions
- Organizational placement of IRM activities
- Determination of information proponency and sole competent sources for data
- Data standardization and data resource directory construction
- Access, privacy, security, and freedom of information issues
- Quality control of data validity, accuracy, consistency, and the retention process

- Authority over the review and approval of the information systems plans of the Staff Agencies

- Forms, reports, and records control.

(3) Organizational Structure

The organizational structure to develop, implement, monitor, and execute the policies, procedures, and the program itself, is a major consideration for HQDA as they embark on instituting an information resource management program. Chapter XI of this report addresses the organizational structure issue in some depth. Primarily the organizational considerations for an initial IRMP center on what is feasible to get the program started. Thus, our focus has been on determining

- What IRM activities are initially necessary for the program

- Where those activities are currently being performed within HQDA (if at all)

- What level of authority will be required for each activity

- Other organizational considerations concerning the current HQDA environment.

These issues are addressed in subsequent sections of this chapter.

(4) Management Tools

The tools to assist in the management of the information resource are many and varied. Some of the major tools include:

- A data standardization program for data elements and data items

- Data bases pertaining to forms, records, and reports to be managed

- Data Element Dictionaries and Directories (for metadata)

- Audit mechanisms for quality control of data and information resource management policy compliance control

- Cost accounting mechanisms for information.

The degree of sophistication of these tools and the scope of their application will be significant in determining the success of the IRM program.

Data Standardization has been an ongoing effort in DOD and the Department of the Army for over 15 years. The program has

met with mixed response, support, and success, and yet it is generally agreed that standards in terminology, data element names, data item values and codes, and attendent data management software would go a long way toward facilitating information sharing and reducing the costs associated with information systems. The Data Standards Program is a fundamental and integral part of the HQDA Information Resource Management Program and provides a set of tools which can be used to assist in the use, maintenance, and management of the information resource.

The current Forms, Records, and Reports Management activities in TAGO involve the establishment and maintenance of data bases pertaining to the forms, records, and reports of HQDA. These data bases are an essential source of information needed by the Information Resource Management Community to monitor and control the development, proliferation, and dispensation of forms, reports, and records.

Data element dictionaries and directories are collections of data about the data contained in a computerized file or data base, i.e., metadata. Typically, dictionaries contain the defining characteristics of data elements such as name, size, data type, character set, precision, date of last update, etc. Data directories contain information about the location of a particular data element within an organization, which computer programs access that element, which organizations are responsible for the data, etc.

The FIPS Task Group 17 of the National Bureau of Standards has identified a new tool which they term the Data Resource Directory (DRD). This tool is a combination of the functions of a data element dictionary and a data element directory and one whose scope is the entire data (or information) resource of an organization (manual or automated). The HQDA DRD, then, would contain all the metadata pertaining to the HQDA information resource. Even with the understanding that the contents of the DRD is metadata and not the actual data itself, the size of such a DRD for an organization the size of HQDA would be considerable. The actual development of a DRD for HQDA will undoubtedly occur in stages with suitable restrictions of scope (such as the focus of our study on automated information or the concentration on individual subject areas one at a time). Indeed, the implementation of the concept of a DRD may actually result in a distributed DRD for reasons of efficiency, effectiveness, or security. In Phase 2 of our contract, we shall investigate further the concept of the Data Resource Directory for HQDA.

The Audit mechanisms for quality control of data and IRM policy compliance will entail the development of management procedures to be followed by the Information Resource User Community and the Information Resource Handling Community with regard to the information resource. Such mechanisms will be

similar to the audit procedures currently in effect for the management of other resources.

The Commission on Federal paperwork in their report on Information Resources Management (September, 1977) rejects the idea that information-related costs should be considered as overhead and advocates the development of mechanisms for cost accounting for information. Unfortunately, few such mechanisms already exist; research is needed to identify information costs, categorize them, and develop mechanisms for aggregating and summarizing these costs. The development of such costs can allow HQDA Management to compare actual information system performance with expected performance and thereby determine bottlenecks, breakdowns, and misdirections in the Total HQDA Information System.

An information resource management program, then, is

- A Philosophy
- A Set of Policies,
- An Organizational Structure, and
- A Collection of Tools.

The philosophy is clear: information is a valuable resource of HQDA which must be managed. The set of policies is based on this philosophy and serves to define the philosophy for the HQDA environment. The collection of tools is virtually endless. As new and improved technology and techniques are developed, new tools will become available to support IRM. The activities pertinent to the organizational structure for information resource management are described in the next section of this chapter.

4. FUNCTIONAL REQUIREMENTS

Exhibit X-2 identifies 11 activities which are relevant to the management of information as a resource. We believe these activities are fundamental to an initial automated IRMP, but they do not necessarily comprise all of the functions which the Army may need to develop to manage its total information resources.

(1) Information Policy Development and Promulgation

The first activity listed on the exhibit is Information Policy Development and Promulgation. As we have discussed, a key concept of information resource management is the development of a consistent set of policies with regard to the management of information. This set of policies is the cornerstone upon which the program is built and which defines the authority and

Relevant Functions of Information Resource Management

- INFORMATION POLICY PROMULGATION
- INFORMATION SYSTEMS PLANNING REVIEW AND COORDINATION
- INFORMATION RESOURCE EDUCATION
- INFORMATION RESOURCE TECHNOLOGY ASSESSMENT
- METADATA MANAGEMENT
- DATA BASE ADMINISTRATION GUIDANCE
- DATA STANDARDIZATION
- POLICY COMPLIANCE AUDIT
- FORMS MANAGEMENT
- RECORDS MANAGEMENT
- REPORTS MANAGEMENT

EXHIBIT X-2

limitations of the remaining activities. Some of the areas where information management policies will be required were listed in the preceding section of this chapter. Basically these policies relate to the scope and conduct of all the activities of the information resource management program.

(2) Review and Coordination of Information Systems Planning

The next activity is the Review and Coordination of Information Systems Planning with respect to the information to be provided or used by the system. This review would include:

- consideration of alternative sources of data for the system
- evaluation of the potential for consolidation of data or function
- an HQDA-wide perspective for information acquisition and sharing.

The actual development of the Information Systems Plans would remain in the purview of the individual Staff Agencies and their respective DPI's. Further, it is understood that other forms of review of these plans (such as for ADPE to be involved, soundness of the system design, justification of the need for the system, consideration of Life Cycle Management guidelines, etc.) are highly important and will continue to be needed in addition to the information review. The coordination of the development of information systems for the various Staff Agencies is important to the enhancement of information sharing and to the identification of potentially redundant situations.

(3) Information Resource Education

The third activity, Information Resource Education, has two aspects. One is the education of HQDA on the philosophy and benefits of viewing information as a resource and on what the program is doing to manage that resource. The second aspect is the education of HQDA personnel on the contents, location, use, and constraints of the information resource. This function aids

- the Action Officer in processing his action items,
- the systems planner and designer in creating new information systems
- HQDA management in planning and budgeting for information.

There will need to be developed an information locator system (possibly based upon a HQDA Data Resource Directory) which can be used to facilitate the information resource education process. The automation of this locator system is deemed an essential

aspect of its viability due to the potential size of its contents and the user population. In addition to providing an on-line information locator service to HQDA, the information resource education activity might become involved in publishing a periodic newsletter containing items of interest to the information resource community.

(4) Information Resource Technology Assessment

Information Resource Technology Assessment similarly has two aspects. One is the assessment of current DPI and Staff Agencies' capabilities to support their own information needs as well as the demands of other organizations. The second aspect is the tracking and assessment of current technological trends in information management and assistance and guidance to the Staff Agencies and DPI's in incorporating this technology.

Information technology is a rapidly growing and changing field, and many times a system can be technologically outdated before its development is completed. The assessment of information technology per se (e.g., ADPE or Word Processing Equipment) is best left to the expertise of the Information Resource Handling Community. However, information resource management, as an emerging field, can be expected to develop specific technologies and approaches relevant to the management of the information resource. The Information Resource Management Community will want to track such developments and assist in evaluating and promulgating new developments throughout HQDA.

(5) Metadata Management

Metadata Management is the management of data about the data (metadata) contained in the information resource. Metadata management is concerned with such issues as the name of a data element, its location, its definition, a list of its permissible users, a list of the information systems which access this element, the sole competent source of the information, the proponent responsible for its definition, etc. This metadata can be maintained in a metadata base called a Data Dictionary/Directory. The creation, coordination, and maintenance of this dictionary/directory is termed Metadata Management.

The management of metadata can occur at several levels throughout HQDA. The current trend toward developing data dictionaries in the various Staff Agencies and DPI's points out the need for a metadata management function in each organization. This function, while based in the technological issues of creating a working data dictionary, will also need to stress user involvement in the selection and definition of terms. The maintenance of metadata in a functional area will be an ongoing process as new needs are identified, new elements defined, and existing elements modified or deleted. The individual data

dictionaries for the functional areas can become the central point of definition for that portion of the information resource in the domain of each Staff Agency.

On a HQDA-wide level, the development of the HQDA Data Resource Directory described earlier will provide a focal point for coordinating individual Staff Agency dictionary development as well as providing the basis for a locator service to assist in the identification and location of information throughout HQDA. The maintenance of the Data Resource Directory will require a full-time staff to coordinate metadata definitions and alterations as well as to support the Information Resource Education activity in assisting action officers and others in obtaining information. Further, it is envisioned that the metadata maintenance staff will be involved in accumulating statistics and information on the use and service of the information resource.

(6) Data Base Administration

Data Base Administration, as described in Chapter III, is the technical design and maintenance of data bases used in information systems. Data Dictionaries can be extremely useful tools to Data Base Administrators as they develop data bases. Effective Data Base Administration is a highly technical area which requires significant technical training. DBA skills are scarce within the Army today and are expected to remain scarce for the forseeable future. Consequently, training, guidance, and assistance programs will need to be established.

The Data Base Administration function should continue to be performed at the individual Staff Agency and DPI level as primarily a technical activity. Coordination of data base administration efforts across functional areas would contribute to an improved basis for information sharing and the identification of potentially redundant data or data bases. HQDA policies and guidelines for the design and maintenance of data bases, the selection of data base management software, and standard data element names and codes would facilitate the task of data base administration and contribute to consistency of data base management throughout HQDA.

(7) Data Standardization

Data Standardization, the seventh activity of an IRM program, is the development, maintenance, and enforcement of DA standard data element names, values, and coding schemes. Adherence to data standards can facilitate the information sharing process; however, wholesale standardization is not necessarily feasible. The relative lack of success of the current DA program for data standardization after more than 15 years of operation bespeaks of the difficulty in carrying out a standards program. This fact,

coupled with the need to coordinate with data standardization efforts at the DOD, Federal, and NATO levels makes this an important function.

We see the need to incorporate into the HQDA automated information resource management program the development and maintenance of data standards for use in HQDA automated systems. If the initial scope of this program is limited to HQDA and its supporting DPI's it will need to work closely with current DA data standardization efforts without necessarily incorporating those ongoing activities. As the scope of the information resource is expanded the HQDA data standards program would be able to merge with the DA standards program. A key objective, of course, will be to maintain compatibility among the programs.

(8) IRM Policy Compliance Audit

Accompanying the development and promulgation of information management policy is the need to audit individual Staff Agencies, DPI's, and information systems for compliance with the policies, procedures, and standards regarding information management. Such an audit activity not only supplies management with information concerning violations of the policies but provides an incentive for system developers to design compliance into their systems (knowing they will be checked.)

The audit function will need to be performed at a variety of levels and across all of HQDA. The auditors will require sufficient technical skills and information resource management training to be able to determine policy compliance effectively. They will also require sufficient authority and backing to insure the cooperation of the Staff Agencies and DPI's in the audit. The independence of the audit is an important consideration and may require measures similar to those currently in place with the Army Audit Agency or the Inspector General.

(9) Forms Management

Forms Management with regard to automated information concerns the design and control of the empty forms to be used as input media to automated information systems. The management of forms addresses the possible use of alternative forms, the consolidation of existing forms, and the retention or purging of outdated forms.

(10) Records Management

Records management includes the management activities relating to the creation, maintenance, and use of official records. Where these records are automated, this function comes under the purview of an automated information resource management program.

