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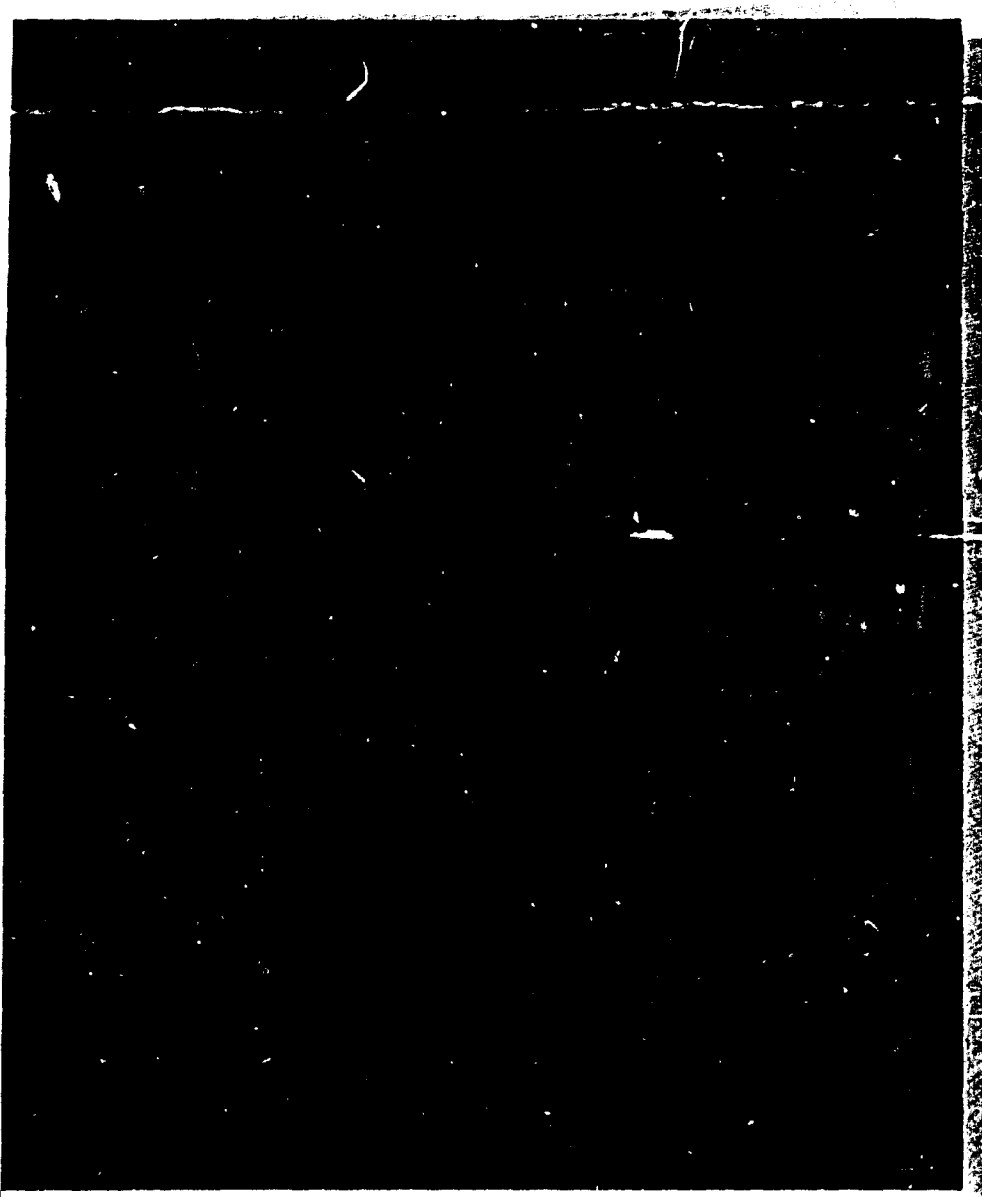

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PROGRAMS

Technical Report
Phase II

SRI Project 6329

ORGANIZATIONAL DESIGN— PROCESS AND CONCEPTS

By:

Howard M. Vollmer

in collaboration with

John J. McAuliffe
William C. Pedersen

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PREFACE

This is a report on Phase II of a three-year study initiated by members of the Organization and Manpower Studies group of the Institute's Technological and Social Change Programs (formerly the Technology Management Programs). Since 1963, staff members of this activity have conducted research on the structure, organization, and dynamics of the R&D industry; the social and economic impacts of R&D; the organization and management of R&D and other high technology activities; technology utilization and transfer; technological and social forecasting; scientific and technical manpower; science policy and the allocation of scientific and technical resources; and the development of systems analysis and other analytical methods useful in research on these topics. The results of this research are published or disseminated in the Institute's "R&D Studies Series," books, magazine and journal articles, and reprinted conference addresses.

Further work on this study is being continued by the senior author in collaboration with other members of the newly formed Human Development Research Department in the Institute. This department is conducting research in fields of management and organizational development, manpower, and education.

ACKNOWLEDGMENTS

The authors of this report wish to express appreciation to many colleagues at Stanford Research Institute who have made past and present contributions to the ideas that have gone into this report. Sincere appreciation is also due to many staff members of the organizations studied in connection with the present phase of this study, who gave freely from their own thoughts and experiences related to the organizational design process and thus made this analysis possible. They are too numerous to list completely by name here. Among those who have been especially helpful, however, are:

Brian Usilaner, Office of Budget Review, Bureau of the Budget

Alan Dean, Assistant Secretary for Administration, Department of Transportation

John McGruder, Director of Management Systems, Department of Transportation

Leo Werts, Assistant Secretary for Administration, Department of Labor

William Kolberg, Associate Manpower Administrator, Department of Labor

Walter Hahn, Assistant Deputy Administrator for Policy Development, Environmental Science Services Administration

(The late) Merrill Wallenstein, Special Assistant to the Director, National Bureau of Standards

Robert Ferguson, Special Assistant for Program Planning, National Bureau of Standards

Frank Jasinsky, Director of Career Development, TRW Systems, Inc.

Jack Fordyce, Manager of Training, TRW Systems, Inc.

William Baker, Vice President for Research, the Bell Telephone Laboratories

Donald Benedict, President, the Oregon Graduate Center

The interpretations of the organizational design efforts that have occurred in the above organizations and are reported herein are those of the authors of this report and do not necessarily reflect official interpretations of the agencies and institutions involved or the individual views of those who granted us access to study organizational design activities in these organizations. Organizational design is still more an art than a science; thus, there is room for considerable differences in individual views and approaches. Hopefully, however, as individual experiences in organizational design accumulate, are reported, and are studied analytically, this will become a more systematic art. What Congressman Emilio Daddario said recently in a more general context certainly applies to the field of organizational design:

> The federal government and academic science are today engaged as allies with the pressing challenge of the present. America is faced with many new physical, social, economic, and security problems. These problems and conditions will be neither removed nor resolved without new tools, new methods, new approaches. Since we do not have all the necessary tools, methods, and approaches, we must develop them. There is only one way to do that, and that is through research, and people who have been adequately trained to do it.

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Chapter 1

INTRODUCTION AND SUMMARY

"Organizational design" is a field in which interest is growing, both in the United States and abroad. It seeks to draw on all that has gone before in organizational theory from a variety of sources--including the behavioral sciences, management sciences, industrial engineering, economics, political science, and general systems analysis. It is concerned with sifting through these various theoretical and pragmatic contributions to abstract systematic principles, guidelines, and methods of approach that can be used by top level corporate officers, planners, consultants, and all who are concerned with designing more effective organizational entities.

The translation of organizational theory into practical guidelines for the design of new organizational structures, or the redesign of existing ones, is not a simple matter. Its complexities are akin to those in the general relations of science to engineering. It is not merely a straightforward job of translating information from one language or jargon to another. It requires the linking together of two cultures that prevail in the world of the theorist (e.g., the scholar) on one hand and the world of the activist (e.g., the politician or the businessman) on the other hand. Both have much to offer each other. The theorist--insofar as his theory is soundly based in empirical verification--has concepts, methods of approach, and general information that could make the political leader or the business leader much more effective and efficient in his day-to-day activities. Conversely, the leader in practical affairs is in daily contact with a wealth of problems and has experiences both of success and of failure in handling these problems that could greatly enrich theoretical enquiry if these experiences could be brought into the theorist's frame of reference more easily.

This is certainly true in the newly developing field organizational design. Since the beginning of recorded history, organizations have been designed on an ad hoc basis--the "datum of one" experience of the designer himself. On the other side, in recent years there has been a proliferation of books and reports on organizational theory, but with little attention given to their practical implications. In present times, it is

more important than ever before to build systematic links between organizational theory and the practical concerns of organizational design. Rapidly changing technology has made many forms of governmental, military, and industrial organization obsolete--or they will become obsolete in the near future. What is even more pressing is the growing "crisis of authority" that is infecting an increasing range of governmental, educational, business, religious, and other institutions in modern society in the face of rapid changes in social structure and in basic human values.

What kind of a bridge will be built between theory and practice to make organizations and institutions more effective and more adaptable to technological and social change in the future?

It is our general conclusion, based on our studies, that this bridge needs two fundamental ingredients--(1) people who are educated and skilled both in organizational theory and in the application of this theory to the design of new organizational forms (i.e., a profession of organizational designers) and (2) concepts that are theoretically sound and yet have practical usefulness in linking theory with specific steps in the organizational design process (i.e., the body of theory necessary for the development of this profession).

The present report on Phase II of this study seeks to make a contribution to this theory by developing a body of concepts that are related systematically to different steps in the organizational design process. References are also made at several points in this report (and in the report on Phase I) to the development of people in the organizational design profession and to the different roles that they can assume. The third and final phase of this study is planned to bring together these efforts at concept development and people development and to demonstrate further their applicability to current institutional problems.

Research Objectives

The specific objectives of the three one-year phases of this study are as follows, by phase:

I To identify major problems in modern organizations that are amenable to organizational design solutions, to indicate the basic bodies of theory from which these design solutions might be derived, and to make a preliminary specification of steps in the organizational design process.

II To make a further specification of steps in the organizational design process based on recent or ongoing organizational design efforts, to analyze the strengths and weaknesses of different strategies of organizational design, and to specify the manner in which different conceptual formulations can be used as tools in different parts of the design process.

III To test the usefulness of conceiving the organizational design process in terms of the strategies and component steps developed in this study as applied to ongoing design efforts, to check the usefulness of the conceptual tools developed for application in connection with each step of the process, and to report the results of this total investigation in the form of a "Handbook of Organizational Design" appropriate for the use of managers in innovative forms of organization in government or private institutions.

Content of Phase I

The findings of Phase I of this study have been reported in H. M. Vollmer, et al., Organizational Design--an Exploratory Study, R&D Studies Series, Stanford Research Institute, Menlo Park, California, 1967. This report indicated that the major problems in modern organizations for which organizational design solutions could be especially appropriate include the following:

- The problem of aligning the needs of individuals and the needs of employing organizations and of identifying and managing "adaptation mechanisms" that can merge these two sets of needs
- The problem of designing organizations so that they do not act as "consumers of talent"; i.e., the problem of alleviating technical and managerial obsolescence
- The problem of designing organizations so that they do not act as "wasters of talent"; i.e., the problem of alleviating the underutilization of actual or potential talent
- The problem of designing organizations so that they encourage innovative behavior and channel such behavior in constructive directions

The report also includes a preliminary identification of major steps in the organizational design process and shows how these steps could be applied in the design of (1) fundamental research organizations, (2) emergency public service organizations, (3) a manpower development program, and (4) a mass-production factory.

Content of Phase II

The present report, covering work accomplished in Phase II of this study, draws on ten recent or ongoing examples of organizational design activities to provide a basis for further specification of design strategies, basic steps in the design process, and conceptual tools connected with these steps.

Chapter II provides summary descriptions of the major examples of design efforts drawn on this purpose, including:

- The Department of Transportation
- The Manpower Administration (Department of Labor)
- The Environmental Science Services Administration (Department of Commerce)
- The National Bureau of Standards (Department of Commerce)
- TRW Systems, Inc.
- The Bell Telephone Laboratories
- "Modern Chemical Corporation"
- "The University Research Laboratories"
- The Oregon Graduate Center
- "An Independent Research Organization"

Chapter III describes the advantages and disadvantages of three different strategies of organizational design, including (1) the Engineering Strategy, (2) the Behavioral Strategy, and (3) the Systems Strategy.

Chapters IV through VII cover four major components of the process of organizational design:

- Diagnosis of organizational goals and problems
- Analysis and resynthesis of organizational structure
- Implementation of organizational design
- Evaluation of organizational design

Conceptual Definitions

The conceptual definitions developed in this phase of the study and applied to one or more of the major components of the organizational design process include the following:

- Organizational Goal(s): a definition of the overall purpose of organized activity, in relation to which all roles, functions, and policies within the organizational entity are ultimately evaluated. (See Chapter IV.)
  - Operational Goals: the main outputs (goods and/or services) that an organization is expected to produce for beneficiaries (e.g., owners, stockholders, customers, clients, and employees).
  - Maintenance Goals: the main characteristics of the organizational system that are expected to prevail (e.g., growth, and length of life of the organizational entity).
- Organizational Objectives: a definition of measurable accomplishments that are viewed as related to organizational goals--i.e., indicators of progress toward the attainment of organizational goals. (See Chapter IV.)
  - Operational Objectives: measurable standards of quantity and quality as applied to organizational outputs (e.g., production rates and reject rates).
  - Maintenance Objectives: measurable standards applied to characteristics of the organizational system (e.g., rate of growth and length of life of the organization).

- Organizational Structure: the differentiation and integration of policies, functions, and roles established to attain organizational objectives. (See Chapters IV and V.)

  - Organizational Policies: authoritative statements intended to guide the actions of those in organizational roles toward the attainment of organizational goals and objectives.

  - Organizational Functions: major groupings of related categories of work (e.g., into divisions or departments) in ways intended to support the attainment of organizational objectives.

  - Organizational Roles: the constellation of rights and duties that are attributed to individuals who are commonly viewed as contributing to the attainment of organizational objectives.

- Personal Goals: a definition of the work and career goals of individuals within an organizational entity. (Chapter IV.)

- Organizational Socialization Process: the process whereby personal goals tend to become redefined in alignment with organizational goals. (Chapter IV.)

- Leadership Decision-Making Process: the process whereby organizational goals are defined by those who assume leadership roles in an organization. (Chapter IV.)

- Systemic Disturbance: categorization of an organizational problem in terms of a disturbance in the abilities of an organization as a social-political-economic system to attain its stated goals. (Chapter IV.)

- Symptoms: overt manifestations of underlying systemic disturbances. (Chapter IV.)

- Systemic Remedies: prescriptions of organizational design changes that correct systemic disturbances so that organizational problems are removed or satisfactorily alleviated. (Chapter IV.)

- Palliative Remedies: prescriptions of organizational design changes that remove (or cloak) symptoms, but do not affect systemic disturbances. (Chapter IV.)

- Organizational Authority: the recognized right of individuals in certain organizational roles to influence the actions of individuals in other organizational roles within the scope of recognized limits. (See Chapter V.) This authority can take the form of:

  - Administrative Authority: the recognized right of individuals in certain managerial roles to exercise one or more of the following:

    Staffing Authority--the right to hire, transfer, and terminate assigned personnel.

    General Policy Authority--the right to state principles intended to guide the general actions of assigned personnel.

    Work Assignment Authority--the right to designate work tasks for assigned personnel.

    Work Control Authority--the right to direct assigned personnel in the performance of their day-to-day work activities, to inspect the quality and quantity of these activities, and to initiate actions to correct deficiencies in these activities.

    Arbitration Authority--the right to settle work-related disputes referred for judgment by assigned employees.

  - Functional Authority: the recognized right of individuals in certain managerial or staff specialist roles to exercise one or both of the following:

    Functional Policy Authority--the right to state principles intended to guide the actions of assigned personnel in certain specified functional areas (e.g., financial accounting, personnel practices, health and safety, legal and contractual matters, and security).

    Functional Control Authority--the right to direct assigned personnel in the aspects of their day-to-day work that relate to specified functional areas, to inspect work activities in this regard, and to initiate action to correct deficiencies in these areas.

- Initiating Authority: the recognized right of individuals in certain organizational roles to initiate the actions of individuals in other roles in ways that contribute to the accomplishment of a sequence of materials, personnel, information, or financial flow processing.

- Project Authority: the recognized right of individuals in certain organizational roles to exercise staffing authority, general policy authority, work assignment authority, work control authority, and/or arbitration authority for a limited time period and for the accomplishment of a specific organizational objective.

- Implementation of Organizational Design: the process whereby new descriptions of organizational policy, organizational functions, and organizational roles are assimilated into the day-to-day activities of an organizational entity. (See Chapter VI.)

- Organizational Property: the resources of an organization (funds, facilities, equipment, personnel, information, and so forth) to which individuals in certain roles are given access and control that are not available to other individuals within the organization. (Chapter VI.)

- Organizational Status: the rank ordering of organizational roles from those to which high prestige is attributed to those to which low prestige is attributed within an organizational context. (Chapter VI.)

- Communications Position: the access that members of an organization have to communications relevant to their work and to their careers, as a result of their position in the organization (i.e., job and role) and their location in space. (Chapter VI.)

- Evaluation of Organizational Design: the process whereby an assessment is made of the effectiveness, efficiency, and timeliness of an organizational design effort. (See Chapter VII.)

- Organizational Effectiveness: the extent to which a particular form of organizational structure (policies, functions, and roles) contributes to the attainment of organizational goals. (Chapter VII.)

- Organizational Efficiency: the extent to which a particular form of organizational structure contributes to the attainment of organizational goals in a manner that minimizes economic and psychological costs of the structure. (Chapter VII.)

- Timeliness of Organizational Design: the relationship of changes in organizational structure to other simultaneous changes that influence organizational effectiveness or efficiency. (Chapter VII.)

The Organizational Design Process

Analysis of the examples of organizational design reviewed in this phase of the study indicates that the total organizational design process includes the steps listed under each of the following components:

- Diagnosis of Organizational Goals and Problems (Chapter IV)
  - Entrée
  - Data collection
  - Analysis and categorization
  - Verification
  - Feedback
  - Prescription
- Analysis and Resynthesis of Organizational Structure (Chapter V)
  - Identification of authority patterns
  - Analysis of interaction of roles
  - Analysis of functional differentiation
  - Analysis of policy development
  - Resynthesis of structural arrangements

- Implementation of Organizational Design (Chapter VI)
  - Identification of human effects
  - Determination of approach
  - Assignment of responsibilities and resources
  - Conduct of implementation activities
  - Monitoring of feedback
- Evaluation of Organizational Design (Chapter VII)
  - Specification of objectives
  - Development of criteria for measurement
  - Design of methodology
  - Integrative synthesis
  - Collection of evaluative data
  - Interpretation of evaluative data
  - Use of evaluative information

Chapter II

EXAMPLES OF ORGANIZATIONAL DESIGN EFFORTS

As in most studies of organizations in real-life situations, this analytical effort had to utilize "targets of opportunity." Cases in which organizational design or redesign efforts were currently under way, or had fairly recently occurred, were examined to derive basic concepts, methods, and general guidelines that would be useful to organizational designers in future efforts.

As it turned out in this Phase II investigation, there were ten examples of organizational design that were readily available to the authors and that could be drawn on for this purpose. They represented a variety of institutional settings. Four examples were cases of design (or major organizational change) in federal government agencies. Three were from private industry. Two more concerned university-level educational institutions, and the final one was an independent research organization. They also varied in size, from the design of the massive federal Department of Transportation to that of the small, but growing, Oregon Graduate Center.

In the various cases examined, information was collected on organizational design concepts and approaches by means of personal interviews with key persons in the design process; by examination of written records of steps taken in the design process (including both published and unpublished records); and, where possible, by observation of task force meetings and other kinds of behavior that reflected design activities. In a few cases, these sources of information were supplemented by questionnaire or interview data on attitudes of members of the organization regarding matters pertaining to design activities.

In each case, the senior author or one of his co-investigators, John J. McAuliffe or William C. Pedersen, searched for information related to the following general questions:

1. What was the overall strategy of organizational design reflected in the particular example under examination?

2. What kind of diagnosis of organizational goals and problems was used as a basis for organizational design in each example?

3. What forms of organizational structure, or changes in organizational structure, were derived from this diagnosis?

4. How were new organizational designs implemented in the day-to-day behavior of members of the organization?

5. What methods are being used to evaluate the effectiveness of these design changes?

The information generated to answer the above questions for each of the examples investigated is not presented herein because it was not the purpose of this study to make a systematic comparative analysis of the ten examples. Instead, as indicated, it was the objective of this investigation to derive guidelines useful to the designers of future organizational entities. Therefore, such guidelines relating to each of the above five general questions is presented in the five chapters following.

Herein, for the general reference of the reader, are presented brief descriptions of the ten organizational design examples that provided the basis for the conclusions presented in the succeeding chapters.

The Department of Transportation

As early as 1874, a proposal to establish a Bureau of Transportation to coordinate and regulate transportation functions was introduced in Congress, but subsequently no centralized effort was developed. Federal transportation functions eventually evolved as relatively uncoordinated functions of separate departments and agencies. Following World War II, with encouragement by the Bureau of the Budget, the proposals for centralizing transportation functions at the federal level became more numerous and more energetically pressed. In 1949, a task force of the Hoover Commission recommended the establishment of a transportation department. That same year the Department of Commerce was selected as a "holding company" to begin to gather federal functions and entities related to transportation. The Bureau of Public Roads, Civil Aeronautics Authority, and Federal Highway Commission were transferred to Commerce in 1949, and in 1950 an Undersecretary for Transportation was appointed in the Department of Commerce. However, the concept of a separate department of transportation received a serious setback when the Federal Aviation Administration broke away from the Department of Commerce and became a separate agency in 1958.

Continuing work on the problem of the federal role in transportation undertaken originally during the Kennedy administration took a new direction in 1964 when President Johnson appointed a task force to study transportation needs and functions. At the same time, he also appointed a task force to study the general organization of all government functions. Both task forces recommended the establishment of a separate department for transportation. Alan Boyd, then Undersecretary for Transportation in the Department of Commerce, also made a similar recommendation. Still, resistance within certain sectors of the transportation industry and the federal government delayed further action on the problem. It was therefore a somewhat unexpected event in some quarters when President Johnson recommended to the Congress in his State of the Union message on January 12, 1966, that a cabinet level Department of Transportation be created.

Undersecretary Boyd and his small group of key advisers faced the massive task of developing an organizational plan and implementing details to gather the activities of some 30 existing and dispersed transportation groups and agencies into a single entity--an entity that could not be built on any inherited institution or management system. Compounding the problem of acquiring the appropriate functions and organizing the department was the need to keep the department alive in an environment somewhat hostile to its birth. Thus, the problem of organizational survival and maintenance had to be dealt with at the same time that the problem of organizational design and implementation was faced.

The Undersecretary and a few key people had given considerable prior thought to the programs, functions, and organizational design of such a department, but much still remained to be done. Final decisions had to be made on the specific functions and programs to be assigned to the department, the powers and authority to be invested, and how it should be organized to carry out its mission. A task force including representatives of other agencies of government as well as some of the agencies expected to be affected was immediately appointed to draft the necessary legislation and to develop plans for organizing the department. This group also gave advice to Undersecretary Boyd and his key planning group on the scope of functions and authority to be vested in the department. The resulting legislation, after amendments by both the House and the Senate, was approved by the Congress and signed by the President on October 15, 1966.

While the task force was at work, Boyd continued to work with his small group of people who had conceived and developed the original organizational proposals and concepts, many of which were reflected in the legislation creating the department. The central theme in their design

was to have the operating functions performed by a small number of decentralized but coordinated Administrations that reflected the various transportation modes. Five Administrations were included: Federal Aviation, Federal Highway, Federal Railroad, St. Lawrence Seaway Development Corporation, and U.S. Coast Guard. (Originally, it was proposed that the Maritime Administration be included, but this proposal was eliminated in the final act.) A sixth administration, Urban Mass Transit, was added later by transfer of this function from HUD to DOT. The heads of these Administrations were to report directly to the Secretary rather than through Assistant Secretaries, and most of the line authority and operating responsibility was to be vested in them. (This differs markedly from the more traditional government organizations that utilize Assistant Secretaries as supervisors or coordinators of line bureaus.) The Office of the Secretary was intended to focus its attention on those matters of policy, program, and management that required central leadership, department-wide perspectives, and intermodal action. The Assistant Secretaries were to be planners and advisers to the Secretary and were to provide staff leadership, planning, and coordination in their areas (policy development, international affairs, public affairs, research and technology, and administration). A General Counsel placed at the Assistant Secretary level was to perform similar functions in legal matters. In policy councils, the Secretary would draw on both his staff (Assistant Secretaries) and his line people (Administrators) for inputs to his operating decisions.

Two principal means were used to structure the initial design effort. The first was to utilize a small group of key executives, headed by the Undersecretary of Commerce, who were experienced in government and involved in transportation functions. They hammered out the design for the main structure and principles of operation for the proposed department. The second was to use a task force of upper middle management executives from several agencies of the federal government to develop the more detailed plans and proposals for transportation functions to be assumed and the powers and authority needed. They also investigated and recommended alternative forms of organization. Final decisions remained with the Undersecretary and his key advisers, but broad representation from other branches of the government contributed significantly to the knowledge required for the final organization, operation, and survival of the department.[1]

The Manpower Administration

In 1954 Secretary Mitchell of the Department of Labor started an effort to analyze manpower programs and their relationship to the departmental organization. In so doing he raised questions about fundamental goals and missions. This was in response to post-Korean manpower problems.[2]

During the later 1950s, there was a definition of plans for enlarging manpower services, but no money was made available for this purpose. An attempt was made in the early 1960s to revitalize employment services, and funds were then made available by the President. However, officials in several Bureaus within the Department were successful in resisting efforts toward reorganization. The heads of some activities were aided in this resistance by constituents outside the Department. In 1963, a blueprint was developed for an "ideal" labor department organization, but resistance again occurred and no progress was forthcoming. More recently top officials in the Department have again expressed a belief that the Department must be reorganized to enhance flexibility and adaptability in its manpower programs. The main question became "What kind of organization and support groups should the Secretary have to respond to change and to test his ideas, concepts, and decisions in the manpower programs area?"

On March 14, 1967, Secretary of Labor Wirtz issued Order No. 4-67 creating the Office of the Assistant Secretary of Labor for Manpower, under the direction of Stanley Ruttenberg. He also was to serve in the capacity of Manpower Administrator. The Manpower Administration under his direction consisted of the following organizations: Bureau of Apprenticeship and Training (BAT); Bureau of Employment Security (BES); Office of Manpower Policy, Evaluation, and Research (OMPER); Office of Financial and Management Services (OFMS); and a new Bureau of Work Programs (BWP).

During the second half of 1967, the Manpower Administration made plans to reorganize its bureaus with the following objectives for the purpose of making the administration more effective:

1. To strengthen the staff area of the Manpower Administrator by establishing a central data system office and a central public information office.

2. To revise the organization of the Bureau of Work Programs (BWP) and to redesignate it the Bureau of Work Training Programs (BWTP).

3. To study and realign the functions of BAT to make it more effective in dealing with the responsibilities of promoting and developing private apprenticeship programs.

4. To merge the Office of Farm Labor Service into the U.S. Employment Services and reidentify it as the Office of Rural Manpower Services.

5. To establish eight Manpower Administration regions headed by Regional Manpower Administrators and to adjust the regional boundaries of the Bureaus to conform to those of the Manpower Administration.

In the third quarter of 1967, a consultant on organizational realignment was engaged by the Manpower Administrator. The consultant, in collaboration with representatives of the Manpower Administration, developed reorganizational plans that were submitted to the Secretary of Labor in November 1967. On December 19, the Secretary met with Bureau heads and announced his version of the reorganization. The announcement was made to all employees on December 20, 1967.

Immediately after the organizational change announcement by the Secretary of Labor, the Assistant Secretary for Manpower took a trip around the nation with the Bureau Chiefs to explain the reorganization to federal and state people in field operations.

To implement the organizational changes, a task force was established. A member of the Office of the Assistant Secretary for Administration, William Kolberg, was appointed chairman of the task force. The task force was composed of Bureau personnel from the affected units and was divided into working parties with a member of the consultant's staff attached to each. The working parties guided the various bureaus in formulating detailed plans to implement organizational changes.

This task force completed its work in the Fall of 1968, and its recommendations were incorporated in an announcement by Secretary Wirtz on October 21, 1968. This announcement essentially called for the abolishment of the BES and BAT bureau structures and a redistribution of their functions to the Manpower Administration and other parts of the Department of Labor.[3] However, the final chapter on this reorganization effort is yet to be written. Resistance from outside constituents has

again occurred. By order of the Office of the President, implementation of the recommended changes has been held up until the officials of the new presidential administration can be consulted.

The Environmental Science Services Administration

After 24 years of service, the former chief of the Weather Bureau retired on October 1, 1963, and a new chief, Robert M. White, took over. After some six months of initial analysis and concept formulation, he brought a group of operations research/management sciences personnel into the Bureau to consider the best way to reorganize it and to expand its structure to include some related functional activities. This group formulated a description of goals and capabilities in a paper entitled "The Weather Bureau--a Perspective." This total experience in the reorganization of the Weather Bureau preceded the establishment of a special committee by the Assistant Secretary of Commerce, J. Herbert Holoman, in May 1964, to review the Department's environmental science service activities and to make recommendations regarding their further reorganization.

This committee included Dr. Allen V. Astin, Director of the National Bureau of Standards; Admiral H. Arnold Karo, Director of the Coast and Geodetic Survey; Dr. White, Director of the Weather Bureau; and some prominent consultants. A series of task forces was also set up to assist the work of this committee and included many of the same personnel who had participated earlier in the analysis of the goals and capabilities of the Weather Bureau. The overall committee recommended the creation of a new organization, to be called the Environmental Science Services Administration (ESSA), which would bring together the activities of the Weather Bureau, the Coast and Geodetic Survey and the Central Radio Propagation Laboratory of the National Bureau of Standards. First the Secretary of Commerce and then President Johnson approved these recommendations, and the President proposed that Congress authorize the creation of ESSA in May of 1965. Congress approved this proposal, and the consolidation of the agencies named took place in the few months that followed.

With regard to the creation of ESSA, Walter Hahn (who was involved in several stages of its design) has written:

> Today there exists under one organizational roof the Department of Commerce's activities in seismology, oceanography, meteorology, geophysics, hydrology, hydrography, aeronomy, geodesy, geomagnatism, and telecommunications. Roy Popkin

in his book describing ESSA writes: "It might be said that the creation of ESSA is the first major step forward in the development of a national program in the environmental science field. This is an age of science, and the programs of ESSA represent the epitome of applied science."[4]

The National Bureau of Standards

The National Bureau of Standards (NBS) was established in 1901 within the Treasury Department "to provide standards of measurement for the Nation." In 1903 its jurisdiction was transferred to the Commerce Department. There had been a long-standing need for such an organization within the United States. Other technologically advancing countries had established such agencies earlier. By the beginning of the twentieth century the United States was becoming a major trading nation, and measurement standardization was necessary if the nation was to participate extensively in world trade.[5]

The activities of NBS enlarged over the years as demands for services increased, especially with the advent of widespread mass production. NBS was originally organized along discipline lines, but this was modified somewhat by a reorganization in 1962-63. This reorganization grouped NBS programs into three main Institutes:

1. The Institute for Basic Standards
2. The Institute for Materials
3. The Institute for Applied Technology

The last--the Institute for Applied Technology--was created especially to implement the plan of the Assistant Secretary of Commerce, J. Herbert Holoman, to establish a special organizational entity that would be concerned with the translation of scientific findings into useful applications in U.S. industry.

