Organizations act, but what determines how and when they will act? There is precedent for considering the organization as but the lengthened shadow of one or a few men. If this were adequate, our search for understanding could be focused narrowly on personality variables, which would simplify the task in the specific case but make generalization enormously difficult. Leaving room for the influence of the individual (which we will explore later), we will set aside the personality approach as deceptively simple and consider in Part One some of the impersonal forces which generate and guide the behavior of organizations.

We will argue that organizations do some of the basic things they do because they must—or else! Because they are expected to produce results, their actions are expected to be reasonable or rational. The concepts of rationality brought to bear on organizations establish limits within which organizational action must take place. We need to explore the meanings of these concepts and how they impinge on organizations.

Uncertainties pose major challenges to rationality, and we will argue that technologies and environments are basic sources of uncertainty for organizations. How these facts of organizational life lead organizations to design and structure themselves needs to be explored.

If this thesis rings true, then those organizations with similar technological and environmental problems should exhibit similar behavior;
patterns should appear. But if our thesis is fruitful, we should also find that patterned variations in problems posed by technologies and environments result in systematic differences in organizational action.

Our ability to find patterns in phenomena rests on the adequacy of the conceptual schemes we employ; that is, the kinds of answers we get are limited by the kinds of questions we ask. We begin our analysis of organizations in action with an inventory of the alternative conceptual schemes available to us.

strategies for study

Complex organizations—manufacturing armies, community agencies—are ubiquitous. Our understanding of them is limited and segmented. How are these organizations managed in practice? What is the flow of information from one level of the hierarchy to the next? How do they adapt to change? How do they maintain stability? These are some of the questions we need to answer. We need to develop a new set of concepts and theories that can help us make sense of the complex world of organizations.

The fact that impressive and some would say useful—results and savings flow from organizations suggests that some people are better at organizing work than others. We need to understand how these people are able to achieve such results. We need to develop a theory that explains why some organizations are more efficient than others. We need to understand the processes that lead to success and failure in organizations.

What we know or think we know is housed in a variety of fields or disciplines. This tendency further complicates our efforts to understand organizations. Although each of the several schools of thought has made significant contributions to our understanding of organizations, there is still a need for a comprehensive theory that integrates the insights of these schools.
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*strategies for studying organizations*

Complex organizations—manufacturing firms, hospitals, schools, armies, community agencies—are ubiquitous in modern societies, but our understanding of them is limited and segmented.

The fact that impressive and sometimes frightening consequences flow from organizations suggests that some individuals have had considerable insight into these social instruments. But insight and private experiences may generate private understandings without producing a public body of knowledge adequate for the preparation of a next generation of administrators, for designing new styles of organizations for new purposes, for controlling organizations, or for appreciation of distinctive aspects of modern societies.

What we know or think we know about complex organizations is housed in a variety of fields or disciplines, and communication among them more nearly resembles a trickle than a torrent (Dill, 1964; March, 1965). Although each of the several schools has its unique terminology
and special heroes, Gouldner (1959) was able to discern two fundamental models underlying most of the literature. He labeled these the “rational” and “natural-system” models of organizations, and these labels are indeed descriptive of the results.

To Gouldner’s important distinction we wish to add the notion that the rational model results from a closed-system strategy for studying organizations, and that the natural-system model flows from an open-system strategy.

### CLOSED-SYSTEM STRATEGY

#### The Search for Certainty

If we wish to predict accurately the state a system will be in presently, it helps immensely to be dealing with a determinate system. As Ashby observes (1956), fixing the present circumstances of a determinate system will determine the state it moves to next, and since such a system cannot go to two states at once, the transformation will be unique.

Fixing the present circumstances requires, of course, that the variables and relationships involved be few enough for us to comprehend and that we have control over or can reliably predict all of the variables and relations. In other words, it requires that the system be closed or, if closure is not complete, that the outside forces acting on it be predictable.

Now if we have responsibility for the future states or performance of some system, we are likely to opt for a closed system. Bartlett’s (1958) research on mental processes, comparing “adventurous thinking” with “thinking in closed systems,” suggests that there are strong human tendencies to reduce various forms of knowledge to the closed-system variety, to rid them of all ultimate uncertainty. If such tendencies appear in puzzle-solving as well as in everyday situations, we would especially expect them to be emphasized when responsibility and high stakes are added.

Since much of the literature about organizations has been generated as a by-product of the search for improved efficiency or performance, it is not surprising that it employs closed-system assumptions—employs the rational model—about organizations. Whether we consider scientific management (Taylor, 1911), administrative management (Gulick and Urwick, 1937), or bureaucracy (Weber, 1947), the ingredients of the organization are deliberately chosen for goal, and the structures established are to attain highest efficiency.

#### Three Schools in Caricature

Scientific management, focused primarily on production activities, clearly employment criteria, and seeks to maximize efficiency according to a technical logic, setting standards to ensure conformity with standards and scientific management achieves closure by assuming that goals are known, tasks and production process somehow disappears. Administrative-management literature emphasizes among production, personnel, supply, and organization; and again employs the efficiency. Here efficiency is maximized by them into departments, fixing responsibility as span of control or delegation, and contractual management achieves closure by plan is known, against which special responsibility and control are determined. (That this may be true of Simon, 1957.) Administrative management tasks are known, that output disappears into the organization. Bureaucracy also follows the pattern and structure as means of handling clients the ultimate criterion is efficiency, and refining offices according to jurisdiction assigning experts to offices, establishing rules and organizing cases or clients, and then most important of all, expert officials by providing salaries and job security. [The extended implications of the above theory are brought out by Merton’s (1968) personality.] Bureaucratic theory also explains how Weber saw three holes through which the logic, but in outlining his “pure type” Policy ...

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Three Schools in Caricature

Scientific management, focused primarily on manufacturing or similar production activities, clearly employs economic efficiency as its ultimate criterion, and seeks to maximize efficiency by planning procedures according to a technical logic, setting standards, and exercising controls to ensure conformity with standards and thereby with the technical logic. Scientific management achieves conceptual closure of the organization by assuming that goals are known, tasks are repetitive, output of the production process somehow disappears, and resources in uniform qualities are available.

Administrative-management literature focuses on structural relationships among production, personnel, supply, and other service units of the organization; and again employs as the ultimate criterion economic efficiency. Here efficiency is maximized by specializing tasks and grouping them into departments, fixing responsibility according to such principles as span of control or delegation, and controlling action to plans. Administrative management achieves closure by assuming that ultimately a master plan is known, against which specialization, departmentalization, and control are determined. (That this master plan is elusive is shown by Simon, 1957.) Administrative management also assumes that production tasks are known, that output disappears, and that resources are automatically available to the organization.

Bureaucracy also follows the pattern noted above, focusing on staffing and structure as means of handling clients and disposing of cases. Again the ultimate criterion is efficiency, and this time it is maximized by defining offices according to jurisdiction and place in a hierarchy, appointing experts to offices, establishing rules for categories of activity, categorizing cases or clients, and then motivating proper performance of expert officials by providing salaries and patterns for career advancement. [The extended implications of the assumptions made by bureaucratic theory are brought out by Merton’s (1957) discussion of “bureaucratic personality.”] Bureaucratic theory also employs the closed system of logic. Weber saw three holes through which empirical reality might penetrate the logic, but in outlining his “pure type” he quickly plugged these holes. Policymakers, somewhere above the bureaucracy, could alter the goals,
but the implications of this are set aside. Human components—the expert officeholders—might be more complicated than the model describes, but bureaucratic theory handles this by divorcing the individual's private life from his life as an officeholder through the use of rules, salary, and career. Finally, bureaucratic theory takes note of outsiders—clientele—but nullifies their effects by depersonalizing and categorizing clients.

It seems clear that the rational-model approach uses a closed-system strategy. It also seems clear that the developers of the several schools using the rational model have been primarily students of performance or efficiency, and only incidentally students of organizations. Having focused on control of the organization as a target, each employs a closed system of logic and conceptually closes the organization to coincide with that type of logic, for this elimination of uncertainty is the way to achieve determinateness. The rational model of an organization results in everything being functional—making a positive, indeed an optimum, contribution to the overall result. All resources are appropriate resources, and their allocation fits a master plan. All action is appropriate action, and its outcomes are predictable.

It is no accident that much of the literature on the management or administration of complex organizations centers on the concepts of planning or controlling. Nor is it any accident that such views are dismissed by those using the open-system strategy.

**OPEN-SYSTEM STRATEGY**

**The Expectation of Uncertainty**

If, instead of assuming closure, we assume that a system contains more variables than we can comprehend at one time, or that some of the variables are subject to influences we cannot control or predict, we must resort to a different sort of logic. We can, if we wish, assume that the system is determinate by nature, but that it is our incomplete understanding which forces us to expect surprise or the intrusion of uncertainty. In this case we can employ a natural-system model.

Approached as a natural system, the complex organization is a set of interdependent parts which together make up a whole because each contributes something and receives something from the whole, which in turn is interdependent with some larger environment. Survival of the system is taken to be the goal, and the parts and their relationships presumably are determined through evolutionary processes. Dysfunctions are conceivable, but it is assumed that produce a net positive contribution or benefit will degenerate.

Central to the natural-system approach is self-stabilization, which spontaneous, necessary relationships among parts and the system viable in the face of disturbances.

**Two Examples in Caricature**

Study of the informal organization in search of patterns in complex organizations using the informal organization is to attend to variables which are not so managed as patterned, adaptive responses of human action (Roethlisberger and Dickson, 1939). The informal organization is a spontaneous and further necessity, in complex organizations, perhaps survival.

A second version of the natural-system less crystallized under a label. This scheme is unit in interaction with its environment, forcefully expressed by Chester Barnard in his studies of Selznick (1949) and Clark (1948), who conclude that organizations are not what the best laid plans of managers have unconditioned or upset by other social units or publics—on whom the organization is dependent.

Again it is clear that in contrast to the research area focuses on variables not self-organization and hence not contained within it, is also clear that students regard interest in the environment as inevitable or natural, and

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OPEN-SYSTEM STRATEGY

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Central to the natural-system approach is the concept of homeo-
stasis, or self-stabilization, which spontaneously, or naturally, governs the
ecessary relationships among parts and activities and thereby keeps the
system viable in the face of disturbances stemming from the environment.

Two Examples in Caricature

Study of the informal organization constitutes one example of re-
search in complex organizations using the natural-system approach. Here
attention is focused on variables which are not included in any of the
rational models—sentiments, cliques, social controls via informal norms,
status and status striving, and so on. It is clear that students of informal
organization regard these variables not as random deviations or error, but
as patterned, adaptive responses of human beings in problematic situ-
ations (Roethlisberger and Dickson, 1939). In this view the informal
organization is a spontaneous and functional development, indeed a
ecessity, in complex organizations, permitting the system to adapt and
survive.

A second version of the natural-system approach is more global but
less crystallized under a label. This school views the organization as a
unit in interaction with its environment, and its view was perhaps most
forcefully expressed by Chester Barnard (1938) and by the empirical
studies of Selznick (1949) and Clark (1956). This stream of work leads
to the conclusion that organizations are not autonomous entities; instead,
the best laid plans of managers have unintended consequences and are
conditioned or upset by other social units—other complex organizations
or publics—on whom the organization is dependent.

Again it is clear that in contrast to the rational-model approach, this
research area focuses on variables not subject to complete control by the
organization and hence not contained within a closed system of logic. It
is also clear that students regard interdependence of organization and
environment as inevitable or natural, and as adaptive or functional.