(11) Reports Management

Reports Management involves the management of the reports produced by automated information systems. This function includes tracking the need for continued production of (possibly outdated) reports, coordinating the development of new (possibly redundant) reports, and control over the production of periodic reports.

The management of forms, records, and reports used in conjunction with automated systems will entail the establishment and enforcement of policies, the creation and execution of procedures for approving and monitoring forms, records, and reports usage, and the development of automated data bases and aids to assist in the management process. Many aspects of these three activities are already being executed in the Office of the Adjutant General for the Army as a whole. There will need to be close coordination of these activities as they pertain to HQDA automated systems to form the initial HQDA automated information resource management program.

5. ORGANIZATIONAL CONSIDERATIONS

Several of the functions listed in the preceding section are currently being performed in HQDA, albeit at different locations and with varying degrees of coordination. Exhibit X-3 shows the 11 information resource management activities and selected Staff Agencies which have some responsibility with regard to those functions. Staff Agencies listed by name have some HQDA-wide role for that activity while the DPI and Functional Area columns indicate a responsibility generally limited to the respective DPI or Functional Area.

The chart shows, as might be expected, that the DPI's are generally involved in some way with each of the IRM activities. This, of course, is true because of our focus on automated information and the DPI's role in developing, implementing, and executing information systems.

The second major point shown in the chart is the dispersed location of policymakers for automated information management. Thus, within HQDA

- ACSAC establishes policy with regard to information systems planning and data standardization,
- COA has a newly created office of Resource Management Policy which establishes policies about policies,
- TAG sets policies with regard to forms, records, and reports management, and
- The DPI's and Functional Areas set their own policies in the absence of HQDA-wide policy (such as with Data Base Administration, Metadata Management, Information Education,

Current IRM Functional Responsibilities

HQDA ORGANIZATIONS / IRM ACTIVITIES	ACSAC	COA	DPI's	Functional Areas	TAG	USACSC
Policy Promulgation	X	X	X	X	X	
Information Systems Planning	X		X	X		X
Information Education			X	X		
Technology Assessment			X			X
Metadata Management			X			
Data Base Administration			X			
Data Standardization	X		X	X		X
Compliance Audit			X			X
Forms Management			X		X	
Records Management			X		X	
Reports Management			X		X	

EXHIBIT X-3

and Technology Assessment). In addition, the DPI's and Functional Areas at times set their own policies in areas where HQDA policies already exist (such as data standardization where a system may adhere to local standards, DA standards, DOD standards, NATO standards, or Federal standards depending upon the area and mission involved).

The Computer System Command is responsible for developing data standards for HQDA and DA as well as providing assistance in technology assessment and information system planning and in auditing to some extent compliance with DA data standards,

The chart of Exhibit X-3 does not distinguish among the various levels of IRM activity in which the individual areas engage. In Chapter III we mentioned three levels relevant to the Information Resource Management Community:

- Executive, or policymaking,
- Administrative, or controlling, and
- Operational, or execution.

The Executive Level of IRM is concerned with high-level policy and direction of the information resource management activities. Executive activities to be performed are as follows:

- Establish the goals and direction for information resource management
- Conduct long-range planning for information resource management
- Set policy concerning information resource management
- Authorize information resource management activities
- Arbitrate information disputes
- Evaluate information resource management effectiveness and efficiency.

The Administrative Level of IRM is concerned with enforcing and controlling the information resource management activities. Specific tasks at this level include:

- Refine information resource management goals into specific objectives
- Conduct mid-range planning for information resource management

- Translate information resource management policy into procedures
- Enforce information resource management activities
- Clarify and validate information disputes
- Control information resource management effectiveness and efficiency.

The Operational level of IRM is concerned with executing and monitoring the information resource management activities. Duties at the operational level are:

- Meet information resource management objectives
- Provide short-range response to information needs
- Execute information resource management procedures
- Audit compliance with information resource management policies
- Identify information dispute issues
- Monitor information resource management effectiveness and efficiency.

Each activity of the IRMP entails executive, administrative, and operational aspects. Exhibit X-4 shows the degree of authority we believe to be appropriate for each level within each activity. Basically, the categories of authority shown in the chart are

- Establish a regimen that a given activity should be performed
- Provide guidance on how that activity should be carried out
- Review the execution of the activity
- Approve the plans for the activity or disallow its execution
- Develop or execute the activity
- Comply with the activity guidelines or pass the activity guidelines along to others in HQDA.

Exhibit X-4 shows the executive role of IRM to be one of policy and planning approval, general advocacy of the philosophy of information as a resource, and the coordination of the program. The administrative role is one of policy development, planning review, and approval authority over data standards and metadata, forms, records, and reports management. The operational role is generally one of

Information Resource Management Activities

	Information Management Policy	Information Systems Planning	Information Resource Education	Information Resource Technology Assessment	Metadata Management	Data and Data Base Administration	Data Standardization	Policy Compliance Audit	Forms Management	Records Management	Reports Management
Executive Level	Approve/ Direct	Approve	Provide Guidance	Establish Regimen	Provide Guidance	Establish Regimen	Provide Guidance	Approve	Establish Regimen	Establish Regimen	Establish Regimen
Administration Level	Develop/ Enforce	Review	Develop	Provide Guidance	Approve	Provide Guidance	Approve	Review	Approve	Approve	Approve
Operational Level	Follow/ Comply	Develop	Study/ Teach	Execute	Execute	Execute	Execute	Execute	Execute	Execute	Execute

EXHIBIT X-1

executing the activities, complying with the policies, and developing the plans.

At this point it is important to note that we have not attempted to describe a single organizational entity for information resource management (although such an organization might be conceivable). We have described a program for information resource management which may take on any of several possible organizational embodiments. The point of the discussion thus far has been to describe the activities which we believe to be necessary to such an initial program and the levels of authority necessary for each activity. In Chapter XI, we will discuss three alternative approaches to organizing for the implementation of an initial information resource management program: centralized, decentralized, or distributed. The assignment of IRM activities to particular HQDA Staff Agencies as part of the program development is beyond the scope of this phase of our study and is the subject of Phase 2.

6. IMPLEMENTATION CONSIDERATIONS

Before we enter the discussion regarding alternatives in Chapter XI we need to summarize some important considerations pertaining to the establishment of a program for managing the automated information resource of HQDA. These considerations are presented in Exhibit X-5.

(1) Effectiveness of IRM Policies and Placement of Authority in Supporting DA Mission Accomplishment

HQDA is, itself, a staff organization to the Department of the Army. As such, HQDA exists to assist the Field and Installation Commanders in accomplishing their missions. This assistance takes many forms including

- Obtaining and retaining resources for the Army from OSD and Congress
- Proposing and defending programs to OSD and Congress
- Active management of DA resources through the establishment of policies and procedures and the collection of pertinent information
- Feedback of information to the Field and Installation Commanders to assist in their individual management endeavors.

The management of the information resource must be accomplished in a way that assists the various Staff Agencies (and, thus, the Field and Installation Commands) in meeting their missions and not merely regulates their actions. To achieve this goal will require heavy user involvement in the process of managing the information resource. User responsibilities will need to be

Considerations in Establishing an IRM Program

- EFFECTIVENESS OF POLICIES AND PLACEMENT OF AUTHORITY
- EVOLUTION OF PROGRAM FROM EXISTING ACTIVITIES
- EXPEDIENCY OF INITIATION OF PROGRAM
- EXTENSIBILITY OF PROGRAM SCOPE
- EFFICIENCY OF OPERATION
- COST OF DEVELOPMENT, IMPLEMENTATION, OPERATION

EXHIBIT X-5

clearly defined and accepted. Proponents, consumers, and sources of information will need to be integrated into the information resource management process and not relegated to merely a passive, compliance/recipient role.

The IRM policies and procedures which the User Community and the Information Resource Handling Community will be expected to follow must be developed in a cooperative environment which blends the right degree of participation and authority. This blend is achieved in other management programs in HQDA through the establishment of high-level committees with representatives from each Staff Agency and chaired by the organization which has primary functional responsibility in a given area. This committee/responsible agency approach provides a direct channel for user participation while also focusing authority for coordinating and ensuring compliance throughout the Army Staff. The placement of this authority and the assignment of responsibilities are a key consideration in the establishment of an information resource management program for HQDA.

(2) Evolution of IRMP from Existing HQDA Activities

The IRM Program for HQDA, then, must be evolutionary, not revolutionary. Initially, the seeds of the concept must be planted with sufficient resources to assure its growth. Too large of a push at the outset could, however, prove fatal to the program by forcing change too rapidly. A gradual controlled transition will be necessary over a period of years. There will, of course, be substantial near-term benefits, particularly from the perspective of metadata management.

- The education process will be large and continuous as more and more people are exposed to the concept and understand the benefits of this approach,
- The various IRM activities, now dispersed throughout HQDA, will require better coordination and some consolidation,
- HQDA has a large investment in current automated information systems which it cannot discard immediately,
- The IRM Program will be a dynamic undertaking which will entail periodic review and redirection as the Army matures its understanding of how it wants to manage its information resources.

(3) Expediency of the Initiation of an IRMP

Accompanying the notion of an evolutionary approach is the consideration of how to get the program approved and underway. Again, the less radical the change incurred (reorganization, reallocation of resources, retrofitting of existing systems, etc.)

the more likely the program will get off to a rapid start. Further, it is not necessary for the Army to commit to the entire program at the start or even to have completely defined the program at the outset.

There are many technical aspects of information resource management which need to be developed in addition to the management or organizational aspects. One such technical activity is the construction of a Data Dictionary/Directory of data elements, their definitions, their representation characteristics, their locations, proponents, sources, users, timeliness indicators, and other pertinent metadata. The construction of a dictionary/directory for all of the automated information resource at HQDA would be a substantial undertaking. A more expedient approach which allows for some organizational learning about the dictionary development process would be the selection of a limited scope set of data or systems to serve as a pilot. The PPBS process and the current PROBE effort are one possible arena for a pilot implementation.

(4) Extensibility of the IRMP Scope

As we have indicated, our study has focused on developing a program for managing the automated information resource of Headquarters, DA and its supporting DPI's. The possibility for extension beyond this current scope should be considered as the program is implemented and evolves. In Chapter III of this report we discussed the applicability of the IRM concept to non-automated information, i.e., irrespective of the medium on which the information is collected, stored, transmitted, or reported. We have also discussed the possible extensions of managing information as a resource of HQDA to managing information as a resource of DA, similar to the management of DA personnel, financial, or materiel resources.

The early focusing of scope is commensurate with the long-term evolutionary approach to IRM by defining an achievable but important first step. The program must be carefully designed so that future extensions of scope are possible. It should also be pointed out that the growing trend towards more and more automation in the Army (as elsewhere) implies that information considered beyond the scope of this effort today may well be automated (and, hence, within the program scope) in the near future. There is also the likelihood that an effective information resource management program at HQDA will foster similar (and hopefully related) programs throughout DA as well.

(5) Efficiency of Operation

The resource posture of HQDA and the Army is under constant scrutiny and evaluation by Congress, OMB, OSD, and HQDA itself. The size of the Army Staff is shrinking. New programs are

evaluated in the light of the expected manpower savings to be obtained. New resources are often difficult to obtain. Quite often the allocation of resources to a new program will entail the transfer of resources from some other activity. In such instances, the benefits of the new program must be sufficient to warrant the reallocation of resources.

The IRM Program for Headquarters, DA must be developed with the recognition that resources are constrained (particularly authorizations for personnel). In our earlier discussion of the effectiveness of the program we described the need for the active involvement of the Staff Agencies in the development and execution of the program. Under such a mode of division of responsibilities, the impact of resource constraints should be lessened.

(6) Cost of Developing, Implementing, and Operating an IRMP

The cost of establishing and maintaining an information resource management program is an important consideration in getting such a program underway. Decision-makers need an estimate of the cost associated with the program alternatives to determine which alternative, if any, to pursue. Cost estimates are also required by planners in preparing for the allocation of resources. Cost is not necessarily the deciding factor in implementing a program alternative, but those alternatives which exhibit costs far in excess of available resources are not likely to be implemented.