This three-institute structure has worked fairly well for some of the purposes of NBS and the Department of Commerce and has reportedly engendered a high degree of commitment among staff members in relation to the goals and objectives of each Institute. Yet in the later 1960s,

key persons in the Bureau and Department staff began to recognize a number of major problems, including the following:

1. There was a need for more information on what services NBS customers (i.e., the thousands of U.S. companies and laboratories that use NBS measurement and materials standards) really need from the NBS and a need to relate these customer requirements to the way in which NBS is organized to provide its services.

2. More specifically, there was a belief that many customer service needs did not fall neatly into the disciplinary lines along which NBS is still basically organized and a consequent belief among some that interdisciplinary realignments in organization might be more appropriate.

3. Furthermore, there was a general problem of performance evaluation at NBS in that many of its products are intangible (i.e., in the form of services) or unmeasurable in cost/benefit terms (e.g., how much is a more precise standard worth to users across the nation?); this in turn led to problems in making any kind of comparative analysis of the benefits that would be derived from alternative ways to organize NBS functions.

The introduction of a federal government-wide planning, programming, and budgeting system into NBS has recently brought the above questions into sharper focus and has caused NBS officials to consider the possibilities of further reorganization. Whether such reorganization will turn out to be desirable and, if so, the shape that it will take are yet to be determined. This is likely to be one of the organizational questions that will be given further attention by the new administration in 1969.

TRW Systems, Inc.

TRW Systems, Inc., at Redondo Beach, California, provides a unique case in the integration of manpower development and organizational development activities. Both its history as an organization and the industry in which it operates are important considerations in understanding the problems that it faced and the organizational solutions that it has developed.

The company was chartered in its present form in 1960 when the existing Thompson-Ramo-Wooldridge subsidiary, an Air Force "captive organization" was split into two groups. A nonprofit corporation was established to take over the existing functions of management and advance planning of the Air Force ICBM program. About 20 percent of the staff accompanied this transfer. The remaining staff and the Air Force work in systems engineering then under way was retained by TRW Systems.

Before the split, the company had been banned from competing for hardware contracts in related Air Force programs. It had also come under criticism from the aerospace industry on the grounds that its role as manager of the program gave it a privileged position in bidding on Air Force systems engineering work. The split freed the company to compete for all types of Air Force contracts, but it also meant that it lost the continuing base of financial support that it had enjoyed under its earlier contractual arrangement. The company now entered a new arena of competitive business with requirements for marketing and manufacturing capabilities and a need to operate profitably under an increasing trend toward fixed price and incentive contracts.

The aerospace industry is characterized by rapid changes in technology and the production of highly complex products. This requires that the staff must not only be up to date in their particular fields of specialty but must also be flexible and innovative in relating their specialties to complex and changing problems. They must also perform their work in a highly coordinated manner. A space vehicle with its thousands of parts and its network of supporting systems requires a high degree of interrelationship and interdependence between components. The specialized individuals and groups who work on these components are therefore highly interdependent in the accomplishment of their work.

To minimize fluctuations in business and employee turnover, the company elected to base its business on several contracts rather than one or two massive contracts. This imposed the additional requirement that it organize in a way that would permit effective use of specialized talent and other resources on several projects at one time.

TRW responded to the organizational problem by establishing a matrix form of organization. Functional departments were formed that grouped people together by functional speciality and activity. Project offices were created to plan and coordinate the work for a particular customer program. Under this arrangement, functional departments represent the "permanent" structure of the organization; project offices are created and abolished according to the needs of customer programs.

The way in which this kind of organizational structure is implemented in the day-to-day activities of TRW Systems staff members represents the really unique feature of its organizational design. In part, this entails the use of "sensitivity training" for key executives, but this aspect of the implementation effort now constitutes only a small part (10 to 15 percent) of the total TRW systems activities in "organizational development." Much more attention is concentrated on task-oriented "team building exercises" to integrate the activities of project teams, "interface management techniques" to resolve problems of interdepartmental coordination, and general efforts to create a companywide atmosphere of free communication across all organizational boundaries within the company.[6]

More detail on the nature of this implementation effort is given in Chapter VI, and both Chapters VI and VII provide further evidence on the success of this approach.

The Bell Telephone Laboratories

The Bell Telephone Laboratories at Murray Hill, New Jersey, has been a well-known leader in industrial scientific research in the United States and abroad for many years. What is not quite as well-known is the way in which Bell Labs is organized and the way in which this organizational structure can be linked to its scientific success. A notable article by Jack Morton (the Director of Components Research and Engineering at Bell Labs) first set forth an explicit description of this organizational form in 1964.[7]

The major concern of the management of the Bell Labs, as this article suggested, has been (1) to provide an environment in which outstanding scientific research is conducted and then (2) to provide an environment in which this research is rapidly translated into industrial applications of interest to the parent Bell System. The Bell Labs in its recent history has tried to accomplish these objectives by the use of an organizational theory of "bonds" and "barriers." The theory entails the balancing of considerations regarding organizational structure with considerations regarding location of facilities. Within the framework of this theory, the Bell experience is that good basic scientific research is not likely to occur in laboratories that are organizationally subordinated to engineering departments or other applications-oriented activities; in such cases, fundamental scientific research tends to be squeezed out by materials testing and other applied activities. Therefore, the conclusion is drawn that good fundamental research should be insulated (organizationally) but not isolated (spatially) from the organizational entities that use the results of this research.

Until the end of World War II, two barriers existed between Bell Labs and the Western Electric user of the Labs R&D activities. Each had its own president and a separate organizational structure. There was also a spatial barrier, in that Bell Labs was physically separated from other Western Electric activities. These two barriers were found to provide a handicap in the flow of new designs into Western Electric manufacturing activities and in the feedback of information from manufacturing to design. Consequently, this spatial barrier was removed, and a spatial bond was created by moving the Labs' Development and Design groups onto Western Electric premises. Because a spatial barrier now exists between Applied Research, on one hand, and Design and Development, on the other hand, these two functions have been kept organizationally within the Bell Labs structure. Thus a barrier of one kind (spatial or organizational) is now accompanied by a bond of the other kind.

These principles are observed in the converse situation that exists between fundamental research and applied research activities at Bell Labs' main site in Murray Hill. Morton describes it as follows:

> Now we want some feedback, so let us see how we get it from, say, applied to basic: We get it, in one way, with a space bond--people in applied and basic live in the same building. And we get it through a common language. But at the same time, we see that if applied people or engineering people can dictate what the basic research people do, they will kill the long-range basic research. So we need an organizational barrier: One man--Bill Baker--is head of all basic research; other men head up applied research and engineering. Our people are free to sell, to stimulate and motivate all they like. But my engineers and researchers, for example, cannot tell the basic researchers what to do. And conversely, the basic researcher who believes he has made an important discovery cannot order the applied research or engineering people to pursue it. So this organizational barrier provides freedom for basic research and freedom regarding what shall be developed.[8]

These principles of "bonds and barriers" have been applied to the structuring of other kinds of organizations, and especially R&D organizations, as is indicated further in the example below.

Modern Chemical Corporation

In 1968 the Modern Chemical Corporation (a pseudonym) asked Stanford Research Institute, through a coordinated effort with Modern personnel, to develop and supply information regarding the design of a fundamental research facility in a manner that would best serve the purposes of the corporation. With regard to the organization of the proposed research activity, the SRI team[8] recommended that particular attention be given to application of bonds and barriers considerations, as expressed in the following extract from the project report:

> Of primary concern here is the organization of the research facility within the structure of the corporation, especially in terms of the "barrier" and "bond" considerations. Barriers between the research facility and the other parts of the corporation will be required to maintain research integrity, but strong bonds will also be necessary to facilitate the movement of laboratory discoveries through development to production and eventually exploitation. Barriers are the element that can be most easily provided--for example, by locating the laboratory many miles away from other corporate operations or by locating it in a remote area of the corporate complex. Barriers can also be provided by organizational structure. If research reports directly to the top corporate officer, then other operating groups must go through this corporate officer before imposing their requests upon the research group. Indeed, establishing effective and smooth communication between the research staff and the rest of the corporate functions often is not easy.
>
> A research staff has its own built-in barriers--in part because of training, in part because of the scientific interest, and in part because of past experience. The most difficult problem is providing the mutual sharing of ideas, problems, plans, insights, and goals that constitute the bond. Therefore, Modern Corporation will need to direct a great deal of attention to providing and enhancing the bonds between research and the other corporate groups, and to do it continuously. Providing the research group with the maximum amount of corporate information will improve the bonds considerably and will help to ensure that the research group will be working toward the same corporate goals, plans, and strategy as the rest of the corporation. In-depth bonds between the

corporate functions are needed, and bonds must be very strong among the top echelons of each of the corporate activities. By maintaining strong bonds and clear communication channels the corporation will obtain the greatest benefit from the research operation. Bonds with the research group can be established by using its staff as internal consultants and as members of corporate committees, and by developing an attitude within the corporation that the research function is of primary importance to the general corporate welfare.

Organization within the corporation can take many forms, but a general principle is that the research facility should not be organized differently from the other corporate functions. If manufacturing, sales, and other corporate functions are divisions of the corporation, then research should also be a division. If, on the other hand, these functions are separate companies, then research should be a separate company. The director or president of the research facility should report in parallel with manufacturing and sales to corporate management. Several U.S. corporations have research as a separate company reporting to the top corporate officer. Others maintain a research facility as an operating division, reporting to the top corporate officer. In companies in which research reports to an operating division (for example, manufacturing), there have been difficulties and the research has not provided the assistance that it could and should.

The research facility must have stature with corporate management and with other corporate operations, as well as with the scientific community at large. The organizational structure should not be one that appears to give special privileges to the research group; but it must provide equivalent stature with other corporate functions, i.e., such as marketing, manufacturing, and others. The facility must also have considerable freedom to establish research directions. Research goals must be well-defined and consistent with the overall corporate goals so that the research group and the corporate officers can together judge the success of these efforts.

The facility should not be expected to devote its major efforts to solving day-to-day corporate and technical problems, but the facility staff should be encouraged to provide guidance and assistance in solving such problems. The facility

> should be subject to accountability, but not to precise auditing. The research group, as an integral part of the corporation, will expect to be held accountable for its contribution to accomplishing the corporate goals. Its staff will need encouragement and opportunity (and occasionally persuasion) to move products and processes from the laboratory stage through development to production, and the research personnel should be invited to assist in the exploitation of these products or processes.

Modern has just begun to implement these initial design considerations, so to date there is no further information on the progress of this implementation or on the overall effectiveness of the design effort.

The University Research Laboratories

In Germany, and to a lesser extent in France, universities had become the most important centers for "pure" science activities by the middle of the nineteenth century. This pattern was not followed in England. English scientists of the nineteenth century (Darwin and Huxley are examples) were more likely to have made their important contributions to science while serving in government institutions, such as the Royal Navy or the Geological Survey, or in association with scientific societies, such as the Royal Society. The prevailing British concept of a university then, exemplified in Oxford and Cambridge, was an institution limited strictly to educational, rather than research, functions.[10] Thus, former Oxford Professor John Henry Cardinal Newman wrote in 1852 in his introduction to The Idea of a University:

> The view taken of a University in these discourses is the following--that it is a place of teaching universal knowledge. This implies that its object is, on the one hand, intellectual, not moral; and, on the other, that it is the diffusion and extension of knowledge rather than the advancement. If its object were scientific and philosophical discovery, I do not see why a university should have students . . .[11]

The United States mainly followed the German model. By the early twentieth century, scientific faculties in American universities had begun to engage in research activities.[12] The educator, economist, and

philosopher Thorstein Veblen expressed the emerging American concept of the university when he wrote in 1918:

> The university is the only accepted institution of the modern culture on which the quest for knowledge unquestionably devolves. This is the only unquestioned duty incumbent on the university.[13]

Further reflecting this point of view, an alumni committee of the University of Chicago claimed 20 years later in 1938:

> We have amassed a good deal of evidence demonstrating that Chicago is a great research institution--one of the greatest. With that accomplished, our final purpose is to point out the place of a great research institution in the pattern of modern life. A university must not be confused with a college. A college transmits knowledge. A university discovers new knowledge (or recaptures lost knowledge) which colleges presently will interpret and teach. . . . But the real test of a great university lies in its additions to human knowledge.[14]

Then came World War II and with it, an unprecedented demand on the scientific and technical manpower resources of the nation. Most of this manpower was in university settings. Federal contracting with universities for research and development drastically expanded to meet national defense requirements. Dramatic science-based technical accomplishments in universities during this period included the nuclear fission experiments at the University of Chicago and the proximity fuse work at Johns Hopkins.

Thus, in the post-World War II period, university research has become organized research, not necessarily linked directly to the educational process. Furthermore, the traditional academic department form of organization in universities has generally not been able to adapt to the requirements of modern organized project research, as is typically associated with federal government requirements. To meet these requirements, universities have had to adopt a form of organization, employing many nonteaching research personnel, that is quite similar to the typical form of organization of research facilities in industry and government. As universities have moved into the research "industry," competing with nonacademic institutions for federal and other research funds, they have found it expedient to modify their forms of organization for these purposes along lines amenable to project administration. At the same time,

of course, the more successful nonacademic laboratories have been forced, by the necessities of research requirements, to provide a form of colleague-oriented authority and status structure that is traditionally more characteristic of academic institutions than of industrial institutions.

The university research laboratories studied as a part of a previous project are hereafter referred to as "URL." They form a research complex attached to the school of engineering of a major university. URL is nationally recognized as a leading research facility in its field. The dean and faculty of the engineering school determine the goals and basic policies of URL. The laboratory complex consists of four laboratories, each of which is organized, for general administrative purposes, under the direction of a senior faculty member. In turn, these senior faculty members in their roles as laboratory directors report to another senior faculty man who serves as general manager of the laboratory complex. There are, therefore, five senior faculty members who, as the management of URL, administer its research programs.

Another 16 faculty members serve on the URL research staff but do not have regular administrative responsibilities in URL. In day-to-day research activities, these junior faculty members have a considerable degree of autonomy. As members of the engineering school faculty, they also participate in policy decisions concerning the laboratories.

In addition, there are 40 research associates in the laboratories. These are professional research personnel who do not have faculty status and who therefore normally do not teach or participate directly in the education of engineering students. From 60 to 80 student research assistants are also employed on a part-time basis in URL, as a part of the graduate student training program of the school of engineering.

Finally, there are 12 administrative assistants to provide URL research personnel with procurement, report production, and other business services.

As in the case of most other university research organizations, URL has the two formally specified goals of contributing to research and to teaching. In addition, it should be recognized that URL was first established mainly as a research service facility to help meet federal defense research requirements during World War II. To this day, URL has retained this public service goal to do applied research under government and, to a lesser extent, industry sponsorship, in addition to its basic research and educational missions.

To accommodate applied research, basic research, and educational objectives simultaneously, URL has assigned most of its applied research projects to one laboratory and has employed the large majority of the nonfaculty research associates in this laboratory to handle these projects. This arrangement frees most of the faculty to work on more basic research projects designed to contribute to general knowledge in the engineering sciences under study and also allows the faculty to involve the majority of the student research assistants in these more basic research projects for the advancement of their graduate education. Questionnaire data have shown that the nonfaculty research associates are apt to be at least as interested in applied research as in basic research, while the large majority of the faculty are primarily interested in basic research in this laboratory complex. The structure of this laboratory complex also has a marked degree of association with the way in which different kinds of staff members perceive organizational goals and act to implement these goals in their day-to-day behavior, as described further in Chapter IV.

The Oregon Graduate Center

In Portland Oregon, a very new kind of research and graduate education institution has started to develop. This institution, known as the Oregon Graduate Center, has been started largely for the purpose of promoting the technological and industrial growth of the Pacific Northwest, generally, and Portland, specifically. Thus a report of the Portland City Club of leading businessmen acknowledged in 1963 that "Portland is the largest metropolitan area in the West without a full university." The post-World War II period has provided tremendous stimulation and growth in the economy of most areas of the United States, but Oregon, with 4 percent of the U.S. population, has seen its share shrink. Besides the fact that there has been decreasing employment in the two major industries of the state (lumbering and agriculture), the graduates of Oregon universities tend to emigrate to other states where better opportunities for graduate study and employment in high technology enterprise exist.

In his initial campaign for governor in 1958, Mark Hatfield recognized these problems and, after his election to this office, appointed two committees on Science, Engineering, and New Technologies to diagnose the problems further and recommend appropriate solutions. These committees recommended the establishment of a center for graduate education and research in the Portland area that would help to hold local college graduates and that would help to stimulate technological developments

in local industry. After some initial discussion as to whether this should be a separate center or a part of an existing college structure in Portland, the decision was finally made to set up a private scientific research and education center with state and local encouragement, but without state financing. In February 1963, the Center was incorporated as a nonprofit institution, with Dr. Samuel Diack as Chairman of its Board of Trustees.

A search for an appropriate candidate for President of the new institution was then started, and Dr. Donald Benedict, formerly a leader in physical sciences activities at Stanford Research Institute, was contacted and expressed interest in the position. In the Summer of 1966, the Tektronix Foundation, directed by Mr. Howard Vollum and his associates in Tektronix, Inc.), gave an initial grant of $2 million to design and develop the Center, with Benedict appointed as President. Subsequently several grants, in much smaller amounts, were obtained from local sources.

Benedict was then given a free hand to structure the new organization. During the growth period, Benedict has not expected a need for departmentalization of the Center along usual disciplinary lines. He has been active in recruiting an outstanding group of young faculty men who will do research and teach graduate students in an interdisciplinary environment. Although he recognizes that disciplinary departments may become necessary at a later stage of growth, he hopes to maintain the Center undepartmentalized in order to learn whether the frequently predicted advantages of interdisciplinary groupings are realized.

Up to September, 1968, 17 faculty members have accepted appointments. The organization owns and occupies an 8,000 square foot laboratory and has begun to build a permanent campus on a separate, 74 acre site about ten miles from downtown Portland. The first research laboratories are operating, and the first students are expected in September 1969. A plan is also being developed for a concerted drive for financing from private sources in the Pacific Northwest.

According to an article on the Center written by Bryce Nelson:

> In its initial stages, the Oregon Graduate Center has been successful in acquiring physical facilities, equipment, community goodwill, and the beginning of a faculty. The important question remaining to be answered is: What kind of institution will the Oregon Graduate Center become?[15]

This question must be answered in the face of the following additional questions raised by Nelson:

1. Will the Center be too narrowly based in certain science fields to attract the high quality scientists and students that it desires?

2. Will it be able to attract the amount of funds from a variety of private sources that it ultimately needs?

3. At the same time, will the Center be able to establish its "intellectual independence from industry"?--a problem that Hatfield and others think could be a serious one.

To these might be added the question of the degree to which an institution, organized in this manner, will ultimately be able to support the development of technologically based industry in the Portland area.

However, these questions will surely be answered within a decade or so. At present, it is evident that an institution that is highly unusual and that has considerable novelty in its structure has received a promising start. It will have to be given suitable encouragement, a reasonable period of time, and adequate financing in order to demonstrate the range of its potential. This could become the forerunner of a new type of educational institution that breaks through into new structural patterns, entailing stronger interdisciplinary activities and tighter patterns of community-institutional interactions than have yet been achieved elsewhere.

An Independent Research Organization

Like a number of other independent contract research organizations, the one referred to here as TAROS was founded in the post-World War II period of accelerated national interest in research and development. Its formal purposes, as stated in its articles of incorporation, are as follows:

> To conduct pure and applied research in the natural sciences, engineering, and management fields; to promote and enhance the application of science in the development of commerce and industry in the region; and to participate in the improvement of the general welfare of mankind.

As indicated in this statement, TAROS was initially conceived by its founders, a group of leading industrialists, to be a research service facility to aid in the translation of scientific research findings into applications useful in the continued industrial development of their area. At the same time, the formal statement of purpose indicates flexibility regarding the degree to which TAROS was primarily intended to be simply an applied research center or to be an organization where fundamental research is also undertaken to discover and develop scientific knowledge of ultimate use. In other words, the question was left unsettled as to whether TAROS was to be primarily responsive to immediate research problems posed by its clientele, or to be, at least in some sizable degree, responsive to more fundamental research problems generated by scientific interests. Moreover, even though the articles of incorporation indicate a special emphasis on regional research problems, these articles left open the possibility that a considerable amount of research effort might also be devoted to problems of a wider range of clientele in "the improvement of the general welfare of mankind."

In the years since its founding, TAROS has indeed become responsive to the problems of a wide range of clientele, which is now international in scope. Its organizational structure reflects this variety of interest. (This organization was first studied by the author some seven years ago in connection with a previous project but was reinvestigated again in connection with the present study.) TAROS has always had a very flexible organizational structure, permitting research scientists to cross departmental lines freely to form interdisciplinary project teams to meet the research interests of client groups. A recent innovation has been the introduction of a matrix form of organization, whereby certain kinds of programs are being set up to operate across existing departmental lines so that an even higher degree of flexibility in building interdepartmental and interdisciplinary research teams can be achieved.

Since this interdepartmental form of matrix organization is so new at TAROS, the degree to which it will aid the organization in achieving its overall goals is yet to be ascertained. Also the degree to which it will contribute to the perennial problem in scientific organizations of helping to integrate the interests of individual scientists with organizational goals and requirements is still an open question. In any case, at the time of our prior investigation of this latter question (1962), there was still a considerable degree of variation in staff perceptions of overall corporate goals at TAROS, as is described further in Chapter IV. A certain amount of variation in staff perceptions of goals probably supports flexibility in organizations like TAROS and is certainly compatible with a loose and rather decentralized kind of organizational structure.

Conclusions: Design for Flexibility

Possibly the one theme that runs through all of these examples is the attempt to design organizational structures for flexibility in response. Rigidity in structure is no longer appropriate for organizations in a world of rapid technological and social change. The previous examples refer to a variety of stages in the organizational design process, but all reflect a concern with building organizations for an inherently uncertain future.

Notes for Chapter II

1. A more complete description of the events in connection with the formation of this department is provided in A. L. Dean, "The Making of a Department of Transportation," (a paper presented before the Conference on the Public Service, Washington, D.C., October 13-14, 1967).

2. A history of the Department of Labor from 1913 to 1963 is provided in U.S. Department of Labor, The Anvil and the Plow (Washington, D.C., G.P.O., 1963).

3. U.S. Department of Labor, "Statement by Secretary of Labor Willard Wirtz," October 21, 1968.

4. W. A. Hahn, "Providing Environmental Science Services," Public Administration Review, Vol. XXVIII, No. 4 (July/August 1968), pp. 326-341. See also R. Popkin, The Environmental Science Services Administration (New York: Praeger, 1967).

5. For a history of the National Bureau of Standards up to 1966, see R. C. Cochrane, Measures for Progress (Washington, D. C., U.S. Department of Commerce, 1966).

6. The approach to organizational development used in TRW Systems is described in detail in S. A. Davis, "An Organic Problem-Solving Method of Organizational Change," Journal of Applied Behavioral Science, Vol. 3, (January-March 1967), pp. 3-21.

7. J. A. Morton, "From Research to Technology," International Science and Technology (May 1964), pp. 82-92.

8. Ibid., pp. 88, 90.

9. This team was led by D. H. Hutchinson, and included W. C. Thuman, H. L. Rice, J. J. McAuliffe, and W. C. Pedersen.

10. See B. Barber, Science and the Social Order, rev. ed. (New York: Collier Books, 1962), p. 189.

11. J. H. Newman, The Idea of a University (New York: Longman's Green, 1929), p. ix.

12. R. S. Bates, Scientific Societies in the United States (New York: Columbia University Press, 1930), p. 30.

13. T. Veblen, The Higher Learning in America (New York: B. W. Huebsch, 1918), p. 15.

14. University of Chicago Alumni Committee on Information and Development, "New Stars in the Scientific Firmament," cited in L. Wilson, The Academic Man (New York: Oxford University Press, 1942), pp. 166-67.

15. B. Nelson, "Oregon Graduate Center: a new Portland Scientific Institution," Science, Vol. 157 (8 September 1967), pp. 1151-54.

Chapter III

STRATEGIES OF ORGANIZATIONAL DESIGN

There are several different approaches to organizational design. These approaches have been classified in different ways in the literature. For the purposes of our investigation, it seems most useful to identify and describe three principal approaches: the engineering approach, the behavioral approach, and the systems approach.

These approaches differ from each other in their theoretical assumptions and antecedents, the elements of organizational design that receive the main focus of attention, the roles that the designer characteristically plays in the design process, and the typical outputs of design activities. There seems to be so much consistency within these different approaches that we can refer to them as different "strategies" of organizational design. Moreover, it would appear that some strategies are more appropriate for the design of certain kinds of organizations than for others; there does not seem to be any one best or most effective approach to take. Circumstances should dictate the most appropriate strategy.

The reader may wish to keep track of the various features in the different strategies by referring to Figure 1 as he reviews the following more detailed discussion.

The Engineering Strategy

What is labeled here as "the engineering strategy" refers essentially to the design of an organizational entity from the outside. In the first half of the nineteenth century and even further back, it has been the traditional and most common approach. Its theoretical antecedents in Europe trace back at least to the works of the German social scientist, Max Weber. Weber described the essentials of the "rational bureaucratic" for organization as including: (1) a clear-cut division of labor into job positions along functional lines, (2) a hierarchy of managerial positions structured into a pyramid of increasing generality of authority over subordinate positions, (3) work activities governed by a consistently applied system of formal and informal rules generated from organizational practice (i.e., precedent), (4) impersonality in the performance of job requirements (e.g., an employee is fitted to the characteristics of a job, rather than vice

Figure 1 THREE STRATEGIES OF ORGANIZATIONAL DESIGN

	THEORETICAL ANTECEDENTS	FOCUS OF THE DESIGN	ROLE OF THE DESIGNER	TYPICAL OUTPUTS OF THE DESIGN PROCESS	STRATEGY IS MOST APPROPRIATE FOR:
ENGINEERING STRATEGY	Weber, Taylor, and drawing on industrial engineering and operations analysis	Organizational structuring and evaluation, with particular emphasis on operational goals	Primarily as an expert consultant to top management	Documents, such as organization charts, job descriptions, and PPB plans and memoranda, etc.	Authoritarian organizations
BEHAVIORAL STRATEGY	Lewin, Rogers, and drawing on the behavioral sciences	Organizational diagnosis and implementation of change, with particular emphasis on maintenance goals	Primarily as a social technician working with different organizational levels	Procedures for discussion, team building, conflict resolution, etc.	Voluntary or employee-centered organizations
SYSTEMS STRATEGY	Drawing on all of the above, combined in terms of systems theory	Emphasizing all of the above	Primarily as a professional in a relation to organizational clients	A mixture of documents and procedures	Changing, complex, high technology organizations

SOURCE: Author.

versa), and (5) a career progression that is provided for entrants at the bottom level, moving upward through a hierarchy of positions as increasing experience is acquired by an individual at each level.[1] In other words, in the Weberian model, organizations were seen as antedating the individual; it is the job of the individual to learn about organizational requirements and how to conform to them. (Note that Weber merely described this predominant form of rational-bureaucratic organization, he did not advocate it.) This implies a kind of organization that can be designed from outside, without prior reference to the particular characteristics of those who will become its employees, members, or incumbents. In other words, it is a form of organization that is amenable to the engineering strategy of design.

The engineering strategy received its most direct support initially from the works of Taylor, Fayol, Gulick and Urwick and others who came to represent "Taylorism" in industrial engineering and business management circles.[2] Their concern was to bring "sound engineering principles to the practice of management." Some of the most sophisticated modern approaches to organizational design from this engineering perspective are to be found in the works of specialists in operations research and analysis. Their attention focuses mostly on manipulation of economic or engineering variables that are quantifiable and are amenable to top management manipulation to optimize time, financial cost, and product effectiveness in an organizational context. In other words, this is an operational goal-oriented strategy, rather than an organizational maintenance goal-oriented strategy. Operations analysts seldom devote much attention to the kinds of satisfactions that participants (employees) in an organization derive from their work, or the degree to which they develop identification with their employing organization. Although they recognize that certain minimal degrees of job satisfaction may be required among employees (particularly key managerial employees) to maintain organizational capabilities for any great period of time and that the maintenance of employee morale may be a necessary cost item in their analyses, it definitely takes second place behind "getting the job done" effectively and efficiently.

The widespread application of the Planning, Programming, and Budgeting (PPB) system of management in federal government agencies (and now in state and local governments and in private industry) reflects this engineering strategy of organizational design, even though it draws upon certain systems concepts. As is well known, the PPB concepts were originally developed by a group of highly talented economists and management scientists in the Department of Defense. This design seeks to reorient management decision-making and planning from the principles of "line-item budgeting" to principles of "program budgeting" (i.e., product-oriented allocation of funds) to optimize production goals and cost savings at the same time. Thus President Johnson's initial announcement of the establishment of a federal government-wide PPB system on August 25, 1965, said:

> Under this new system each Cabinet and Agency head will set up a very special staff of experts who, using the most modern methods of program analysis, will define the goals of their department for the coming year. And once these goals are established this system will permit us to find the most effective and the least costly alternative to achieving American goals.[3]

As a PPB approach is applied, it soon becomes evident that it has organizational implications. PPB principles often cannot be superimposed on organizational structures that are primarily functionally oriented. A PPB system induces change toward a program-oriented form of organization. Such was the case in the military branches of the Department of Defense. Longstanding bureaus in the Navy, for example, were realigned into weapons systems commands. More recently, there have been pressures for this shift to occur in nonmilitary parts of the federal government (e.g., in the Department of Labor and the National Bureau of Standards). Also, some brand new agencies (e.g., the Environmental Sciences Service Agency) have been essentially organized along PPB lines. David Novick has pointed out that some of the more successful industrial companies (e.g., General Motors) have been applying PPB principles to both their organization and their methods of operation as far back as 1924 and that this approach inevitably has implications for the organization of entire industrial companies:

> Businesses that are now introducing or are thinking of introducing the Planning-Programming-Budgeting System are also faced with the problem of thinking through once again their objectives and goals, the alternative programs available for accomplishing them, and the choices to be made among them. For the company this means analyzing all the interdependent activities in achieving a specific goal--looking at the whole, not just a series of parts.[4]

Who does this analysis? In other words, who implements an organizational design along PPB lines?