CHOICE OR COMPROMISE?

The literature about organizations, or at least much of it, seems to fall
into one of the two categories, each of which at best tends to ignore the
other and at worse denies the relevance of the other. The logics associated with each appear to be incompatible, for one avoids uncertainty to achieve determinateness, while the other assumes uncertainty and indeterminateness. Yet the phenomena treated by each approach, as distinct from the explanations of each, cannot be denied.

Viewed in the large, complex organizations are often effective instruments for achievement, and that achievement flows from planned, controlled action. In every sphere—educational, medical, industrial, commercial, or governmental—the quality or costs of goods or services may be challenged and questions may be raised about the equity of distribution within the society of the fruits of complex organizations. Still millions live each day on the assumption that a reasonable degree of purposeful, effective action will be forthcoming from the many complex organizations on which they depend. Planned action, not random behavior, supports our daily lives. Specialized, controlled, patterned action surrounds us.

There can be no question but that the rational model of organizations directs our attention to important phenomena—to important “truth” in the sense that complex organizations viewed in the large exhibit some of the patterns and results to which the rational model attends, but which the natural-system model tends to ignore. But it is equally evident that phenomena associated with the natural-system approach also exist in complex organizations. There is little room to doubt the universal emergence of the informal organization. The daily news about labor-management negotiations, interagency jurisdictional squabbles, collusive agreements, favoritism, breaches of contract, and so on, are impressive evidence that complex organizations are influenced in significant ways by elements of their environments, a phenomenon addressed by the natural-system approach but avoided by the rational. Yet most versions of the natural-system approach treat organizational purposes and achievements as peripheral matters.

It appears that each approach leads to some truth, but neither alone affords an adequate understanding of complex organizations. Gouldner calls for a synthesis of the two models, but does not provide the synthetic model.

Meanwhile, a serious and sustained elaboration of Barnard’s work (Simon, 1957a; March and Simon, 1958; Cyert and March, 1963) has produced a newer tradition which evades the closed- versus open-system dilemma.

What emerges from the Simon-March-Cyert stream is that the focus is on organizational processes relating to the organization in an environment which does not fully control the organization or the consequences of those alternative actions. The organization has limited capacity to gather and process information on the consequences of alternatives. To deal with complexity, the organization must develop planning, as well as for deciding. The complexity characteristics of the organization, hence it must make decisions in bounded rationality. This requirement involves replacing the goal of maximizing with one of satisfactory accomplishment—satisficing rather than maximizing (Simon, 1957a).

These are highly significant notions, and this book seeks to extend this “newer tradition” that is consistent with the open-system strategies going on within the organization—The Cutting Edge of Uncertainty—complexity of the organization’s environment touches on matters important in the closed-system and deliberate decisions.

But despite what seems to be obvious, the Cyert stream of work has not entirely reframed the organization of work, and we need to ask why so many aspects of the organization continue to espouse patently incomplete strategies.

The Cutting Edge of Uncertainty

Part of the answer to that question lies in the complexity of organizations, with open-system strategists attempting to balance open and closed systems, and closed-system strategists in search of vehicles for rational achievement.

We can suggest now that rather than use them, the two strategies reflect so
What emerges from the Simon-March-Cyert stream of study is the organization as a problem-facing and problem-solving phenomenon. The focus is on organizational processes related to choice of courses of action in an environment which does not fully disclose the alternatives available or the consequences of those alternatives. In this view, the organization has limited capacity to gather and process information or to predict consequences of alternatives. To deal with situations of such great complexity, the organization must develop processes for searching and learning, as well as for deciding. The complexity, if fully faced, would overwhelm the organization, hence it must set limits to its definitions of situations; it must make decisions in bounded rationality (Simon, 1957b). This requirement involves replacing the maximum-efficiency criterion with one of satisfactory accomplishment, decision making now involving satisfying rather than maximizing (Simon, 1957b).

These are highly significant notions, and it will become apparent that this book seeks to extend this "newer tradition." The assumptions it makes are consistent with the open-system strategy, for it holds that the processes going on within the organization are significantly affected by the complexity of the organization's environment. But this tradition also touches on matters important in the closed-system strategy: performance and deliberate decisions.

But despite what seem to be obvious advantages, the Simon-March-Cyert stream of work has not entirely replaced the more extreme strategies, and we need to ask why so many intelligent men and women are in a position to make the same observations we have been making should continue to espouse patently incomplete views of complex organizations.

**The Cutting Edge of Uncertainty**

Part of the answer to that question undoubtedly lies in the fact that supporters of each extreme strategy have had different purposes in mind, with open-system strategists attempting to understand organizations per se, and closed-system strategists interested in organizations mainly as vehicles for rational achievements. Yet this answer does not seem completely satisfactory, for these students could not have been entirely unaware of the challenges to their assumptions and beliefs.

We can suggest now that rather than reflecting weakness in those who use them, the two strategies reflect something fundamental about the
cultures surrounding complex organizations—the fact that our culture does not contain concepts for simultaneously thinking about rationality and indeterminateness. These appear to be incompatible concepts, and we have no ready way of thinking about something as half-closed, half-rational. One alternative, then, is the closed-system approach of ignoring uncertainty to see rationality; another is to ignore rational action in order to see spontaneous processes. The newer tradition with its focus on organizational coping with uncertainty is indeed a major advance. It is notable that a recent treatment by Crozier (1964) starts from the bureaucratic position but focuses on coping with uncertainty as its major topic.

Yet in directing our attention to processes for meeting uncertainty, Simon, March, and Cyert may lead us to overlook the useful knowledge amassed by the older approaches. If the phenomena of rational models are indeed observable, we may want to incorporate some elements of those models; and if natural-system phenomena occur, we should also benefit from the relevant theories. For purposes of this volume, then, we will conceive of complex organizations as open systems, hence indeterminate and faced with uncertainty, but at the same time as subject to criteria of rationality and hence needing determinateness and certainty.

THE LOCATION OF PROBLEMS

As a starting point, we will suggest that the phenomena associated with open- and closed-system strategies are not randomly distributed through complex organizations, but instead tend to be specialized by location. To introduce this notion we will start with Parsons' (1960) suggestion that organizations exhibit three distinct levels of responsibility and control—technical, managerial, and institutional.

In this view, every formal organization contains a suborganization whose “problems” are focused around effective performance of the technical function—the conduct of classes by teachers, the processing of income tax returns and the handling of recalcitrants by the bureau, the processing of materials and supervision of these operations in the case of physical production. The primary exigencies to which the technical suborganization is oriented are those imposed by the nature of the technical task, such as the materials which must be processed and the kinds of cooperation of different people required to get the job done effectively.

The second level, the managerial, services the technical suborganiza-

tion by (1) mediating between the technical and the third, or institutional, level of the organization. Parsons' distinction of the three levels is such that each level is relatively independent; but in terms of performing the organization and handling resources and to subject its customers to independent. This overall articulation of technical structure and agencies of the organization is a two-way interaction, with each side, by and distribution, in a position to interfere with the operation of the larger organization.

If we now reintroduce the concept as an open system subject to criteria of disposal problems—which are in part co-

Strategies for Studying Organizations
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ial, services the technical suborganiza-
tion by (1) mediating between the technical suborganization and those who use its products—the customers, pupils, and so on—and (2) procruring the resources necessary for carrying out the technical functions. The managerial level controls, or administers, the technical suborganization (although Parsons notes that its control is not unilateral) by deciding such matters as the broad technical task which is to be performed, the scale of operations, employment and purchasing policy, and so on.

Finally, in the Parsons formulation, the organization which consists of both technical and managerial suborganizations is also part of a wider social system which is the source of the “meaning,” legitimation, or higher-level support which makes the implementation of the organization’s goals possible. In terms of “formal” controls, an organization may be relatively independent; but in terms of the meaning of the functions performed by the organization and hence of its “rights” to command resources and to subject its customers to discipline, it is never wholly independent. This overall articulation of the organization and the institutional structure and agencies of the community is the function of the third, or institutional, level of the organization.

Parsons’ distinction of the three levels becomes more significant when he points out that at each of the two points of articulation between them there is a qualitative break in the simple continuity of “line” authority because the functions at each level are qualitatively different. Those at the second level are not simply lower-order spellings-out of the top-level functions. Moreover, the articulation of levels and of functions rests on a two-way interaction, with each side, by withholding its important contribution, in a position to interfere with the functioning of the other and of the larger organization.

If we now reintroduce the conception of the complex organization as an open system subject to criteria of rationality, we are in a position to speculate about some dynamic properties of organizations. As we suggested, the logical model for achieving complete technical rationality uses a closed system of logic—closed by the elimination of uncertainty. In practice, it would seem, the more variables involved, the greater the likelihood of uncertainty, and it would therefore be advantageous for an organization subject to criteria of rationality to remove as much uncertainty as possible from its technical core by reducing the number of variables operating on it. Hence if both resource-acquisition and output-disposal problems—which are in part controlled by environmental ele-
ments and hence to a degree uncertain or problematic—can be removed from the technical core, the logic can be brought closer to closure, and the rationality, increased.

Uncertainty would appear to be greatest, at least potentially, at the other extreme, the institutional level. Here the organization deals largely with elements of the environment over which it has no formal authority or control. Instead, it is subjected to generalized norms, ranging from formally codified law to informal standards of good practice, to public authority, or to elements expressing the public interest.

At this extreme the closed system of logic is clearly inappropriate. The organization is open to influence by the environment (and vice versa) which can change independently of the actions of the organization. Here an open system of logic, permitting the intrusion of variables penetrating the organization from outside, and facing up to uncertainty, seems indispensable.

If the closed-system aspects of organizations are seen most clearly at the technical level, and the open-system qualities appear most vividly at the institutional level, it would suggest that a significant function of the managerial level is to mediate between the two extremes and the emphases they exhibit. If the organization must approach certainty at the technical level to satisfy its rationality criteria, but must remain flexible and adaptive to satisfy environmental requirements, we might expect the managerial level to mediate between them, ironing out some irregularities stemming from external sources, but also pressing the technical core for modifications as conditions alter. One exploration of this notion was offered in Thompson (1964).

Possible Sources of Variation

Following Parsons’ reasoning leads to the expectation that differences in technical functions, or technologies, cause significant differences among organizations, and since the three levels are interdependent, differences in technical functions should also make for differences at managerial and institutional levels of the organization. Similarly, differences in the institutional structures in which organizations are imbedded should make for significant variations among organizations at all three levels.

Relating this back to the Simon-March-Cyert focus on organizational processes of searching, learning, and deciding, we can also suggest that while these adaptive processes may be generic, the ways in which they proceed may well vary with differences in elements.

Most of our beliefs about complex organizations are based on one or other of two distinct strategies. The closed-system strategy is achieved by incorporating only those variables that are significant to achievement and subjecting them to a mature, replicable logic. The open-system strategy shifts attention from adaptation to performance and incorporates uncertainty by recognizing the need for reaction and accommodation with environment. A newer tradition views organization as an open system, indeterminate, but subject to criteria of rationality, efficiency, and effectiveness.

With this conception the central problem is one of coping with uncertainty. As a concept, organizations cope with uncertainty, specifically to deal with it, specializing or diversifying operations and compensating through a variety of means to conditions of certainty or near certainty. In the context of organized specialization the problem becomes significant.