There are many cost areas associated with establishing an IRM program for HQDA. The more tangible costs include the staff required to develop, implement, and operate the program, the tools needed to assist the establishment process, and the necessary supporting data and materials. The intangible costs include possible internal organizational conflicts caused by overlapping missions and the organizational learning time required for HQDA to make the transition to managing its automated information as a resource.

In Chapter XI we provide an estimate of the tangible personnel costs associated with the initiation and operation of the IRM program. These cost figures provide a basis for comparing the suggested alternative approaches for establishing an initial program. Detailed costing of the selected alternative is reserved for Phase II of our study.

In evaluating the cost of establishing an IRM program one must also consider the cost of not having such a program. Problems with HQDA's current mode of information management have been described throughout this report.

These problems, while difficult to quantify in dollar terms, represent real cost considerations for the Army. Some of these problem areas include excessive time spent in searching for existing automated information, inadequate information from automated sources to support operational decision-making, redundant reporting and storage of information, manual correlation and resolution of data inconsistencies, expansive growth of data bases and information systems, information conflicts or gaps due to uncoordinated information planning, and possible budget cuts in selected areas due to the inability to produce correct information at the right time.

In the next chapter we present alternatives for establishing an initial program for managing the automated information resources of HQDA given the requirements and considerations discussed in this chapter.

INITIAL INFORMATION RESOURCE MANAGEMENT PROGRAM ORGANIZATIONAL ALTERNATIVES

The objective of this chapter is to present organizational alternatives for the initial step in the long-range implementation of the HQDA Information Resource Management Program (IRMP). This includes consideration of organizational and implementation factors based on the IRMP requirements stated in Chapter X.

Our discussion of the organizational alternatives includes the following:

- Approach to the Development of Alternatives
- Major Organizational Options
- Introduction to Organizational Alternatives
- Centralized Approach to an Initial Automated IRM Program
- Distributed Approach to an Initial Automated IRM Program
- Decentralized Approach to an Initial Automated IRM Program
- Cost Considerations of IRM
- Recommended Organizational Alternative
- Summary of Organizational Alternatives Analysis.

The discussion begins with a description of the approach used in developing the alternatives.

1. APPROACH TO THE DEVELOPMENT OF ALTERNATIVES

The previous chapter described the objectives of an Information Resource Management Program and the requirements for successful accomplishment of the program objectives. The scope of the program to be initially implemented by any of the organizational approaches under consideration was defined in the course of the study as encompassing automated data systems within HQDA. Within this scope, a list of functional activities were identified which are regarded as essential to meeting the requirements of successful implementation of an Information Resource Management Program.

(1) Functional Responsibilities

The basic functions of an IRM Program have been described previously and include:

- Information Policy
- Information System Planning
- Information Resource Education
- Information Technology Assessment
- Metadata Management
- Data Administration
- Data Standardization
- Policy Compliance Audit
- Forms Management
- Records Management
- Reports Management.

These functions provide a checklist of responsibilities that should be satisfied by any organization which is proposed for the effective administration of an Information Resource Management Program.

The matrix presented in Chapter X, and reproduced here for ease of reference as Exhibit XI-1, describes the functions regarded as essential to the implementation of an IRM Program. It also shows the nature and appropriate level of authority for performance of the function. The functions listed across the top of the matrix describe the areas of concern or responsibilities that should be addressed in the IRM organizational alternatives.

(2) Levels of Authority

The matrix in Exhibit XI-1 identifies three levels of management responsibility for each of the IRM functions. The management responsibilities shown are not necessarily synonomous with organizational levels of authority. Rather, they describe the elements of management responsibility that comprise each of the functions of an IRM Program. More importantly, the authorities indicated for each of the three categories of management responsibility describe the level, at a minimum, at which the functions must be performed in order to achieve the objectives of the program. For example, while it is important to the success of the Program that certain key functions receive executive management attention in the form of approval or initiating actions, it should be clear that not all functions require this level of attention for effective program implementation. It was important in the development of organizational alternatives,

Information Resource Management Activities

	Information Management Policy	Information Systems Planning	Information Resource Education	Information Resource Technology Assessment	Metadata Management	Data and Data Base Administration	Data Standardization	Policy Compliance Audit	Forms Management	Records Management	Reports Management
Executive *Level*	Approve/ *Direct*	Approve	Provide Guidance	Establish Regimen	Provide Guidance	Establish Regimen	Provide Guidance	Approve	Establish Regimen	Establish Regimen	Establish Regimen
Administration Level	Develop/ Enforce	Review	Develop	Provide Guidance	Approve	Provide Guidance	Approve	Review	Approve	Approve	Approve
Operational Level	Follow/ Comply	Develop	Study/ Teach	Execute	Execute	Execute	Execute	Execute	Execute	Execute	Execute

EXHIBIT XI-1

however, that the appropriate levels of authority for program implementation be identified prior to attempting to design organizations which could realistically carry out the program.

2. MAJOR ORGANIZATIONAL OPTIONS

Our analysis of the functions and management responsibilities required for initial implementation of the IRM Program within the current HQDA environment indicated that the program could be implemented in any one of several organizational modes. A realistic consideration of the political and resource constraints within HQDA also indicated that these alternative approaches would differ more in the degree of emphasis on organizational approach, e.g. centralized or decentralized, rather than along a wide range of functional approaches. The reason for this narrow range of difference between the most centralized approach and the most decentralized approach is the limited number of realistic organizational choices for several of the IRM functions. As a result, the major differences in the organizational approaches revolves around where the focus of authority and responsibility is located for certain key functions, e.g., information policy and information systems planning.

(1) Organizational Alternatives

The basic characteristics of each organizational alternative can be seen in Exhibit XI-2. Each of these alternatives is categorized as follows:

- Centralized Approach

  Would require the establishment of a central authority for functions related to IRM. Authority and responsibility would be placed at the highest common point in the organization to effect maximum control.

- Distributed Approach

  Would require the establishment of a centralized IRM staff for policy development, and a possible reassignment of some existing functions to achieve a distribution of responsibilites for IRM at the appropriate levels. Authority and responsibility would be located at the level in the organization that conforms with current allocation of similar functions.

- Decentralized Approach

  Would create additional responsibilities at the staff agency/DPI levels for IRM functions, and would rely on the coordination of inter-functional concerns through an Oversight Committee. Authority and responsibility would be located as close to the level in the HQDA organization where the actual work takes place.

Characteristics of Organizational Alternatives

CENTRALIZED	DISTRIBUTED	DECENTRALIZED
• Most Executive, Administrative, Operational Aspects of IRM Unified in a Single Organization • IRM Office Can be New Organization or a Consolidation into an Existing Staff Agency • Emphasis on Efficiency	• Executive, Administrative, Operational Aspects of IRM Distributed throughout HODA • Establishment of HODA IRM Staff • Emphasis on Pragmatics	• Executive, Administrative, Operational Scope of IRM Repeated in Each Major Functional Area • Establishment of Oversight Committee to Coordinate IRM Activities • Emphasis on Effectiveness

EXHIBIT XI-2

A more detailed discussion of each of these organizational alternatives can be found in section 3 of this chapter.

(2) Evaluation Methodology

The basic test of an existing organization is whether it is meeting its management or organizational objectives, i.e., is it accomplishing what it was established to do? Further consideration of organizational performance involves the determination of the efficiency and effectiveness with which an organization accomplishes its objectives, and the identification of opportunities for improvements in the organization, i.e., identifying those revisions to the organization that would reduce the cost or personnel required to meet its objectives.

The evaluation of the effectiveness of a proposed organization relies on the same criteria of efficiency and effectiveness, however, the degree to which an organization meets the criteria must be assessed in a more subjective manner than in the case of existing organizations. The final judgement of the relative effectiveness of two or more alternative organizational approaches must rely on a combination of the practitioner's experience with organizational behavior and evaluation of the management environment in which the organization must perform. In the case of the development of the HQDA Information Management Program, it was first necessary to establish:

- General design criteria for structuring the program
- The essential functions to be performed by the organization in order to achieve an effective IRM Program
- The nature and level of management responsibility that must be applied to each function in order to achieve an effective and efficient organization.

(3) Environmental Constraints

The definition of the functions and identification of the management responsibility associated with their performance reduced considerably the number and range of organizational options to be considered. The number of alternatives was reduced even further in considering what were regarded as environmental constraints:

- Continued emphasis on reduction of size of HQDA staff would pose a problem to creating a program requiring sizeable staff additions

- Internal and external pressures to minimize the size of staff in the Office of the Army Chief of Staff should be considered for any proposal that creates a permanent IRM responsibility at that level

- Recent experiences have demonstrated a reluctance within HQDA for the creation of new staff level committees

- Strong resistance against central control or the appearance of control over the ownership of information.

These environmental conditions provided additional criteria for use in the development of the organizational alternatives. As indicated early in the discussion, the final evaluation of the relative effectiveness of the organizational approaches must, of necessity, rely on subjective judgement. While various evaluation methodologies were considered, such as assigning relative effectiveness weights to various organizational locations for specific functions, each was rejected as only adding further subjectivity to an already highly subjective process.

(4) Implementation Factors

Before we begin the discussion on the organizational alternatives, we need to reiterate that certain considerations should be taken into account in evaluating these alternatives.

The IRM policies and procedures which HQDA will be expected to follow must be developed in a cooperative environment which blends the right degree of participation and authority. The placement of this authority and the assignment of responsibilities are a key consideration in the development of alternatives for information resource management at HQDA.

The IRM program must also be evolutionary. A gradual controlled transition will be necessary, with this transition directed with a long term perspective in mind. The less radical the change incurred, the more likely the program will get off to a good start. It is not necessary for HQDA to commit to the entire program at the start. Indeed, the program itself is expected to evolve over the ensuing years.

The early focusing of scope is commensurate with the long-term evolutionary approach to IRM by defining an achievable but important first step. An effective IRM program at HQDA will foster the development of similar programs throughout the Army as well. The program must be developed with the recognition that resources are constrained. Increased efficiency and the other benefits of the new program must be sufficient to warrant the reallocation of resources.

3. INTRODUCTION TO ORGANIZATIONAL ALTERNATIVES

The organizational approaches presented in the following sections are not intended to describe specific organizational structures that could be portrayed in a set of detailed organization charts. Rather, they describe variations in philosophy or degree of management, each approach to which could be achieved through two or more subtle, but perhaps significant differences in organization. The review and consideration of these approaches is required with HQDA prior to design of a specific organization to implement the program.

The organizational configurations that were considered to be feasible with the HQDA environment and that would provide a comparable degree of effectiveness in the implementation of an IRM program can be seen in Exhibit XI-3. A discussion of the first six IRM functions can be found in each of the organizational alternatives sections which follow. These functions include:

- IRM Policy
- Information Systems Planning
- Information Resource Education
- Information Technology
- Metadata Management
- Data and Data Base Administration.

The other five IRM functions are the same for all of the three alternatives and are described below. These include:

- Data Standardization

  The administration of the program regarding standard data elements and data descriptions should be developed and promulgated by a separate agency. The other functional areas would participate in the development of data standardization policies to the extent of recommending approaches and reviewing draft policies. The central IRM staff agency will retain responsibility for resolution of conflicts and issues associated with data standardization, and set policy with regard to data standards

  One of the primary responsibilities of the DPIs will be to implement the data standardization policies and procedures developed by the central standardization staff.

Organizational Alternatives

IRM ACTIVITY \ ALTERNATIVE	CENTRALIZED	DISTRIBUTED	DECENTRALIZED
IRM POLICY	DCS/ACS LEVEL	IRM STAFF WITH OVERSIGHT COMMITTEE	STAFF AGENCY WITH OVERSIGHT COMMITTEE
INFORMATION SYSTEMS PLANNING	DCS/ACS REVIEWS AND APPROVES PLANS	IRM STAFF APPROVES PLANS	COMMITTEE COORDINATES PLANS
INFORMATION RESOURCE EDUCATION	A STAFF AGENCY IS ASSIGNED APPROPRIATE RESPONSIBILITY	A STAFF AGENCY DEVELOPS PROGRAM	EACH STAFF AGENCY DEVELOPS PROGRAM
INFORMATION TECHNOLOGY		A STAFF AGENCY DEVELOPS PROGRAM	
METADATA MANAGEMENT		A STAFF AGENCY DEVELOPS PROGRAM	
DATA/DATA BASE ADMINISTRATION		A STAFF AGENCY DEVELOPS PROGRAM	
DATA STANDARDIZATION	A STAFF AGENCY IS ASSIGNED RESPONSIBILITY		
POLICY COMPLIANCE AUDIT	A STAFF AGENCY IS ASSIGNED RESPONSIBILITY		
FORMS, RECORDS, AND REPORTS MANAGEMENT	A STAFF AGENCY IS ASSIGNED RESPONSIBILITY		

EXHIBIT XI-3

- Policy Compliance Audit

The integrity and effectiveness of the IRM Program would be dependent to a considerable extent on periodic reviews of adherence to IRM policies and procedures by the functional areas and DPIs. These management audits should be performed with the same intensity and level of effort that is applied to other internal reviews. For that reason, this function should be assigned to an individual staff agency and performed by personnel with sufficient EDP and information management training to provide a competent level of evaluation.