In President Johnson's 1965 directive to all federal agencies, reference was made to setting up "a very special staff of experts." The Bureau of the Budget directive in October of that same year stated:

> Specialized staff assistance is essential in all but the smallest agencies. Such assistance will be especially useful in the preparation and review of Program and Financial plans and in the preparation of the appropriate analytical studies. Each agency will, therefore, establish an adequate central staff or staffs for analysis, planning, and programming.[5]

At the same time it has been evident that because program goal definition is a key top management responsibility (in fact, it may be argued, the key top management responsibility), this responsibility cannot be delegated to staff specialists. Thus the same BOB implementing directive pointed out:

> Personal responsibility for the Planning, Programming, and Budgeting System rests with the head of each agency. Since planning, programming, and budgeting are all essential elements of management, line managers at appropriate levels in the agency must also take responsibility for, and participate in, the system.[6]

A more recent BOB directive (April 1968) is even more explicit in defining the joint responsibilities of agency heads to make fundamental decisions on the objectives of their programs as well as to participate directly in the development of implementing plans and documents:

> Responsibility for the development and use of PPB systems rests with the head of each agency. Agency heads are requested to take such action as is necessary to insure that line managers participate in operation of the PPB system, and that they have available sufficient resources to insure participation in the development of PM's, SAS's, and PFP's.[7]

Thus line managers, assisted by staffs of operational analysis technicians, are expected to implement a design that has been developed from outside by designers who are operating in what was indicated in our Phase I report as an "expert consultant" role--i.e., individuals who have the responsibility for the nature of the design itself but not for implementing it.[8] And the characteristic outputs of this design effort are documentary in nature--e.g., Program Memoranda, Program and Financial Plans, and Special Studies. The primary focus of this engineering strategy of design seems to be to improve what is described later in this report (Chapters V and VII) as the structuring and the evaluation elements of organizational design. There is primary concern not only with a product-oriented budgeting procedure, but also with organizational arrangements (structure) that correspond to this orientation. Furthermore, a major purpose of PPB is to set up a system that allows a feedback of information on the extent to which program goals are being attained. President Johnson expressed hopes in this regard when he said:

> This program is designed to achieve three major objectives: It will help us find new ways to do jobs faster, to do jobs better, and to do jobs less expensively. It will insure much sounder judgment through more accurate information, pinpointing those things that we ought to do more, spotlighting those things that we ought to do less. It will make our decision-making process as up-to-date, I think, as our space exploring programs.[9]

In actuality, however, this kind of engineering approach to organizational design or redesign has not turned out to be successful in all cases that showed promise at first. A notable example can be found in attempts to set up a PPB system in the Department of State in recent years.[10] In spite of the work of a group of design specialists known as the Hitch Committee, key executives in the Department of State have not yet fully accepted and implemented a PPB system in many of the departmental activities. Behavioral scientists who have worked on this effort have claimed that the effort has lacked adequate attention to developing ways and means to implement the changes that the expert consultants proposed by failing to deal with the feelings of resistance that these PPB efforts have engendered in key State Department executives.

In sum, it appears that the engineering strategy of design from outside appears to be most appropriate in special purpose organizations in which operational goals are relatively more important than maintenance goals. Such would seem to be the case with a military or paramilitary organization, for example. The raison d'être of armies, police forces, fire departments, and emergency hospitals is to provide certain vital public services effectively and quickly. Wherever they can no longer accomplish such goals acceptably, one expects that it will be possible to abolish these kinds of organizations or to reorganize them quickly. In other words, it is essential to their very purposes that these organizations be amenable to "top-down" direction, as well as design from the outside.

There are other kinds of organizations at the other extreme, usually referred to under the title of "voluntary associations," for which an engineering design strategy is certainly inappropriate. These are organizations that exist primarily for the benefit of their members, either in a more general way (e.g., fraternal and benevolent societies) or perhaps initially in a more specialized way (e.g., trade unions). In any case, maintenance of membership rather than specific accomplishment of any planned or programmed set of goals is their central problem.

In a total society in which the enhancement of individual capabilities in every organizational setting is becoming a more crucial value, even government agencies, industrial companies, and other institutions that have operated in the past in a more authoritarian "top-down" manner are having to become more member-oriented or employee-oriented in their methods of operation. Most of these organizations fit somewhere in the middle between extremely authoritarian and extremely voluntary kinds of organizations. Often, like the U.S. Department of State, they must operate with a considerable degree of decentralization in decision-making either by function or geographical region and they require a high degree of voluntary commitment to organizational purpose or mission on the part

of a highly professionalized elite group of staff members. In such cases, increasing attention is being given to what can be called a behavioral strategy of organizational design or redesign.

The Behavioral Strategy

The behavioral strategy of organizational design seeks to change organizations (and hence "redesign" them) by changing the behavior of individuals within an organizational structure. It is a strategy that pays more attention to building individual commitment and enhancing individual participation than it does to the efficient and effective attainment of a set of operational goals as defined by top management. It therefore is more of an "inside-out" approach to organizational design or redesign. It tends to place greater emphasis on organizational maintenance and organizational development than on productivity. As strategic variables, Warren Bennis has pointed out that this approach considers such items as "human collaboration and conflict," "control and leadership," "communication between hierarchical ranks," and "management and career development."[11]

Many practitioners of this strategy in the field now known as "organizational development" trace their origins to such Gestalt psychologists, clinical psychologists, and social psychologists as Kurt Lewin, Carl Rogers, and Abraham Maslow, all of whom predicated their theories on the assumption that human beings are more or less "self-actualizing" animals.[12] They seek to develop their capabilities to the fullest extent in all organizational environments. Organizations will fail if they do not provide a favorable environment for such self-actualization, they believe.

In accord with this point of view, it is a fundamental error for an organizational designer ("change agent" is the term commonly used) to actively intervene in making changes; it is his role to draw changes out of the analysis provided by the members of the organization themselves. Thus a paraphrase of Elliot Jaques' words on this subject reads as follows (substituting "designer" for "change agent" or "social scientist" acting in this role):

> It is our conviction that the [designer] working in a collaborative role rather than a technocratic one will achieve the best results, and it is our goal to achieve such a role. One might roughly differentiate collaboration as doing things with people, as opposed to technocracy as doing things to people. . .
>
> It is sometimes easier to do things to people than with them, easier to tell people what to do than to help them work through the emotional problems which stand in the way of their

doing it for themselves. The results, however, are rarely as satisfactory. Continued dependence upon the [designer] without emancipation, understandable resentment against the [designer] and even against [his occupational category] in general, or else confusion arising from advice about what to do without instruction on how to do it; these are the most likely fruits of a technocratic approach.[13]

An account of the initial steps in the behavioral approach to organizational design is provided by Herbert A. Shepard (again substituting "designer" for "change agent"):

> Typically, the strategy conforms roughly to an action-research model. The first steps are directed to diagnosis of the organization's dynamics, usually with the active participation of members. For example, the upper levels of management may be interviewed by the [designer] or the [design] team. Each interviewee is asked to provide his own diagnosis of the organization's processes and needs. Through these interviews the [designer] develops some rapport with members of the organization. . . During the interviews the [designer] also assesses the member's depth of concern with the issues discussed, his energy, vitality, and readiness to devote himself to more extensive work. A planning group is then formed of those with greatest readiness to consider the action implications of the diagnosis. The group meets for two or three days of intensive work along several dimensions: developing openness and trust among themselves, thinking through the diagnostic information, learning the concepts applicable to organization change processes, developing an image of their own and the organization's potential, and planning next steps for themselves and the designer. In so doing they form the first of a series of temporary systems needed during the process of organization change.[14]

Some key aspects of the behavioral strategy that come out in the above description include the following:

1. In contrast to the engineering strategy, the behavioral strategy focuses on (a) the diagnosis of organizational problems and (b) the implementation of organizational change, rather than on the structuring and the evaluation elements of organizational design.

2. The diagnosis and implementation of organizational design in the behavioral approach takes place as the designer plays essentially

what might be described as a "social technician" role (sometimes called a "communications facilitator") and tries to develop the trust and confidence of members of the organization who actually make their own diagnosis of the organization's problems and decide on the corrective action that they will take.

3. The problems that are identified in this kind of diagnostic procedure are most likely to involve "process" variables--relating to the needs of members of the organization--rather than focusing on problems of production.

4. The implementation of design changes is likely to start immediately in the teams ("temporary systems") formed to diagnose organizational problems; these group interactions tend to spread out into the organization to cause change.

5. The products of the behavioral strategy are procedures for building new patterns of interpersonal relationships (for example, involving greater trust, and freer communication), rather than the typical documentary products of the engineering strategy.

A basic assumption in the behavioral strategy is that organizations, or at least key people in organizations, actually want to change their modes of operation. Yet the truth of the matter is that in many organizations, resistance to change is a powerful force. Observers have noted that this has certainly been the case in the Department of State in relation to PPB efforts, although such resistance there is probably no greater than would be expected in any deeply entrenched and long-existing organization. In such organizations, however, one cannot expect key employees to cooperate fully with--or to welcome with open arms--the assistance of outside consultants to try to implement changes that can easily be seen to threaten existing patterns of authority and status. However, this was the finding also of William F. Whyte and his very skilled associates who attempted to use various behavioral techniques to achieve major changes in the functioning of the institution known as the "Tremont Hotel."[15] In such cases, it appears that a combination of the engineering strategy and the behavioral strategy is likely to be most effective.

The Systems Strategy

Among social and management scientists who have experienced failures in both the engineering strategy and the behavioral strategy, there has been a tendency to turn toward a mixed strategy that includes joint consideration of technological, structural, and interpersonal variables--an

approach that can be called a systems strategy of organizational design and change. Thus, William F. Whyte has written:

> In a work organization, the activities people carry on are strongly influenced by the technology, the flow of work, the formal distribution of tasks, and the location of individuals in the formal structure of the organization. This structuring of activities, in turn, will strongly influence which people come together in interaction, how frequently, and for how long a period. In many situations, the most effective approach to changing interactions is through changing the technology, work flow, formal organization structure or assignment of task responsibilities, and thus changing activities. On the other hand, influence can move in the other direction. While tasks may be formally assigned to groups of workers, we often find that, in the process of their interaction together, they reorganize the distribution of these tasks and thus activities within their group.[16]

In a more critical vein, Jeremiah O'Connell has also pointed to the deficiencies of attending only to behavioral factors in what he calls "the conversion approach" without also considering economic and structural variables:

> . . . in the context of the theoretical development to date, this case pinpoints two major ideas that deserve special attention in future models of planning for organizational change. First, there seems to be a drift away from the economic realities of business enterprise. The so called "conversion" approaches seem to give low priority to time as a scarce and expensive resource. . . . The promise of goal achievement through the mediacy of collaboratively developed social change can be judged as reasonable only after an evaluation of the time interval between change-agent intervention and goal achievement. . . . Second, the proponents of the "conversion" approaches have so focused on the social system that they have progressed little in an appreciation of the leverage to be achieved in changing organizational behavior by technological or structural alterations--what we have called systemic alterations.[17]

Similarly, Harold Leavitt classifies organizational components into task, structure, technology, and people and points out that:

> These four are highly independent . . . so that change in any one usually results in compensatory (or retaliatory) change in

> others. In discussing organizational change [I assume] that it is one or more of these variables which are to be changed. Sometimes the aim may be to change one as an end in itself, sometimes as a mechanism for effecting changes in one or more of the others. Usually, but not necessarily, efforts to effect change are ultimately designed to effect the task variable.[18]

The same is true for organizational design in general. Its object is, ordinarily, to provide an organizational environment in which task performance is maximized. To do this, organizational design must also consider the interactions of structure, technology, and people. Whereas an engineering strategy is likely to concentrate on technology and structure and a behavioral approach is concerned with people, the systems strategy is concerned with all these elements simultaneously--even though the designer may decide to begin with one element or another.

The systems strategy seeks to draw on the insights, concepts, techniques, and data that are offered by behavioral scientists as well as management scientists, economists, and others who call themselves systems analysts.[19] In a point-by-point comparison with the two previous strategies of organizational design, the systems strategy:

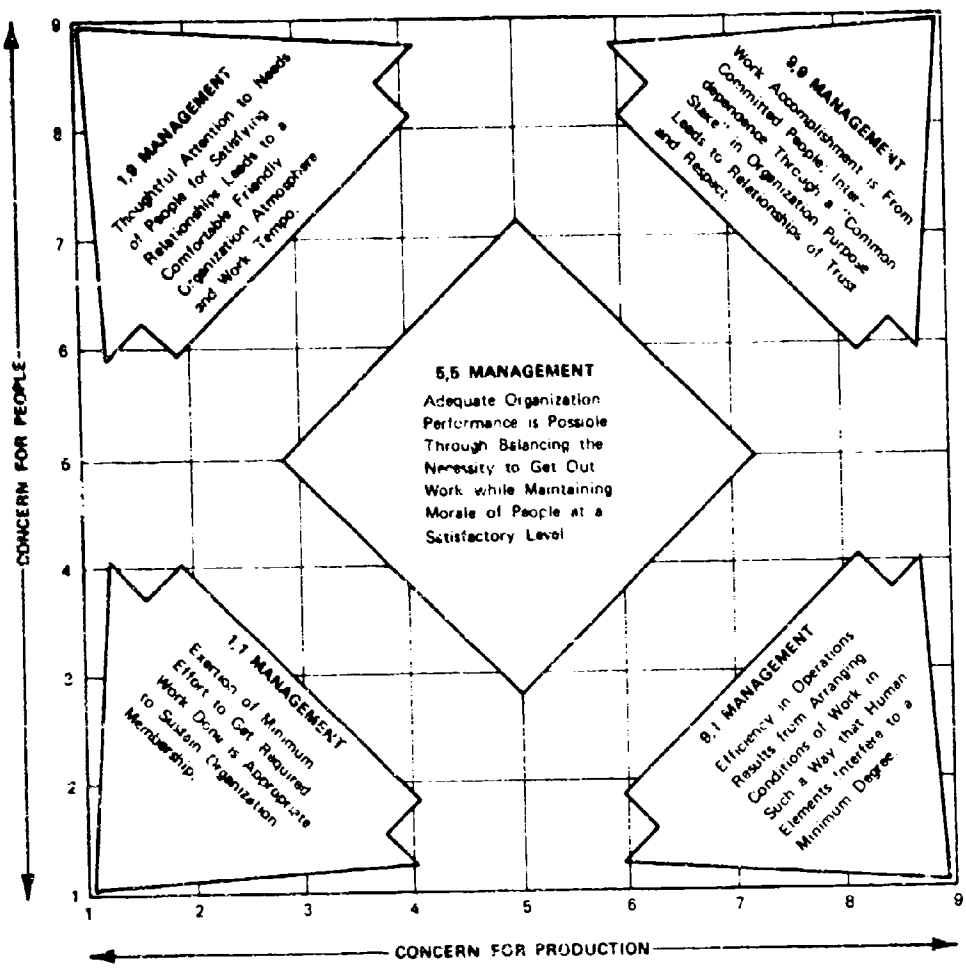
1. Focuses on all four elements of the organizational design process--the diagnosis of organizational problems in systemic terms; the structuring of organizational functions, authority, communications, and technology; the implementation of organizational designs or planned change so that such changes are incorporated into day-to-day behavior patterns of members or employees; and the evaluation of the effectiveness of organizational designs.

2. Casts designers in a fully professional role, in which they must bring expert knowledge of technology, organizational structure, human behavior, economic factors, and other relevant subjects to bear on the needs of their organizational clients.

3. Devotes attention to systemic problems involving both maintenance goals and production goals of the organization and to means to obtain the desired balance between them.

The way in which maintenance goals and production goals can be considered in combination by an organizational designer have been suggested in the "managerial grid" approach of Robert R. Blake and Jane S. Mouton.[20] They propose that "concern for production" and "concern for people" (a primary factor in organizational maintenance) can be combined in a form indicated in Figure 2. In describing such an approach taken at a plant

Figure 2 THE MANAGERIAL GRID



SOURCE Robert R. Blake and Jane S. Mouton, "Breakthrough in Organization Development," *Harvard Business Review* (Nov.-Dec., 1964), p. 136

of the "Sigma Corporation," the professional contributions of the two authors were summarized as follows:

> . . . the work and reputation of Blake and Mouton provided the specific departure point for an organizational development effort. Their prior design of the Grid Seminar and their six-phase concept of organization development represented a significant contribution, even though they themselves spent little time at the plant.[21]

The six-phase approach used by Blake and Mouton includes two preliminary "management development" activities ("laboratory seminar training" and "team development"), followed by four "organization development" activities that closely parallel what we consider to be the four major aspects of organizational design:

> Intergroup development [similar to organizational problem diagnosis] . . . Situations are established whereby operating tensions that exist between groups are identified and explored by group members and/or their representatives. The goal is to move from the appallingly common "win-lose" pattern to a joint problem-solving activity.
>
> Organizational goal setting [similar to organizational structuring] Organization development moves beyond team areas into problems that require commitment at all levels. Such broad problems include: cost control, union-management relations, safety, promotion policies, and over-all profit improvement. . . . Departmental groups may also help to define goals and assign roles.
>
> Goal attainment [similar to the implementation of organizational change] . . . when problem areas are defined by special task groups, other teams are set up throughout the organization. These teams are given a written "task paragraph" which describes the problem and the goal. . . . [After it is assured that the problems and the goals are understood] the team members work toward a better statement of the problem and toward corrective steps. They also begin to assign responsibility for these corrective steps.
>
> Stabilization [similar to an evaluation of the effectiveness of organizational design or redesign] . . . changes are assessed and reinforced so as to withstand pressures toward "slip back" and regression. This also gives management an opportunity to evaluate its gains and mistakes under the organizational development program.[22]

Blake and Mouton themselves evaluated the question of the effectiveness of this systems strategy at the Sigma plant in the following words:

> Now, after reviewing the program and its consequences, even a conservative answer to this question would seem to be "yes." The program had become part of day-to-day managerial activities at Sigma. Both in opinion and behavior, most managers endorsed the work patterns presented in the Phase 1 Grid Seminar.[23]

Whereas it has been indicated previously that an engineering strategy may be sufficient for organizations that are essentially authoritarian in structure and a strictly behavioral approach may be satisfactory in voluntary or employee-oriented organizations, it may be argued that a systems strategy is especially appropriate to "high technology" organizations in modern society. These are organizations that are production-oriented, but their production tends to be in one-of-a-kind or few-of-a-kind runs. In such organizations, routine tasks are likely to be automated, and human energies are devoted increasingly to more complicated and less specifiable activities requiring professionalized skills and orientations.[24] "Concern with people" becomes particularly important in these skilled labor-intensive activities, yet "concern with production" is equally important in view of the high quality standards that are likely to be applied to their outputs. Such concerns apply to research and development organizations and to many components of the relatively new aerospace industry, but they apply equally well to educational institutions (especially colleges and universities), hospitals, law firms, and an increasing number of other institutions in an era of rapidly advancing technological and social change.

Only a systems strategy of organizational design can be ultimately satisfactory for the needs of such institutions. The subsequent chapters examine further the ramifications of a systems strategy for the four main aspects of the organizational design process, as illustrated by reference to the organizational design cases examined.

Notes for Chapter III

1. See M. Weber, From Max Weber: Essays in Sociology (New York: Oxford University Press, 1946) and M. Weber, The Theory of Social and Economic Organization (Glencoe, Ill.: Free Press, 1947).

2. The basic source is F. W. Taylor, The Principles of Scientific Management (New York: Harper, 1942).

3. Cited in D. Novick, "The Origin and History of Program Budgeting," California Management Review (Fall, 1968), p. 7.

4. Ibid., p. 11.

5. Executive Office of the President, Bureau of the Budget, Bulletin 66-3, October 12, 1965.

6. Ibid.

7. Executive Office of the President, Bureau of the Budget, Bulletin 68-9, April 12, 1968.

8. H. M. Vollmer, Organizational Design--an Exploratory Study (Menlo Park, Calif.: Stanford Research Institute, "R&D Studies Series," p. 111).

9. Cited in D. Novick, op. cit., p. 7.

10. A review of this is to be found in F. C. Mosher and J. E. Harr, Program Budgeting Visits Foreign Affairs (Syracuse, N.Y.: Inter-University Case Program, Inc., publication forthcoming).

11. W. G. Bennis, Changing Organizations (New York: McGraw-Hill, 1966), p. 87.

12. See K. Lewin, Resolving Social Conflicts (New York: Harper, 1948); C. Rogers, On Becoming a Person (Cambridge, Mass.: Riverside Press, 1961); and A. H. Maslow, Motivation and Personality (New York: Harper and Row, 1954).

13. E. Jaques, "Social Therapy: Technocracy or Collaboration?" in W. G. Bennis, K. D. Benne, and R. Chin, The Planning of Change (New York: Holt, Rinehart and Winston, 1961), pp. 163-64.

14. H. A. Shepard, "Changing Relationships in Organizations," in J. G. March, ed., Handbook of Organizations (Chicago: Rand McNally, 1965), pp. 1136-37.

15. W. F. Whyte and E. L. Hamilton, Action Research for Management (Homewood, Ill.: Irwin and Dorsey Press, 1964).

16. Ibid., pp. 185-86.

17. J. J. O'Connell, Managing Organizational Innovation (Homewood, Ill.: Irwin, 1968), pp. 144-45.

18. H. Leavitt, "Applied Organizational Change in Industry: Structural, Technological, and Humanistic Approaches," in March, op. cit., p. 1145.

19. What I have called the "systems strategy of organizational design" is quite compatible with the "systems concept of managerial behavior" in Leonard Sayles, Managerial Behavior (New York: McGraw-Hill, 1964).

20. R. R. Blake and J. S. Mouton, "Breakthrough in Organization Development" Harvard Business Review (November-December 1964), pp. 133-35.

21. Ibid., p. 152.

22. Ibid., p. 155.

23. Ibid., p. 155.

24. These concepts are developed fully by A. Shapero, "The Management of Technical and Intellectual Resources" (Austin, Texas: University of Texas, a paper given at the IEEE convention, Second on Management and Research Development, March 18, 1968, New York City).

Chapter IV

DIAGNOSIS OF ORGANIZATIONAL GOALS AND PROBLEMS

Before moving into the structural aspects of organizational design, it is important to deal with the logically prior question: Organizational design for what? What is one trying to accomplish by the organizational design or redesign effort? An adequate answer to this question, in turn, presupposes that the designer (or design team) has made a satisfactory diagnostic analysis of (1) the goal (or "mission") toward which the organizational entity is expected to be oriented and (2) the major systemic problems that now affect, or will affect, the capability of the organization to move toward these goals.

Problems in Goal Definition

It appears useful to make certain terminological distinctions as an aid in sorting out problems in organizational goal definition. A basic concept is that of:

> Organizational Goal(s): a definition of the overall purpose of organized activity, in relation to which all roles, functions, and policies within the organizational entity are ultimately evaluated.

In turn, there appear to be two major kinds of organizational goals. One refers directly to the outputs that the organization is intended to produce, which is usually the original "purpose" of the organization in the minds of its founders. The other refers to the assumptions that are made regarding the expected life, growth, and general survival conditions for the organization. We refer to these two types of goals as "operational goals" and "maintenance goals," respectively, and describe them as follows:

> Operational Goals: the main outputs (goods or services or both) that an organization is expected to produce for beneficiaries (e.g., owners, stockholders, customers, clients, and employees).

> Maintenance Goals: the main characteristics of the organizational system that are expected to prevail (e.g., growth and length of life of the organizational entity).

Philip Selznick and others have described how the major function of leaders is to define organizational goals and to build organizational "character" to support the attainment of these goals.[1] This implies, in turn, that organizational goals cannot merely remain in a vague or idealistic form--e.g., the defense of the nation for the military, the education of youth for school systems, or the salvation of souls for the church. Organizational goals must become translated into more specific operationally defined objectives. Hence our further description of organizational objectives and the subordinate components, operational objectives and maintenance objectives:

Organizational Objectives: a definition of measurable accomplishments that are viewed as related to organizational goals--i.e., indicators of progress toward the attainment of organizational goals.

Operational Objectives: measurable standards of quantity and quality as applied to organizational outputs--e.g., production rates and reject rates.

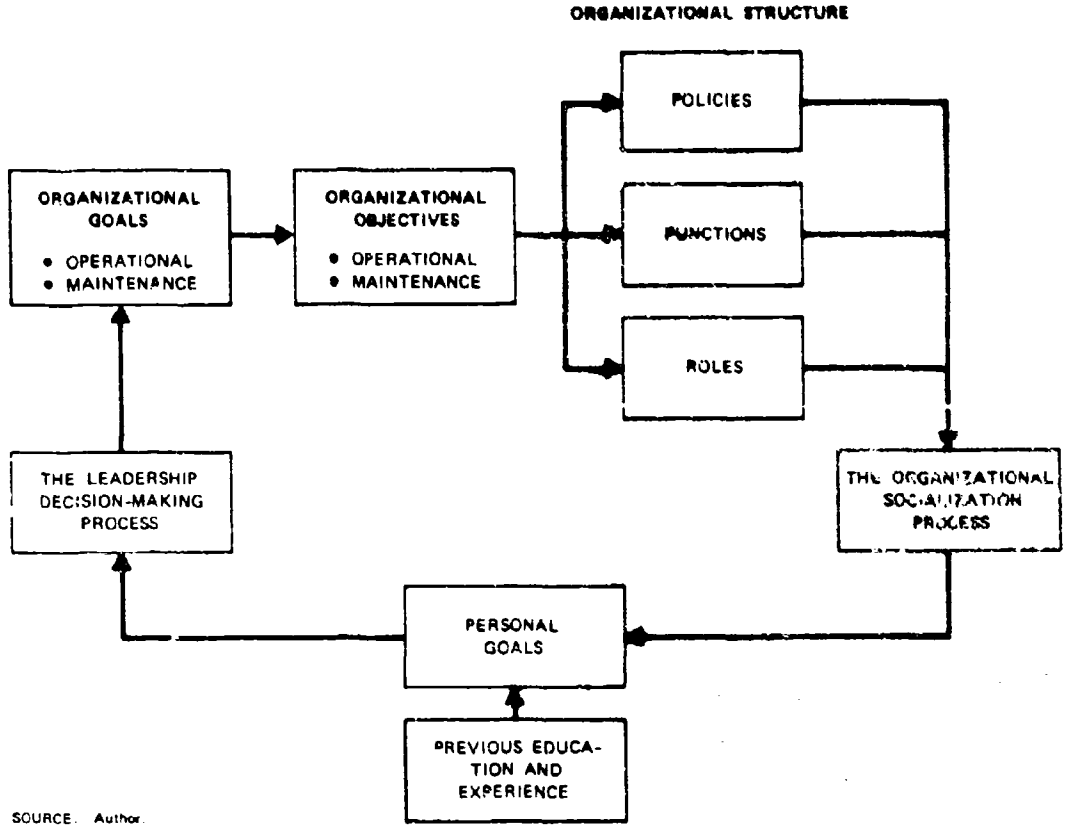
Maintenance Objectives: measurable standards applied to characteristics of the organizational system--e.g., rate of growth and length of life of the organization.

A digression may be made at this point to consider the perennial problem in business organizations as to whether profit or return on investment should be considered to be an operational goal or a maintenance goal (or whether rate of profit should be considered to be an operational objective or a maintenance objective). The answer to this question would have to be another question in reply, namely, what do the leaders consider to be the overall operational goals of the organization? Is it to maximize profit, or is it primarily to produce a high quality product or service? If in the minds of the key decision-makers it is the latter, then profit and rate of profit must be viewed as part of the maintenance goals and objectives.

Figure 3 illustrates how, in the process of organizational design, goals become translated into objectives, and these, in turn, become differentiated into "organizational structure," with "policies," "functions," and "roles" as structural components. These concepts are defined as follows:

Organizational Structure: the differentiation and integration of policies, functions, and roles established to attain organizational objectives.

Figure 3 RELATIONS BETWEEN ORGANIZATIONAL GOALS, ORGANIZATIONAL STRUCTURE, AND PERSONAL GOALS



SOURCE. Author.

Organizational Policies: authoritative statements intended to guide the actions of those in organizational roles toward the attainment of organizational goals and objectives.

Organizational Functions: major groupings of related categories of work (e.g., into divisions or departments) in ways intended to support the attainment of organizational objectives.

Organizational Roles: the constellation of rights and duties that are attributed to individuals who are commonly viewed as contributing to the attainment of organizational objectives.

It is important to recognize that those who perform organizational roles may have individual work and career goals derived from their previous education and experience that do not necessarily correspond with organizational goals and objectives until they have been subjected to a process of organizational socialization that usually extends over a period of some years of employment.[2] However, as indicated in Figure 3, the influence of organizational policies, functional assignments, and roles is not just a one-way process that acts to reshape the personal goals of employees. Employees with strong personal goals also tend to move into higher status positions in organizations where they can participate in the leadership decision-making process, and thereby ultimately exercise an influence on reshaping the overall goals of the organization itself. Studies have found that this is especially true for highly professionalized scientists and engineers in universities, certain government agencies, and high technology industrial companies.[3]

Therefore, we can complete the basic set of concepts in this section by the addition of the following:

Personal Goals: a definition of the work and career goals of individuals within an organizational entity.

Organizational Socialization Process: the process whereby personal goals tend to become redefined in alignment with organizational goals.

Leadership Decision-Making Process: the process whereby organizational goals are defined by those who assume leadership roles in an organization.

Problems of Goal Conflict

As goals proliferate in any organizational context, there is always a possibility of conflict between them. Thus, for example, there can be conflicts between two major operational goals--the education of students and the conduct of research--in university settings. A clear example of this kind of goal conflict was provided in the on-campus university research organization referred to under the pseudonym "URL."[4] As in the case of most other university research organizations, URL has the two formally specified goals of contributing to (1) research and to (2) teaching. In addition, URL was first established mainly as a research (3) service facility to help meet federal defense research requirements during World War II. URL has retained this public service goal to do applied research under government and, to a lesser extent, industry sponsorship, in addition to its basic research and educational missions.

To accommodate applied research, basic research, and educational objectives simultaneously, URL has assigned most of its applied research projects to one laboratory and has mainly employed nonfaculty research associated in this laboratory to handle these projects. This arrangement frees most of the faculty to work on more basic research projects designed to contribute to general knowledge in the engineering sciences under study and also allows the faculty to involve the majority of the student research assistants in these more basic research projects for the advancement of their graduate education. Questionnaire data showed that the nonfaculty research associates are apt to be at least as interested in applied research as in basic research, while the large majority of the faculty are primarily interested in basic research.

From these differences in research interests and activities, it would be expected that faculty and nonfaculty research associates might differ in their perceptions of the priority of emphasis placed on the three main goals of URL. Questionnaire data showed that this was indeed the case. Nonfaculty research associates generally ranked service (applied research) goals as equal in importance with scientific and technical (basic research) goals at URL, whereas faculty personnel generally ranked scientific and technical goals as more important than service goals.