We also suggest that technologies and institutional forms provide sources of uncertainty for organizations. As different dimensions will result in differences in organizational processes, we must turn to a closer examination of the means by which organizations handle the text of complex organizations.
uncertain or problematic—can be removed, can be brought closer to closure, and proceed may well vary with differences in technologies or in environments.

RECAPITULATION

Most of our beliefs about complex organizations follow from one or the other of two distinct strategies. The closed-system strategy seeks certainty by incorporating only those variables positively associated with goal achievement and subjecting them to a monolithic control network. The open-system strategy shifts attention from goal achievement to survival, and incorporates uncertainty by recognizing organizational interdependence with environment. A newer tradition enables us to conceive of the organization as an open system, indeterminate and faced with uncertainty, but subject to criteria of rationality and hence needing certainty.

With this conception the central problem for complex organizations is one of coping with uncertainty. As a point of departure, we suggest that organizations cope with uncertainty by creating certain parts specifically to deal with it, specializing other parts in operating under conditions of certainty or near certainty. In this case, articulation of these specialized parts becomes significant.

We also suggest that technologies and environments are major sources of uncertainty for organizations, and that differences in those dimensions will result in differences in organizations. To proceed, we now turn to a closer examination of the meaning of “rationality,” in the context of complex organizations.
Rationality in Organizations

action in a later chapter, but it is necessary between the instrumental and economic to give consideration to how about organizations gives consideration to the dimension of technology but hides the question, which in fact takes priority. This be considered only after we know that the

Complex organizations are built to them to be impossible or impractical limits. This does not mean, however, that technologies are instrumentally perfect. The it would produce the desired outcome in approached in the case of continuous process manufacturing—for example, of automotives will produce the desired outcome only if it may be incorporated into complex organization, because desire for the possible settle for possible rather than highly precise intensity of desire for certain kinds of outcomes leads to the creation of complex organizations to operate patently imperfect technologies.

Clearly, technology is an important variable of complex organizations. In modern societies, this is a complete but simple typology of technologies. This variety would be quite helpful. Typology is used (Woodward, 1965) and (1962) but are not general enough to deal found in complex organizations. Lacking data to identify three varieties which are (1) without (2) sufficiently different to illustrate the

The Long-linked Technology

A long-linked technology involves several that act Z can be performed only after

1 The notions in this section rest especially on Frederick L. Bates. For a different but somewhat
Dubin, 1969.
action in a later chapter, but it is necessary to distinguish at this point between the instrumental and economic questions because present literature about organizations gives considerable attention to the economic dimension of technology but hides the importance of the instrumental question, which in fact takes priority. The cost of doing something can be considered only after we know that the something can be done.

Complex organizations are built to operate technologies which are found to be impossible or impractical for individuals to operate. This does not mean, however, that technologies operated by complex organizations are instrumentally perfect. The instrumentally perfect technology would produce the desired outcome inevitably, and this perfection is approached in the case of continuous processing of chemicals or in mass manufacturing—for example, of automobiles. A less perfect technology will produce the desired outcome only part of the time; nevertheless, it may be incorporated into complex organizations, such as the mental hospital, because desire for the possible outcome is intense enough to settle for possible rather than highly probable success. Sometimes the intensity of desire for certain kinds of outcomes, such as world peace, leads to the creation of complex organizations such as the United Nations to operate patently imperfect technologies.

VARIATIONS IN TECHNOLOGIES

Clearly, technology is an important variable in understanding the actions of complex organizations. In modern societies the variety of desired outcomes for which specific technologies are available seems infinite. A complete but simple typology of technologies which has found order in this variety would be quite helpful. Typologies are available for industrial production (Woodward, 1965) and for mental therapy (Hawkes, 1962) but are not general enough to deal with the range of technologies found in complex organizations. Lacking such a typology, we will simply identify three varieties which are (1) widespread in modern society and (2) sufficiently different to illustrate the propositions we wish to develop.

The Long-linked Technology

A long-linked technology involves serial interdependence in the sense that act Z can be performed only after successful completion of act Y.

1 The notions in this section rest especially on conversations some years ago with Frederick L. Bates. For a different but somewhat parallel analysis of work flows, see Dubin, 1959.
which in turn rests on act X, and so on. The original symbol of technical rationality, the mass production assembly line, is of this long-linked nature. It approaches instrumental perfection when it produces a single kind of standard product, repetitively and at a constant rate. Production of only one kind of product means that a single technology is required, and this in turn permits the use of clear-cut criteria for the selection of machines and tools, construction of work-flow arrangements, acquisition of raw materials, and selection of human operators. Repetition of the productive process provides experience as a means of eliminating imperfections in the technology; experience can lead to the modification of machines and provide the basis for scheduled preventive maintenance. Repetition means that human motions can also be examined, and through training and practice, energy losses and errors minimized. It is in this setting that the scientific-management movement has perhaps made its greatest contribution.

The constant rate of production means that, once adjusted, the proportions of resources involved can be standardized to the point where each contributes to its capacity; none need be underemployed. This of course makes important contributions to the economic aspect of the technology.

**The Mediating Technology**

Various organizations have, as a primary function, the linking of clients or customers who are or wish to be interdependent. The commercial bank links depositors and borrowers. The insurance firm links those who would pool common risks. The telephone utility links those who would call and those who would be called. The post office provides a possible linkage of virtually every member of the modern society. The employment agency mediates the supply of labor and the demand for it.

Complexity in the mediating technology comes not from the necessity of having each activity geared to the requirements of the next but rather from the fact that the mediating technology requires operating in *standardized ways*, and *extensively*; e.g., with multiple clients or customers distributed in time and space.

The commercial bank must find and aggregate deposits from diverse depositors; but however diverse the depositors, the transaction must conform to standard terms and to uniform bookkeeping and accounting procedures. It must also find borrowers; but no matter how varied their needs or desires, loans must be made at the same rate and on terms uniformly applied to the particular borrower. Poor risks who receive bank solvency. Standardization permits customers into appropriate aggregate category as a qualified risk but is so defined upsets insurance rests. The telephone company when telephone became regarded as a necessity, equipment was standardized to the point into one network. Standardization enables aggregate job applicants into categories of standardized requests for employees.

Standardization makes possible the evolution of technology over time and through space by organization that other segments are open; but the bureaucracy and impersonal application of rules have in such situations that the bureaucratic and impersonal application of rules have (Merton, 1947; Merton, 1957a).

**The Intensive Technology**

This third variety we label *intensive techniques* is drawn upon in order to act on an object; but the selection, combination, and order of these is determined by feedback from the object itself. This intensive technology is regarded as "technical logic is found also in the construction of a general hospital. At any moment an emergency, some combination of dietary, x-ray, la
d hospital services, together with the various medical services, occupational therapies, soc
or religious services. Which of these, and in what order, are decided from evidence about the state of the patient. In the construction industry, the nature of the object to be constructed and its setting;
needs or desires, loans must be made according to standardized criteria and on terms uniformly applied to the category appropriate to the particular borrower. Poor risks who receive favored treatment jeopardize bank solvency. Standardization permits the insurance organization to define categories of risk and hence to sort its customers or potential customers into appropriate aggregate categories; the insured who is not a qualified risk but is so defined upsets the probabilities on which insurance rests. The telephone company became viable only when the telephone became regarded as a necessity, and this did not occur until equipment was standardized to the point where it could be incorporated into one network. Standardization enables the employment agency to aggregate job applicants into categories which can be matched against standardized requests for employees.

Standardization makes possible the operation of the mediating technology over time and through space by assuring each segment of the organization that other segments are operating in compatible ways. It is in such situations that the bureaucratic techniques of categorization and impersonal application of rules have been most beneficial (Weber, 1947; Merton, 1957a).

The Intensive Technology

This third variety we label intensive to signify that a variety of techniques is drawn upon in order to achieve a change in some specific object; but the selection, combination, and order of application are determined by feedback from the object itself. When the object is human, this intensive technology is regarded as "therapeutic," but the same technical logic is found also in the construction industry (Stinchcombe, 1959) and in research where the objects of concern are nonhuman.

The intensive technology is most dramatically illustrated by the general hospital. At any moment an emergency admission may require some combination of dietary, x-ray, laboratory, and housekeeping or hotel services, together with the various medical specialties, pharmaceutical services, occupational therapies, social work services, and spiritual or religious services. Which of these, and when, can be determined only from evidence about the state of the patient.

In the construction industry, the nature of the crafts required and the order in which they can be applied depend on the nature of the object to be constructed and its setting; including, for example, terrain,
climate, weather. Organized or team research may draw from a variety of scientific or technical skills, but the particular combination and the order of application depend on the nature of the problem defined.

The development of military combat teams, with a multiplicity of highly skilled capacities to be applied to the requirements of changing circumstances, represents a shift toward the intensive technology in military operations (Janowitz, 1959).

The intensive technology is a custom technology. Its successful employment rests in part on the availability of all the capacities potentially needed, but equally on the appropriate custom combination of selected capacities as required by the individual case or project.

**Boundaries of Technical Rationality**

Technical rationality, as a system of cause/effect relationships which lead to a desired result, is an abstraction. It is instrumentally perfect when it becomes a closed system of logic. The closed system of logic contains all relevant variables, and only relevant variables. All other influences, or *exogenous variables*, are excluded; and the variables contained in the system vary only to the extent that the experimenter, the manager, or the computer determines they should.

When a technology is put to use, however, there must be not only desired outcomes and knowledge of relevant cause/effect relationships, but also power to control the empirical resources which correspond to the variables in the logical system. A closed system of action corresponding to a closed system of logic would result in instrumental perfection in reality.

The mass production assembly operation and the continuous processing of chemicals are more nearly perfect, in application, than the other two varieties discussed above because they achieve a high degree of control over relevant variables and are relatively free from disturbing influences. Once started, most of the action involved in the long-linked technology is dictated by the internal logic of the technology itself. With the mediating technology, customers or clients intrude to make difficult the standardized activities required by the technology. And with the intensive technology, the specific case defines the component activities and their combination from the larger array of components contained in the abstract technology.

Since technical perfection seems more nearly approachable when the organization has control over all the elements involved,
PROPOSITION 2.1: Under norms of rationality, organizations seek to seal off their core technologies from environmental influences.

ORGANIZATIONAL RATIONALITY

When organizations seek to translate the abstractions called technologies into action, they immediately face problems for which the core technologies do not provide solutions.

Mass production manufacturing technologies are quite specific, assuming that certain inputs are provided and finished products are somehow removed from the premises before the productive process is clogged; but mass production technologies do not include variables which provide solutions to either the input- or output-disposal problems. The present technology of medicine may be rather specific if certain tests indicate an appendectomy is in order, if the condition of the patient meets certain criteria, and if certain medical staff, equipment, and medications are present. But medical technology contains no cause/effect statements about bringing sufferers to the attention of medical practitioners, or about the provision of the specified equipment, skills, and medications. The technology of education rests on abstract systems of belief about relationships among teachers, teaching materials, and pupils; but learning theories assume the presence of these variables and proceed from that point.

One or more technologies constitute the core of all purposive organizations. But this technical core is always an incomplete representation of what the organization must do to accomplish desired results. Technical rationality is a necessary component but never alone sufficient to provide organizational rationality, which involves acquiring the inputs which are taken for granted by the technology, and dispensing outputs which again are outside the scope of the core technology.

