NAVAL POSTGRADUATE SCHOOL
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THESIS

AN ANALYSIS OF INFORMATION RESOURCE MANAGEMENT
WITHIN THE DEPUTY CHIEF OF STAFF FOR PLANS
U.S. ARMY MILITARY PERSONNEL CENTER

by

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March 1985

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This thesis will model the current information resource management structure of DCS Plans and propose a solution.

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An Analysis of Information Resource Management Within the Deputy Chief of Staff for Plans U.S. Army Military Personnel Center

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ABSTRACT

Organizations are becoming increasingly aware of the need for identifying and controlling their information resources. The Paperwork Reduction Act of 1980 explicitly tasks federal agencies with establishing information policy and mechanisms for implementing that policy. As a result, increasing emphasis is being placed on information resource management (IRM).

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Organizations are becoming increasingly aware of the need for identifying and controlling their information resources. The Paperwork Reduction Act of 1980 [Ref. 1], explicitly tasks federal agencies with establishing information policy and mechanisms for implementing that policy. As a result, increasing emphasis is being placed upon information resource management (IRM).

It is appropriate at this juncture to define what we mean by information, particularly as opposed to data. From his book, Information Systems in Management, James Senn defines data as: "Facts, ideas, or concepts that can be communicated or processed", [Ref. 2: p. 509]. He distinguishes data from information by defining information as:

> Data that have been processed into meaningful form. It adds to a representation and tells the recipient something that was not known before. Information should be timely, accurate, and complete. [Ref. 3: p. 511]

Thus we can see, at the conceptual level, that information is data that has undergone a transformation into a meaningful form. Once in a meaningful form, it clearly has value to an organization and can be viewed as a resource which must be managed.

B. INFORMATION RESOURCE MANAGEMENT

What is information resource management? Although the origin of the concept and term is generally credited to John

Diebold of the Diebold Group [Ref. 4: p. 51], there are now a variety of definitions of what constitutes the practice of information resource management in an organization.

One which seems to fit the overall objectives of this thesis has been offered by Dr. Elizabeth Byrne Adams, Professor of Management at George Washington University. She views IRM as follows:

> Information resource management is a management function to develop and implement policies, programs, and guidelines to plan for, manage and control information resources. [Ref. 5]

She further states:

> Information resource management is the process of managing information in an organization so as to maximize its goals. [Ref. 6]

Thus, IRM involves the identification of information resources, how they relate to each other, which users have access to this information, who can change it, and how often. Once these relationships are identified, the optimal mix for the organization must be determined.

This type of information tends to be buried among the minds of various personnel in an organization and, thus, is not readily available for decision makers. IRM takes a systematic approach to identifying and capturing this information about information, and makes it available to the organization.

Figure 1.1 represents the facets of an organization typically covered by the IRM approach, Note four separate support systems are involved in effectively and actively managing information as a resource. They include Decision Support Systems, Office Support Systems, Operational Support Systems, and Telecommunications Support systems.

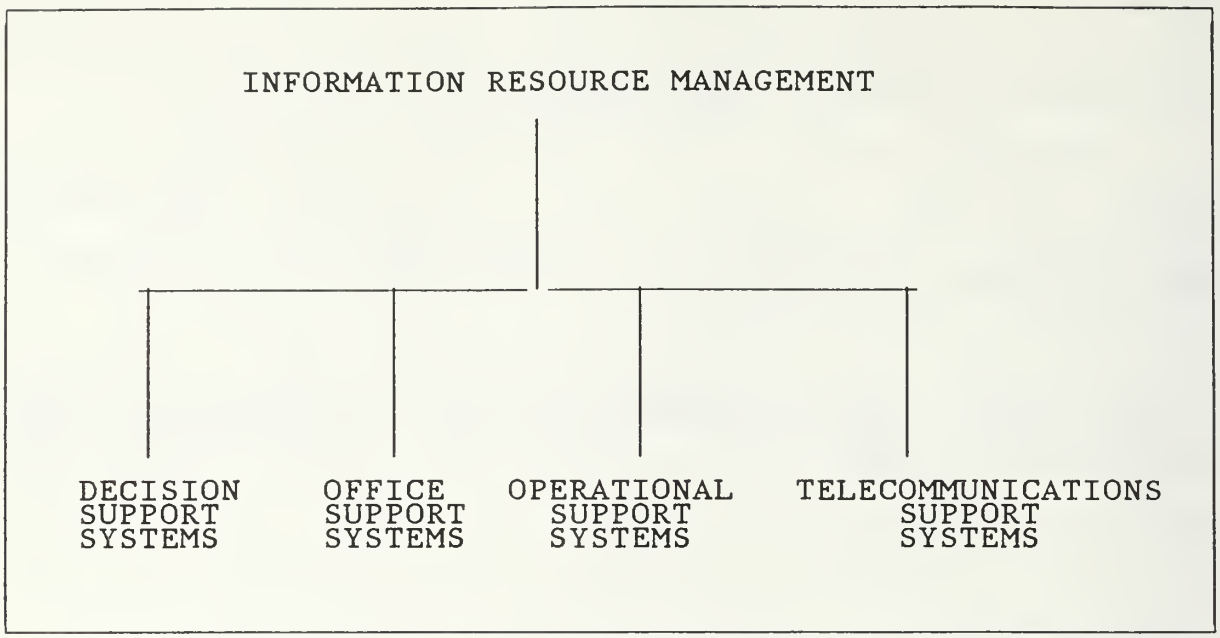


Figure 1.1 Information Resource Management

Decision Support Systems include identifying such areas as the critical success factors of an organization, the models used, and both the internal and external databases accessed to provide information for decision makers.

Office Support Systems identify the processes of information creation, dissemination, and storage and retrieval by the workers in the organization.

Operational Support Systems provide for the functioning of the previous two by the use of automated systems to achieve speed, reliability, flexibility and accuracy. This includes data processing devices and services of all types at all levels.

Finally, Telecommunications Support Systems tie all three together to enhance the overall information flow through the use of local and wide area networks.

In short, information resource management involves finding a satisficing relationship of people, organizational

objectives, organizational data, hardware and software, with the objective of focusing the management of these assets to treat organizational information as a resource, [Ref. 7: p. 43].

C. DEPARTMENT OF DEFENSE VIEW OF INFORMATION RESOURCE MANAGEMENT

Since we are examining an arm of the Department of Defense, it is appropriate to review DOD policy with regard to information resource management. DOD Directive 7740.1, DOD Information Resource Management Program, provides the DOD definition of IRM within the armed services:

> The policy, action or procedure concerning information (both automated and nonautomated) that management establishes to serve the overall current and future needs of the organization. IRM policy and procedures would address such areas as availability, timeliness, accuracy, integrity, privacy, security, auditability, ownership, use and cost-effectiveness of information. [Ref. 8: p. 2-1]

We can see this closely parallels the view defined previously.

D. DEPARTMENT OF THE ARMY VIEW OF INFORMATION RESOURCE MANAGEMENT

The Department of the Army (DA) has only just begun to deal with the concept of information resource management. In September 1984, Congressional hearings began to review draft legislation submitted to establish a fifth arm of the Army's General Staff, the Deputy Chief of Staff for Information Management.

The charter of this newly formed three star general officer position is:

> to improve the management quality and flow of information as a principal resource in achieving total Army goals, by fully integrating all information functions, including information resource management, communications, administration and command and control. [Ref. 9: p. 4]

The significance of this proposed change may be lost to someone outside the Army. This is the latest in a series of evolutionary changes that the Army has experienced as the use of computer based management information systems has increased over the last two decades. It is the eighth reorganization of its information management structure since the initial organization was established in 1967. [Ref. 10: p. 5-32]

This information management position has steadily expanded its scope of responsibility and authority as it has evolved. The latest change will elevate the role of information management in the Army's organizational hierarchy to the same level as the traditional four - Personnel; Research, Development and Acquisition; Operations and Plans; and Logistics. These five will be second in authority only to the most senior officer in the Army, the Army Chief of Staff. [Ref. 11: p. 6-41]

In fact, these changes follow an amazing parallel to the evolutionary growth stages in the use of computers as first described by Gibson and Nolan in 1974, [Ref. 12: p. 76], and modified by Nolan in 1979, [Ref. 13: p. 115]. In both articles, the authors describe how organizations typically experience a well defined, recognizable growth pattern as management information systems (MIS) are introduced into the corporate structure. Figure 1.2 shows this pattern which

STAGE 6: MATURITY

- Organization wide information analysis completed
- Applications mirror the enterprise
- Information Engineering is largely completed

STAGE 5: DATA ADMINISTRATION

- Organization wide strategic planning
- IRM emphasized
- Stable data models are created

STAGE 4: INTEGRATION

- Existing applications retrofited into databases
- Increased demand by users
- Redundancy of data

STAGE 3: CONTROL

- Effects of lax control felt
- Senior and middle managers cannot obtain information needed for decision making
- Users becoming frustrated at applications backlog
- Management attempts to gain control
- Need for data administration vaguely perceived

STAGE 2: CONTAGION

- Growing demand for and proliferation of applications
- Enthusiastic development
- Applications developed in isolation
- Lax control
- No overall planning
- Proliferation of incompatible and redundant data

STAGE 1: INITIATION

- Initial development of first applications
- No overall control

Figure 1.2 Stages of MIS Growth--Nolan

starts with the initiation of the use of MIS at stage 1, until maturity is reached at stage 6. Note the progressive concern with the control and management of information resources as the organization traverses this hierarchy. Typically, the corporation reorganizes its information management entity as it goes through these stages, just as the Army has.

As an organization, the Army appears to be in stage 4: Integration, and is attempting to enter stage 5: Data Administration. As evidenced by the Army Times article [Ref. 9], it is apparent that Army planners are convinced of the value of information. Organization wide strategic planning and information resource management is being emphasized. This latest organizational change recognizes the need for applications to mirror the enterprise.

E. OBJECTIVES

The Deputy Chief of Staff for Plans, U.S. Army Military Personnel Center, has a critical need for improved information resource management and has thus requested this thesis work be undertaken. At present, manpower projections developed through the use of manpower modeling by DCS Plans, determine the Army's manpower policies for both the officer and enlisted force. Not only does this shape the structure of the force, but it has a major budgetary impact on the Army. The decisions made and resultant policies derived, using the current information resource management structure, are subject to the closest scrutiny of both the Office of Management and Budget (OMB) and the Congress.

Senior officers within DCS Plans view the current information structure as flawed, resulting in data which are inefficiently gathered, inaccurate and untimely. Solutions are urgently needed to provide a more efficient flow of

accurate, timely information. The purpose of this thesis is to review this situation and propose various strategies to improve it.

F. METHODOLOGY

In chapter two, we will review the organizational context of the Army's Deputy Chief of Staff for Operations and Plans, DCSOPS, the Deputy Chief of Staff for Personnel, DCSPER, the U.S. Army Military Personnel Center, MILPERCEN, and MILPERCEN's Deputy Chief of Staff for Plans, DCS Plans.

Special attention will be paid to the role of each as an organizational entity in the Army. We will see how each relates to the other, and requires the creation of information models to perform their respective tasks.

In chapter three, we will delineate current information models which support these entities with respect to the organizational context developed in chapter two. This will be accomplished by describing the Army's Force Development/Manpower Management Information Model and the resultant models created in DCS Plans to support it: the Authorizations Information Model, the Inventory Information Model, and the Force Alignment Information Model.

Chapter four will propose a two phased strategy to improve information resource management in DCS Plans. Phase I reviews some traditional techniques such as data administration and data dictionary/directory systems for gaining control of information in an organization. Phase II suggests using an emerging methodology, information engineering (IE), to help develop an institutional information architecture. Such an architecture would aid in understanding the complex relationships of these information models and provide a basis to detect and correct flaws in them. The overall objective of both phases is to to provide

a methodology for DCS Plans to achieve some measure of information resource management.

Chapter five will review the conclusions reached during this study and recommend further areas of study.

II. BACKGROUND

A. THE ARMY STAFF

Before analyzing the information models described in chapter three, it is useful to understand the roles of the Army Staff elements which have caused the creation of these models. These models are manipulated to serve as a basis for much of the manpower policy of the Army.

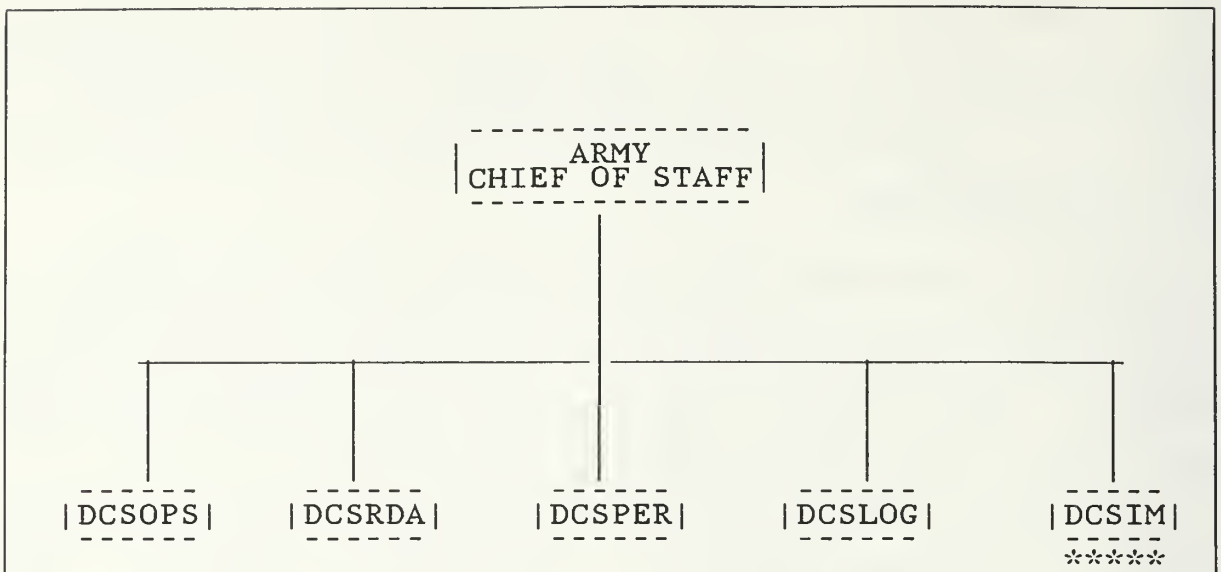
A logical starting point is to examine the roots of the force development/manpower management process that ultimately leads to the need for an Army organization, DCS Plans, to monitor the alignment of the force.

