AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

NON-TRADITIONAL ORGANIZATIONAL DESIGN CONCEPTS

Major Robert B. Heath, Jr., USAF 82-1115

"insights into tomorrow"

REPORT NUMBER 82-1115

TITLE Non-traditional Organizational Design Concepts

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AIR COMMAND AND STAFF COLLEGE
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Project based on the results of literature reviews. Functional form established as USAF's traditional organizational design concept. Following are identified as non-traditional organizational structures: divisional form; consolidation; matrix structure in conjunction with project, program, and product management; management by committee; parallel organization; and team approach. These concepts are analyzed using a set of criteria. Non-traditional concepts have further uses within the USAF. Recommendations for selecting organizational structures provided.

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EXECUTIVE SUMMARY

Part of our College mission is distribution of the students' problem solving products to DoD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

"insights into tomorrow"

REPORT NUMBER 82-1115

AUTHOR(S) Major Robert B. Heath, Jr., USAFR

TITLE Non-traditional Organizational Design Concepts

I. Problem: Today's organizations are being subjected to heavy internal demands while trying to deal with their dynamic external environments. The United States Air Force (USAF), as an organization, is not an exception. Non-traditional design concepts for structuring organizations are viewed as solutions for coping with those problems.

II. Objectives: The overall objective is to identify non-traditional organizational design concepts which may be useful to the USAF. Five steps are used to accomplish this objective: (1) the traditional design concept is identified; (2) the reasons for using non-traditional orgnizational structures are investigated; (3) non-traditional design concepts are identified and described after reviewing literature; (4) criteria are selected and defined in order to evaluate the various concepts; and (5) the non-traditional concepts are analyzed for potential use in the USAF. The secondary objective is to have the contents of this effort included as part of an introduction to Headquarters Air University/ Leadership and Management Development Center's (HQ AU/LMDC's) study project on non-traditional methods of structuring organizations.

III. Discussion of Analysis: The functional form (as prescribed in Air Force Regulation 26-2, Organization Policy and Guidance, 1978) is established as the traditional organizational design concept. The literature reviews are confined primarily to materials published during the period 1976 to mid-1981. Eight non-traditional organizational design concepts are identified and discussed. These non-traditional concepts, along with the functional form, are analyzed using the following evaluation criteria: (1) primary purpose of the structural concept; (2) internal environment; (3) external environment; (4) degree of decentralized decision making; (5) implications for internal communications; (6) need for special training; (7) degree of formalization; (8) amount of stan-

dardization; (9) job enlargement and job enrichment; (10) impact on productivity; (11) special provisions for recognition; and (12) whether or not the structural concept has been applied in the public sector.

IV. Findings: Managerial techniques such as management by objectives and quality circles are applicable within various organizational structures. Therefore, they are not considered as organizational design concepts. Organizational processes are recognized to be as important as structure. The examination of organizational structure is valid and valuable, but not all-inclusive. The findings of the structural approach are to be used with caution. The issues of centralization and decentralization, which focus on decision making, are primary factors in organizational design. Since centralized control (centralization) is a principle of employing aerospace forces, the functional form with its inherent centralization is well justified as being the traditional organizational design concept. The (1) divisional form provides self-contained, autonomous units within the overall organization. Decentralized decision making is characteristic. The focus is on the output of the division. (2) Consolidation presents opportunities for taking advantage of economies of scale and centralization. The major shortcoming is the lack of responsiveness to dispersed locations requiring goods and services that must be provided by the consolidated point. (3) Project, (4) program, and (5) product management used in conjunction with the matrix structure are all very similar. They provide flexibility in sharing scarce resources among the project, program, or product managers. The internal environment and the external surroundings are usually dynamic. Due to the functional specialists constantly moving within the structure and being subjected to a two-boss system, a special culture exists within the organization. Most authorities agree that increased productivity is usually not possible for the matrix structure. The extensive internal communication network and the slow, deliberate decision-making process are the major distractions to improving productivity. (Examination of a two-tier matrix organization is included also.) (6) Management by committee is an effective structure for gaining employee participation in planning and problem solving. Via the committee system, decision making is decentralized. Employees respond positively and producitvity increases markedly due to the implementation of employee suggestions. (A theoretical model of a circular organization is included as a hybrid of the management-by-committee structure.) The (7) parallel organizational structure relies upon managers to form a hierarchy of committees, councils, and teams which participate in corporate planning and problem solving. This structure makes the entire organization responsive to change and improves internal communications. The decentralized decision making process also provides job enrichment. The (8) team concept is implemented at the working/operating level. Previous simple, repetitive tasks are combined into jobs which are performed by teams. Team members are given the training and opportunity to do all the tasks associated with their assigned, enlarged jobs. There are marked increases in output quality and quantity, dramatic improvements in employee morale, and significant improvements in internal communications.

V. Conclusions: The functional form is justifiably the USAF's traditional organizational structure. In spite of limiting the literature search to material published primarily during a period of less than 6 years, a sufficient number of

non-traditional organizational design concepts are identified and evaluated for potential USAF use. A set of evaluation criteria, as used in this paper, is invaluable for analyzing the various organizational concepts. All of the eight non-traditional organizational structural concepts have further potential uses in the USAF. It would be worthwhile to expand the literature review to cover publications of the past 8 months and for the period prior to 1976.

VI. Recommendations: The contents of this report should be used as a departure point for the HQ AU/LMDC study project. The literature review should be expanded to cover the period prior to 1976 and after August 1981. All non-traditional organizational design concepts should be evaluated with a set of criteria similar to the one contained in this paper. Before deciding upon future organizational structures, the results of structural evaluations should be matched with organizational purposes, goals, and strategies. In addition, high-level management assessments of the relative importance of all of these various factors and considerations must be obtained. All of these aspects, in combination with lists of advantages and disadvantages and estimated implementation costs (funding requirements), should then be used as the basis for decisions on organizational structures.

CHAPTER I

INTRODUCTION

Background

Based on the results of reviews of current literature, the purpose of this paper is to present an analysis of available information on the various types of non-traditional organizational structural designs. The need for identifying and examining alternative organizational structures is highlighted by the rather surprising number of requests (over 30) in the Air University Compendium, 1981-1982. (See Appendix A for a complete list) These requests were received from various Air Force authorities at different levels and with diverse interests.

In fact, one of the requestors, HQ USAF/MPMO (Headquarters, United States Air Force/Manpower and Organization), asked for a study of non-traditional organizational design concepts. MPMO's request resulted in the start of the study under the auspices of HQ AU/LMDC (Headquarters, Air University/Leadership and Management Development Center). This paper can serve as an initial lead-in or an input to that study.

The review of business periodicals and management literature revealed that much has been written on organizational design concepts. Organizational structural design concepts have been receiving an increasing amount of attention even in behavioral science literature, particularly during the past 5 or 6 years (Haber, Ullman, & Leiffer, 1979). Only recently has the

dominant structural form of modern organizations, the "scientific management bureaucracy," been subject to criticism (Davis, 1977, p. 262).

But what are the changes, and why the changes? As Hutchinson (1976) says, "Trying to analyze and present an overall view of evolving organizational forms and structures is like walking into an antique shop and asking 'What's new?'" (p. 48). There have been a multitude of on-going examinations from all directions and various disciplines attempting to better understand the assumptions and concepts associated with the traditional forms. As a result, new theories and designs have evolved. In addition to the theoretical design proposals, the real world situation has forced organizations to seek and adopt alternative organizational structures. Due to various circumstances and reasons, organizational structural arrangements have evolved.

The questions and proposed solutions relate to the explicit and implicit assumptions underlying the classic, dominant organizational structural designs and the present societal demands being placed upon those organizations and their structures. In essence, organization arrangements conform to the prevailing culture and influence further development of the culture while responding to the internal institutional needs (Davis, 1977). With the dynamics of the modern industrial technical world and its various cultural and environmental changes, institutional structures are coming under attack.

Of what significance is this to the military, specifically the United States Air Force (USAF)? The USAF is subject to many of the above pressures. Funding constraints have resulted in selective consolidations of functions. Increasing workloads and continuing manpower constraints have been reasons

for selectively reorganizing using the matrix structure (Zambenini, 1977). The present and foreseen shortages of scientists and engineers, coupled with the projected smaller pool of young males for military service, are reasons for looking to innovative measures so that the Air Force's expanded and increasingly technological workload/missions can be accomplished effectively and efficiently. Unique organizational/management dilemmas, such as organizing a joint rapid deployment force and the future possibility of a "space command", give rise to the need for examining all possible organizational structure alternatives. Thus, the intent of this paper to provide a review of recent efforts associated with organizational design concepts and the resulting new structures. This information and the effects of these alternative arrangements will be incorporated into an analysis. During the course of this paper, the special considerations that could be of value to the USAF will be emphasized.

Terminology

As with any field of study or discipline, a unique set of terminology exists. In general terms, there are numerous ways of defining the term "organization." To begin with, the focus of this paper is on the "formal, non-social organization" even though it is recognized that within the formal organization a social informal process and structure do exist.

In 1947, Max Weber, a central figure of organizational theory, distinguished the corporate group from the other forms of social organization and defined the corporate group as a "relationship which is either closed or limits admission of outsiders by rules,. . .so far as its order is enforced by the action of specific individuals." (p. 145-146). According to Weber,

the organization involves relationships, has a boundary, provides a structuring of interaction imposed by the organization itself, and contains a hierarchy of authority and a division of labor (Hall, 1972). Another noted organizatonal theorist, Chester Barnard (1938), stressed a different aspect of organizations. His basic definition of an organization was "a system of consciously coordinated activities or forces of two or more persons" (p. 73). A number of other definitions contained in literature expand and/or emphasize points of the definitions provided above (Hall, 1972). In an attempt to consider all relevant aspects, the following definition will be the baseline for this paper:

> An organization is a collectivity with relative identifiable boundary, a nomative order, authority ranks, communications systems, and membership coordinating systems. This collectivity exists on a relatively continuous basis in an environment and engages in activities that are usually related to a goal or set of goals (Hall, 1972, p. 9).

The organizational structure, according to Lorsch, is the definition of individual jobs and their expected relationships to each other as depicted on organization charts and in job descriptions. In essence, this is management's attempt to draw a map of whom it wants to do what (Lorsch, 1977). Thus, the organizational structure is the arrangement within the shape of, and the relationship between the parts of, the institution. Organizational structure is often viewed as charts, boxes, interconnecting lines, etc. In the words of Meyer and Rowan (1977), the structure is likened to "the blueprint of the organization" (p. 342).

The "classic organization structures," are the autocracy and bureaucracy, as advocated by Rice (1980). The autocracy is the simplest and most primitive.

> The master-servant, superior-subordinate relationship has probably existed since the first two people entered into a cooperative venture and will probably continue to exist. Autocracy, however, has some very serious limitations. . . but seems to work best in a stable environment with non-technical problems (Rice, 1980, pp. 22-23).

The bureaucratic model, in its purest form, as defined by Max Weber, employs

> a command hierarchy, written rules, and regulations which guide activities, the assumption of rationality in its members' behavior, a system of jobs which provide continuity. . .and impersonal attitudes and procedures for carrying out the tasks of the organization. Bureaucracy is used appropriately in a static environment (Rice, 1980, p. 23).

Today, the term bureaucracy is also used to describe the mode of operation within various organizational structures. Thus, often when an organization is described as being a bureaucracy or its process bureaucratic, the term describes its command hierarchy and predominance of rules and regulations and a slow, methodical decision-making process. Bureaucracy can exist in a vertical/tall, horizontal/flat, functionally designed, or product-oriented organization. Nevertheless, according to Weber's model the bureaucratic model is specific and is regarded as one of the true classic structures.

The study of organizations is contained in the field of organizational theory, as well as in other such disciplines as sociology, psychology, industrial psychology, operations research, and communications. However, the vast amount of material and studies devoted to organizational arrangement and design are provided from those involved in the study and work of organizational theory. This theory attempts to explain the nature of(1) organizations (types, goals, etc.),(2) their structures (size, complexity, formalization, etc.),(3) their internal processes (power and conflict, leadership, communications, etc.) and(4) their relationships with society (environment.

change, etc.). The more that organizations are studied, the more questions arise. In fact, organizational theory is still in the process of evolving (Rice, 1980). The field of organization study does not have a set of theories in the sense of a set of empirically verified propositions that are logically limited. A number of perspectives or conceptualizations exist and are becoming increasingly crystallized based upon previous research (Hall, 1972). Nevertheless, organizational theory provides keen insight into what makes organizations "tick" and is the basis for present views of formal organizations and their management.

As numerous texts point out, the examination of organizations should not be devoted solely to their structures. It must be remembered that "a structure is not an organization" (Waterman, Peters, & Phillips, 1980, p. 14). The organization is more. The processes and systems within organizations are equally important. Behavioral scientists examine the organization from the aspect of inter-personal relationships that exist within the organization, while emphasizing the importance of the individual. Much can be gained also by studying organizational strategy and goals as well as organizational interaction with the environment. Analysis and understanding of organizations from the "internal process perspective"--power, conflict, leadership, decision making, and communications--are also revealing. Such authorities as Stout, emphasize the importance of the informal processes and informal structures which exist within institutions. Often, these "informal structures provide a means of bypassing or exploiting the formal organizational structure" (Stout, 1981, p. 47). Therefore, it is recognized that there are many ways to study and evaluate organizations.

This author thinks the organizational structure is analogous to the

human body. A great deal can be learned about human beings from the study of anatomy; likewise, much can be determined about organizations from the study of their structures and design concepts. Just as one would be sorely lacking if he/she expected to understand the totality of human beings from the "anatomy perspective," the reader is advised that the "structural perspective," even though it is an accepted approach, is not all-inclusive nor comprehensive enough for understanding organizations.

Categories of Structure

Almost every expert in organization theory who has written on the subject has devised his/her own categorization of organizational design structures. Mintzberg (1979), author of The Structuring of Organizations, suggests a typology of five basic configurations: simple structure, machine bureaucracy, professional bureaucracy, divisionalized form, and adhocracy. The simple structure is not elaborate structurally and is highly centralized (coordinates by direct supervision). It is associated with simple, dynamic environments and strong leaders and tends to be found in smaller, younger organizations or those facing severe crisis. The machine bureaucracy coordinates primarily by the imposition of work standards. Jobs are highly specialized and formalized. Units are functional and very large at the operating level. Power is centralized vertically with limited horizontal decentralization. This structure tends to be found in simple, stable environments and is often associated with older, larger organizations and mass production technical systems. The professional bureaucracy relies on the standardization of skills in its operating core for coordination. Jobs are highly specialized but minimally formalized. Training is extensive, and

grouping is on a concurrent functional and market bases. Decentralization is extensive in both the vertical and horizontal dimensions. This structure is found in complex, but stable environments. In the divisional form, a good deal of power is delegated to market-based units whose efforts are coordinated by the standardization of outputs and whose performances are continually monitored via extensive control systems. Such structures are typically found in very large, mature organizations. Adhocracy coordinates primarily by mutual adjustment among all of its organizational parts, calling especially for the collaboration of a support staff. Jobs are specialized, involving extensive training but little formalization. Units are small and combine functional and market bases. Liaison devices are used extensively, and the structure is decentralized selectively in both the horizontal and vertical dimensions. These structures are found in complex, dynamic environments (Mintzberg, 1980).

In contrast, Hax and Majluf (1981) contend that there are only three archetypes that represent distinct forms of organizational structures: functional, divisional, and matrix. The functional form is structured around the inputs required to perform the tasks of the organization. "Typically, these inputs are functions or specialties such as finance, marketing, production, engineering, research and development, and personnel" (p. 421).

The divisional form is structured according to the outputs generated by the organization.

> The most common distinction of the outputs is in the terms of the products delivered. However, other types of outputs could serve as a basis for divisionalization, such as services, programs, and projects. Also, markets, clients, and geographical locations could serve as criteria for divisionalization (Hax & Majluf, 1981, pp. 420-421).

Whether the organization is structured functionally or divisionally, there exists a common main guideline--unity of command. The principle of unity of command is simply the "one-boss rule," i.e. a single individual is assigned responsibility for the management of the organizational unit.

The third distinct form is matrix. According to Hax and Majluf (1981), matrix is a fundamental departure from the unitary notion. The matrix structure is typically a combination of functional, divisional structure with a product or project focus. Functional specialists (i.e. people from the functional areas such as finance, engineering, marketing, etc.) are assigned to ("matrixed to") one or more product division/projects. The "matrixed" people serve "two masters"--the functional director and the product/program/project manager (Wall, 1978, p. 38).

Even though Hax and Majluf identify only three archetypes or organizational structures, they stress that in practice most organizations are combinations of these three archetypes and should be designated as hybrids (Hax & Majluf, 1981). Not only are hybrids prevalent; but, organization design "experts" often identify, categorize, and define the basic structures and variants with their own respective, unique terminologies. Thus, these various "types" and names for the supposedly different structural arrangements add confusion to the examination of the organizational structures (Davis, 1976; Duncan, 1979; Hutchinson, 1976; Scott, 1981). After extensive review, it is quite evident that another 20 or 30 pages could be devoted to the various designations. However, that is not the intent of this paper.

With the background provided thus far, USAF's overriding, predominant policy and approach to organization will be defined. This predominant approach to organizational design will be designated as the traditional

concept. With this traditional concept as the baseline, all other design variations will be categorized as "non-traditional concepts." These deviations will be explored and evaluated with the aim of identifying those that are appropriate for future use or consideration by the USAF.

USAF's Traditional Approach

As outlined in Air Force Regulation 26-2, Organization Policy and Guidance (1978), the USAF is organized according to specific principles, objectives, and policies. The principles are functional grouping, unity of command, span of control, delegation of authority, and decision making.

> Functional grouping requires that each part of an organization (1) be directed toward achieving a major goal; (2) constitute a logical, separable field of responsibility; (3) have a clear-cut charter that is definite in scope, purpose, objectives, and results to achieve, with a single commander, supervisor, or staff member fully accountable; (4) cover all elements of a function that are closely related and constitute a complete entity and function; (5) have easy, workable relationships with other parts of the organization, but with natural definable division among them. AFR 26-2 emphasizes that the most effective functional groups are made up of functions that have a common goal.
>
> Unity of command dictates that the responsibilities of each person must be clearly defined; and equally important, each person must be held accountable to only one supervisor for performing specific responsibilities. Span of control is the number of people one person can effectively control or supervise. There is no specific quantity. The maximum number of subordinates directly accountable to and effectively supervised by a single superior varies due to such factors as: (1) the complexity of the unit's mission; (2) how similar the parts of the organization are; (3) the nature, complexity, and similarities of the tasks of the subordinates; and, (4) how far the subordinates are from the supervisor.
>
> Delegation of authority stipulates that each supervisor or commander should exercise the most responsibility practicable at each level. Delegation of authority helps streamline the organizational structure, simplify administrative procedures, and stimulate executive response. (pp. 1-1.1 - 4.1)

Also, AFR 26-2 points out that decentralization is the systematic and consistent delegation of authority. The authority to make a decision should be delegated to the lowest level where all the information needed to make the decision is available. The principle of decision making necessitates that an organization be structured to permit rapid decision making. Even though intermediate organizational levels are usually established to reduce a supervisor's/commander's span of control, these intermediate levels should be established only if there are definite jobs to be done at those levels.

Primary objectives of USAF organization are (1) to maintain a structure that operates effectively with the least expenditure of resources and (2) to standardize the organization structure as much as possible. Other objectives are (3) to keep pace with technological advances, changing missions, and concepts of operation; (4) to streamline the decision-making process; (5) to ensure that the organizational improvements in one part of the Air Force are applied elsewhere, when applicable; and (6) to develop organizational nomenclature that has precise meaning throughout the Air Force.

The most pertinent of the Air Force policies, in relation to this paper, is the policy of a functional approach to organization. AFR 26-2 emphasizes that the predominant organizational structure is based on functions. Organizations based on processes, geography, or self-sufficiency are the exceptions. Even though it is recognized that an institution as large and complex as the Air Force cannot always adhere to the functional approach, organization based on functions is to be the preferred/standard/accepted approach. Other policies on organization include (1) emphasis on wartime tasks; (2) the need for USAF Reserve and Air National Guard; (3) the need for constantly seeking to improve organization structure and concepts

and standardization of structure/concepts/nomenclature; (4) working with HQ USAF/MPMO (Manpower and Organization) on organizational configuration changes.

From this point forward, since USAF principles, objectives, and policies clearly indicate functional grouping is to be the predominant form for organizational structure, this author will refer to organizational structure based on functions as the traditional design concept.

From this author's experience in two of the USAF's operations major commands (MAJCOMs)--Strategic Air Command (SAC) and United States Air Forces Europe (USAFE)--it is obvious that organization was predominantly functionally oriented, with few exceptions. Recent USAF Tactical Air Forces (TAF) efforts to reorganize the aircraft maintenance setup, first under the Production Oriented Maintenance Organization (POMO) concept and now under the Combat Oriented Maintenance Organization (COMO) (Townsend, 1980), are, in this author's opinion, a departure from a pure functional approach and result in a hybrid function/division/matrix arrangement. After examining the other operational MAJCOM organizational charts, it is apparent that they are organized based on functions. Thus, in "theory" and in "practice," the USAF, for the most part, is organized at MAJCOM level and below using the functional approach.

The most notable exception is the Air Force Systems Command (AFSC). In fact, AFSC could be considered the USAF's pioneer for non-traditional organizational design concepts. (AFSC's experience will be discussed in Chapter II.) Therefore, it is concluded that the functional form will be designated as the USAF's traditional concept, as prescribed in AFR 26-2. Before closing this chapter, further insight beyond that offerred at the

beginning will explain why there is intense interest in non-traditional organizational structures.

Additional Considerations

As indicated in the initial portion of this introduction, new organizational designs of alternative structures evolve in response to changes in the environments of the organizations and to needs internal to the organizations/institutions (Davis, 1977). This author found no evidence to the contrary. In addition to Davis, various authors believe the reasons for reorganization and for alternative organizational structures fall within the two categories of internal and external causes (Brown, 1979; Duncan, 1979; Meyer & Rowan, 1977; Lorsch, 1977).

Typical internal pressures causing organizational structure change include: (1) the organization's strategy or change in strategy, goals, etc.; (2) the tasks or change in tasks of the institution's members; and (3) the members' psychological characteristics or change in the characteristics of the organizational members (Lorsch, 1977). Other internal reasons, according to Brown (1979), are the need to produce new, different, and more effective authority and work patterns and a redoing of basic procedural arrangements. The environment surrounding the organization contains forces such as, "competitors' actions, customer requirements, financial constraints, scientific and technological knowledge, and so on" which can drive an organization to change its organizational structure (Lorsch, 1977, p. 5)

To be specific, the worsening economy has placed financial burdens on numerous businesses causing some firms to consolidate so they can benefit from economies of scale. Additionally, with a shortage of certain skills,

some organizations have used a matrix structure so scarce talent could be used on a priority basis within the firm. Other businesses have had to deal with an "information overload" by decentralizing, despite the higher costs of operation. These are just samples of the "real world" factors that drive institutions to alter their organizational structures.

Likewise, the USAF has experienced, and expects to face, similar conditions. As mentioned earlier, awareness of the challenges to the Air Force, as an institution and as an organization, is very much on the minds of Air Force personnel. Concern for organizational structure and ways to reorganize is a current topic of discussion. Therefore, this paper will focus on existing non-traditional organizational structural designs the USAF could disregard, limit the use of, expand the application of, or adopt on a test basis.

In the next chapter, the results of this author's literature review will be provided. Several concepts associated with organizational design will be explained. Then the various non-traditional structural arrangements, along with related case studies, will be discussed in detail. The third chapter will contain the development of the evaluation criteria which will be used to analyze and compare the non-traditional structures. Chapter IV will provide the results of the evaluation. The closing chapter will include comments, conclusions,and recommendations.

CHAPTER II

LITERATURE REVIEW

The previous chapter revealed that there is widespread interest in examining organizational structure with the hope of finding ways of coping with the various demands being placed upon today's, and even tomorrow's, organization. Additional evidence of this interest in organizational structure is contained in the vast number of literary articles and books devoted to the subject.