At a minimum, then, organizational rationality involves three major component activities: (1) input activities, (2) technological activities, and (3) output activities. Since these are interdependent, organizational rationality requires that they be appropriately geared to one another. The inputs acquired must be within the scope of the technology, and it must be within the capacity of the organization to dispose of the technological production.

Not only are these component activities interdependent, but both input and output activities are interdependent with environmental ele-
ments. Organizational rationality, therefore, never conforms to closed-system logic but demands the logic of an open system. Moreover, since the technological activities are embedded in and interdependent with activities which are open to the environment, the closed system can never be completely attained for the technological component. Yet we have offered the proposition that organizations subject to rationality norms seek to seal off their core technologies from environmental influences. How do we reconcile these two contentions?

**Proposition 2.2:** Under norms of rationality, organizations seek to buffer environmental influences by surrounding their technical cores with input and output components.

To maximize productivity of a manufacturing technology, the technical core must be able to operate as if the market will absorb the single kind of product at a continuous rate, and as if inputs flowed continuously, at a steady rate and with specified quality. Conceivably both sets of conditions could occur; realistically they do not. But organizations reveal a variety of devices for approximating these “as if” assumptions, with input and output components meeting fluctuating environments and converting them into steady conditions for the technological core.

Buffering on the input side is illustrated by the stockpiling of materials and supplies acquired in an irregular market, and their steady insertion into the production process. Preventive maintenance, whereby machines or equipment are repaired on a scheduled basis, thus minimizing surprise, is another example of buffering by the input component. The recruitment of dissimilar personnel and their conversion into reliable performers through training or indoctrination is another; it is most dramatically illustrated by basic training or boot camp in military organizations (Dornbusch, 1955).

Buffering on the output side of long-linked technologies usually takes the form of maintaining warehouse inventories and items in transit or in distributor inventories, which permits the technical core to produce at a constant rate, but distribution to fluctuate with market conditions.

Buffering on the input side is an appropriate and important device available to all types of organizations. Buffering on the output side is especially important for mass-manufacturing organizations, but is less feasible when the product is perishable or when the object is inextricably involved in the technological process, as in the therapeutic case.

Buffering of an unsteady environment obviously brings considerable advantages to the technical core, but it does not come without a price. A classic problem in connection with buffering is the need to maintain inventories, input or output, sufficient to obviate obsolescence as needs change. Operations face considerable costs toward this proclivity, both of which are costly.

Thus while a fully buffered technological system permits maximum technical rationality, it also affords a margin of safety that is often neglected. Organizations compromise between conditions which are inherently unstable and the energy required for buffering operations; then, the organization under rationality, permutes devices for protecting its technical core.

**Proposition 2.3:** Under norms of rationality, organizations seek to buffer environmental influences by surrounding their technical cores with input and output components.

Whereas buffering absorbs environmental fluctuations and reduces the need for expensive organizational functions, leveling involves attempts to reduce these effects. Utility firms—electric, gas, water, or telephone companies—are faced with seasonal or other fluctuations in demand, and they meet this need by setting up special promotional campaigns, such as salesmanship, or by charging variable energy rates or surcharges on peak days or during slow seasons.

Organizations pointed toward emergency service attempt to level the need for their services by maintaining reserves during nonemergency periods, and by emphasis on emergency service. Hospitals accomplish something similar by scheduling nonemergency admissions.

Although action by the organization is not allowed to grow to the point that it must compromise the requirements of rationality, organizations employ to protect core technologies.

**Proposition 2.4:** Under norms of rationality, organizations seek to buffer environmental influences by surrounding their technical cores with input and output components.

If environmental fluctuations penetrated...
Rationality in Organizations

Under norms of rationality, organizations seek to buffer events by surrounding their technical cores with input and output devices, primarily to buffer fluctuations in demand and maintain a steady flow of inputs and outputs. This buffering is necessary to maintain a steady flow of inputs and outputs, which is essential for maintaining the technical core. However, buffering also has costs, and these costs must be balanced against the benefits of maintaining a steady flow.

Proposition 2.3: Under norms of rationality, organizations seek to smooth input and output transactions.

Whereas buffering absorbs environmental fluctuations, smoothing or leveling involves attempts to reduce fluctuations in the environment. Utility firms—electric, gas, water, or telephone—may offer inducements to those who use their services during " trough" periods, or charge premiums to those who contribute to "peaking." Retailing organizations faced with seasonal or other fluctuations in demand, may offer inducements in the form of special promotions or sales during slow periods. Transportation organizations such as airlines may offer special reduced fare rates on light days or during slow seasons.

Organizations pointed toward emergencies, such as fire departments, attempt to level the need for their services by activities designed to prevent emergencies, and by emphasis on early detection so that demand is not allowed to grow to the point that would overtax the capacity of the organization. Hospitals accomplish some smoothing through the scheduling of nonemergency admissions.

Although action by the organization may thus reduce fluctuations in demand, complete smoothing of demand is seldom possible. But a core technology interrupted by constant fluctuation and change must settle for a low degree of technical rationality. What other devices do organizations employ to protect core technologies?

Proposition 2.4: Under norms of rationality, organizations seek to anticipate and adapt to environmental changes which cannot be buffered or leveled.

If environmental fluctuations penetrate the organization and require...
the technical core to alter its activities, then environmental fluctuations are exogenous variables within the logic of technical rationality. To the extent that environmental fluctuations can be anticipated, however, they can be treated as constraints on the technical core within which a closed system of logic can be employed.

The manufacturing firm which can correctly forecast demand for a particular time period can thereby plan or schedule operations of its technical core at a steady rate during that period. Any changes in technical operations due to changes in the environment can be made at the end of the period on the basis of forecasts for the next period.

Organizations often learn that some environmental fluctuations are patterned, and in these cases forecasting and adjustment appear almost automatic. The post office knows, for example, that in large commercial centers large volumes of business mail are posted at the end of the business day, when secretaries leave offices. Recently the post office has attempted to buffer that load by promising rapid treatment of mail posted in special locations during morning hours. Its success in buffering is not known at this writing, but meanwhile the post office schedules its technical activities to meet known daily fluctuations. It can also anticipate heavy demand during November and December, thus allowing its input components lead time in acquiring additional resources.

Banks likewise learn that local conditions and customs result in peak loads at predictable times during the day and week, and can schedule their operations to meet these shifts (Argyris, 1954).

In cases such as these, organizations have amassed sufficient experience to know that fluctuations are patterned with a high degree of regularity or probability; but when environmental fluctuations are the result of combinations of more dynamic factors, anticipation may require something more than the simple projection of previous experience. It is in these situations that forecasting emerges as a specialized and elaborate activity, for which some of the emerging management-science or statistical-decision theories seem especially appropriate.

To the extent that environmental fluctuations are unanticipated they interfere with the orderly operation of the core technology and thereby reduce its performance. When such influences are anticipated and considered as constraints for a particular period of time, the technical core can operate as if it enjoyed a closed system.

Buffering, leveling, and adaptation to anticipated fluctuations are widely used devices for reducing the influence of the environment on the technological cores of organizations. Often, however, there are occasions when these devices are not sufficient. A few examples may serve to illustrate the point.

**Proposition 2.5:** When buffering, leveling, and adaptation to anticipated fluctuations are not sufficient, the organization may choose to operate at lower levels of environmental penetration.

Rationing is most easily seen in organizations, such as hospitals. Even in nonemergency situations, such as assigning a fixed number of nurses to a hospital, especially state mental hospitals, by employing primarily organic-treatment or milieu therapies (Belknap, 1956). Teachers in welfare organizations may ration effort among students seeking service, or if not empowered, may concentrate their energies on the most promising cases which appear most likely to yield satisfactory results.

But rationing is not a device reserved for certain organizations only when the priority task is constantly changing. If inputs are scarce, one may assign priorities among tasks for which one has resources. Libraries may ration book lending efforts (Meier, 1963).

**Rationing is an unhappy solution, for it means that the organization is not operating at its maximum capacity.** Under normal conditions, the allocation of capacity under adverse conditions is to be instrumentally effective and random.

**The Logic of Organizational Rationing**

Core technologies rest on closed systems, embedded in a larger organizational technology to a time and place, and links
Rationality in Organizations

When its activities, then environmental fluctuations are within the logic of technical rationality. To the
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mental penetration.

Proposition 2.5: When buffering, leveling, and forecasting do not pro-
tect their technical cores from environmental fluctuations, organizations under
orms of rationality resort to rationing.

Rationing is most easily seen in organizations pointed toward emer-
gencies, such as hospitals. Even in nonemergency situations hospitals may
ration beds to physicians by establishing priority systems for nonemergen-
cy admissions. In emergencies, such as community disasters, hospitals may
ration pharmaceutical dosages or nursing services by dilution—by
assigning a fixed number of nurses to a larger patient population. Mental
hospitals, especially state mental hospitals, may ration technical services
by employing primarily organic-treatment procedures—electroshock, drugs,
insulin—which can be employed more economically than psychoanalytic
or milieu therapies (Belknap, 1956). Teachers and caseworkers in social
welfare organizations may ration effort by accepting only a portion of
those seeking service, or if not empowered to exercise such discretion,
may concentrate their energies on the more challenging cases or on those
which appear most likely to yield satisfactory outcomes (Blau, 1955).

But rationing is not a device reserved for therapeutic organizations.
The post office may assign priority to first-class mail, attending to lesser
classes only when the priority task is completed. Manufacturers of sud-
denly popular items may ration allotments to wholesalers or dealers, and
if inputs are scarce, may assign priorities to alternative uses of those
resources. Libraries may ration book loans, acquisitions, and search
efforts (Meier, 1963).

Rationing is an unhappy solution, for its use signifies that the tech-
nology is not operating at its maximum. Yet some system of priorities for
the allocation of capacity under adverse conditions is essential if a tech-
nology is to be instrumentally effective—if action is to be other than random.

The Logic of Organizational Rationality

Core technologies rest on closed systems of logic, but are invariably
embedded in a larger organizational rationality which pins the tech-
nology to a time and place, and links it with the larger environment
through input and output activities. Organizational rationality thus calls for an open-system logic, for when the organization is opened to environmental influences, some of the factors involved in organizational action become constraints; for some meaningful period of time they are not variables but fixed conditions to which the organization must adapt. Some of the factors become contingencies, which may or may not vary, but are not subject to arbitrary control by the organization.

Organizational rationality therefore is some result of (1) constraints which the organization must face, (2) contingencies which the organization must meet, and (3) variables which the organization can control.

**RECAPITULATION**

Perfection in technical rationality requires complete knowledge of cause/effect relations plus control over all of the relevant variables, or closure. Therefore, under norms of rationality (Prop. 2.1), organizations seek to seal off their core technologies from environmental influences. Since complete closure is impossible (Prop. 2.2), they seek to buffer environmental influences by surrounding their technical cores with input and output components.

Because buffering does not handle all variations in an unsteady environment, organizations seek to smooth input and output transactions (Prop. 2.3), and to anticipate and adapt to environmental changes which cannot be buffered or smoothed (Prop. 2.4), and finally, when buffering, leveling, and forecasting do not protect their technical cores from environmental fluctuations (Prop. 2.5), organizations resort to rationing.