Figure 2.1 depicts the current organization of the Army Deputy Chief of Staff Structure. Two Deputy Chiefs of Staff, the Deputy Chief of Staff for Operations and Plans, (DCSOPS), and the Deputy Chief of Staff for Personnel, (DCSPER), are intimately involved with the force development/manpower management requirements of the Army. [Ref. 10: p. 6-41]

1. The Deputy Chief of Staff for Operations and Plans (DCSOPS)

DCSOPS has primary responsibility for insuring the Army's operational readiness for war. In doing so, it has one particular responsibility, force development, which is directly tied to developing manpower requirements for the Army.

Congress annually sets a well defined strength level for the Army (authorizations) and the actual manpower on hand (inventories) cannot exceed it. The Deputy Chief of Staff for Operations and Plans (DCSOPS) is the Army Staff



Legend

DCSOPS Deputy Chief of Staff for Operations and Plans

DCSRDA Deputy Chief of Staff for Research, Development and Acquisition

DCSPER Deputy Chief of Staff for Personnel

DCSLOG Deputy Chief of Staff for Logistics

DCSIM Deputy Chief of Staff for Information Management

***** Not Yet Approved By Congress

Figure 2.1 Army Deputy Chief of Staff Structure

element responsible for establishing the structure of the force, by taking this overall strength level established by Congress, and subdividing it into the various authorization levels required by the Army's organizational structures (ie., the number of divisions, brigades, battalions, and so on), to meet the Army's combat readiness requirements. [Ref. 10: p. 8-6]

This is not a trivial undertaking. From a well defined strength ceiling of nearly 800,000 this year, the Army has to divide itself into an officer and enlisted force structure, strategically capable of meeting worldwide defense requirements. Within these categories there has to be a careful allocation and partitioning process. There has to be care given to the structure of the organization, so that the force is not top heavy with leaders who have too few soldiers to lead. Another concern is the "tooth to tail" ratio which is having a large logistical support structure in support of a much smaller tactical force. An additional aspect of this undertaking is that there must be a further partitioning of these allocations among different branches, such as, infantry, engineers, medical, supply, etc.

Historically, this partitioning by branch has been the source of intense competition among branches for two reasons:

1. Doctrine, i.e., the correct Order of Battle for the Army is the subject of constant debate and rivalry and;
2. Since rank, power and authority are based on the size of the branch, there is an additional incentive for a proponent to see their branch prevail in this allocation and partitioning process.

Future changes to the structure of the force, through anticipated technological breakthroughs (e.g., the increased accuracy and destructiveness of a weapon systems resulting in the obsolescence of a current doctrine), or sociological changes (e.g., increasing participation by women in jobs traditionally held by men), are also factored into the allocation and partitioning process.

Finally, an additional level of complexity is added to this process in that Congress and the OMB are very

interested in this partitioning by rank and specialty for two reasons:

1. This is the basis for pay appropriations and;
2. The structure of the force determines our war fighting capability; this leads to questions like: "Are there too many officers and too few privates?" "Do we have enough armored divisions to win a land battle in Europe?", etc.

2. The Deputy Chief of Staff for Personnel (DCSPER)

Once the force structure is determined through the force development process, the Deputy Chief of Staff for Personnel (DCSPER) is responsible for creating the inventories to meet these authorizations. DCSPER has sole authority for Army policies and programs for manpower utilization, standards, allocation, and documentation. DCSPER also controls the management of all Army personnel on active duty, the reserve components, the Reserve Officer Training Corps (ROTC), and Department of the Army (DA) civilian personnel.

This includes responsibility for approval of all qualitative aspects of manpower guidance documents, Military Occupational Specialty (MOS), grade, and branch, as well as the utilization of manpower to include policy guidance for the determination of manpower requirements. [Ref. 14: p. 225] DCSPER is also responsible for manpower management surveys of the major Army commands (MACOM) and field operating agencies (FOA) of the Army staff [Ref. 15].

DCSPER is appropriations director for the Military Personnel Army (MPA) appropriation, the Reserve Personnel Army (RPA) appropriation (pay appropriations) and the Operations and Maintenance Army (OMA) appropriation [Ref. 10: p. 8-7].

In summary, DCSPER is responsible for the whole spectrum of personnel activities that encompass manpower management in the Army. Not only is it concerned with the current state of the force but DCSPER is also responsible for the life cycle management necessary to insure that anticipated technological and sociological changes that effect the future structure of the force, are also factored into future manpower inventory development.

To accomplish this manpower management task, DCSPER requires an operating agency to insure these policies are translated into active programs.

B. THE U.S. ARMY MILITARY PERSONNEL CENTER (MILPERCEN)

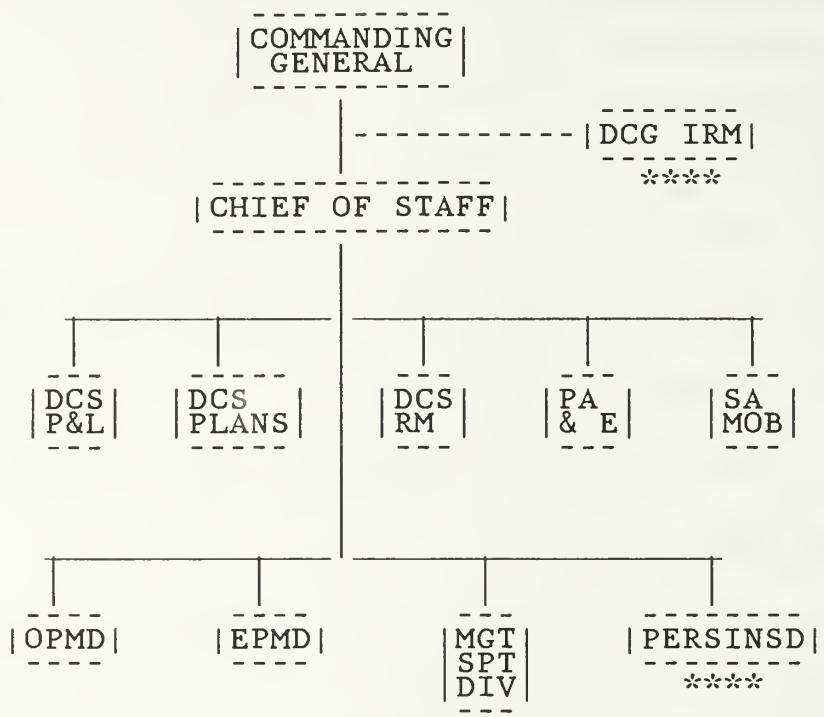
1. MILPERCEN Mission

Whereas DCSPER sets the manpower policy for the Army, the U.S. Army Military Personnel Center (MILPERCEN) is the field operating agency (FOA) responsible for carrying it out. The Commanding General (CG) MILPERCEN bears direct responsibility for the development of military personnel management systems and procedures to implement the policies and programs set by the DCSPER to insure force alignment, i.e., that the inventory of manpower on hand equals the authorizations allowed by the force structure. This includes both the officer and enlisted force, [Ref. 10: p. 6-14], and requires extensive computer based management information systems to manage this function.

2. MILPERCEN Organization

Figure 2.2 displays the current MILPERCEN organization chart. MILPERCEN is made up of ten major staff elements.

Two of these, DCS Personnel and Logistics and DCS Resource Management, are in direct support of MILPERCEN as a



Legend

DCG IRM	Deputy Commanding General, Information Resource Management
DCS P & L	Deputy Chief of Staff, Personnel & Logistics
DCS PLANS	Deputy Chief of Staff, Plans
DCS RM	Deputy Chief of Staff, Resource Management
PA & E	Program Analysis & Evaluation
SA MOB	Special Assistant for Mobilization
OPMD	Officer Personnel Management Directorate
EPMD	Enlisted Personnel Management Directorate
MGT SPT DIV	Management Support Division
PERSINSD	Personnel Information Systems Directorate
****	Headed by the same individual

Figure 2.2 MILPERCEN Organization Chart

field operating agency, and are solely concerned with the personnel, logistical, and financial matters internal to the operation of MILPERCEN.

Six other organizational elements are direct contributors to accomplishing MILPERCEN's Army wide mission. Three of these, Program Analysis and Evaluation, the Special Assistant for Mobilization, and Management Support Division, all have other roles which for the purposes of this thesis do not require further amplification, [Ref. 16].

The Director of the Personnel Information Systems Directorate, PERSINSD, has the dual responsibility of Deputy Commanding General for Information Resource Management (DCG IRM). As such, he has two focuses. First is the quality of the distributed databases that feed the Army's Officer Master File (OMF) and the Enlisted Master File (EMF). The OMF and EMF serve as databases about the current state of the officer and enlisted force and contain a wide range of typically personnel oriented data elements such as name, social security number, birth date, and so on. These databases, themselves, serve a dual role:

1. A day to day picture of the force, e.g., how many cooks are at Fort Ord? and;
2. The base point for making management decisions about the force, e.g., does the Army need more cooks at Fort Ord? The respective accuracies of the OMF and the EMF are critical to the success of MILPERCEN.

The second focus is to be the information systems manager for MILPERCEN, ie, the management of the current MIS as well as the planning for future MIS to support MILPERCEN. His second responsibility requires extensive coordination with the Army's Computer Systems Command (CSC). CSC is the Army agency that designs and implements MIS for the Army.

At present, the IRM efforts of the DCG IRM are primarily devoted to attempting to purify these databases

and have not yet extended beyond this role. With world wide inputs to the OMF and EMF through the Standard Installation/Division Personnel System (SIDPERS), this constitutes a monumental data synchronization/data integrity problem and fully occupies the DCG IRM, [Ref. 17].

Finally, two organizational elements, Officer Personnel Management Directorate (OPMD), and Enlisted Personnel Management Directorate (EPMD), have a strong relationship with DCS Plans and are, in fact, highly dependent on the quality of information developed by the information models developed in DCS Plans.

a. OPMD

OPMD's mission is to manage the officer force. From an officer's entrance on active duty until he leaves the service, OPMD is the agency that monitors his career through assignments and schooling [Ref. 16], with two objectives:

1. To meet the current needs of the Army and;
2. To develop an officer's ability to assume positions of increasing rank and responsibility over a thirty year career.

It is useful at this point to understand the typical management problems OPMD must wrestle with. As an example, given (hypothetically) that the Army plans to add a new light infantry division to its force structure by 1991, how many second lieutenants should be brought on from active duty from ROTC during 1985 to serve as captains by 1991? Of the seventeen Army branches, (e.g. infantry, armor, signal, etc.), how many of these ROTC officers should be commissioned in each branch?

Several questions are raised. What attrition rate over this six year period can be expected and how will it vary by branch? What is the expected force structure of

this new division? Will there be a need to send some of these officers to special training to fill high technology positions in this division? Faced with these difficult officer personnel management issues, OPMD has to manage the officer force.

b. EPMD

EPMD has the role of managing the enlisted force over a thirty year career, and must have a means to handle similar questions. As an example, the new light infantry division mentioned previously will require infantry sergeants. Taking into consideration such factors as the reenlistment rate, attrition rate, reclassification rate, the requirements of the other Army divisions, etc., how many high school graduates must be recruited from the pool of American youth this year to insure this new division has sufficient numbers to man all the division's infantry battalions by 1991? EPMD has to manage the enlisted force while faced with these types of complex enlisted personnel management issues.

From these hypothetical examples, it becomes obvious that MILPERCEN requires an element within its organizational structure to respond to these types of scenarios. Such an element must be organized to conduct the planning, programming, and monitoring necessary to fulfill MILPERCEN's force alignment responsibilities. To do so requires a resident decision support system (DSS) configuration capable of conducting manpower modeling. The element charged with this responsibility is DCS Plans.

C. THE DEPUTY CHIEF OF STAFF FOR PLANS, MILPERCEN (DCS PLANS)

1. DCS Plans Mission

DCS Plans is charged by the CG MILPERCEN to align the Army's future personnel inventories with future active Army projected authorizations--force alignment [Ref. 18]. A good example of the type of force alignment information that DCS Plans must create to accomplish this goal is the promotion board process.

Annually, a series of promotion boards are conducted by the Army to meet projected vacancies at each rank. As mentioned earlier, this is for the purpose of selecting for promotion qualified individuals who have been groomed to fill positions of greater responsibility within the Army.

As an example, the author of this thesis was recently one of 2521 officers selected for promotion to Lieutenant Colonel. The figure 2521 is the total of all the Majors the Army will promote this year and is the inventory needed to fill the projected vacancies against authorizations, at this grade, during 1985. The figure 2521 was further subdivided for the board into floors and ceilings, by branch and specialty, i.e., the board had to select a minimum of 200 and a maximum of 275 Infantry majors for Lieutenant Colonel, a minimum of 120 and a maximum of 155 signal Majors, and so on. [Ref. 19: p. L-1] The basis for the numbers used by the board originates in the manpower modeling efforts of DCS Plans to achieve the alignment of authorizations with inventories.

To take this type of problem one step further, consider the Second Lieutenants brought on active duty in 1985. Beyond the needs of a new light infantry division, how many are needed, by branch, to insure we have sufficient numbers to meet the Army's needs for Lieutenant Colonels by

the year 2000? DCS Plans must try to accurately project these type of requirements, and has created information models for that purpose.