Several management and organizational theory-related subjects will be explained in this chapter. Then the divisional form will be discussed. Following a comparison of this structure and the traditional form of functional grouping will be a discussion of the consolidation concept. Other non-traditional structural design concepts such as ad hoc arrangements (i.e. project, program, and product management in conjunction with the matrix configuration), ad hoc hybrids (i.e. parallel structure and management by committee), and the team approach will be presented also.

Managerial Techniques

In addition to structure, current literature addresses numerous innovative managerial techniques which at times are associated with organizational structure innovations. At this point, this author wishes to emphasize that managerial/management methods such as flexible time, management by objectives (MBO), participative management, quality circles, and, in some

applications, team building, do not actually affect organizational structure (Patten, 1979). Such techniques will not be considered as organizational design alternatives; however, they are mentioned because they offer legitimate ways to enhance organizational efficiency and effectiveness. These methods should be considered as ways to manage and operate within the organization's structure. In addition, most of these techniques can be used effectively within any organizational configuration.

Flexible time is merely an arrangement or system which allows employees to work at various times of the day or night, as long as production or services are not degraded or interrupted. MBO is an approach whereby each unit of the organization sets its own goals/objectives. These goals are then modified to be in consonance with the other organizational levels, including the institution's overall goals. Participative management allows the various organizational components/divisions/levels to take part in decision making. Rarely is the organization structure altered to accomodate these concepts.

Quality circle is very popular and has received a great deal of publicity. This concept was first used in the U.S. in the mid-1970's by such companies as the Lockheed Corporation and Honeywell, Inc. (Nelson, 1980). Normally, the quality circle (QC) consists of about 15 volunteer employees with the first-line supervisor designated the circle leader. QC groups normally meet at least twice a month, or as often as once weekly. The time spent during sessions is used to define, evaluate, and resolve problems in order to enhance the quality of production output (Shelby & Werner, 1981). The essential aspect of quality circles is that the circle is allowed to present its recommendations to top management. Various studies have

validated substantial cost savings resulting from implementation of QC recommendations (Magnus, 1981; Sommer, 1979). As emphasized by Shelby and Werner (1981), the QC arrangement neither replaces nor alters existing formal organizational structures. Rather, it supplements and supports the existing organization.

An approach similar to QC is called team building. Team building is used to provide a means for groups of managers/supervisors to come together in a learning setting to acquire interactive skills. The key to this concept is communication within the group. The regular reporting relationships within the organizational structure do not necessarily constitute or determine the team. The team-building effort requires a series of seminars or workshops over an extended period of time. A particular case study indicated one organization conducted team building over a 5-year period that involved 30 separate 1-week workshops (Patten, 1979). Team building as described above is usually associated with organizational development which emphasizes improving managerial skills. The team or "synthetic group" is merely a form for teaching and learning (Patten, 1979).

However, there is a team concept used by Sherwin and Williams and Proctor and Gamble which results in a unique organizational structure (Poza & Markus, 1980). This concept, which is similar to a matrix organization, will be presented later in this chapter.

These various concepts and approaches have been identified as examples of managerial techniques. Such techniques are not to be confused with or considered as non-traditional organizational structures or design concepts. There is little doubt that these techniques can be of some benefit to most organizations and that most of these approaches can be used within

many institutions without altering their structural designs. Nevertheless, the focus of this paper is upon organizational structure.

Organizational Processes

Another point of clarification is the difference between processes within organizations and the existing structures. Such processes as communication, decision making, and strategy formulation are valid considerations in the examination of organizations. It is also important to be aware of the interrelationships of these processes among each other and to organizational structure.

As an example, the interrelationship between strategy and structure has been the topic of numerous articles (Goldstein, 1978; Hutchinson, 1976; Lorsch, 1977; Ranson, Hinings, & Greenwood, 1980). While most authorities suggest that strategy influences structure, Litschert and Bonham (1978) make a good case for the converse. Likewise, Sayles and Chandler (1971) argue that structure influences goals as well as strategy. Their position is valid from the standpoint that the organization's existing structure offers, dictates, and affects its capabilities to a significant degree. The reality of these capabilities, in turn, tempers and influences the organization's perspective, goals, and strategy. However, a case can be made for strategy affecting structure. The institution can define its goals and strategy without regard to structure. Then, if necessary, the structure can be altered to insure that the goals are attained and the strategy followed. It is likely that both situations exist. Perhaps, then, it is more appropriate (and correct) to state that goals, strategy, and structure are interrelated and that each affects the other in various ways and degrees, depending

upon the circumstances. Regardless, there is an interrelationship between stratecy and the other processes and structure.

The awareness of the various processes is worth emphasizing since the reader should not forget that the structural approach for examining the organization and for understanding organizational change is only one of several approaches. No single, isolated approach or perspective is completely adequate. Realistically though, much is to be gained by examining individually the various organizational components or aspects, such as structure. Thus, with that intent, investigation of organizational structure will begin with centralization.

Centralization

The traditional design concept for the USAF is the functional approach. This functional form is best illustrated in Figure 1 which shows a notional major command (MAJCOM) headquarters with an operational (flying-oriented) mission. The key to this arrangement is that each major subdivision (Deputy Chief of Staff--DCS) is grouped according to specialities or functions (i.e. operations, logistics, comptroller, etc.). An additional characteristic of this functional form is normally a condition referred to as centralization (Hax & Majluf, 1981). This term has been described in many ways. "Centralization has to do with the locus of authority to make decisions affecting the organization" (Hinings, Pugh, Hickson, & Turner, 1968, p. 76). "When all the power for decision making rests at a single point in the organization--ultimately in the hands of a single individual--the organizational structure is centralized" (Mintzberg, 1979, p. 181).

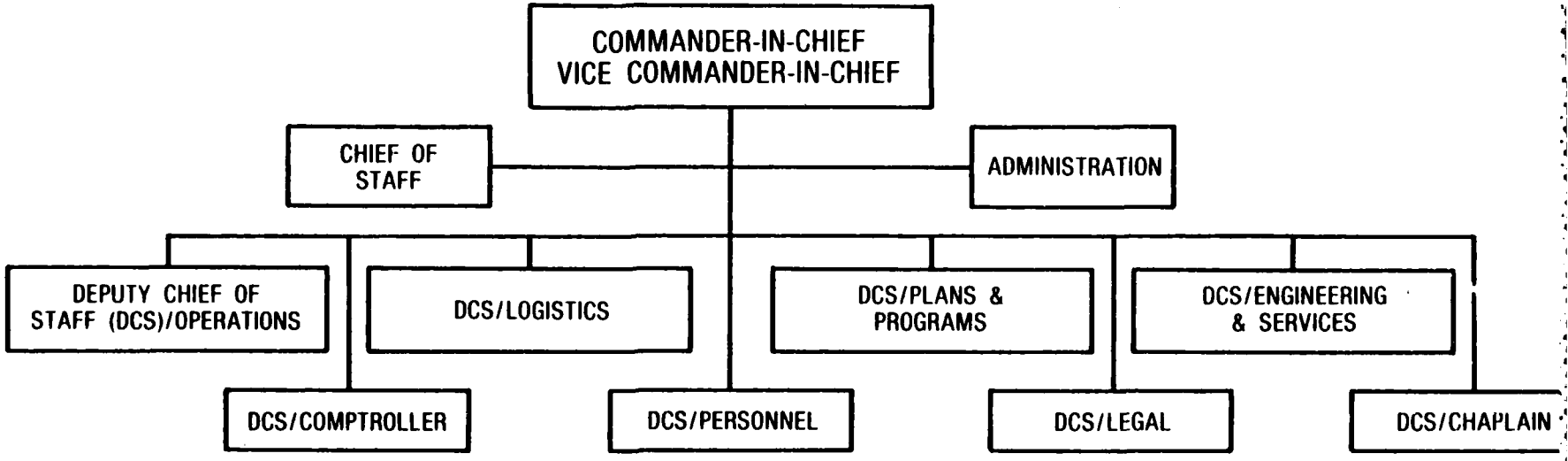


FIGURE 1 A SCHEMATIC REPRESENTATION OF A TYPICAL USAF MAJOR COMMAND (MAJCOM) HEADQUARTERS.

Also, centralization can relate to the degree of autonomy that particular organizational units or levels possess. In other words, depending on the type of decision, an organizational unit, division, or department may have to refer to a headquarters or parent organization for guidance, direction, or approval (Litterer, 1980). Thus, centralization is associated with the degree of control, coordination, and delegation.

Using the national MAJCOM (Figure 1) as an example, each DCS has a limited amount of decision-making authority. When command-wide, cross-functional decisions are to be made, the MAJCOM commander-in-chief makes the decisions. Therefore, the functional form's tendency of centralization is exhibited. Within the Air Force, centralization derived from the functional form is valued. In fact, according to AFM 1-1, Functions and Basic Doctrine of the United States Air Force (USAF), centralized control is fundamental to the success of airpower operations.

In general terms, the advantages of centralization are numerous: (1) improved coordination and control, (2) improved balance in resource allocation, (3) reduction in managerial overhead, and (4) better crisis management due to sharper focus of power, authority, and prestige at a central position (Child, 1977; Connor, 1978).

Centralization and Decentralization

Before exploring decentralization and the divisional form, it is essential to compare centralization and decentralization. From the study of texts and articles on these two subjects, it is apparent to this author that experts have some difficulty with these two concepts. As Mintzberg puts it, "the waters of decentralization and centralization are dirty" (Mintzberg,

1979, p. 185). As an example, the functional structure is not centralized; it is just more centralized than most of the decentralized forms which will be explored next.

Decentralization and Divisional Form

External and internal circumstances of functionally-oriented, centralized organizations often drive them to consider decentralization. Over a period of years not only has decentralization been considered, but it has been adopted. An empirical study by Rumelt (1974), based on observations of Fortune 500 firms, reported a noteworthy shift from the centralized, functional configuration to the decentralized, divisional structure during the period 1950-1970. In 1950 only about 20% of the companies were decentralized. By 1970, 80% were decentralized--relying on the divisional form. It is therefore apparent that a logical alternative to the USAF's predominant functional form is the decentralized divisional form.

A universal characteristic of the divisional form is that the organizational unit is "organized" by product, project, market, geography, nation/territory/region, strategic business unit, etc. (Waterman, Peters & Phillips, 1980). Via decentralization, there is a full-time commitment to the purpose (i.e. product, project, market, etc.) of the division.

> The decentralized structure is particularly effective when the organization's environment is complex, i.e., there are a large number of factors to be considered in decision making and the environment can be segmented or broken down into product, market areas, etc. around which the organization can be structured (Duncan, 1979, p. 66).

The strengths and advantages of the decentralized divisional form includes the following: (1) suited to fast change; (2) high product, project, and

program visibility; (3) full-time commitment to product, project, etc., plus full-time task orientation (i.e. dollars, schedules, profits, etc.); (4) task responsibility and contact points clear to customers or clients; (5) multiple tasks processed in parallel; and (6) ease in crossing functional lines (Duncan, 1979).

There are numerous successful examples of decentralized, division-structured organizations. Perhaps the most notable is General Motors (GM). Peter Drucker's study of GM, shortly after World War II (1946), revealed that the keys to GM's success with decentralization were its central management committees, decentralized operating divisions with great latitude/discretion in decision making, control mechanisms which permitted standardized comparison of the operating divisions, and GM's overall pervasive philosophy which permitted free, open discussions between the central committee and the operating divisions.

The next two sections will provide more insight into the divisional form.

Functional Form vs Divisional Form

The functional form has been designated as the traditional design structure. However, a very common form even within the USAF, and elsewhere since the 1970's, has been the divisional form. In many cases the divisional form is actually overlaid on the functional form. (The MAJCOM's are excellent examples of the divisional form. Internally each MAJCOM is structured functionally, but normally operates as an entity in the divisional form.) As a result, the organization usually retains most of its centralized characteristics. The "true" divisional form is decentralized or significantly more decentralized than the functional form (Hax & Majluf, 1981).

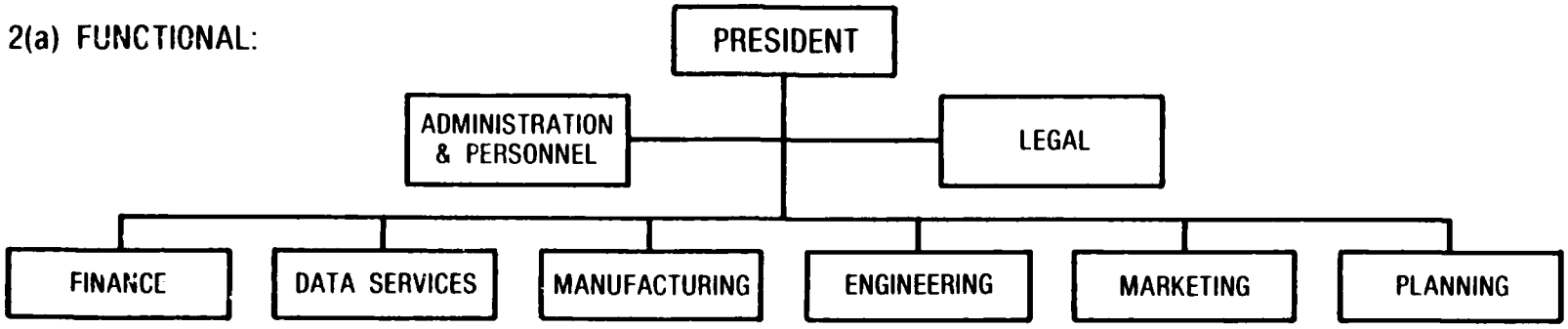
The functional form has an inherent emphasis on specialization (i.e. skills, like tasks, group by common function) which tends to limit decision making to the specialist's perspective only. As a result, there is a strong tendency to push the decision-making process upwards toward a focal point where an overall perspective can be obtained. In other words, the functional form lacks decentralized coordination. Only at the top of the organization or at some designated point near the top is there confluence of the inputs required for final, all-encompassing decisions (Mintzberg, 1979). To the contrary, the divisional form provides self-contained, multi-functional units which result in autonomy for subdivisions of the organizations. Therefore, decision making with a broader perspective is possible with the divisional arrangement.

Figure 2 shows the centralized functional form (Figure 2(a)), and the decentralized divisional form (Figure 2(b)). In the functional configuration, decision information flows to the firm's president or chief executive. In the divisional form, each division has its own specialists and is operating independent of the other divisions. Thus, most decisions can be made at the division level.

A Functional and Divisional Design Case Study

To reveal in more detail the significance of these two organizational design structures, results are provided from a study of two manufacturing plants--one organized by function, the other by (product) division. The study, conducted by Walker and Lorsch (1968), involved two closely matched firms which were making the same product. Their markets, technology, and even raw materials were identical. The parent companies were also similar.

2(a) FUNCTIONAL:



2(b) DIVISIONAL:

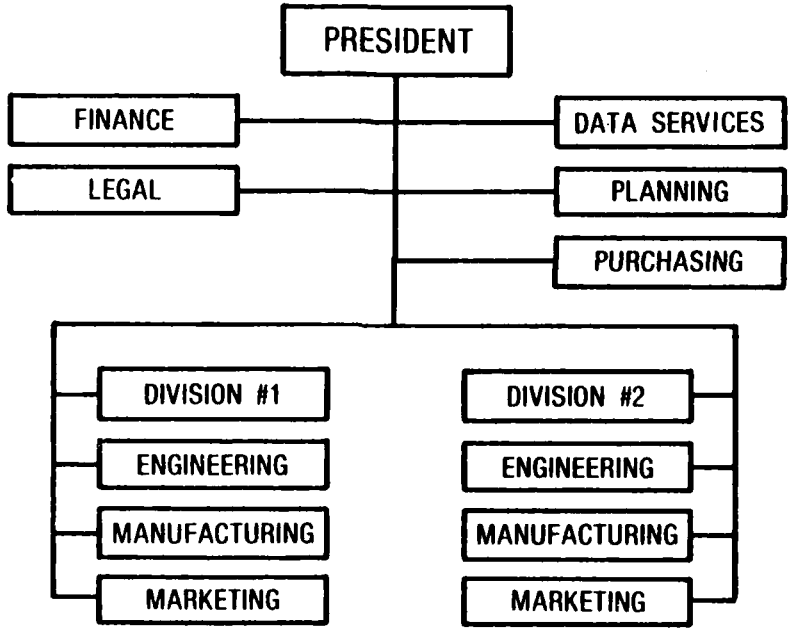


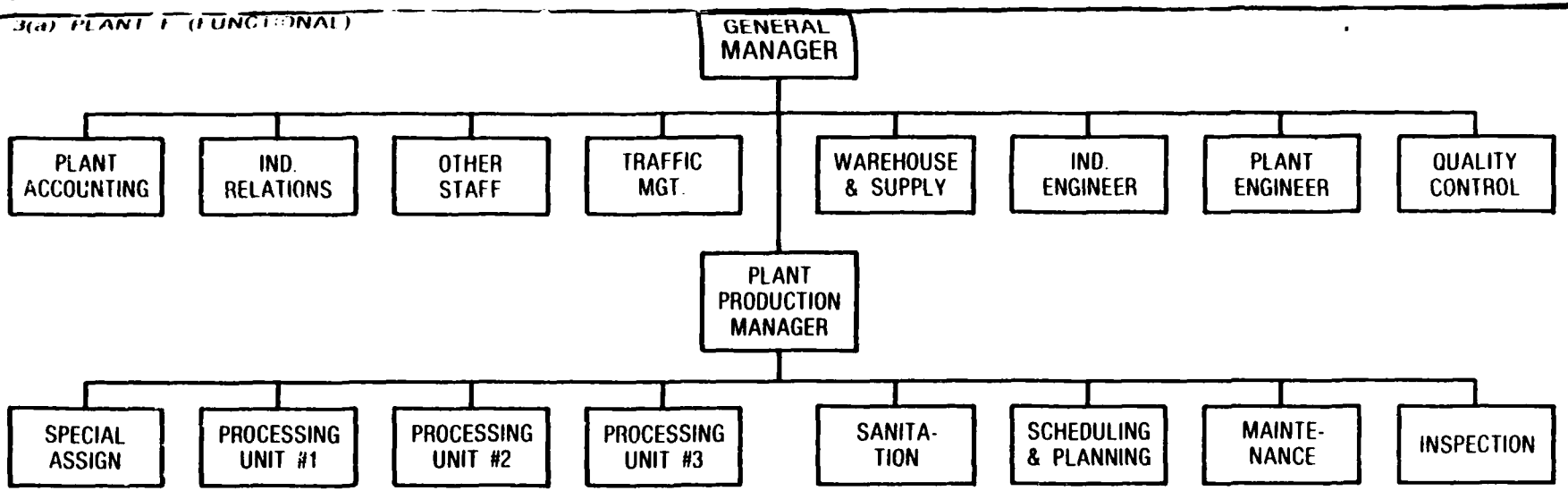
FIGURE 2 REPRESENTATIONS OF A TYPICAL FUNCTIONALLY-ORGANIZED FIRM (2(a)) AND OF A TYPICAL DIVISIONALLY-ORGANIZED FIRM (2(b)).

The plants were separated from other facilities at the same site where other company products were made.

Each plant employed specialists who were involved with the manufacturing units and the packing units, as well as quality control, engineering, warehousing, and traffic management. In Plant F (functional), only the manufacturing departments, planning and scheduling, and sanitation functions reported to the plant production manager (Figure 3(a)). While in Plant D (divisional) (Figure 3(b)), warehouse and supply, maintenance, industrial engineering, quality control functions, plus the processing and packaging units were all under the direction and management of the plant production manager. As a result, Plant D's production manager was in direct control of the functions necessary for production, and these functions operated collectively as a product-oriented unit. Close examination of these two plants will provide insight into the effects of their differing structures.

To begin, it is useful to focus on the working level (functional) differences in outlook in terms of orientation toward goals, time, and time usage and in terms of perception of the formality of the organization. The organization structural bases in the two plants had a marked effect on the specialists' differentiated goal and objectives. Moreover, the specialists identified closely with their counterparts in other plants. At Plant D, the working level specialists' goals were more diffuse. The specialists were concerned not only with their own goals, but also with production and the operation of the entire plant. Because the functional specialists at Plant F focused on individual goals, there were relatively wide differences in goals and objectives. Plant D's structure, on the other hand, seemed to make the specialists more aware of the common product goals and reduced

3(a) PLANT F (FUNCTIONAL)



3(b) PLANT (DIVISIONAL)

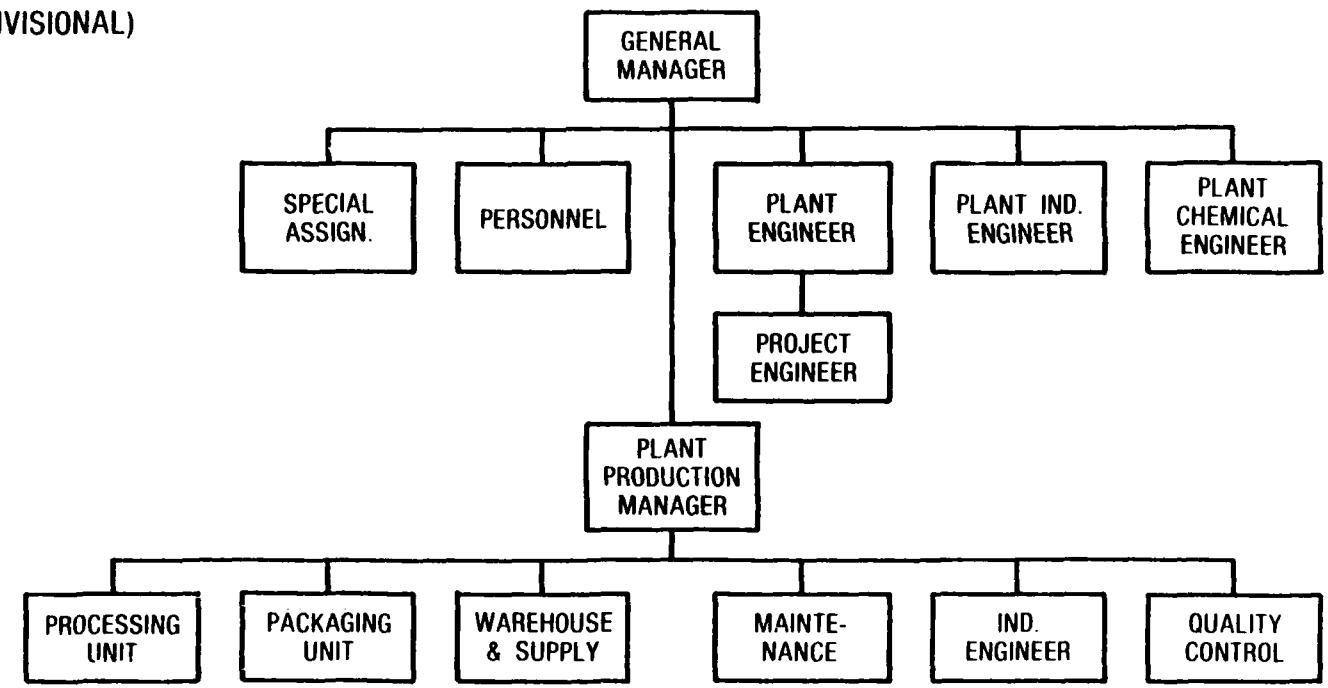


FIGURE 3 PICTORIAL REPRESENTATIONS OF FUNCTIONALLY-ORGANIZED PLANT (3(a)) AND DIVISIONALLY-ORGANIZED PLANT (3(a)) (WALKER & LORSCH, 1968, P.33).

differences in goal orientation. Yet, this disparity between Plants F and D did not hamper production performance.