These are maneuvering devices which provide the organization with some self-control despite interdependence with the environment. But if we are to gain understanding of such maneuvering, we must consider both the direction toward which maneuvering is designed and the nature of the environment in which maneuvering takes place. We will examine these questions in Chapter 3.

domains of...
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RECAPITULATION

Rationality requires complete knowledge of cause/ effect over all of the relevant variables, or closure. Rationality (Prop. 2.1), organizations seek to shield...environmental influences. Since complexity (Prop. 2.2), they seek to buffer environmental...their technical cores with input and output devices which provide the organization with interdependence with the environment. But if...of such maneuvering, we must consider which maneuvering is designed and the nature of which maneuvering takes place. We will examine...

domains of organized action

In accounting for the produced automobile, we ultimately must take into consideration the mining of ore and the production of steel, the extraction and refining of petroleum, and the production of rubber or synthetic rubber, all of which are essential (within current technology) if an automobile is to roll from a factory. Along the way the firm may also receive contributions from others who make fabricating machinery and conveyor belts, or build factories, and still others who generate and distribute power and credit. Some automobile manufacturers include within their boundaries a larger proportion or different array of these essential activities than other such firms, but none is self-sufficient.

Consider the technology of treating medical ills. A fairly routine hospital case may now rely on a series of complex organizations which perform research, make pharmaceuticals, ship, store, and prepare medications. It involves use of the products of medical schools and nursing schools (which may be incorporated within the hospital), and of factories which
construct x-ray apparatus or weave cloth to make sheets. Hospitals vary in the extent to which they include or exclude certain essential activities, but none is self-sufficient.

The overall technology of producing steel products involves the discovery and extraction of ore, its transportation to points where furnaces and power are concentrated, and the processing of ores into steel. Ultimately it includes the fabrication of steel into items for final consumption. An organization within the steel industry must establish some niche and some boundaries around that part of the total effort for which the organization takes initiative. For reasons to be discussed later, firms involved in extraction, ore transport, and the basic processing of steel seldom undertake the ultimate conversion of steel into products for final use. In any event, the steel firm is dependent on others along the way.

The essential point is that all organizations must establish what Levine and White (1981) have termed a “domain.” In their study of relationships among health agencies in a community, domain consists of “claims which an organization stakes out for itself in terms of (1) diseases covered, (2) population served, and (3) services rendered.” With appropriate modifications in the specifics of the definition—for example, substituting “range of products” for “diseases covered”—the concept of domain appears useful for the analysis of all types of complex organizations. Thus universities are universities, but their domains may range considerably; some offer astronomy courses, others do not; some serve local populations, others are international; some offer student housing and graduate education, others do not. No two firms in the oil industry are identical in terms of domain. Some refine petroleum, and market gasoline and other derivatives; others buy and market gasoline and oil. Some operate in a regional territory; others are national or international. Some provide credit cards; others are cash and carry. Prisons may be prisons at one level of analysis, but the concept of domain may prevent us from making inappropriate comparisons of prisons with very different domains.

Domain, Dependence, and Environment

In the final analysis the results of organizational action rest not on a single technology but upon a technological matrix. A complicated technology incorporates the products or results of still other technologies. Although a particular organization may operate several core technologies, its domain always falls short of the total matrix. Hence the organization’s domain identifies the points at which it inputs from the environment. The component location within it of capacities, in turn, organization is dependent.

The organization may find that there is a particular kind of support needed, with many alternatives; the capacity of the environment support may be dispersed or concentrated; capacity may be concentrated or dispersed competition for it. If the organization’s can say that demand for the input is common to similar needs, we can say that the demand.

Similar distinctions can be made on organization. Its environment may contain one or clients, and the organization may be alone one of many competitors approaching the.

The extent to which the sources of may also be important to the organization in a major metropolitan area may draw its members of the environment, its personnel input from still a different one; and there may be elements except via the hospital. The community, however, may find that the need for interdependent and interact regularly with recreational, and governmental matters.

The public school usually finds its concentrated, and the two interconnected be in a similar situation, whereas the financial inputs, students, faculty, and resources are separated sources.

Task Environments

But the notion of environment turns out to refer to “everything else.” To simplify the concept of task environment used by Dill of the environment which are “relevant setting and goal attainment.” Dill found Norwegian firms to be composed of for (both distributors and users); (2) s
Domains of Organized Action

... action rests on a technological matrix. A complicated... tion may operate several core technologies, the total matrix. Hence the organization’s domain identifies the points at which the organization is dependent on inputs from the environment. The composition of that environment, the location within it of capacities, in turn determines upon whom the organization is dependent.

The organization may find that there is only one possible source for a particular kind of support needed, whereas for another there may be many alternatives; the capacity of the environment to provide the needed support may be dispersed or concentrated. Similarly, demand for that capacity may be concentrated or dispersed; there may or may not be competition for it. If the organization’s need is unique or nearly so, we can say that demand for the input is concentrated; if many others have similar needs, we can say that the demand is dispersed.

Similar distinctions can be made on the output side of the organization. Its environment may contain one or many potential customers or clients, and the organization may be alone in serving them or it may be one of many competitors approaching the client or clients.

The extent to which the sources of input and output support coincide may also be important to the organization. The general hospital in a major metropolitan area may draw its financial support from one sector of the environment, its personnel inputs from another, and its clientele from still a different one; and there may be no interaction among these elements except via the hospital. The general hospital in a small community, however, may find that the necessary parties are functionally interdependent and interact regularly with respect to religious, economic, recreational, and governmental matters.

The public school usually finds its clientele and financial supporters concentrated, and the two interconnected. The municipal university may be in a similar situation, whereas the private university may collect financial inputs, students, faculty, and research data from quite varied and separated sources.

Task Environments

But the notion of environment turns out to be a residual one; it refers to “everything else.” To simplify our analysis, we can adopt the concept of task environment used by Dill (1958) to denote those parts of the environment which are “relevant or potentially relevant to goal setting and goal attainment.” Dill found the task environments of two Norwegian firms to be composed of four major sectors: (1) customers (both distributors and users); (2) suppliers of materials, labor, capital,
equipment, and work space; (3) competitors for both markets and resources; and (4) regulatory groups, including governmental agencies, unions, and interfirm associations. With appropriate modifications of the specific referents—for example, substituting “clients” for “customers” in some cases—we have a useful concept to work with, and one much more delimited in scope than environment. We are now working with those organizations in the environment which make a difference to the organization in question; Evan (1966) employs the term “organization set” for this purpose.

[The remaining environment can be set aside for a while, but we cannot discard it for two reasons: (1) patterns of culture can and do influence organizations in important ways, and (2) the environment beyond the task environment may constitute a field into which an organization may enter at some point in the future. We will consider both of these aspects later.]

Just as no two domains are identical, no two task environments are identical. Which individuals, which other organizations, which aggregates constitute the task environment for a particular organization is determined by the requirements of the technology, the boundaries of the domain, and the composition of the larger environment.

**Task Environments and Domain Consensus**

The establishment of domain cannot be an arbitrary, unilateral action. Only if the organization’s claims to domain are recognized by those who can provide the necessary support, by the task environment, can a domain be operational. The relationship between an organization and its task environment is essentially one of exchange, and unless the organization is judged by those in contact with it as offering something desirable, it will not receive the inputs necessary for survival. The elements typically exchanged by the health organizations studied by Levine and White fall into three main categories: (1) referral of cases, clients, or patients; (2) giving or receiving of labor services encompassing the use of volunteers, lent personnel, and offering of instruction to personnel of other organizations; and (3) sending or receiving of resources other than labor services, including funds, equipment, case and technical information. The specific categories of exchange vary from one type of organization to another, but in each case, as they note, exchange agreements rest upon prior consensus regarding domain.

The concept of domain consensus has some special advantages for our analysis of organizations in action, for it enables us to deal with operational goals (Perrow, 1961a) with the human quality of motivation and with the two grounds on which the notion of domain is challenged.

Domain consensus defines a set of criteria for an organization and for others with whom the organization will and will not do. It provides an image of the organization’s role in a larger context as a guide for the ordering of action among the others. Using the concept of domain consensus, the formal statement of goals found in official or institutional advertising is in fact the assumption that the firm is judged and choices of action alter. Domain consensus accepts such ideologies as that which informs the concept of domain consensus, individual goals or motives. Regardless of how individuals conceive of their organizations and their environments, and this conception is reinforced by interaction. Members of regulatory agencies for their organizations, and members of firms conceive of production and distribution as the organization’s excuse for existence.

**MANAGE**

Task environments of complex organizations, or pluralistic, composed of several or multiple constituent organizations, are even of organizations embedded in total environment, even for any specific organization there can be a plurality of kinds of roles and positions (see Richman, 1968). The evidence is inescapable that the decisions made regarding these roles and positions are not simply matters of organizational discretion but are the product of the need to interact in the Soviet Union the questions of discipline.

This pluralism of task environments suggests that organizations because it means that an organization is a part of a larger system. But several elements, each of which is interdependent, with its own domain.
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are identical, no two task environments are 
which other organizations, which aggregates 
ment for a particular organization is deter-
ons of the technology, the boundaries of the 
of the larger environment.

**Domain Consensus**

A domain cannot be an arbitrary, unilateral ac-
's claims to domain are recognized by those 
ary support, by the task environment, can a 
relationship between an organization and its 
ly one of exchange, and unless the organiza-
act with it as offering something desirable, 
necessary for survival. The elements typic-
organizations studied by Levine and White 
es: (1) referral of cases, clients, or patients; 
bor services encompassing the use of volun-
tering of instruction to personnel of other 
g or receiving of resources other than labor 
ment, case and technical information. The 
ge vary from one type of organization to 
 they note, exchange agreements rest upon 
main.

Consensus has some special advantages for 
in action, for it enables us to deal with 
operational goals (Perrow, 1961a) without imputing to the organization 
the human quality of motivation and without assuming a "group mind," 
two grounds on which the notion of organizational goals has been 
challenged.

Domain consensus defines a set of expectations both for members of 
an organization and for others with whom they interact, about what the 
organization will and will not do. It provides, although imperfectly, an 
image of the organization's role in a larger system, which in turn serves 
as a guide for the ordering of action in certain directions and not in 
others. Using the concept of domain consensus, we need not assume that 
the formal statement of goals found in charters, articles of incorporation, 
or institutional advertising is in fact the criterion upon which rationality 
is judged and choices of action alternatives are made. Nor need we 
accept such ideologies as that which insists that profit is the goal of the 
firm. The concept of domain consensus can be clearly separated from 
individual goals or motives. Regardless of these, members of hospitals 
somehow conceive of their organizations as oriented around medical care, 
and this conception is reinforced by those with whom the members 
interact. Members of regulatory agencies likewise conceive of a jurisdic-
tion for their organizations, and members of automobile manufacturing 
firms conceive of production and distribution of certain kinds of vehicles 
as the organization's excuse for existence.

**MANAGEMENT OF INTERDEPENDENCE**

Task environments of complex organizations turn out to be multifaceted 
or pluralistic, composed of several or many distinguishable others poten-
tially relevant in establishing domain consensus. This appears to be true 
even of organizations embedded in totalitarian politico-economic systems, 
since for any specific organization there appears to be alternative sources 
of some inputs; the several kinds of inputs required come under the 
jurisdictions of different state agencies; and there are alternative forms 
of output or places for disposal of output (Berliner, 1957; Granick, 1959; 
Richman, 1963). The evidence is inescapable that elaborate state 
planning and decrees do not fully settle for specific industrial organizations 
in the Soviet Union the questions of domain and domain consensus.