The information products created by DCS Plans are subject to intense scrutiny and debate both inside and outside of the Army, thus the validity of their information/data models are critical. On the one hand, the Army could oversubscribe the force beyond the limits set by Congress, which is a violation of public law. On the other hand, the force could fall short of the size required meet to the readiness levels that have been set to insure our national security.

Finally, this issue is further intensified by the parochial interests of the branches as the allocation and partitioning process goes on. This is best understood with a final example. Suppose Plans has projected that the Army must recruit 12,000 high school students in 1985 to provide 5,000 infantry sergeants DCSOPS has authorized for the new light division by 1991. Further suppose that the U.S. Army Recruiting Command, USAREC, meets that goal. In 1991, the Army finds it only has 4700 infantry sergeants remaining to fill those 5000 spaces.

Faced with this forecasting error, there are few alternatives:

1. The division could go short, but this hurts our readiness posture;
2. One less infantry battalion could be organized, and an armor or attack helicopter battalion could be substituted. This improves our readiness posture, but will no doubt cause internecine warfare between the infantry, armor and aviation proponents.
3. Congress could note that the Army has unfilled authorizations and redistribute them to the Navy.

None of these are satisfactory in the eyes of the Army's senior leadership.

In this case DCS Plans would be held responsible for this situation. Should they be however? Was the model faulty, i.e., were there unexpected factors that the model did not account for or was the model correct but EPMD as personnel manager at fault? Clearly, there is no definitive answer, yet DCS Plans is at the center of these controversies. In the words of the Chief of the Special Support Branch of DCS Plans: "Our role in Plans is to be the honest brokers of the Army". [Ref. 20]

2. DCS Plans Organization

To serve as the honest brokers of the Army DCS plans needs an organizational structure capable of planning, programming and monitoring the process of force alignment. Figure 2.3 depicts the DCS Plans organization chart. Plans has five branches to accomplish this mission: Program Management, Force Plans, Personnel Plans, Training Plans, and Special Support, [Ref. 18].

a. Program Management Branch

The primary focus of the Program Management Branch is force modernization issues. They insure that projected changes to the force are accounted for and the implications to the officer and enlisted branches and specialties are factored into the models used in Plans.

This task is complicated by the same factors that any civilian corporation faces with its own internal organizational dynamics. The Army experiences the pains of poor communications among the various elements that make up its enterprise model, and MILPERCEN needs a faction to interface with other planners outside of MILPERCEN so they are not surprised by change. As the doctrinal battles ebb

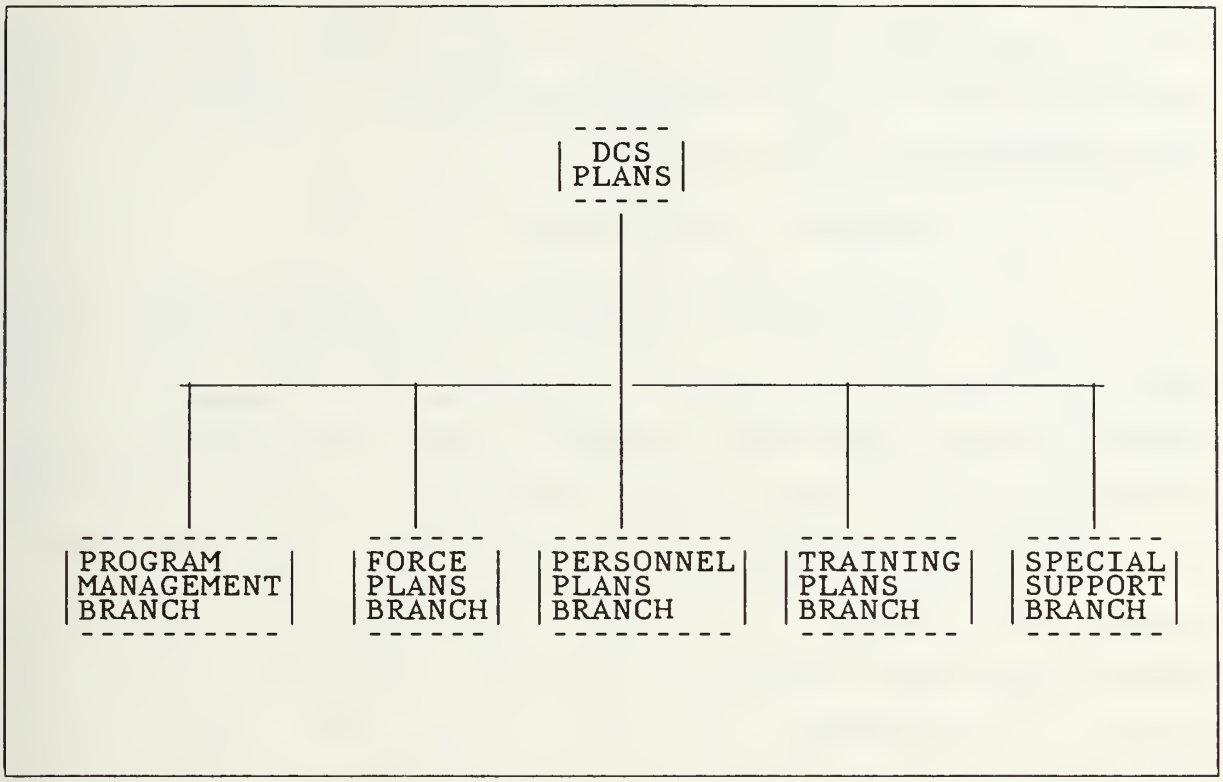


Figure 2.3 DCS Plans Organization Chart

and flow, swift changes in policy can occur. This has to be carefully monitored.

b. Force Plans Branch

Force Plans Branch actually develops the tools and models used in the force alignment process and is heavily dependent upon the efforts of Program Management to identify and insure all factors are accounted for. They have an operations research/systems analysis cell devoted to handling the modeling requirements as they occur.

Force Plans analyzes the officer and enlisted personnel system and maintains personnel planning models for them. They produce the officer and enlisted objective force implementation plan. An example of this was mentioned

earlier: "What input from ROTC is necessary to support the officer objective force, i.e., how many Second lieutenants are necessary to grow enough Lieutenant Colonels for the Army fifteen years hence?"

c. Personnel Plans Branch

While Program Management and Force Plans look to the future, Personnel Plans is concerned with the present and near term. Personnel Plans Branch is responsible for monitoring the short term execution of personnel management programs. As an example, Personnel Plans manages accessions to the Army by setting USAREC's priorities for recruiting.

One can view Personnel Plans in the role of making the series of necessary adjustments to insure that inventories meet authorizations as effective dates come nearer. For example, if it is now in 1990, and we project ourselves to be 300 short of infantry sergeants in 1991 for our new light division. Personnel Plans would raise the Selective Reenlistment Bonus (SRB) to encourage more reenlistments, and reduce the attrition rate. They may, in addition, raise the promotion ceiling so the 1990 Sergeant's Promotion Board could select more soldiers for promotion to sergeant. In more graphic terms, they are concerned with "tweaking" the inventory as the future becomes the present, to avoid the situation where alternatives outside the scope of control of MILPERCEN become necessary.

d. Training Plans Branch

Training Plans Branch, based upon the inventory needs projected by Personnel Plans, interfaces with the Army's Training and Doctrine Command (TRADOC) to insure that enough training quotas are planned and programmed into the training base. This is not merely a bookkeeping function, but a complex undertaking.

As an example, suppose the new light infantry division needs 8000 riflemen in the rank of Private. To say we need 8000 more riflemen and work that into a manpower model only solves half the problem. Are there sufficient facilities to train 8000 riflemen? To add an element of complexity, if we train 8000 riflemen, what other training is cancelled or delayed? What is the impact of this delay? Will mortar crewmen run short?

The Army does not have unlimited training resources and these resources must be managed and allocated. MILPERCEN needs an element to closely coordinate personnel planning with the managers of the training base, TRADOC.

Thus we can see a relationship between the activities of these four branches. Are policy changes reflected in the force structure? Program Management Branch insures that they are. Are they accounted for in the manpower model? Force Plans Branch handles that task. What are the short term requirements? What quick adjustments have to be made? Personnel Plans reacts to these issues. Will the training base be ready to support the Army and what feedback is there to the overall model? Training Plans monitors these aspects. Constant communication between these branches is essential. There has to be a constant balance between the long and short term views.

e. Special Support Branch

Special Support Branch has many roles in the DCS Plans operation. They are responsible for the Correctable Authorization Data Base (CAUDB), which is the authorization database used within Plans and the rest of MILPERCEN. CAUDB, is an example of the information resource management problems of DCS Plans. Authorization data bases exist for this purpose outside of Plans, yet the branch chiefs within Plans will only trust their own product. This, and similar situations, will be examined in Chapter Three.

They also operate the Force Modernization Operations Center (FMOC). FMOC is the hub of a growing decision support system capability [Ref. 21], with three objectives:

1. Futures Analysis Support--the ability to generate alternative scenarios and link them to MILPERCEN's models to assess the impact of policy changes.
2. Executive Level Decision Making Support--providing a forum for high level decision making through the use of the DSS with a graphics capability. In effect, this provides a forum for doctrinal battles to be waged.
3. Data Standardization and Quality Control--the development of data dictionaries/directories to insure automated data validity and clear delineation of maintenance responsibilities.

Special Support Branch is concerned with the overall effectiveness of DCS Plans, and serves as its crisis manager when the information models break down.

D. SUMMARY

It should now be apparent that the mission of Army manpower planning is a complex undertaking, which involves many organizational elements. Each element requires some means to carry out their respective tasks in this established hierarchy. As one would expect, the use of computer based management information systems has evolved to support this process. As one would also expect, the development of these systems has created information models to solve a particular element's role in the process.

We will now turn in Chapter Three to the task of describing these models and the flaws in their construction.

III. INFORMATION MODELS

A. THE ARMY FORCE DEVELOPMENT/MANPOWER MANAGEMENT INFORMATION MODEL

In Chapter Two we described the organizations involved in developing the force structure, manning it, and keeping the force aligned. We see that a hierarchical relationship exists to facilitate this process, which causes policies emanating at the Department of the Army level to become translated into systems and programs at the MILPERCEN/DCS Plans level.

Chapter Three takes this hierarchical relationship one step further and redescribes it in terms of the tools used to accomplish the process, i.e., the reports, programs, files, databases, and information systems used to accomplish the force development, manning, and alignment tasks.

1. Army Force Development/Manpower Management Relationships

To describe the force development/manpower management (FD/MM) information model under which the Army operates, it is first necessary to review the force development/manpower management relationships that comprise this model.

Although some appreciation of this relationship is gained from Chapter Two, it is worthwhile to view this relationship graphically, and bear in mind that the models that will be described in this chapter have resulted from this relationship. We will ultimately see that the DCS Plans information models, which are designed to carry out the force alignment mission, are the logical result of this hierarchical relationship.

The schematic in Figure 3.1 provides a broad overview of the force development/manpower management relationship that exists in the Army. The line drawn is arbitrary and only serves to illustrate the degree of involvement between force development and manpower management as responsibility extends from DCSOPS to DCS Plans. [Ref. 14: p. 221]

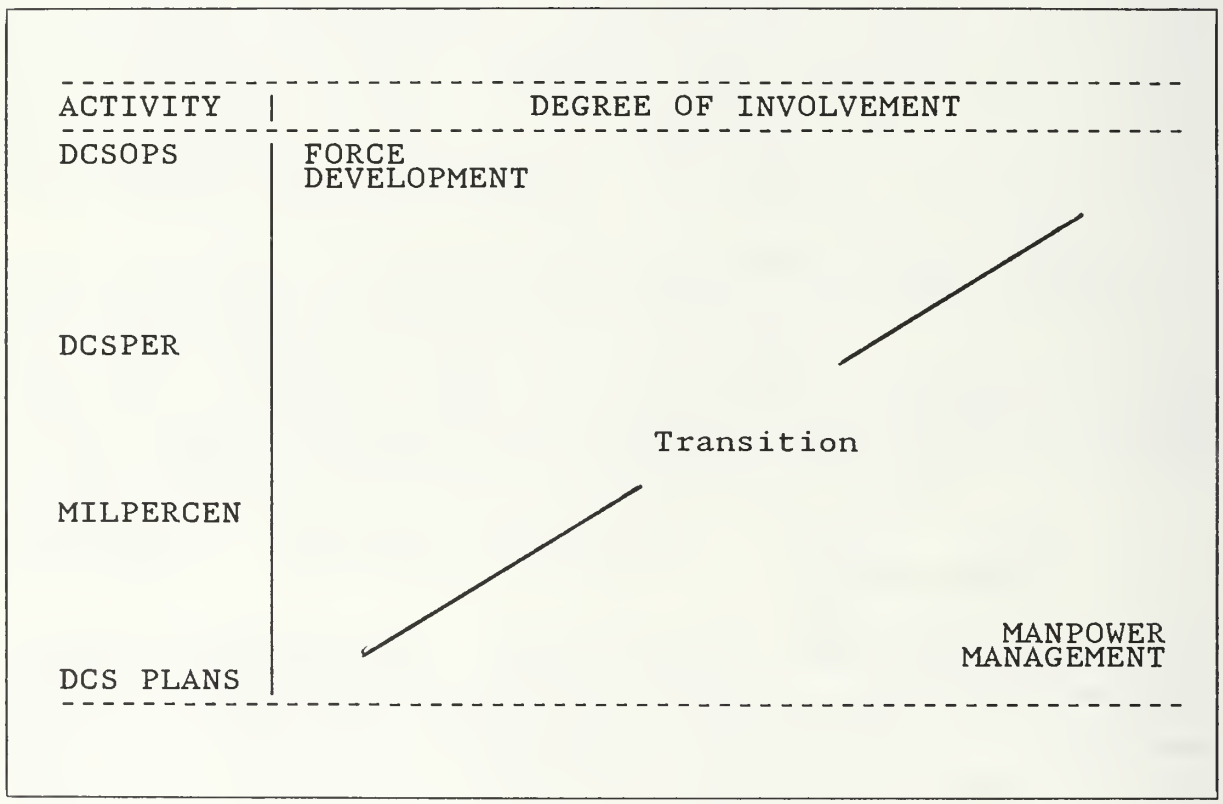


Figure 3.1 Force Development/ Manpower Management

On one end of the scale, DCSOPS is clearly concerned with the force structure in terms of the strategy they can adopt as constrained by the strength ceilings set by Congress. On the other end, DCS Plans is concerned with the Army's ability to fill against these authorized numbers. In the middle, DCSPER transitions from the force structure

issue to the manpower fill issue, with MILPERCEN as their vehicle to achieve this transition.