Also, one might expect that the senior faculty members, who have administrative responsibilities at URL, might be likely to rank the goals differently from the way the junior faculty do. More specifically, one might expect that the senior faculty, as administrators, would be more sensitive to the relation between laboratory activities and the overall educational goals of the parent university, whereas the junior faculty, who must view the laboratories in the light of their own personal career

goals, would be more sensitive to the opportunities that the laboratories provide for producing professionally respected research outputs--i.e., publications of basic research findings in the professional literature. Again, the questionnaire data showed that this was the case. The senior faculty tended to rank educational considerations as first in importance among all laboratory goals, whereas the junior faculty tended to rank making contributions to basic technical and scientific knowledge as first.

The primary attachment of the junior faculty to these research interests rather than to teaching was also brought out in several questionnaire and interview comments made about the problems that the junior faculty have in the URL laboratories. One of the problems most frequently mentioned by the junior faculty members was that they have to put up with students who are "inadequately trained" for the important research activities in their laboratories. Three such comments were expressed, as follows:

> Being an educational institution we do get a lot of inexperienced people working in the laboratory. When these new students start up I feel they should be trained better for experimental work and to care more for the equipment they use.
>
> I believe there should be a more honest evaluation of research students, some of whom should be kindly but firmly discouraged when ample evidence has accumulated, rather than tailoring a "research program" to fit the aptitudes of a student.
>
> The presence of students compounds this problem of low efficiency. They should not be allowed in the lab unless they are working on a lab project. I believe that students are a large source of problems.

The data indicate that URL, like most university research organizations, is a loosely organized research facility that exists primarily to support the basic research interests of individual faculty members. It is an example, par excellence, of organizational adaptation to the personal goals of individual staff members. Moreover, URL's continuation within the parent university depends on the degree to which it can continue to support these individual research interests effectively. Unlike many nonacademic research organizations, the organization at URL must adapt its goals almost immediately to the research interests and career development activities of individual (faculty) staff members. This contrasts markedly with research organizations outside universities, where individuals are more often employed to support the pre-existing goals of

their employing organizations. Even in the latter cases, however, we can find instances where the strong professional interests of staff members over time can modify and reshape the goals of their research organizations.

As goals proliferate in organizational contexts, there is also a tendency for maintenance goals to displace operational goals. This tendency is well documented in the sociological literature on organizational change,[5] and was brought out in some detail in our previous study of an independent research organization, referred to as "TAROS," where two operational goals emphasizing (1) research services to industrial and government clients (applied research) and (2) contributions to fundamental knowledge in technical disciplines (basic research), had been specified in the corporate charter, as well as a maintenance goal, (3) an adequate level of growth in the size and staff capabilities of the institution itself.[6] Goals become implemented in an organization to the degree that they become explicitly recognized and acted on by various interest groups connected with the organization. To make at least a partial assessment of the degree to which the three aforementioned categories of goals--institutional, technical, and service--had become implemented in the day-to-day operations of TAROS, two open-ended questions were asked of both managerial and professional personnel in a written questionnaire: "What do you feel is the single most important goal of TAROS--that is, the most important consideration influencing management dicisions at TAROS?" and "What do you feel is the second most important goal of TAROS?" Responses to these two questions were then classified as primarily related to institutional, technical, or service goals. Following are examples of responses classified as institutional maintenance in character:

> (The single most important goal of TAROS) appears to be "to stay in the black" financially and to enhance the "public image" of TAROS.
>
> Determination of the role TAROS is to play over the long term in the research world.
>
> Keeping at the top in its field.
>
> Survival and financial growth.
>
> To be viable and healthy with a high assurance of continuity.
>
> To make TAROS a good place for scientists and engineers to work.

Other responses, such as those listed at the top of the following page, were classified as technical in nature.

(The single most important goal of TAROS) is doing good scientific work.

Quality of product.

Accomplishment of important scientific objectives.

To do an excellent technical job on any project undertaken.

To keep our projects in the frontiers of science.

Selection and support of proper areas for research activity at TAROS and ensuring the highest possible standards in the areas of endeavor selected.

Showing more concern for good research products than for expansion plans and public relations.

Still other responses, such as the following, were classified as service goals:

(The single most important goal of TAROS) is providing a high quality research service to industry and government.

To do useful research.

To develop solutions to problems contributing to the welfare of the client, the nation, or mankind in general.

To conduct as much research as we can afford in the public interest.

To satisfy clients regarding their problems in the applied research field.

To apply TAROS breadth of capabilities to problems of great national and international significance.

Larger proportions of all managerial personnel and of all professional research personnel asked this question indicated that institutional goals were of greater importance in comparison with the proportions who mentioned other goal categories. This finding reflects what Selznick has claimed to be a primary function of leadership in any organization--the specification and recasting of the aims of the organization in order to adapt them, without serious corruption, to the requirements of institutional survival.[7] At the same time, some managerial personnel have been

concerned lest institutional considerations at TAROS obscure what they consider to be more fundamental operational goals, as the following comment of a TAROS manager indicates:

> It has often appeared that TAROS was evaluating its own success in terms of its size and the magnitude of its annual business. I believe this is a mistake resulting from its competitive business situation. Financial solvency should be the first constraint under which we operate, but not the goal of TAROS.

This individual continued to suggest that the primary goals of TAROS should be public benefit and research quality in relation to general scientific knowledge. Research personnel have voiced the same complaint in the following terms:

> The greatest problem in TAROS' research activities is that these activities are determined too much by the criterion "Can we get somebody to pay for it?" and not enough by the criterion "Is this an important area of research?" Importance means making a contribution to science or to the welfare of mankind directly.

> Occasionally in the past there has existed on our part a slight tendency to accept projects independently of our judgment of their value to the client and to TAROS. We should keep in mind that, while making money is important, it is much more important to do good research. Thus, we should be prepared to reject a project occasionally on the grounds that while it would make dollars, it doesn't make sense.

> We should take the emphasis away from selling contracts and making profits, and put it back on doing an outstanding technical job.

A tabulation of questionnaire responses indicated that technical goals tend to receive an emphasis second in frequency to institutional goals among both the managerial and research personnel surveyed, with service goals placing third in frequency of mention. However, the increasingly competitive position of TAROS in the R&D industry appears, in part at least, to have caused primary emphasis to be placed on institutional survival.

However, it should be pointed out that the emphasis on at least three categories of goals at TAROS causes some confusion and ambiguity in the minds of many TAROS staff members. No single goal has become formalized or thoroughly implemented throughout the organization. This situation is indicated by the following comments written on questionnaires by TAROS

staff members, many of whom feel that there should be clearer definitions of organizational goals:

> Very seldom, if at all, can you find agreement within the staff as to TAROS' objectives and methods of accomplishment.
>
> We should decide what type of research organization this is to be. What types of research are we to specialize in? What types are we to reject? What are to be the criteria for new research program selection?
>
> TAROS should establish and make known to its professional personnel the long range plans for TAROS. What kind of organization do we want to be?
>
> We need to have more clearly defined objectives and policies.

Related to the desire among many staff members for more clearly defined goals is an expressed desire among some for more centralized authority:

> TAROS could use considerable "pulling together" at the top and a greater level of understanding and cooperation between divisions.
>
> TAROS could greatly improve in terms of a more clear delineation of responsibilities for supervision of research and the allocation of research tasks to the various parts of the organization.
>
> Management should try to create greater unity within TAROS. Too often TAROS gives the impression of being a merchandise mart of research shops coordinated by cost accountants.
>
> Management could develop policy guidance and exercise more positive control of research activities of the divisions to reduce competition, to exercise quality control to maintain high standards, and to encourage research personnel who are doing high quality work.

On the other hand, a sizable number of TAROS personnel apparently recognize that some degree of goal ambiguity and lack of clear-cut assignment of responsibilities within the organizational structure is functional to the flexibility of the organization itself. In terms of Selznick's analysis of organizations, these people may be said to recognize, at least

implicitly, the dangers of premature goal definitions within any organizational coalition.[8] They appear to recognize the need for a considerable degree of decentralization in policy decisions within a research organization that attempts, in part at least, to produce contributions to basic scientific knowledge. At TAROS, such individuals tend to complain about too much centralization of authority:

> The organization of TAROS has become too pyramided, I feel . . . . One effect has been that many people with managerial responsibility have become far removed from performing the raison d'être function of TAROS--contract research.
>
> There needs to be a major decentralization along lines of functional research involving both fiscal matters and the locus of policy decisions.
>
> We should avoid centralization of research management and limit the "integrating" functions and "interpretation" of research to a less dominant position.
>
> We should have scientific objectives for TAROS established by scientists, and project quality monitored by scientists, not by administrators.

Therefore, it appears that the major leadership function of management at TAROS is to maintain a delicate and somewhat precarious balance between perceived organizational needs for purpose, direction, and coordination of effort, on the one hand, and for flexibility, freedom, and accommodation to diverse primary interests in both the external and internal enivronment of the organization, on the other hand. As the comments suggest, a major factor in this internal environment is the personal goals of professional staff members.

A satisfactory organizational design must build on an adequate diagnosis of problems of the compatibility (1) among operational goals, (2) between operational goals and maintenance goals, and (3) between organizational goals and personal goals of key staff members. In its major task of bringing together a collection of transportation mode-oriented sections from a variety of federal departments and agencies into a new Department of Transportation, for example, two task forces (known as the Zwick Task Force and the Trimble Task Force) met for a total of some 16 months from January 1966 until April 1967. These task forces made a complete diagnosis of problems related to the overall goal or mission for the new department, what its component parts should be, and how these might best be related to each other to accomplish the new goal--coordinated transportation systems administration. The task forces came up

with a prescription (subsequently adopted by the new Secretary, Alan Boyd) that, in essence, the operating goals of the Department should be the primary responsibility of line administrators reporting directly to the Secretary and that the maintenance goals of the Department as a whole should be given primary attention by assistant secretaries, who also report directly to the Secretary, but have no line operating responsibilities. Giving special attention in this way to the implementing of organizational maintenance goals can be quite important in a new organization, where operational goals have not yet become institutionalized in the thinking of both insiders and outsiders. This division of top management responsibilities would also appear to have a distinct advantage in assuring that adequate attention will be given both to operating goals and to maintenance goals, but only time will tell the degree to which this initial structural solution proves to be adequate.

Also time will be needed to determine the degree to which the new transportation systems orientation will become diffused throughout the entire organization so that it will begin to influence the personal goals and orientations of key staff members. The Department has already taken steps to implement this by beginning management development programs that include the temporary reassignment of individuals whose careers to date have been connected only with one transportation mode (e.g., Coast Guard and FAA personnel) to the Departmental headquarters and to line administrations within the Department. This should serve as an additional organizational socialization mechanism to broaden the general outlook of these personnel.

Moreover, work remains to be done--and is now under way--to develop specific objectives, which in turn can be used to assess the degree to which the Department is accomplishing aspects of its operational and its maintenance goals. Measures of specific objectives are being built into an overall Departmental management information system that is currently being designed and implemented.

In other cases examined in this study, the organizational situations are somewhat different--or to be precise, the organizational entities are at somewhat different stages of development. The Department of Labor, for example, has existed for over 50 years, and now has the general problem of changing certain past orientations and modes of operation to accommodate to the new organizational goal of actually administering federal manpower programs in a coordinated manner in local areas. Certain existing elements within the Department have a long-standing political and social base of support in local regions to maintain their transaction-oriented services to various clientele, rather than to accommodate to a

Departmental leadership desire to shift to coordinated total person-oriented services in federal manpower programs. Here is a case where well-established maintenance goals within the Department stand as obstacles to a shift toward new operational goals. In other words, the flexibility of the Department to shift toward accommodating new goals is constrained considerably by prior goal commitments.

Perhaps at the other extreme in terms of the time dimension, the Oregon Graduate Center is so new and without previous institutional commitments that the degree to which its top management has flexibility in the shaping of its organizational goals seems at first glance to be almost unlimited. It might be predicted that two constraints in the long run will act to limit this flexibility. One constraint is the manifest desire of younger faculty members currently being recruited into the Oregon Graduate Center staff to do "significant research oriented toward making fundamental contributions to scientific disciplines" (i.e., to conduct basic research). The other constraint is the ultimate desire of the current and potential financial sponsors of the Center in the northern Oregon business community to contribute to the growth of a technical industrial complex in that area (i.e., through providing applications-oriented research services). It is a major challenge to the leadership of the Oregon Graduate Center to try to design an institution that will achieve these client sponsor goals and the personal goals of key staff members simultaneously. Reportedly, a similar type of institution failed to get off the ground in northern New Jersey primarily because, according to one key informant, "it turned out that industrial firms in this area are just not interested in supporting a basic research center."

Symptoms Versus Systemic Problems

In diagnosing problems that organizations have in accomplishing their general goals and their more specific objectives, it is important to move beyond the awareness of surface symptoms of organizational disorders to identification and analysis of the systemic bases of organizational problems. In this regard, an analogy may be drawn with a patient who goes to a physician and requests "some pills to get rid of my headache." Insofar as the physician is professional in his orientation, he will want to run some more or less standard tests to try to determine the systemic disturbances that underlie the headache symptom, instead of just prescribing a palliative remedy.

Thus this analogy leads us to distinguish between:

Systemic Disturbance: categorization of an organizational problem in terms of a disturbance in the abilities of an organization as a social-political-economic system to attain its stated goals, and

Symptoms: overt manifestations of underlying systemic disturbances.

Correspondingly, we must make a further distinction between:

Systemic Remedies: prescriptions of organizational design changes that correct systemic disturbances so that organizational problems are removed or satisfactorily alleviated, and

Palliative Remedies: prescriptions of organizational design changes that remove (or cloak) symptoms, but do not affect systemic disturbances.

Figure 4 summarizes several examples of the need to go beyond palliative remedies to systemic remedies. The first example is drawn from William F. Whyte's classic study of the restaurant industry. In his study, he found a number of problem situations where restaurant managers complained that waitresses were frequently breaking down in tears, cooks and chefs frequently lost their tempers, and consequently there were serious lags in food services with many dissatisfied customers.[9] A palliative remedy for this constellation of symptoms would have been for management to admonish waitresses "to get hold of themselves," "to buck up," or to try "to keep cool" and to admonish cooks to control their tempers. This might have alleviated the immediate symptoms, but it would not have gotten to the underlying systemic basis of the disorder. Whyte's investigation found that the basic problem was status inconsistency in the role relationships of cooks and waitresses; waitresses, being female and also being lower paid are considered to be in a lower position than cooks in the restaurant hierarchy. To resolve this role conflict, Whyte and his associates recommended the use of a physical mechanism--the spindle--to insulate the two roles from direct interaction with each other. This example is one of the few hardware "inventions" resulting from social research. It is also an example of the development and application of a systemic remedy that now has widespread use in the restaurant industry.

A second example is derived from a project experience of the author a few years ago. A client from a bakery goods company reported that there was an abnormally high turnover rate among his bakery wagon drivers--i.e.,

Figure 4 SYMPTOMS AND SYSTEMIC REMEDIES

EXAMPLES	SYMPTOM	PALLIATIVE REMEDY	SYSTEMIC DISTURBANCE	SYSTEMIC REMEDY
1	Waitresses cry, cooks lose their tempers, and production schedules lag	Admonitions to "buck up"	Status inconsistency between roles	Design mechanism for physical separation of interaction–the spindle
2	Abnormally high turnover among bakery wagon drivers	Use test to select drivers "who will not turn over"	Role incompatibility in jobs	Job redesign
3	Low applications productivity among scientists	Give scientists more application assignments from management	Incompatibility between management goals and scientific career commitments	Design a basic research lab as a "socializing" institution
4	Resentment of privileges of minority group members by present employees	Additional orientation sessions for both groups	Status insecurity among both groups	Design of new careers opportunities for both groups

SOURCE: Author.

over 100 percent each year. A consultant had sold this client a personnel selection test that would allegedly allow him "to select drivers who would not be prone to turn over." After several years of experience using this selection test, the client had recognized that his high turnover situation had not improved. It took only a small amount of diagnostic investigation to get to the systemic basis for the disorder. Further investigation in this company revealed that there was a basic conflict within the role requirements of the bakery wagon drivers--they were required to be delivery drivers and salesmen entrepreneurs (on a sales commission-based wage) at the same time. Bakery wagon drivers could not be recruited from the same labor market as salesmen entrepreneurs. So a simple systemic solution was to redesign the job classifications, so that different people could perform the two main roles. As a result, turnover rates decreased to a normal level for both drivers and for route salesmen.

The third example summarizes the experience of many industrial research organizations--that young scientists, who are recruited directly from universities are not interested in doing mission-oriented (applied) research, but are only interested in continuing to play a scholarly role oriented toward doing nondirected (basic) research and writing technical publications in the scientific literature. Some companies have tried to solve this problem by giving scientists more applications assignments, but our own studies have found that this has almost inevitably resulted in dissatisfaction and higher turnover rates among scientists. Young university-trained scientists commonly have personal goals that conflict with (or at least do not support) overall organizational goals in many industrial companies. This basic conflict must be alleviated. In-house fundamental research laboratories insulated from (but not isolated from) day-to-day technical concerns in these companies can sometimes provide a structural systemic remedy for this conflict. Thus fundamental research laboratories can function as a "half-way house" in a process of organizational socialization for research scientists, as the following description of the corporate Scientific Laboratory of the Ford Motor Company by its Director, Jack Goldman, indicates:

> It's another characteristic of this generation of scientists that the good ones all come out of school wanting to do nothing but pure basic research. They dream of the purity, and don't want to taint themselves by touching things that are more applied in nature.
>
> Well, I think our experience will undoubtedly document the fact that the best way to get the best men into applied research is first to recruit them into the company to do basic

research. Ultimately they recognize that they become sensitized to corporate needs, and it doesn't take long for them to recognize that they can serve a very noble and useful purpose by doing applied work.

I'm fond of citing an example that we had. We have a very, very fine physical chemist, one of the best in the country, who's working today in the field of combusion research. He is particularly concerned with the problems of hydrocarbon emissions in combustion, or what people like to think of as smog production. As you well know, this is a serious problem not only for our industry but for the country as a whole. Now, if you look around the country, you find very, very few first class people doing anything in combustion. In fact, one of the characteristics of the industry I'm in, and I noted this particularly when I entered it, is that, considering our investment and what a large fraction of the gross national product this product (motor vehicles) is, there has been remarkedly little--in fact almost no--real good fundamental research on the chemistry of the combustion process.

And you couldn't go out for love or money into the academic halls and recruit a fine Ph.D. to come to work and do combustion research. The best ones have ample opportunity in the romantic industries or the glamour industries, and in the glamour fields of science. But here is a man whom we recruited from an AEC laboratory where he had done some of the pioneering work on the heavy metal fluorides which were so very important in the separation of uranium and plutonium, and he started out working in this same field when he joined Ford. But several years later what emerged is a recognition on the part of this individual that combustion is a very important problem. It is important to Ford, it is important to the country, and it involves some interesting and good chemistry. And he realized that he could probably make a great name for himself, if he turned his attention to this. Now he is working full time in the field of combustion research. You would never have gotten him into the corporation if you had tried to interest him in this at first. I predict that out of his work, as sure as night follows the day, some important development may arise which will be important to us in this problem of the control of hydrocarbon emissions.[10]

The fourth case in Figure 4 is a hypothetical example of a kind of problem that could arise if care were not taken in the design of a new careers program--a program oriented toward providing opportunities for job development and career growth for minority group members from poverty backgrounds within a corporate environment. What might happen is that the career opportunities opened up for this special category of personnel could cause a backlash of resentment among present employees, with a consequent buildup of negative attitudes in the new careers group. A simple palliative response to this situation would be to intensify orientation sessions for both groups to try to motivate them to "understand each other," "get along better and so forth," but this would not get at the systemic basis of the problem--namely a feeling of status insecurity in both groups. Present employees might justifiably feel resentful that a new and special category of persons was obtaining special treatment, privileges, and opportunities that had not been made available to current employees. Similarly, new careers trainees would be expected to be hypersensitive about the reactions of long term experienced employees in a work situation that is quite new and in many ways "strange" to the new careers personnel. A systemic solution to this problem might be to make sure that new careers-types of opportunities for career development and advancement are equally available to current employees as well as to the new careers trainees themselves. In other words, this would become a new careers situation for everybody, or an "everyone wins game" strategy in which all employees become the beneficiaries of a changed organizational structure.

Turning to one of our case studies made expressly for this report, we can note some of the symptoms of trouble that were evident at the National Bureau of Standards before 1968. For several years, the funds authorized by Congress had fallen short of meeting the anticipated requirements of the Bureau, and the top management of the Bureau had believed that key members of Congress and the Bureau of the Budget (acting as watchdog for the Executive Office of the President) had been unfavorably impressed with the way that expenditures had been controlled and with the selection of projects in NBS. A superficial view of the problems associated with these moves could have been taken. Instead a closer review of the bases of these problems led the NBS management to a systemic diagnosis that (among other things):

- There was a need for greater coordination within NBS; there was too little coordination of similar activities between the NBS divisions.

- There was a need to know more about what NBS customers need and to relate both tangible and (mostly) intangible outputs to these customer needs.

There was a need to develop more effective incentives to motivate scientific staff members to respond to customer needs, and yet to retain a high degree of technical autonomy and sense of individual freedom for scientific and technical staff members.

In Chapter III, it was pointed out that in the behavioral approach to organizational design, there is a considerable amount of emphasis on the diagnosis of organizational problems before making organizational changes, but the diagnosis is made primarily by members of the organization themselves. Outside "change agents" serve mainly as "communications facilitators," to assist members of the organization to develop their own diagnoses. In the engineering approach to organizational design, in contrast, diagnosis itself tends not to receive much emphasis. Outsiders, acting as "expert consultants," tend to make immediate inputs regarding what are assumed from the consultants' previous experinece to be desirable structural designs or structural changes. There is not likely to be a well-defined process to determine the appropriateness of proposed structural changes to the solution of systemic problems in the organization under consideration.

Our own studies suggest that what we call a systems strategy of organizational design would generally be more effective than a behavioral or an engineering strategy for the purpose of identifying and analyzing systemic bases of organizational problems and for prescribing structural solutions to them. The behavioral strategy may be effective in uncovering and handling local problems that are in the forefront of attention of staff members in departments or divisions within an organization where behaviorally oriented group process techniques are applied. However, this strategy can easily not give sufficient attention to the wider problems of the organization as a social, political, economic, and technical system. In other words, it can lack the objective point of view that can be brought to bear on organizational problems by a systems-oriented diagnostician. Conversely, the main weakness of the engineering strategy appears o be that an expert consultant can easily be diverted by surface symptoms, and therefore be led to the prescription of palliatives, rather than remedies based on an adequate diagnosis of the systemic bases of organizational problems. Our own studies suggest that what is needed is essentially a professional approach to diagnosis as part of a total systems strategy.

The Professional Diagnostician

A professional approach to the diagnosis of organizational problems implies that a diagnosis of organizational problems will be made by a professional diagnostician. The trouble is that there is no such clearly defined professional role for organizational diagnosticians at present. Nevertheless, we can foresee the day when such a professional role will emerge that is analogous to the role of medical, psychiatric, or psychological diagnosticians vis-a-vis individual physiological or psychological problems. Such a role for an organizational diagnostician would have to have all of the essential components of other kinds of professional roles.

Ernest Greenwood has made a widely recognized analysis of the essential components of professional roles.[11] According to his analysis, these roles include: (1) a systematic body of theory that underlies professional practice; (2) clients' recognition of professional authority based on certified expertise, rather than one's position in an administrative hierarchy; (3) wider community sanction of the right of the profession to organize itself and to control access into professional roles; (4) a professional code of ethics that emphasizes universal access of all potential clients to professional services, objectivity in the manner in which professional services are performed, and confidentiality in regard to sensitive matters in the professional-client relationship; and (5) a professional culture, including a set of characteristic values, norms, and symbols that surround professional practice.

In one or more of these regards, the role of a professional differs from other kinds of roles that may be associated in some way with the diagnosis of organizational problems. For example, the professional differs from the scholar--the role of the typical academic man who studies organizations--in that the professional is basically client service-oriented in his work, while the scholar is primarily concerned with making contributions to fundamental knowledge in his particular discipline. The professional differs from the nonprofessionalized expert consultant in that the latter may be able to draw on a large body of personal experience to make his prescriptions for structural change, but he is not likely to have the professional's body of theory underlying his practice, his specific expertise in diagnostic methods, and the degree of social support (along with work quality enhancement) to which a professional is subject in organized relations with his colleagues through a professional association. Also, the professional diagnostician differs from a social technician in that the professional has a responsibility to use all his professional skills to make an independent (or objective) diagnosis, not

merely to facilitate communications in a client group so that they come to some apparently workable conclusions about their own problems.

For the role of a professional diagnostician to develop along the lines of Greenwood's analysis, it would first be necessary for a systematic body of theory on organizational problem diagnosis to be developed and assembled where it could be taught to practitioners in universities or some other appropriate professional education contexts. The Phase I report of our present study indicated that the foundations for such a body of theory currently exist in the behavioral and management sciences, but much remains to be done to translate this theory into systemic principles to guide organizational diagnosis, as well as other aspects of organizational design.[12] A start in this direction has been made in recent years in such university programs as the one currently located at the University of California at Los Angeles.

Much also remains to be accomplished in the direction of general client recognition of the professional expertise of organizational diagnosticians. Most managers, and most consultants to management, still believe that their own experience in the practice of management qualifies them to make prescriptions to other managers, without calling on the assistance of personnel who are specially trained and qualified in organizational diagnosis and other aspects of organizational design. In this regard, the whole field of organizational design appears to be at a stage of development that is roughly comparable to the development of medicine some two to three centuries ago, when it could be said accurately that "not too much science yet underlay the medical arts" and when each individual mostly doctored himself with home remedies. The science and body of applicable theory underlying organizational design is likely to develop much faster today, however, along with the acceleration of development of all scientific and technical fields that is currently taking place.

For reasons similar to the above considerations, there has not been any community recognition to date of the right of organizational designers to certify and generally control entry into this field. However, the consultants and applied researchers who might be viewed as the forerunners of a future profession of organizational designer have already begun to develop values, norms, symbols, and general codes of ethics that probably will eventually characterize a more professionalized body of practice. These include the universality, objectivity, and confidentiality that are hallmarks of all professional-client relationships.

The Diagnostic Process

How would, or should, a professional diagnostician go about doing his work? Perhaps this question can best be answered by reviewing what appear to be the main steps in the process of organizational problem diagnosis. These may be described as follows:

1. Entrée--determining how the diagnostician can gain access to the sources of information that will be most fruitful in uncovering the systemic bases of surface symptoms.

2. Data Collection--actually collecting data on organizational problems by interview, observation, review of records, written questionnaire, or product review.

3. Analysis and Categorization--grouping of patterns of findings from the data and labeling these findings in terms of systemic requirements or problems in relation to operational and maintenance goals of the organization.

4. Verification--collecting additional data to test the adequacy of the labeling accomplished in the previous step.

5. Feedback--making the diagnosis known to representatives of the client organization so that they can accept the diagnosis and act on it.

6. Prescription--developing a plan for a structural design or structural changes that will solve problems identified in the prior steps of the diagnostic process.

It is generally thought to be true that entrée to information on sensitive problem areas connected with organizational design is easier for an inside member of the organization to obtain than for an outside consultant or professional designer. However, this is not necessarily true. Although an insider often knows much about an organization by virtue of day-to-day experience in it, he can often be denied access to certain items of crucial information by others in the organization, in part because of common interdepartmental (e.g., staff-line) rivalries or interpersonal jealousy and in part because the universality (absence of favoritism), objectivity (lack of self-involvement), and confidentiality (ability to keep secrets) of insiders are generally suspect. For this reason, organizations often turn to outsiders for diagnostic services, but the effectiveness of outsiders as diagnosticians is likely to suffer

also if they do not inspire confidence in the universality, objectivity, and confidentiality of their work.

The success of entrée depends directly on the ability of the diagnostician to be able to collect diagnostic data at key points of sensitivity regarding systemic aspects of the organization to be designed or changed. Sometimes access to just a few such points of sensitivity is sufficient for general diagnostic purposes. This is analogous to a physician taking readings on oral temperature, pulse rate, blood pressure, and sound of respiration. More serious or diversified symptoms of disorder might cause a physician to collect additional data by means of a blood test, urinalysis, or X-ray. Even more extensive and comprehensive tests would be indicated in other situations.

The same is true in organizational problem diagnosis. Interviews with leaders or key personnel are sometimes sufficient for a general diagnosis of organizational problems, the systemic bases of which seem to be close to the surface and commonly identified by most knowledgeable people in the organization--as has been true in our case study at the National Bureau of Standards, for example. On the other hand, fairly frequently, the systemic bases of organizational problems are somewhat hidden. Techniques must be used by the diagnostician to observe the interaction of key people to "read between the lines" in their communications with each other and to note the gestures that betray covert problem areas. Review of the products of activities (e.g., documentary records) in an organization or in a predecessor area of activity before organizational design or redesign can also reveal the systemic bases of problems in some cases. Finally, written questionnaire surveys of all the members of an organizational entity, or at least a representative sample of members, is an extensive technique for diagnosis that is sometimes called for.[13] Where extensive diagnosis seems to be needed, written questionnaires have advantages over both personal interviews and observation techniques in that (1) written questionnaires can be completely anonymous (this is especially important where individuals are being asked about sensitive matters, such as their job satisfaction, their work problems, their attitudes toward supervisors or their employing organization, and their future career plans and (2) data from much larger samples of individuals or groups can be handled by a written questionnaire survey at the same cost that would be required to interview a small sample of respondents or to observe their behavior firsthand.

Thus, for example, it required questionnaire data to reveal the goal change and goal conflict data reported earlier in this chapter for the organizations known as URL and TAROS, while interviews with a few key leaders

and a review of certain documentary outputs were sufficient to identify the organizational problems described in this report for the National Bureau of Standards and most of the other cases.