At Plant F, the specialists shared a concern with short-term issues. The time orientation of specialists at Plant D was more differentiated. For example, its production supervisors concentrated on issues that needed solutions within a week, and quality control specialists worried about even longer-term problems. According to Walker and Lorsch, the reason is not difficult to find. Since Plant D's organization led its supervisors to identify with product production goals, those who could contribute to the solution of longer-term problems became involved in these activities. In Plant F, where each unit focused on its own goals, there was more of a tendency to worry about making daily progress. On the average, employees at Plant D reported devoting 30% of their time to daily problems, while at Plant F this figure was 49%.

Another difference between the plants related to formality. In the study, the formality of organizational structure in functional activities was measured by three criteria: (1) clarity of definition of job responsibilities, (2) clarity of dividing lines between jobs, and (3) importance of rules and procedures. It was found that at Plant F there were fewer differences among functional activities in the formality of organization structure than at Plant D. Plant F employees reported that a uniform degree of structure existed across functional specialties. Job responsibilities were well-defined, and the distinctions between jobs were clear. Similarly, rules and procedures were relied on extensively. At Plant D, substantial differences in the formality of organization existed. Plant engineers and industrial engineers were rather vague about their responsibilities

and about the dividing-line between their various jobs. Similarly, they reported relatively low reliance on rules and procedures. Production supervisors, on the other hand, noted that their jobs were well-defined and that rules and procedures were more important to them.

While the study found that both plants experienced some problems in accomplishing integration, these difficulties were more noticeable at Plant F. Collaboration between maintenance and production personnel and between production and scheduling was a problem. In Plant D, the only relationship where integration was unsatisfactory was between production and quality control specialists. Thus, Plant D seemed to be getting slightly better integration in spite of the greater differentiation among specialists.

In Plant D, communication among employees was more frequent, less formal, and more often face-to-face in nature than in Plant F. Formal boundaries outlining positions at Plant F appeared to act as a damper on communication. At Plant F the telephone and written memoranda were more often employed than at Plant D, where spontaneous meetings involving several persons were frequent.

In both plants, confrontation of conflict was reported to be more typical than either the use of power to force one's own position or an attempt to smooth conflict by "agreeing to disagree." There was strong evidence, nevertheless, that in Plant D supervisors were coming to grips with conflicts more directly than in Plant F. Key personnel at Plant F reported that more conflicts were being smoothed over. They were concerned that issues were too often not getting settled. Many disagreements at Plant F, in fact, were being pushed up the management hierarchy for resolution. So many disagreements were pushed upstairs that the hierarchy became overloaded and could

not handle all the problems facing it. It responded by dealing only with the more immediate and urgent ones. At Plant D, supervisors uniformly reported that they resolved conflicts themselves. There was no evidence that conflicts were being avoided or smoothed over.

Key personnel at Plant D appeared to be more deeply involved in their work than did those at Plant F, and they admitted more often to feeling stress and pressure than did their opposite members at Plant F. But, Plant F supervisors and managers expressed more satisfaction with their work than did those at Plant D; they liked the company and their jobs more than did their counterparts at Plant D.

And, finally, it is important to make a comparison between the two plants in terms of their effectiveness in attaining their goals. Management of the two plants were aiming at the same two objectives: (1) maximizing current output within existing capabilities, and (2) improving the capabilities of the plant. Of the two, Plant F met the first objective more effectively; it was achieving a higher production rate with greater efficiency and at less cost than was Plant D. In terms of the second objective, however, Plant D was clearly superior to Plant F. The former's productivity had increased by 23% from 1963 to 1966 compared to Plant F's 3% increment.

A summary of the characteristics of the two organizations is provided in Table 1. Two key points according to Walker and Lorsch were that the nature of the organization at Plant F seemed to suit its stable, but high rate of efficiency, and that the atmosphere at Plant D, in contrast, was well-suited to the goal of improving plant capabilities.

Walker and Lorsch (1968) noted in their final remarks that even though

Table 1

Characteristics of the Two Organizations (Walker & Lorsch, 1968, p. 137)

Characteristics	Plant F	Plant D
Differentiation	Less differentiation except in goal orientation	Greater differentiation in structure and time orientation
Integration	Somewhat less effective	More effective
Conflict management	Confrontation, but also "smoothing over" and avoidance; rather restricted communication pattern	Confrontation of conflict; open, face-to-face communication
Effectiveness	Efficient, stable production; but less successful in improving plant capabilities	Successful in improving plan capabilities, but less effective in stable production
Employee attitudes	Prevalent feeling of satisfaction, but less feeling of stress and involvement	Prevalent feeling of stress and involvement, but less satisfaction

Plant F's performance level (higher production rate with greater efficiency and at less cost) was higher than that of Plant D's, it was very possible, because of Plant D's greater proven ability to improve its plant capabilities, for Plant D to reach a performance level at least as high as Plant F's. Nevertheless, they stated that:

> Even though this might occur in time, it should not obscure the most important point: the functional organization seems to lead to better results in a situation where stable performance of a routine task is desired, while the divisional organization leads to better results in situations where the task is less predictable and requires innovative problem solving (p. 138).

This author would like to add one other observation. The reader should be aware that Plant D is an example of a very simple divisional configuration (only one product production division). Usually a company contains several operating divisions which would complicate the interaction, coordination, etc. Nevertheless, this author considers the conclusions valid. The results of this study are particularly useful because it contains practical results and details of an actual "real-world" comparison between functional and divisional approaches to organization.

Centralization/Decentralization Revisited

Jay R. Galbraith (1971) states that each era of management evolves new forms of organization as new problems are encountered. Earlier generations of managers invented the centralized functional form and then the decentralized product division structure was devised in response to increasing organization size and complexity of tasks.

Galbraith (1971) contends that the situation is not always progressively evolutionary, particularaly when it comes to centralization and decentraliza-

tion. There are a number of current examples where corporations converted from a centralized functional configuration to a decentralized product divisional form, and have now returned to a centralized organization. Likewise, some of the once decentralized organizations have at times converted to centralized structures. A case in point, prior to the 1950's many firms were functionally structured and centrally controlled and managed. During the prosperous 1960's when money was "cheap" and massive expansion was practiced, many companies decentralized. However, during the early 1970's, many firms such as Litton Industries, Inc. reverted to a centralized arrangement to gain tighter control. Other corporations had to cope with a shortage of skilled specialists, resulting in centralization for yet another reason. Several major oil companies have gone from the centralized functional form to divisional concept and back to a modified, centralized functional concept (Much, 1976), This return to centralization is being referred to as "recentralization" (Connor, 1978).

Without doubt, centralization and decentralization have provided the organizational flexibility and responsiveness to cope with most situations. Thus, reorganization to more centralized forms or changing to more decentralized divisional structures are two options, though not exotic, which are available to the USAF as organization structure alternatives.

Consolidation

The divisional form was presented earlier as a non-traditional organizational structure which offers decentralization as a benefit. When the decentralized configuration exists, a means of returning to a more centralized structure is available via consolidation. Although consolidation does

not necessarily mandate a greater degree of centralization, the two concepts are closely associated. According to Mintzberg (1979), one aspect of centralization is the physical proximity of organizational assets and interrelated subdivisions. It is the proximity consideration that provides a potential organizational structure alternative. This option will be referred to as consolidation.

Rarely can consolidation be accomplished without affecting organizational structure. This is especially true if a dispersed or decentralized divisional form exists. Therefore, consolidation provides a legitimate means of changing such a structure into a potentially more centralized and functional configuration. The benefits of this consolidated arrangement are numerous.

In fact, several advantages of consolidation are similar to those of centralization. These include: (1) improved coordination and control, (2) improved balance of resource allocation, (3) reduction in managerial overhead, and (4) better crisis management. In addition, consolidation provides such benefits as (5) economies of scale, (6) improved use of scarce resources, and (7) improved use of managerial talent within the upper hierarchy (Child, 1977; Connor, 1978).

The disadvantages of consolidation will be presented as part of the summary of a case study which is included in the next section.

USAF Consolidation Efforts

Past and current situations, such as constrained funding, shortage of certain skilled personnel, and the need to take advantage of economies of scale, have resulted in consolidation of selected USAF operations and services. An excellent example of the consolidation concept is the Air

Force (AF) Logistics Command's Air Logistic Centers (ALC's). The ALC's are located at Warner Robins, Georgia; Oklahoma City, Oklahoma; Ogden, Utah; San Antonio, Texas; and Sacramento, California. Each ALC has specific responsibilities for selected weapons systems and commodities. Each ALC performs inventory control point functions and provides direct support, worldwide, to customers and weapons systems users through its extensive distribution system, repair activities, procuring agencies, and technical engineering assistance functions. In addition, ALC's determine worldwide material requirements, make buys, and schedule repair actions when necessary. The ALC's represent a large effort in terms of manpower, money, and facilities (especially in physical plant and repair depots) required to support and maintain the AF's major weapon systems (Johnson, 1980).

Another example of consolidation, on a lesser scale, is the San Antonio Contracting Center (SACC). The SACC was established at the San Antonio AF Station following a 1975 study which recommended a consolidated (centralized) contracting operation to serve the various AF installations dispersed throughout the San Antonio, Texas area. (The SACC customers are Brooks AFB, Kelly AFB, Lackland AFB, Randolph AFB, Wilford Hall Medical Center, and San Antonio Real Property Maintenance Agency.) Some of the various installations previously had their own contracting offices. Consolidation was recommended for the following objectives: increased procurement efficiency; better use of available procurement skills, facilities, and equipment; economy of scale; and improved procurement responsiveness. Also, significant manpower, material, and dollar savings were envisioned (Austin, 1981).

The SACC, under the control of the Air Training Command (ATC), is proving to be a viable concept. Manpower savings and economies of scale resulted,

but not to the extent originally hoped. In addition, the SACC is experiencing problems--some typical of a service organization which consolidates. Responsiveness to its distantly dispersed customers is a major customer complaint. One customer, Randolph AFB, is 18 miles away, while two others, Kelly AFB and Lackland AFB, are each 12 miles away. From the available data before and after SACC, responsiveness (mean contract administrative lead time) for all locations except Randolph AFB is significantly better/faster than the pre-SACC period. Thus, the data does not support the customers' complaint of slow responsiveness (Austin, 1981).

Since the SACC serves ATC, AF Logistics Command, and AF Systems Command units, the ATC regulations being used at the SACC are not compatible with the ones being used by the non-ATC units. There are other problems. Procedural coordination problems are commonplace primarily due to geographic separation and poor communications. Customer orders are cancelled or modified without notifying customers. It is often difficult for customers to locate and communicate with a central contact point at the SACC when issues erupt. As typical of consolidated functions which rely on a common data processing system, SACC and its customers rely on a central computer system that is prone to breakdown and often slow to respond because of the batch processing mode of operation. Most of the computer output (hard copy documents) contains vital customer data only at an aggragate level, making the products extremely time-consuming, and practically impossible to use (Austin, 1981).

The difficulties identified above are rather classic. (Classic in the sense that several can be grouped into categories which are recognized reasons that lead organizations to decentralize and disperse.) Dispersal offers such advantages as providing familiarity with local conditions, rapid

response to local needs, and stimuli for motivating the personnel employed in the extremities of the organization (Cason, 1978; Connor, 1978; Mintzberg, 1979).

This example of an USAF consolidation effort surfaced the dilemma of consolidation vs dispersal and also touched on some issues related to centralization vs decentralization. Within today's environment of trying to do more with less, the pressure is strong to consolidate and centralize. But, as organizations become bigger, as the working environment becomes more complex, and decision-making requirements and information inputs become so overwhelming, the concept of decentralization (often considered in conjunction with dispersal and the divisional form) is an attractive organizational structure. These factors linked with the shortcomings of consolidation further enhance the dispersal and decentralized divisional concepts. In summary, the advantages and consequences of both consolidation and dispersal have to be weighed.

Ad Hoc Structures

For the lack of a better overall category which addresses the major portion of newer, sophisticated organizational structures, this author will borrow, as did Mintzberg (1979), the term Alvin Toffler (1970) popularized in Future Shock: "adhocracies." This category refers to a very different structural configuration that draws experts from different disciplines within the organization and fuses them into "smoothly" functioning ad hoc groups. These groups exist for the duration of their purpose. Group life for short-term projects is not very long. On the other hand, complex programs or product lines which last for years give the groups or teams a long-term existence.

In either case, team members return to the functional housekeeping unit for reassignment to other projects, programs, or products (Mintzberg, 1979). Before examining case studies of some of the typical arrangements which can be classified as adhocracies, highlights from Mintzberg's book, The Structuring of Organizations (1979), will be incorporated with the works of others to address: (1) the description of adhocracies' basic structures, (2) conditions for their existence, and (3) some associated issues.

In adhocracies, there is a tendency to group the specialists in functional units for housekeeping purposes, but to deploy them in small "product-based or market-based" project teams to do their work. These teams or groups are located at various places in the organization and involve various mixtures of managers, staff, and operating experts. The adhocracies are characterized as innovative-oriented. As a result, standardization of coordination is usually not relied upon. Coordination is not planned, but is obtained through interaction among the various group members and groups (Goodman & Goodman, 1976).

The adhocracy structures must be flexible, allowing the internal shape to change frequently. Adhocracies show no reference to the classic principle of management: unity of command. Individuals within adhocracies have two bosses: their functional manager and the group/team manager. Thus, managers are numerous. Not only do these managers have a major role in decision making, but nonmanagers share the decision-making power. Also, in theory, adhocracies are decentralized in both the horizontal and vertical dimensions. The amount of decentralization varies according to the nature of the decision to be made. This selected decentralization stems from the fact that the adhocracies do have top management which must make certain predeter-

mined decisions from a central perspective. Within adhocracies, top management at the organization's strategic apex spends much of its time making strategic choices for the good of the entire organization, not just for a single team or a few. Also, some of top management's time is devoted to resolving the many disturbances that can arise because of the inherent fluidity and conflict that exists in the adhocracy (Mintzberg, 1979).

Just as the adhocracy's internal environment is dynamic, it's external environment is normally dynamic, as well as complex. As will be substantiated later, the adhocracy form is clearly superior in a fast changing, technical environment which exerts disparate forces on the organization (Mintzberg, 1979).

For years, business organizations were usually functionally structured. Then the divisional form was adopted by many businesses to enhance results in specific markets or for certain products. Some firms were even torn between functional form, product divisions, and marketing divisions. As a result, various companies implemented the adhocracy form commonly referred to as a matrix structure (to be discussed in the following section). This adhocratic structure allowed the firms to move people about and permitted groups to simultaneously focus their efforts on different, competing priorities. Thus, this structural arrangement proved to be well-suited for conditions where product changes were frequent (Mintzberg, 1979).

As a final condition, adhocracy seems to be prevalent in young organizations. In the early stages of development and when the firm is least stable, the adhocracy structural form, which is also fluid and unstable, is well-suited and compatible (Mintzberg, 1979).

Even though the adhocracy configurations might appear to be the solution

for today, and possibly tomorrow, for structural design, they are not without problems. The first broad issue concerns human reactions to ambiguity. Due to its flexible structure and decentralization of power, adhocracy is a great place for people to work who believe in more democracy with less bureaucracy. However, some individuals prefer a "structured," rigid environment. Some might view adhocracy as "a nice place to visit, but no place to spend a career" (Mintzberg, 1979, p. 461). The fact that adhocracy is founded on a dual authority concept (i.e. two bosses--one functional, the other project, program, etc.), with many groups or teams of a temporary nature (i.e. when project is complete, the workers are reassigned), some organizational members are not comfortable or satisfied to work in such an environment. In addition, the fluidity tends to enhance competitiveness and encourage conflict. Thus, ambiguity coupled with a "politicized" internal environment makes for a potential volatile situation (Mintzberg, 1979). (Mintzberg points out that management can use these conditions for the good of the organization by channeling conflict and aggressiveness toward productive ends.)

The other broad issue is the inefficiency of adhocracy due to its high cost of communication (Knight, 1976). In adhocracy, there is normally a great deal of cross talk, exchanging of ideas, etc. among the functional specialists and functional managers, project managers, and the various other key personnel. Frequent meetings are commonplace, many being informal. Furthermore, Goodman and Goodman (1976) indicate there is a tendency for imbalanced workloads to occur. However, this author views the "problem" of the imbalanced workload as a situation that results when management does not exert itself. In other words, the flexibility of being able to move people around within the organization (a strong point of adhocracy) is something

that management should take advantage of.

Lastly, while adhocracy is ideally suited for selected or one-of-a-kind projects, it is not competent at ordinary things (Mintzberg, 1979). "No structure is better suited to solving complex, ill-structured problems than adhocracy. None can match it for sophisticated innovations" (Mintzberg, 1979, p. 463). Unfortunately, the costs associated with that innovation and unstructuredness simply make adhocracy an inefficient arrangement (Mintzberg, 1979).

Matrix Structure

In the previous section, the discussion of adhocracy, the overall category for a new generation of organizational structures, was extracted primarily from the work of Mintzberg (1979). Even though Mintzberg's terminology may be unique to orgnizational theory, he is not alone in recognizing and writing about innovative structural design concepts. This is especially so when it comes to the particular concept of matrix structure. In fact, the sheer volume of recent literature in this area suggests the importance of this new organizational approach.

The matrix organization (Figure 4) represents a blend of two types of structures: the functional form and the divisional form (project- or product-oriented) (Sheridan, 1979). The functional form groups similar skills together and experiences problems when work flows conflict, intersect, and compete. Whereas, thedivisional form attempts to insure continual responsiveness to selected products, projects, markets, etc., but this form tends to impede contacts among skill specialists (Cathey, 1979; Dessler, 1977, ; Galbraith, 1971; Mintzberg, 19/9).

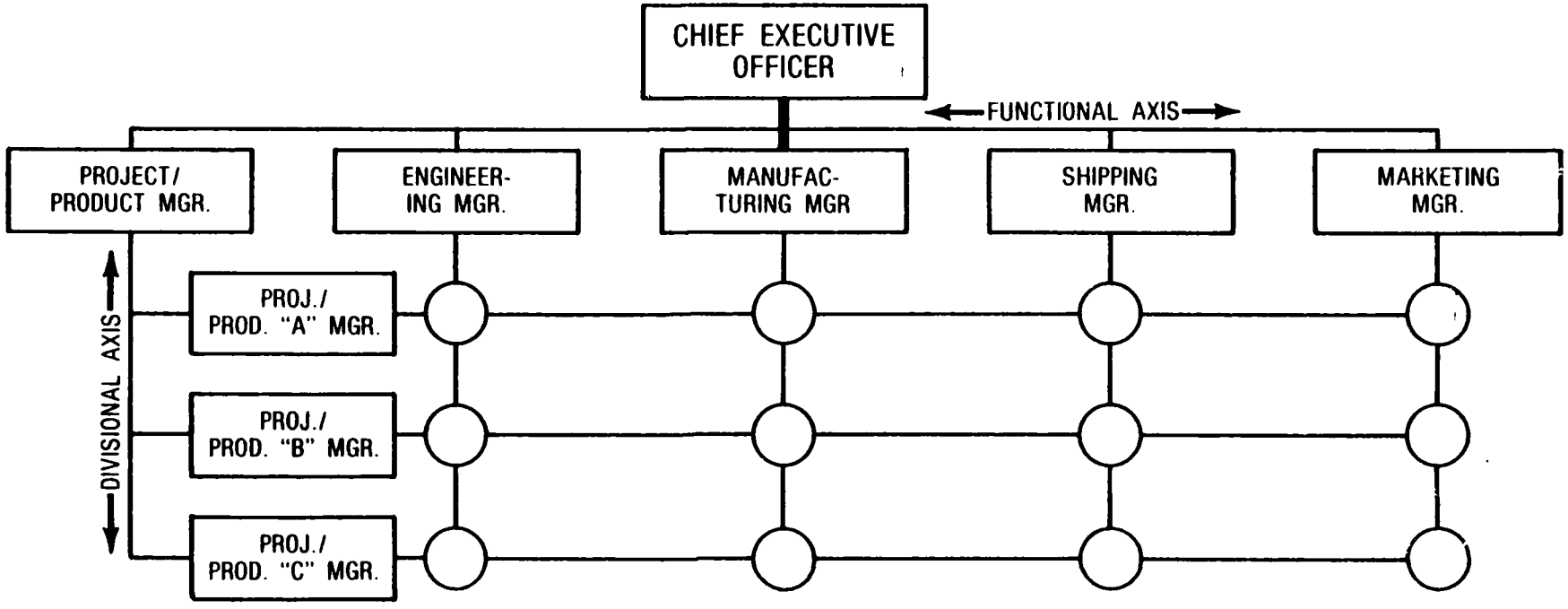


FIGURE 4 SCHEMATIC REPRESENTATION OF A TYPICAL MATRIX ORGANIZATION STRUCTURE (SHERIDAN, 1979).

The matrix structure represents not only a blend of the two concepts, but it offers, in theory, a balance of power between the functional experts and the divisional managers (Cathey, 1979; Dessler, 1977; Luper, 1979). Even though most authorities indicate that the sharing of influence and power is better balanced in a matrix structure, as opposed to the functional or the divisional form, Hutchinson (1976) questions this idea. He contends that the balance, when it does exist, is very delicate. In reality, the project/product/program manager is most often in the more powerful position. Only in the rare case, when the situation is very technical and the project/product/program manager is a generalist, does the functional specialist have the upper hand. In a matrix, the functional axis tends to have permanence, while the divisional axis receives the visibility and holds the power even though it is subject to periodic change in programs, projects, and contracts (Sheridan, 1979).

Before examining the matrix organization in more detail, there are several generalizations worth mentioning which should give the reader a further understanding of the perplexities of the matrix concept. These generalizations reinforce Mintzberg's views and give added dimension to the meaning and importance of the matrix structure. Essentially, the structure offers a unique, systematic approach to organized problem solving (Connor, 1978). The matrix manager (project, program, or product manager) integrates parochial (functional)interest toward common organizational objectives (Connor, 1978). In other words, the matrix manager guides the work of the functional specialists. Together they solve problems.

Many authorities view the matrix configuration as an unstable arrangement.

Unstableness results not only from the dual authority (two bosses) and the temporary nature of the projects, but also from the dual pressures of functional vs divisional interests (Davis, 1976; Jacobs, 1976; Kolodny, 1979; Sayles, 1976). Others point to the permanency provided by the majority of functional experts. Even though many individuals are moved from project to project, these specialists are still within the overall organization. In many businesses, the matrix structure is responsible for producing and marketing products which have long-term existences. Thus, by no means could one consider such an internal arrangement as unstable and temporary (Lawrence, Kolodny & Davis, 1977).

In a typical matrix organization, a manager is put in charge of each project or program and given the authority and responsibility for completing the project or conducting the program. The project/program manager is assigned personnel from the various functional departments (manufacturing, engineering, marketing, etc.). Dessler (1977) suggests that, normally, the project/program manager has the authority for relieveing the functional personnel from their "regular" functional group assignments and rewarding them with promotions, salary increases, etc. However, in certain organizations the project managers deem that they have little authority over the functional specialists. Thus, in some cases the project managers often feel they have the responsibility for producing, but little or no authority over the functional specialists who are critical to their success or effectiveness. Therefore, the issue of project/program manager authority is not settled. Perhaps, it is best to conclude that the amount of project/program manager's authority is dependent upon the manager's leverage, reward capability, etc.

Regardless of whether the project manager has authority commensurate

with his or her responsibility, the functional specialists provide the technological skill and expertise. As Luper (1979) contends, the standards of performance eminate from the functional portion of the organization. In addition, functional experts benefit from the matrix situation by being associated with a specific program, product, or project. The functionalists can identify with the output, and at the same time, the particular output receives added, intensified attention (Wall, 1980).

In addition to the descriptions provided thus far, there are special conditions that give rise to the need for the matrix structure, and there are unique conditions that must be established within the organization to insure an effective matrix. First of all, there are a number of reasons and factors that lead to the development of the matrix organizational structure.

Primarily, companies become dissatisfied with the basic functional or divisional configuration choices. Often there are competing goals between the functional and divisional interests. For example, priorities between functional/operational enhancements and product development frequently conflict or engineering specifications and product marketing considerations sometimes clash. If the organization is functionally structured, the specialty areas are not overly concerned with giving priorty to product schedule or requirements. Whereas, the divisional form results in a situation where functional skill interests are subjugated to project, program, or market priorities.