The centralized IRM organization would be responsible for initiating and following up on the corrective actions that are recommended as a result of any findings of the auditing staff agency.

- Forms Management

Under each of the alternative approaches to IRM, a separate staff agency would be assigned responsibility for Automated Data Forms Management. The purpose of this function is to establish the same discipline that is applied to manual data forms management in the automated data environment. The staff agency would issue policy governing the design and use of automated data forms and approve all forms other than those used for internal functional agency purposes only.

In performing this function, the staff agency would rely on the other staff agencies to provide input, particularly to the policy formulation process.

- Records Management

Policies governing the storage and retention of automated data records would be established and promulgated by the same staff agency as for forms management. As in the case of other IRM functions, the other staff agencies and comparable level organizations would participate in the development and review of draft policies. However, the final decision-making authority for storage and retention policies will rest with staff agency.

The DPIs will be responsible for carrying out the policies and procedures established by the staff agency.

- Reports Management

This function primarily involves review of the nature and frequency of standard reports to minimize the duplication of reports or other undesirable reporting practices. The same staff agency as for forms and reports would be responsible for developing procedures and compiling an

inventory of standard reports and conducting periodic audits of the appropriateness of report distributions. The staff agency would also identify opportunities for consolidation or elimination of duplicative reports.

Proposed actions and recommendations would be reviewed with the affected functional areas, but the central IRM staff agency would retain responsibility for resolution of issues related to reports management.

4. CENTRALIZED APPROACH TO AN INITIAL IRM PROGRAM

The centralized management approach to implementation of an IRM program implies a high commitment to the objectives of the IRM program. It would entail the establishment of a centralized staff agency with responsibility for Information Resource Management. The immediate office of this staff agency could be staffed by personnel performing comparable functions in other organizations throughout HQDA, or through the assignment of representatives to an existing organization at the DCS/ACS level. As the title of the approach suggests, many of the responsibilities would be centralized at the DCS/ACS level, in a manner very similar to those DCSs with responsibilities for other resources, such as COA, DCSPER, and DCSLOG. The following IRM activities would be centralized in this alternative:

- Information Resource Management Policy
- Review and Approval of New Information Systems
- Assessment of IRM Technologies
- Metadata Management
- Data Administration
- IRM Education

(1) Functional Responsibilities

The assignment of responsibilites for the IRM functions in a centralized approach to program implementation can be seen in Exhibit XI-4, and generally would be as follows:

- Information Policy

  The development of policy and procedures governing the administration of the IRM program would be centralized at the Deputy Chief of Staff or Assistant Chief of Staff level. These policies would encompass the functions associated with Information Resource Management including:

Centralized IRM Approach Activities

	Information Management Policy	Information Systems Planning	Information Resource Education	Information Technology Assessment	Metadata Management	Data and Data Base Administration	Data Standardization	Policy Compliance Audit	Forms Management	Records Management	Reports Management
CENTRAL HQDA OFFICE	Develop/ Approve	Review/ Approve	Develop/ Teach	Review/ Evaluate and Provide Guidance	Develop/ Approve	Establish Regimen	Provide Guidance	Provide Guidance	Provide Guidance	Provide Guidance	Provide Guidance
STAFF AGENCIES	Review	Develop/ Review	Provide Guidance/ Teach	Identify Needs/ Execute	Develop/ Execute	Provide Guidance/ Execute	Review/ Execute	Review/ Execute	Review/ Execute	Review/ Execute	Review/ Execute
DPI'S	Follow/ Comply	Develop/ Review	Study/ Teach	Identify Needs/ Execute	Develop/ Execute	Execute	Execute	Execute	Execute	Execute	Execute
COMMITTEES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

EXHIBIT IX-1

- Information Systems Planning
- Data Standardization
- Data Administration
- Metadata Management

Responsibilities for the review of policy drafts and proposed procedures would rest with the DCSs for the functional staff agencies. The DPIs would implement the policies and procedures that were developed for IRM.

. Information Systems Planning

The review of information systems proposed for development by the functional areas would be performed by the proponent staff agency. The review and approval of the information contained in the systems by the centralized IRM staff agency would be required prior to initiating design tasks. It is anticipated that in most instances the central IRM staff agency approval would be a pro forma action documenting the conclusion of the submitting DCS in their review of the proposed information system. The approval authority would serve, however, to resolve any conflicts or deadlocks regarding the initiation of the proposed information system. Responsibility for the development of the information system plans and other preliminary materials would be retained by the individual staff agencies and supporting DPI's.

. Information Resource Education

This function would be assigned to the centralized IRM staff agency and be devoted to the dissemination of information on the advantages, objectives, and operation of the IRM Program, as well as on the services available to the user community. This function would also include the development of training courses and materials for presentation to both the information handling and user communities. Although this function might require a small permanent training staff at the DCS level, much of the training could ultimately be performed by personnel provided by the staff agency directorates or the DPI's.

. Information Technology Assessment

This function describes the activities associated with the review and evaluation of IRM technologies as well

as new hardware and software technologies. The dissemination of information about the technologies to the HQDA information handling community would also be included as an activity of this function.

The function would be performed by a small staff located within the central IRM agency and would provide technical assistance to the individual staff agencies and DPI's related to new systems or IRM technology applications. The individual staff agencies and supporting DPI's would identify the needs for new applications and coordinate these with the central agency.

- Metadata Management

The responsibility for the administration of the metadata management program would rest with the centralized IRM staff agency. The agency would maintain the HQDA data element dictionary directory. The individual staff agencies and supporting data processing installations would participate in the development and maintenance of their own data dictionary/directories and provide metadata to the central repository. The central staff agency would coordinate the development of the individual DED/D's by the staff agencies.

- Data and Data Base Administration

A central staff agency would be responsible for the development of policy concerning data base administration procedures. The individual staff agencies and DPI's would retain responsibility for other data administration procedures through data administrators specific to the functional staff area. The data administration activities include:

- data base design
- security of the data base
- integrity of the data base
- data base standardization
- performance monitoring
- documentation.

While an overall objective of data administration in the IRM program is to foster standard DBMSs and common data management procedures and systems, the DPIs would retain responsibility for selecting the best aproach to meet their data administration needs.

(2) Advantages of Centralized Approach to IRM Program

There are several advantages apparent in relying on a highly centralized approach to implementing an initial IRM program. The centralized approach:

- Provides a high degree of visibility to the objectives of the program which will serve to increase the level of compliance with program policies
- Assures a high degree of emphasis on the attainment of program objectives and minimizes the time required to coordinate and achieve agreement on policies and tasks
- Permits more emphasis on common approaches and standards, and provides for more rapid resolution of issues and conflicts arising from this emphasis
- Provides for concentration of scarce IRM skills
- Avoids duplication of staff activites within HQDA for several important IRM functions and will require less staff than other approaches to implementation of IRM.

(3) Disadvantages of Centralized Approach to IRM Program

The disadvantages of a centralized approach to implementation of an IRM Program include the following:

- Denotes perception of tight control over information
- Implies reduced sensitivity toward individual mission requirements
- Provides for a concentration of approval authorities for several IRM activities may cause bottlenecks and delays in implementation process
- Results in the success of this approach being highly dependent upon the ability of the central authority to exercise freedom of action and repeatedly overcome challenges to authority.

5. DISTRIBUTED APPROACH TO AN INITIAL IRM PROGRAM

The distributed management approach to the implementation of a HQDA IRM Program entails the establishment of a HQDA Information Resource Management staff. This staff would have the responsibility for several IRM functions in HQDA. The staff would develop Information Resource Policy and would participate in the promotion of the IRM concept throughout the HQDA environment. The staff would also approve new information system plans. This IRM staff would be located at a level which would provide the high visibility needed for the program.

An IRM oversight committee would also be established with members from each of the staff agencies. The committee has the responsibility for review of HQDA IRM policies, and is chaired by the Director of the Information Resource Management staff.

An IRM steering committee would be established at the DPI level and be made up of members from each of the DPI's. The committee would provide guidance and recommendations on IRM policy to the individual operational staffs.

Within this alternative structure, each staff agency is responsible for operational level activities of the IRM program.

(1) Functional Responsibilities

The assignment of responsibilities for the IRM functions in the distributed approach to program implementation are shown in Exhibit XI-5 and would be as follows:

. Information Policy

The development and approval of policy governing the administration of the centralized IRM program would be assigned to the centralized IRM staff. These policies would include several of the other functions of IRM including:

- Information Systems Planning
- Data Standardization
- Data Administration
- Metadata Management.

The responsibility for the review of HQDA IRM policies would lie with the oversight committee whose members include representatives from each staff agency and is chaired by the director of the IRM staff. The staff agencies and DPI's would follow the policies and procedures developed by the IRM staff.

. Information Systems Planning

The review and approval of the proposed information systems would be performed by the IRM staff. This central approval authority serves to resolve any conflicts or duplicative development efforts prior to the detailed design and implementation of the proposed system. The responsibility for the development of information systems plans would be within each of the staff agencies. The DPI's would identify the

Distributed IRM Approach Activities

	Information Management Policy	Information Systems Planning	Information Resource Education	Information Technology Assessment	Metadata Management	Data and Data Base Administration	Data Standardization	Policy Compliance Audit	Forms Management	Records Management	Reports Management
CENTRAL HODA OFFICE	Develop/ Approve	Review/ Approve	Provide Guidance	Provide Guidance	Provide Guidance	Provide Guidance	Establish Regimen	Establish Regimen	Provide Guidance	Provide Guidance	Provide Guidance
STAFF AGENCIES	Follow/ Comply	Develop/ Review	Provide Guidance/ Teach	Identify Needs/ Execute	Develop/ Execute	Provide Guidance/ Execute	Review/ Execute	Review/ Execute	Review Execute	Review/ Execute	Review/ Execute
DPI'S	Follow/ Comply	Develop/ Review	Provide Guidance/ Teach	Identify Needs/ Execute	Develop/ Execute	Provide Guidance/ Execute	Execute	Execute	Execute	Execute	Execute
COMMITTEES	Review Policies and Make Recommendations										

EXHIBIT XI-5

requirements and assist in the development of information systems plans.

- Information Resource Education

The responsibility for the development of the IRM education program would be assigned to an individual staff agency. This function would include the dissemination of information on the advantages and objectives of the IRM program, as well as what IRM tools are currently available and envisioned for the future. Also included in this function is the development of training courses and materials for presentation to the IRM user community. The central IRM staff would also assist in the promotion of IRM concepts. The individual staff agencies and DPI's would assist in conducting the IRM education courses and disseminate information to the information system users.

- Information Technology Assessment

The activities of review and evaluation of IRM technologies as well as new hardware and software technologies, and the dissemination of information about these findings, would be the responsibility of a separate staff agency. This agency would also provide technical assistance to the Data Processing Installations with regard to their system development plans. The individual staff agencies and DPI's would identify the needs for new applications and coordinate with the technology assessment office for recommendations.

- Metadata Management

The responsibility for the administration of the metadata management program rests with an individual HQDA staff agency. This staff agency would maintain the HQDA information dictionary/directory. The individual functional staff agencies and supporting DPI's will participate in the development and maintenance of their own data dictionary/directory and provide the necessary information to the central repository of HQDA information.

- Data and Data Base Administration

An individual staff agency would be responsible for the development and maintenance of a data administration program. This agency will develop policies for the various data base administration functions and delineate individual responsibilities.