Whether interviews with key informants or more extensive questionnaire surveys are used, it is vitally important for the diagnostician to pay attention to unspoken as well as spoken meanings in his data. Dr. L. J. Henderson had this in mind when he advised physicians:

> When you talk with the patient, you should listen, first, for what he wants to tell, secondly, for what he does not want to tell, and thirdly, for what he cannot tell. He does not want to tell things the telling of which is shameful or painful. He cannot tell you his implicit assumptions that are unknown to him. . . .
>
> When you listen for what the patient does not want to tell and for what he cannot tell, you must take especial note of his omissions, for it is the things that he fails to say that correspond to what he does not want to say plus what he cannot say.[14]

Next it is essential to categorize the problems that emerge from the data--including resource problems (people, money, facilities, information, and so forth), and process problems (production, communication, recruitment, control, and so forth) in terms of the ways in which these problems affect the accomplishment of the operational and maintenance goals of the organizational entity. In other words, a systemic analysis of such problems must be made in terms of what Walter Hahn described as a "theory of the enterprise" in his description of the initial design activities that led to the Environmental Science Services Administration:

> It is an understanding of ends, the program output, the raison d'être . . . that leads to an understanding of the organization which produces services for client needs. What was needed--although one would not dare to have put this label on it at the time--was an explicit "theory of the enterprise." This concept is analogous to the "theory of the business' described by Donald Heany as ". . . a commonly held vision of the whole."[15]

Having made a preliminary diagnosis of organizational problems calling for design solutions, it is often useful to collect some additional data, at least with a few key interviews, to verify the diagnosis and to be assured that it is consistent over time with "the theory of the enterprise." In this further testing and verification, the diagnostician has

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opportunity to feed back the diagnostic information to members of the client organization in such a way that they are likely to accept it and to act on it. Chris Argyris, who has had extensive experience in organizational diagnosis (using both interview and observation techniques) warns that the feedback of diagnostic information should not just entail a presentation of his (the diagnostician's) findings; he should try to do this in a way that will encourage client representatives to make these findings their own, especially in situations where the clients become defensive about the problems uncovered in the diagnosis. Argyris writes:

> Whatever the negative feelings about the diagnosis, it is important for the researcher-consultant to create a climate where they can be brought out. The researcher-consultant can use management's defensiveness to help them obtain the first "gut" experiences that are usually necessary if research efforts are to be used effectively. One of the most effective ways a client system has to "seduce" a researcher-consultant to prevent their own growth is to compliment him on the diagnosis and then to ask him for his recommendations. It is at this point that the researcher-consultant might suggest that if the management is not able to suggest recommendations, then the diagnosis (assuming it is valid) has not been understood . . . What can he do to help the executives fully understand the diagnosis so they can derive their own recommendations? For the executives' sakes he will do his best to refrain from behaving as if he were in a line relationship. However, he will work hard to act as a resource person if they desire him to help them work through their prognosis.[16]

As Argyris recommends, then, the prescription or prognosis for structural change should be initiated by clients. At the same time, a professional designer would certainly be expected to play a strong "resource" person" role to assist clients in diagnosis and in the structuring or restructuring activities that follow diagnosis.

Conceptual Summary

This chapter has presented and briefly described the use of the following concepts that are especially relevant to establishing a "theory of the enterprise" framework for the diagnosis of problems calling for organizational design or redesign solutions.

- Organizational goal(s)

  - Operational goals
  - Maintenance goals

- Organizational objectives

  - Operational objectives
  - Maintenance objectives

- Organizational structure

  - Policies
  - Functions
  - Roles

- Personal goals

- Organizational integration processes

  - Organizational socialization
  - Leadership decision-making

- Goal definition

- Goal conflict

  - Conflict among operational goals
  - Conflict between operational and maintenance goals
  - Conflict between organizational and personal goals

- Goal flexibility

Furthermore, the chapter has described the need in organizational diagnosis for distinguishing between:

- Symptoms

- Palliative remedies

- Systemic bases

- Systemic remedies

The main steps in the diagnostic process include:

- Entrée
- Data collection
- Analysis and categorization
- Verification
- Feedback
- Prescription

Four major methods for the collection of diagnostic data are:

- Interviews with leaders or other key informants
- Observation of critical activities or interactions
- Reviews of significant outputs (e.g., documents)
- Systematic questionnaire surveys.

As organizational diagnosis is conducted more in the future in the context of a systems strategy of organizational design, it is expected that diagnosticians will be performing a more professionalized role, which includes:

- A systematic body of theory underlying professional practice
- Clients' recognition of professional authority based on certified expertise
- Community sanction of professional organization
- A professional code of ethics emphasizing universal access of all potential clients to professional services, objectivity in the manner in which these services are performed, and confidentiality with regard to sensitive matters
- A professional culture surrounding diagnostic practice.

Notes for Chapter IV

1. See Philip Selznick, Leadership in Administration (Evanston, Ill.: Row, Peterson, 1957), especially p. 62.

2. For a further discussion of organizational socialization, see H. M. Vollmer, "Organizational Socialization among Scientists" (a paper given at the annual meetings of the American Sociological Association, San Francisco, Calif., August 28-31, 1967), and H. M. Vollmer, Adpatations of Scientists and Organizations (Palo Alto, Calif.: Pacific Books, publication forthcoming), Chapter VIII, "Organizational Socialization."

3. See H. M. Vollmer, Adaptations of Scientists and Organizations, Chapter XII, "Status Advancement."

4. For a more complete description of this case, see H. M. Vollmer, et al., Adaptations of Scientists in Five Organizations: a Comparative Analysis (Menlo Park, Calif.: Stanford Research Institute, "R&D Studies Series," 1964), Chapter III.

5. See especially R. K. Merton, Social Theory and Social Structure (Glencoe, Ill.: Free Press, 1949), p. 155.

6. For a more complete description of this case, see H. M. Vollmer, Adaptation of Scientists in an Independent Research Organization (Menlo Park, Calif.: Stanford Research Institute, 1963).

7. See Selznick, op. cit. See also David Sills, The Volunteers (Glencoe, Ill.: Free Press, 1957).

8. Ibid.

9. See W. F. Whyte, Human Relations in the Restaurant Industry (New York: McGraw-Hill, 1948).

10. See H. M. Vollmer, ed., The Fundamental Research Activity in a Technology-Dependent Organization (Arlington, Va.: Air Force Office of Scientific Research, 1965), pp. 8-9.

11. See E. Greenwood, "The Elements of Professionalization" in H. M. Vollmer and D. L. Mills, eds., Professionalization (Englewood Cliffs, N.J.: Prentice-Hall, 1966), pp. 9-18.

12. See H. M. Vollmer, Organizational Design--an Exploratory Study, pp. 101-108.

13. See H. M. Vollmer, "The Use of Questionnaire Surveys in the Analysis of Individual and Group Factors in Research Organizations" (a paper given at the Twentieth National Conference on the Administration of Research, Miami Beach, Florida, October 25, 1966).

14. See Vollmer and Mills, Professionalization, p. 200.

15. W. A. Hahn, "Providing Environmental Science Services," Public Administration Review, vol. 28, no. 4 (July/August 1968), p. 329.

16. C. Argyris, Interpersonal Competence and Organizational Effectiveness (Homewood, Ill.: Dorsey Press and R. D. Irwin, 1962), p. 103.

Chapter V

ANALYSIS AND RESYNTHESIS OF ORGANIZATIONAL STRUCTURE

Having diagnosed the problems to be overcome in an organizational design, the designer can move into the task of structuring the new organizational entity (or restructuring an existing entity) in ways designed to overcome these problems and to attain organizational goals and objectives. This is the second major task in organizational design. It includes (1) analysis of the structure of the existing organization so that its weaknesses can be identified, or analysis of the structure of similar organizations so that the applicability selected elements of these structures to a newly proposed organization can be ascertained, and (2) resynthesis of structural elements either into a changed organization or into an entirely new organizational form.

From the previous chapter, the conceptual definition will be recalled:

> Organizational Structure: the differentiation and integration of policies, functions, and roles established to attain organizational objectives.

Expanding on this definition, it may be said that we view organizational structure as the skeletal framework that supports an organization and enables it to achieve its goals and purposes in a manner analogous to the functions of steel in physical structures. However, some kind of bonding substance is also needed to weld this framework together.

Authority as an Organizational Bonding Agent

In organizational entities, authority is the essential bonding substance that welds individual actions into common purposes, as organizational analysts have long recognized. Authority is ordinarily defined as power to influence the actions of others who, in turn, recognize the right of an individual (or group) to influence their actions within a predefined scope of activity. In other words, authority is "legitimate power."[1] Authority differs from sheer force, in that the latter is seen

by those subjected to it as illegitimate. They may respond affirmatively to it simply because the alternative would be much more unpleasant than responding negatively or not responding--as would be the case, for example, among persons forced to do something at gun point. On the other hand, the modern employment relationship is generally characterized by limited authority. Thus employees and managers alike recognize the rights of certain managers to direct the work activities of assigned employees, but not to regulate the private lives of these employees in any way that is not directly related to work performance.[2]

These, then, are the two defining characteristics of authority--that it is a form of power that is dependent on the acceptance of those subject to it and that it is limited in scope of terms of commonly recognized definitions.

Naturally, there can be gray areas in defining authority. For example, the legitimacy or scope of certain management prerogatives are sometimes called into question in labor disputes. In recent years, analogous situations have occurred in student demonstrations in universities and in civil disorders in local communities. These are really crises of authority, within the scope of our definition. In such periods of crisis, prior authority patterns may break down, but new patterns may also emerge. In any case, the point to be made here is that a commonly recognized pattern of authority is necessary for organizational stability. It is management's task to structure organizations in ways that will enhance authority, rather than to undermine it and thereby undermine the accomplishment of organizational goals.

One of the things that strikes an organizational analyst is the extent to which authority is normally--and necessarily--diffuse in most of the more complex organizational entities. Authority takes many different forms and manifests itself in different ways. It is certainly impossible to describe it in terms of the simpleminded dictum that formerly appeared in many management textbooks, namely, that "every man should have only one boss." This principle of "the unity of command" has never worked out in practice, even in the most rigidly structured organizations. In the more complex kinds of organizations, employees or members have always been subject to a variety of kinds of authority that impinges on them from different individuals performing different roles.

It is therefore useful to define the overall concept of organizational authority in the following way and then to define the different ways in which this authority can be expressed as is shown following:

- Organizational Authority: the recognized right of individuals in certain organizational roles to influence the actions of individuals in other organizational roles within the scope of recognized limits. This authority can take the form of:

  - Administrative Authority: the recognized right of individuals in certain managerial roles to exercise one or more of the following:

    Staffing Authority--the right to hire, transfer, and termin e assigned personnel.

    General Policy Authority--the right to state principles intended to guide the general actions of assigned personnel.

    Work Assignment Authority--the right to designate work tasks for assigned personnel.

    Work Control Authority--the right to direct assigned personnel in the performance of their day-to-day work activities, to inspect the quality and quantity of these activities, and to initiate actions to correct deficiencies in these activities.

    Arbitration Authority--the right to settle work-related disputes referred for judgment by assigned employees.

  - Functional Authority: the recognized right of individuals in certain managerial or staff specialist roles to exercise one or both of the following:

    Functional Policy Authority--the right to state principles intended to guide the actions of assigned personnel in certain specified functional areas (e.g., financial accounting, personnel practices, health and safety, legal and contractual matters, and security)

    Functional Control Authority--the right to direct assigned personnel in the aspects of their day-to-day work that relate to specified functional areas, to inspect work activities in this regard, and to initiate action to correct deficiencies in these areas.

- Initiating Authority: the recognized right of individuals in certain organizational roles to initiate the actions of individuals in other roles in ways that contribute to the accomplishment of a sequence of materials, personnel, information, or financial flow processing.

- Project Authority: the recognized right of individuals in certain organizational roles to exercise staffing authority, general policy authority, work assignment authority, work control authority, or arbitration authority for a limited time period and for the accomplishment of a specific organizational objective.

Subsequent sections of this chapter describe how some different patterns of authority can be identified. At this point we can simply indicate that these various kinds of authority become expressed and embodied in the three major components of organizational structure, which we have previously identified as organizational roles, functions, and policies.

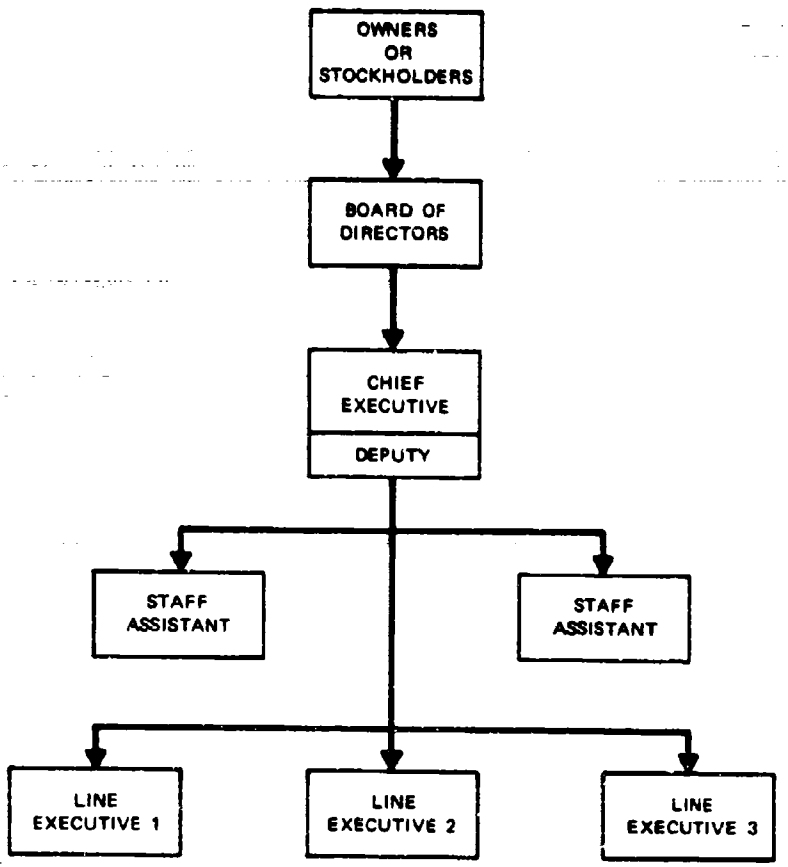
Before examining these structural components in more detail, however, it is useful to recognize that organizational structure can be viewed differently depending on one's vantage point. It is often true that, as in the well-known story of three blind men describing an elephant, organizations look quite different to people whose perception is colored by their own particular point of view. We must understand these different points of view and seek to transcend them to improve organizational design practices.

Different Views of Organizational Structure

In management textbooks, the most commonly discussed view of organizational structure is a top-down perspective. This is a perspective that is especially compatible with the engineering strategy of organizational design, which was described in Chapter III. It sees the structure of an organization essentially in terms of the traditional organization chart.

As shown in Figure 5, the traditional organization chart is really a diagram of administrative authority in an organizational entity. In a typical corporation, the owners or stockholders elect a board of directors, who in turn appoint a chief executive officer or perhaps a set of top executive officers and who also typically set basic general policies

Figure 5 ADMINISTRATIVE STRUCTURE



SOURCE: Author.

for the corporation. The chief executive (or any other executive) may also appoint a deputy to act in the absence of the chief, to assist him in implementing policy decisions, and also to take line administrative responsibilities assigned to him by the chief.

In this organizational model, there is often a distinction between middle-level line executives and staff assistants for special functional areas such as finance, personnel, legal and contractual matters, health and safety, research and development, and long range planning. (Such staff offices may exist also at divisional or departmental levels, but for the sake of simplicity, they are shown in Figure 5 only in relation to the chief executive.) In this traditional line-staff model of organization, line activities are considered to be those activities that are directly related to the main goals of the total organization. Staff activities are not considered to be directly related to these main goals, but are supportive to these main goals by providing types of services that are considered necessary to achieving the main goals, either of the total organization (in the headquarters of the chief executive) or of line operating divisions or departments (where attached to divisional or departmental headquarters).

The kind of administrative organization chart shown in Figure 5 is useful for some purposes, but its uses are also distinctly limited. It is useful insofar as it outlines the major administrative channels of authority that can be used by the chief executive, but there is much in the actual day-to-day operations of organizations that it does not describe. These deficiencies include:

1. No description of the specific kinds of administrative authority that are commonly exercised at different levels in the pyramid of authority shown on the organizational chart.

2. No description of functional authority relations between staff officers and line executives (or occupants of other roles) within the organizational structure.

3. No description of initiating authority relations between one line executive and another line executive (or between other role occupants) along sequential lines set up for the processing of materials, information, people, or funds within the organizational structure.

4. No description of the relations between representatives of the organization and customers or clients.

5. **No description of relations between administrative authority and project authority in situations where work is performed by project teams, special task forces, or other temporary ad hoc groups that cut across more permanent lines of administrative authority.**

With regard to the first deficiency noted above, it may be pointed out that in the typical corporate structure, owners or stockholders commonly exercise only staffing authority over boards of directors; they appoint these boards and then leave it to the board to define basic policy guidelines for the corporation. The board of directors then exercises both general policy authority and staffing authority over the executive officer(s). In turn, the chief executive and his immediate assistants commonly exercise staffing authority, general policy authority (implementing and expanding policies originating with the board of directors), and work assignment authority over subordinate executives and managers in both line and staff categories. Work control authority is often delegated to middle or lower levels of supervision.

It may be noted that in scientific organizations, and in other kinds of organizations that employ personnel who are highly professionalized in their work behavior and attitudes, even lower level supervisors may not exercise work control authority. Although salaried professional employees may be agreeable to obtaining work assignments from their supervisors (work assignment authority), many studies have shown that they resist day-to-day direction in the conduct of their work (work control authority).[3] Professional norms, built up through intensive professional education and sustained by professional associations and codes of ethics, place the responsibility for the technical quality of work performance squarely on the shoulders of the fully trained and qualified professional person himself.[4] Knowledgeable managers of professional personnel recognize this and modify the kinds of authority that they exercise accordingly.

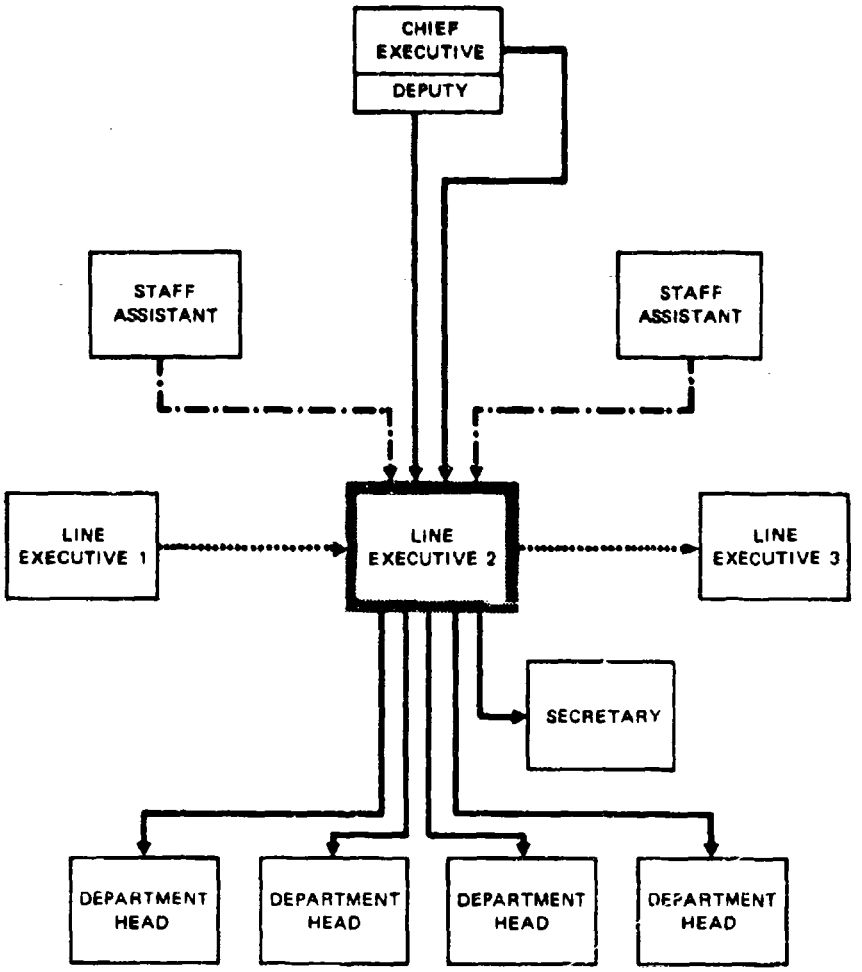
Finally, what we have called arbitration authority can be exercised by managers at any level of management where disputes between subordinates are referred to them for judgment. This is a kind of authority that is commonly exercised by managers who adopt a "management by exception" style. It is also a kind of authority that can be exercised by specialized personnel (e.g., labor arbitrators) or special committees (e.g., grievance committees) in organizations that have institutionalized a "separation of powers" (administrative and judicial) in a manner that is somewhat similar to the structure of the U.S. government. In some modern institutions, this separation of powers has been accompanied by the provision of specialized persons in ombudsmen roles to facilitate "creative dissent," as well as the processing and solution of grievances.[5]

Patterns of authority other than those connected with administrative authority of the types described above can best be described by turning to another view of organizational structure--namely the view of a participant. This is a point of view that is especially compatible with the behavioral strategy of organizational design that was also described in Chapter III. Some of the authority relations that can be identified from this perspective are illustrated in Figure 6. This figure portrays the "participant interaction structure" for essentially the same administrative structure that was shown in Figure 6. However, this time the authority structure is shown as it might be viewed by a middle level executive identified as "Line Executive 2."

Figure 6 has been expanded to show that Line Executive 2 could have four department heads and a secretary (or administrative assistant) subject to his direct administrative authority. Thus his "span of control" would be considered to be five. However, the size of the span of control that would be manageable for him would also be affected by the number of other people to which he would have to attend fairly frequently in the course of his work activities. Figure 6 suggests that this would include the deputy chief executive from whom Line Executive 2 might normally receive administrative directives; the chief executive himself from whom he might also receive direct communications from time to time; at least two staff assistants (staff managers) to whose authority he could be subject in certain functional areas; initiating authority from Line Executive 1 whose activity might be part of a process chain in which Line Executive 2 was also a part; and finally, Line Executive 2 might also exercise initiating authority over Line Executive 3 who heads a subsequent activity in the same process chain.

Thus, in sum, Figure 6 indicates that, although the "span of control" for Line Executive 2 might be no more than five, his actual "span of attention" in his day-by-day work activities would be at least ten. In all likelihood, it would be more than ten because the typical line executive has to attend to authoritative communications to and from more than two staff managers and often more than two other line managers of equal status. Decreasing his "span of control" over subordinate units would not help this situation very much. The possibility of "communications overload" from all these sources points to one of the sources of breakdowns and other symptoms of stress among middle level managers. Possible needs for reduction in the complexity of these interactions must be recognized in structural analysis and resynthesis. For example, adding an assistant in a deputy position who directly administers the activities of subordinates can allow a middle level executive to concentrate on other relationships that are external to his immediate division or department.

Figure 6 PARTICIPANT INTERACTION STRUCTURE



Administrative authority

Functional authority

Initiating authority

SOURCE: Author.

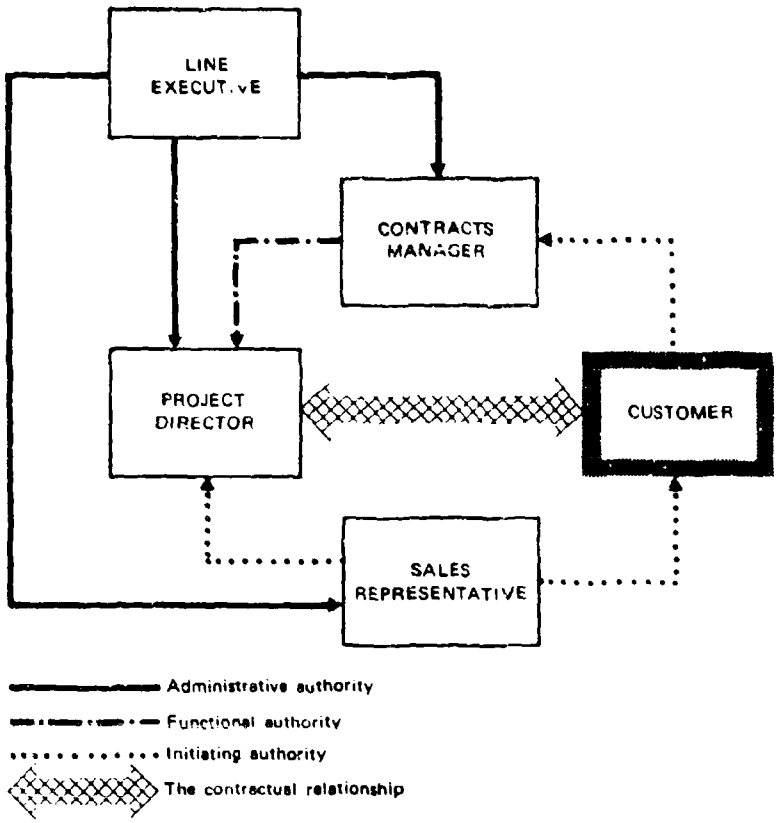
Viewing an organizational structure from the standpoint of a customer or client, rather than from the standpoint of a manager or employee, provides another individual behavior-oriented perspective. This is an important perspective to take into account because it is assumed that most economically sensitive organizations are designed to provide products or services to customers in a manner that is effective (in terms of quality and quantity), efficient (in terms of costs), and competitively successful. Careful analysis of the structural aspects of customer relations might reveal ways to improve the attainment of these objectives.

In this regard, Figure 7 provides a simplified portrait of relations between a customer (or client) and key organizational representatives as these relations might be seen from the customer's viewpoint. Our model here is drawn from the typical pattern of relations that occur in the R&D contract services industry, but essential aspects of these relations would also be expected to be found in other service contract relationships.

In this case it is assumed that a sales representative ordinarily contacts a potential customer, explains to him the services offered by the organization the salesman represents, and then introduces the potential customer to an individual within the organization who is prepared to serve as the director of a project that can supply the services that the potential customer desires. Thus the salesman may be said to exercise initiating authority both with respect to the potential customer and with respect to an appropriate project director. The project director may then contact the potential customer, and the two of them may work out a relationship that results in a contract for services, at which point the potential customer becomes an actual customer. Meanwhile, however, it is likely that the potential customer has formalized his requirements in a set of work specifications that is sent to a contracts manager (a staff officer) in the organization under examination, to obtain his approval of the contractual format from a legal standpoint. Thus the potential customer may be said to exercise initiating authority in relation to the contracts manager, who in turn exercises functional authority (in contractual-legal matters) over the project director.

Finally, the customer is ordinarily aware of the fact that the project director is an agent of a larger organizational entity, and, as such, is subject to the administrative authority of a line executive. He also will probably assume that the other agents with whom he has had contact--the sales representative and the contracts manager--are subject to the same kind of authority, as is shown in Figure 7. To the customer, however, the most important relationship--i.e., the one

Figure 7 CUSTOMER RELATIONS STRUCTURE



SOURCE: Author.

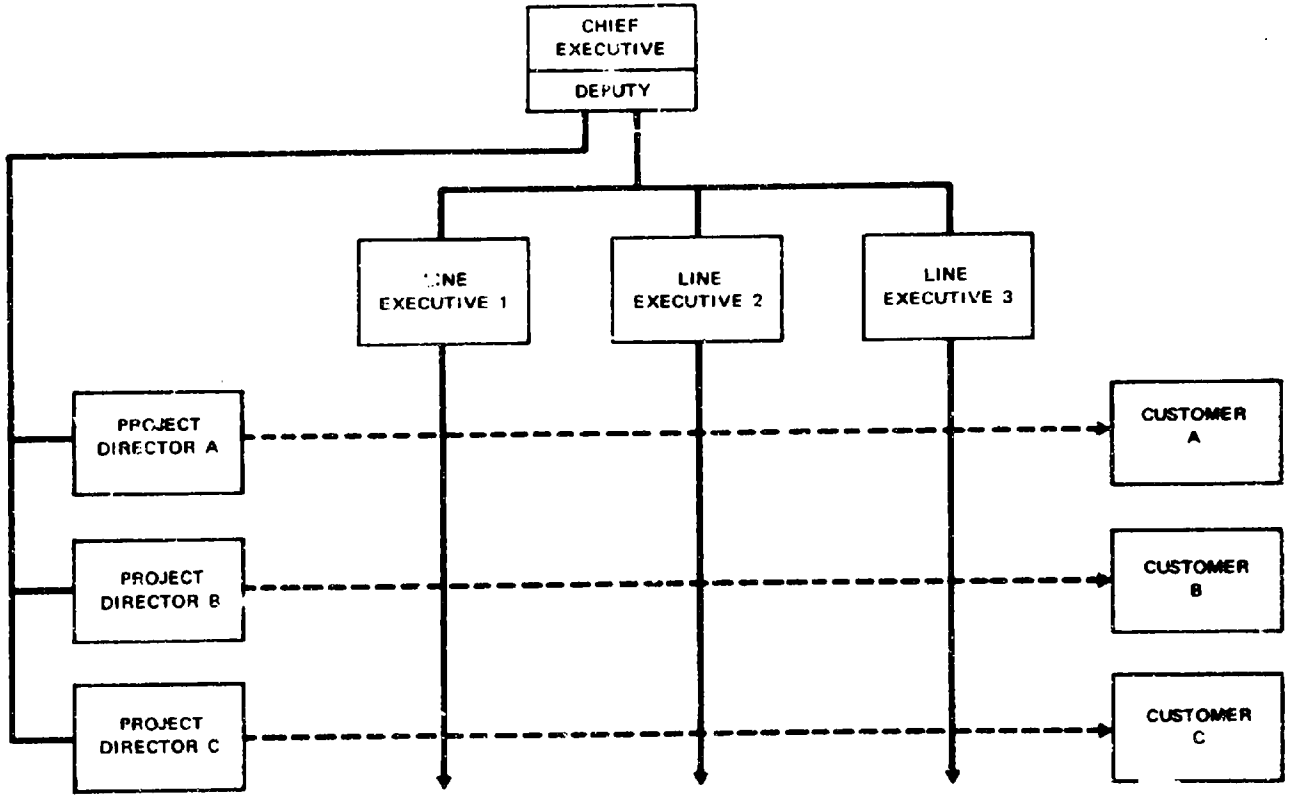
requiring his most direct and constant attention--is more likely to be the reciprocal contractual relationship that has been established between the customer and the project director of the service organization.

Naturally, the reader will recognize that this relationship also has been simplified. In actuality, what we have called "the customer" here is likely to be a customer (or client) organization in many cases, and is therefore likely to have its own set of technical monitors, contract managers, and other interface personnel in relation to the service organization. The point to be made from Figure 7 is that it is also possible to begin to view organizational structure from the standpoint of a customer who is outside the organization, as well as from that of an insider. The outside view introduces new complexities of relations. These must be taken into account in structural analysis and resynthesis if organizational entities are to achieve their operational goals effectively and efficiently.

A more complete view of the interaction of line administrative authority and project authority that is especially compatible with an overall systems strategy of organizational design is shown in Figure 8. Here a project matrix structure is presented in a general form that was originally developed in the large project activities of aerospace companies, but has been used increasingly in other high technology organizations.[6] In the case shown in Figure 8, personnel for three concurrent projects are drawn from three line organizations. Thus, while serving on these projects, these personnel are actually "subject to two bosses"--one who exercises temporary project authority and the other who exercises administrative authority. Again, in case the reader should think that this situation contradicts the common principle of unity of command in management, he should recall that the roles on which attention was focused in Figures 6 and 7 were also subject to more than one source of authority. This is in actuality a common situation in all organizational contexts. Structural analysis must account for such complexities.