Regardless of whether the functional or divisional form is used, each arrangement relies upon a hierarchy of power and a unity of command. In addition, these forms deal with multiple goals in sequence. Thus, the organization is constantly faced with the dilemma of making decisions

between functional or divisional interests, each at the expense of the other. The matrix is an attempt at specializing in the functional and divisional dimensions simultaneously, while providing the means of blending the powers of the functional expertise and the divisional emphasis and control. The essence of the matrix arrangement is to insure simultaneous pursuit of multiple goals while involving balanced power (Davis, 1976).

Other reasons for developing the matrix structure stem from more practical aspects such as flexibility and sharing of resources. Since the functional specialists serve as an available pool of expertise, the organization can accomodate surges and changes by shifting people from one project or program to another. This atmosphere of constant moving is more or less "accepted." Also, a change or shift in personnel does not affect the entire organization since the matrix groups are decentralized. This pooling of resources is also a good solution for sharing scarce skills and assets (expensive data automation capacity, large and complex data bases, etc.). Management can assign priorities and provide the skills and assets where they are most needed (Dessler, 1977; Duncan, 1979; Hax & Majluf, 1981; Lawrence, Kolodny & Davis, 1977; Martin, 1977; Zambenini, 1977).

Not only are the reasons for the matrix structure important to understand, but the conditions that are necessary for an effective matrix organization must be recognized and maintained. Sheridan (1979) and Barks (1978) point out that in addition to top management support (in the form of financing and training opportunities), a special culture has to be maintained. Continual flow-through to allow open conflict and interaction must be established within the overall matrix and within the subdivisions. Management must channel and use effectively and constructively this open conflict and

communications to solve problems (Mintzberg, 1979). The importance of open communication cannot be understated. Good use of the constant communication and interaction (competitiveness, in some instances) can lead to improved solutions to the various problems organizations encounter (Cathey, 1979). Also, Wall (1980) believes that the "matrix atmosphere" is conducive to motivating personnel and results in a high degree of synergism. Inherent to the structure is the decentralized feature which permits decision making at the lower and middle levels of management. As a result, top management is given opporunities and extra time to deal with problems of operational coordination, strategic decision making, and planning (Child, 1977).

Sprinkled throughout the examination of the matrix design concept, some faults or disadvantages were alluded to or previously mentioned. A common complaint from the functional personnel (who are often described as collocateds since they "occupy" two locations--simultaneously--one functional and one project/program-oriented) is the problem of having role conflicts, i.e. having two bosses (Dessler, 1977; Sayles, 1976). In some cases, the functional specialists exert independence and show close allegience to their functional bosses, as opposed to their project/program/product manager. As a result, there is a definite potential for problems relating to the lack of support from the functional portion of the matrix (Connor, 1978). Thus, there is validity for the condition described previously. The matrix managers are responsible for assuring project, program, or product delivery on time, within cost, and as specified, but they lack authority (power) over the personnel needed to fulfill the organizational objective (Martin, 1977).

Others who have studies matrix arrangements conclude that the high burden of communication and liaison within the matrix is costly in terms of time and expense (Child, 1977; Sayles & Chandler, 1971). The constant cross-communication linked with decentralized decision making results in a slow, deliberate process that is, in some cases, detrimental to organizations in a quick-paced dynamic environment (Peters, 1979). In fact, Waterman, Peters, and Phillips (1980) refer to the matrix design concept as the "matrix mess" because of the ambiguity and constant formal and informal links among the various matrix participants involved.

Peter Drucker (1974) even states that matrix structure "will never be a preferred formof organization; it is fiendishly difficult" (p. 598). His reasoning stems from the idea that matrix is often resorted to so that organizations can share internally scarce resources. He also suggests firms in the divisional form are unable to cope with increased pressures for meeting deadlines and constraints. These pressures are exacerbated when functional specialists within the divisions/departments are not responsive enough. Thus, organizations rely on the matrix form out of desperation (Drucker, 1977). When the pressures subside, the organizations will revert to more "traditional" structures--functional or divisional (Kolodny, 1979).

Matrix Structure and Management Concepts

Now that the matrix structure has been reviewed, the results of several case studies will be presented. The case studies will look at the applications of project management, program management, and product management. Before exploring these uses, a definition of terms will be given.

To begin with, the reader must be warned that project,program, and product management are concepts that can be accomplished using a divisional

organizational structure. The divisional form, as previously described, would be self-contained and permanent. The focus of the divisional manager would be on project or program completion or product production. However, in this portion of the paper, the terms project, program, and product management are associated strictly with the matrix structure.

From a restricted beginning in the aerospace industry, matrix applications have proliferated the private and public sectors. Matrix structures now flourish in multi-national corporations financial institutions, hospitals and health care agencies, educational establishments, and various other types of organizations (Kolodny, 1979).

In conjunction with the matrix organization and the associated management concepts, such terms as project management, program management, and product management are often used interchangeably. Originally, project management referred to special U.S. Defense Department and aerospace organizations that existed during World War II. At that time, ad hoc offices were established to integrate and manage the production and delivery of high priority weapons systems. Product management was, more or less, an equivalent term introduced in industry. The product manager was responsible for coordinating and integrating the engineering, manufacturing, purchasing, etc. functions necessary to insure that a product or product line was delivered to the marketplace. Program management was the term introduced in the non-defense, public sector establishments. A program was a discreet task or objective that cut across organizational boundaries and required coordinated support of the various functional departments (Connor, 1978).

Today, project management generally refers to a short duration effort or a sub-component or subdivision within program management. The term is

used in both private and public sectors. Product management still retains its original meaning. Whereas, program management normally applies to long-term efforts (Lawrence et al, 1977). However, according to Huffman, Lozito and Snyder (1981), the USAF uses the terms program management and program management offices to refer to its concept and organizational units for managing the acquisition process of aerospace subsystems and weapon systems. The duration of the USAF programs varies from months to years.

As a means of clarifying and providing more information on these three concepts, as they are used in conjunction with the matrix structure, an example or two for each type will be provided in the following sections. Project management will be discussed first, followed by program management, and then product management will be examined.

Project Management. Luper (1979) states that the project management can actually be traced back to the Egyptians who used this concept while building the pyramids. Nevertheless, a resurgence of the concept has occurred in the last 40 years with such notable successes as the World War II Manhattan Project. However, project management means different things to different people.

This author noted during the literature review that on a number of occasions the terms project, program, and systems management were used interchangeably. Futhermore, as was discovered in J. S. Baumgartner's book, Systems Management, it was evident that project management does not necessarily rely upon the matrix structure. Close examination of Baumgartner's presentation revealed that project management, in his example, used the divisional form of organization (Baumgartner, 1979). Thus, returning to the

Egyptians, perhaps Luper was referring to a divisional approach whereby management attention was upon the project, and the organizational structure was the divisional form.

As described by Rice (1980), the project management concept can be conducted without formalizing the matrix structure. Without the matrix, a project team can be formed under the direction of a project manager who has responsibility for a specific innovation or for resolving a particular problem. Whatever the purpose, as soon as the project is completed, the team is disbanded. Team members return to their functional departments (Rice, 1980). Thus, the organizational structure is only temporarily altered, and within the framework as just described, would be nothing more than a short-term divisional form or a team approach. (Team concept of a permanent nature will be examined later.) Thus, such arrangements, as described by Rice, are not dependent upon a permanently established matrix and will not be discussed further. For the purpose of this section, therefore, project management will be used to refer to short duration efforts that use the matrix organizational design. (Later, the term project management will be used in conjunction with program management and the matrix structure and will refer to a subdivision within an overall program. In both cases, the matrix structure will be an integral part of each concept.)

Project management utilizing the matrix structure has been used, to some degree, by various data automation and electronic data processing (EDP) firms. As Fireworker and Bogner (1980) and Jacobs (1976) cite from their experiences, numerous firms which specialize in EDP software development use project management. The field of work is obviously technical and relies on white-collar employees, but the necessity for the matrix structure is related

to the fluctuations in manpower requirements as software development moves from the initial planning phase to the final implementation. The entire life cycle for producing tailor-made software/hardware packages is relatively short. However, during the actual development (writing and testing) of the software, manpower requirements are extremely intense. The firms' programming specialists are assigned to functional areas/departments and then are "matrixed" project to project. This way a large number of programmers can be devoted in varying amounts as they are needed at the crucial stages of the projects. In Jacobs' (1976) judgement, this concept for his firm achieved

> better return on project investment; higher productivity; more stable operations; fewer interruptions and scheduling problems due to emergency situations; better understanding between the user and the systems personnel; and increased management's role in EDP development (p. 14).

Another excellent example of project management is provided by Wilson and Stone (1980). The success of their architectural and engineering firm depends substantially on the proper use of the available human resources. Management of those resources is paramount.

In their organization, as in any typical architectural/engineering firm, there is a mix of talents. The architectural staff includes a wide range of skills, from inexperienced draftsmen to registered architects with unlimited design capabilities. These individuals, although capable in a number of areas, tend to specialize in a certain type of work such as commercial buildings, hospitals, schools, or landscape architecture. Each of the engineering disciplines (i.e. structural, mechanical, electrical, and civil) is represented by a similarly diverse and specialized staff. With this array of skills, the architectural staff serves as the divisional axis and provides the project managers. The engineering staff members belong to

the functional axis and are the collocates (the ones "matrixed" to the projects).

Project management with the matrix structure was instituted in the firm in 1975. Since then a computerized information collection and reporting system has been incorporated to assist management in planning and extensive project monitoring. As a point of interest, the computer system is used to compare new projects with similar, previous ones to estimate in-house manpower and skill level mixes. After applying judgement factors for each particular new project, manpower requirements are compared with availability of manpower. Based on present and the projected workload, new requirements are determined to derive a computer-assisted forecast. As a part of the automated scheduling, specific estimates of the amounts of each type of skill are provided. As a result, critical work flow problems can be identified and resolved. In a business where up to 200 jobs are being performed simultaneously, this approach of a matrix structure with computerized scheduling is proving to be effective.

A third illustration of project management is extracted from Slocum and Hellriegel's (1979) work which reports on a slightly different scheme for project management, but still relies on the matrix environment. Hughes Aircraft Company is organized into five different divisions: space and communications, industrial electronics, international operations, research center, and research laboratory. Each division bids on various kinds of jobs under the auspices of the company. When Hughes Aircraft Company is awarded a contract, the work is "performed" by the division that submitted the bid. In many instances, the "winning" division needs additional skills to complete the contract, and "matrixes" the extra specialists from the other com-

pany divisions. As a result of this arrangement, there is normally a large number of employees moving around within the company. Certainly this is a most unusual adaptation of the matrix-based project management concept. Slocum and Hellriegel conclude that the constant influx and reallocation of personnel places a continual burden on the organization's personnel management system. But, with the pressures from new technology advances and short lead times, there is perhaps no better alternative. Only through the use of a matrix structure is Hughes Aircraft Company's approach possible (Slocum & Hellriegel, 1979).

The final example is a variation referred to as a venture team. The venture team is designed to meet the demand for a breakthrough in product marketing. The concept uses a matrix concept with the project manager usually being provided by the long-range planners. However, the life span of the group can vary (Connor, 1979). The major difference between the venture team approach and the "true" project management concept is that only a few of the organizational specialists are used at any one time. Thus, it is questionable whether this should be considered project management. Perhaps the venture team is closer in character to "management by committee" (i.e. committee with the purpose of finding a breakthrough) another concept which will be discussed later. Nevertheless, Connor (1978) includes the venture team concept within the overall category of project management. The team is somewhat like project management matrix group in that personnel resources are obtained from the functional areas, the group is composed of multidisciplinary experts, and the group is goal-directed toward the achievement of a single result. For companies that are committed to growth, and for those where success depends on the marketing of existing products and the develop-

ment of new ones, the matrix-based venture team approach offers a promising alternative (Connor, 1978; Hutchinson, 1976).

Program Management. As mentioned earlier, for the purposes of this paper, program management connotes long-term efforts or programs which are conducted and managed within the confines of a matrix structure. It is also worth noting that this term "program management" is used to refer to the matrix management organizational concept which exists primarily in the various levels of the public sector (non-defense, and defense agencies and departments) and those civilian industries that interface closely with those public sector institutions.

Sayles and Chandler (1971) devoted their book, Managing Large Systems, to the experience gained from 4 years of field work within the National Aeronautics and Space Administration (NASA) during the mid-1960's. At that time, there were some critical decisions in America's space program. NASA was a large, complex organization consisting of thousands of engineers, scientists, and technicians, and administrative personnel. The people were organized under the space program in a very diverse structure of sub-program teams (Sayles and Chandler often referred to these teams as project teams), committees, task forces, etc. Even with this conglomeration of subdivisions, NASA was characterized as program management within a matrix structure (Sayles & Chandler, 1971).

Much of NASA's work was based on three major types of technology: launch vehicles, spacecraft, and airplanes. Within these areas were also certain across-the-board types of support technology (functional skills), such as electronic control and guidance equipment, data processing equipment, life support systems, on-board power sources. All of these skills

were "matrixed" from the respective functional areas into the four program offices: Manned Space Flight, Space Sciences and Applications, Advanced Research and Technology, and Tracking and Data Acquisition.

The authors noted that rivalry existed between the manned program and the other programs. Because of the visibility and overwhelming support given to the manned effort, resources in generous quantities were always available to that program. The program managers in the other areas had relatively little authority over the functional areas, so the unmanned segments suffered. As a result, Sayles and Chandler hinted that upcoming programs should perhaps consider a matrix structure with a minimum level of "captive resources. . .for the program and project managers" (Sayles & Chandler, 1971, p. 170).

For NASA, the technological environmnnt was very demanding, dynamic, and fast-paced. Status as a world power was associated with the U.S. space program. The strides made in the space program also included advancements in communication technology, weather prediction, and navigation. However, as emphasized by Sayles and Chandler (1971), and perhaps of equal significance, was the advancement that NASA made in managerial and organizational technology, specifically, the overall success with program matrix management.

A very fine example of the USAF's adoption of the matrix arrangement is explained in Thurber's 1978 article in the Defense Management Journal. The content of the article focuses on the matrix organization that the Air Force Systems Command's Aerospace Systems Division (ASD) established in early 1976.

As Thurber (1978) explains, the matrix organization, with its "two-

boss" system, would not appear to be compatible with the traditional military philosophy of single authority within the hierarchal chain of command. Until the conversion to the matrix organization, ASD had followed the classic model of program management using the divisional form. The various program offices managed the acquisition of most aircraft and related support systems, and each office had its own functional specialists. However, in 1975 pressures began to mount which forced management to consider alternate approaches like the matrix concept.

By 1975, a number of new aircraft were in production, and the ASD workload had increased dramatically. However, there were constraints on the number of personnel assigned to ASD. The Air Force was concerned with personnel overhead costs of the self-contained program offices, the insularity of many of the programs, sluggish organizational responsiveness to workload shifts, and inadequate professional development for the functional skill specialties. An answer to these problems was sought.

Matrix was identified as the solution and reorganization began in early 1976. Emphasis was placed on strengthening and enhancing the specialists' functions. The reorganization was to create a means for cross-feeding innovative ideas and techniques among the various program offices. In addition, an aim was to strengthen the coordination and integration of career development programs for the military and civilian functional specialists.

Increasing the authority and influence of the overall functional managers was also an objective. The functional managers were given the personnel authorizations and were then responsible for allocating the specialists to the respective program offices. As a result, the functional mana-

agers had to balance the frequently conflicting personnel demands against the personnel available in order to satisfy the program offices. Complaints arose from the program managers stating that they were responsible for program mission accomplishment, but were stripped of authority over the needed functional resources (Thurber, 1978). The issue of program manager authority is still a current issue in some matrix organizations (Banks, 1981).

When viewed from the functional specialists' perspective, the situation had different overtones. For administrative purposes, the functional staff specialists were assigned to "home offices" within each functional staff organization. When the specialists were assigned to the program offices, the individuals were then referred to as collocateds, indicating that they reported to their respective program office(s) for day-to-day operational/work matters and to their functional staff "home offices" for administrative and career-development matters (Thurber, 1978).

The arrangement surfaced a very critical point concerning effectiveness reports/performance appraisals which are crucial to advancements and promotions. The subject of who controls these reports was, and continues to be, a very important and sensitive issue to the collocateds. However, as Thurber suggests, a solution was found. The military reports were routed through the program office (thus giving the program manager leverage--increased power) over the military functional experts assigned to the program office. However, Thurber was not clear as to who signed or had final authority over these important reports. (This author's discussion with an individual presently at ASD revealed that the program manager signs, controls, and has final authority over the officer effectiveness reports.) Thereby, the

program manager presently possesses a significant amount of authority over the assigned military specialists (Adams, 1981). On the other hand, civilian specialists' performance appraisals were to be reviewed by the functional organizations. Thus, implementation of the matrix configuration met with a few obstacles. In addition, immediate manpower savings were not realized. Also, there were initial problems with employee uncertainty, ambivalance with the "two-boss" system. Some collocateds considered themselves as second-class citizens, even though an aim of the reorganization was to enhance employee career development. There was the constant struggle of program managers trying to get enough specialists for their respective offices. At times, personnel matters were sent to the ASD commander for resolution.

After a rough start, the situation improved. Thurber concluded that the switch to a matrix structure did help ASD to better utilize its human resources. Flexibility was greatly enhanced. Among the other benefits were rapid reallocation of personnel to meet program demand, enhancement of professional communication among the program offices, crossfeeding of innovative management techniques, and exchange of lessons learned. Most important, in Thurber's (1978) opinion,

> each of the functional deputies [managers] were now in a better position to assert a cohesive division-wide stewardship of his [her] discipline and to raise a much stronger voice in the business-management decisions of the program offices (p. 20).

An article by Zambenini (1977) covers the same ground, but is from the functional comptroller's vantage point. The article is similar and echoes the improvement matrix brought to the management of the functional specialists.

In Coleman's (1977) Aviation Week and Space Technology article, he indicated that the U.S Navy was pleased with the matrix concept in its

Naval Air Systems Command and was farther along the path to organizational maturity than the Air Force. Not only had the Navy increased flexibility, improved economy of technical skills, and obtained a stronger overall naval air systems development and acquisition program, but the level of manpower in the headquarters had been reduced (Coleman, 1977).

In his current book, Baumgartner (1979) discusses management experiences within the U.S. Department of Defense, the Apollo Program, an oil recovery project, the unmanned space programs, and the annual automobile line change-over. A unique case from Baumgartner's book involves the USAF's F-15 development program.

On 1 January 1980, the USAF F-15 System Program Office (SPO) was charged by the Secretary of Defense to develop the F-15 as the world's best air superiority fighter aircraft. The F-15 SPO was based on a matrix that integrated the two types of organization: divisional and functional forms (Figure 5).

The SPO Director designated a sub-program (project) manager for each of the following major aircraft sub-component areas: air frame, engine, avionics, armament, ground equipment, training and support. The functional areas consisted of engineering, configuration management, test and development, integrated logistics support, production and procurement, and program control. Each functional area director was responsible for accomplishing specific functional tasks for all the sub-program/project areas within the SPO. (Baumgartner used the terms sub-program and project interchangeably.) Project managers were focal points for their respective sub-program areas and reported directly to the SPO Director. Similarly, the functional managers interfaced with the SPO Director. However, the project managers

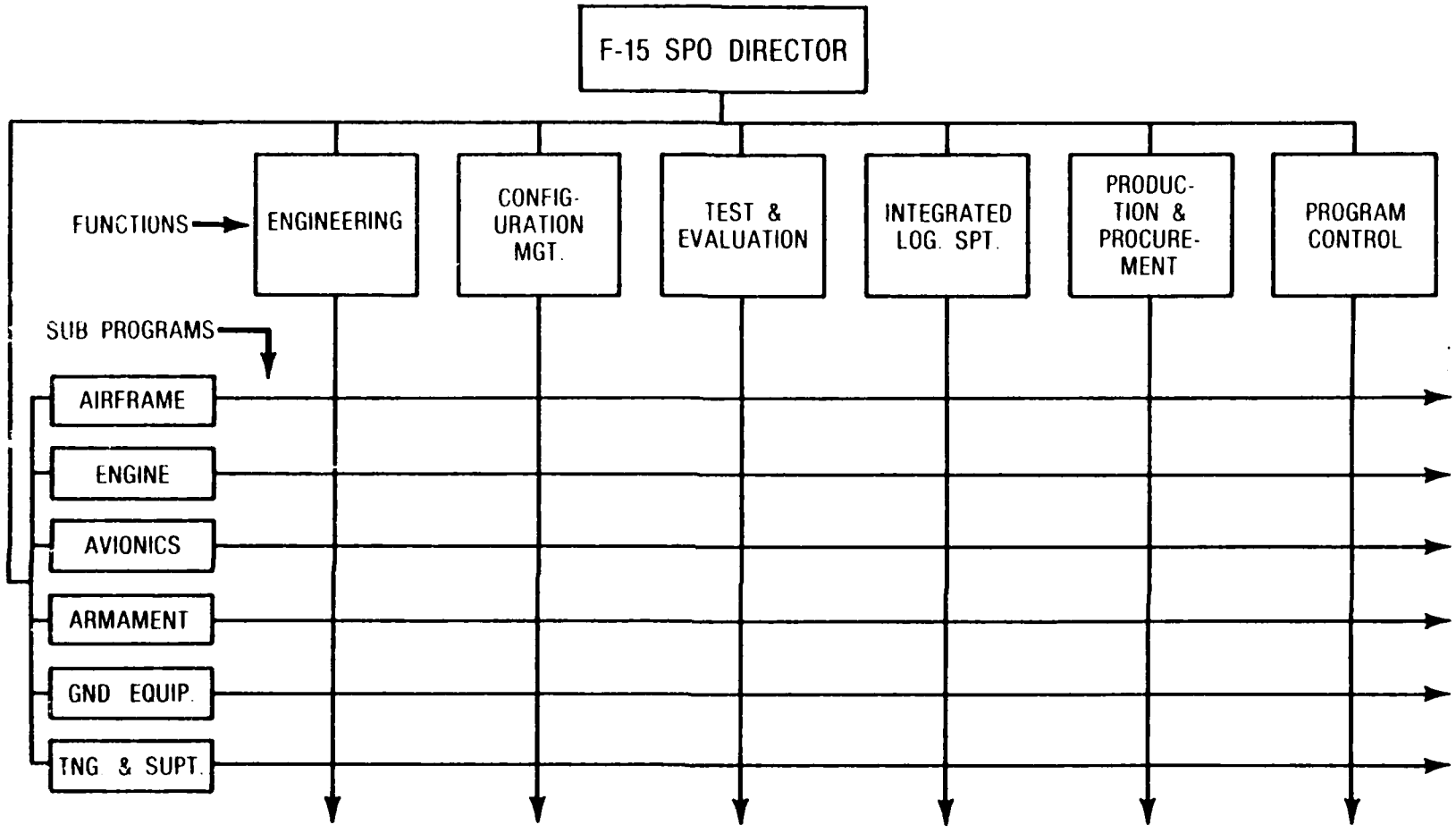


FIGURE 5 SCHEMATIC REPRESENTATION OF F-15 SYSTEM PROGRAM OFFICE.

were also responsible for resolving problems and implementing tasks whenever possible. Thus, on a daily basis, the sub-program manager and the functional manager were expected to interact and make decisions. As a result, there was a decentralized operation. If need be, the two could raise an issue for the Director's guidance.

The preceding description was given by Baumgartner from the F-15 SPO perspective. However, Wall viewed the F-15 matrix organization from a broader scope, the Aerospace Systems Division perspective. (The Aerospace Systems Division (ASD) at Wright-Patterson AFB included several SPO's.) Looking at the Commander, ASD/CC, as the "commodity commander," Wall (1978) concluded that a two-tier matrix existed. The following paragraphs portray the arrangement from Wall's interpretation.