The agency's objective is to increase reliance on common data management procedures and systems.

Each staff agency and DPI will have their own data/data base administrators whose activities include:

- data base design
- security of the data base
- integrity of the data base
- data base standardization
- performance monitoring
- documentation.

(2) Advantages of Distributed Approach to IRM Program

The prime advantage of this alternative is the potential efficiency and consistency of consolidation of IRM policy making to a highly visible IRM staff. Other advantages include:

. The establishment of an IRM staff and oversight committee at a level of authority which would ensure adherence to IRM program objectives

. The user has a direct role in the development of policy and procedural guidelines resulting in user adherence to program policy

. Staff agencies and DPI's develop their own systems to meet local needs.

. Allows for the coordination between functional and operational ADP groups

(3) Disadvantages of Distributed Approach to IRM Program

Though there are a number of advantages to this alternative, there are some disadvantages which may detract from its effectiveness. These potential disadvantages include:

. The make up, size and relatively few times an oversight committee would be able to meet are factors compounding a possible lack of effectiveness

. Capability for timely response to conditions in a dynamic environment may be precluded

. Establishment of another staff office means the creation of new positions in an environment of decreasing resources

. The distribution of IRM activities poses problems in program coordination because interfaces needed to be established to provide bi-directional communication

6. DECENTRALIZED APPROACH TO AN INITIAL IRM PROGRAM

The decentralized organization structure denotes that Information Resource Management functions and responsibilities would be assigned to the individual HQDA Deputy Chiefs of Staff (staff agencies) and the corresponding Data Processing Installations. This alternative poses replication of most the IRM functions at each staff agency throughout HQDA.

Each staff agency would establish their own IRM staff. This staff could be set up through the existing DCS support offices (AMO/ISO) or be a separate office made up of individuals from within the staff agency. The IRM staff at each of the individual staff agencies would coordinate with the IRM support staffs of the other functional areas to assure that the information management program components and concepts were properly applied throughout staff level operations. This coordination would take place through an IRM steering committee which would be established to review the functional areas for adherence to overall HQDA IRM policies and procedures. This committee would be made up of representatives from each of the individual staff agency IRM support staffs and representatives from the DPI level IRM committee.

The staff agency IRM support staff would be responsible for assuring that the individual functional staff area and operational DPI area are meeting program requirements. Each supporting data processing installation would also establish an IRM support office. This DPI support office would be responsible to support the IRM policies and procedures established at the staff agency level. This staff could be located within an existing DPI support office or be a separate IRM support office made up of representatives from each of the other support offices within the DPI.

The supporting DPI IRM staffs would also interface with other operational staffs from the different staff agenices. The interface would take the form of the establishment of a DPI level IRM steering committee which would provide guidance and recommendations on IRM policies, to assure that the individual DPI staffs are adhering to the established IRM policies and procedures.

(1) Functional Responsibilities

The responsibilities within each IRM function, as shown in Exhibit XI-6, would be assigned as follows in the decentralized approach:

- Information Policy

  A central policy office would be established to develop and approve information policy for both staff agencies and supporting operational organization levels.

Decentralized IRM Approach Activities

	Information Management Policy	Information Systems Planning	Information Resource Education	Information Technology Assessment	Metadata Management	Data and Data Base Administration	Data Standardization	Policy Compliance Audit	Forms Management	Records Management	Reports Management
CENTRAL HQDA OFFICE	Develop/ Approve	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STAFF AGENCIES	Follow/ Comply	Review/ Approve	Develop/ Provide Guidance/ Teach	Review/ Evaluate/ Provide Guidance	Develop/ Review	Develop/ Provide Guidance	Review/ Execute	Review/ Execute	Review/ Execute	Review/ Execute	Review/ Execute
DPI'S	Follow/ Comply	Develop/ Review	Provide Guidance/ Teach	Identify Needs/ Execute	Develop/ Review	Develop/ Execute	Execute	Execute	Execute	Execute	Execute
COMMITTEES	Review	Review/ Coordinate	Review Policies and Make Recommendations								

EXHIBIT X1-6

Policies for the following functions would be included:

- Data Standardization
- Data Administration
- Metadata Management

The responsibility for the review of the policies would lie with the oversight committee whose members include representatives from each of the staff agencies and from the DPI steering committee. The individual staff agencies and supporting data processing installations would implement the policies and procedures that were developed for the IRM program.

- Information Systems Planning

The individual staff agencies would have the responsibility to review and approve information systems plans from their individual functional and operational level areas. The oversight committee would coordinate the plans to ensure adherence with established policies and procedures. The supporting DPI's will review plans developed at the DPI and submit them to the functional staff agency for review and approval.

- Information Resource Education

Each staff agency would have the responsibility for the development of their own IRM education program. This includes the development of training courses and materials for presentation to the IRM user community. This activity includes dissemination of information on the advantages and objectives of the IRM program as well as tools that are currently available. The supporting DPI's would provide guidance and instructions on IRM policies and procedures to their individual staffs.

- Information Technology

The individual staff agencies would have the responsibility to review and evaluate new IRM technologies, which include hardware and software developments. The staff agencies would provide guidance and disseminate information on IRM technologies to the supporting DPI's on available resources and information technologies. The DPI's would assist in conducting the IRM education courses, and disseminate information to the DPI staff.

- Metadata Management

  Each staff agency would develop their own data element dictionary and provide guidance on what information should be included as part of their meta data program. The DPI/IRM staff would develop and maintain their own central respository of information and submit this information to the staff level DED/D as required.

- Data and Data Base Administration

  Each staff agency and supporting data processing installations would be responsible for the development of their own data administration program. The activities of the program include selection and recommendation of data base administration procedures and guidance on how these procedures should be instituted and followed. The individual data base administrator functions include:

  - data base design
  - security of the data base
  - integrity of the data base
  - data base standardization
  - performance monitoring
  - documentation.

(2) Advantages of Decentralized Approach to IRM Program

The advantages of this alternative are based upon the establishment of centralized IRM support groups within the individual functional and operational levels. This alternatives advantages include:

- Individual functional autonomy would be retained, which enhances the focus on individual functional mission accomplishment

- Functional management attention to the IRM functions through their role on the oversight committees

- The participative decision making process has the effect of operational adherence to the policy and procedural guidelines

(3) Disadvantages of Decentralized Approach to IRM Program

This alternative, in some ways, reflects the existing HQDA situation. Though there are a number of advantages to this alternative, there are some disadvantages which may detract from its effectiveness. These potential disadvantages include:

- IRM program activities and control are relegated to the functional level since a total information review from one source is not available

- Problems or difficulties that may arise requiring committee action may be forestalled because of the difficulties associated with bringing all of the committee members together at short notice

- There may be a reduced enforcement capability which can cause a potential for inconsistent/conflicting implementation of IRM policy

- Benefits to be accrued from information resource management are limited to the degree of program implementation which is chosen to meet the requirements of the individual functional areas.

7. COST CONSIDERATIONS OF INFORMATION RESOURCE MANAGEMENT

Any reallocation of functions within an organization results in a change in resource consumption. The change may be an increase in total organization costs, a decrease in cost, or a shift in how consumption is managed. The installation of an information resource management program falls within the overall category of a reallocation of functions in that a previously unrecognized management function is given an identity and held accountable for results.

The impact of the above includes the followng:

- Identification of an organizational structure

- Development of objectives

- Establishment of programs to meet organizational objectives.

Each of the impact statements has cost implications. The implications, however, vary considerably in terms of impact on the overall organization and in terms of the ability of the organization to describe the implications. The difficulty lies in determining what is the composition of the entity to be costed, and then determining the cost characteristics of each element.

In general terms, an organization is costed by identifying the associated personnel, facility, equipment and materials that will be utilized, and assigning valid values to each element. An objective is usually costed in terms of the opportunity costs associated with implementing the objective. A program is costed by determining resource consumption throughout the life of the program. Each of these processes requires the development of a chart of accounts based on the unique cost characteristics of the subject. This section explores cost considerations that should be reviewed during the initial

development and installation of an information resource management program.

(1) Organizational Costing

In considering the development and installation of an information resource management program, one area of analysis is the comparative costs of alternative organizations. This is, in effect, a subset of the overall analysis of alternative organizations.

In the information resource management program (see Exhibit XI-1), we identify eleven functions and three levels of management. The matrix shows a managerial relationship, at each level, to each function. Organizational structures can be derived from this matrix and then subjected to an evaluation process based on predetermined criteria. Organization structures, however, cannot be costed without a companion series of assumptions. These assumptions are discussed below.

One could assume that no additional resources will be assigned the Army by higher authority to implement an Information Resource Management Program. A companion assumption could be that personnel positions would be established by transfer from functions with lesser priority than IRM. If these assumptions are made, then there is no additional overall cost to the Army for personnel assignment to IRM.

A comparative analysis of alternative organizations under the above assumptions would examine the changes at each echelon based upon numbers and grades of proposed positions.

Unless it could be established that HQDA and subordinate elements would require office space and equipment over and above that currently used, these items are not true costs and should not be considered. The determination of costs associated with equipment needs over and above current inventory requires a detailed specification such as number and types of terminals, lines to be installed, etc.

For the comparison of alternative organizations, even with a relaxation of the two assumptions cited above, the chart of accounts probably remains relatively uncomplicated. This is so because comparative costs analysis of management-type organizations to perform identical functions seldom result in significant changes. Significance is defined here as equal to or greater than major elements in the decision process. The important considerations in comparative cost analysis is to provide assurance that the identified functions are included in each of the alternative organizations.

At a later stage in program development, it is appropriate to obtain detailed descriptions of resource requirements for the selected alternative. In this case, the discussion above is expanded into a matrix with three dimensions. One is a resource by function expansion; the second is to identify costs by appropriation; the third is to display costs by program year. This is shown in Exhibit XI-7.

(2) Comparative Costs of Three Possible Initial IRM Organizational Concepts

Exhibit XI-8 presents the current information management manyear level of effort at HQDA. These figures are HQDA estimates and have not been verified by actual count by Arthur Young & Company. The manpower estimates have been translated into dollar amounts using an average cost based on FY79 salary for a GS13 step 5. Exhibit XI-9 displays possible professional manpower requirements for alternative organizations to initiate an Information Resource Management Program. These are initial requirements for comparison purposes only and represent professional personnel at the staff agency level required to actively participate in the initial IRM program operations. The intent is to show only those costs which relate to utilization of personnel resources for the initial IRM program related activites. Exhibit XI-10 presents the manyear level estimates for the annual operation of the IRM program for a typical year approximately 5 years out from program initiation. These estimates represent staff agency personnel only, as the DPI personnel remain compatible with the current figures seen in Exhibit XI-8. These manpower requirements have also been translated into dollar amounts using an average cost based on FY79 salary for a GS13 step 5. These costs are valid in the sense that they reflect a comparison of the relative cost weights of the three alternatives. The manyear figures and relative costs which are shown are based upon the following assumptions:

- The number of personnel resources assigned to each function represents those resources which relate to information resource management program related activities.
- A change in professional manpower requirements by function would be reflected on a proportional basis across all three alternative organizations.
- Secondary mission requirements that are normally performed by General Staff and Staff Agency elements are not considered.
- Military personnel costs can be traded into the organizations for civilian personnel costs on a one-for-one basis.