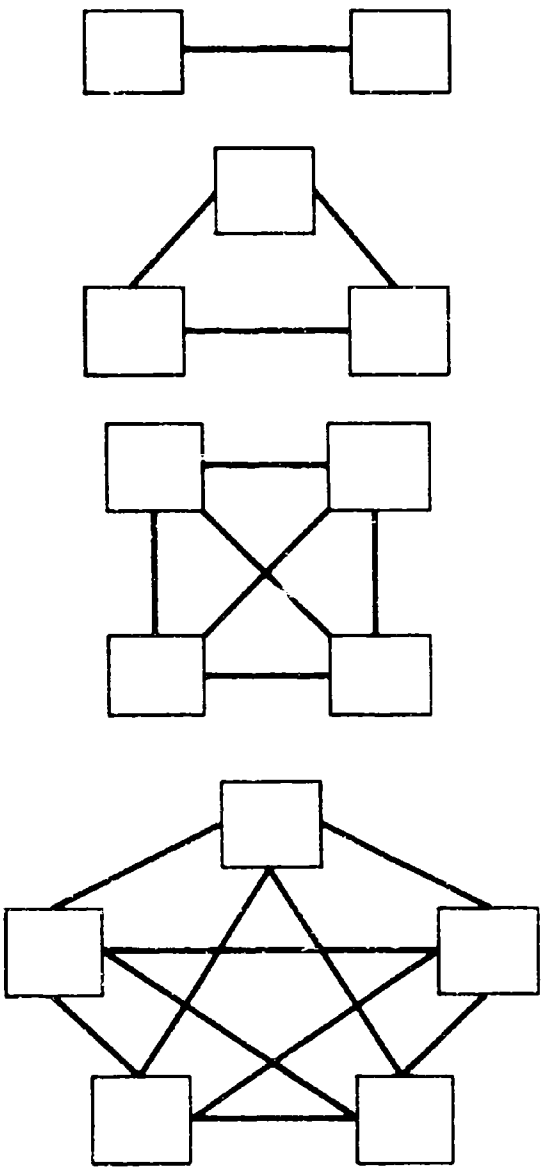
It is evident that no one view of organizations can account for all the lines of structural relations. As organizations grow from small groups of two or three elements (roles or functions) to a larger number of elements, they grow in complexity of internal relationships in terms of a geometric progression, rather than a straight line arithmetic progression. In this regard, Figure 9 shows that there can only be one relation in a structure of two elements, but there are three possible relations between three elements, six relations between four elements, ten relations between five elements, and so forth, in increasing complexity.

Figure 8 PROJECT MATRIX STRUCTURE



SOURCE: Author.

Figure 9 PROGRESSION OF COMPLEXITY IN STRUCTURE WITH INCREASING SIZE



SOURCE: Author.

Thus all the possible authority relationships in organizational structures much larger than five or six elements can hardly be pictured at once in their totality. What must be developed is a series of structural diagrams from the different points of view that are a key to understanding the organization as a whole.

These key points of view surely include that of the chief executive--from the top down--but they do not stop there. They must also include pictorial representations of the structure of the organization from the viewpoint of other major line and staff management personnel and also from the viewpoint of typical customers. Where temporary project or task force groupings are also common, an overall outline of a project matrix structure can also be a useful part of an organizational design.

Finally, wherever detailed job descriptions of organizational roles are developed as components of an overall organizational design, it could be useful to include in these job descriptions a listing of the kinds of administrative, functional, initiating, and project authority that the individual who occupies the job is expected to be subject. This might serve as an aid to jobholders in recognizing the different kinds of authority to which they are expected to respond, as well as providing documentary evidence that a comprehensive structural analysis of the organization has been made.

Role, Function, and Policy

What has been said to this point indicates the need for a "common group memory" as a basis for coordinating group activities.[7] This common group memory expresses itself in terms of jointly shared concepts of organizational goals and organizational structure. As was just pointed out, the point of view of any one individual (even the chief executive) or set of individuals within the organizational entity cannot provide a fully adequate picture of what an organization is trying to accomplish, why it is trying to do this, and who does which, how and when. These are complicated matters in larger, more complex organizations.

An adequate diagnosis of organizational goals and problems toward which these goals are oriented, such as was described in Chapter IV, can provide the basis of a total group understanding and memory of the what and the why of their collective activities. In this section, we make a further examination of other elements that are considered to be integral aspects of organizational structure itself. These include the roles that individuals play in collective activities--the who of organizational structure; the functions that are performed by major divisions or departments

of the organization to accomplish its goals and objectives--the which of organizational structure; and the policies that guide the performance of these functions and roles in accordance with organizational goals--the how and when of organizational structure.

Turning to a consideration of the first structural element, we recall the definition:

> Organizational Roles: the constellation of rights and duties that are attributed to individuals who are commonly viewed as contributing to the attainment of organizational objectives.

Several important things may be said about the place of organizational roles in organizational structure.[8] In the first place, roles provide the way in which individual employees (or members) are fitted into organizational structure. Since they represent the basic point of contact between individuals and organizational entities, the characteristics of organizational roles and the way that they are performed reflect the interaction of two sources of influence: (1) formal and informal requirements imposed on each individual by the organization (e.g., his job description) and (2) characteristics of the individual himself (e.g., his total "personality" reflecting his career interests, work attitudes, past experience, and so forth). Thus from the organizational standpoint, the way in which its key roles are performed is a result not only of the way in which formal job requirememts are designed, but also of the kinds of individuals recruited to fill different job positions and the way in which the process of organizational socialization takes place for individuals who occupy different job positions. In this regard, the definition will also be recalled:

> Organizational Socialization Process: the process whereby personal goals tend to become redefined in alignment with organizational goals.

Organizational socialization, in turn, can include formal training and orientation, but it often occurs most effectively in terms of informal contacts within the organizational context.[9] It is markedly influenced by those with whom a new employee interacts during the earlier years of his employment, how these individuals react toward him, which of these persons he takes (or does not take) as significant models for his own attitudes and behavior, and so forth. In organizational design, it is as important to try to plan for these kinds of informal interactions as it is to devote attention to the careful writing of formal job descriptions. More will be said about this later in connection with the topic of functional differentiation.

It is also important to bear in mind that the way that roles are played can have significant effects on the reshaping of organizational goals and organizational structure. As indicated previously--but worthy of constant repetition in the general context of organizational design--individuals are never completely passive agents, even in the most totalitarian or highly structured organizational contexts. By definition, for example, those in a leadership role can and do influence directly the initial shaping and subsequent reshaping of organizational goals,[10] as is described in the following:

> Leadership Decision-Making Process: the process whereby organizational goals are defined by those who assume leadership roles in an organization.

Those who assume an active leadership role--as distinguished from a simple administrative authority role--can also bring about significant changes in organizational structure to accomplish changed organizational goals.[11] A prime example of this in our recent case studies has been the creation of the new Department of Transportation under the leadership of Alan Boyd, which merged federal agencies that were previously independent or were associated with other departments. Another example has been a more recent plan to abolish the long-standing and politically entrenched Bureaus of Employment of Security and of Apprenticeship Training by Stanley Ruttenberg, with an assimilation of their functions into a more unified Manpower Administration and other components of the Department of Labor. It is vital for organizational design activities to identify and structurally support the key job positions in which strong, innovative leaders like these are to be placed. Both in the case of Boyd and of Ruttenberg, special task forces with representative elements from the groups and organizations concerned in realignment activities provided significant aspects of this structural support before making the changes indicated.

Finally, the way in which roles are defined and performed really specifies the ways in which order and coordinated efforts are maintained in organizational structure. In other words, roles embody patterns of authority. There may be an infinite number of communications that occur between occupants of different jobs within an organizational structure, but work gets accomplished because some communications--those that are perceived as originating from authoritative sources--are acted on, and others are not.[12] Therefore, as indicated earlier, it is useful for an organizational designer to identify which roles should be performed by those who occupy certain key job positions in order to exercise administrative, functional, initiating, or project authority in

relation to other specified jobs. This can be done in a series of structural diagrams from different points of view (see Figure 7, for example), as well as in individual job descriptions.

Another structural element has been defined as:

> Organizational Functions: major groupings or related categories of work (e.g., into divisions or departments) in ways intended to support the attainment of organizational objectives.

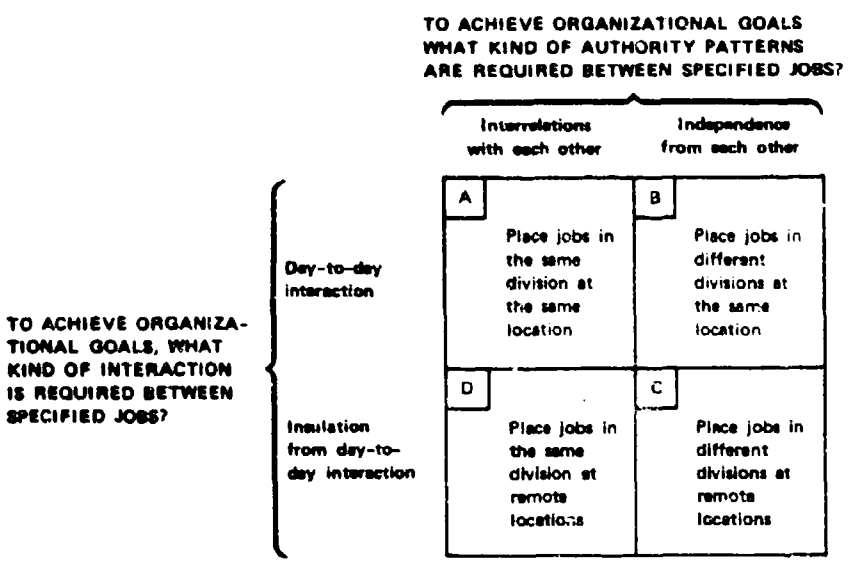
This refers to the "division of labor" that Emile Durkheim and other social scientists have identified as being a key characteristic of modern industrial society in general, as well as being characteristic of complex organizations within this kind of society.[13] It is characteristic partly for reasons suggested previously in Figure 9; as collectivities increase in size it is impossible for each individual or each unit to interact with every other individual or unit within the collectivity. Limitations on the human span of attention will not permit this. We therefore have to group jobs together into major functions (1) to reduce the number of interactions that is required among units within functions and also (2) to try to change interactions between functions from a multiplicity of lines of interpersonal or interunit relations into a much smaller number of lines of interfunctional relations. These are important objectives in the process of departmentalization.

It is also important in the process of departmentalization to determine which jobs within a total organizational structure need to be grouped in a way that specified kinds of authority can emerge among these jobs. Where certain linkages of authority are desired among a group of jobs, it is usually desirable to locate them within the same department or division. Management textbooks often go into considerable detail on the advantages and disadvantages of different groupings of jobs into authority patterns related to particular product lines, to major functions associated with the principal product line, or to geographic service regions.[14] It is evident that which form of departmentalization is most appropriate to a particular organizational situation depends on the goals and objectives of the organization in relation to its total internal and external environment. Is it a single-product organization, or is it a diversified multiple-product organization? Is it strictly local, or is it worldwide in the scope of its operations? Is it small and therefore simple in the pattern of its internal interactions, or is it large and complex? These are all questions that must be examined closely before determining the most appropriate form of departmentalization.

Another factor that is not always given the attention it deserves within the process of designing organizational structure is consideration of the spatial placing of both individual jobs and of groupings of jobs into departments. How jobs are grouped into departments should be seen as a function of the kind of authority relations that are desired between these jobs to accomplish organizational goals and objectives. But where jobs and departments are physically placed in a spatial configuration should be seen as a function of the kind of day-to-day interaction that is desired between those in different jobs. Unfortunately, it often happens the other way around in common practice; the tail wags the do, so to speak. Because buildings and land development require major capital investments and long lead times to develop, individuals and groups of individuals are often placed together in existing physical structures, rather than designing physical structures with sufficient flexibility to meet changed organizational requirements. New developments in building programming and building systems analysis are attempts to remedy this tendency. The point to be made here is that facilities design and site location should be seen as the servant of organizational design, rather than vice versa.[15]

The importance of considering spatial arrangements in relation to departmentalization in organizational structure is illustrated in Figure 10. This figure summarizes the experience of organizational planners who have found that certain organizational functions may actually require insulation or independence or both from other functions, while others may require close day-to-day interactions or interrelations of authority or both. Considering the possible variations on the two dimensions of authority and interaction shown in Figure 10, we have four major types of departmentalization, indicated as types A, B, C, and D. The Bell Telephone Laboratories provide a well-known example of Type B. At the main site in Murray Hill, New Jersey, for example, research jobs have been placed in a division that is independent of the division in which engineering development jobs have been placed. This has been done in accord with a conscious theory of "bonds and barriers," according to Jack Morton of the Bell Laboratories.[16] Bell is said to have an "organizational barrier" between research and development, so that the engineers cannot tell the researchers what to do or vice versa. Bell is also said to have a "spatial bond" between the two functions--researchers and engineers are located on alternate floors within the same set of buildings so that they are encouraged to talk to each other frequently in both formal and informal meetings and therefore to exchange information and ideas in a manner that is considered to be beneficial to the overall interests of their employer.

Figure 10 IMPLICATIONS OF AUTHORITY AND INTERACTIONAL PATTERNS FOR DEPARTMENTALIZATION AND LOCATION OF FUNCTIONS



SOURCE: Author.

Much of the thinking of the structuring of fundamental research activities within larger "mission-oriented" organizations follows this same kind of rationale.[17] It has been said repeatedly that "good fundamental research should be insulated (organizationally) but not isolated (spatially) from other corporate functions." This rationale applies to the Oregon Graduate Center. It is located in an area where it is hoped that its activities will stimulate the growth of nearby, technologically based industry, but it is organizationally separate from any of these companies.

The relationship of spatial and structural considerations turned out to be the focus of much discussion in the reorganizational activities in several cases studied in connection with the present project. Thus, for example, there is discussion about whether the present structure of the National Bureau of Standards in three main Institutes, along with the location of most activities at one site in Gaithersburg, Maryland, is the best arrangement to satisfy requirements for interpersonal communication between personnel in different Institutes in accord with customer service needs, to meet requirements for adaptation of Institute activities to a program budgeting structure in accord with Presidential directives, and to fulfill the overall requirements of NBS itself. The merger of previously separate functions into a unified Department of Transportation and the abolition of separate bureaus within the Manpower Administration of the Department of Labor also reflects the needs for establishing new kinds of authority relations in order to coordinate a variety of geographically dispersed services.

Statements of policy represent the third element in organizational structure, in accord with the general definition:

> Organizational Policies: authoritative statements intended to guide the actions of those in organizational roles toward the attainment of organizational goals and objectives.

Such statements are made by those who exercise policy authority and are typically embodied in official memoranda, filed in organizational policy manuals, and used as a point of reference to guide and limit the scope of individual managerial decisions within an organizational structure.[18] Organizations can be quite different in their effectiveness--even if they have similar kinds of functional differentiation along departmental lines and similar job categories and role relationships between these categories--if in contrast they have different patterns of policy development.

There appear to be two different types of dangers in the development of organizational policy. A type 1 danger is to develop a set of policies that is too detailed. Policy statements are only useful if they establish very broad guidelines within which a high degree of flexibility is possible. What is good for one part of an organization may not be good for another part. Policies that are too detailed do not allow the kind of staff discretion that is characteristic of organizations that are especially adaptable to changing circumstances.

On the other hand, a type 2 danger is to develop a set of policies that are not detailed enough, or even to ignore the development of policy altogether. Where policy development is insufficient, component parts of an organization can easily wander off in directions that not only do not contribute to the attainment of overall organizational goals, but also even may detract from the attainment of these goals.

Examples of each type of danger in policy development can be identified in the management literature. It is sufficient to point out here that the job of an organizational designer is to develop guidelines for a balanced amount of policy development that does not deviate too far in one direction or the other, but is most satisfactory for the particular kind of organization that is being designed. In general, it may be assumed that a more detailed set of policies (but not overly detailed) is more appropriate for an organization that is designed to perform more routine, predictable functions with a predeterminable job structure. Such might be the case, for example, in a mass production factory. In contrast, it may be assumed that a looser and more general set of policies (but not too general) is more appropriate for an organization that is designed to perform essentially unpredictable functions, with an unpredictable job structure and under unpredictable circumstances. Such might be the case, for example, in emergency operating organizations designed to function in local communities in a disaster.[19] Actually, a certain amount of strong, but flexible, policy structure is absolutely essential in the latter kinds of organizations because functional differentiation and specific jobs and roles cannot be clearly determined in advance; policy guidelines then become the only predetermined elements of structure to support the attainment of organizational goals and objectives. Without policy guidelines, these kinds of organizations would have little or no structure at all.

The Structural Analysis and Resynthesis Process

Having described what appear to be the essential elements of organizational structure, we are able to turn to a statement of how these elements might be identified, analyzed, and restructured as part of the overall process of organizational design. The steps in this process can be summarized as follows:

1. Identification of authority patterns--describing the patterns of administrative, functional, initiating, and project authority that occur in an existing organization or that might occur in a new organization.

2. Analysis of interaction of roles--describing both the authoritative and the nonauthoritative interactions between key roles that must take place for organizational goals and objectives to be accomplished.

3. Analysis of functional differentiation--describing the grouping of roles and their placement both in a departmental and a spatial arrangement that appear to be most conducive to the attainment of organizational goals and objectives.

4. Analysis of policy development--describing the content and degree of specificity in organizational policies that appear to be most conducive to the attainment of organizational goals and objectives.

5. Resynthesis of structural arrangements--describing in graphic or verbal forms changes in the interaction or roles, functional differentiation, or policy development in existing or past structural arrangements that would appear to be more conducive to the attainment of organizational goals and objectives in the future.

The identification of administrative authority patterns (indicated in the first step above) can usually be accomplished by a simple review of a standard organization chart for the organizational entity under examination. However, the further identification of functional, initiating, and project authority patterns usually requires personal interviews with key individuals. This latter information is not usually shown on standard types of organization charts at present, but it might become included in more sophisticated and more comprehensive organization charts in the future.

The second step requires a more detailed overview of the interaction of different kinds of roles in authoritative and nonauthoritative patterns, rather than simply identifying each individual kind of authority pattern. Information on these kinds of interactions can ordinarily be obtained only by interviews with key personnel who are knowledgeable about this. Where these kinds of interactions involve two kinds of authority, they can be portrayed by a matrix-type of chart such as was shown in Figure 9, or by a series of such charts where more than two kinds of authority are concerned. Where these kinds of interaction do not include relations of authority, but rather exchanges of information among equals, they can either be described generally in verbal terms or indicated specifically by sociometric methods. In the latter case, however, specific detail such as would be indicated by sociometric diagrams is usually not required for the overall purposes of organizational design. What is required is that individuals who are expected to interact fairly frequently with each other be placed in a situation of spatial proximity that encourages this kind of interaction.

The second and third steps also require that these role interactions be viewed in relation to their contributions to organizational goals and objectives. Here the designer must draw on all of his knowledge from empirical studies that bear on the effects of different kinds of structural arrangements on the productivity, general behavior, attitudes, and so forth of individuals. He must then assess the degree to which these different kinds of behavior or attitudes seem to support or to undermine the accomplishment of certain organizational goals. Thus, for example, studies have shown that scientists who are subject to some limited influences from others in the selection of their research projects are likely to be more productive--both in terms of basic contributions to knowledge and in the usefulness of their research findings--than are those who are unable to exercise any choice in the selection of their research projects or those who select their research projects independently of any influence from others.[20] Therefore, in designing a research organization, the designer would seek to ascertain the role structure and the departmental structure that would provide the balance between complete authority and complete freedom that is appropriate for the particular organizational context. In any case, the designer should be familiar with the implications of empirical studies that relate to the success or failure of the kind of organization that he is seeking to design effectively.

The same applies to the fourth step. The designer should be familiar with studies and cases that bear on the effects of different kinds of policies on the ability of organizational entities to accomplish their goals and objectives.

The fifth step refers simply to the redesign of existing structural components in ways that would be expected to result in a more effective organization or to the assembly of ideas from past experience and relevant studies in a structural configuration that would seem to be appropriate for a new organizational entity. The main point to make here is that no past configurations of roles, functions, and policies can be applied wholly to a new or revised organizational structure. Every organizational entity is in some major sense unique, in that it has a different set of goals and objectives or it exists under a different set of circumstances. Organizational structure must be tailored to fit these differences.

Conceptual Summary

This chapter has presented and described the use of the following concepts in connection with the analysis and resynthesis of organizational structure. Organizational structure has been described as the "skeletal framework" that supports an organization and enables it to achieve its goals and objectives. Authority has been described as the essential "bonding substance" that holds organizational structure together. The following types and subtypes of authority have been described:

- Administrative authority
  - Staffing authority
  - General policy authority
  - Work assignment authority
  - Work control authority
  - Arbitration authority
- Functional authority
  - Functional policy authority
  - Functional control authority
- Initiating authority
- Project authority

It has also been pointed out that the span of attention to different kinds of authority among key participants in an organization is a more crucial factor to take into account in structural analysis than the administrative span of control. Identification of the span of attention for different kinds of key participants can be accomplished by viewing authority patterns from different perspectives. Among the different viewpoints that are useful for this purpose are the following:

- The viewpoint of top executives
- The viewpoint of middle-level executives
- The viewpoint of project managers
- The viewpoint of customers

The structure of an organizational entity becomes embedded in a "common group memory" of three essential elements of structure:

- Organizational roles
- Organizational functions
- Organizational policies

This "common group memory," in turn, is developed through the organizational socialization process. At the same time, individuals can act to reshape organizational goals and structure (and hence the "common group memory") through the leadership decision-making process. One of the tasks of structural analysis is to identify the places where these major processes would be expected to make their maximum impacts in the roles, functions, and policies of an organization.

The main steps in the structural analysis and resynthesis process in order to meet the unique configuration of needs of a particular organizational entity have been described as follows:

- Identification of authority patterns
- Analysis of interaction of roles
- Analysis of functional differentiation
- Analysis of policy development
- Resynthesis of structural arrangements

Notes for Chapter V

1. Basic sources on the sociological concept of authority include M. Weber, From Max Weber: Essays in Sociology, pp. 294-299; H. Golhammer and E. Shils, "Types of Power and Status," American Journal of Sociology, Vol. XLV (1939), pp. 171-182- and R. Bierstedt, "An Analysis of Social Power," American Sociological Review, Vol. XV (1950), pp. 730-738.

2. See H. Vollmer, Employee Rights and the Employment Relationship (Berkeley and Los Angeles: University of California Press, 1960), pp. 117-127.

3. See H. Vollmer, Adaptations of Scientists and Organizations (forthcoming), especially Chapter III, "Scientists in Technology Management Organizations," and Chapter VII, "Uses of Incentives."

4. See H. Vollmer and D. Mills, Professionalization, Chapter 4, "Professional Controls."

5. See I. Silver, "The Corporate Ombudsman," Harvard Business Review, Vol. 45 (May/June, 1967), pp. 77-87.

6. For a further description of the form and uses of matrix concepts of organization, see D. Cleland, "Organizational Dynamics of Project Management," IEEE Transactions on Engineering Management, Vol. EM-13 (Dec. 1966), pp. 201-205.

7. For the concept of "group memory" the author is indebted to an unpublished paper by two colleagues, G. H. Ball and D. A. Evans, "Explicit Group Memory--The Structure Sketch and Other Ideas" (Menlo Park, Calif.: Stanford Research Institute, 1968).

8. This definition of organizational role is essentially based upon the classic concept of role formulated by R. Linton in The Study of Man (New York: Appleton-Century-Crofts, 1936).

9. See H. Vollmer, "Organizational Socialization Among Scientists." See also Charlton Price, Men, Management, and Mental Health (Cambridge, Mass.: Harvard University Press, 1962).

10. See P. Selznick, Leadership in Administration.

11. See H. Vollmer, Adaptations of Scientists and Organizations, Chapter XII, "Status Advancement."

12. The relationship of authority to communication was especially emphasized by C. Barnard, The Functions of the Executive (Cambridge, Mass.: Harvard University Press, 1938), pp. 163-175.

13. See E. Durkheim, The Division of Labor in Society (Glencoe, Ill.: Free Press, 1933); for a further discussion of social functions see A. R. Radcliff-Brown, "On the Concept of Function in Social Science," American Anthropologist, Vol. 37 (1935). pp. 394-402.

14. See for example, E. Dale, "Structure of Business Organizations," in W. G. Ireson and E. L. Grant, Handbook of Industrial Engineering and Management (Englewood Cliffs, N.J.: Prentice-Hall, 1955).

15. This concept has been explicitly recognized in the work of the author's colleague, W. Tennant, "Developing Design Criteria for Research Facilities," Twentieth National Conference on the Administration of Research (Denver, Colo.: Denver Research Institute, 1967), pp. 59-66.

16. See J. A. Morton, "From Research to Technology," International Science and Technology (May, 1964), pp. 88-90.

17. See H. Vollmer, The Fundamental Research Activity in a Technology-Dependent Organization.

18. See C. Barnard, op. cit.

19. See H. Vollmer, et al., Organizational Design--an Exploratory Study, pp. 138-141.

20. See D. Pelz and F. Andrews, Scientists in Organizations (New York: Wiley, 1966), Chapter 12, "Coordination."

Chapter VI

IMPLEMENTATION OF ORGANIZATIONAL DESIGN

It is not enough to make structural designs on paper. Descriptions of policy, functions, and roles must be put into practice so that the day-to-day activities of an organizational entity conform to these descriptions. This process, which we describe as follows, is the topic of discussion in this chapter:

> Implementation of Organizational Design: the process whereby new descriptions of organizational policy, organizational functions, and organizational roles are assimilated into the day-to-day activities of an organizational entity.

Concern for the problems of implementation must be a part of any effort to design a brand new organizational entity because staff members always take some time to learn to act in terms of the policies and other structural aspects that have been provided for the new entity. However, concern for problems of implementation becomes even more vital when one is redesigning the structure of an existing entity. In this latter case, staff members must not only learn new patterns of behavior and attitude, they must also unlearn old ways of doing things.

The problems of learning new ways of behavior, and perhaps unlearning old patterns are largely "people problems." As Warren Bennis has written:

> What we know least about--and what continually vexes those of us who are vitally concerned with the effective utilization of knowledge--is implementation. As I use the term, "implementation" encompasses a process which includes the creation in a client-system of understanding of, and commitment to, a particular change which can solve problems, and devices whereby it can become integral to the client-system's operations. It bears to organizational theory the same relationship that the term "internalization" does to personality theory; i.e., it is a process which leads to automatic self-generation and integral functioning.[1]

Bennis goes on to point out that this process implies emotional changes in the way that individuals feel about themselves and their relations to their

organizational environment, as well as intellectual changes in the way that they perceive that environment:

> When it comes to implementation of organizational changes, most practitioners seem to overemphasize the importance of intellectual understanding, or the informational status of the intended change. . . . information and understanding are necessary but not sufficient components for inducing change. More is required if the change is to affect important human responses. For human changes are bound up in self-image and its maintenance. . . . If intended change is perceived to threaten (or enhance) the self-image, then we can expect differential effects. If an intended change is perceived as threatening the social life space of the individual, then safeguards must be undertaken which ensure new forms of gratification and evaluation.[2]

We can use these thoughts of Bennis as a point of departure and go on to say that any organizational designs (or redesigns) are likely to be perceived as threatening to the self-images or life space of key individuals if these designs are seen as having an effect of downgrading the organizational property, status, or communications position of these individuals. Insofar as he is concerned with getting an organizational design implemented, a designer must be sensitive to these kinds of human effects of a proposed organizational structure and he must seek ways to overcome deleterious effects.

Human Effects of Organizational Design

One possibly deleterious effect of an organizational design is to decrease the organizational property of a key individual, which we define as:

> Organizational Property: the resources of an organization (funds, facilities, equipment, personnel, information, and so forth) to which individuals in certain roles are given access and control that are not available to other individuals within the organization.

Concern over property rights, or "territoriality" as some analysts have described it, is a basic characteristic of human beings and also of other forms of animal life.[3] Where these rights are hard earned as a result of concentrated effort and struggle, individuals are not likely to give them up without a fight. For example, new organizational structures may be perceived by an individual as placing him in a position where he will suffer a loss of access to information, people, equipment, or funds that are

seen by him to be significant to the performance of a job to which he has become committed as a part of his self-image. Where this occurs he is likely to try to resist the new structure by using overt to covert strategies. These may range from trying to maneuver himself into a new position that permits him to gain access again to these crucial resources, on one hand, to trying to sabotage the entire organizational structure, on the other hand. If because of his background, personal reputation, or connections within the organization or outside it, an individual is in a position of power, authority, or influence, his resistance to a new organizational structure can either wreck it entirely or at least cause it to be modified significantly.

In the implementation phase, an organizational design must take account of this tendency for individuals to protect what they consider to be their organizational property rights. This is especially important with regard to key individuals--i.e., those who are in positions where they might sabotage an organizational design or modify it significantly in undesirable ways. Such property rights can be taken into account in an organizational design in one of two significant ways: either care can be taken to provide access to new kinds of organizational property among those key individuals who have lost prior organizational property rights or these individuals can be terminated and thereby removed entirely from a situation of influence in the new organizational structure. The former alternative is more likely to be seen as expedient from the standpoint of overall personnel development and general employee morale, but the latter may be necessary as a last resort to implement the redesign of an organizational entity.

A somewhat related but slightly different kind of deleterious effect of an organizational design is to decrease the organizational status of a key individual, which we define as:

> Organizational Status: the rank ordering of organizational roles from those to which high prestige is attributed to those to which low prestige is attributed within an organizational context.

Obviously, a person who loses status in a new organizational structure is likely to resist this loss, often in ways that can be injurious to the effective operation of the organization itself. This loss of status may or may not also involve an actual loss of organizational property rights. In either case, it entails some injury to the individual's self-esteem because it also includes a loss of prestige in the eyes of others. In accord with basic social psychological theory and research, the way that "significant others"--those whose opinions we value--view us tends to determine our self-esteem.[4]

One way that self-esteem can be attacked is to be demoted from a position of higher status to one of lower status. As in the case of the loss of organizational property rights, a way to avoid this loss of self-esteem while actually demoting an individual is to transfer him to a lower level position in another geographic location or another division where a loss of status is less noticeable among his immediate associates. Another way is to compensate an individual for a loss in status by a gain in certain organizational property rights--e.g., opportunity to travel to foreign assignments. A third way is to shift an individual from one kind of status position to another that actually has less administrative authority, but still is respectable in a mixed situation where different kinds of status are ambiguously defined--e.g., transfer from a line management to a headquarters staff position.

The status of key people can also be demeaned by what might be referred to as a process of "layering." This is a situation in which more levels of management are superimposed over particular individuals. Even though their job titles, salaries, and other perquisities of office seem to remain the same, their line of access to the top level of executive decision-making in the organization has become extended by the interposition of other levels of administrative authority. Thus their access to significant aspects of organizational property is likely to be diminished, and their status in the eyes of others in the organization may also decrease.

The restructuring of an organization can result both in layering and in demotion, with the dangers attendant to both of these actions. Fred Goldner of Columbia University has described how demotions occur in a leading industrial company and how this company has attempted to diminish resistance to demotion by reducing the perceived loss of status resulting from it.[6] In our case studies connected with the present project, we found a concern with the effects of layering in several situations. For example, it has been present in the Department of Transportation, where a new department-level administration was superimposed over a previously independent federal agency, the Federal Aviation Agency. This concern was also present in at least two parts of the Department of Labor (the Bureau of Employment Security and the Bureau of Apprenticeship Training) when the intermediate-level Manpower Administration was interposed between these bureaus and the departmental headquarters.