Overlaps exist, but in the vernacular of Army planners, there is a gradual shift from "spaces" to "faces" as the transition from force development to manpower management is effected.

2. Information Systems Used in the FD/MM Process

To structure the force and identify the detailed manpower requirements to support this structure, Army planners need a group of MIS to aid them in their efforts.

Figure 3.2 is a schematic of the model which represents this family of force development/manpower management information systems. These systems are used to program, allocate, and display the force structure that, given the strength ceiling set by Congress, most optimally meets the worldwide threat as perceived by Army planners. [Ref. 14: p. 232]

There are six information systems used by DCSOPS and DCSPER to fulfill this planning need. These systems are updated and processed semi-annually. The first five are for the DCSOPS force planners, the sixth, PERSACS, is a tool for the manpower planners in DCSPER. [Ref. 22]

a. BOIP

The Basis of Issue Plan (BOIP) is an information system which accounts for resource changes due to the modernization of equipment. Input to the BOIP comes from the Army's logistic community (DCSLOG), the element responsible for material acquisition. For example, the recent fielding of the M-1 Abrams Main Battle Tank resulted in changes to the composition of a tank battalion such as the number of people to run it, the types of equipment to maintain it, the kind of training they require, and so on.

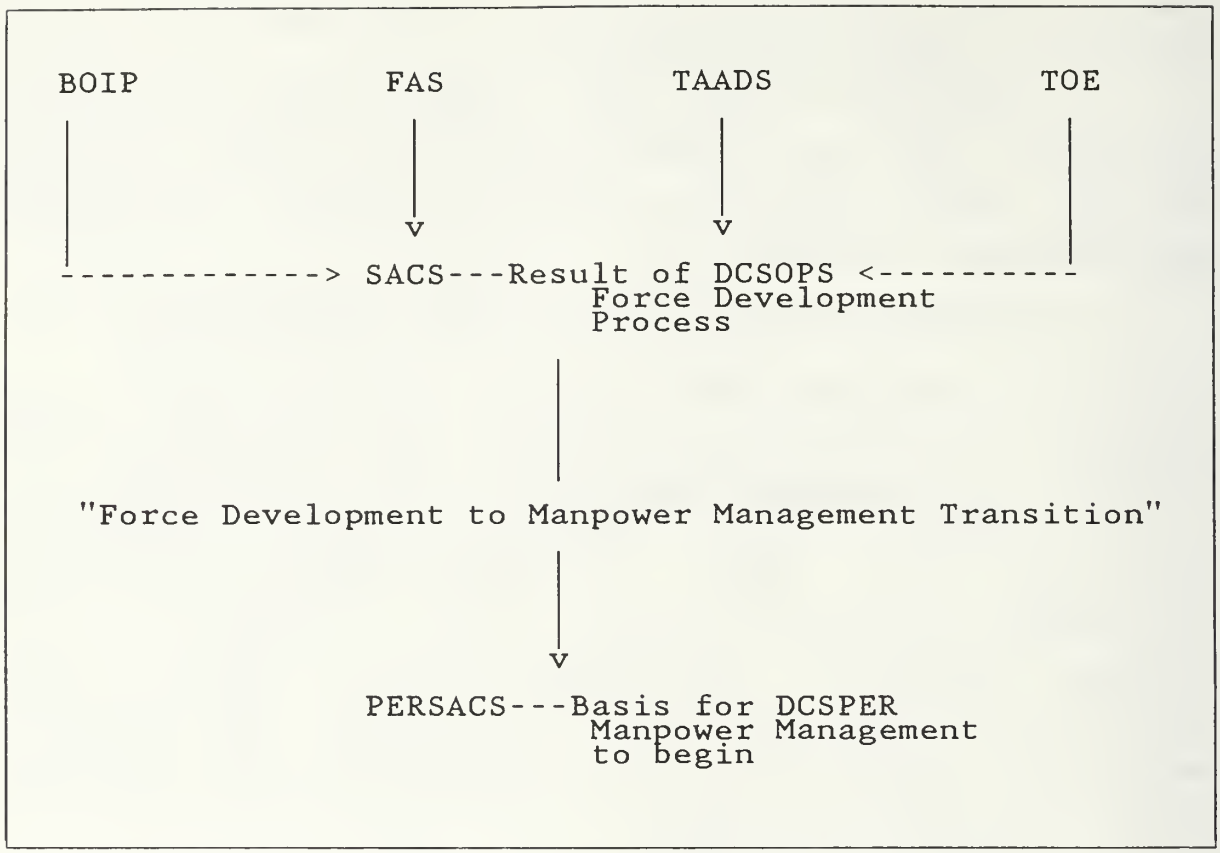


Figure 3.2 The Army FD/MM Information Model

This was captured in the BOIP to insure these resource requirement changes were factored into the force planning process.

b. FAS

The Force Accounting System (FAS) is an information system which keeps track of the current units in the Army, their types (i.e., armor, infantry, medical) any approved changes to their structure, and their manpower requirements. It can display this information by major command (MACOM) or geographic area, e.g., how many battalions have the M-1 tank, how many don't, and where are they located?

c. TAADS

The Army Authorization Document System (TAADS) is a system which contains and reports the modifications to TOE's or TDA's.

A TOE is the Table of Organization and Equipment for a tactical unit. For example, according to approved doctrine an armor battalion typically has 54 tanks in it. A modified TOE (MTOE) is a change to the TOE within the scope of authority of a MACOM commander e.g., the Commander in Chief U.S. Army Europe, (CINCUSAEUR), may modify this to 50 tanks to share shortages, yet keep all battalions near full doctrinal strength.

A TDA is a Table of Distribution and Allowances, which are the authorizations for non-tactical units. MILPERCEN is staffed by a TDA. A modified TDA (MTDA) is a TDA modified within the authority of a MACOM commander.

d. TOE

The Table of Organization and Equipment System (TOE) is an information system which contains all current doctrinally approved tables of authorized organizations and their equipment. The Army's Training and Doctrine Command (TRADOC) recommends the doctrinal composition of Army organizations.

As an example, the Infantry School at Fort Benning, Georgia recommends the structure and composition of the doctrinal airborne infantry battalion and submits this to TRADOC for approval. Once approved, these Tables of Organization and Equipment are sent by TRADOC to DCSOPS for input into the TOE system.

e. SACS

Structure and Composition System (SACS) is an information system updated by the previous four information systems, which contains and reports manpower requirements and any approved changes by grade and MOS. It is an amalgamation of information from the previous four systems and is the document which constitutes the end product of the force development process. SACS represents the approved force structure.

f. PERSACS

The Personnel Structure and Composition System (PERSACS) is an information system for the personnel section of SACS, and is used by the personnel planners in DCSPER [Ref. 14: p. 411]. It is a composite of authorizations for the Army by grade and MOS, and is the source for the creation of the Correctable Authorization Database (CAUDB) maintained in MILPERCEN by DCS Plans.

PERSACS is the primary source for authorization data at the Department of the Army level, and serves as a basis to begin the manpower management process [Ref. 23: p. 3]. Table I summarizes each the features of each system [Ref. 14: p. 232].

3. Problems With The Force Development/Manpower Management Model

Clearly, overlaps exist in the information contained in and reported by these systems. There is a historical reason for this. These systems were designed and refined during the late 1960's and early 1970's, when data processing was largely file based. They were also developed

TABLE I

Information Systems Used in the FD/MM Model

BOIP	- The Basis of Issue Plan is an information system which accounts for resources changes due to the modernization of equipment.
FAS	- Force Accounting System is an information system which keeps track of the number of units, their types, approved changes to their structure and manpower requirements.
TAADS	- The Army Authorization Document System is an information system which shows modifications to TOE's and TDA's.
TOE	- is an information system which contains all current, doctrinally approved tables of organizations and their equipment.
SACS	- Structure and Composition System is an information system which has manpower requirements by grade and MOS. It is the end result of the force development process.
PERSACS	- Personnel Structure and Composition System The base point for the manpower management process to begin.

independently of each other and their file structures are largely incompatible. SACS and PERSACS were designed to draw from the others what could be used to develop the overall force structure for planners. [Ref. 14]

Viewing this in terms of Nolan's model, we are now at stage 4 or 5 in terms of our sophistication with regard to data processing, but still using information systems developed during stages 1, 2, and 3. As will be discussed later, this is causing considerable frustration among manpower planners.

B. THE DCS PLANS INFORMATION MODELS

Given the structure of the force as reflected in SACS and the manning goals as captured in the PERSACS, there is a transition from DCSPER to MILPERCEN to begin the "spaces" to "faces" process.

With this "hand off" to MILPERCEN, the basis to man the force has been initially established. As shown in Figure 3.3, DCS Plans uses the information generated by the PERSACS to perform three actions:

1. Scrub the authorizations information generated by PERSACS to insure that all planning is based upon sound data. As described in Chapter Two, it is the primary responsibility of Program Management Branch to insure all changes are captured in the system.
2. Project the current and future inventory that will be available to meet it. This is done by Force Plans and Personnel Plans.
3. Based upon these projected inventories, do the actual force alignment process--create more of one specialty and less of another to meet the projected needs.

This is actually a series of recommendations by DCS Plans to the CG MILPERCEN that OPMD and EPMD implement.

DCS Plans has developed three information models to achieve this end: the Authorizations Information Model, the Inventory Information Model, and the Force Alignment Information Model.

1. The Authorizations Information Model

The Authorizations Information Model is used to derive and maintain authorization information for use within MILPERCEN to serve as a basis for manning the force. It's structure is shown in Figure 3.4.

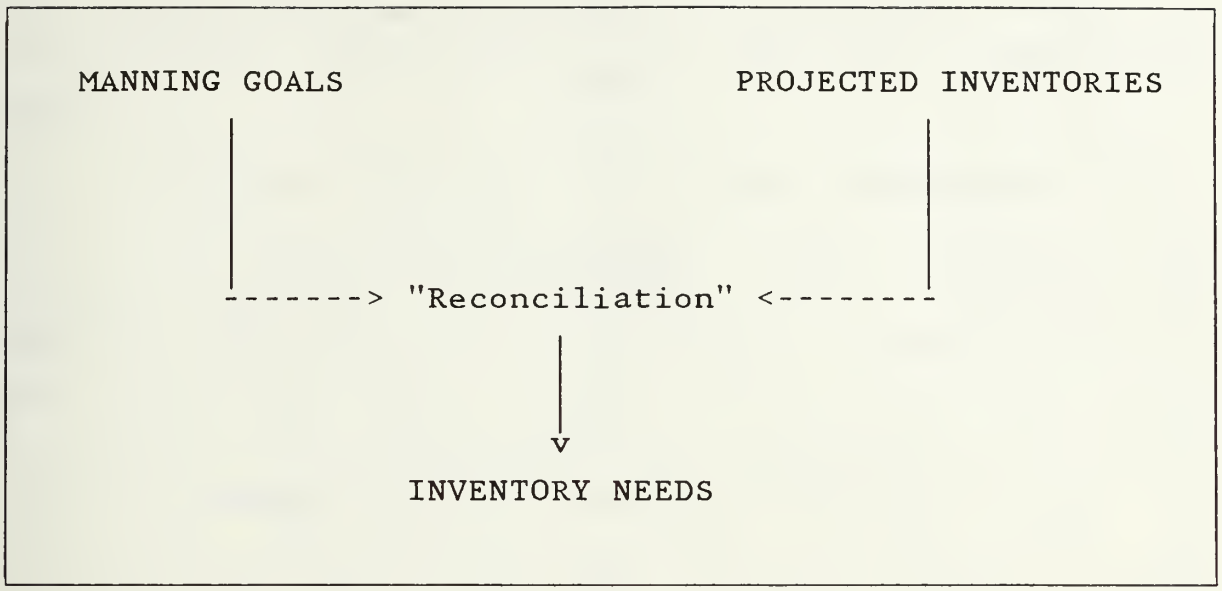


Figure 3.3 Reconciliation of Goals and Inventory

Three elements make up the authorizations model, [Ref. 24: p. 30], the CAUDB , the PMAD, and the UAD.

a. CAUDB

The Correctable Authorizations DataBase (CAUDB) is a database maintained to reflect MOS and grade and is used to provide a single source of approved authorizations for managing the force.