This pluralism of task environments is significant for complex organi-
lizations because it means that an organization must exchange with not one 
but several elements, each of which is itself involved in a network of 
interdependence, with its own domain and task environment. In the
Domains of Organized Action

environment, to the extent that the organization may find it necessary or desirable to discontinue support to an organization. Thus task environments pose contingencies for organizations.

Task environments also impose constraints. The capacities of supporting organizations and the absence of feasible alternatives may fix absolute limits to the support which may be available to an organization at a given time. The most dramatic example of constraints, perhaps, arises in the case of governmental organizations which are captives of a particular population. The public school system treated badly by its mandatory population may lose some of its members, but the organization as such cannot move to another community; it must stay home and fight the “in-law” battle. The foreign office of a world power cannot elect to negotiate in another, rosier world. The captive organization exists in the business world, as well, in the form of the satellite or subsidiary firm, or the firm which produces for a single buyer, as in the missile business during the 1950s. Carlson (1961) notes that some organizations have no control over selection of clientele, and that the clientele likewise lacks an option. He refers to these as “domesticated” because they are not compelled to attend to all of their needs, society guaranteeing their existence.

Since the dependence of an organization on its task environment introduces not only constraints but also contingencies, both of which interfere with the attainment of rationality, we would expect organizations subject to norms of rationality to attempt to manage dependency.

Power and Dependence

Building on a conception advanced by Richard Emerson (1962), we can say that an organization is dependent on some element of its task environment (1) in proportion to the organization’s need for resources or performances which that element can provide and (2) in inverse proportion to the ability of other elements to provide the same resource or performance. Thus a manufacturing firm is dependent on a financial organization to the extent that the firm needs financial resources, and financial resources are not available from other sources. The hospital is dependent on physicians in the community to the extent that the hospital needs patients and that physicians monopolize the capacity to refer patients to hospitals.

Emerson points out that dependence can be seen as the obverse of power. Thus an organization has power, relative to an element of its task environment, to the extent that the organization may find it necessary or desirable to discontinue support to an organization. Thus task environments pose contingencies for organizations.

This approach to dependence and power analysis of complex organizations and the necessity of viewing power as some-
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environment, to the extent that the organization has capacity to satisfy
needs of that element and to the extent that the organization monopolizes
that capacity.
This approach to dependence and power has several advantages for
our analysis of complex organizations and their domains. It frees us from
the necessity of viewing power as some generalized attribute of the
organization, and leads us to consider net power as resulting from a set of
relationships between the organization and the several elements of its
pluralistic task environment. Thus an organization may be relatively
powerful in relation to those who supply its inputs and relatively
powerless in relation to those who receive its outputs, or vice versa. Or
an organization may be relatively powerful in relation to both input and
output sectors, a situation which may generate “countervailing power”
(Galbraith, 1958) in the form, for example, of new or strengthened regu-
latory agencies which become part of its task environment (Palamoun-
tain, 1955).
An organization may be relatively powerless on all sectors of its task
environment, as Burton Clark (1956) has shown in his study of an adult
education organization. This organization rested on “precarious values,”
in the sense that none of the important elements of its environment was
fully committed to adult education as a high-priority activity. The or-
ganization therefore had to cater to whatever fleeting interests of an
unstable population it could activate at a particular time, had to scrounge
for resources, and could not develop a sustained domain consensus which
would have facilitated planning for efficiency.
An organization may have power with respect to competitors if it
has ability to act without regard for their actions; i.e., if competitors do
not pose contingency factors for the organization. In the business sphere
this is illustrated by the phenomenon of “price leadership,” where it ap-
pears that no matter what action the price leader takes, it will be copied
by followers. This situation also illustrates that an organization may be
powerful in its task environment whether this is advantageous or not;
for instance, being the price leader may be embarrassing in an environ-
ment which suspects collusion in such situations, and which contains
regulatory agencies to penalize collusion. One of the advantages of the
definition of power we have chosen is that it does not rest on any assump-
tions of intent or usage.
Finally, the power-dependence concept advanced here provides an
important escape from the “zero-sum” concept of power (Emerson, 1962;
Parsons, 1960), which assumes that in a system composed of A and B,
the power of A is power at the expense of B. By considering power in
the context of interdependence, we admit the possibility of A and B
becoming increasingly powerful with regard to each other—the possibility
that increasing interdependence may result in increased net power. It is
this possibility on which coalitions rest.

The hospital, for example, may be quite dependent on referring
physicians who control the supply of patients, and we would say that
physicians are powerful with respect to the hospital. At the same time,
if the hospital is the only one available or is sufficiently superior to others,
physicians may be highly dependent on the hospital, and we would say
that the hospital was powerful with respect to physicians. Thus the
conception of power as rooted in dependence permits us to consider
power in non-zero-sum terms.

**The Competitive Strategy**

We noted earlier that the task environment is defined by the de-
pendence of the organization. Since dependence introduces constraints
or contingencies, the problem for the organization is to avoid becoming
subservient to elements of the task environment.

**Proposition 3.1:** Under norms of rationality, organizations seek to mini-
mize the power of task-environment elements over them by maintaining alter-
natives.

To the extent that the needed capacity is dispersed through the task
environment, the organization may develop alternative sources. By scatter-
ing its dependence, it prevents the concentration of power over it. It
need not concede power to a single element of the task environment.
(This maneuver sometimes encourages the several suppliers to coalesce
into a united front, thus gaining power through its concentration. Cartels
are an example.) We might expect, for example, that under favorable
conditions the organization would practice exchanging with each of its
several possible sources, thus establishing with each a precedent for
support if conditions become less favorable (Kriesberg, 1955).

Now if the task environment contains not only many elements with
the needed capacity but also many elements requiring such capacity, we
are at or near the point which economists describe as perfect competition,
when sufficient numbers of suppliers and demanders make the actions of
any one insignificant. We would expect organizations to elect to compete
under such conditions, for the organization knows that support will be
available when needed and that it can
commitment by negotiating an exchange
occurs.

In reality, however, conditions of power and highly unstable over time; and even
competition in one sector—for example,
face imperfect competition in other sectors
of personnel. Competition in an imperfect
ventory, for it forces the relevant elements
to seek alternative sources of exchange,
not losing out on any particular negotia-
tion time the organization needs a particu-
lar thing in exchange; but if the elements
control that support have better offers,
a source of supply. Buffering capacity
problem (Prop. 2.2), but does not elimi-

If the organization engaged in com-
competition, in which the actual
market can make significant differences
the imbalance in the organization’s favor

**Proposition 3.2:** Organizations subje-
peting for support seek prestige.

Acquiring prestige is the “cheapest”
extent that an environmental element in
an organization, the organization has given
that element without making any comm
without yielding power. The importance
the study of a voluntary general hospi-
the creation and maintenance of a “favor
in its salient publics” as an important
Perrow concludes that if an organization
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sion, wield informal power in the commu
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for raising funds could reduce their dep
community and thereby resist efforts to in
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pense of B. By considering power in the environment is defined by the dependence introduces constraints the organization is to avoid becoming capacity is dispersed through the task environment. By scat-tering the several suppliers to coalesce power through its concentration. Cartels are developed alternative sources. By scat-tering the concentration of power over it. It is element of the task environment. By scat-tering the several suppliers to coalesce power through its concentration. Cartels, for example, that under favorable practice exchanging with each of its blushing with each a precedent for favorable (Kriesberg, 1955).

contains not only many elements with elements requiring such capacity, we musts describe as perfect competition, are and demanders make the actions of perfect organizations to elect to compete anization knows that support will be available when needed and that it can maintain its freedom from commitment by negotiating an exchange each and every time a need occurs.

In reality, however, conditions of perfect competition are infrequent and highly unstable over time; and even if the organization faces perfect competition in one sector—for example, in disposing of its output—it may face imperfect competition in other sectors—for example, the recruitment of personnel. Competition in an imperfect market introduces considerable contingency, for it forces the relevant elements of the task environment to seek alternative sources of exchange, and thereby raises the possibility of losing out on any particular negotiation to such “third parties.” Each time the organization needs a particular kind of support, it offers something in exchange; but if the elements of the task environment which control that support have better offers, the organization may be without a source of supply. Buffering capacity may reduce the severity of this problem (Prop. 2.2), but does not eliminate it.

If the organization engaged in competing for its needs must assume imperfect competition, in which the actions of (large) elements in the market can make significant differences, it becomes advisable to skew the imbalance in the organization’s favor.

**Proposition 3.2**: Organizations subject to rationality norms and competing for support seek prestige.

Acquiring prestige is the “cheapest” way of acquiring power. To the extent that an environmental element finds it prestigious to exchange with an organization, the organization has gained a measure of power over that element without making any commitments; i.e., it has gained power without yielding power. The importance of prestige is underscored in the study of a voluntary general hospital by Perrow (1961), who sees the creation and maintenance of a “favorable image of the organization in its salient publics” as an important way of controlling dependency. Perrow concludes that if an organization and its products are well regarded, it may more easily attract personnel, influence relevant legislation, wield informal power in the community, and ensure adequate numbers of clients, customers, donors, or investors. Litwak and Hylton (1962) found that welfare organizations which could establish distinctive bases for raising funds could reduce their dependency on other agencies in the community and thereby resist efforts to incorporate them into Community Chest programs.
The fostering of prestigious images is widely evident among business firms, universities, and government agencies.

**Proposition 3.3:** When support capacity is concentrated in one or a few elements of the task environment, organizations under norms of rationality seek power relative to those on whom they are dependent.

We are not asserting that organizations with power will necessarily exercise or flaunt it, nor that the desire for power provides personal motives for individuals holding responsibilities at the institutional level of the organization. The proposition does assume, however, that power is a way of handling what would otherwise be serious contingencies, and that rationality is not achieved by completely powerless (dependent) organizations. We would expect, therefore, that organizations subject to rationality norms and constrained by monopolized or nearly monopolized capacity for support, will maneuver toward achieving power to offset their dependence. The question is how to achieve such power.

**THE ACQUISITION OF POWER**

Complex organizations “acquire” dependence when they establish domains, but the acquisition of power is not so easy. Organizations may, however, trade on the fact that other organizations in their task environments also have problems of domain and face constraints and contingencies. In the management of this interdependence, organizations employ cooperative strategies (Thompson and McEwen, 1958). As Cyert and March (1963) conclude, organizations avoid having to anticipate environmental action (Prop. 2.4) by arranging negotiated environments.

**Cooperative Strategies**

Using cooperation to gain power with respect to some element of the task environment, the organization must demonstrate its *capacity to reduce uncertainty* for that element; and must make a commitment to exchange that capacity.

Thus an agreement between A and B, specifying that A will supply and B will purchase, reduces uncertainty for both. A knows more about its output targets, and B knows more about its inputs. Likewise, the affiliation of a medical practitioner with a hospital reduces uncertainty for both. The medical practitioner has increased assurance that his patients will have bed and related facilities, and the hospital has increased assurance that its facilities will be used.

**Domains of Organized Action**

Convincing an environmental element to satisfy future needs is enhanced by historical performance tends to suggest satisfaction, and we might expect the organization to develop a relationship rather than establish a new one.

Under cooperative strategies, the exchange rests on the exchange of commitments, uncertainty for both parties. But commitments and uncertainty, reduced for the sake of uncertainty for others. Commitments and management of interdependence provide the basis. **Contracting, coopting, and coalescing** cooperation and contract, and present commitments.