In both cases, it seemed necessary to the organizational designers to establish one or more additional layers of administration to reduce the span of attention of top-level executives and to coordinate work activities in ways that they had not been coordinated previously. The problem was how to handle the negative reactions of perceived loss of status among key staff members that resulted from this new structural arrangement. In

general, it could be said that the planned solution has been to compensate for this apparent loss of status by trying to show key individuals that their longer run career advancement opportunities (both in terms of organizational property and organizational status) have increased, rather than decreased, at the same time that an apparent layering has occurred. Thus, for example, in the Department of Transportation, key individuals from the FAA and other transportation mode-oriented organizations have been given new opportunities to participate (both on a permanent and on a temporary job-rotation basis) in new transportation systems activities at the department level, and others have been given the expectation of such opportunities in the future. In the Manpower Administration of the Department of Labor, several key officials of bureaus concerned in the proposed reorganization would be given positions in wider areas of responsibility within the Manpower Administration and the total department.

The introduction of PPB structure in the National Bureau of Standards has also caused apprehension on the part of key individuals in the three main Institutes that make up the Bureau. However, these apprehensions appear to be connected with their view that they might lose certain aspects of organizational property, rather than losing status per se. Specifically, there is apprehension that Institute officials might lose control of program funds in a budgeting procedure now related to programs that logically stretch across two or more of the present Institute structures. These apprehensions have yet to be allayed completely, but progress is being made by locating the leadership responsibilities for different inter-Institute programs in one or the other of the existing Institute organizations. In the long run, this suggests that the NBS could be moving in the direction of a matrix authority type of structure such as was described in the previous chapter, but the transition in this direction is being made slowly enough to provide reasonable assurance to Institute officials that their technical and administrative interests will be preserved; in fact, they could even be expanded in some significant ways.

A new organizational structure may not result in any loss of status or property among key individuals, but it still may put them in a less desirable communications position, which we define as:

> Communications Position: the access that members of an organization have to communications relevant to their work and to their careers, as a result of their position in the organization (i.e., job and role) and their location in space.

Thus it is well known that employees who are in jobs through which important formal communications are normally channeled, who serve on important committees and task forces, or who are frequently in a position to share informal communications with others in key positions (e.g., have lunches

with key executives, belong to the same clubs outside work, share ride pools), are also in a position to "know what is going on" in the organization. Such knowledge is power. It enables an individual to conduct his own day-to-day work and to chart his future course of career development in ways that are most likely to be successful and in tune with organizational changes. Also it enables the individual who is privy to inside information about organizational matters to share these "secrets" with his colleagues in a way that can amount to conscious manipulation of their attitudes, behavior, and relationships to the source of the inside information.

Informal channels of communication are absolutely necessary to the effective operation of any organization; the formal channels are never adequate to carry all the information that is required in the day-to-day activities of an organization and that are necessary to build individual interest in, and identification with, organizational goals and objectives. Nevertheless, it must be recognized that those individuals who provide key links in informal chains of communication (as well as formal chains) have extremely important responsibilities that can be used either in a manner that supports an organizational structure or that undermines it. Due care must be taken concerning the effects of new organizational designs on the communications positions of key individuals.

Spatial arrangements can affect communications positions too. It is well known that persons in isolated outposts are generally less likely to be well informed about organizational matters than are those who are located at headquarters establishments. Instances are known to the author where this feeling of isolation from important communication has had serious effects on staff morale and has resulted in unusually high employee turnover rates. Although perhaps to a lesser degree, the same feeling of isolation can be experienced by those in more remote buildings at the same site, or even by those in a remote position in the same building.

In the previous chapter it was pointed out that the design of an organizational structure should be considered concurrently with the design of physical structures and the planning of site location. One main reason for this is the possible effect of both on communication position. As was pointed out also, some kinds of jobs (e.g., scientific research) may require some organizational and spatial insulation, but not isolation, in relation to other organizational activities.[6]

Nevertheless, even the best of organizational designs may turn out to provide more structural and spatial isolation for individuals in certain jobs than seems desirable. In its implementation phase, the organizational design must seek to overcome these deficiencies.

For example, it should be recognized that outposts remote from organizational headquarters do not have to be isolated from formal and informal communications that are important to organizational activities. One marketing office of a major corporation was for many years a major center of informal communications among key staff members who used to visit this office while making contacts with major clients and customers of the corporation located in the area of this marketing office. While on travel status, these key staff members would often visit with each other after hours and exchange information (including new product ideas, and new approaches for marketing) to an extent that they would not do at home where most had family responsibilities after normal work hours. This all changed, however, when this particular marketing office expanded into essentially another line operating activity in the corporation and moved to a location where space rental was less expensive, but where the usefulness of this office as a center of contacts for visitors from the headquarters of the corporation was also considerably decreased. As a result, the informal communication that formerly surrounded this office decreased. Ever since, the total cost/benefits of this change in the location of this marketing office have been subject to critical comment within this corporation.

The relative effects of organizational design changes on the organizational property, status, and communications position of key personnel depend on the kind of personnel involved. It depends on who constitutes their most significant reference group. Physical scientists, for example, are more likely to be more concerned about their status among their scientific colleagues--those outside their organization as well as those inside--than about their status among nonscientists in their own organization.[7] Even being promoted into a managerial position is seen as a "cop out" by many scientists.[8] Conversely, leaving a managerial position is often viewed as an advancement in opportunity; "I got rid of all that administrative junk, and now I can get back to my research interests," is a frequently heard comment. From an organizational structure standpoint, this is why the provision of "dual ladders" for professional advancement without increasing administrative responsibilities for those with a technical professional orientation is important.

What is also extremely important to scientists is to be placed--organizationally and spatially--so that they can have an appropriate amount of communication with their colleagues, but not too much communication. Several studies have found that the diffusion of scientific and technical information is most likely to occur through interpersonal, face-to-face contacts, rather than simply through the dissemination of scientific literature.[9] Furthermore, Pelz and Andrews have found that a moderate amount of communication among scientific colleagues enhances scientific productivity.[10] The same could probably be said in relation to other kinds of

productivity among other kinds of personnel. The trick, both in the structuring and in the implementation phases of organizational design, is to reach for the solutions that provide for the optimum level of face-to-face communications that is appropriate for each kind of personnel. Perhaps such an optimum arrangement with regards to communication positions will never be reached in any one organizational design effort because compromises have to be made with other design considerations, but in any case, extreme deficiencies in the arrangement of communications positions should be remedied as a part of design implementation.

Directive Methods of Implementation

There seem to be two major approaches to implementing an organizational design. One is directive; the other is nondirective. The former seeks primarily to elaborate and specify structural concepts in ways that are compatible with the point of view of top executives in the new or changed organizational entity and hence is associated most with the engineering strategy of organizational design. In contrast, the latter approach seeks to elicit employee views on the best ways to elaborate and specify structural concepts and hence is basically most compatible with the behavioral strategy of organizational design.

In any actual design effort, elements of both strategies are likely to be mixed together, yet it is still possible to characterize the implementation phases of most design efforts as being predominantly of one type or the other. Whichever approach is followed, however, it should be recalled that the purpose of the implementation effort is to elaborate and specify organizational policies, functions, and roles so that they can be assimilated into the day-to-day activities of an organizational entity. To accomplish this, the implementation effort must overcome individual resistance to perceived loss of organizational property, status, or communications position. In fact, in an optimum situation, it should enhance individual self-esteem at the same time that it increase organizational effectiveness.

This section will provide illustrations of what could be classified as mainly directive approaches to implementation, derived from recent experiences in the Environmental Science Services Administration (ESSA), the Department of Transportation, and the Manpower Administration of the Department of Labor.

In his account of the design of ESSA, Walter Hahn (who played a major role in the implementation of this design) has pointed out that this effort had prior origins in an effort to restructure the Weather Bureau. By July 1964, this restructuring effort had produced four products:

1. A set of managerial concepts to marshall resources to meet the agreed-on goals and output objectives of the Bureau

2. A set of technical concepts on which the services and systems of the revised Bureau were to be predicated

3. An explicit formulation of the legal and administrative constraints imposed by the federal government

4. An initial "first-level breakout structure" for the reorganization of the Bureau

Hahn then goes on to describe the implementation effort:

> With these conceptual foundations [the four products listed above], it was then possible to use the operations research/management sciences personnel (along with their counterparts in management and organization, personnel, budget, etc.) in a much more systematic and delegable fashion. . . . Once the products described above existed, it was possible to give sufficient guidance to an analytical and implementation team so that the authority could be delegated with a reasonable expectation that the results would be in harmony with the wishes of the manager. This implementation activity included costing the various alternatives for specific organizations, arraying different resources into homogenious groupings, developing analytical tools for producing the proper information, communicating the design, and ferreting out specific, real, and imaginary problems.[11]

That this was truly an implementation effort is revealed further by Hahn's comments as follows:

> The organizational planning and implementation team did not create the theory of enterprise, but they were instrumental in finding it, revealing it, making it explicit, and communicating it. Management scientists had participated in all the foregoing deliberations on technological assumptions, managerial concepts, objectives and goals, hierarchical and other constraints, etc. They also were free to roam the organization seeking information not only from within the Bureau, but from its clients, including those clients who were less than satisfied. Thus its members, those new to the Bureau and those who were "old timers" roamed all over it at all levels, in field and headquarters,

and in science and operations, listening, recording, discussing, and building a theory of the Bureau as an integrated enterprise.[12]

This brief description of the Weather Bureau implementation effort is sufficient for noting the following general conclusions about it:

1. Although its purpose was to implement a design that was basically "in harmony with the wishes of the manager," it also required a large amount of listening on the part of members of the implementation team so that a common understanding of a "theory of enterprise" could be built that was sensitive to individual aspirations and problems as well as to organizational goals and objectives

2. The implementation effort required the adjustment of the structural design to the expressed interests of important "outsiders" (clients) as well as "insiders" (staff members)

3. The implementation effort was mainly conducted by operations research and management sciences staff personnel, who could be expected to place the greatest emphasis on implementing the economic cost/benefit aspects of the design--although attention was also given to social psychological and other factors in the implementation effort.

Creation of the U.S. Department of Transportation has perhaps required a more massive and extensive implementation effort than has been associated with any other federal agency, primarily because the Department is essentially a new creation. In this regard, Alan Dean (who also has played an important and continuing role in the design and development of the Department) has written concerning the magnitude of the task:

> This was due not only to the magnitude of the resources and the large number of people involved, but was also due to the lack of any primary nucleus organization around which the Department could be built. Both the Department of Health, Education, and Welfare and the Department of Housing and Urban Development superseded important agencies which were in effect elevated to Cabinet status. Even when significant changes in policy, personnel, and organization followed the acquisition of Departmental status, the effort was still basically evolutionary and could be built upon a single inherited institution and management system. Not so with the Department of Transportation, which was formed through the merging of a variety of previously dispersed organizations.[13]

When President Johnson signed the bill creating the Department on October 15, 1966, a task force under Vice Admiral Trimble of the Coast Guard was immediately assembled to develop the detailed plans for organization and staffing. Membership was confined to key representatives from those elements definitely slated for incorporation into the Department. This task force first drafted a charter to provide a general framework and guidelines for their activities and then divided into working parties for the various functional activities such as budgets, finance, personnel, and legal. Many different forms of organization and systems of operation already existed for each function within the various entities to be inherited. The working parties studied these and made recommendations on how they could be integrated, centralized, or reorganized. Their recommendations, in turn, had to be reviewed and approved by the task force as a whole to provide compatible operating patterns and systems for the various functional activities.

Task force recommendations were delivered to Undersecretary Boyd who, by then, had been nominated by the President to be the Secretary of the new Department. By the time he was sworn into office on January 1, 1967, the planning activities of the task force had reached a state where the group could be dissolved and the leadership taken over by the incoming officials of the new department, although the task force members remained available for consultation.

The bill creating the Department provided that the legislation should not take effect until 90 days after the first Secretary took office. Thus, the new Secretary had a period of grace in which to appoint key staff and effect an orderly transition of functions. Members of his small group of planners and strategists who had participated in the final decisions on organizational design and operating policy assumed key line and staff positions in the department. They were thus able to work out further steps to implement the design that they had created and to guide the activities of the Department in a direction compatible with the final design.

Several key moves were also made in implementing the organizational design. One was to retain continuity of the small group of advisers to Mr. Boyd, most of whom had been involved in planning for the Department since well before the legislation was enacted. These advisers assisted Secretary Boyd in final decisions on the implementing details. Another was to appoint some of these men to key operating positions and to key staff positions where, as an extension of the Secretary, they were able to make necessary adjustments to the organizational design while ensuring that the entity would function and that its fundamental concepts of the organizational design were carried out. The appointment of a task force made up of people from the functions and entities being incorporated served not

only as a resource for the Secretary and his small group, but also acquainted these representatives and their respective agencies with the problems of merger and led to development of solutions and recommendations that they could accept. A 90-day waiting period after the appointment of the Secretary provided time for the incoming officials to assume their jobs, establish their relationships, and begin work on the implementing actions proposed by the task force.

On April 1, 1967, the Department was officially activated by Executive Order. While the organization was far from being fully developed and staffed, it was a viable, functioning entity with a staff of 95,000 civilian and military personnel and a program of transportation activities having annual expenditures of about $5.5 billion per year.

The main feature of the activities of the Trimble task force and other implementing activities connected with the establishment of the Department of Transportation can be summarized as follows:

1. All major organizational elements to be included in the new Department were represented by key personnel in the implementation effort, thus assuring a common sense of participation and establishing a basis for a new sense of unity among previously dispersed organizations

2. For the most part, those who initially planned the organizational structure and who guided its implementation also assumed key positions in the management of the new organization, thus assuring a high degree of continuity of effort

3. It was recognized by the highest authority (i.e., the legislative action setting up the Department) that the initial implementation of an organizational structure takes time (e.g., 90 days in this case), thus providing a reasonable period of time for working out problems of changes in organizational property, status, and communications positions.

4. It has been recognized that the full implementation of such a massive organizational creation will take much more time to complete and will probably require additional special efforts to assure continuity and to provide appropriate transitions in accord with the requirements of a new President taking office in January 1969

In the Manpower Administration of the Department of Labor, Stanley Ruttenberg, the Manpower Administrator, established a special Realignment Task Force, under the chairmanship of William Kolberg, in December 1967

to implement the Secretary of Labor's directive on the reorganization of Manpower Administration functions. In his memorandum establishing the Realignment Task Force, Ruttenberg indicated:

> . . . I have asked my task force to develop a description of an overall Manpower Administration Operating Concept. Such a description will be useful in resolving specific individual issues . . . and will thus, in turn, be essential as a basis for planning and executing individual realignment moves.
>
> To help resolve the individual issues, the Task Force will organize a number of working parties. . . . they will include a representative of the overall task force and a representative from those bureaus and offices involved. These working parties will be expected to consider the issues and sub-issues and develop specific recommendations for their resolution in line with the overall operating concept for the Manpower Administration and in line with an overall schedule to be developed by the Task Force. Their recommendations will be considered by the overall Task Force and the Executive Staff as appropriate. I will then render the necessary decisions and announce them and the actions to be taken. . . .
>
> To facilitate the execution of the steps decided upon, the overall Task Force will establish a working group made up of administrative specialists. This group will include specialists in management analysis, personnel management, contracting, budgets, space management, etc....
>
> I recognize that, in some respects, the Task Force and working group structure may overlap some of the functions of our established staff units. . . . But I have done this intentionally for two reasons: (1) We must continue to operate while, at the same time, planning and implementing the realignment, and (2) a temporary Task Force and working party structure permits us the greatest flexibility and creates no large permanent group to be closed out after the implementation has been completed.[14]

To provide outside expertise to assist this Task Force and its working parties, outside consultants were engaged. The consultants saw their tasks as primarily to provide assistance on such matters as:

- Preparing detailed plans for reorganizing and reassigning functions and personnel

- Conducting special analyses
- Preparing implementation documents
- Scheduling transfers and other actions
- Revising operating procedures as required to accommodate functional changes
- Laying groundwork for important systems improvements in planning and control
- Orienting senior officials in new organizational concepts
- Assisting in the direction and training of Task Force and work group members
- Providing advice on manpower economies
- Monitoring progress and reporting results

The Realignment Task Force and its component working parties completed their activities in June 1968, at which time the Manpower Administrator stated that this first phase of the implementation effort was completed. He then called for two additional phases of effort:

> Phase II will involve the completion of all immediate follow-up actions needed to carry out implementation of the decisions. This phase includes rewriting mission and function statements, preparing new job descriptions, transferring personnel, and rearranging office space and equipment, and should be essentially completed during July. Phase III is a longer term effort concerned with revamping operating procedures and key working relationships. . . . The purpose of Phase III efforts is to ensure that the realigned units form a cohesive, integrated structure that is fully responsive to the goals and objectives of the Manpower Administration.[15]

Some of the important aspects of this Manpower Administration reorganization effort were:

1. Much more than either of the implementation efforts described previously, the effort in the Manpower Administration entailed the transfer (or possibility of transfer) of key individuals in existing positions, with the consequent anxieties about loss of

organizational property, status, or communications position that would be expected

2. Some anxieties regarding these kinds of losses were at least partially allayed by representation of every group concerned on the Realignment Task Force and its various working groups, yet no assurance could be given that the Manpower Administrator might not make final decisions on reorganization in directions that would be seen as disadvantageous by certain individuals

3. The nature of this reorganizational effort being what it was--namely an attempt to realign functions in accord with overall organizational goals and objectives in the face of what was recognized at the outset to be certain strongly entrenched interests on the part of key individuals--the employment of an outside consultant with widely recognized expertise in organizational design and redesign probably served an extremely useful function in taking the "blame" for some unpopular actions from the shoulders of in-house management and helping to assure the ultimate success of the overall design effort

Examination of these three implementation efforts in the Environmental Science Services Administration, the Department of Transportation, and the Manpower Administration provides somewhat diverse examples of situations in which more than less directive implementation efforts were seen as necessary. In all three cases there was not time for a more leisurely nondirective approach, and furthermore a nondirective approach in the face of deeply entrenched individual interests would likely have resulted either in completely unsuccessful organizational design efforts or at least in organizational designs that would have been modified in directions that would have undermined the goals and objectives of the new organizational structures.

Nondirective Methods of Implementation

There are other situations in which nondirective methods of implementation of organizational design or redesign appear to be quite appropriate. Mainly, these are situations in which (1) the shape of an organizational structure that is most appropriate to new tasks and new environmental circumstances cannot be meaningfully defined in advance and (2) there is an indefinite period of time available to implement changed structure--in other words, where change can realistically be viewed as a slow but continuing process and therefore where a behavioral strategy of organizational design is especially appropriate.

One of the most outstanding examples of the use of essentially nondirective methods to implement organizational design activities can be found in TRW Systems. It was in 1960 that TRW Systems was chartered in its present organizational form. At that time, the company entered the high competitive aerospace systems industry. To minimize fluctuations in business and employee turnover, the company elected to base its business on many smaller contracts rather than one or two massive contracts. This imposed the additional requirement that they organize in a way that would permit effective use of specialized talent and other resources on several projects at one time.

TRW responded to the organizational problem by establishing a project matrix form of organization. On one hand, departments were formed that grouped people together by functional specialty and activity. On the other hand, project offices were created to plan and coordinate the work for a particular customer program. Under this arrangement, functional departments represent the permanent administrative structure of the organization; project offices are created and abolished according to the needs of the customer programs. The actual work is performed by people in the functional departments, and a project manager in effect subcontracts his work to or through the functional department head involved. Functional department heads have responsibility for providing the manpower to do the work. They schedule the assignment of projects and people within their group, and they are responsible for work quality. The project manager controls the budgets and establishes the work completion schedules. He is responsible for integrating and coordinating the work of the several divisions that may be involved and for getting the end product produced on time and within the budget. Thus, no one man or one group controls all aspects of the job. Successful operation requires a great deal of understanding, cooperation and effective communication, not only at the managerial level but also at the nonsupervisory level where an employee of the functional division, assigned to a project, has two bosses to whom he reports.

With success came an increase in the number of project offices, the numbers and the kinds of specialized functional departments and divisions, and an ever growing complexity in intergroup and intragroup relationships. New employees had to be oriented to work in this environment, and new managers and supervisors were needed to cope with the enlarged business. Continued success and profitability was dependent on enhancing skills in interpersonal and intergroup relations at all levels and on being able to facilitate organizational change to meet customer demands. The company then elected to pursue a further program of manpower development aimed at accomplishing these objectives.

To accomplish this need, Sheldon Davis, the Industrial Relations Director, met with the company president and proposed a plan entailing the use of an outside consultant experienced in group dynamics and human relations training. The president agreed to the plan, but made it clear that he did not want a readymade program designed to train people in a general way. Rather, he wanted the program to be task-oriented in ways that would fit the particular needs of the company.

A two-day meeting was held of the consultant, the key people in industrial relations, and several top management people in the company to outline the problem and the possible solutions. No immediate action was taken, but over a considerable period of time, the consultant held individual interviews with managers throughout the company to determine their perspective of the problem and the need. Ultimately, a feedback session was held with this group and a course of action was proposed that included sensitivity training for key supervisors and managers, "team building" sessions for permanent groups and proposal preparation teams, and "interface laboratories" to explore problems and solutions to relationships between groups.

Reaction to this meeting was generally favorable, and on the strength of that, it was decided to hold a team building session on a trial basis to explore intragroup and intergroup relations of one of the project office groups. An outside consultant and a member of the industrial relations staff attended the meeting to guide the participants in focusing on the issues and working toward practical solutions. Initially the group talked at great length about how other groups caused problems for them, but eventually they began to discuss what they might be doing to contribute to these problems and, in turn, to cause problems for these other groups. As a result of this meeting, representatives of the trial group visited the other groups a few days afterward to see what could be done to improve intergroup working relationships. This, plus a better understanding of interpersonal relationships within the group, spelled success for this initial effort.

In 1961 it was decided that a more complete "career development" program should be undertaken, on a small scale to start; that it should involve the top people in the organization; and that it should be conducted on a continuing basis rather than as a crash program. It was decided that this program would not be imposed from the top down; rather, the people enrolled in the various training groups would attend on a voluntary basis and would participate in structuring the problems and developing the solutions. To ensure appropriate focus on the problem and to obtain the ideas and inputs of managers, a paper outlining the apparent needs of the company was prepared and distributed to all managers by the Industrial Relations Department.

Initially the Industrial Relations Department began by sending managers to sensitivity training sessions conducted by outside organizations. To ensure applicability to company problems, participants met before attending these sessions so that they would be introduced to the kind of training they would receive. Periodic meetings following these classes were held to reinforce the learning and to discuss ways in which it could be applied to the actual work environment.

TRW Systems was able to interest several nationally prominent leaders in sensitivity training in becoming involved in the program. These men did the initial training of company staff members to prepare them to conduct sensitivity training courses and worked with the various company groups in team building and group interface activities. To maximize the use of these consultants and to provide day-to-day capability in the industrial relations staff, consultants were paired with personnel managers in the various divisions of the company. This combination provided a blend of internal knowledge of the organization with external expertise in individual and team development. The result has been expanded knowledge and capability on the part of both the consultants and the personnel managers in conducting team meetings and also readily available and qualified in-house advice and assistance to line managers by the industrial relations staff.

The work has now reached a point where most attention is devoted to getting new project teams into operation more quickly, helping existing teams and groups solve their internal relationship problems, and conducting interface meetings to deal with problems of interaction between groups.

There is increasing use of these meetings to examine organizational structure and obtain the suggestions of group members on how the organizational form might be changed to increase group effectiveness. While these meetings originally included only the professional staff of the group, they now include meetings and discussions with the nonprofessional employees as well. A major production unit of the company with several hundred employees is now undertaking a series of meetings to examine internal intragroup relations. These meetings will extend from the management level to the production workers themselves, and inputs from all levels will be considered in any realignment of work relationships.

Over the initial four or five years of this implementation effort, more than 500 key persons in the organization attended sensitivity training sessions. Yet, as was pointed out, sensitivity training itself turned out to be only a small portion of the total effort. As Sheldon Davis wrote:

> . . . one important theme of the nearly four-year organizational change effort at TRW Systems is that of using laboratory training (sensitivity training, T-Grouping) clearly as a means to an end--that of putting most of our energy into on-the-job situations, real-life intergroup problems, real-life job family situations, and dealing with them in the here-and-now. This effort has reached a point where sensitivity training, per se, represents only 10 to 15 percent of the effort in our own program. The rest of the effort, 85 to 90 percent, is in on-the-job situations, working real problems with the people who are really involved in them. This has led to some very important, profound, and positive changes in the organization and the way it does things, including decision-making, problem solving, and supervisory coaching of subordinates.[16]

Davis has pointed out further that, although some consider the use of these kinds of group dynamics techniques as "soft management," this use should really not be so considered. These methods emphasize the identification of human feelings and the development of ways to deal with such feelings so that they can be productively used, rather than ignored, in solving organizational problems:

> Our feelings will be available to one another, and we will try to problem-solve rather than be defensive. These values have within them a very tough way of living--not a soft way. But, unfortunately, in much of the behavioral science literature, the messages come out sounding soft and easy, as if what we are trying to do is to build happy teams of employees who feel "good" about things, rather than saying we are trying to build effective organizations with groups who function well and can zero in quickly on their problems and deal with them rationally, in the very real sense of the word.[17]

Davis' claims are borne out by the available data. On one hand, TRW Systems staff members are more likely to be well satisfied with their work environment than their counterparts elsewhere. For example, data collected by SRI as part of a nationwide survey of engineering personnel in 1967 found that 71 percent of the TRW Systems engineers are "satisfied" or "very satisfied" with their work in general--compared with an average of only 51 percent of the engineers employed in other Los Angeles area companies and 54 percent of all the engineers surveyed throughout the United States who gave this same response. Furthermore, 89 percent of the TRW Systems engineers said that they believe that their management has given their work "the recognition it deserves," compared with 69 percent of the other engineers in the local labor market and 78 percent nationally.

The real "proof of the pudding" is in the fact that TRW Systems engineers are not only happier than their counterpoints elsewhere, but also they behave differently, and their differences in behavior are apparently reflected in overall differences in corporate effectiveness. Thus, for example, during the period of this effort to implement organizational change, the turnover of professional employees at TRW Systems decreased from 17.1 percent to 6.9 percent annually, which is currently about one-third of the average for the aerospace industry. Furthermore, during the same period, net sales, income, and earnings have shown very impressive and consistent gains, and total employment has increased from 6,000 to 11,000.

Naturally, there is no way to determine how much of these gains can be attributed directly to the organizational implementation effort described above. Other factors may have had some influence here, but the major factor that seems to differentiate TRW Systems from its competitors who have not fared as well in the aerospace industry has been this effort to use group dynamics techniques to implement organizational change. Members of top management in the company, including the president, believe that this implementation effort deserves a good deal of the credit.

The key characteristics of this implementation effort can be summarized as follows:

1. This has been basically a nondirective effort, in that a major attempt has been made to cause individuals and groups to bring out their own problems in relating to each other and to try to work out their own solutions to such problems in interaction with each other, rather than trying to anticipate problems ahead of time and supply readymade solutions

2. This kind of nondirective effort, focusing mostly around task-oriented problems of interpersonal and intergroup relations, is not a "soft" approach; it is really a "hard" approach in that it apparently results in payoffs of reduced staff turnover and increased productivity that are important to the organization as a whole--as well as increased staff satisfaction

3. This kind of approach emphasizes dealing with human feelings, sensitivities, and anxieties as real problems to be overcome rather than "sweeping them under the table" and only admitting "rational considerations;" thus problem-solving meetings using this approach are likely to come to grips with the kinds of human effects of organizational design that are more likely to be covered up, or dealt with in a less direct and ultimately less

effective manner, in more directive methods of implementing organizational design

4. Finally, to take a nondirective approach to implementation requires a considerable amount of time--four to five years in the case of TRW Systems and the effort is still continuing; it now includes subprofessional employees at levels that are not previously involved.

The Implementation Process

The main steps in the process of implementing the design of a new organizational structure can be summarized as follows:

1. Identification of human effects--analyzing aspects of a new organizational structure to determine "points of sensitivity" where individuals might be expected to perceive any significant losses of organizational property, organizational status, or communications position in the new organizational structure

2. Determination of approach--in the light of the above analysis, deciding on directive or nondirective steps that might be taken to overcome feelings of individual loss that might be connected with the new organizational structure

3. Assignment of responsibilities and resources--deciding who should do what, and with what resources (funds, equipment, facilities, personnel, and so forth) to carry out the desired appraoch to implementation

4. Conduct of implementation activities--carrying out task force, committee, group meeting, or other kinds of orientation or interaction plans on a day-by-day basis

5. Monitoring of feedback--identifying, recording, answering, and otherwise acting on feedback information that is taken to be indicative of the success of the implementation effort

It is extremely important to take the possible human effects of a new organizational structure into account in the process of designing it. Sometimes such effects on the perceived loss of organizational property, status, or communications position can be overcome by redesigning the structure itself on paper before trying to implement it in actual practice. In other cases, however, such deleterious effects for individuals cannot be entirely eliminated because they conflict with other cost/benefit

features that are sought in the design. In such cases the designer--or those responsible for implementing the design--must have the individual human effects that cannot be compensated for in the structure of the design itself well in mind so that the designer can then search for ways to overcome such effects and to minimize individual resistance wherever such resistance might destroy or markedly undermine the success of the total design effort.

Some of these kinds of human effects can be anticipated in advance by organizational designers who are sympathetic to human sensitivities. This is especially true in cases of redesign of existing organizations that include perceptions of demotion of key individuals, "layering" over positions where levels of management were previously nonexistent, and isolation of certain individuals from important chains of communication. Such cases are not likely to require interviewing or other data collection methods, but there can be other cases where human deprivations might not be so obvious. It is a reasonable safety precaution for organizational designers to interview key personnel on their feelings regarding the possible deleterious effects of any proposed new structure before an attempt is made to impose this structure as a fait accompli. Then the approach to be taken to overcome such effects must be decided on. Viewing the comparative advantages of a more nondirective and a more directive approach to the implementation of organizational design, it can be seen that these approaches are not necessarily mutually exclusive. A directive approach to the implementation of certain initial facets of organizational design might be quite necessary within the first year or so following a structural change. On the other hand, many aspects of structural change that are difficult if not impossible to specify in advance can perhaps best be worked out by nondirective methods in the years to follow. This is actually what happened at TRW Systems. For the first year after the establishment of the new corporation, the project matrix form or organization was introduced, and employees were quickly oriented into its basic requirements by essentially directive methods. The following years of group dynamics work have served to round out the initial structural change and to make it effective in the day-to-day activities of staff members.

Thus some situations may require a directive approach to the implementation of organizational design or redesign, and others may require a nondirective approach; but where possible, a combination of approaches may lead to the highest degree of overall success in the long run. Such a combination is also more compatible with what we have described as the total systems approach to organizational design.