Costs by Program Year

YEAR / FUNCTION	YEAR 1					YEAR 2					YEAR N		
	MYs	MPA $	OMA $	PEMA $	TOTAL	MYs	MPA $	OMA $	PEMA $	TOTAL			
10 FUNCTION A					X					X			
11 MILITARY PERSONNEL	X	X				X	X						
12 OMA			X					X					
121 CIVILIAN PERSONNEL	X		X			X		X					
123 SUPPLIES AND CONTRACTS			X					X					
13 PROCUREMENT				X					X				
131 EQUIPMENT A				X					X				
132 EQUIPMENT B				X					X				

EXHIBIT VI-2

CURRENT IRM LEVEL OF EFFORT AT HQDA *

CURRENT IRM LEVEL OF EFFORT	STAFF AGENCIES						SUPPORTING DATA PROCESSING INSTALLATIONS						TOTALS					
	Authorized		On Hand		Actual***		Authorized		On Hand		Actual		Authorized		On Hand		Actual	
IRM ACTIVITY	MY	$**	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$	MY	$
IRM Policy	24	747	9.8	305	4.5	140	11.2	348	11	342	6.8	212	35.2	1095	20.8	647	11.3	352
Review & Coordination of Information Systems Planning	47	1463	30	933	13.2 / 10	411	62.2	1935	31.3	974	20.5	638	109.2	3398	61.3	1907	33.7 / 10	1049
Information Resource Education	7	218	5	156	.2	6	24.2	753	19.8	616	4.9 / .5	152	31.2	971	24.8	772	5.1 / .5	158
Information Technology Assessment	20	622	4.8	149	3.2	100	46.2	1437	25.2	784	10.1	314	66.2	2059	30	993	13.3	414
Metadata Management	3.5	108	1.2	37	1.2	37	9.7	302	5.4	168	3.2	100	13.2	410	6.6	205	4.4	137
Data/Data Base Administration	18.5	576	3.6	112	4.6 / 5	143	159	4947	139.2	4331	51.3 / 2	1596	1725	5523	142.8	4443	55.9 / 7	1739
Data Standardization	23	716	11.5	358	11.1	345	13.5	420	6.1	190	3.2	100	36.5	1136	17.6	548	14.3	445
Public Compliance Audit	9	280	6	187	1.8	56	80	2488	26.4	821	14.6	454	89	2768	32.4	1008	16.4	510
Forms Management	2	62	5	156	1.1	34	10.8	339	3.3	103	1.2	37	12.8	401	8.3	259	2.3	71
Records Management	3	93	3	93	2.7	84	98.8	3074	111.3	3463	22.7	706	101.8	3167	114.3	3556	25.4	790
Reports Management	3	93	3	93	.7	22	4.8	149	58.3	1814	21.5	669	7.8	242	61.3	1907	22.2	691
TOTALS	160	4978	82.9	2579	44.3 / 15	1378	520.4	16192	437.3	13606	160 / 2.5	4978	680.4	21170	520.2	16185	204.1 / 17.5	6356

* These figures were provided as initial estimates and have not been verified by actual count by Arthur Young & Company

** All personnel are costed at $31,113 per annum based on current salary GS13 Step 5 and are in 000's

*** Actual reflects percent of time actually devoted to IRM activity

MY Represents Manyears

Represent Contractor Manyears

EXHIBIT X1-8

ESTIMATE OF INITIAL IRM PROGRAM PERSONNEL REQUIREMENTS

IRM ACTIVITY \ ALTERNATIVE	Centralized		Distributed		Decentralized	
	MY	S*	MY	S	MY	S
IRM Policy	10	311	10	311	10	311
Review & Coordination of Information Systems Planning	7	218	7	218	15	467
Information Resource Education	5	156	7	218	7	218
Information Technology Assessment						
Metadata Management	20	622	25	778	35	1089
Data/Data Base Administration	10	311	10	311	10	311
Data Standardization	2	62	2	62	2	62
Policy Compliance Audit						
Forms Management						
Records Management						
Reports Management						
TOTALS	54	1680	61	1898	79	2458

* All personnel are costed at $31,113 perannum based on current salary GS13 Step 5
All costs are in 000's

ESTIMATE OF ANNUAL OPERATING IRM PROGRAM PERSONNEL REQUIREMENTS

ALTERNATIVE / IRM ACTIVITY	Centralized		Distributed		Decentralized	
	MY	S*	MY	S	MY	S
IRM Policy	10	311	10	311	10	311
Review & Coordination of Information Systems Planning	15	467	15	467	30	934
Information Resource Education	10	311	15	467	15	467
Information Technology Assessment	5	155	15	467	20	622
Metadata Management	20	622	25	778	35	1089
Data/Data Base Administration	40	1245	40	1245	40	1245
Data Standardization	15	467	15	467	15	467
Policy Compliance Audit	5	155	5	155	5	155
Forms Management	5	155	5	155	5	155
Records Management	5	155	5	155	5	155
Reports Management	5	155	5	155	5	155
TOTALS	135	4198	155	4822	185	5755

* All personnel are costed at $31,113 perannum
based on current salary GS13 Step 5
All costs are in 000's

- Managerial judgement will be exercised to transfer personnel from one function to another in subsequent years.

- Most of these functions are currently being performed within General Special Staffs or Staff Agencies. The Staff or Agency can determine whether or not it is dealing with realignment or an additional requirement.

- The management aspects of IRM may generate additional software or hardware requirements. Any such needs that develop beyond the initial requirement would be similar or identical for all organizational configurations.

The number of personnel resources reflected in Exhibit XI-9 depicts resources required for initial IRM program related activities. The number of personnel required to perform some of the functions appear to be similar across the three alternatives. This is due to the fact that, although the organizational structures differ in a minor way, the number of personnel required to perform these functions remains relatively constant.

It is important to note that the detailed costing for an IRM program at HQDA will be done in Phase II of this project. At that time, a specific organizational configuration and associated costs will be developed.

8. RECOMMENDED ORGANIZATIONAL ALTERNATIVE

The simplistic, textbook approach to an information management program focuses on requirements for policies, procedures and corresponding controls. This approach would not meet the needs of HQDA which is not only complex in its organizational relationship but has ongoing responsibility for a broad spectrum of programs, each with its own information needs and unique response requirements. Therefore, we suggest that a successful Information Resource Management Program at HQDA is dependent upon an organizational approach that draws on the strengths of the existing structure to the maximum extent possible.

The multi-faceted nature of the HQDA programs, as well as the line-staff relationship between Headquarters, the staff agencies, and the DPI's mandate that there be a division of responsibility that fosters coordination, but not control, of data. The need to share data acorss organizaion boundaries requires some centralized coordination; otherwise, each functional staff area, office and DPI would continue to focus on their own program. Although centralization is appealing from the control aspect, it will not succeed because of the HQDA structure and IRM program needs for flexibility. The control tendencies of a strong, centralized program do not foster the needed cooperation. What is required is a balanced approach that will provide cooperation of programs with appropriate independence of program operations.

As a result, our recommendation is a distributed approach. This is a hybrid of the classical centralized and decentralized management approaches. The basic philosophy is analogous to distributed processing - locate the work at the level in the organizaiton best suited to perform the specific tasks.

The proposed distributed organization structure provides for both an IRM staff and IRM oversight committees. The IRM staff would have the responsibility for several of the IRM functions at HQDA. The staff would develop information resource policy and would also approve new information systems plans. The IRM oversight committee at the staff level would be made up of members from each of the staff agencies and from the oversight committee established at the DPI level. This staff level committee would be chaired by the director of the IRM staff. The oversight committee would have the responsibility to provide guidance on the development of IRM policy, as well as review those policies that were developed. The IRM staff would support the IRM Oversight Committee by performing review functions for feasibility studies, system design and implementation and conduct system evaluations to assure that HQDA-wide requirements were being met.

The oversight committee formed at the DPI level would monitor the adherence to staff level data management concepts and would support the HQDA-wide IRM Oversight Committee. We recommend that the chairperson of the DPI level committee be the representative member of the staff level IRM committee.

The funcional staff agencies would retain their own current responsibilities for feasibility studies, system design and implementation, and system operations. In addition, they would be responsible for maintaining a detailed data element dictionary/directory and for providing the IRM staff with the data needed for a HQDA wide data resource directory. An individual staff agency would be responsible for auditing data quality and performing system evaluation from the perspective of HQDA IRM requirements.

A discusion of the recommended distributed organizational approach with regard to each of the IRM activities follows:

(1) Information Policy

The development of a consistent set of policies with regard to the management of information is a key concept of IRM. This set of policies defines the authority and responsibilities of all of the IRM activities. The responsibility for the development and approval of policy governing the administration of the distributed IRM program would be assigned to a central IRM staff. This distributed approach to IRM would establish a mechanism for resolving problems on a HQDA-wide basis and allows for the development of a consistent set of policies. It provides a balanced approach that encourages user involvement and cooperation of programs with appropriate independence of program operations.

(2) Information Systems Planning

The review and coordination of information systems planning with respect to the information to be provided includes the consideration of alternative sources of data for the system and evaluation of the potential for consolidation of data or funcion, while maintaining an HQDA-wide perspective for information acquisition and sharing. In the distributed approach, the review and approval of the information contained within these systems would be performed by the central IRM staff. This coordination of the development of information systems for the various staff agencies will allow for the enhancement of information sharing. The distributed approach would serve to resolve any conflicts or duplicative development efforts in the design and development of proposed information systems.

(3) Information Resource Education

This function entails the educaton of HQDA on the philosophy and benefits of IRM and what the program is doing to manage information. In the distributed approach an independent staff agency would have the responsibility for the development of the IRM education program. This agency would compile and disseminate information on the advantages and objectives of IRM, as well as what tools are currently available and envisioned. This agency would also develop and conduct training courses for the IRM user community. This centralized education approach provides a coordinated, directed mechanism whereby HQDA can educate and train the IRM user community. It will aid the systems planners and designers in the development of coordinated information systems by providing a method that promotes the use of consistent procedures in systems design and development.

(4) Information Technology Assessment

Information technology assessment involves the assessment of current operational capabilities to support information needs, and tracks and assesses current technological trends in information management. In the distributed approach a separate staff agency would have the responsibility for this funciton. As part of its activities, the staff agency would provide assistance and guidance to the other staff agencies and DPI's in incorporating these technologies. In the distributed approach, the separate staff agency would develop and coordinate specific technoligies and approaches relevant to the management of information, and would also assist in evaluating and promulgating new IRM developments throughout HQDA. This allows for coordination between functional and operational ADP groups and IRM users.

(5) Metadata Management

The management of data about data contained in the information resource is termed metadata management. This function entails the creation, coordiantion, and maintenance of a data resource directory. In the distributed approach a separate staff agency would be responsible for the administration of the metadata management program. Although the management of metadata would occur at several levels throughout HQDA and would require user involvement, the separate staff agency would provide the focal point for coordinating individual staff agency directory development. It would also provide the basis for a central locator service to assist in the identification and location of information throughout HQDA. This central staff would allow for coordianted metadata definitions and alterations as well as a central source for accumulating statistics and information on the use and service of the information.

(6) Data and Data Base Administration

Data Base Administration entails the development and monitoring of policies and procedures for the technical design and maintenance of information systems. In the distributed approach, a separate staff agency will develop the policies and guidelines for the design and maintenance of data bases and the selection of data base management software. This approach would allow for coordination of data base administration efforts across functional areas and would contribute to an improved basis for information due to the centralization of policy and guideline development. This centralization facilitates the task of data base administration and contributes to the consistency of data base management throughout HQDA.

(7) Data Standardization

This function includes the development, maintenance, and enforcement of DA standard data element names, values, and coding schemes. In the distributed approach the administration of the data standards program would be the responsibility of an individual agency. The centralization of this funciton allows for the consistent development of data standards for use in HQDA automated systems. This central authority could ensure that data elements and codes that are used in more than one system were standardized, which facilitates data transfer and increases data re-utilization. This authority would ensure a centralized program that fosters the coordinated development and implementation of standard data elements across HQDA.

(8) Policy Compliance Audit

The policy compliance function entails the auditing of individual staff agencies, DPI's and information systems for compliance with IRM policies, procedures and standards. This function would be assigned to an independent staff agency in the

distributed approach. The centralization of this funciton into one staff agency allows for the concentration of sufficient EDP and IRM personnel that would provide a competent level of evaluation. The central audit function would also help to ensure coordinated adherence to policies, procedures and standards within HQDA. The audit agency would also establish a mechanism for determining problems on a Headquarters-wide basis with regard to IRM policies and procedures.

(9) Forms, Records, and Reports Management

Forms management concerns the design and control of forms to be used with automated information systems. Records management includes the management activities with regard to creation, maintenance, and use of official records. Reports management involves the management of reports produced by automated information systems. In the distributed approach a separate staff agency will establish and enforce the policies and procedures dealing with each of these functions. This centralization allows for consistent policy development and coordinates the creation of the procedures for approving and monitoring each of the activities associated with the forms, records and reports process. This centralization will enhance the opportunity for close coordination of these IRM activities as they pertain to individual HQDA automated information systems, and becomes an integral part of the IRM program.