**Contracting** refers here to the negotiated exchange of performances in the future; those agreements which legal bodies were formally achieved between labor collective bargaining, but it also includes police department and minor criminals to provide for information about more important components of the understanding between a university, for example, the naming of buildings or the contract. Contractual agreements thus may rest on one or other will perform in order to maintain (3.2), or they may depend on institutional cooptation can be depended upon to evaluate full penalties for failure (Macaulay, 1963).

**Coopting** has been defined (Selznick) as inserting new elements into the leadership of an organization as a means of averting threat. Cooptation increases the certainty of future cooperation. The acceptance on the corporate representatives of financial institutions, for example, access to financial resources for the element. But coopting is a more constrained coexistence, for to the extent that coopted element of the environment in a position to exert influence on other aspects of the organization.
widely evident among business

Convincing an environmental element of the organization's capacity
to satisfy future needs is enhanced by historical evidence; prior satisfac-
tory performance tends to suggest satisfactory performance in the future,
and we might expect the organization to prefer to maintain an on-going
relationship rather than establish a new one for the same purpose.

Under cooperative strategies, the effective achievement of power
rests on the exchange of commitments, the reduction of potential uncer-

tainty for both parties. But commitments are obtained by giving commit-
ments and uncertainty, reduced for the organization through its reduc-
dependence presents organizations with dilemmas. Contracting, coopting, and coalescing represent different degrees of cooperation and commitment, and present organizations with alternatives.

**Contracting** refers here to the negotiation of an agreement for the exchange of performances in the future. Our usage is not restricted to those agreements which legal bodies would recognize. It includes agreements formally achieved between labor and industrial management via collective bargaining but it also includes the understanding between a police department and minor criminals to forego prosecution in exchange for information about more important criminal activities. It also covers the understanding between a university and a donor involving, for example, the naming of buildings or the awarding of honorary degrees. Contractual agreements thus may rest on faith and the belief that the other will perform in order to maintain a reputation or prestige (Prop. 3.2), or they may depend on institutional patterns whereby third parties can be depended upon to evaluate fulfillment of obligations and assess penalties for failure (Mceanlay, 1963).

**Coopting** has been defined (Selznick, 1949) as the process of absorbing new elements into the leadership or policy-determining structure of an organization as a means of averting threats to its stability or existence. Cooptation increases the certainty of future support by the organization coopted. The acceptance on the corporation's board of directors of representatives of financial institutions, for example, increases the likelihood of access to financial resources for the duration of the cooptive arrange-

**Coalescing** refers to a combination or joint venture with another
organization or organizations in the environment. A coalition may be unstable, or may have a stated terminal point; but to the extent that it is operative, the organizations involved act as one with respect to certain operational goals. Coalition not only provides a basis for exchange but also requires a commitment to future joint decision making. It is therefore a more constraining form of cooperation than co-opting.

Proposition 3.3 said that when support capacity is concentrated within few elements in the task environment, organizations under norms of rationality seek power relative to those on whom they are dependent. We can refine that proposition somewhat, using the distinctions just introduced relative to degrees of cooperation and commitment.

**Proposition 3.3a:** When support capacity is concentrated and balanced against concentrated demands the organizations involved will attempt to handle their dependence through contracting.

**Proposition 3.3b:** When support capacity is concentrated but demand dispersed, the weaker organization will attempt to handle its dependence through co-opting.

**Proposition 3.3c:** When support capacity is concentrated and balanced against concentrated demands, but the power achieved through contracting is inadequate, the organizations involved will attempt to coalesce.

**DEFENSE OF DOMAIN**

The attainment of a viable domain is, in essence, a political problem. It requires finding and holding a position which can be recognized by all of the necessary "sovereign" organizations as more worthwhile than available alternatives. It requires establishing a position in which diverse organizations in diverse situations find overlapping interests. The management of interorganizational relations is just as political as the management of a political party or of international relationships. It can also be just as dynamic, as environments change and propel some elements out of and new elements into a task environment.

And just as political parties and world powers move toward their objectives through compromise, complex purposive organizations find compromise inevitable. The problem is to find the optimum point between the realities of interdependence with the environment and the norms of rationality.

**Proposition 3.4:** The more sectors in which the organization subject to rationality norms is constrained, the more power the organization will seek over remaining sectors of its task environment.

The public school, for example, virtually all students of a specified age, growth has urgent need for power with the environment who control financial and growth imposes mandatory loads, the school to resources. The private school, on the the both student load and inputs as variab...
n the environment. A coalition may be un-
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DEFENSE OF DOMAIN

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sects in which the organization subject to
the more power the organization will seek
environment.

The public school, for example, which is constrained to accept vir-
tually all students of a specified age, under conditions of population
growth has urgent need for power with respect to those in the task
environment who control financial and other inputs. If the task en-
vironment imposes mandatory loads, the school must seek power with respect
to resources. The private school, on the other hand, may be able to treat
both student load and inputs as variables, and seek their mutual adjust-
ment.

The business firm constrained by an impoverished market, as during
a recession, finds it urgent to have power to curtail the rate and price of
inputs provided by supply elements of the task environment. To the
extent that it has power, it may renegotiate contractual arrangements.
If the firm is also constrained by large fixed costs, as in heavy industries,
our proposition would predict that the organization will seek power to
curtail the flow of labor inputs. It is in such industries that wage pay-
ments typically are in hourly or piece rates, and firms are not committed
to fixed salaries or guaranteed annual wages. By contrast, in the un-
iversity, where variations in student load occur primarily at only one time
of the year, wage payments are in annual terms.

Proposition 3.5: The organization facing many constraints and unable
to achieve power in other sectors of its task environment will seek to enlarge
the task environment.

Captive organizations frequently find themselves boxed in on several
sides, to the point where norms of rationality are threatened or over-
whelmed. It is at this point that captive organizations often join forces to
establish noncaptive, evaluating organizations which develop yardsticks
of rationality and set standards for accreditation. Community hospitals,
prisons, city governments, and public schools all exhibit this device of
creating new elements in the task environment to offset other constraints
within it. To the extent that the new element has power to confer or
withhold prestige, it can loosen the constraints operating on the organiza-
tion (Prop. 3.2). The nonaccredited school or hospital, for example, may
be threatened with irreplaceable loss of personnel, to the point where
those who control financial inputs are forced to increase their support.

RECAPITULATION

The domain claimed by an organization and recognized by its environ-
ment determines the points at which the organization is dependent,
facing both constraints and contingencies. To attain any significant measure of self-control, the organization must manage its dependency. Under norms of rationality, therefore (Prop. 3.1), organizations seek to minimize the power of task-environment elements over them by maintaining alternatives. When competing for support (Prop. 3.2), organizations seek prestige, which is a way of gaining power without increasing dependency.

Often, however, the environment does not offer many alternative sources of support. When support capacity is concentrated in the task environment (Prop. 3.3), organizations seek power relative to those on whom they are dependent. Subject to the nature of the interdependence, the organizations may resort to contracting, coopting, or coalescing.

The more an organization is constrained in some sectors of its task environment (Prop. 3.4), the more power it will seek over remaining elements of its task environment. When the organization is unable to achieve such a balance (Prop. 3.5), it will seek to enlarge its task environment.

From the point of view of a rational model of organizations, the compromises and maneuvering in defense of domains are disruptive and costly. We would therefore expect organizations subject to norms of rationality to seek to design themselves so as to minimize the necessity of maneuvering and compromise. We will consider the design of organizations in the next chapter.
Organizational rationality is rooted in both technology and task environment. Given a domain, these variables define major constraints and contingencies for an organization. We have indicated several strategies available to organizations for meeting important contingencies, and have suggested that they entail varying degrees of commitment and curtailed freedom. Now we can suggest that in addition to dealing with contingencies through strategies for interaction, organizations may remove or reduce contingencies through organizational design.

Proposition 4.1: Organizations under norms of rationality seek to place their boundaries around those activities which if left to the task environment would be crucial contingencies.

The implication of this proposition is that we should expect to find organizations including within their domains activities or competencies which, on a technological basis, could be performed by the task environment without damage to the major mission of the organization. For the
hotel, for example, provision of rooms and meals would be the major mission, and the operation of a laundry would be excluded; yet we find hotels operating laundries. On the other hand, provision of rooms and meals would not be within the major mission of the hospital, although hospitals commonly include these activities within their domains.

The incorporation of subsidiary competencies along with major missions is commonplace in organizations of all types and is not a major discovery. But our proposition is not an announcement of the fact; rather it attempts to indicate the direction in which domains are expanding. Since we are arguing that such expansion will be in the direction of crucial contingencies, and that crucial contingencies are located by the technology and the task environment, we can be somewhat more precise in suggesting the direction of expansion of organizations, depending on the type of technology required by the major mission.

In examining the concept of organizational domain, we have noted that domain is defined by (1) technology included, (2) population served, and (3) services rendered. Major changes in design involve modifications of the "mix" of these three elements.

**Proposition 4.1a:** Organizations employing long-linked technologies and subject to rationality norms seek to expand their domains through vertical integration.

The concept of vertical integration is significant in economics but seldom employed in other disciplines, perhaps because it applies primarily to long-linked technologies, and these appear most prominently in industrial areas. It refers to the combination in one organization of successive stages of production; each stage of production uses as its inputs the product of the preceding stage and produces inputs for the following stage. Technologically, each stage could be incorporated in a separate organization, and in fact much though not all vertical integration in industry occurs through the amalgamation into one organization of formerly discrete organizations. The literature of economic history is rich in examples of vertical integration.

The major American oil firms, for example, were refining organizations, but eventually integrated forward by establishing competence in marketing—i.e., handling their own output problems—and integrated backward by acquiring control over supplies of crude oil and marine transportation services—i.e., handling their own input problems. As automobile manufacturers developed mass production they also established marketing channels for mass distribution of parts and accessories in order to have what was needed and at reasonable prices. Soon also for commercial production of aluminum and marketing of finished products in one product, and obtained bauxite mines, a major treatment of this aspect of economy, from whom these examples are taken.

Vertical integration, however, is not non; it is a current movement of many variety of fields. With the recent shrink to renewed emphasis on rationality norms moved backward behind the livestock and contractual relationships with livestock feed, and contracting to have livestock flow of animals into slaughterhouses in advance, both of which are serious complications on irregular volume and fluctuating prices.

Vertical integration thus is a major in domains in order to reduce or eliminate the most feasible when the underlying technology dependent on the one preceding the one following. Thus it is most feasible in organizations rather than in those employing mediators; hospitals became not only organizations educational organizations to assure the fulfillment of personnel; hospitals often operate programs.

Even when a sequential relationship does exist, there may be other limitations preventing organizations from becoming important. One limitation occurs when the activity is a major mission and rapidly. Basis is forward to fabricate that product into a product. Organic and distribution, frequently find backward integration rapid fanning out. Sears, Roebuck, for ex
marketing channels for mass distribution, and acquired capacity to make parts and accessories in order to have assured stocks of supplies when needed and at reasonable prices. Soon after accomplishing the technology for commercial production of aluminum, Alcoa moved into the making and marketing of finished products in order to develop demand for the product, and obtained bauxite mines, ore ships, and warehouses. [For a major treatment of this aspect of economic history, see Chandler (1927), from whom these examples are taken.]

Vertical integration, however, is not simply an historical phenomenon; it is a current movement of many industrial organizations in a variety of fields. With the recent shrinkage of profit margins, which led to renewed emphasis on rationality norms, major meat packers have moved backward behind the livestock auction markets to establish contractual relationships with livestock feeders. By owning the livestock and feed, and contracting to have livestock fed, the packers can control the flow of animals into slaughterhouses and can calculate their costs in advance, both of which are serious contingencies when packers depend on irregular volume and fluctuating prices in auction markets.