The CAUDB is actually a carefully reviewed, scrubbed version of the information found in PERSACS for use in MILPERCEN. It is a file organization kept on a mass storage device. It is a MILPERCEN product, produced semi-annually and maintained by the Special Plans Branch of DCS Plans. [Ref. 23]

b. PMAD

The Personnel Management Authorizations Document (PMAD) is a semi-annual extract of the CAUDB, and is the

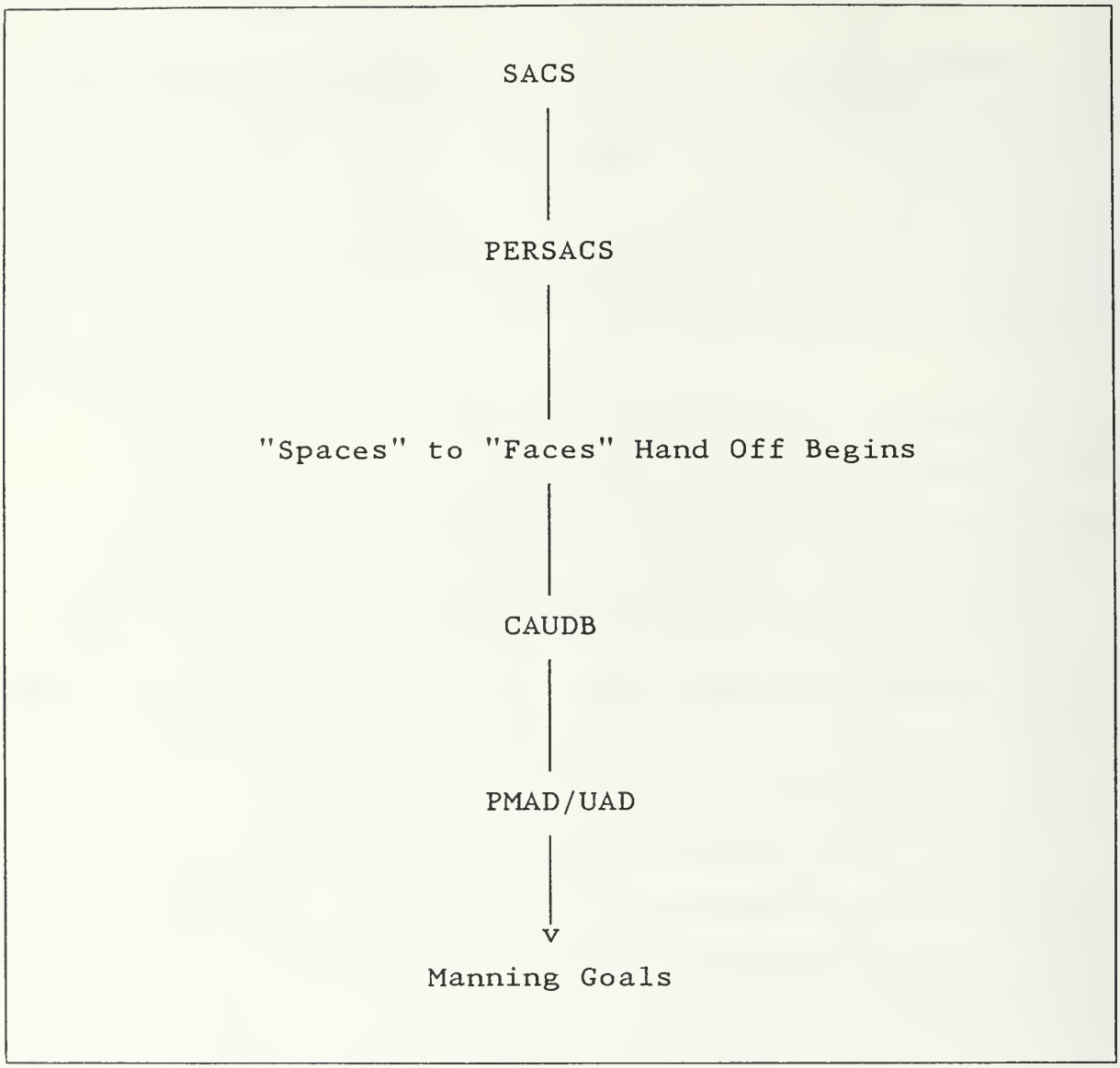


Figure 3.4 The Authorizations Information Model

actual document used throughout MILPERCEN for the daily management of the force. [Ref. 24: p. 30]

c. UAD

The Updated Authorization Document (UAD) is a monthly extract of the CAUDB [Ref. 25]. The UAD is used in

lieu of the PMAD as the PMAD ages [Ref. 22]. Table II summarizes the tools used in the Authorization Information model.

2. Problems With the Authorizations Information Model

The very existence of the CAUDB , PMAD and UAD points out the IRM problems plaguing Plans. Interviews with the DCS Plans branch chiefs reflect a common theme of mistrust for authorization information that is not created by Plans. Even though PERSACS contains the information needed to development manning goals, branch chiefs will only trust the PMAD and UAD extracts of the CAUDB for authorization data to be used in their various programs [Ref. 22].

TABLE II

Tools Used in the Authorizations Information Model

CAUDB	- The Correctable Authorizations Data Base reflects MOS and grade and is used to provide a single source of approved authorizations. It is a MILPERCEN product and is maintained by the Special Plans Branch of DCS Plans.
PMAD	- The Personnel Management Authorizations Document, PMAD, is a semi-annual extract of the CAUBD, and is the document used for the daily management of the force.
UAD	- The Updated Authorizations Document, UAD, is a monthly extract of the CAUDB.

The mistrust of the branch chiefs is founded on the belief that the information systems feeding into the creation of SACS and PERSACS (BOIP, FAS, TAADS, and TOE) are flawed, inaccurate, and untimely.

MILPERCEN (Program Management Branch), in conjunction with other Army organizations, conducts a thorough review of this PERSACS authorization information to insure that the basis for manning goals accurately reflects the latest changes which may not be captured in the semi-annual production of SACS and PERSACS [Ref. 18].

Thus we see the first instance of data redundancy in the chain of events that the Army uses to develop its manning goals. As stated by Kroenke, such redundancy problems inevitably leads to data integrity problems [Ref. 26: p. 4]. Confirmation of Kroenke's view is the considerable time and effort spent by DCS Plans insuring that authorization data is accurate.

3. The Inventory Information Model

From the authorizations model comes the creation of the manning goals for the Army. This constitutes the first part of the force alignment process.

The Inventory Information Model shown in Figure 3.5 is the second part of the force alignment process. This model has a variety of tools to project the inventory and future needs to meet manning goals. The source for current inventory information to feed this model is found in the Officer Master File (OMF) and the Enlisted Master File (EMF).

The inventory projection process actually begins with two DCSPER programs, ELIM/COMPLIP and PIA II, although the results are used in both DCSPER and Plans.

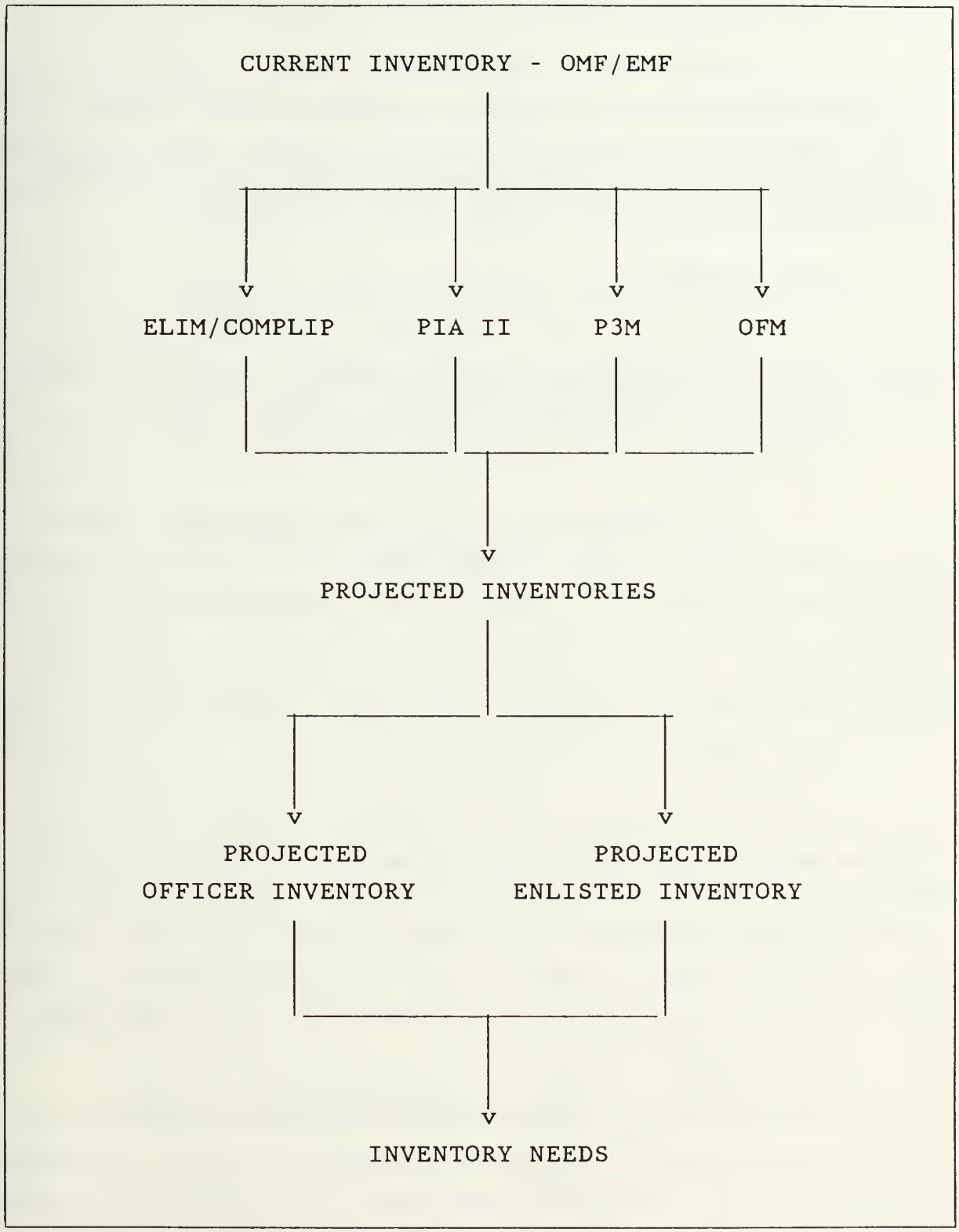


Figure 3.5 The Inventory Information Model

a. ELIM/COMPLIP

ELIM/COMPLIP is a linear programming model used in DCSPER to project the future manpower status of the Army. It forecasts such things as gains, losses, and recruiting objectives. These are aggregate totals for the force. [Ref. 14: p. 411]

b. PIA II

PIA II, The Personnel Inventory Analysis II model, is a DCSPER model which computes enlisted training requirements and is used by Training Branch. [Ref. 14]

c. P3M

The Personnel Policy Projection Model (P3M) is a major planning tool within DCS Plans. It is used to predict MOS manning levels and reenlistment requirements. It is also a basis for predicting accessions and training requirements. It is used throughout the branches in Plans, but is maintained by Force Plans Branch. [Ref. 27: p. 1]

d. OFM

The Objective Force Model, OFM, is a linear program model that develops and determines an optimal force structure in terms of specialty, grade, and year of service. This is used to project the right numbers for the size of the force in future years. It is used by Force Plans Branch. [Ref. 28] Table III summarizes the tools used in the Inventory Information Model.

4. Problems With The Inventory Information Model

The Inventory Information Model has the same data redundancy and integrity problems as the Authorization model. The DCS Plans staff uses their own models to project

TABLE III

Tools Used in the Inventory Information Model

ELIM/ COMPLIP	- is a program used in DCSPER to project the future manpower status of the Army. It projects such things as projected gains, projected losses, and recruiting objectives.
PIA II	- The Personnel Inventory Analysis II model, PIA II,is a model which computes enlisted training requirements.
P3M	- The Personnel Policy Projection Model, P3M, is a major planning tool within DCS Plans. It is used to predict MOS manning levels and reenlistments requirements. It is also a basis for predicting accessions and training requirements.
OFM	- The Objective Force Model, OFM is used to project the size of the force in future years.

much of the same type of information that the DCSPER Planners do. Thus, overlaps exist between the use of ELIM/COMPLIP , PIA II, P3M and OFM.

These models also use the same files (the EMF and the OMF) to project this information. In fact, what appears to happen is that the DCS Plans staff uses the DCSPER projections to find out what is a reasonable guess of the numbers, then proceeds to use their own models (P3M and OFM) to fine tune the DCSPER projections to develop a MILPERCEN projection. [Ref. 22]

More significantly, these models are run independently, using whatever version of the EMF/OMF is most current. This causes built-in data integrity problems. This is particularly true for the smaller specialties such as parachute rigger, where the loss of a number as small as 4 or 5 from the overall population is significant.

5. The Force Alignment Information Model

Having established manning goals for the Army and determined the projected inventory, the logical result is to adjust the inventory to insure authorizations meet inventory. The result creates the need for a third model, the Force Alignment Information Model (Figure 3.6).

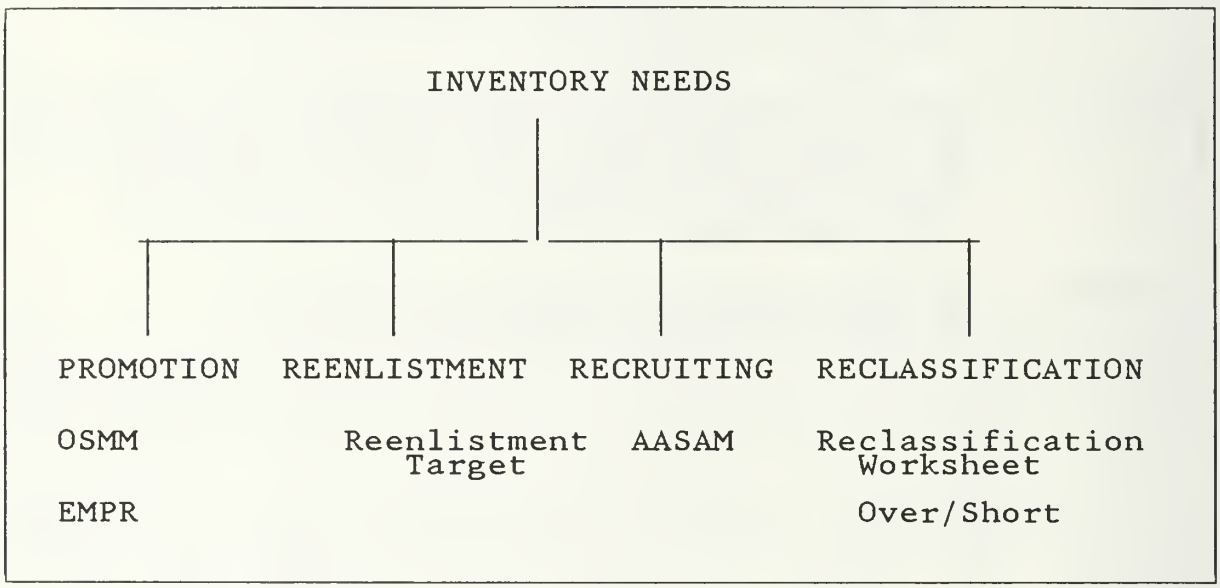


Figure 3.6 The Force Alignment Information Model

Four actions can align the force:

1. promotions (by speeding them up or slowing them down),
2. reenlistment (by encouraging reenlistments in shortage specialties and discouraging them in overage specialties),
3. recruiting (by raising or lowering the recruiting goals for the Army Recruiting Command) and;
4. reclassification (by changing a soldier's specialty from one which is in excess supply to one the Army needs).