In the distributed approach, the IRM policies and procedures which HQDA will be expected to follow would be developed in a cooperative environment which blends the right degree of participation and authority. The possible organizational locations of the IRM activities in this approach are shown in Exhibit XI-11. The placement of this authority and the assignment of responsibilities is a key consideration in the distributed approach of information resource management at HQDA.

The IRM program must be evolutionary. A gradual controlled transition will be necessary, with this transition directed with a long-term perspective in mind. The less radical the change incurred, the more likely the program will get off to a good start. Within the distributed organization it is not necessary for HQDA to commit to the entire program at the start. Indeed, the program itself is expected to evolve over the ensuing years.

The early focusing of scope of the distributed organization is commensurate with the long-term evolutionary approach to IRM. It defines an achievable but important first step. The distributed IRM program at HQDA will foster the development of similar programs throughout the Army as well. The program would be developed with the recognition that resources are constrained. The increased efficiency and the benefits of the distributed IRM program would be sufficient to warrant the reallocation of resources.

Possible Location of IRM Activities

IRM ACTIVITY	POSSIBLE LOCATION OF IRM ACTIVITY
IRM POLICY	ACSAC, TAG, OCSA, NEW STAFF AGENCY
REVIEW AND COORDINATION OF INFORMATION SYSTEMS PLANNING	ACSAC, TAG, OCSA, NEW STAFF AGENCY
INFORMATION RESOURCE EDUCATION	ACSAC, TAG, USACSC, NEW OFFICE
INFORMATION TECHNOLOGY ASSESSMENT	USACSC, USAMSSA
METADATA MANAGEMENT	USAMSSA WITH ACSAC, TAG, NEW STAFF AGENCY
DATA/DATA BASE ADMINISTRATION	ACSAC WITH USAMSSA
DATA STANDARDIZATION	USACSC WITH ACSAC OR NEW STAFF AGENCY
POLICY COMPLIANCE AUDIT	ARMY AUDIT AGENCY, IG, ACSAC, TAG, NEW STAFF AGENCY
FORMS, RECORDS, AND REPORTS MANAGEMENT	TAG IN COORDINATION WITH IRM POLICY OFFICE

The distributed organizational approach is, therefore, the most feasible alternative for consideration by HQDA in the establishment of an Information Resource Management Program.

9. SUMMARY OF ORGANIZATIONAL ALTERNATIVES ANALYSIS

Our analysis of the technical, political, and resource constraints within HQDA has indicated that the IRM program could be implemented in any one of three organizational approaches. These three organizational alternatives differ in the degree of emphasis on IRM functions and responsibilities. The major differences in the alternatives revolves around where the focus of authority is located for certain key IRM functions, such as information policy and information systems planning.

Once the overall approach has been selected by HQDA, we can then further develop alternatives by function as part of the implementation plan (Phase II). This would include the designation of responsibilities, activities, and detailed resource requirements. However, top management agreement and commitment is needed before the program can be further developed.

Details of our recommendations for the initial development of an information resource management program for automated information at HQDA are presented in Chapter XII.

XII. STUDY RECOMMENDATIONS

The overall goal of a HQDA Information Resource Management (IRM) Program, and this report, is to establish the process whereby HQDA can begin to address problems in the management and use of its information resources. The recommendations presented in this chapter are designed to provide HQDA management with a general plan of action for moving forward in the development and implementation of an IRM program. We believe that important program initiation and design decisions need to be made in the immediate future so that the development of the IRM philosophy, concepts, and program structure can proceed in a well directed and timely manner.

1. SUMMARY OF RECOMMENDATIONS

In the preceding chapters of this report we have provided a discussion of IRM concepts, a description of the existing HQDA information management environment, and an analysis of HQDA IRM requirements and alternatives. Together, these elements provide HQDA with an assessment of the problems, needs, and framework related to information resource management. Based on our review of these factors and our previous experience in related studies, we recommend to HQDA management that:

- The concept of information as an organizational resource be recognized by HQDA management and promulgated as Army policy.
- Top management commitment and support be given to the development of an information resource management program.
- An evolutionary approach be followed in the development of the IRM program.
- Automated information systems at HQDA be used as the starting point for the implementation of the IRM program.
- The development of the HQDA automated IRM program proceed in Phase II following the distributed organizational approach.
- Consideration be given to the extension of the IRM program to include non-automated information after the basic program is established.
- Consideration be given by HQDA top management to the placement of authority and assignment of responsibilities in establishing the IRM program for HQDA.

- Particular emphasis to be placed on making improvements in the data element standards, data resource directory, quality assurance, and information cost accounting areas.

Each of these recommendatons is discussed in more detail in the following section of this chapter.

2. STUDY RECOMMENDATIONS

RECOMMENDATION 1: The concept of information as an organizational resource should be recognized by HQDA management and promulgated as Army policy.

Information is critical to the performance of essential HQDA managerial functions. Automated information is not effectively managed in HQDA. In order to provide proper focus and direction for information management at HQDA, we recommend that the concept of information as a valuable and expensive organizational resource be recognized by HQDA management and promulgated as Army policy. The pronouncement and promotion of this organizational philosophy is needed so that HQDA managers can develop the proper perspective in viewing information not as a free commodity, but rather as a resource, similar in treatment to dollars, personnel, and equipment.

RECOMMENDATION 2: Top management commitment and support should be given to the development of an information resource management program.

The establishment of any new program cutting across organizational lines will fail if it does not have management backing. The history of systems management and related developments has demonstrated this important organizational principle. Recent initiatives in the ADP and information management areas at HQDA, although offering the potential for improving management and organization effectiveness and efficiency, have not been fully implemented.

To realize the full benefits of IRM and to establish proper program direction, we recommend that management commitment and support be given to the development of an information resource management program by senior HQDA officials. In particular, the commitment must carefully distinguish management of information resources from ADP resources. Only through this type of high-level support can such a broad management program succeed.

RECOMMENDATION 3: An evolutionary approach should be followed in the development of the IRM program.

The implementation of the IRM program at HQDA should not be revolutionary, but rather be built on existing information management activities. Many of the functions relevant to IRM are currently being performed in a number of locations throughout HQDA, but there is a

lack of coordination among the activities, especially across Staff Agencies. There is also a lack of focus on managing information as a resource, i.e., from a horizontal view. Instead, a concentration exists on managing systems in a vertical fashion with a view of information as an integral part of each system. The result, of course, is the local optimization of information definition and representation to achieve Staff Agency missions.

We recommend that the IRM program at HQDA be evolutionary in nature. Initially, the concept must be established with sufficient resources to assure its growth. Too large of a push at the outset could, however, prove fatal to the program by forcing change too rapidly. A gradual controlled transition will be necessary over a period of, perhaps, 5-10 years. But the transition must be directed or focused by an organizaiton or group of leaders with a long-term perspective, people who can coordinate the ongoing and future development of information systems, but who can also reconcile the shorter term benefits to ensure success.

RECOMMENDATION 4: Automated information systems at HQDA should be used as the starting point for the implementation of the IRM program.

The overall success of the IRM program will be directly dependent on its ability to demonstrate improvements in the early stages of program development. A comprehensive program addressing all aspects of information management would require major organizational and technological changes, and may encounter much resistance by HQDA Staff Agencies. Many management programs have failed in the past because of the setting of over ambitious and unachievable program goals and objectives in their initial years of development.

We recommend that automated information systems at HQDA be used as the starting point for the implementation of the IRM program. With this more narrow focus, the information management staff can concentrate on specific areas which will bring about the greatest return in terms of information improvement during the first several years of operation. There are already well-defined tools to assist in the management of automated information, and certain doctrines and concepts relating to automated data bases and data administration are already established. Further, metadata about automated information is more readily available. This gradual implementation approach is also compatible with the development of alternatives for addressing the full spectrum of information (both automated and manual) as part of a HQDA or Army-wide long range plan for information resource management.

RECOMMENDATION 5: The development of the HQDA automated IRM program should proceed in Phase II following the distributed organizational approach.

In Chapter X of this report we defined the requirements for an automated IRM program. Organizational alternatives for meeting these requirements were identified and evaluated in Chapter XI. These alternatives were:

- Centralization of authority and responsibility at the highest common point in HQDA to insure an efficient and effective program
- Distribution of operational aspects of IRM authority and responsibility with centralization of information policy and some HQDA-wide information management activities
- Decentralization of authority and responsibility as close as possible to the level of HQDA where the information is used; coordination of inter-functional area concerns would be accomplished through an Oversight Committee.

Thus we have provided HQDA with a basis for selecting a conceptual design which could be used in the further development and implementation of an IRM program for HQDA.

Our assessement of the advantages, disadvantages and costs of each alternative, the demonstrated needs of HQDA, and the current organizational environment have led to our recommendation of a distributed approach which is a hybrid of the classical centralized and decentralized approaches. The basic philosophy of this approach is analogous to that of distributed processing: locate the work at the level in the organization which is best suited to perform the task.

This alternative was selected because it provides a balanced approach that fosters management control and cooperation with appropriate independence for Staff Agency program operations. It will also allow HQDA to build upon existing IRM activities in moving towards more coordination and sharing of information resources.

We have developed the essential philosophy and concepts of the distributed approach in Phase I of our study. Based on our conclusions regarding the need for information resource management in HQDA and our preliminary cost analysis we recommend that the Army proceed with Phase II of the effort to develop the detailed definition of the selected approach and the specification of an implementation plan for installing information resource management at HQDA.

RECOMMENDATION 6: Consideration should be given to the extension of the IRM program to include non-automated information after the basic program is established.

Our study has focused on developing a program for managing the automated information resource of HQDA. Automated information is only one subset of the overall information resources of HQDA. The concepts of information management are equally applicable to non-automated information and should be considered irrespective of the medium on which the information is collected, stored, transmitted, or reported. Future study directions and program development should also consider the organizational scope of this study. Much of the data received by HQDA is submitted by field commands and operating agencies.

We recommend that full consideration be given to the extension of the IRM program to include non-automated information as well as information management policies which are applicable to all Army activities. The early focusing of scope is commensurate with the long-term evolutionary approach to IRM by defining an achievable but important first step. The IRM program for HQDA has been carefully designed so that future extensions of scope are possible. It should also be pointed out that the growing trend towards more and more automation in the Army (as elsewhere) implies that information considered beyond the scope of this effort today may well be automated (and, hence, within the program scope) in the near future. There is also the likelihood that an effective information resource management program at HQDA will foster similar (and hopefully related) programs throughout DA as well.

RECOMMENDATION 7: Consideration should be given by HQDA top management to the placement of authority and assignment of responsibilities in establishing the IRM program.

Information is a key aspect of the mission of HQDA. The management of the information resource must be accomplished in a way that assists the various Staff Agencies (and, thus, the field and installation commands) in meeting their missions and not as a program which merely regulates their actions. To achieve this goal will require heavy user involvement in the process of managing the information resource. User responsibilties will need to be clearly defined and accepted. Proponents, consumers, and sources of information will need to be integrated into the information resource management process and not relegated to merely a passive, compliance or recipient role.

We recommend that careful consideration be given by HQDA top management to the placement of authority and assignment of responsibilities in the establishment of an IRM program for HQDA. The successful implementation of the program will depend on the location of IRM authority and responsibilties. Organizatonal assignments must include the blending of the right participants together with the right degree of authority and control.

RECOMMENDATION 8: Particular emphasis should be placed on making improvements in the data element standards, data resource directory, quality assurance, and information cost accounting areas.

The primary focus of this report has been on the design and development of an automated information resource management program for HQDA. There are a number of improvements which can be made at HQDA that are a part of this overall program but which could be implemented independent of a decision to proceed with the development of an IRM program. These improvements are directed at specific problems that were identified during the conduct of the study. These problem areas include data element standards, data dictionaries and directories, quality assurance, and cost accounting for data. Our recommendations in each of these areas are discussed in the sections which follow.

(1) Data Element Standards

The Computer Systems Command (CSC) administers the Army's data standardization program under the guidance of the Assistant Chief of Staff for Automation and Communications. CSC establishes standards for data element names and codes based upon candidates submitted to it from the Army's data processing installations and field operating agencies in addition to monitoring and incorporating standards promulgated by DOD and other organizations.