The commodity commander (ASD/CC) had numerous functional directorates (procurement/contracting, supply, maintenance, comptroller, etc.) and the various program offices (on occasion, Wall also refers to them as project offices) reporting to him/her. As normally in a matrix, the functional people had two memberships--one in the specialty/functional organization, the other in the program/project organization. Figure 6 illustrates the single-tier arrangement thus far.

At this point, the F-15 program office was subdivided into the following sub-program (sub-project) elements: airframe, engine, armament, and training. Each sub-project manager reported to the F-15 program and was provided a portion of the functional support that had originally been assigned to the F-15 program manager. As a result of this structure, the F-15 SPO appeared as shown in Figure 7. When viewed from the ASD/CC's overall perspective the matrix appeared as illustrated in Figure 8. Thus,

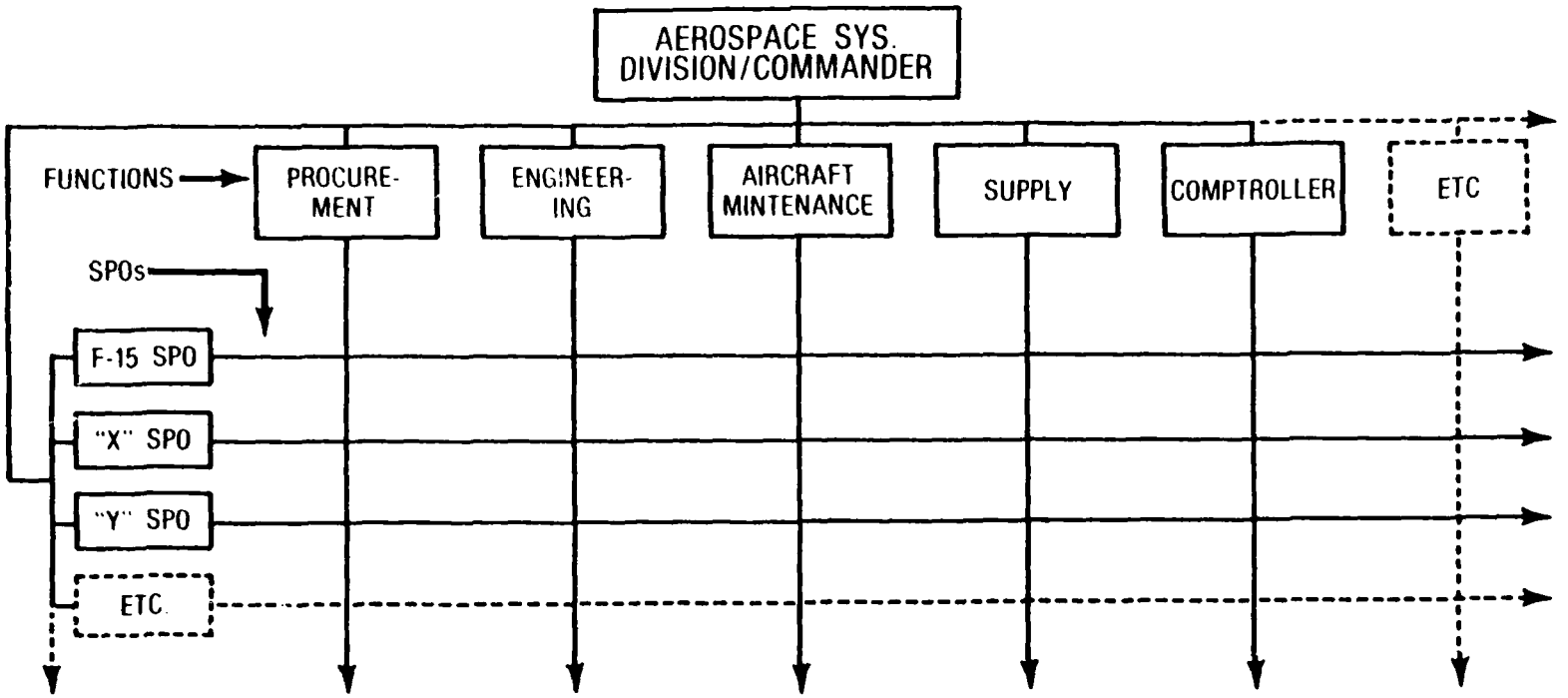


FIGURE 6 SCHEMATIC REPRESENTATION OF THE FIRST TIER OF THE TWO-TIER MATRIX STRUCTURE AT AEROSPACE SYSTEMS DIVISION (WALL, 1978, P. 39).

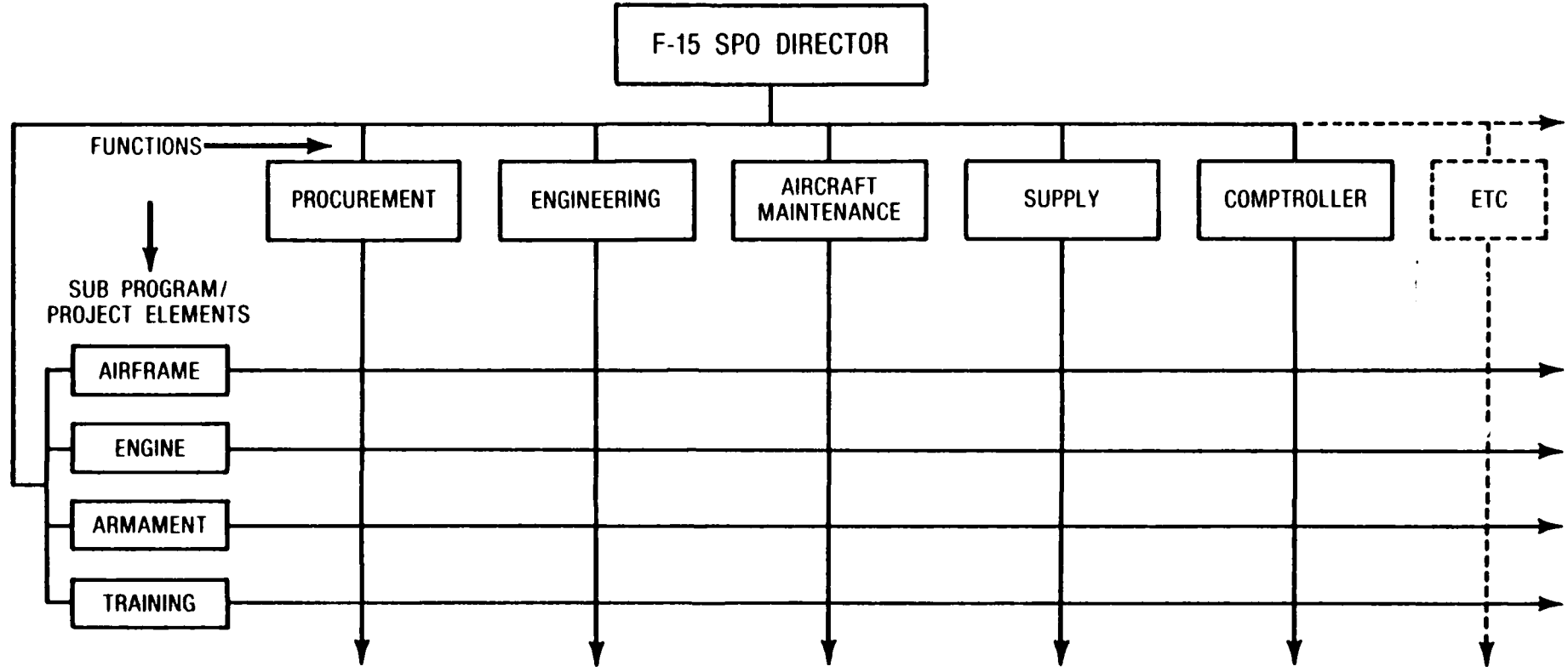


FIGURE 7 SCHEMATIC REPRESENTATION OF THE SECOND TIER OF THE TWO TIER MATRIX STRUCTURE AT AEROSPACE SYSTEMS DIVISION (WALL, 1978, P. 41).

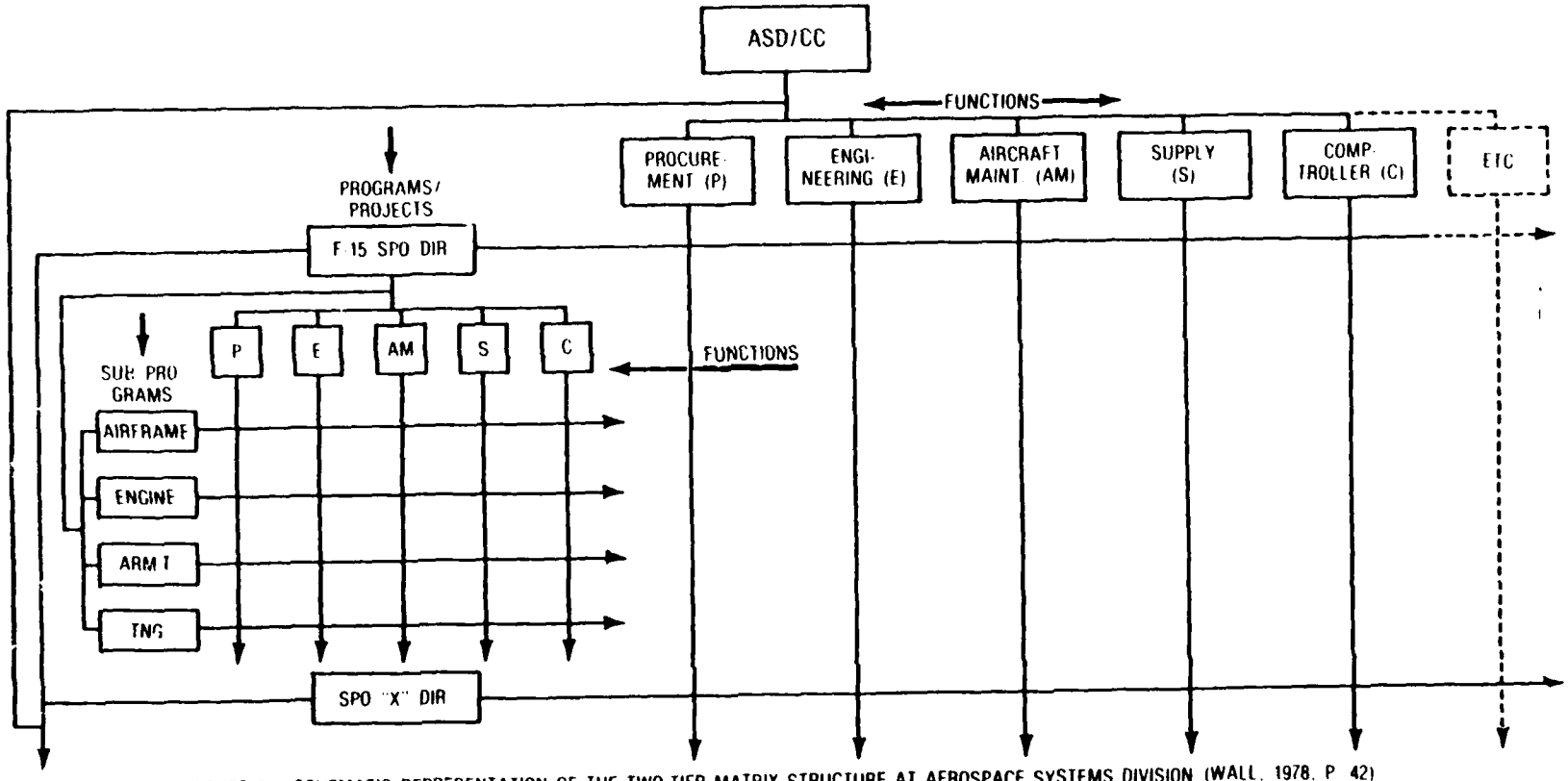


FIGURE 8 SCHEMATIC REPRESENTATION OF THE TWO-TIER MATRIX STRUCTURE AT AEROSPACE SYSTEMS DIVISION (WALL, 1978, P 42)

a two-tier matrix existed.

Wall (1978) emphasized that the

> principal criteria affecting the establishment of sub-project managers (and the two-tier matrix) were the degree to which program differentiation was required and attainable, the criticality of resource control, and the significance of the sub-project (p. 44).

In the case of the F-15, the creation of sub-programs focused added intensified management within the program office. At the same time, it provided greater flexibility, higher levels of group interaction, and further decentralization of routine decision making than in a one-tier matrix. As a consequence, management coordination and communication within the two-tier matrix was complicated to a greater degree.

It is important to mention that Wall failed to state that the functional directorates actually assigned their respective specialists to "functional offices" within the SPO. These "functional offices" were designated as engineering, configuration management, test and development, integrated logistics support, production and procurement and program control (Baumgartner, 1979). As an example, the comptroller personnel were assigned to program control. Therefore, the matrix situation as described by Wall was oversimplified and more complicated than he described. At the same time, Baumgartner's (1979) description was not precisely correct either. He referred to the functions as engineering, configuration management, program control, etc. In fact, these were the separate and distinct "functional" organizations/offices within each SPO which were provided personnel from the functional areas such as engineering, logistics, comptroller, etc. Thus, it appears that both authors oversimplified the SPO matrix configuration. However, in combination the two accounts are revealing as to how

complex the matrix structure and management concept can be.

It is apparent that the F-15 acquisition and development effort by the ASD's SPO was conducted in a very dynamic, hectic atmosphere. The success was due to leadership, the people involved, and the application of some effective and unique management and organizational concepts (Baumgartner, 1979).

Product Management. Private enterprise's answer to public sector's program management and the matrix structure is often referred to as product management. Since the private sector depends on profits from the sale of delivered products and services, naturally the focus is on products and product lines. Thus, the term "product management" is appropriate. Again, as with other concepts, product management in conjunction with the matrix structure is the only application considered.

Galbraith (1971) cites an example where the matrix structure was used as an integral part of product management. In the case of Standard Products Company, which had competed effectively for a number of years by offering a varied line of products, the organizational structure was originally functional. New product line development was desired, but it was difficult to keep new products on schedule and within costs. On occasions, outside specialists were hired on a temporary basis to assist in a team concept. The approach worked and was effective for short durations. However, Standard wanted to make product development an on-going effort. As a result a Product Development Department (divisional form) was established. Later, as the department grew, management became concerned with the high costs of full-time experts and their support staff. This, linked with the cylical workload, caused management to consider the alternatives.

With the goals of establishing an effective technical group to drive an innovative process and maintaining a climate where collaboration across product lines and functions would be continuous and rewarding, the matrix structure was decided upon. A Product Management Division was established. Within the Division, product managers were located. Functional specialists were matrixed from such areas as engineering, manufacturing, and marketing (Figure 9). It is important to note that the matrix structure as applied only at the technical specialist and middle/upper management levels. The production line stayed intact (Galbraith, 1971). Therefore, the organization was actually a hybrid of functional form (manufacturing was organized by functions such as fabrication, assembly, etc.) with white-collar/managerial/technical specialists involved in the matrix concept via a product division configuration.

There are a number of other examples of matrix structure applications in a variety of corporations such as Honeywell, Texas Instruments, and Dow Corning. All of these businesses have used the matrix arrangement in a product management concept (Connor, 1978). On occasion, General Motors (GM) (which is predominantly a divisional form) has used the matrix structure when confronted with such product decisions as down-sizing its automotive product lines (Rowen, Howell, & Gugliotti, 1980). Standard Steel has used matrix management for a number of years with success according to John Fogarty, President. He was quoted as saying, "There's no doubt in my mind that our. . .system of matrix management is helping us in our goal of working smarter, instead of harder" (Cathey, 1978, p. 38).

As with program management's two-tier concept, product management has a similar potential. As an example, Hutchinson (1976) proposed a two-tier structure for corporation planning. Hutchinson's suggestion proposed that

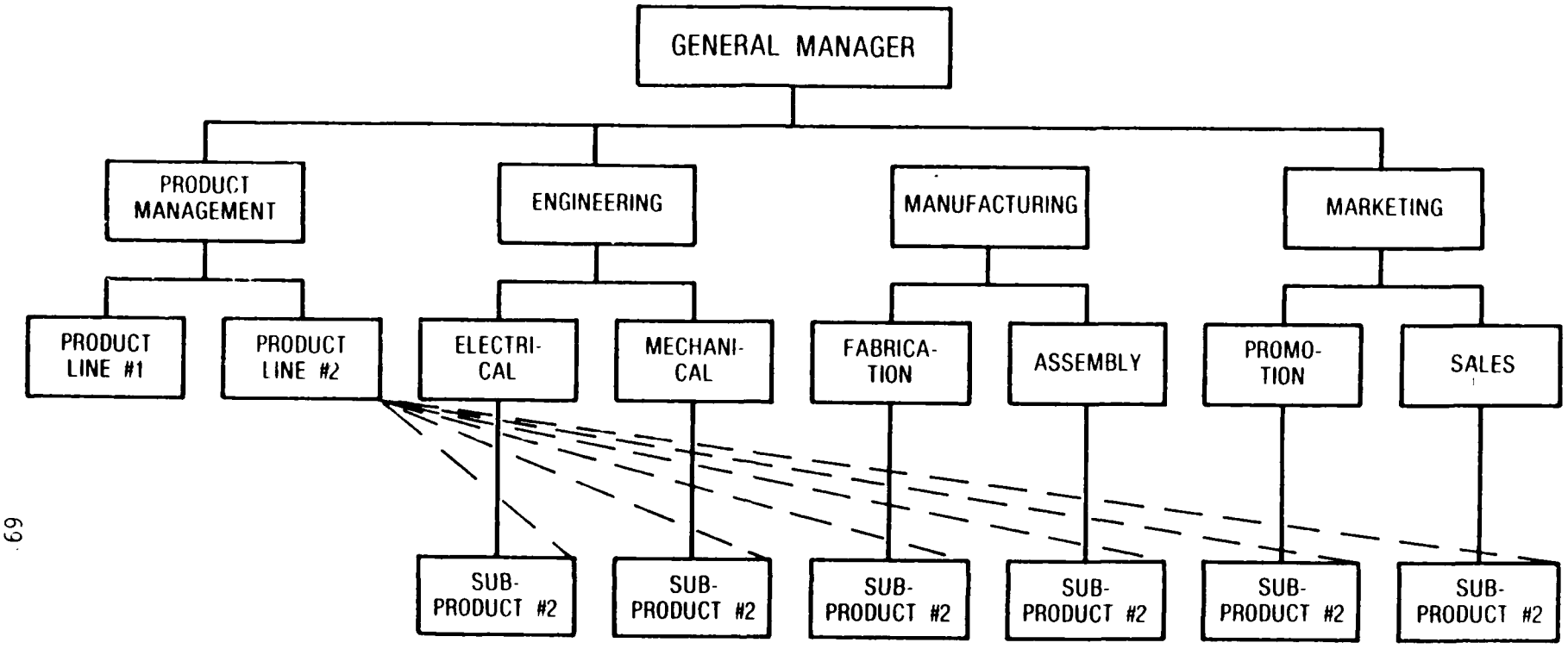


FIGURE 9 PICTORIAL REPRESENTATION OF STANDARD PRODUCTS COMPANY'S MATRIX STRUCTURE FOR PRODUCT MANAGEMENT (GALBRAITH, 1971, P.36) (DASHED LINES DENOTE TECHNICAL AUTHORITY OVER PRODUCT LINE #2. A SIMILAR SET OF DASHED LINES ALSO CONNECTS PRODUCTS LINE #1 TO A CORRESPONDING SET OF TECHNICAL SPECIALISTS IN THE RESPECTIVE FUNCTIONAL AREAS.)

in the future, organizations would have two executive groups--one in charge of planning and identifying ventures, the other concerned with and responsible for production and marketing. Many of the functional/operation experts/managers would participate in both groups. If Hutchinson's structure is included as part of a product management concept and uses the collocateds as resources to fill the planning matrix, there would, in essence, be a two-tier or two-way structure.

Management By Committee. Management by committee is viewed primarily as a means of dealing with a change or making the organization more responsive to change. The committee concept does not necessarily alter the existing organization, instead it is an adjunct to it. However, management by committee in many cases requires structural modification (Mintzberg, 1979). The amount of alteration depends upon the size and complexity of the existing organization and whether or not the purpose of the committee is long-term.

Using the case as detailed by Goldstein (1978), the management by committee concept will be explained. The setting was a radiology department of a hospital in Australia during 1972. Several problems existed: poor employee morale, slow service to hospital patients, poor quality radiographs (X-rays), and an inadequate work area. The new department head wanted to improve the situation. Goldstein was consulted. The goal was to seek the 100 employees' involvement in providing new ideas, to implement the feasible ideas, and to continue the improvement process into the future. The employees consisted of radiologists (highly trained professionals), radiographers (highly trained technicians), a nursing support staff, clerks/typists, and orderlies. All five categories worked interdependently

with each other.

The overall, guiding philosophy behind the resulting committee approach was that once top management support was established, the working level would provide ideas for improvement, give input into the decision-making process and the scheduling of decisions, and would be responsible for implementing the solutions. A critical point was that approval of decisions and scheduling of work associated with the decisions would not be performed by the eventual doers of the work. But, planning and working (doing of the work) would be carried out by the same people.

The committee structure was composed of "dual-hatted" members: members were employees in the department involved in the daily work while acting as committee members. In August 1972, two working committees of employees (supervisors, radiographers, nurses, and clerks) were established. One working committee was responsible for presenting ideas for speeding up the movement and evening up the flow of patients processing through the department. The other committee was charged with reducing the "table top" time (time used in taking the X-rays) and improving the quality of the radiographs (X-rays). A steering committee composed of the department head, who also served as radiologists' representatives, superintendent of radiography, assistant radiographer, two lower grade radiographers, chief clerk, an orderly, and Goldstein served to legitimize and guide the effort.

The thrust of the initial effort was to solve the immediate problems. The results were outstanding. Employee morale, because of the opportunity to participate, was uplifted. The employees were more energetic and responsive to patients. The average time spent by patients in the department dropped from 56 minutes to 39 minutes (a 30% reduction) in the first 4

months of the committees' existence. However, in mid-1973, the working committees began to "run out" of ideas.

At that time a change was made in the committee arrangement. The two previous working committees were dissolved. Two new working level groups, Ideas Committee and Action Committee, were established. Membership was obtained from the grass roots (i.e. no supervisors). Peer inputs via committee members were canvassed on a recurring basis. Proposals from the Ideas Committee were presented to the Steering Committee. If an idea was rejected, it was returned with comments to the Ideas Committee. If approved, the suggestions were submitted to the Actions Committee (composed of individuals from the supervisory staff) for planning, scheduling, and implementation. Progress reports were provided to both the Steering and Ideas Committees by the Action Committee.

In March 1976 a thorough evaluation of the department was conducted. Employee morale was high, work systems had improved, work activity was less hectic, and the other parts of the hospital perceived the dramatic "turn around." The average time the patients spent in the department had dropped to an all-time low of less than 35 minutes despite a 10% workload increase. Also, the quality of radiographs had improved. Furthermore, as a result of the committee's efforts, a new physical layout was proposed, designed, and was to be completed in 1980, giving the hospital a new diagnostic center.