DCS Plans has developed a series of tools to aid in the management of each of these areas.

a. Promotion

(1) OSMM. The Officer Strength Management Model is a tool used to align the officer force. It is a model that responds to changes to officer continuation rates and outputs a projected force versus the authorizations allowed. It is a basis for officer promotion plans. [Ref. 29]

(2) EPMR. The Enlisted Programs Management Report is a product of P3M which projects the enlisted inventory up to three years out and is a basis for enlisted promotion plans. [Ref. 30].

b. Reenlistment

For reenlistment, the Reenlistment Target Model (RTM) is used. This is a model which determines by month and specialty the personnel eligible for reenlistment. Based upon historical reenlistment rates, this model projects the expected reenlistment rate. [Ref. 31]

c. Recruiting

AASAM, the Active Army Seasonal Assessment Model, is a linear goal program, which, using constraints such as the training base and the projected needs of the inventory, projects the recruiting mission of the U.S. Army's Recruiting Command (USAREC). [Ref. 32]

d. Reclassification

(1) Reclassification Worksheet. The Reclassification Worksheet (Reclass WS) evaluates the projected strengths for all military occupational specialties and determines a reclassification status. The

result is a yes/no for each MOS and grade in the enlisted force structure. Yes means that if the MOS is short that a soldier can reclassify into it, or if it is over, out of it. [Ref. 33]

(2) Over/Short Report. This report is also a product of P3M, and concentrates at the lower grade levels for which there is the most flexibility for change. It also reflects which MOS are currently over or short. [Ref. 34] Table IV summarizes the tools used in the Force Alignment Model.

6. Problems with The Force Alignment Model

The approach used to align the force through promotion, reenlistment, recruiting, and reclassification, has the expected drawback: a tremendous synchronization problem. It is as if four doctors are independently treating the same patient, with four sets of tests, charts and medical histories. There is a terrific debate as to the best treatment for the patient.

The FMOC is used to allow the Army elements involved to arrive at the best means to align the force. Senior Army general officers who are heads of major commands take part in these meetings. The assumption is that the information being displayed on the graphics devices in the FMOC represent hard factual data and decisions can be comfortably made that effect the lives of thousands of soldiers and their families. This is simply not true.

Although the officers in the organizations involved in preparing the data and information used in the FMOC offer their best professional efforts, it is virtually impossible for them to insure total communication, synchronization, and data integrity with the information models as they are. [Ref. 22]

TABLE IV

Tools Used in the Force Alignment Information Model

AASAM	- Active Army Seasonal Assessment Model is a linear goal program, which using such such constraints as the training base and the projected needs of the inventory, projects the recruiting mission of the U.S. Army's Recruiting Command (USAREC).
EPMR	- The Enlisted Programs Management Report is a product of P3M which projects the enlisted inventory up to three years out and is a basis for enlisted promotions.
OSMM	- The Officer Strength Management Model is a tool used to align the officer force. It is a model that responds to changes to officer continuation rates and outputs a projected force versus authorizations. It is a basis for promotion plans.
Over/ Short Report	- This report is run in conjunction with the P3M and concentrates at the lower grade level for which there is the most flexibility for change.
Reclass WS	- Evaluates the projected strengths for military occupational specialties and determines a reclassification status. The result is a Yes/No for each MOS and grade in the enlisted force.
RTM	- This model determines by month the personnel eligible for reenlistment, by specialty. This is based on historical reenlistment rates and projects the expected reenlistments.

C. SUMMARY

We now have a concept of the people, organizations, and information models involved with DCS Plans in carrying out the force alignment process. Figure 3.7 shows the overall information model.

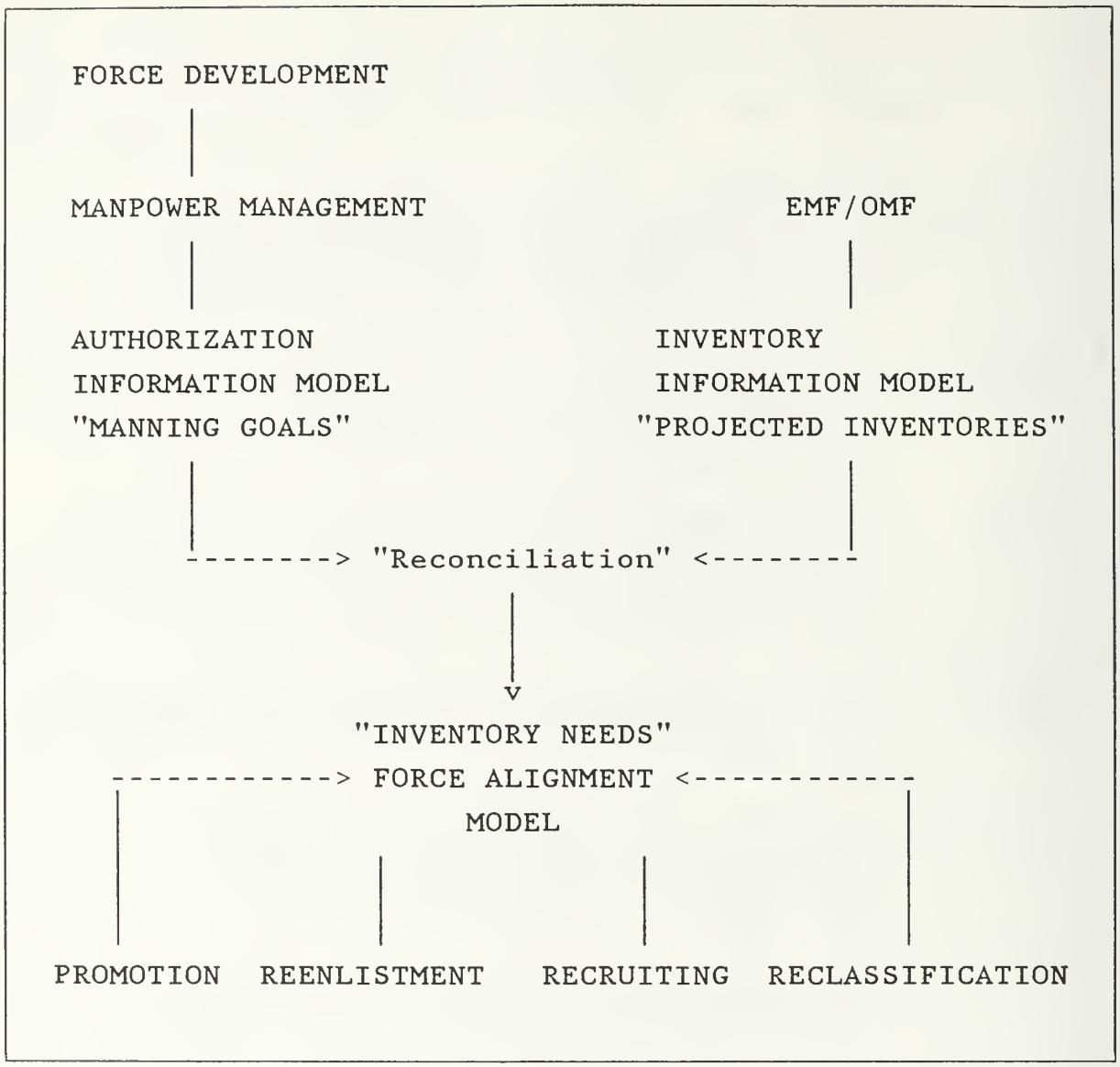


Figure 3.7 The Overall Information Model

The development of the models and tools that have evolved to support this process have followed the pattern of Nolan's Model.

Clearly, with the exigencies of short term response times to policy changes, many of these tools have been rapidly developed without regard to future needs. The

pressures have been, and still are, applications now. There is no time to reflect how they should all fit together.

However, this thesis is proof that the need has been recognized for a systematic reappraisal of the DCS Plans situation so they can begin to achieve better synchronization, data integrity, and overall data administration.

In the next Chapter we will explore solutions to the problems we have highlighted. Our focus now shifts to available means to improve this process.

IV. RECOMMENDATIONS FOR DCS PLANS

A. A TWO PHASED STRATEGY FOR IMPROVEMENT

Having described the organization of the Deputy Chief of Staff for Plans, MILPERCEN, and the information models that have been created to accomplish their mission to align the force, it is now appropriate to review and discuss a strategy to improve their management of data and information resources. This chapter will suggest a two phased strategy to improve information resource management in DCS Plans.

Phase one discusses some of the currently accepted strategies to achieve control of data, including the establishment of a data administration organization and the development of support tools such as a data dictionary system.

Phase two reviews and discusses the possibility of using an emerging methodology, information engineering (IE), as a means of developing an institutional information architecture. The development and understanding of this architecture will provide a basis for correcting the flaws in the existing information models.

During the research phase of this thesis extensive interviews were conducted with the branch chiefs at DCS Plans. Discussions revealed that DCS Plans has no formalized information resource management goals or policies. This is evident from the functional redundancies, data integrity problems, and general level of frustration that the organization experiences. Everywhere members of DCS Plans reiterated the same complaint: "We hope you can do something to improve the accuracy of the data. We don't trust our data and are uncomfortable with the answers we

get." [Ref. 22] The pace of the organization is so intense that the members of DCS Plans have little time to pause and reflect upon this state of affairs. They are always reacting to the latest problem, change or deadline.

Chapter two described Special Plans as the crisis managers when the information models go awry. The organization looks to them to fix the system when the inputs to the models produce suspicious answers. It can be argued that Special Plans Branch is, in reality, the de facto information resource manager for DCS Plans.

During these interviews, the greatest interest in this work was whether it would lead to the ability to spot obvious flaws in the system that caused inaccuracies in their projections. For example, if the P3M model were suddenly to project 509,000 piccolo players in Army bands by 1986, that would be an obvious error. The highly public nature of their information products makes them sensitive to these types of errors because they are broadcast to the entire Army. The potentially disastrous consequences of graphically projecting such an obvious mistake in a high level forum as the Force Management Operations Center is at the root of the excruciating time and effort spent in insuring that the data has been scrubbed. Clearly, this type of gross error has to be detected by the system before it is subjected to public scrutiny. [Ref. 21]

Insuring data integrity is largely a manual process in DCS Plans. Evidence of this is the careful process for creating the CAUDB from the PERSACS. It is through human intervention that those responsible assure themselves that the authorizations database is sound.

1. The Problems of Attempting Change in the Military

For those of us who have served for some time in the military, it is common knowledge that changes are slow and

difficult. In proposing solutions for DCS Plans, this has to be taken into account.

To survive, civilian corporations have rapidly adapted to changes in the data processing environment. Proponents of the IRM approach argue that this "adapt to survive" syndrome clearly extends to information as a corporate resource. The briefest review of literature supports this theme. [Ref. 35: p. 90]

Throughout the federal government, the impact of aging information systems is felt. The recent efforts by DOD to institutionalize IRM [Ref. 8] is recognition by the federal government that change is needed. The situation in Plans is only a microcosm within a macrocosm of federal data processing inefficiency, inaccuracy and obsolescence. [Ref. 36: p. 54]

Change is not easy for the military. The slow pace and long lead times required for government acquisition of data processing systems and services protracts the pain of old information systems. A military officer finds himself almost unable to effect change during a normal three year tour of duty. [Ref. 37: p. 55] To improve this situation requires a dynamic reappraisal by senior government and congressional decision makers of how we adapt to change in the current ADP acquisition environment. This is a major problem and solving it is clearly beyond the scope of discussion of this thesis.

What this thesis does offer are solutions relevant to and implementable for DCS Plans. The starting point is to define some realistic, achievable information resource management goals for Plans.

2. Two Critical IRM Goals for DCS Plans

I have identified two critical IRM goals that will help this organization achieve its need for data and how

they can best access, process and manage it [Ref. 38: p. 4]. Based on the force alignment process, and the overall context in which DCS Plans operates, the following steps are recommended:

1. In the short term, place and maintain within Special Plans branch, control over all data and its administration. This is a complex undertaking and requires a two step plan to accomplish this organizational change.
2. For the long term, develop an institutional information architecture as defined by the processes and databases used in the Force Development/Manpower Management process. This will aid in understanding the complex relationships of the Force Development/Manpower Management process, and provide a basis to detect and fix flaws in the information models.

B. PHASE I - GAINING CONTROL OVER THE DATA

In phase I two steps must be taken to gain control over the data:

1. Capture organizational control over the data.
2. Capture and control data about the data (Meta Data).

1. Capturing Organizational Control Over the Data

The first recommendation is to capture organizational control over the data by formalizing the role of Special Plans as the information resource manager of DCS Plans. This calls for incorporation of a data administration cell to establish organizational responsibility and authority over the data and its use. A two step methodology can achieve this.

First, an individual from Special Plans should initially assume this role. It is necessary to formalize the role with someone who already knows the organization, functions, and mission of DCS Plans and the cause and effect relationships between the data and the models. This is necessary to gain the recognition and confidence of the others in the organization that Special Plans is responsible for, and capable of, handling data administration. In fact, there is a military officer in Special Plans who already appears to have this task in conjunction with other duties. Thus, this is an easy first fix.