The Army's data standardization program, though it has been in existence at various stages for more than 15 years, has not been completely effective. The lack of effectiveness has been due in part to insufficient resources and in part to the inability of the Army as an organization to associate data standards with the accomplishment of the Army's mission. We recommend that priority and support be given to enhancing the Army's current efforts at data standardization through the allocation of additional resources to develop a distributed program which can integrate data standards into the Army's operational environment. One possible approach is the clear specification of what standards can be developed at which level in the organization, in effect, the establishment of a formal hierarchy of data standards. A tool which can contribute to the identification of candidate data elements for standardization is the development of the data resource directory which is described in the next section. The process of constructing the directory will point out very clearly the need and practicality of maintaining data standards across HQDA.

(2) Data Resource Directory

A data resource directory (DRD) is a central repository of information about the information resource of an organization. This tool is helpful to users of information, managers of the information resource, and information system designers and implementers. It provides the basis for locating information which may be distributed throughout HQDA, maintained [illegible]

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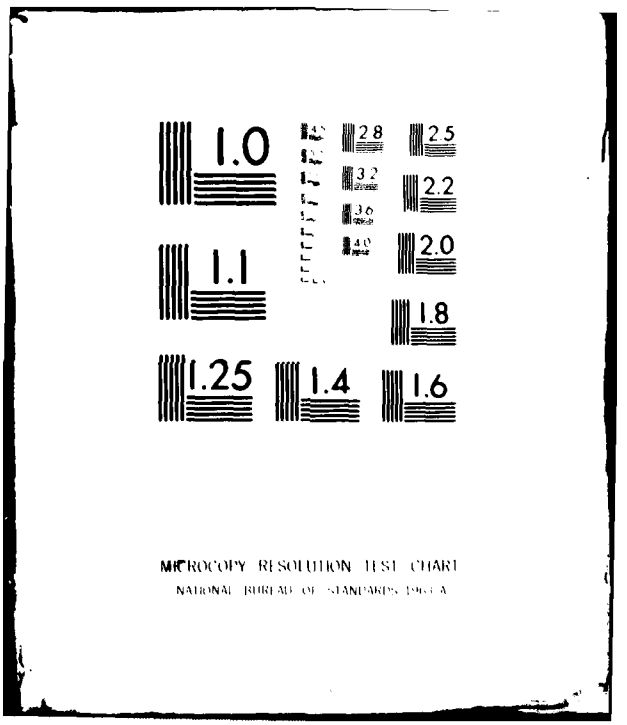
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metadata about the information resource, and establishing a framework for common terminology and definitions. The DRD can be expected to become a focal point for the management of the information resource.

We recommend that HQDA consider the need to establish and develop a data resource directory for the entire organization. The actual implementation of this directory may be manual or automated and the initial scope of the directory may be limited to information from particular functional areas, but we believe that HQDA should begin now to plan for the development of a HQDA DRD.

The development of a data resource directory for HQDA can be greatly assisted by the creation of data element dictionaries at the DPI level. A data element dictionary (DED) is a collection of metadata which define and describe the data elements contained in the files and data bases of the DPIs. Several DPIs have installed or are considering the installation of DED software packages. We recommend the encouragement of such advances, but we caution that a thorough study is needed before HQDA standardizes on a single DED package. In particular, HQDA should consider the advantages of "active" DED systems which dynamically interface with application systems to audit the correct use of dictionary terms and to automatically update the application programs when changes occur in the data definition. Passive DED systems can be of assistance in defining and organizing data, but they do not provide for this dynamic interaction with the application programs and as a result often are not maintained.

(3) Quality Assurance Program

A common problem expressed by several HQDA officials is a lack of confidence in the quality of the data contained in their information systems. Sometimes this lack of confidence is simply a matter of perception and understanding the circumstances under which the data was collected or processed. In other instances the data is, indeed, incomplete, inaccurate, or out-of-date.

In order to restore confidence in the data and improve its quality, we recommend the establishment and support of a Data Quality Assurance Program on a distributed basis throughout HQDA. Such a program would entail the functions of:

- Cleaning up data already contained in system files and data bases
- Educating the user population on the pertinent conditions affecting data quality
- Auditing individual systems to determine the causes of particular data quality problems

- Establishing procedures concerning quality assurance to be followed in information system design and development.

Some suggested topics of consideration for possible improvement in the quality assurance area include:

- Designate clear authority and responsibilities for individual proponents for data
- Incorporate metadata pertaining to data quality into the data resource directory
- Establish release policies for data which identify the "as of" date of particular pieces of information
- Develop standards for header information on the transmission of data (such as magnetic tapes) which, in effect, not only identify the contents of the transmission but the structure and organiation as well.

These, and other possibilities should be investigated by the IRM community in HQDA.

(4) Information Cost Accounting

During the course of our study, we found it difficult to obtain current and comprehensive cost information related to information management. The present accounting system of the Army does not address ADP or information-related costs as a separate category. As a consequence, HQDA officials must make decisions regarding information management and ADP without the benefit of full cost information.

We recommend that HQDA develop a cost accounting methodology for information management and related activities. This approach could be modeled after the Guidelines for Accounting and Automatic Data Processing Costs published by the United States General Accounting Office (1978). Further, we recommend that HQDA study appropriate modifications to those guidelines which will be necessary for their application to information resource management.

3. THE REVIEW, FURTHER DEVELOPMENT, AND IMPLEMENTATION OF STUDY RECOMMENDATIONS.

The purpose of this section is to summarize the current status of our study in terms of the overall information resource management (IRM) development process. This summary will assist HQDA in reviewing the recommendations by providing an understanding of the requirements for the next steps in this development process.

This section also provides a discussion of study factors which should be considered in the report and recommendations review. Future study directions will be directly dependent on this resultant decision-making process.

The last part of this section highlights the tasks to be performed in Phase II of the study. This includes IRM methodology development, organization design, policy and procedure development, and implementation plan development.

(1) IRM Program Development Stage

The primary objective of Phase I of our study was to determine the requirements for and provide a concept of a HQDA information management program. With this report, we have discussed our findings of the status of information management at HQDA, developed a conceptual approach for managing information as a resource, and presented our recommendations for implementing an information resource management program at HQDA.

To put this report and our recommendations in proper perspective, we believe that it is appropriate at this time to briefly review the overall IRM program development process. Exhibit XII-1 provides an overview of this process. It is important for HQDA officials in reviewing our recommendations to understand the objectives of Phase I, as stated above, as well as the remaining tasks of Phase II. As will be described later in this section, the detailed program design and development tasks will take place in Phase II of this study. As such, proper attention should be given at this stage in the development process to determining the best overall IRM approach for HQDA. The selection by HQDA officials of the IRM approach to be implemented will bring to a close the Phase I contract activities.

(2) Reviewing the Recommended Alternative Approach

In addition to understanding the IRM program development process, in reviewing the recommended alternative approach it is important for HQDA officials to consider the following study factors:

- The study has been limited to HQDA automated information
- Specific organizational assignments to be made in Phase II will be based on the scope of the currently defined program
- Alternative ways for further developing and implementing each designated IRM function will be developed in Phase II based on program scope and timing decisions (initiation dates) and will consider staffing requirements, management tools, and estimated costs

HQDA Information Management Study Concepts

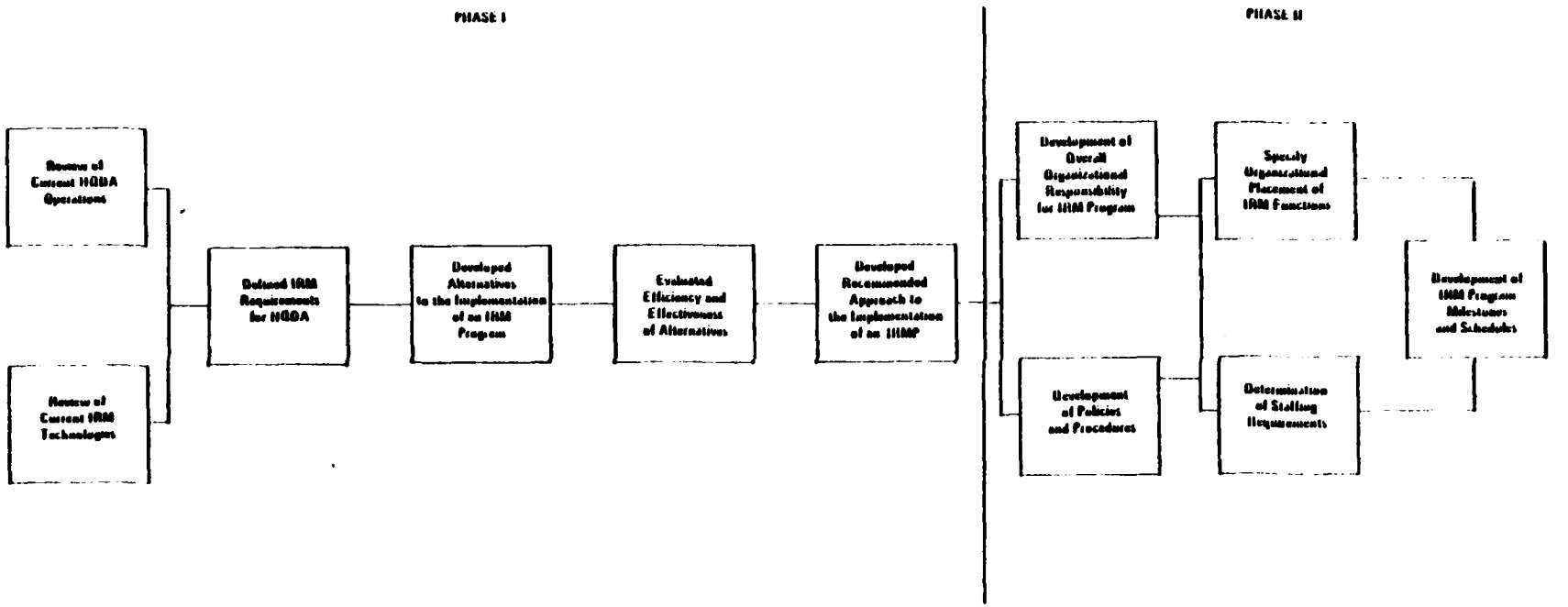

EXHIBIT XII-1

- It is important that one overall IRM approach be agreed upon so that the development of the program can proceed in a planned and orderly manner.

Constructive feedback regarding this report and the recommendations is needed from HQDA officials so that program design factors can be promptly addressed and any required changes made. The expeditious handling of these matters is needed to carry forward the momentum of this important project and to allow for the timely initiation of Phase II.

(3) Phase II Activities

As stated earlier, the purpose of the second phase of this study is to detail the information resource management (IRM) approach which was recommended in Phase I. This phase will consist of the development of policies, procedures, resource requirements and associated costs, and organizational structure required to implement and manage the recommended IRM approach at HQDA. The following major tasks will be performed:

- IRM Methodology Development - The objective of this task is to design and develop a detailed methodology for IRM which, when followed, will give HQDA the capability it needs to manage the Army's information resource. This will include a methodology for management of the composition of data, sources of data, dissemination of data, flow of data, and location of data.

- IRM Organization Design - The objective of this task is to specify the organizations within HQDA which will be required to implement and maintain the HQDA IRM program developed in the previous task. This task will detail the recommended positions within the HQDA structure which will best facilitate the IRM functions; the mission and internal organization of the management elements; the type, skills, grade, and number of personnel required to staff the organization; and the relationships and interfaces which will be required among HQDA staff elements.

- Policy and Procedure Development - The objective of this task is to develop the policies and procedures which are required for IRM within HQDA. This task will include development of the policy for enactment of the IRM program, the development of resource maintenance procedures, and the development of operational IRM procedures.

- Implementation Plan Development - The objective of this task is to prepare a detailed, time-phased implementation plan and schedule for implementing the HQDA IRM organization and program. The implementation plan will consist of major milestones and tasks to be met, tools and staffing required

to accomplish the tasks, anticipated problems and associated costs, training requirements, and developmental control mechanisms.

* * * *

This chapter concludes the detailed discussion of Phase I study findings, conclusions, and recommendations.


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