This approach and the resulting organizational structure (shown in Figure 10) is applicable in various situations. Goldstein (1978) cites similar applications such as the Advisory Board at Lincoln Electric, the Works Council at Glacier Metals, and the consultive groups at Volvo. However, caution must be taken when attempting management by committee. The

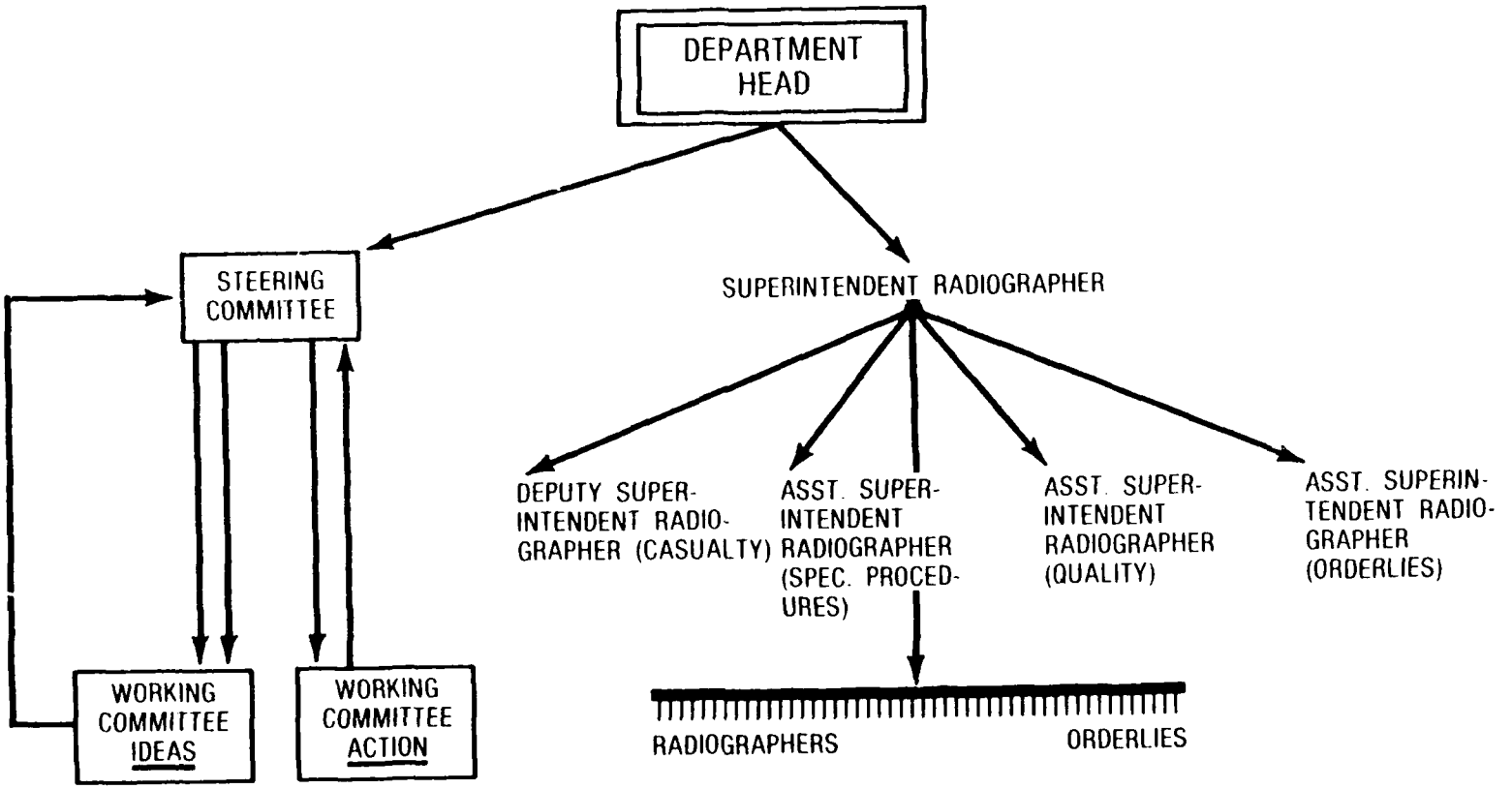


FIGURE 10 PICTORIAL REPRESENTATION OF RADIOLOGY DEPARTMENT'S MANAGEMENT BY COMMITTEE ORGANIZATIONAL STRUCTURE (GOLDSTEIN, 1978, P 978)

support of head management is essential, the employees have to be oriented to the concept, and the number of committees has to be modified according to the size and complexity of the organization (Goldstein, 1978).

Ackoff (1974) offers a theoretical structure which also provides opportunities for organizational members to participate in the management of the institution. He refers to his concept as the circular organization.

In order to help explain his proposal, Figure 11 is provided. the representation is a simple three-level corporation. Figure 11 (a) is the organization before the establishment of the circular organization and Figure 11 (b) is after the establishment of the circular organization. In Figures 11 (a) and 11 (b) each box represents an organizational unit headed by a manager. A_1 is the corporate headquarters; A_2, B_2, C_2 are divisions; A_3, B_3, C_3 are departments.

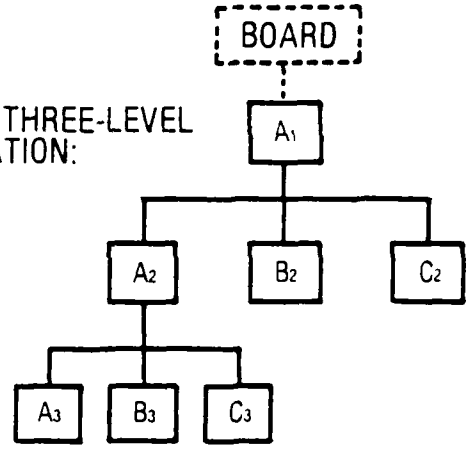
The circular organization is based on the establishment of "committee-like" boards above each manager. (Refer to Figure 11 (b)). Board membership is explained by using A_2 as an example. The membership of the board above A_2, the board to which the A_2 manager would report, would be composed of (1) the A_2 manager, himself/herself; (2) each manager who reports to A_2 (i.e. A_3, B_3, C_3); and (3) the manager of A_1 (to whom the manager of A_2 reports). The manager of A_1 would act as the chairman of that board.

This and every board, thus, would have several levels represented on it.

> Each manager would be a member of the board to which [he/she] reports, also of the board to which [his/her] superior reports, and [he/she] is the chairperson of the boards to which each of [his/her] immediate subordinates reports (Ackoff, 1974, pp. 51-52).

The boards would not manage but would have two major functions: to es-

11 (a) TYPICAL THREE-LEVEL ORGANIZATION:



11 (b) A CIRCULAR ORGANIZATION:

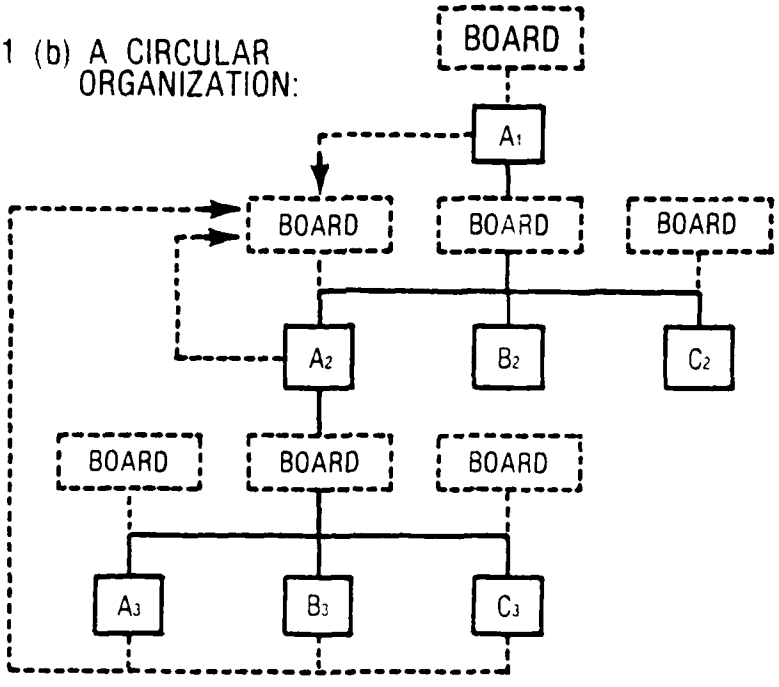


FIGURE 11 PICTORIAL REPRESENTATION OF A TYPICAL THREE-LEVEL ORGANIZATION (11(a)) UTILIZING A CIRCULAR ORGANIZATIONAL STRUCTURE (11(b)) (ACKOFF, 1974, PP 50-51)

tablish policies under which the manager reporting to it would operate and to evaluate that manager's performance and remove him/her, if necessary. Therefore, the immediate subordinates of any manager, acting collectively, could remove the manager from his/her position. Important point: the board cannot fire the manager; it would only control the occupancy of the position, not the occupant. On the other hand, no manager could remove a subordinate without agreement of the board to which that subordinate reports. This means that each manager's performance would be evaluated by those immediately below him/her as well as by his/her immediate supervisor.

The lowest and highest boards require special mention. The lowest-level manager has no other managers or supervisors reporting to him/her, only a group of workers. The workers would elect six or seven representatives who would serve on their manager's board. These representatives would meet with their constituency to discuss the issues being considered by the board of which they are part. In this way meaningful participation of those at the lowest levels would be assured. They would also have some "control" over those who have immediate control over them, and they would have the opportunity to interact with their manager's superior.

The design of the top board obviously would contain A_1, A_2, B_2, C_2, and the board of directors of the corporation. The chairperson of the board would serve as "top" board chairperson. In addition, the top board would have one representative from each of the following advocacy groups: employees (union), customers, supplies, government, investors, and debtors. The board would then have members who would look out for the interests of each of these groups as well as the corporation as a whole. There could also be a provision to select public representatives to assure corporate concern

for such problems as racial equality, ecological improvement, sexual equality, and protection of consumer interests.

In conclusion, as stated initially, these committee structures serve as adjuncts to the established organizational configurations. These committees create a cumbersome arrangement, but are conceived to maximize the opportunities for employees' involvement in the management of the organizations.

Parallel Organizational Structure. The parallel organizational structure, as devised by GM in their Central Foundry Division, and as described by Miller (1978), is certainly unique. At the same time it is similar in some respects to the arrangement associated with the preceding structure, management by committee. It is also similar to the matrix approach in that each employee below the division general manager potentially has two bosses. The major reason for establishing the parallel structure was that the Central Foundry Division

> became tired of trying to make some things work and persist within the traditional product division structure that would not let them persist, so it set up a new structure to get them done (Miller, 1978, p. 65).

While Miller does not fully define the parallel organization, its function is strategic (long-range) planning. The parallel organization potentially involves each salaried, management-level employee in affecting the future of the division and the corporation. The participating employee "wears two hats" (one in his/her normal supervisory role and one as a member of the parallel organization.) The employee's work in the parallel structure gets him/her away from normal duties and into other various areas, issues, and projects.

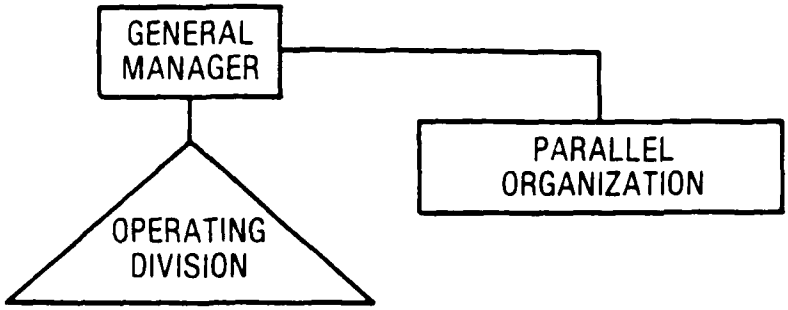
Using Miller's example, at the top of the organization is the general

manager (Figure 12(a)). Below him/her is the operating organization, consisting of five plants. Working in "parallel" to the operating plants is the parallel structure (Refer to Figure 12(b)). A discussion of the parallel organization follows.

As in the operating organization, the general manager is at the apex. Under the general manager are various committees, each responsible for a separate area of concern (Figure 12(b)). The core of each committee is composed of the general manager's immediate staff, plus the five plant managers. Attached to each committee is a different set of ten observers. These are observers only. The only contribution they make is providing as-requested reports. These observers are "bonus-level," outstanding division people. These ten observers head up permanent planning councils which are charged with working on the subject as identified by the top committee. When a project is completed, another assignment is identified by the committee. Attached to the ten planning councils are two lower level managers which are recognized as the best at that level. The two managers are observers to the planning council; but, more importantly, each is in charge of a support council. Thus, there are 20 support councils utilizing lower- and middle-level managers. Attached to each of 20 support councils are two general supervisors. Each of the 40 general supervisors is the head of a support team. As a result, the parallel structure is pyramid shaped, but has only four layers below the general manager. Considering that the operating plants have eight levels of supervision, the lines of communication are shortened considerably.

All membership positions on the various councils, support councils, and support teams are recognition devices which enter into the overall

12(a) OPERATING AND PARALLEL ORGANIZATIONS



12(b) PARALLEL ORGANIZATION

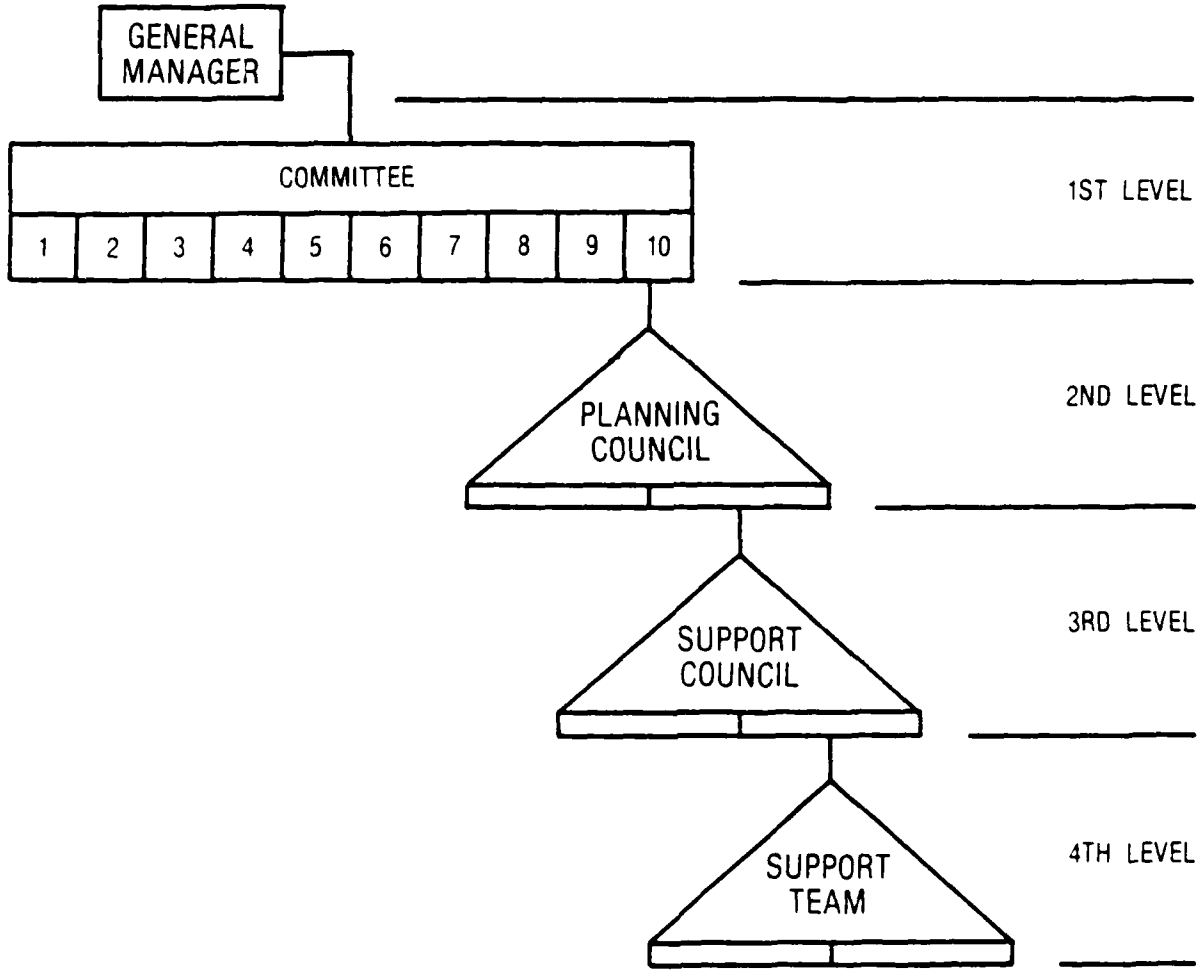


FIGURE 12

PICTORIAL REPRESENTATION OF OPERATING AND PARALLEL ORGANIZATIONS (12(a)) WITH DETAILS OF THE PARALLEL ORGANIZATION (12(b)) (MILLER, 1978, PP 66-67)

reward and promotion system. The entire concept is viewed by the general manager as a way of developing "tacticians, managers who get the iron out, who get today's problems solved, and strategists, long-term thinkers and planners who will really strengthen the division" (Miller, 1978, p. 68).

Unfortunately, the literature contained no data to reveal how effective this concept has been. The only quantitative information provided was a statement to the effect that managers involved in the parallel organization spent 15 to 20% of their time on parallel organization activities (Miller, 1978). Nevertheless, it appears that the structure has merit in that it draws upon "grass roots" inputs for planning and serves to motivate middle-and lower-level managers while broadening their perspectives.

Team Concept: A Special Case

Recently a number of managerial innovations such as organizational development, participative management, management by objectives, and job enrichment have surfaced. These "panaceas" rarely affected the organization structure. In adidtion to those innovations, literature has been devoted to case studies concerning work restructuring and improving the quality of work. In the three case studies which follow, alteration of organization design structure was a key component of the efforts. The resulting structure has been designated the team concept. (Tichy, 1976).

The first case involves Volvo Skivdeverken in Sweden (Tichy, 1976). At this particular plant, Volvo was experiencing high personnel turnover and absenteeism, a few wildcat strikes, and an unstable workforce in its assembly-line automotive production operation. In conjunction with a new plant design, efforts were focused on human relations and human behavior

problems. The new E-shaped plant was suited for off-line production areas in the "legs" of the E with the major assembly area in the long portion of the E.

In 1974 every production department participated in a joint program to improve work methods. A project group collaborated with the departments and coordinated the suggestions. The result was a mechanized system which transported assembly parts and partially assembled and finished products. The system passed through the various departments (composed of teams of 20 to 25 employees). To a great extent, workers were responsible for overseeing and inspecting machinery, tools, and the products. Since the production process was largely automated, the exchange and adjustment of tools constituted most of the total job. The workers controlled the pace of the system.

The role of supervisors and team leaders was focused on providing resources for the workers and helping them facilitate and implement work flow improvements and refinements to the new system at the shop level. Thus, the traditional, centralized functionally-oriented production organization was altered into a less centralized (more decentralized) production organization composed of teams.

The productivity data and information on the overall morale showed positive gains in comparison to other Volvo plants. Specifically, turnover decreased by 5% and absenteeism decreased by more than 2%. From a cost reduction aspect, the operation improved also (but no exact figures were given).

The second case cited is from the experience of Sherwin-Williams (paint company) at its Richmond, Kentucky plant. In 1976, with the help of a con-

sulting firm, a Sherwin-Williams automotive paint plant design group devised the layout for a new operation. A major factor in the success of this endeavor was top management support during the early stages and throughout the effort. It is also important to note that the Richmond plant was specially designed and built with a team concept in mind. The design was an open work area arrangement tailored for the manufacture and packaging of automotive paint. The paint was produced via batch processing. In total, the Richmond innovation gave equal weight to its socio-technical considerations (plant design and layout, organizational structure, job and workflow design, and pay scheme) and its implementation components (employee selection, training, and team building) (Poza & Markus, 1980).

The Richmond organizational concept defined the team as the basic unit of performing work. Each team was given a whole task to perform (i.e. prepare raw materials, manufacture paint products--by whole batch, or package the finished goods). Within each of the three major divisions (raw materials, manufacturing, packaging), the individual worker was allowed to upgrade to perform all sub-tasks or tasks within his/her division. Providing suitable training opportunities was essential. There were no production superintendents, assistant plant managers, shift foremen, or area foremen; only team leaders. Coordination across divisions and across shifts of operation was the appropriate team leaders' responsibility.

The results were most successful. Benefits included improved coordination, increased sense of responsibility to plant-wide objectives, and improved problem-solving skills among employees. Based on an original workforce estimate of 200, the Richmond plant, after the restructuring, operated at full capacity with 160 employees (a 20% reduction). Absenteeism

was 63% below other plant averages (2.5% vs. 6.7%). Also, the turnover rate for employees was negligible. Productivity was 30% higher than in the "sister plants", and the cost per gallon of paint output was a full 45% lower than other similar industry operations. The Richmond plant was also producing the highest quality paint manufactured by Sherwin-Williams. Ninety-four percent of the paint output was rated excellent (or 75% of the all-plant average). In fact, "Consumer Reports proclaimed Sherwin-William's automotive paint as the best produced in the United States" (Poza & Markus, 1980, p. 22).

The final team concept example is obtained from the federal bureaucracy. The first-hand experiences of McKenna (1977), who headed the Bureau of Retirement and Survivors of the Social Security Administration for 1967 to 1975, provides the basis for the subsequent information.

Originally in 1941, the Bureau was decentralized into three operational units. By 1965, the Bureau had evolved into a centralized series of six functional branches (which resulted in a hierarchal chain of authority with each branch reporting to the one above it). Work was processed by passing it through the six branches (each branch having 100 to 500 people) in an assembly-line fashion. No one component (subdivision of branch) was responsible for the total action/completed product. A completed product, a retirement or survivor claim, averaged 45 days from start to finish. However, a time study showed that only about one hour of actual direct time was devoted to examining, coding, key punching, and completing the claim. The remainder of the 45 days was spent moving the paperwork from place to place, proofreading, logging it in/out, deciding where it was to go, etc. Besides the obvious inefficiency, employee career development and motivation

was low.

McKenna (1977) set out to improve the productivity and personnel utilization and management. Task forces were set up to study and identify problems and to propose solutions. The key to turning the situation around was establishing a managerial training program. Through a series of conferences, managers and supervisors were taught management and team leadership. Reduction in detailed proofreading by managers was emphasized. Technicians and clerks worked to broaden their scopes of work. The traditional branches were desolved and replaced with teams or modules of about 45 people that were responsible for completing most or all of the necessary processing actions on a specific portion of the total incoming workload. Members of each module were encouraged and provided the necessary training to be able to accomplish all of the expected tasks. Thus, the work was no longer repetitive. To serve as a "safety mechanism," a small core of specialists was centralized to handle unique cases or rare problems and to provide support for overloaded modules.

Conversion to the modular concept was not without problems. Funding constraints and hiring and promotion freezes complicated the transition to a more decentralized structure. After some delays and hardships, modified and improved physical facilities were obtained. After everything settled down in 1975 and early 1976, employees were enthusiastic and extremely pleased with the new work environment and the job enlargement. Accuracy of output increased and, most noteworthy, the processing time was reduced to less than 12 days.

Summary

With the voluminous amount of material presented thus far, a recap of the organizational design concepts should be beneficial. The following is a brief summary of each of the structural arrangements.

Traditional Structure

Early in the paper the functional form of organizational structure was established as the traditional concept of structuring the organization. The basis for this approach was guidance contained in AFR 26-2, Organization Policy and Guidance, which stated that functional grouping was to be the predominant structure in the USAF and that the principle of organization based on functions was to be followed.

The functional grouping or the functional form is characteristically structured around skill inputs required to perform tasks. The functionally structured organization tends to develop highly skilled technicians and is conducive to high levels of efficiency. This tendency toward technical excellence also narrows the perspectives of the functional specialists toward their own respective functional areas. As a result, only at the top, or near the top, of the organization is there confluence of all the inputs required for optimum decisions. The impact of this condition is referred to as centralization.

Non-traditional Structures

The first non-traditional design structure was the divisional form. This form is structured according to the outputs generated by the organiza-

tion. Production of output is given the highest priority at the expense of emphasizing skill or task development. Divisional units contain their own functional specialists and the units have a greater degree of autonomy than the functional units. Inherent within this authority is decentralized decision making. Since the divisional form is self-contained, communication is enhanced. Also, the individual employees tend to have a greater appreciation for the divisional perspective as opposed to their narrow functional skills outlook. There are consequences of this structure: often when divisional members are allowed to take on other tasks (reduce their specialization), efficiency (in comparison to the functional form) is reduced, and often divisions contain a duplication of resources which results in increased costs for the small organization.