The next step is to hire permanent civilian expertise to augment this military officer. The objective here is to allow the civilian to ultimately assume total responsibility for DCS Plans data administration. This achieves both a professional approach to the task, as well as some desperately needed continuity for the organization.

The role of the data administrator should be in the traditional context as described by such authors as Leong-Hong and Plagman [Ref. 39: p. 210]. They view the typical functions of a data administrator as:

1. data definition (requirements),
2. database design and implementation,
3. access, security and integrity issues,
4. development of and compliance with standards,
5. software procurement and interface with vendors, and;
6. liaison, consulting and training functions.

The new data administrator would interact with the five branches of DCS Plans by fulfilling these six roles. This is best explained with a hypothetical example.

Suppose, in a cost cutting move, Congress wishes to examine the need for the Military Academy at West Point. To study this issue DCS Plans develops a new model to monitor the success rate of officers to determine whether West Point

officers are more effective than ROTC or OCS officers. The argument is that if West Point officers have a higher success rate, they are more effective and therefore the cost of the Military Academy is justified.

To measure this the new model requires that a new data element, success rate, be calculated and maintained for all officers. Success rate is a numerical value, which is derived from the sum of weights given to typical Army success indicators as promotion, selection for special schooling, critical assignments (command), and so on. The new model has a program that calculates this data by examining the OMF and extracting the data needed by the model's algorithm. As an example, the OMF contains data values that provide an officer's rank, level of schooling, and his assignment history.

Currently, Force Plans branch would design this model and have the MILPERCEN data processing center run it. No one would review this process to determine the implementation issues relevant to how the data used by the model is managed.

For example, consider schooling data. The Army's Command and General Staff College, CGSC, is a highly competitive tactical school that only 40% of the officer corps ever attends in residence. CGSC graduates approximately 1000 officers each June who are highly sought after by the Army's major commands [Ref. 14]. Clearly attendance at CGSC is an important success indicator for an officer and would be weighted heavily by the model. Since schooling data is maintained in the OMF, a logical assumption would be to extract this data and feed it into the model.

There are several problems with this assumption. First, as an exception to the normal rule, officers selected for attendance at Command and General Staff College normally

have their attendance recorded on the OMF before the officer attends the school. This is done to allow an officer selected for this schooling to be programmed to fill special assignments upon graduation by identifying them to assignment officers as having a CGSC level education. Although the data value reflects graduation from CGSC, this is not true for the 1000 officers who are currently attending the course.

Second, has the officer graduated or not? Some fail the course. With the current practice there is no way to tell. The data field is filled with the numeric value, "4", which represents CGSC level schooling. Upon failure, the "4" is removed and replaced with a different value. Thus, there is no way to distinguish graduates from those attending.

Third, this data is entered directly from OPMD by each of the Army's seventeen branches (Armor, Infantry, Aviation, etc.) that make officer assignments, since in this case, they have the greatest vested interest that it be captured. This is done over the course of a year but not at any synchronized points. Infantry branch may do it in September, Armor in November, and so on.

Fourth, the other 60% of the officer corps takes the course by correspondence. Without completion of this level of military schooling either in attendance or by correspondence, selection for promotion to lieutenant colonel is extremely rare. Of the officers selected by the recent lieutenant colonel's board, nearly 100% has completed CGSC either in residence or through correspondence [Ref. 19]. To prevent installation commanders from discriminating against accepting for assignment officers who took and completed the course through correspondence (resident attendance has far more prestige), a correspondence officer has the same data value recorded as

an officer who attended in residence. Only by examining an officer's official military personnel file, OMPF, and reading his CGSC academic report, can residence or correspondence attendance be determined. Assignment managers in MILPERCEN and promotion boards are the only two groups that normally have access to the OMPF.

When displayed on the Officer Record Brief, ORB, a standard Army report used to display an officer's background, one is unable to discern a resident from a correspondence graduate.

Thus, the data definition for CGSC level schooling is unclear. As used, the same value "4" represents resident attendance and graduation, correspondence attendance and graduation, or current attendance. These three would not likely be weighted the same by our new model. Thousands of officers could have their success factors incorrectly weighted, even though the value for schooling data was current and correct within the database design constraints.

A data administrator who has a corporate understanding of the current database design and the implications of the use of the various data elements would immediately identify this flaw in the model. Through liaison with Force Plans branch, the data administrator could point out the inconsistency for CGSC level schooling and suggest how the model could factor this in.

At present, what would likely happen is that as the model became faulty, Special Plans would have the task of unraveling the problem and developing a solution. A data administrator with control over the data would perform this task before it became a problem.

The assumption of total responsibility for data administration by the civilian is dependent upon his mastery of such organizational and information dynamics as this. (In phase two I will suggest an avenue of approach to

achieve this mastery). Without such mastery, the organization will lack confidence in this data administration cell. At the first instance of an impractical recommendation, the organization, as fast paced as it is, may splinter to handle their own separate information needs.

In fact, there are personal computers already appearing in Plans. Without a firm plan to achieve control by a data administration cell that understands the mission and needs of the organization, there is always the possibility of the proliferation of bootleg databases which contain inconsistent data [Ref. 40: p. 178]. This may already be happening. It seems to be the only way out in the government.

2. Capturing and Controlling Data About the Data (Meta Data)

Integral to the job of the data administrator is the availability of automated tools to help achieve organizational control. Central to any attempt to achieve IRM is a data dictionary system. [Ref. 41: p. 64].

A data dictionary system (DDS) is a tool which contains information about the definition, structure, and usage of data. It contains information about what data exists, how the data is used, and its relationships with other data. It's use permits better documentation, control, and management of data as a corporate resource. [Ref. 42: p. 129]

From the previous example, we can see how a data dictionary system would be an invaluable aid to the DCS Plans data administrator. According to Schussel [Ref. 43], a well designed data dictionary system can answer such questions as:

1. What are the input sources of the data? In this case the branches in OPMD are the sources.
2. Who can update the data? Assignment officers in OPMD can.
3. Which programs and systems use it? The new "Success Rate" model will be one. The officer record brief, ORB, an assignment tool is another. Suppose OPMD decides to redesign the ORB. The DDS would help identify the impact on the Plans model.
4. Are there validity tests for the data? CGSC is a course for Majors and Lieutenant Colonels. If the data reflected a Second Lieutenant with a data value of "4" in the data field for schooling, the system should flag this to the DCS Plans data administrator.
5. What are the valid ranges of values for the data? Again, suppose a Lieutenant Colonel does not have a "4" in the data field. Under current promotion policies this is not very likely and should be flagged by the system.
6. What are the access restrictions? Who can look at the data?
7. What are the security restrictions? Can the personnel officer at Fort Forlorn change the data through SIDPERS to reflect he has no CGSC officers, to get more than his fair share?
8. What reports use the data? Again, the ORB does and the new model will.
9. Are there other names for the data in other applications? As an example, an assignment officer typically refers to CGSC graduates as MEL 4, military education level 4. Without this corporate knowledge, the designers of the new model might decide to capture this same data under a different name such as "school success indicator". Suppose for convenience

they also recommended that it be added to the OMF? Without a DDS, there is a potential for redundancy.

Through the use of a data dictionary system, the first steps toward data integration can be achieved. The development and implementation of a data dictionary system is critical to the future of not only Plans, but MILPERCEN in general.

Adoption of the previous two proposals can provide quick relief as well as provide the basis for the eventual integration of information resources. The data administration cell is already partially in place. It only needs to be formalized in the organization and the process started to gain authorization to hire a civilian data administrator.

The data dictionary system can be handled in two ways:

1. Prototyping with a data dictionary system to determine DDS requirements, a possibility another Naval Postgraduate School student is currently investigating for a thesis (Prototyping With Data Dictionaries As A Requirements Definition by Major Allen Noel, U.S. Army. This thesis is scheduled for publication in March 1985) or;
2. DCS Plans could continue its relationship with the Naval Postgraduate School and, using another Army thesis student, develop DDS specifications in a purely textual document. This could be most easily done by the student following the traditional systems development life cycle (SDLC) approach.

C. PHASE II - DEVELOPING AN INSTITUTIONAL INFORMATION ARCHITECTURE

In phase II we need to develop an institutional information architecture. This will provide two benefits:

1. The new data administrator, who should participate in its design, will more quickly attain mastery over the Force Development/Manpower Management process, and;
2. It will serve as a means to detect and correct flaws in the overall process.

1. Information Engineering

One example of a discipline well suited to developing an information architecture is information engineering (IE) an emerging methodology developed by James Martin. [Ref. 44: p. 2] According to James Martin:

> Information Engineering (IE), refers to the set of interrelated disciplines which are needed to build a computerized enterprise based on today's data systems. The basic premise of information engineering is that data lies at the center of modern data processing. Modern data processing is composed of events which create and modify data, with appropriate accuracy controls and processes that use, analyze, summarize and manipulate data, or print documents from the data. [Ref. 45]

Figure 4.1 depicts the relationships involving the creation and use of data according to James Martin [Ref. 46: p. 3].

A premise of this information model is the while data is stable, procedures are not. As an example, if an airline reservation information system contains bookings information, the type bookings information rarely changes, ie, name, destination etc. (Granted, the data values will routinely change, but the type of data will not.) The procedures to gather that data however, may constantly change, e.g., new programs, new systems, and changes in policies. [Ref. 47: pp.3-4] The role of Program Management

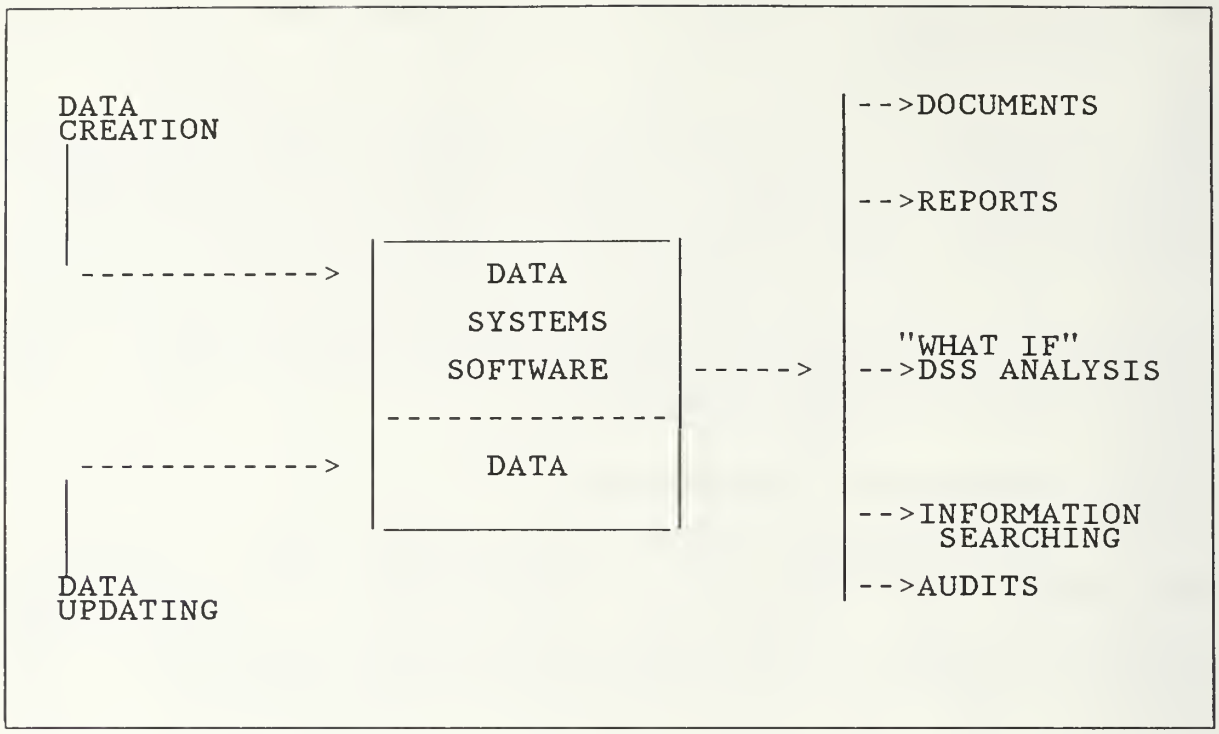


Figure 4.1 James Martin Data/Information Model

branch in keeping track of changes is evidence of the instability of procedures. As described in chapter three, several such models exist in the Army's Force Development/ Manpower Management process.

2. Using Information Engineering to Achieve the Second IRM Goal

In order to achieve the second IRM goal for DCS Plans using information engineering, we need to use the building blocks of the IE approach. Figure 4.2 depicts the basic building blocks of information engineering as described by James Martin. [Ref. 44: p. 11].