The kind of approach to implementation that is to be taken partially determines who does what. A directive approach may be carried out best by line managers, since the nature of their job responsibilities requires

that they assume a direct role in implementing administrative changes. On the other hand, a nondirective approach might best be conducted by staff specialists, such as training and personnel specialists, where they are qualified in group dynamics techniques and where they are better placed (in staff positions) to elicit the more sensitive data on feelings that are not normally expressed in the same way in line administrative relationships. Still, it should be pointed out that a proper combination of staff and line responsibilities is advantageous in either approach. The ultimate purpose of nondirective group dynamics techniques like those used at TRW Systems is to "train" employees and line managers alike to be able to express and deal with feelings in their day-to-day relations.

In either kind of approach, outside consultants can be quite useful in a third party role to help bridge communications between management and employees in the process of implementation.

Implementation efforts require the allocation of funds and other resources, and calculation of the costs of implementation in relation to expected benefits should be a part of the implementation planning process.

Then comes the conduct of implementation activities and the monitoring of feedback to determine what is being accomplished. Such monitoring is so obviously important that it is included here as an essential part of the implementation process, but a further discussion of methods of monitoring feedback is given in Chapter VII.

Conceptual Summary

This chapter has pointed out that an organizational design becomes a reality only when prescriptions on paper are implemented in day-to-day organizational behavior. There are two main types of approaches to the implementation of organizational design: (1) directive approaches and (2) nondirective approaches. The former are essentially "top-down" approaches that are most compatible with the engineering strategy of organizational design and that consist mostly of the use of special task forces, committees, and directed employee orientation sessions. The latter are essentially "inside-out" approaches that are most compatible with the behavioral strategy and that consist mostly of the use of task-oriented group dynamics methods to uncover and resolve problems of human feelings. The use of either of these approaches is not mutually exclusive; both directive and nondirective approaches can be profitably combined in different phases of a total systems strategy of implementation.

Whichever approach is used, it must be borne in mind that the main purpose of implementation efforts is to identify and resolve the human

effects of organizational design. These may include perceived loss of organizational property, organizational status, and communications position. Wherever possible, such losses should be anticipated in advance. Interviewing should also be conducted with key personnel to identify and, where possible, remedy unanticipated deleterious effects as a part of the implementation effort.

The main steps of the implementation process are identified as follows:

- Identification of human effects
- Determination of approach
- Assignment of responsibilities and resources
- Conduct of implementation activities
- Monitoring of feedback

Notes for Chapter VI

1. Bennis, Changing Organizations, p. 175.

2. Ibid., pp. 175-76.

3. See R. Ardrey, The Territorial Imperative (New York: Atheneum, 1967).

4. See C. H. Cooley, Human Nature and the Social Order (New York: Charles Scribner's Sons, 1922; and G. H. Mead, Mind, Self and Society (Chicago: University of Chicago Press, 1934).

5. F. Goldner, "Demotion in Industrial Management," American Sociological Review, Vol. 30 (1965), pp. 714-24.

6. See J. Morton, op. cit.

7. Physical scientists are thus more likely to be "cosmopolitan" than "local" in their orientations, according to the typology presented by A. Gouldner in "Cosmopolitans and Locals: Toward an Analysis of Latent Social Roles," Administrative Science Quarterly, Vol. II (1957), pp. 281-306, 444-80. Data from my own national survey of scientists indicate that 73 percent of those surveyed consider themselves to be more identified with their scientific profession than with their employing organization; see H. Vollmer, Work Activities and Attitudes of Scientists and Research Managers: Data from a National Survey (Menlo Park, Calif.: Stanford Research Institute, "R&D Studies Series," 1965), p. 42.

8. Work Activities and Attitudes of Scientists and Research Managers: Data from a National Survey, p. 32, shows that only 18 percent of scientists surveyed have aspirations to go into managerial positions; on the other hand, p. 33 shows that 16 percent of those scientists now in managerial positions wish to return to non-managerial positions in the future.

9. See for example H. Menzel, The Flow of Information Among Scientists (New York: Columbia University, Bureau of Applied Social Research, 1958).

10. Pelz and Andrews, op. cit.

11. Hahn, op. cit., p. 329.

12. Ibid., pp. 329-30.

13. A. L. Dean, "The Making of a Department of Transportation," (a paper presented by the Assistant Secretary for Administration, Department of Transportation, at the Conference on Public Service, Washington, D.C., October 13-14, 1967), pp. 8-9.

14. Memorandum for S. H. Ruttenberg to miscellaneous individuals on "Next Steps to Implement the Secretary's Decisions on Realignment of Manpower Administration Functions and Responsibilities," dated January 10, 1968, pp. 2-3.

15. Memorandum from S. H. Ruttenberg to his executive staff on "Implementing the Realignment of Manpower Administration Functions and Responsibilities," dated June 27, 1968, pp. 3-4.

16. S. A. Davis, "An Organic Problem-Solving Method of Organizational Change," Journal of Applied Behavioral Science (January-March 1967), p. 5.

17. Ibid., pp. 4-5.

Chapter VII

EVALUATION OF ORGANIZATIONAL DESIGN

Sooner or later organizational designs must be evaluated. Those who participate in design efforts (the designers), those who pay for them (the sponsors), and those who are affected by the design (members or employees of organizations) certainly want to know whether the benefits of an organizational design have been worth the costs--both the economic costs and the psychological costs. Therefore we must discuss the general concept:

> Evaluation of Organizational Design: the process whereby an assessment is made of the effectiveness, efficiency, and timeliness of an organizational design effort.

In our report on Phase I of this project, we indicated that the evaluation of design efforts represents an essential aspect of the total process of organizational design. We pointed out that the core of an attempt to evaluate organizational design efforts is to apply predesign and postdesign measures of the performance of an organizational entity in a manner that allows one to draw meaningful conclusions about the effects of changes in organizational structure on changes in organizational performance.

Moreover, we indicated that in attempting to evaluate organizational performance, it is important to try to avoid three common errors. The first type of error may be described as the regression toward quantifiable measures. Examples of this tendency are evaluations of performance in manufacturing companies that stress quantity of units produced at low cost/sales ratios, without considering less tangible measures such as the durability of items produced and customer satisfaction; enemy kill-ratios in warfare, rather than more difficult evaluations of the extent to which war tactics are actually reducing an enemy's capacity to retaliate; the number of patients being processed through a mental hospital, rather than measures of the effectiveness of the treatment provided; and research revenue generated in a research organization, rather than the quality of the research work performed.

Another kind of error may be described as the regression toward short run payoffs. Examples include the evaluation of business effectiveness in terms of current sales, rather than in terms of long range forecasts that take into account anticipated technological and social changes; the evaluation of basic research activities on criteria comparable to those used for the evaluation of applied research activities; evaluation of military strategy in terms of its effectiveness in "winning" wars, rather than in terms of its consequences for longer term international adjustments; and evaluation of personnel policies in terms of a reduction of employee turnover, rather than in terms of career development.

The third kind of error may be described as the regression toward compartmentalized performance. This consists of an organization's performance (or the performance of a division or department of an organization) being evaluated solely in terms of the goals or mission of the specific organization, rather than in terms of the requirements of the larger organizational, community, industrial, or societal systems in which the organization performs a function. Examples of this include the evaluation of corporate performance solely in terms of profitability for stockholders, rather than in terms of the quality of goods and services provided to customers or the welfare of employees, and the evaluation of professional services primarily in terms of colleague recognition, rather than in terms of client needs.[1]

In the present chapter, we maintain that the appropriate use of certain basic concepts of evaluation, the careful collection of appropriate kinds of evaluative data, and the imaginative use of evaluative research designs can help to avoid the three kinds of error described above.

Basic Concepts of Evaluation

A concept that is basic to the evaluation of organizational design is the concept of "organizational effectiveness," which may be defined as follows:

> Organizational Effectiveness: the extent to which a particular form of organizational structure (policies, functions, and roles) contributes to the attainment of organizational goals.

Since organizational goal attainment often cannot be measured directly, organizational effectiveness is often assessed in relation to more specific organizational objectives, which by definition can be measured directly (see Chapter IV).

It is not enough to try to assess changes in organizational effectiveness. Designers must also be concerned with the economic and psychological costs of an organizational design effort. To use Chester Barnard's classic distinction, organizational "efficiency" as well as "effectiveness" must be taken into account.[2] Thus the further definition is offered:

> Organizational Efficiency: the extent to which a particular form of organizational structure contributes to the attainment of organizational goals in a manner that minimizes economic and psychological costs of the structure.

The psychological costs that should be evaluated in connection with organizational design efforts are essentially those that might result from a perceived loss of organizational property, organizational status, or communications among key people brought about by an organizational design or redesign. In the previous chapter, it was indicated that these kinds of costs should be minimized, or compensated for, wherever possible.

The economic costs of an organizational design are usually more obvious and normally include such items as the salaries of those engaged in the design effort (e.g., consultants, managers, and staff specialists assigned to an organizational design task force), as well as related fixed costs and allocated overhead expenses. Some other costs may be more subtle, such as lost-time salary costs for the time that staff members spend on special design task forces.

In making cost/benefit analyses of design efforts from a financial standpoint, however, it should be remembered that there could be important trade-offs between financial costs and psychological benefits. Thus, for example, it may be that the lost-time costs for individuals serving on organizational design task forces (or on other important special projects) may be compensated for, in part at least, by the benefits in added social status and improved communications position that they gain through participation in such an important activity. Their performance on special assignments of this type may also be useful in assessing their potential for promotion to higher levels of responsibility within the organization.

Therefore the benefits of an organizational design effort should not only be seen in terms of improvements in overall organizational performance resulting therefrom, but also in terms of important side benefits that can accrue to individuals who participate in design efforts.

Still a third major factor must be taken into account in the evaluation of an organizational design. This is the factor of time. In making an evaluation, one is often examining organizational efficiency at two points in time to determine the extent of the change in organizational efficiency that has occurred in the time interval.

As indicated previously, however, immediate measures of changes in organizational efficiency that presumably result from an organizational design effort in a designated time interval may not be as appropriate as changes over a longer time period.

Actually, an evaluation effort might even stretch out for an indeterminate period of time. The main difficulty in such a continuing process of evaluation at subsequent periods that are successively further removed in time from a specific organizational design effort is the fact that extraneous influences are more and more likely to intervene in later time intervals and to affect organizational efficiency in ways that are unrelated to the design effort.

In any case, the point to be made here is that the timeliness of organizational design efforts must be taken into account in evaluating the effectiveness of these efforts, as is summarized in the following definition:

> Timeliness of Organizational Design: the relationship of changes in organizational structure to other simultaneous changes that influence organizational effectiveness or efficiency.

An organizational designer naturally wants to design organizational structures and to see them implemented at a point in time when other external and internal influences will act together to change organizational performance in desired directions. Yet this very desire to maximize influences toward change in desired directions simultaneously makes it all the more difficult to sort out the particular effects of specific changes--i.e., the effects of changes in organizational structure versus those of other environmental changes. This is a problem that requires sophistication in evaluative research designs and will be discussed in a later section of this chapter.

To make a point here regarding the importance of timeliness another way, it should be recognized that evaluation of the effectiveness and efficiency of an organizational design effort can never be made in a completely meaningful way until the implementation of the design changes

is completed, or at least well advanced. As pointed out in the previous chapter, such implementation ordinarily takes time to accomplish. The Department of Transportation provides a useful example in this regard. A public agency of this size and scope is evaluated by many audiences. In the long range, citizens, industries of the country, and government bodies concerned with various transportation systems will judge the department's effectiveness in improving the national transportation picture. In the near range, the Congress will annually review the department's performance in solving present transportation problems and in meeting stated goals. On an immediate and continuing basis, the organization has also built in a system for evaluating the effectiveness of present operating patterns and organizational forms. Assistant secretaries are responsible for performance review and planning in their respective areas. The Office of the Secretary has established special staff studies wherein management analysts are evaluating the distribution of resources and authority in various functional areas (legal, audit, public relations, and so forth) to determine whether the present organizational and operating patterns are effectively achieving department-wide goals. The Office of Management Systems also conducts special studies to evaluate internal data and information systems in terms of their effectiveness as presently organized.

Of necessity, the Department of Transportation operates on two levels and in two time frames. Its executives must take a long range look at the future transportation requirements of the nation, make appropriate plans to meet these anticipated needs, and take whatever actions are required now to effect these plans in the future. They must also deal with present transportation problems, recognizing their effect on today's pressing issues of security, social problems, and economic health. Much of their time and effort thus far has been required for further development of the organization and its operating practices. There is some evidence now of more effective coordination of regional problems relating to land, water and air transportation, but it will take considerably more than the present short history of operation to evaluate the effectiveness of the decisions made in structuring and implementing the design of this new department.

Evaluative Data and Techniques of Collection

What kinds of data can be used to evaluate the effectiveness of organizational designs? Essentially, these are the same kinds of data that are collected in field research on organizational phenomena. W. R. Scott

has described these data as deriving from four main sources: (1) documents and records, (2) observations by a researcher, (3) informant reports, and (4) surveys of individual respondents.[3]

Such data are ordinarily examined before and after organizational design changes to assess the effects of such changes. Thus, for example, W. F. Whyte evaluated the effects of changes he and his associates introduced into the structure of the "Tremont Hotel" partly by pointing to documentary records of employee turnover and absenteeism:

> . . . morale was stable and at a relatively high level throughout the hotel. . . . In January of 1945 employee turnover was 22.5 percent a month. In January, 1948, it was 3.55 percent. Employee absenteeism had dropped similarly; in the Coffee Shop, for example, it dropped from 11.0 percent a month in June, 1945, to 0.5 percent in June, 1948.[4]

In contrast, P. R. Lawrence has used observations of a researcher to assess the effects of organizational changes on interpersonal interactions among employees in a department store:

> In the early summer of 1957 the researcher again observed the interaction patterns of DM2 and DM3. . . . In collecting the new interaction data on DM2 and DM3, the researcher used precautions to get comparable and typical data. . . . Both DM2 and DM3 made some important changes in their customery interaction patterns with store managers. These changes are in a direction that brings these men closer to congruence with the desired organizational model.[5]

Whyte also used informants' reports to assess individual behavior changes associated with organizational structure changes:

> Subordinates testified to marked changes in the behavior of Smith. He seemed pleasanter to talk to. He began noticing people as he passed them in the corridors. He made an effort to compliment people on work well done. People commented that he handled his management meetings much better than he had before. . . .[6]

Finally, the previous chapter contained an example of the use of attitude survey data showing that indicators of general employee morale are markedly higher at TRW Systems Group than in other companies that have not experienced the kind of implementation of organizational design that has been taking place in TRW Systems.

Systematic surveys using written questionnaires have advantages over both personal interviews and observation techniques in that (1) written questionnaires can be completely anonymous--this is especially important if individuals are being asked about sensitive matters, such as their job satisfaction, their work problems, their attitudes toward supervisors or their employing organization, and their future career plans and (2) data from much larger samples of individuals or groups can be handled by a written questionnaire survey at the same cost that would be required to interview a small sample of respondents or to observe their behavior firsthand.

Furthermore, insofar as they are anonymous, written questionnaire surveys provide special benefits to management in complex organizations and to nonmanagerial staff members in these organizations. Management groups that have sponsored questionnaire surveys in their organizations have found that these surveys cannot only provide systematic indicators of general morale and job satisfaction, but also can be used to pinpoint problem areas in communication. Questionnaire surveys can provide useful means for working-level staff members to communicate with higher level management around the middle management "communication blocks" that often exist in complex organizations. In other words, survey techniques are not only useful for evaluating the effects of organizational design changes, they can also be used as important aids in the implementation of organizational design.

Sometimes it is actually possible to collect observational data on the effects of experimental variations in different organizational configurations. Carl Rittenhouse has described the use of systematic rating forms by observers of field experiments on different forms of military organization as follows:

> A study . . . examined the performance capabilities of a number of different rifle squad and platoon organizations in order to obtain data relevant to the optimum size and composition of such units. . . . The situations used had to be lengthy and diverse in order to obtain an adequate sample of the varied combat activities of these types of organizations. Field time was limited and minimal numbers of squad and platoon leaders of appropriate experience were available. Thus, problems of experimental control, influence of varying leadership, and of the performance to be measured and the lack of any method of combining part measures in a weighting scheme so as to obtain an overall evaluation, the most appropriate measuring device appeared to be the skilled and experienced judgments of military personnel.

Military judges chosen on the basis of relevant general experience, branch and rank, could not, however, be expected to make comparable judgments, since their particular experiences, which inevitably differed widely, would color their reactions to an unknown extent. The approach, therefore, was to define what was being examined by the raters and to provide them with a standard language with which to report their observations and indicate their opinions.

The first step was that of constructing a sequence of tasks representative in variety and difficulty of combat activities these units would engage in. Scenarios created on this basis were divided into clearly defined segments small enough to be observed closely by evaluators in the field. Military members of the evaluation planning group examined these segments and indicated what they, as evaluators, would accept as indicators of good or poor performance in the field situation. Following this an attempt was made to relate these indicators to various features of organizational structure casually. This was done by listing organizational differences with probable associated differences in functioning. Much of this latter activity had, of course, already been accomplished in the course of designing the different organizations.

The rating forms used in the field consisted of items relating to each of the small segments of actions. The first part of each item listed evidences of possible difficulty in performing the action. This told the evaluators what to look for. They indicated on a four-point scale the degree to which each difficulty seemed to exist in the performance of each action. The evidences chosen appeared to cover all of the frequently--occurring difficulties on which observations could be made during the course of an action. In addition, space was provided in which the evaluator could indicate any other difficulties which he might have observed that were not covered in the specific list. To the extent possible this first part of each item was designed to call for the evaluators observation of matters of fact rather than simple expressions of opinion. This was done by tying the items rigorously to observable behavior which either occurred or did not occur.

> The second part of each item placed more reliance on opinion or judgment in that it consisted of a listing of possible causes of the problems specified in the first part. For each time in part one on which the evaluator had indicated by means of the four-point scale that he had perceived a problem, he was asked in part two to specify a probable cause. Here again, space was provided for the notation of any causes not contained in the specified list. Judgments were also asked as to whether or not some non-organizational factor such as leadership or some other individual deficiency might be governing factors in the instance cited.[7]

Rittenhouse concludes his description of the use of such rating techniques by suggesting their applicability to nonmilitary situations wherever analysis of well-defined segments of performance may be taken as indicative of overall organizational performance capabilities:

> As a highly speculative analytic technique, it is often useful to look at certain parts of the organization or aspects of its functioning and try to determine how overall performance would be affected if the activities of this segment were augmented or reduced by fixed amounts of effort. It may be impossible to do this in any given case, but the effort itself has the salutary effect of forcing a close analytical look at performance.[8]

A "close analytical look at performance" was also made in a research organization studied by the author of this report several years ago. This analysis confirmed the desirability of using multiple criteria of segments of organizational performance, in relation to a set of specified objectives, rather than depending on a singular criterion. The use of multiple criteria allows one to investigate the effects of organizational designs on the maintenance objectives of an organization, as well as its operational objectives, and thereby increases the comprehensiveness of evaluation activities.

Evaluative Research Designs

In his important book Evaluative Research, E. A. Suchman distinguishes between evaluation--the general process of judging the worthwhileness of some activity regardless of the method employed--and evaluative research-- the use of scientific methods for the purpose of

making an evaluation. Suchman then makes a plea for the greater use of scientific approaches to answer questions of organization or program evaluation:

> It is also our conviction that the need today is for more scientific evaluative research and that greater progress in evaluation will be made the more one attempts to examine the objectives of a particular program including the underlying assumptions, develops measurable criteria specifically related to these objectives, and then sets up a controlled situation to determine the extent to which these objectives, and any negative side effects, are achieved. The satisfaction of these three basic requirements is the sine qua non of evaluative research that is truly research and not just subjective judgment.[9]

In none of the cases of organizational design examined in this phase of this project was there a completely developed research design to evaluate the organizational design effort. In most cases there was a fairly careful specification of organizational objectives (the first requirement above), in several of the cases there was some attempt to develop and use measurable criteria related to these (e.g., in TRW Systems and to date partly in the Department of Transportation), but in no case was there an attempt to set up a controlled situation to determine the extent to which these objectives have been achieved or implemented in the context of a new organizational structure.

The reason that such controlled situations have not been set up to test the effects of organizational designs in the cases investigated is not because the designers do not recognize the value of a controlled experiment, or because they do not know generally what it involves and how to set one up, but rather because it is essentially unfeasible to conduct completely controlled experiments with complex organizations in the "real world." The classic controlled experiment requires the taking of measurements of a key variable at two time periods (T_1 and T_2) in an "experimental group" (i.e., organization) that is given a particular kind of "treatment" (e.g., a changed organizational structure) in the intervening time period; taking similar measurements of the same variable in a "control group" (i.e., another organization) in which all variables relevant to the predicted outcomes have effects similar to the effects in the experimental group, but which is not given the "treatment" given to the experimental group; and then measuring the differences in the key variable at T_2 in

the experimental group compared with the control group. If the difference at T_2 in the measure of the key variable for the treated experimental group compared with the measure of this same variable for the untreated control group is large enough to cause one to reject the "null hypothesis" (that there is no difference between the experimental group and the control group), the conclusion is drawn that the differential effect can be logically attributed to the experimental treatment, because the two groups are known to be similar in all other relevant characteristics. However, there is generally too much at stake, in terms both of organizational resources and individual human values, to apply this classic experimental design to the manipulation of human beings in organization--except for highly controlled "total organizations," such as military organizations, prisons, and certain kinds of specialized schools or hospitals. One must ordinarily be satisfied with an evaluative design that represents an approximation to a classic experimental model--at the same time that we can agree with Suchman that organizational designers should push for closer approximations to a systematic scientific model.

Suchman has described the kinds of successive approximations that one can employ, from those that are least definitive (and therefore least desirable) up to the classic experimental model itself.[10]

The model that is least precise--but most often used--is called the "one-shot case study model." Here measurements are taken of a key variable in only one organizational context after an experimental treatment (e.g., a change in organizational structure) has been introduced. The disadvantages of this model are evident: there is no base-line measurement at a time period before the change in organizational structure with which to compare the postchange measure and there is no control group that has not been exposed to the changed structure to assure that the observed effect was in fact caused by the structural change. The obvious remedies for such disadvantages are to admonish organizational designers to try to obtain base-line measures in advance of design changes and to try to obtain some measures of the key variables in other organizations (or segments of an organization) for comparative purposes. Even though other relevant factors may differ in other organizational situations, the obtaining of prechange and postchange data in the organization under consideration and of data on the key variables in other organizations not subject to the kind of structure present in the organization under consideration can begin to provide a designer with better evaluative information on the presumed effects of his designs than most designers now have.

Accomplishing of what was suggested above provides a designer with a "one-organization pretest, posttest model." Suchman points out that the five main sources of error that are still associated with the use of this model are as follows: (1) other extraneous events may occur simultaneously that may influence a key outcome variable, in addition to the structural change aspects of an organizational design; (2) the effects may even be due to unstimulated change associated with the passage of time alone; (3) the before measure itself may constitute a stimulus to change regardless of the effects of the structural change; (4) the after measure may reflect changes over time in measurement due to fatigue or unreliability of instruments of measurement; and (5) unreliability may produce statistical regression with measurement values shifting toward a previously undefined mean.

A way to avoid some of these problems is to adopt a "static organizational comparison model." Here posttest measures are applied to two organizations (or two segments of the same organization), one of which has a new structural design and the other of which does not. If the organization with the new design shows improved performance on the key variable, the improvement is assumed to be attributable to the structural design. However, since no pretest measures are available, there is no way of knowing that the organizations were comparable before the structural change was introduced in one of them. In actual practice, however, there are usually some pretest records of relevant variables that can be used to assure partial comparability between organizations before a structural change was introduced. Such partial comparisons may be better than no comparisons at all.

Finally, there is the "pretest, posttest control group model," which we described previously as the classic experimental design. As mentioned, this model can seldom, if ever, be achieved in connection with the evaluation of organizational designs in real-life situations. At the same time, since it is the model that can yield the most definitive answers to evaluative questions, it is the model that should be aimed at in successive approximations. It is the author's opinion that closer approximations of this model could be achieved in connection with many organizational design efforts that involve only parts of existing organizations. It is sometimes possible to identify other segments of these same organizations that are sufficiently similar to the segments undergoing structural changes (even though not exactly comparable) to permit prechange and postchange measures to be taken in both segments to provide a reasonable basis for inferences about the effects of a change in organizational structure. In so doing, the evaluator must remember that his purpose is not primarily to conduct a perfectly controlled experiment that will make a significant

contribution to general scientific knowledge, but rather to marshall a preponderance of evidence that will lead the sponsors of an organizational design effort to the conclusion that the effort has been effective, efficient, and timely and will thereby shift the burden of proof to anyone who claims that this is not so.

The Evaluation Process

The main steps in the total process of evaluating an organizational design effort may be described as follows:

1. Specification of objectives--translating organizational goals into specific objectives that can be measured in terms of effectiveness, efficiency, and timeliness

2. Development of criteria for measurement--determining the kinds and amounts of data, documents, and records; observations by a researcher, informant reports; and surveys of individual respondents that need to be collected to assess the degree to which organizational objectives have been met

3. Design of methodology--planning the approach to be used--e.g., pretest, posttest control group model; static organizational comparison model; one-organization pretest, posttest model; or one-shot case study model--in the collection and analysis of data for the evaluation of organizational design efforts

4. Integrative synthesis--combining the design methodology and the criteria for measurement with the initial specification of organizational objectives in the early phases of an organizational design effort

5. Collection of evaluative data--gathering data relevant to evaluating the effects of an organizational design both before and after structural changes have been initiated and implemented in an organizational entity and gathering comparable data at similar time periods from a comparable organizational entity that is not experiencing structural changes

6. Interpretation of evaluative data--analyzing evaluative data in terms of changes in key variables that can be attributed to structural changes in the organization

7. Use of evaluative information--applying information gained from an evaluative analysis to corrective actions and, where necessary, making additional changes in organizational structure.

The first three steps in the evaluative process have been discussed previously in this chapter. Here additional comments are made on the remaining four steps.

The importance of an integrative synthesis of a plan for evaluation with the earlier stages of organizational design cannot be overemphasized. Evaluation of a design should not be an afterthought in the total design process. In fact, the beginning of a plan for evaluation can actually be identified in the early stages of diagnosis (see Chapter IV) when organizational goals are translated into specific, measurable objectives. Then is the time to collect initial baseline data to measure the extent to which an existing organizational entity (or other organizational entities that precede the design of a brand new entity) is meeting these objectives, before initiating and implementing new structural arrangements. Then is the time also to begin to plan the methodological approach to be used in evaluation and, where possible, to collect comparable data from other organizational entities that serve as control groups. Development of such a plan for evaluation early in the organizational design process can have important early feedback effects on the way that an organizational structure is shaped and implemented. It raises the important question early in the total process: design for what?

In the collection and interpretation of evaluative data, a question also arises as to who should do this. Should it be the designer himself, or should it be some other individual who is qualified to collect, handle, and interpret the kinds of data that are considered to provide a criteria for measurement of the degree to which organizational objectives have been accomplished? A strong argument can be made for a disinterested outside party (e.g., a consultant or independent research group) to collect and interpret such data to eliminate any cause for concern that self-serving interpretations of evaluative information might be made by the designer himself.

If an outsider collects and interprets evaluative information, however, a close degree of rapport should be maintained between the evaluator and the designer, since the whole purpose of evaluation is to feed back corrective information into activities concerned with the design and redesign of structural arrangements, so that these arrangements continue to serve organizational objectives in an effective, efficient, and

timely manner. Such evaluative information is most likely to be useful for this purpose if it relates to specific segments of performance of individuals in a particular structure of organizational roles. These were the kinds of behavioral segments in relation to specific aspects of structure that Rittenhouse was trying to identify and measure in his studies of military organizations mentioned earlier in this chapter.

Conceptual Summary

The evaluation of an organizational design effort should avoid three common errors:

- Regression toward quantifiable measures
- Regression toward short run payoffs
- Regression toward compartmentalized performance

The evaluation of an organizational design that attempts to avoid these errors begins with the definition and application of three concepts that are fundamental to the evaluation process:

- Organizational effectiveness
- Organizational efficiency
- Timeliness of organizational design

Organizational effectiveness refers to the degree to which an organizational structure supports the attainment of measurable organizational objectives, organizational efficiency refers to the degree to which the attainment of objectives is associated with low economic and psychological costs, and timeliness of organizational design refers to the degree to which changes in organizational structure are coordinated with other changes that influence organizational effectiveness or efficiency.

The kinds of data that may be collected to indicate certain aspects of organizational effectiveness or efficiency associated with design efforts include both quantitative and qualitative information from:

- Documents and records
- Observations by a researcher

- Informant reports
- Surveys of individual respondents

Data from these sources, in turn, can be applied as multiple criteria for the measurement of the attainment of different and distinct organizational objectives.

The alternative research designs for collecting data from these sources and interpreting them in terms of an evaluation of an organizational design effort are as follows, from the least definitive to the most definitive evaluative research design:

- One-shot case study model
- One organization pretest, posttest model
- Static organizational comparison model
- Pretest, posttest control group model

One of these models must be incorporated into the total process of evaluating an organizational design effort, which consists of the following main steps:

- Specification of objectives
- Development of criteria for measurement
- Design of methodology
- Integrative synthesis
- Collection of evaluative data
- Interpretation of evaluative data
- Use of evaluative information

The last step, the use of evaluative information, implies a sequence of feedback of evaluative information, correction of deficiencies in organizational structure, implementation and evaluation of new structural

modifications, feedback of additional evaluative information, new changes in organizational structure, and so forth. Thus it may be said that in modern organizations that must continually adapt to new technological and social change, organizational design and redesign never really end. It is a continuing process that becomes an integral part of effective management.

Notes for Chapter VII

1. Vollmer, Organizational Design--an Exploratory Study, pp. 121-122.

2. See Chester Barnard, op. cit.

3. W. R. Scott, "Field Methods in the Study of Organizations," in J. G. March, Handbook of Organizations (Chicago: Rand McNally, 1965).

4. Whyte and Hamilton, Action Research for Management, p. 155.

5. P. R. Lawrence, The Changing of Organizational Behavior Patterns (Boston: Harvard University, 1965).

6. Whyte and Hamilton, Action Research for Management, pp. 174-175.

7. C. H. Rittenhouse, "The Development and Use of Rating Techniques in Conjunction with Objective Measures in Field Research," (a paper given at the national Human Factors Society convention, Symposium on Field Performance Measurement, 1966).

8. Ibid.

9. E. A. Suchman, Evaluative Research (New York: Russell Sage Foundation, 1967), p. 32.

10. Ibid., pp. 93-96.

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13. ABSTRACT

This is a Phase II report of a three-year study to develop research-based criteria for the design of new forms of organization or the planned change of existing organizations. The objective of Phase II is to make a further specification of steps in the organizational design process based on recent or ongoing organizational design efforts, to analyze the strengths and weaknesses of different strategies of organizational design, and to specify the manner in which different conceptual formulations can be used as tools in different parts of the design process. As a basis for specifying concepts and processes, case studies of organizational design in four federal agencies, three industrial companies, and three educational and research institutions are developed and drawn upon.

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