Consolidation was included as a non-traditional concept because of its potential contribution in situations where economies of scale and the sharing of scarce or expensive resources would be paramount. The benefits associated with consolidation are sometimes more than offset by the reduction in responsiveness to dispersed locations and the difficulty caused by not being in a position to appreciate distant, local situations. (A dispersed, decentralized arrangement, as opposed to a consolidated operation, provides the opportunities for greater communication and contact with the outlying areas.) Thus, consolidation, if implemented without making the appropriate accomodations for the distant clients, is not as efficient as expected.

The matrix structure is a blend of the functional and divisional forms. The functional experts are allocated to the project, program, or product managers who are responsible for completion of a project or program, or the

delivery of a product. Upon completion or delivery of the project, program, or product, the functional specialists are reassigned to another project, program, or product. The functional managers within this concept/structure have administrative responsibilities for the specialists. Therefore, the specialists (referred to as collocateds) serve two bosses, and the resulting ambivalence causes some difficulty. Even with special training and indoctrination, the matrix "culture" is sometimes stressful. Thus, it is proper to view the matrix setup as dynamic with the collocateds constantly moving from job to job. However, this arrangement tends to promote and enhance informal cross-fertilization of ideas and encourages crosstalk among all the participants (output managers and functional specialists). Thus, the matrix concept provides functional fluidity while emphasizing the priority demanded for the delivery of projects, programs, and products.

The applications of project, program, and product management within matrix structures are all very similar and exhibit the characteristics as described above for the matrix structure. Project management is associated with short-lived efforts or is often used to refer to a component or a subdivision of program management. Program management is normally used for long-term accomplishments in the public sector. Similarly, product management is applied in the private sector (industry) to simultaneously take advantage of (1) the fluidity and flexibility within the functional areas and (2) the intensified divisional attention that can be brought to bear on product or product line output.

Management by committee, as presented by Goldstein (1978), is a means of using employee participation to accomplish organized problem-solving and planning. Committee membership, however, is primarily on a permanent

basis. Thus, employees have a dual capacity as functional experts/managers and committee members. The authority of the committee is legitimate and makes possible for decentralized decision making. Also, Ackoff's (1974) theoretical concept, the circular organization, is a form of management by committee. The employees, by virtue of their various board memberships, are given expanded authority in the management processes (planning, controlling, etc.) of the organization.

The parallel organizational structure was identified by Miller (1978). The arrangement is a hybrid that relies upon the advantages of the committee-type concept (fluidity and flexibility) to also gain employee/managerial participation in corporation strategic planning and problem-solving. Besides serving as a reward/incentive device, membership in the parallel organization provides the opportunity for increased employee involvement in decision making and expands the perspective and raises the morale of each member.

The team concept permits employees who are normally part of a sequential processing line operation to form permanent teams or modules. At the same time, these teams are given the responsibility for completing an entire job (start to finish) or a major portion of a job. Upon completion of the job, the team continues with the next job which is usually identical or very similar to the one just finished. In addition, team members are allowed to train, become qualified, and to accomplish all or a varying amount of the job tasks. In other words, the employees are no longer "isolated" individuals with each doing their own highly repetitive task or limited set of tasks. The concept, and resulting structure, can be applied at the industrial shop level in industry or at the "working level" in the public sector as noted in the examples provided.

The functional form along with the eight non-traditional structural concepts [(1) divisional form; (2) consolidation; (3) project management, (4) program management, and (5) product management used in conjunction with the matrix structure; (6) management by committee; (7) parallel organization; and (8) team concept] will be evaluated using 12 selected criteria. These criteria will be identified and defined in the next chapter. The evaluation of the organizational structures will follow in Chapter IV.

CHAPTER III

METHOD

Now that the non-traditional organizational structures have been identified, a means of evaluating and comparing them is needed. To accomplish this, a select number of characteristics, tendencies, and design considerations have been chosen. These criteria not only serve as a means for examining the various design concepts, but they will provide insight into when and under what conditions the configurations and concepts can best be applied. In addition, when viewed collectively, they will provide a means of briefly describing and summarizing key points for each of the concepts.

Evaluation Criteria

The initial point of interest will be the primary purpose of the design concept. In other words, this criterion will capture the essence of a particular design structure/concept. The primary purpose will identify why the structure is used, giving an indication of its strongest quality. In addition to highlighting key attributes of the various configurations, important secondary reasons for using the concepts will also be provided. These extra details will be included in the descriptive analysis of each design concept.

The second item, the organization's internal environment, will differentiate whether the institution is characterized as being technical (complex),

nontechnical (simple), or a mixture. In some cases, a design configuration or concept is usually only applied within a certain portion of the organization. As a result, the dominant characteristic of the internal environment will apply to that portion of the organization.

Perhaps as essential as any other consideration is the organization's external environment. According to Random House Dictionary (1979), the environment is "the aggregate of surrounding things, conditions, or influences." Thus, the nature of the organization's products, its customers, its competitors, its geographic setting, and the economic and political settings comprise the organization's external environment. According to Mintzberg (1979), the external environment can be described in terms of four variables, each in itself being a continuum: 1) stable to dynamic, 2) simple to complex, 3) integrated market to diversified market; and 4) munificent to hostile. The stable environment exists when the surroundings of the organization are predictable. A number of factors make the environment dynamic: unstable government; unpredictable shifts in the economy; unexpected changes in customer demand; and, rapidly changing technology. Thus, the unexpected makes the environment dynamic. The simple environment demands little from the organization. The environment is also classified as simple when required knowledge relating to the environment can be broken down into easily comprehended parts. Whereas, a complex environment requires sophisticated knowledge for the institution's employees. An integrated market is associated with relatively few products/services demanded within a narrow geographical area. Whereas, a diversified (disparate) market exists when a variety of products are demanded from a firm and/or delivery must be

made to several locations. A munificent environment is generous, non-threatening, and predictable. Lastly, a hostile environment is threatening; however, the amount or degree of hostility can vary widely over time. Normally, a threatening environment is dynamic and unpredictable. Hostility is influenced by the competition, the organization's relationships with other groups, and is affected dramatically by the availability of resources (Mintzberg, 1979). Thus, the external environment can be described as predominantly stable/dynamic, simple/complex, integrated market/diversified market, and/or munificent/hostile.

These continuums of environment will be used in conjunction with the case studies and material cited. It is important to emphasize that a sudden change, even for a short duration, can alter a normally simple, stable environment into a complex, dynamic one. If such a change is indeed short-lived, then the organizational structure would not necessarily require permanent modification; instead, it could undergo a temporary change. On the other hand, the organization could maintain its existing structure and confront the sudden change as best as it could.

Also, the surrounding environment is not a single entity nor is it uniform. Instead, the institution faces multiple environments. This aspect, linked with the fact that these different environmental components impact the various parts of the organization in various ways, makes an assessment of the entire interactive process between structure and external environment very difficult (Mintzberg, 1979). As a result, the evaluation will focus on the most dominant portions of the organizations and its environment.

The degree or amount of decentralization will also be judged. As a

brief reminder:

> (1) dispersal of formal power down the chain of authority is called vertical decentralization; (2) the extent to which nonmanagers control decisions is referred to as horizontal decentralization; (3) selective decentralization connotes that power over different kinds of decisions rests in different places in the organization; (4) limited decentralization refers to transferring authority for certain types of decisions to a specific segment of the organization (Mintzberg, 1979).

Thus each structure will be judged on the amount of decentralization that exists.

The internal communication process will also be evaluated. As an integral part of the organization, the communication process includes "the nature of information and ideas, the means of transmission, the direction of transmission, the intent of the sender, and the perception of the recipient" (Hall, 1972, p. 269). From the material available on the various structural concepts, each will be evaluated as to how effective and free-flowing the communicative process (formal and informal) is.

Emphasis upon training, or the need for special training, will be identified. In some structures, training and indoctrination is essential to insure that the proper organizational "culture" or internal environment is fostered (in amounts above and beyond that which is normally required for that respective type of business/industry). The need or emphasis for such will be noted.

The extent to which the organization is formalized will also be a criterion. This author will judge the relative amount of formalization existing in the organization. Formalization is often defined as "the use of rules in an organization" (Hage & Aiken, 1967, p. 79). As Mintzberg (1979) states, formalization is "the organization's way of proscribing dis-

cretion" (p. 81). In other words, formalization is a means by which individual behavior within the organization is regulated. In fact, formalization and standardization, the next measure to be used, go "hand in hand."

It is possible, though, to have a high degree of standardization without having formalization. Standardization can be achieved by strictly specifying or programming (1) the contents of the work to be accomplished (work processes), (2) the results of the work (outputs), and/or (3) the training required to perform the work (skills) (Mintzberg, 1979). Thus, when possible, this author will determine the amount of emphasis being placed on standardization.

The ninth factor will address job enlargement and job enrichment. Job enlargement is a concept which involves efforts to permit the worker to engage in a wide variety of tasks associated with producing a product or service. Job enrichment focuses on providing the worker more control over decisions, goals, and standards associated with the tasks performed (Mintzberg, 1979). The organizational structure will be evaluated on whether or not job enlargement and/or enrichment exists.

The next factor will assess whether or not the design concept increases productivity. This criterion will be a relative one since the change in productive output will be a comparison between productivity attained within the previous concept. In some cases, though, the comparison may be between the production results from the present organizational concept versus those in an identical field of production or service where a different organizational arrangement is used.

The eleventh item to be used in the analysis will be recognition of personnel. If the respective organizational structure includes a unique

means for providing reward or recognition to the organization's personnel, then this indicator will so state.

The last criterion will simply indicate whether or not the structural concept has been established in the public sector.

Comments

These 12 criteria just described will provide a general framework for identifying and presenting the special characteristics, tendencies, and impacts associated with the various organizational structural design concepts that were presented in Chapter II. Using this framework, the next chapter will then be devoted to evaluating and comparing those design concepts.

CHAPTER IV

RESULTS

The material contained in the first two chapters provides the basis for the evaluation that will be included in this portion of the paper. The traditional organizational structure, functional form, will be examined first. Then each of the following structural design concepts will be analyzed: divisional form; consolidation; project management, program management, and product management with matrix structures; management by committee; the parallel organizational structure; and the team concept. A descriptive anlaysis of the individual structural concepts will highlight the salient points of each. This analysis will be guided by the evaluation criteria that were developed in the previous chapter. Following each of the analyses will be a table which summarizes the results and contains additional comments.

Traditional Structure

Functional Form

Presentation of the various types of structures began with the premise that the functional form, as identified in AFR 26-2 (Organization Policy and Guidance, 1978), is the USAF's traditional organization design structure. The dominant feature of this configuration is the emphasis placed on the segregation of skills (Walker & Lorsch, 1968). Because of this emphasis, the overall organization is subdivided according to skills. As a result of

this division of labor, the functional configuration theoretically results in a high level of efficiency. This level of efficiency is possible since most jobs within a particular skill area are also subdivided into simple tasks. The operator/worker is then able to concentrate on a simple task or series of simple tasks and becomes very efficient (Hax & Majluf, 1981; Mintzberg, 1979). The segregation and emphasis on skills tend to channel communications and keep cross-talk among the specialized functional areas to a minimum (Walker & Lorsch, 1968). Another impact of this emphasis on functional separation is that decisions which require a corporate-wide perspective cannot be made by any one functional area. Instead, decision making has to take place at a high-level focal point. This is referred to as centralization. As a consequence, this centralized skill-structured arrangement is suited primarily for a stable, simple environment (Mintzberg, 1979). A summary of these characteristics is provided in Table 2.

Non-traditional Structures

Divisional Form

In comparison to this traditional design structure, there are a number of non-traditional arrangements. The most common non-traditional organizational structure is the divisional form. This configuration emphasizes output, and subordinates the input skills to the division (output) manager (Waterman, et al, 1980). Divisions of the organization are, for the most part, self-contained and result in the functional specialists having an association with divisional output (as opposed to the functional-only parochial view that is prevalent in the functional form). The self-contained aspect also provides a means of fostering decentralized decision making

Table 2

Analysis of the Functional Form Using

Twelve Selected Criteria

Criteria	Evaluation	Comments
1. Primary purpose for using/establishing the structure	To emphasize and insure efficiency via skill specialty grouping	1. Refs: Hax & Majluf, 1981; Mintzberg, 1979; Walker & Lorsch, 1968 2. Functional form is inherently centralized.
2. Organization's internal environment	Both technical and non-technical	
3. Organization's external environment	Simple and stable	1. Refs: Walker & Lorsch, 1968 2. There are occasions when functional form is used to gain control in a dynamic environment (Galbraith, 1971).
4. Degree of decentralized decision making	Very low/well below average	Ref.: Mintzberg, 1979
5. Implications for internal communications	Restricted	1. Tendency for communications to be confined within each skill specialty. 2. Ref.: Walker & Lorsch, 1968
6. Need for special or additional training	Very little/well below average	Training only needed for the specific skills required to do tasks.
7. Degree of formalization	Medium to high	Varies according to desired level of control. Often written rules not necessary when performance can be controlled via standardization.
8. Amount of standardization	Medium to high	Varies according to desired level of control.
9. Job enlargement/job enrichment	Very little/well below average	1. Ref.: Walker & Lorsch, 1968 2. Jobs are usually subdivided into simplest increments.
10. Impact on productivity	Significant increase in productivity; very positive	1. Ref.: Walker & Lorsch, 1968 2. Functional form is well-suited for and often results in highest levels of output and efficiency.
11. Special provisions for recognizing or rewarding personnel	None	
12. Whether or not the structure/concept has been applied in the public sector	Yes	

(Duncan, 1979). Communication within each division is normally open and unrestricted; however, communication among the divisions is often poor (Walker & Lorsch, 1968). A great deal of formalization and standardization is common. Of special note is the fact that standardization of output measures (i.e. profit, standard costs, etc.) often provides a means of comparing the various organizational divisions (Mintzberg, 1979). Evaluation of the cases presented shows that the internal environments of the divisionally-arranged organizations are normally technical in nature while the external surroundings are relatively simple, although somewhat dynamic. The dynamic environment, which places unpredictable demands upon the output of the organization, is the usual reason for establishing a divisional approach (Drucker, 1946; Duncan, 1979; Walker & Lorsch, 1968). Table 3 contains a summary of this analysis.

Consolidation

The next concept discussed and evaluated is consolidation. This concept provides a valid, effective means of converting the dispersed, decentralized structures into configurations which can take advantage of economies of scale and opportunities for sharing scarce and expensive resources (Child, 1977; Connor, 1978). Consolidation has the potential for application in a wide range of environments (Rumelt, 1974). However, when responsiveness and the need to be keenly aware of local, dispersed conditions are essential, the consolidation concept proves to be ill-suited (Cason, 1978; Connor, 1978). Consolidation is associated with increased management control over operations and has a tendency for centralized decision making (Mintzberg,

Table 3

Analysis of the Divisional Form Using
Twelve Selected Criteria

	Criteria	Evaluation	Comments
1.	Primary purpose for using/establishing the structure	Greater control of & commitment to output	1. Ref.: Waterman, Peters, & Phillips (1980) 2. Divisions autonomous; benefit from decentralization (Duncan, 1979).
2.	Organization's internal environment	Technical	1. Ref.: Drucker, 1946 2. Structure also suited for non-technical operation.
3.	Organization's external environment	Simple & dynamic	1. Ref.: Duncan, 1979 2. Often market is diversified.
4.	Degree of decentralized decision making	Very high/well above average	Ref.: Duncan, 1979
5.	Implications for internal communications	Open communications within each division	1. Ref.: Walker & Lorsch, 1968 2. Often communications limited among divisions.
6.	Need for special or additional training	Little to medium/ below average to average	Opportunities exist for job enrichment & enlargement; extra training may be needed.
7.	Degree of formalization	Low to medium/ below average to average	Formalization not necessary when standardization is high.
8.	Amount of standardization	Medium to high/ average to above average	1. Ref.: Mintzberg, 1979 2. High standardization of output via specifications is common.
9.	Job enlargement/ job enrichment	Low to medium/ below average to average	1. Ref.: Walker & Lorsch, 1968 2. Opportunity for enlargement/enrichment; amount varies. Often functional experts receive job enrichment.
10.	Impact on productivity	Does not increase productivity	1. Ref.: Walker & Lorsch, 1968 2. If jobs enlarged, productivity & efficiency often decrease. 3. Vis-a-vis functional form, output lower.
11.	Special provisions rewarding personnel	None	
12.	Structure/concept has been applied in the public sector	Yes	

1979). The degree of formalization and standardization within consolidation can vary. Often, consolidation results in increased production output in comparison to the results from dispersed operations. However, the size of the consolidation can become so large that diseconomies and contradictory internal forces begin to cause decreases in productivity (Cason, 1978). Table 4 recaps the evaluation of this concept.

Matrix Structure with Project, Program, and Product Management

Even though the divisional form is regarded as the most common non-traditional structure, the matrix concept and structure have received more literary attention in the past 5 or 6 years. Examination of the matrix structure within this paper is conducted by presenting the matrix configuration in its "pure, theoretical form." Actual project, program, and product management experiences using the matrix structure serve as verification of the conditions and characteristics of the "pure form."

The matrix structure is an attempt at balancing the power between (1) the functional specialists and their managers (who emphasize skills development) and (2) the project, program, or product ("output") managers (who place their priorities on output) (Dessler, 1977). As a result, this structure provides an internally dynamic environment while offering a flexible means of sharing scarce human resources (functional specialists) among the "output" managers (Duncan, 1979; Martin, 1977). This sharing of human resources results in the "free movement" of people who serve two bosses (Davis, 1976; Kolodny, 1979; Thurber, 1978). Some organizations implement special indoctrination and training programs to reduce employee anxiety and discomfort that is often associated with the ambiguous atmosphere (Barks, 1978; Sheridan, 1979).

Table 4
Analysis of Consolidation Using
Twelve Selected Criteria

	Criteria	Evaluation	Comments
1.	Primary purpose for using/establishing the structure	To gain benefits from economies of scale & increase management control	1. Ref.: Child, 1977; Connor, 1978 2. Econ. of scale result from reduced overhead & common use of equipment & facilities. 3. Proximity enhances control.
2.	Organization's inal environment	Both technical and non-technical	No definite trend.
3.	Organization's external environment	Simple; but, either stable or dynamic	1. Ref.: Rumelt, 1974 2. Usually stable; sometimes dynamic, hostile environment present. 3. Market usually integrated.
4.	Degree of decentralized decision making	Low/below average	1. Ref.: Mintzberg, 1979 2. Sometimes very centralized.
5.	Implications for internal communications	Provides opportunity for improved/enhanced comm.	Actual impacts situation-dependent.
6.	Need for special training	None	Except for initial orientation.
7.	Degree of formalization	Medium to high/ ave. to above ave.	Ref.: Child, 1977
8.	Amount of standardization	Medium to high/ average to above average	Ref.: Cason, 1978; Connor, 1978
9.	Job enlargement/ job enrichment	Little/below average	1. Ref.: Child, 1977 2. Cases indicated no enlargement/enrichment. 3. Opportunities exist for increased enrichment/enlargement (Connor, 1978).
10.	Impact on productivity	Positive	Productivity usually increases; can become large enough to induce diseconomies/diminishing returns (Cason, 1978).
11.	Special provisions for recognition	None	
12.	Structure/concept applied in the public sector	Yes	

The structure usually makes minimum use of formalization; however, the function experts and skilled specialists provide a certain degree of standardization (Child, 1977). The matrix structure usually exists in organizations that are technically-oriented while the external environment is consistently complex and dynamic (Drucker, 1977; Fireworker & Bogner, 1980; Mintzberg, 1979; Wilson & Stone, 1980). Most of the evidence points to less than optimum levels of efficiency and productivity when the matrix structure is used (Goodman & Goodman, 1976; Knight, 1976; Mintzberg, 1979; Peters, 1979; Wall, 1978). This reduction in efficiency and productivity is primarily related to the time "lost" to excessive communications among the collocateds, the reduced economies resulting from having to operate decentralized "autonomous" matrix offices, and the inherently slow, deliberate decentralized decision-making process (Goodman & Goodman, 1976; Knight, 1976; Peters, 1979; Sayles & Chandler, 1971).

The evaluations of project, program, and product management result in virtually the same conclusions. One area where there is a difference is in the degree of formalization. Project management and program management (when used in the Department of Defense) exhibit a significant amount of formalization. Perhaps this characteristic is related to the bureaucratic nature of the military and is unrelated to the matrix structure. However, product management in the private sector does not rely heavily upon written rules and procedures (Child, 1977). Another difference is the fact that product management, as a term, is strictly used in the commercial (private) sector. Essentially, in total, there are no major differences among the project, program, and product management concepts when used with the matrix

structure. Tables 5, 6, and 7 contain highlights of the analyses of these three similar concepts.

Management by Committee

Management by committee is a means of dealing with change and a way of gaining wide-spread employee participation in problem-solving and planning. The case study, as reported by Goldstein (1978), occurs in a technical environment; however, it seems applicable to a non-technical situation also. The external environment is relatively simple, but dynamic. This management-by-committee arrangement basically consists of permanent, standing groups whose agendas vary. The committee assignments are a form of recognition and at the same time provide a means of enriching the employees' jobs. A by-product of this structure is the improved interaction and communication among the employees. Due to the written procedures, records, and minutes, a high degree of formalization exists. As a result of the implementation of the committee's proposals, productivity is increased markedly. A recap of the evaluation is provided in Table 8.

Parallel Organizational Structure

The parallel organizational structure, as described by Miller (1978), relies upon managers to form a hierarchy of committees, councils, and teams to participate in corporate problem-solving and planning. These various bodies function in parallel to the day-to-day operating organization; thus, the term "parallel" is derived. The major advantage of this concept is the involvement of middle-level managers in planning and problem-solving. As a result of their participation, managers are given job enrichment and job enlargement opportunities. In addition, as was the case with

Table 5

Analysis of Project Management with Matrix Structure Using Twelve Selected Criteria

	Criteria	Evaluation	Comments
1.	Primary purpose for using/establishing structure	To balance functional & divisional priorities/ emphasises	1. Refs.:Cathey, 1979; Dessler, 1977; Luper, 1979; Sheridan, 1979 2. A means of sharing scarce resources (Duncan, 1979; Martin, 1977). 3. Hutchinson (1976): power unbalanced.
2.	Organization's internal environment	Technical	1. Refs.: Fireworker & Bogner, 1980; Slocum & Hellriegel, 1979; Wilson & Stone; 1980 2. Special trait: delicateness of balance (Lawrence, Kolodny, & Davis, 1977).
3.	Organization's external environment	Complex & dynamic	Refs.: Drucker, 1977; Mintzberg, 1979
4.	Degree of decentralized decision making	High to very high/ above ave. to well above ave.	Refs.: Child, 1977; Knight, 1976; Mintzberg, 1979
5.	Implications for internal communications	Open, free-flowing; amount greatly increased	1. Refs.: Goodman & Goodman, 1976; Knight, 1976
6.	Need for special or additional training	Yes	1. Refs.: Barks, 1978; Mintzberg, 1979; Sheridan, 1979 2. Indoctrination needed to subdue role conflicts, etc.
7.	Degree of formalization	Low to medium/ below average to average	1. Ref.: Child, 1977 2. In defense/defense industry formalization higher.
8.	Amount of standardization	Low to med./below average to average	1. Ref.: Child, 1977 2. Provided by functional specialists.
9.	Job enlargement/ job enrichment	Medium/average enrichment	Ref.: Wall, 1980
10.	Impact on productivity	Usually no increase	1. Refs.: Goodman & Goodman, 1976; Mintzberg, 1979; Knight, 1976; Peters, 1979; Wall, 1978. 2. Too much time in comm./dec. making. 3. Jacobs (1976) disagrees; output increases.
11.	Special provisions for recognition	Little to some/below ave. to ave.	Wall (1980): functional specialists benefit, have associateion with project; resembles job enrichment.
12.	Structure/concept applies in public sector	Yes	Synonym for program management.