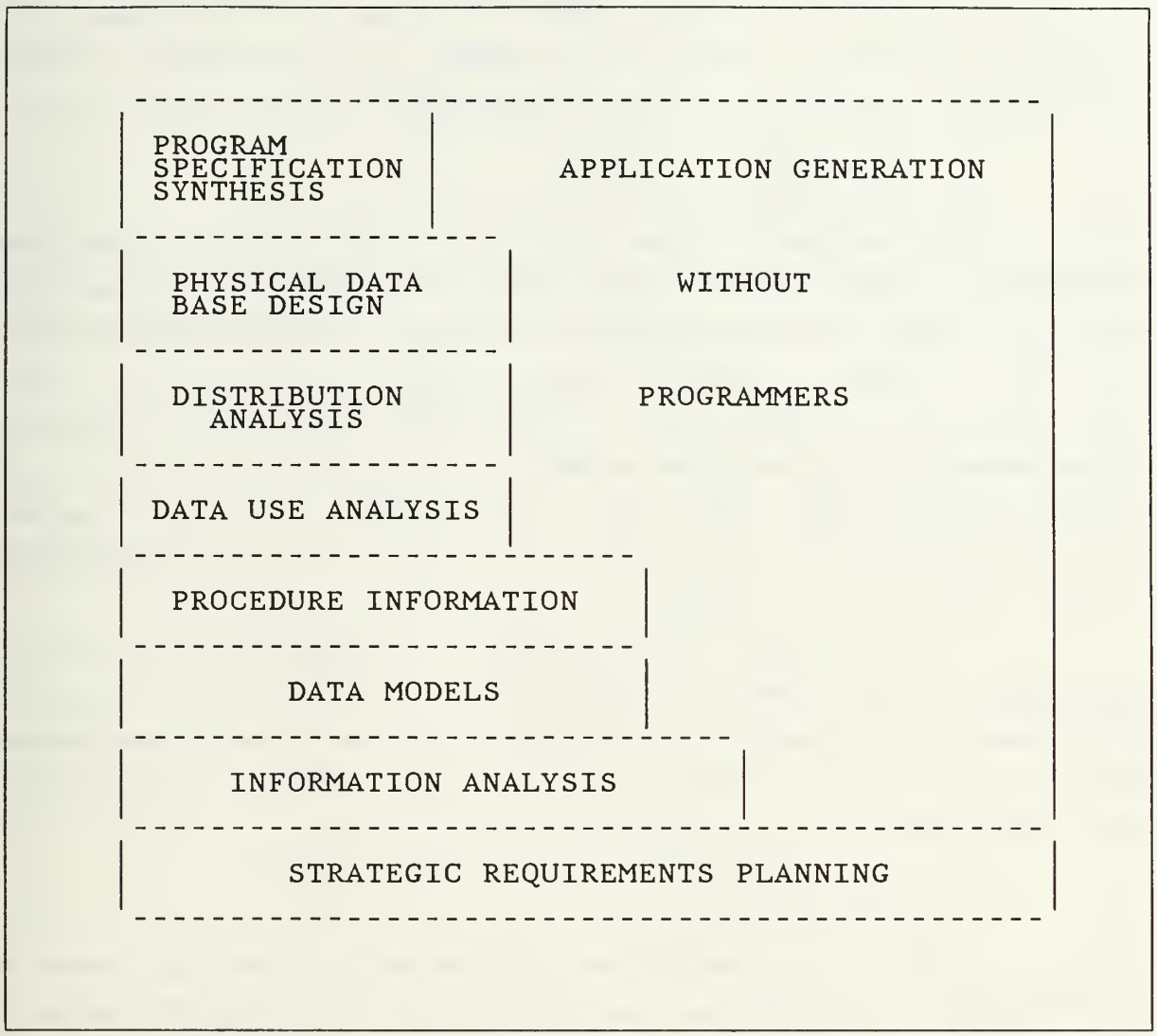


Figure 4.2 Building Blocks of Information Engineering

a. Strategic Requirements Planning

At the cornerstone of the James Martin approach to information engineering is the concept of strategic requirements planning. This is an attempt to the define the objectives of the enterprise and the information needed to achieve it.

As an example, the objective of DCS Plans is to align the force. The tools needed are comprised of the information models described previously. [Ref. 48: p. 94]

b. Information Analysis

The next step, information analysis (sometimes referred to as entity relationship analysis) is a top down analysis of the types of data kept in the organization and how they relate to each other. This can be done either horizontally or vertically. The Force Development/Manpower Management Process with its data interactions, would be an example of the vertical view. An example of the horizontal view would be the data interfaces among the six branches of Plans. [Ref. 49: p. 95]

This thesis has already accomplished much of the strategic requirements planning and information analysis that would normally be conducted in an information engineering study. The next step would be to proceed with data modeling.

c. Data Models

The next stage is data modeling. Stage three is an extension of stage two, in that data modeling attempts to identify a stable, logical database design, based on the interfaces and relationships identified during the information analysis phase. The information models described in the previous chapter would be a good starting point to begin building data models. [Ref. 50]

d. Procedure Information

Procedure Formation is the next step and attempts to identify events that use or change the database. It is also recognized that events can trigger other events. This phase is accomplished through the use of diagramming

techniques. This phase eventually is used in the program specification phase. [Ref. 51: p. 96]

e. Data Use Analysis

Data Use Analysis is a preliminary step to the physical database design. It formally diagrams and collects usage information about typical paths through the database, volume information and response times. [Ref. 52]

f. Distribution Analysis

Distribution Analysis is a step to determine the best means to distribute data and processing power. [Ref. 53]

g. Physical Data Base Design

Based on the previous results, in particular the data use analysis, the physical data base design is accomplished. [Ref. 54]

h. Program Specification Synthesis

Finally from procedure formulation, the basis exists to begin program specification. James Martin suggests the use of nonprocedural languages for programming whenever possible. Unfortunately, the Army is COBOL based, which is a procedural language, thus without a major shift in philosophy, traditional design and coding efforts would apply. [Ref. 55: p. 97]

To proceed with the second IRM goal, there should be a formal information engineering study of DCS Plans. Its objective should be to develop an institutional information architecture for DCS Plans that would aid the data administrator in easily identifying and fixing flaws in the system. Again, much of this work has already been accomplished by this thesis. Now someone must carry on the

effort. A close reading of James Martin's two volume text on Information Engineering, is the first logical step. This will give the reader an adequate background to proceed with the IE study. [Ref. 44]

Next using the ideas suggested by James Martin [Ref. 47], a four staged approach (similar to the systems development life cycle approach) matched to the building blocks described in Figure 4.2 is recommended:

1. Planning In the planning stage, the force alignment objectives of DCS Plans must be matched to an information systems development strategy. This thesis has succeeded in describing the current models and strategy to accomplish the force alignment task. Clearly, this present strategy is inadequate. The models are heavily dependent on the state of the OMF and EMF. Is there a better strategy? Is there a need for some sort of data filter, e.g., an edit capability to flag suspicious data values? What other changes are indicated?
2. Analysis Analysis concentrates on the information architecture required to meet our chosen information systems strategy and the automated support tools needed to achieve it. This thesis has described the current tools and suggested a DDS is in order. What other new tools are needed? What changes are in order to improve the collection and management of data?
3. Design The design stage is to develop detail. Having completed planning and analysis, this thesis has already suggested two approaches to developing this design, prototyping with a data dictionary system, or the traditional SDLC approach.
4. Construction The construction stage is building the new tools we have designed to accomplish our strategy and implementing them.

D. SUMMARY

This chapter has presented a two phased strategy to help DCS Plans begin to achieve information resource management. Central to phase I is achieving control through the creation of a data administration cell and the design and use of automated means such as a data dictionary system to help them maintain control.

Phase II recommends the development of an institutional information architecture to provide a backdrop for the data administration cell to gain mastery over the Force Development/Manpower Management process with the resultant ability to detect and correct flaws in the system.

Phase I and II, in conjunction, will provide a basis to achieve the beginnings of information resource management.

V. CONCLUSIONS

A. SUMMARY

This thesis has reviewed the Army Force Development/Manpower Management process, and how the Deputy Chief of Staff for Plans, U.S. Army Military Personnel Center develops and manages the information resources required to align the force.

Organizational phenomena affecting the development and use of information systems, such as the stages of growth of MIS, and the data integrity problems caused by poor data management, as described by such authors as Gibson, Nolan, Martin and Kroenke have been borne out in this study. These phenomena cause serious problems in the accomplishment of the DCS Plans force alignment task and could reach a critical stage as users realize microcomputers provide a viable option for solving their information problems.

A strategy has been offered by this thesis to reverse this situation.

B. SUGGESTIONS FOR FURTHER RESEARCH AND DEVELOPMENT

Further work needs to be done to achieve this proposed strategy. Clearly, the first step is to formalize the data administration role of Special Plans branch and achieve organizational control over the data. The next step is to build a data dictionary system by capturing the meta data necessary to achieve automated control over the data. Follow on work should be to develop an overall institutional information architecture for the organization. One possible technique that could be used is the information engineering methodology developed by James Martin. All this is fertile

ground for future work by Army officers in the Computer Science, Information Systems, and Operations Research curriculums at Naval Postgraduate School.

Funding should be allocated to provide for student travel to Washington to gather information, the purchase of necessary materials and equipment, and to provide consultation money for faculty members who are interested in sponsoring this work.

C. A CLOSING COMMENT

John Naisbett, in his excellent book Megatrends [Ref. 56], describes our nation as one that is becoming "information driven". This is more evident each day as the proliferation of microcomputers seems to alter the ways our society functions. John Diebold once stated: "The organizations that succeed in the 1980's will be those that manage information as a resource." The Army has no special immunity to these trends.

After fourteen years of military service, it is my personal observation that what exists in DCS Plans is only a small part of the overall problem. Dynamic changes have to be made for the Army to effectively manage its information resources in the 1980's. It is my hope that this thesis has made a small contribution toward that end.

APPENDIX A
GLOSSARY OF TERMS

Accessions	- manpower coming on active duty
Attritions	- manpower leaving active duty
Authorizations	- the manpower allowed in a force structure by Congress
Battalion	- tactical unit, 500 to 800 in manpower
Basis of Issue Plan	- An information system for force planning
Branch	- one of the Army's functional areas, e.g., Signal branch
Brigade	- tactical unit, 1500 to 2000 in manpower
Command and General Staff College	- An Army tactical school
Continuation Rate	- Size of the present population that can be retained
Data Dictionary System	- A repository of information about the definition, structure, and usage of data.
Division	- major tactical unit, 12000 to 17000 in manpower, only 17 in the Army
Enlisted Master File	- A database maintained about the enlisted force
Force Accounting System	- An information system that supports force development

Field Operating Agency	- An organization that carries out policy for a DA staff element
Force Alignment	- the process of insuring inventory levels meets authorization levels
Force Development	- the process of designing the structure of the force to meet strategic goals of the Army
Force Modernization	- the whole spectrum of planned changes to the Army force structure, e.g., the fielding of the M-1 Abrams Main Battle Tank, required restructuring the Army's armor force
Force Structure	- the composition of the force in numbers, branches, and specialties
Grade	- pay level
Inventory	- the manpower available to meet authorizations
Manpower Management	- the whole spectrum of activities to meet the force structure manpower needs of the Army
Military Occupational Specialty	- the specialty a soldier has, e.g., light weapons infantry, or microwave radar repairman
Officer Master File	- A database maintained about the officer force
Order of Battle	- the composition of the force as it is deployed on the battlefield, e.g., a light infantry division might be composed of 8 infantry battalions

Personnel Structure and Composition System	- An information system used in manpower management
Proponents	- the recognized spokesman for a branch e.g., the proponent for infantry is the Commandant of the Infantry School
Rank	- authority level, e.g., major
Reclassification	- changing a military occupational specialty, e.g., infantry to supply
Selective Reenlistment Bonus	- A bonus paid to selected specialties for reenlisting in the Army
Service Academy	- The Military, Naval and Air Force academies
Structure and Composition System	- An information system used in the force development process
Specialty	- a specific skill, e.g., a branch is armor, a specialty of that branch would be a tank commander
The Army Authorization Document System	- An information system used in force planning

APPENDIX B
ACRONYMS

AASAM	- Active Army Seasonal Adjustment Model
BOIP	- Basis of Issue Plan
CAUDB	- Correctable Authorization Data Base
CGSC	- Command and General Staff College
CSC	- U.S. Army Computer Systems Command
CG	- Commanding General
DA	- Department of the Army
DCG IRM	- Deputy Commanding General for Information Resource Management
DCSIM	- Deputy Chief of Staff for Information Management
DCSLOG	- Deputy Chief of Staff for Logistics
DCSOPS	- Deputy Chief of Staff for Operations and Plans
DCSPER	- Deputy Chief of Staff for Personnel
DCS P & L	- Deputy Chief of Staff for Personnel and Logistics
DCSRDA	- Deputy Chief of Staff for Research, Development and Acquisition
DCS Plans	- Deputy Chief of Staff for Plans, MILPERCEN
DCSRM	- Deputy Chief of Staff for Resource Management
DDS	- Data Dictionary System

DOD	- Department of Defense
DSS	- Decision Support System
EMF	- Enlisted Master File
EPMD	- Enlisted Personnel Management Directorate
EPMR	- Enlisted Programs Management Report
FAS	- Force Accounting System
FD/MM	- Force Development/Manpower Management
FOA	- Field Operating Agency
FMOC	- Force Management Operations Center
IE	- Information Engineering
IRM	- Information Resource Management
MACOM	- Major Army Command
MEL	- Military Education Level
MILPERCEN	- U.S. Army Military Personnel Center
MIS	- Management Information Systems
MOS	- Military Occupational Specialty
MPA	- Military Personnel Army
MTDA	- Modified Table of Distribution and Allowances
MTOE	- Modified Table of Organization and Equipment
NPS	- Naval Postgraduate School
OCS	- Officer Candidate School

OFIP - Objective Force Implementation Plan

OFM - Objective Force Model

OMA - Operations and Maintenance Army

OMB - Office of Management and Budget

OMF - Officer Master File

OMPF - Official Military Personnel File

OPMD - Officer Personnel Management Directorate

ORB - Officer Record Brief

OSMM - Officer Strength Management Model

P3M - Personnel Policy Projection Model

PA & E - Program Analysis and Evaluation

PERSACS - Personnel Structure and Composition System

PERSINSD - Personnel Information Systems Directorate

PIA II - Personnel Inventory Analysis

PMAD - Project Management Authorization Document

ROTC - Reserve Officer Training Corps

RPA - Reserve Personnel Army

RTM - Reenlistment Target Model

SACS - Structure and Composition System

SA MOB - Special Assistant for Mobilization

SDLC - Systems Development Life Cycle

SIDPERS - Standard Installation/Division Personnel System

SRB - Selective Reenlistment Bonus

TAADS	- The Army Authorization Document System
TOE	- Table of Organization and Equipment
TRADOC	- U.S. Army Training and Doctrine Command
UAD	- Updated Authorization Document
USAREC	- U.S. Army Recruiting Command
USMA	- United States Military Academy

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