Table 6
Analysis of Program Management with Matrix Structure Using
Twelve Selected Criteria

	Criteria	Evaluation	Comments
1.	Primary purpose for using/establishing the structure	To balance functional & divisional priorities & emphasises	1. Refs.: Baumgartner, 1979; Thurber, 1978 2. A means of sharing scarce resources (Martin, 1977; Thurber, 1978). 3. Hutchinson (1976): power unbalanced.
2.	Organization's internal environment	Technical	1. Refs.: Baumgartner, 1979; Sayles & Chandler, 1971 2. Special trait: delecateness of balance & potential unstableness (Lawrence, et al 1977). 3. Functional specialists provide stability.
3.	Organization's external environment	Complex & dynamic	Refs.: Drucker, 1977; Mintzberg, 1979
4.	Degree of decentralized decision making	High to very high/ above ave. to well above ave.	Refs.: Child, 1977; Knight, 1976; Mintzberg, 1979
5.	Implications for internal communications	Open, free-flowing; amount greatly increased	1. Refs.: Baumgartner, 1979; Goodman & Goodman, 1976; Knight, 1976 2. Wall (1978): communications too complicated and too slow.
6.	Need for special or additional training	Yes	1. Refs.: Barks, 1978; Mintzberg, 1979; Sheridan, 1979 2. Orientation & indoctrination needed to subdue role conflicts & ambivalence.
7.	Degree of formalization	Medium to high/ ave. to above ave.	Due primarily to bureaucratic nature of defense department.
8.	Amount of standardization	Low to medium/ below ave. to ave.	1. Ref.: Child, 1977 2. Provided by functional specialists.
9.	Job enlargement/ job enrichment	Medium/average enrichment	Ref.: Wall, 1980
10.	Impact on productivity	Usually no increase	1. Ref.: Wall, 1978 2. Excessive time spent communicating & decision making.
11.	Special provisions for recognition	Little	Wall (1980): Form of recognition is perceived by functional specialists; resembles job enrichment.
12.	Structure/concept applied in the public sector	Yes	

Table 7

Analysis of Product Management with Matrix Structure Using Twelve Selected Criteria

Criteria	Evaluation	Comments
1. Primary purpose for using/establishing structure	To balance functional & divisional priorities & emphasis	1. Focus on product output without stifling functional experts (Galbraith, 1971). 2. Provides flexibility. 3. Hutchinson (1976) contends product mgr. has power.
2. Organization's internal environment	Technical, or at least semi-technical	1. Special trait: dynamic nature; functional experts add stability. 2. Concept not applied to shop level, etc. (Connor, 1978; Galbraith, 1971).
3. Organization's external environment	Complex & dynamic	Market is usally diversified (Rowen, Howell, & Gugliotti, 1980).
4. Degree of decentralized decision making	High to very high/ above ave. to well above ave.	Refs.: Child, 1977; Knight, 1976; Mintzberg, 1979
5. Implications for internal communications	Open, free-flowing; amount greatly increased	1. Refs.: Goodman & Goodman, 1976; Knight, 1976 2. Wall (1978): communications too complicated & too slow.
6. Need for special or additional training	Yes	1. Refs.: Barks, 1978; Mintzberg, 1979; Sheridan, 1979 2. Orientation & training needed to ease role conflicts.
7. Degree of formalization	Low to medium/ below ave. to ave.	1. Refs.: Child, 1977; Galbraith, 1971 2. Varies with amount of control desired. 3. Not implemented at shop level.
8. Amount of standardization	Low to medium/ below ave. to ave.	1. Ref.: Galbraith, 1971 2. Varies with amount of control desired. 3. Not implemented at shop level.
9. Job enlargement/ job enrichment	Usually no job enlargement, limited enrichment	Ref.: Wall, 1980
10. Impact on productivity	Usually no increase	1. Ref.: Wall, 1980 2. Excessive time spent in decision making & communications.
11. Special provisions recognition	Little	Wall (1980): Indirect reward to functional specialists; resembles job enrichment.
12. Structure/concept applied in the public sector	No	

Table 8

Analysis of Management by Committee Using

Twelve Selected Criteria

	Criteria	Evaluation	Comments
1.	Primary purpose for using/establishing the structure	To deal with change/or make organization more responsive to change	1. Ref.: Goldstein, 1978 2. Uses wide base of employee participation. 3. Structure an adjunct to the operating structure (Ackoff, 1974).
2.	Organization's internal environment	Both technical and non-technical	Ref.: Goldstein, 1978
3.	Organization's external environment	Simple & dynamic	
4.	Degree of decentralized decision making	Medium to high/average to above average	Permits employee, especially middle-level management, to participate in decision making.
5.	Implications for internal communications	Improves formal & informal communications	
6.	Need for special or additional training	Little/below average	Minimal training required for committee procedures.
7.	Degree of formalization	Medium to high/average to above average	Depends upon extensiveness and comprehensiveness of committee rules, procedures.
8.	Amount of standardization	Low/below average	
9.	Job enlargement/ job enrichment	High/above average job enrichment	Job enrichment a major benefit.
10.	Impact on productivity	Positive	1. Ref.: Goldstein, 1978 2. Productivity increased significantly as a result of implementing committee recommendations; meetings consumed employees' time.
11.	Special provisions for recognizing or rewarding personnel	Some/above average	Employees perceived participation as a means of recognition; morale was uplifted.
12.	Structure/concept applied in the public sector	Yes	

management by committee, membership in these various parallel groups is a form of recognition and reward. Another benefit is the improved and increased communications that result. Furthermore, this committee structure results in a more decentralized decision-making process. But, the structure requires a high degree of formalization in the form of written minutes and reports. These activities consume 15 to 20% of the participants' time. (For organizations that are undermanned, or whose managers are fully utilized, this arrangement would require shifts in workload or hiring of additional managers.) As these committees and groups complete their planning and problem-solving efforts, new assignments are given. The internal environment of the corporation cited is somewhat technical (foundry in the automotive industry). However, it seems feasible that this structure could be applied to non-technical areas. The external environment, for the automotive industry, at the time of the study, was becoming dynamic.

From the case study, it appears that the parallel organizational structure can be applied in a stable, as well as a mildly dynamic, environment. Table 9 contains a condensed version of this analysis.

Team Concept

From the evidence contained in the case studies and accounts reviewed, the team approach is successful in providing job enlargement for employees who are dissatisfied and bored with their highly repetitive tasks (McKenna, 1977; Poza & Markus, 1980; Tichy, 1976). The external environment is simple and stable most of the time. Even though the internal environment is semi-technical or technical, the tasks to be performed by the teams are divided into relatively simple steps. Team members are trained and given opportunities to accomplish all of the tasks required to complete the job which

Table 9

Analysis of the Parallel Organizational Structure Using Twelve Selected Criteria

Criteria	Evaluation	Comments
1. Primary purpose for using/establishing the structure	Planning & problem solving	1. Ref.: Miller, 1978 2. Management-level employee participation enables changes to be made.
2. Organization's internal environment	Technical to semi-technical	Miller's (1978) example: automotive steel industry; however, conceivable that concept can be applied in non-technical areas.
3. Oragnization's external environment	Simple and stable or slightly dynamic	1. At times, environment very dynamic. 2. Market diverse.
4. Degree of decentralized decision making	High/above average	A major benefit of this concept is decentralized decision making.
5. Implications for internal communications	Improved; greatly enhanced	Reduces the number of vertical layers through which communication passes.
6. Need for special or additional training	Little/below average	Minimal training required for committee procedures.
7. Degree of formalization	High/above average	Rules, procedures, etc. are extensive.
8. Amount of standardization	Low/below average	1. Minimum standardization is conducive to planning and problem solving. 2. Outputs (reports/minutes) standardized.
9. Job enlargement/ job enrichment	High/above average job enrichment	Minimum job enlargement unless committee membership considered as a reduction in horizontal specialization.
10. Impact on productivity	Unknown/no data provided	Committee business consumed 15% - 20% of participants' time (Miller, 1978).
11. Special provisions for recognizing or rewarding personnel	Yes	Parallel committee, council, and team membership a special recognition/reward for those who performed will or had top ratings (Miller, 1978).
12. Whether or not structure/concept applied in public sector	No	

the team is required to do (Tichy, 1976).

As in the cases from the Bureau of Retirement and Survivors (McKenna, 1977) and Sherwin Williams (Poza & Markus, 1980), a significant amount of job enrichment can be provided. However, when the team concept is applied in the industrial production assembly line environment, the team's workflow is aided and influenced by automated machinery and conveyor systems. As a result, the amount of job enrichment is severely limited (Tichy, 1976). Nevertheless, formal and informal communication among team members are frequent, free-flowing, and significantly enhanced (Tichy, 1976). There is a high degree of standardization due to the required technical specifications of the output (Poza & Markus, 1980; Tichy, 1976). The concept is very successful in improving employee morale and, in the long run, increases significantly the production output (McKenna, 1977; Poza & Markus, 1980; Tichy, 1976). Details of the evaluation are summarized in Table 10.

Comments

As a result of these evaluations, the characteristics and special conditions of each of the structural concepts have been identified. As a result of this information, a clearer picture of when and where to apply these concepts has also been provided. However, some additional thoughts and considerations, along with several concluding remarks and a few recommendations, will be presented in the following final chapter.

Table 10

Analysis of the Team Approach or Concept Using Twelve Selected Criteria

Criteria	Evaluation	Comments
1. Primary purpose for using/establishing the structure	Job enlargement	1. Refs.: McKenna, 1977; Poza & Markus, 1980; Tichy, 1976
2. Organization's internal environment	Technical & semi-technical	Applied in production-line, batch processing, and sequential processing line environments (McKenna, 1977; Poza & Markus, 1980; Tichy, 1976).
3. Organization's external environment	Simple & stable	Confronted with integrated markets.
4. Degree of decentralized decision making	Varied	Machine-controlled process in Volvo application (Tichy, 1976) and work-assigned process in the Social Security Bureau case (McKenna, 1977) allowed little decentralization. Sherwin-Williams' operation permitted decentralization (Poza & Markus, 1980).
5. Implications for internal environment	Improved within team	1. Open, free-flowing among team members. 2. Sherwin-Williams case resulted in increased communication plant-wide (McKenna, 1977).
6. Need for special or additional training	Yes	Team members given extensive training to master all tasks.
7. Degree of formalization	Low to medium/ below average to average	Generally little formalization due to high standardization of output.
8. Amount of standardization	High to very high/ above ave. to well above ave.	Sherwin-Williams set high standards for output(Poza & Markus, 1980). Others standardized or controlled but not to such a degree.
9. Job enlargement/ job enrichment	Very high/well above ave. for enlargement; limited amt. of enrich.	1. Significant job enlargement in all three cases. 2. Naturally, accompanied by some job enrichment, but only in the Sherwin-Williams case (Poza & Markus, 1980) was the increase significant.
10. Impact on productivity	Very positive	All three examples showed increases in output/overall performance.
11. Special provisions for recognition	None	
12. Concept applied in the public sector	Yes	

CHAPTER V

DISCUSSION

Comments

From the literature review (primarily covering periodicals and texts over the past 5 or 6 years), it is obvious that organizational structure has been, and continues to be, a subject of much interest. The interrelationships among organizational structure, the organization's internal processes, and the external surroundings are very complex. The importance of structure should not be underestimated, nor overstated. The organizational structure is not the determining factor for success (Lundborg, 1979). Structure, as well as, organizational strategy, leadership, employee effort, competitors, etc. contribute to how well the organization functions. Examining only one of these factors, such as structure, does not provide a comprehensive analysis (Lorsch, 1977). However, examination of organizational structure, as was accomplished in this paper, reveals a great deal.

As previously stated, there are some perplexing questions concerning organizational structure. Most of the focus is upon deciding which are the more appropriate organizational structures or, to be precise, which is the best organizational structure. In order to answer such questions, it is essential to analyze the various structures to determine their general tendencies and characteristics. With analyses and assessments, such as those presented, there are some strong clues as to which organizational structure

would be best suited under certain conditions.

Even with the clues and indicators, the solution/solutions are not self-evident. For instance, there are complications within the analyses of organizational structures. Complications relate to conditions such as the "threshold phenomenon" (Dalton, Tudor, Spendolini, Fielding, & Porter, 1980, p. 61) and "organizational slack" (Litschert & Bonham, 1978, p. 217)

Combined, these conditions help explain why some of the data appear contradictory and why certain organizational structures are "successes" and "failures" under almost identical situations. The "threshold phenomenon" deals with the situation where certain structures are suitable over a range of conditions and, likewise, a certain range and mix of conditions are conducive to more than one type of organizational design (Dalton, et al, 1980). Whereas, "organizational slack" refers to the available amount of excessive organizational resources. This condition denotes the possibility of situations existing where an inappropriate structure succeeds, and succeeds repeatedly, only because there is an excess of personnel, technology, effort, etc. available and applied which allow the structure to succeed despite its ill-fit (Litschert & Bonham, 1978). In combination, these two conditions help explain why contradictions and incorrect conclusions can exist. In other words, they serve notice that some organizational structures could have flaws which excessive resources have covered up, and/or that conditions affecting organizations and their structures could have been within ranges that were tolerable for the particular design concepts.

These two complications are presented to make the point that the assessments and evaluations of the organizational structures cannot be treated as "hard facts." In fact, if one reviews the evaluation results (Tables 2-

10 in Chapter IV), one will note that many of the assessments are not finite, but are general, in many respects, and denote a range of possible conditions and tendencies for each of the structural concepts.

When deciding upon the more appropriate or optimum organizational configuration, there is another consideration that complicates the decision. This consideration concerns the relative importance of each of the factors or evaluation criteria that are to be used in selecting the proper structure. Not only should the criteria be identified, they ought to be weighted. In other words, which is more important: centralization vs decentralization; job enlargement and job enrichment vs specialization; etc.? These kinds of questions need to be addressed. Some choices in organizational structure could be made based on a few criteria instead of an extensive list. Nevertheless, criteria should be defined. Evaluation criteria, such as those provided in the paper, are crucial to selecting the appropriate organizational structure.

Regardless of how comprehensive and "scientific" the evaluation, there is still room for judgement. As pointed out by the "threshold phenomenon" and "organizational slack," there are too many contradictions. In fact, as Benson (1977) emphasizes, "the organization is typically the scene of multiple contradictions" (p. 15).

These difficulties have resulted in such statements as "there is. . .no one approach that is universally sufficient for designing organizations" (Huber, Ullman, & Leifer, 1979, p. 568) and "there is no single sacred organizational structure" (Lundborg, 1979, p. 112). Early in this paper, the limitations of the structural approach are recognized. At the same time, the approach is identified as very useful (even though somewhat limited, but no more so than any other single approach). The structural approach is

considered valid; however, the analyses have to be used with caution and good judgement. Sometimes there are a number of variables, such as organizational strategy, management's philosophies and desires, and communicative and behavioral aspects, which are paramount and which override the more traditional criteria (such as those used by this author in his analysis) (Dalton et al, 1980; Lorsch, 1977).

As a final comment, it is sufficient to state that one can use the results of the organizational structural approach to determine with an adequate degree of confidence, the essential general tendencies and characteristics of organizations. However, a detailed and thorough assessment of existing and estimated future conditions, a complete examination of non-structural considerations, and a statement of top managements' priorities are required before selecting or changing an organizational design structure.

Conclusions

From the documentation, discussion, and evaluations provided, an adequate description of the conditions, special considerations, characteristics, and general tendencies associated with each of the organizational structure has been provided. The evaluation criteria used to describe and analyze the various organizational configurations are rather comprehensive.

As mentioned before, a number of other factors are essential for fully understanding organizational design and the appropriateness of each. Likewise, the various managerial techniques (as described in the second chapter) are also important and provide organizational enhancements. In some cases, these enhancements could be as effective as organizational structural changes.

Several pages have been devoted to the description and explanation of the

two concepts: centralization and decentralization. Both concepts relate to decision making which is a critical issue in organizational design. In fact, from the United States Air Force (USAF) perspective, centralization and, specifically, centralized control are principles for employing aerospace forces. This centralization concept has been reinforced by the USAF preference for the functional form in the basic organizational structural configurations. The functional form is founded upon the division of labor and segregation of disimilar skills/functions. While this form characteristically enhances efficiency and productivity, decentralized decision making is precluded. The divisional form provides the arrangement which allows decentralized decision making. The USAF uses the divisional structure, in the form of major commands (MAJCOMs), as an overlay to its functionally arranged basis. These MAJCOMs are partially self-contained and, primarily, geographically-oriented and devote most of their attention to a specific mission, i.e. tactical, strategic, weapon systems acquisition, etc.

The consolidation concept provides an arrangement which can capitalize on the economies of scale and offers the opportunity for increased control and centralized decision making. The USAF has taken advantage of this concept. However, in some cases, the disadvantages of consolidation have manifested and distracted from its effectiveness.

The matrix structure and its use in project, program, and product management have proven to be most effective in complex, dynamic environments. All three management concepts used in conjunction with the matrix structure are very similar. The USAF has extensively utilized the matrix structure to conduct project and program management within the Air Force Systems Command (AFSC). The ability to share and to fluidly shift scarce human resources

have been a major attraction of the matrix structural concept, as far as the USAF is concerned.

Perhaps management by committee (as a legitimate structural alternative) has been overlooked. This concept incorporates employee participation in planning and problem-solving. As a result, the organization using this structure is responsive to change and incorporates changes which are essential in dynamic surroundings. The USAF has historically used committees to assist in managing such responsibilities as(1) formulating/allocating budgets at MAJCOM level and below via the Financial Working Group and the Financial Management Council,(2) determining civil engineering construction and facility improvement priorities at MAJCOM level and below via the Facilities Utilization Board, and(3) governing officers' and noncommissioned officers' open messes.

The parallel organization is a unique concept that has many of the characteristics of management by committee. Employee participation is also used to assist in planning and problem-solving. Membership on the various councils and teams is a form of reward and recognition. Only top performers are allowed to participate in the parallel organization. The concept is effective in reducing the layers through which the decision-making process has to pass. To this author's knowledge, such a concept does not exist in the USAF.

The final design arrangement is used at the working level. The team concept/approach provides a means of enlarging jobs which were previously composed of a few simple and highly repetitive tasks. With the team approach, portions of the employees are grouped together and given the responsibility for completing a job or a major portion of a job which is composed of a

full range of tasks. Members are trained and given opportunities to do all of the tasks. The results are impressive (i.e. employee morale has improved dramatically, output quality has improved significantly, and productivity has increased markedly). The USAF has recently implemented variants of the team concept. These are referred to as Production Oriented Maintenance Organization (POMO) and Combat Oriented Maintenance Organization (COMO). There were considerations other than job enlargement which convinced the USAF to implement these concepts (i.e. self-contained units, unit identify, etc.). However, some of the characteristics and tendencies are similar to the team approach.

Certainly, it can be concluded that these organizational design concepts provide a wide range of alternatives. However, this author would like to point out that even though the scope of this paper is quite large, the depth of research is limited mainly to literature during the period 1976 to mid-1981. A few key references from the early 1960's and 1970's are used, but, for the most part, only the most recent literature was reviewed. Also, some of the unique concepts and structures such as the parallel organization and a management-by-committee variant (the [theoretical] circular organization) have only one reference. Therefore, it may be worthwhile to expand the research by going back further in time, especially in areas where only one source is cited.

Recommendations

It is recommended that the contents of this paper be used as the point of departure or the introduction for Headquarters Air University (HQ AU) Leadership and Management Development Center's (LMDC's) upcoming

study project on the use of non-traditional methods and concepts of organization within the Air Force. Since this paper is based on material gathered from a review of literature published primarily over the past 6 years (1976 to mid-1981), it is also recommended that literature searches be conducted on material published prior to 1976 and during the past 8 months. In combination, all of the efforts should be used as the initial portion of HQ AU/LMDC's study.

In parallel with the examination of non-traditional organizational design concepts, comparative data should be collected for the traditional approach, if it is being used in a similar situation. The traditional and non-traditional concepts should then be evaluated with identical sets of criteria. It is recommended that a set of criteria, similar to the one contained in this paper, be used. By examining and comparing organizational concepts in this manner, a relatively accurate determination of the effectiveness of the respective concepts can be obtained.

As a result of the information derived from this effort, HQ AU/LMDC and Headquarters Air Force, Manpower and Organization (HQ USAF/MPMO),--study project requestor--should have in-depth knowledge of the strong points and tendencies of each of the organizational concepts. With this basis, it would then seem feasible to examine the USAF for potential situations where the most effective non-traditional organizational design concepts could be applied.

However, before deciding upon any specific organizational design concept or organizational structural change, it is strongly recommended that the evaluation results of the structural concepts be matched with the organization's purpose, goals, and strategy. In addition, high-level management's assessment

of the relative importance of all of the various evaluation factors/criteria must be obtained. All of these considerations, in combination with a list of advantages and disadvantages and estimated implementation costs (funding requirements), should then be used as the basis for decisions on organizational design concepts or organizational structural changes.

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APPENDIX

APPENDIX A

List of Requests

Air University Compendium of Research Topics,
1981 - 1982

Research topics within the Air University Compendium of Research Topics, 1981-1982 that indicate a concern with organizational design.

Item No.	Page No.	Sponsor	Subject
1	5	NCS	Government organization required to carry out national security telecommunications policy to ensure communications during periods of national emergency
2	17	DLA-SEP	Single material manager for subsistence war reserves in Europe
3	42	OJCS/J-5	Unified command structure for the western hemisphere
4	55	HQ USAF/DAY	Delegation of authority--military vs. civilian industry
5	56	HQ USAF/DAX	Alternative organizations for Information Resources Management (IRM) in the future
6	57	HQ USAF/DAX	Consolidated base administration facility
7	70	HQ USAF/CVAH	Strategic force organization
8	83	HQ USAF/LEM	Air Force Specialty Code (AFSC) structure
9	94	AFLMC/LEM	Centralized Technical Order (TO) management (consulting)
10	101	HQ USAF/MPMO	New concepts for organizing the Air Force
11	110	HQ USAF/XOOTS	Creation of Air Refueling Command
12	115	HQ USAF/XOXFD	Organizational structure to support shuttle operations
13	135	HQ AFCC/SAM	Single command management of base service functions
14	154	AFDSDC/DMTD	Decentralization in Office of the Future Environment
15	156	AFDSDC/LG	Evaluating the operational support effectiveness of a vertically structured logistics system
16	162	AFLC/CCS	Logistics management centralization Diseconomies of scale
17	195	ESD/TO	Evaluation of matrix management
18	202	HQ AFCMD/QAX	The future of Contact Administration Services (CAS)

Item No.	Page No.	Sponsor	Subject
19	208	HQ ESD/ACEP	Allocation of program control resources in the acquisition management area
20	216	HQ AFSC/TEVA	Centralized OSD test organization
21	235	AFSC/SDN	Consolidation of military uniform development
22	255	HQ ATC/XPXC	Establishment of space command
23	260	HQ ATC/TTYK	Space resources and weapon system R & D, employment and support
24	267	HQ ATC/ACMS	The effects of centralization/consolidation of support activities
25	274	HQ ATC/DA	Organizational development
26	321	HQ MAC/DPXX	Is a new command structure/AFSC needed for readiness?
27	335	HQ AFSC/JA	Merger of the Army and Air Force Exchange Service (AAFES) with the Army and Air Force Commissary services
28	346	HQ SAC/SXRS	Organization for space
29	343	HQ SAC/SXRS	Strategic space missions
30	353	HQ SAC/INXX	A coherent organizational structure for Air Force intelligence
31	369	USAF/TAC Joint Studies Group	Intentioned formation of a U.S. space force as an independent, co-equal military service
32	413	AF/LEXP	Centralized Intermediate Repair Facilities (CIRF) concept for USAFE
33	431	HQ AFMPC/ MPCROS7A	Future space organization
34	462	ADCOM/J-5XA	Organizing to meet the challenge of space
35	85	AFLMC/LGX	Logistics Command, Control, Communication
36	208	HQ ESD/OCT-4	Space Defense Command, Control and Communications (C^3) Implementation Methodology