Vertical integration thus is a major way of expanding organizational domains in order to reduce or eliminate significant contingencies. It is most feasible when the underlying technology is long linked, with each activity dependent on the one preceding it and providing a needed input to the one following. Thus it is most feasible in manufacturing industries, rather than in those employing mediating or intensive technologies. Still, hospitals became not only organizations providing health care, but also educational organizations to assure the future provision of highly trained personnel; hospitals often operate nursing schools and internship programs.

Even when a sequential relationship in the several stages of production does exist, there may be other limits to vertical integration which prevent organizations from becoming self-sufficient. Perhaps the most important limitation occurs when the activities which precede or follow a major mission fan out rapidly. Basic steel producers may integrate forward to fabricate that product into some of its structural forms, but find it impossible to engage in the manufacture and distribution of all the ultimate products—such as automobiles—which contain steel. Organizations whose primary missions fall at the other end of the scheme, in distribution, frequently find backward integration difficult because of rapid fanning out. Sears, Roebuck, for example, would find it inconceiv-
able to engage in the many technologies required for the manufacture of the variety Sears offers its customers. The inputs for Sears fan out too quickly. It is reported, however, that Sears did occasionally (and reluctantly) help finance manufacturing companies or purchase portions of their stock in order to assure itself of adequate supplies (Chandler, 1962); and it has moved backward to incorporate warehousing and transportation components.

Whenever the activities behind or ahead of an organization fan out rapidly, we would expect vertical integration to be highly selective, concentrating on those support activities which appear to be strategic or crucial.

Proposition 4.1b: Organizations employing mediating technologies, and subject to rationality norms seek to expand their domains by increasing the populations served.

Such expansion may be territorial or saturative, or both. The historical movement is well documented in the case of transport organizations and public utilities. Railroad and airline firms rushed to expand their networks throughout territories, and the giants in these industries grew from combinations or mergers of small organizations employing parallel technologies. The expansion of the Bell Telephone System into a national network, despite the presence of a swarm of small "dependent independents," is also clear. The growth of branch banking where this is legally permissible is further evidence of the push to reduce contingencies, for the local bank is often constrained by a uniformity of economic fortunes in an undiversified territory, while a banking system expanding through many local communities enjoys a diversity that reduces the possibility of disaster. Bank mergers, especially where branch banking is curtailed, further illustrates this.

The insurance firm must find enough poolers of risk to avoid the possibility of any one loss destroying the coverage of others. Within a given risk category, the insurance organization must achieve large numbers of customers or else become dependent on other insurance organizations through reinsurance.

Sears, Roebuck, whose original success came by saturating rural territories via mail orders and deliveries, expanded still further as the population moved into urban areas where consumers were not dependent on catalogue shopping, by blanketing those areas with retail outlets (Chandler, 1962).

Proposition 4.1c: Organizations subject to rationality norms seek to expand object worked on.

When the intensive application of technology represents a change in rather than mere activity of the client himself becomes an organization. We would expect, therefore, the client to seek to place his client; these have been termed "inducement" (Vreeland, 1963). The university incorporates, subject not only to the teaching-learning organization but to its discipline and the general hospital may operate an out-patient clinic, are admitted for round-the-clock personnel and are expected to abide by hospital extent permitted by their condition.

In both cases the organization incorporates factors which might reduce or negate the organization's efforts.

Where the intended change in the boundaries around the client is virtual organization into what Goffman (1957) "a place of residence and work where the individual, cut off from a wider social unit, together lead an enclosed, formal life." In their early history, general hospitallike custodial institutions for the dying populations therapeutic organizations by the gradual technology until they were finally see determined to live, as more effective sit and home. But they were also seen by medicine the practice of medicine, because they paid technicians, but also twenty-four-hour-a-day staffing believed most conducive (Lentz, 1957). Perhaps the most dramatic was around-the-clock controlled environment mental hospitals which concentrate on (Stanton and Schwartz, 1954). Here the
many technologies required for the manufacture of its customers. The inputs for Sears fan out too, however, that Sears did occasionally (and re-manufacturing companies or purchase portions to assure itself of adequate supplies (Chandler, 1962) backward to incorporate warehousing and trans- 

Proposition 4.1c: Organizations employing intensive technologies, and subject to rationality norms seek to expand their domains by incorporating the object worked on.

When the intensive application of collected, specialized capacities represents a change in rather than merely a service to the client, the activity of the client himself becomes an important contingency for the organization. We would expect, therefore, that organizations operating intensively on the client seek to place their boundaries around that client; these have been termed "inducing organizations" (Bidwell and Vreeland, 1963). The university incorporates its clients as student members, subject not only to the teaching-learning process and activities of the organization but to its discipline and constraints on other matters. The general hospital may operate an outpatient service, but its toughest cases are admitted for round-the-clock participation inside the organization and are expected to abide by hospital norms and regulations to the extent permitted by their condition.

In both cases the organization incorporates its clients on a temporary basis to reduce the possibility of contamination of the client by outside factors which might reduce or negate the effectiveness of the organization's efforts.

Where the intended change in the client is extreme, the placing of boundaries around the client is virtually complete and converts the organization into what Goffman (1957) has termed a total institution—"a place of residence and work where a large number of like-situation individuals, cut off from a wider society for an appreciable period of time, together lead an enclosed, formally administered round of life."

In their early history, general hospitals in the United States were custodial institutions for the dying poor; they were transformed into therapeutic organizations by the gradual emergence of effective medical technology until they were finally seen, by those wealthy who were determined to live, as more effective sites for medical practice than the home. But they were also seen by medical practitioners as better sites for the practice of medicine, because they provided not only equipment and technicians, but also twenty-four-hour-a-day control of the environment to standards believed most conducive to patient health or recovery (Lentz, 1957). Perhaps the most dramatic attempt to cash in on the around-the-clock controlled environment of the human object is in those mental hospitals which concentrate on milieu therapy (Jones, 1953; Stanton and Schwartz, 1954). Here the organization is not content to
neutralize the environment in standard ways, but actively seeks to use the interaction of the patient with that environment for therapeutic purposes.

When the output of the intensive technology calls for less drastic changes in the client, the placing of boundaries around that client is less complete, although the tendency remains clear. In the construction industry, for example, the contractor and the customer establish a relationship which has the effect of placing the customer in the project's administrative apparatus; and if the customer is an organization rather than an individual, the customer's agent may be a full-time liaison member of the project. Similarly, in the construction of custom, heavy industrial equipment, the customer may detail specialists to represent him within the producing organization during construction. During the installation and trial periods, the producing organization may detail its specialists to be members of the consuming organization. Industrial firms providing intensive-technology products to the military and space agencies employ technical representatives whose bases of operations are in the consuming organizations, and whose daily activities are geared more directly to the host organizations which employ them.

**BALANCING OF COMPONENTS**

We have indicated one important reason why complex organizations grow—to incorporate what otherwise would be serious contingencies. The organization which extends its boundaries to incorporate the sources of contingencies often finds that it has acquired capacity in excess of that called for by its major mission. The problem of balance emerges (Boulding, 1953).

Almost inevitably, growth of the type discussed above multiplies the components of the organization. And although we have for simplicity purposes treated organizations as if they employed only one type of core technology, we must recognize that expanded organizations may employ combinations of them. Thus the Bell Telephone System employs the mediating technology, saturating an extremely large territory, but also employs the long-linked technology in the production and installation of its own equipment, since that technology remains within a fairly narrow band. On such occasions as special events, the Bell system may also employ the intensive technology.

Expansion which entails combinations of core technologies further multiplies organizational components.

**Organizational Design**

The multiple-component organization balancing the capacities of its components is most widely known within the technical sector, but it is perhaps even more significant of overall components in the total organic paring the capacities of individual machines within a shop or department.

The problem arises essentially because the organizations are continuously divisible. The organization, for example, may contain greater capacity than it needs at other times. This may occur because into its organization, perhaps on merger of other organizations to the same rate of operations, but the problem lies in the technology and the technology can only be made in certain sizes. In order to have the desired 50 units per time period, it must make 200. In order to offer on the university may have to acquire a full-time

Frequently the problem is posed not as one of economy of scale, another concept in the discipline of economics, but of realistic in the organization. The economy-of-scale principle with problems internal to manufacturing. But as Knauth (1956) shows, the advantage of easier, less expensive financing; intellects to attack trouble spots; sustainable advantage; and adaptable marketing system may be continuously divisible, their increscence not be feasible. This becomes especially true by extending domains to new population of services such as telephone service to two Podunk's. Also to install not only the equipment installed in Hattan, but also the central office equipment suitable for providing service to Podunk's.

Even more significant, perhaps, is the challenge of the present. The resources themselves may be more or less enduring, more or less disposable. The costs of acquiring resource and the organization subjected to rationality and future use of those resources. Certainly co-
The multiple-component organization inevitably faces problems of balancing the capacities of its components. The balancing problem is most widely known within the technical cores of long-linked technologies, but it is perhaps even more significant when we compare the capacities of overall components in the total organization rather than merely comparing the capacities of individual machines or man-machine stations within a shop or department.

The problem arises essentially because capacities are not necessarily continuously divisible. The organization which is vertically integrated, for example, may contain greater capacity at some production stages than at others. This may occur because integration has proceeded through acquisition or merger of other organizations which had not been geared to the same rate of operations, but the primary reason for balancing problems lies in the technology and the task environment. Some resources come only in certain sizes. In order to have a machine which will make the desired 50 units per time period, it may be necessary to obtain one which will make 200. In order to offer one course each term in sociology, the university may have to acquire a full-time sociologist.

Frequently the problem is posed not in an all-or-nothing form but as one of economy of scale, another concept of central importance in the discipline of economics, but of realistic importance to all types of complex organizations. The economy-of-scale principle is best known in connection with problems internal to manufacturing, technical-core activities. But as Knauf (1956) shows, the advantages of bigness in industry include easier, less expensive financing; more numerous, highly trained intellects to attack trouble spots; sustained research; and more accurately tailored and adaptable marketing systems. Thus even though capacities may be continuously divisible, their incorporation on a small scale may not be feasible. This becomes especially clear when organizations grow by extending domains to new populations or territories. In order to provide telephone service to two Podunk subscribers, it may be necessary to install not only the equipment installed for a new subscriber in Manhattan, but also the central office equipment, lines, and service facilities suitable for providing service to Podunk’s entire population.

Even more significant, perhaps, is the fact that capacity is not simply a matter of the present. The resources incorporated in a capacity are themselves more or less enduring, more or less mobile, more or less disposable. The costs of acquiring resources are often so great that the organization subjected to rationality norms must make commitments to future use of those resources. Certainly components which have long lives
and call for large investments may be mobile in the sense that one organization can divest itself of these to another organization. Nevertheless, any technology complicated enough to require a complex organization usually calls for a combination of components of varying capacities, varying lengths of usefulness, varying costs, and varying ease of divestment.

It is not unusual, therefore, for complex organizations of all types to acquire capacities which do not balance.

Proposition 4.2: Multicomponent organizations subject to rationality norms will seek to grow until the least-reducible component is approximately fully occupied.

From this proposition, for example, we would expect the manufacturing organization which in integrating forward has acquired distributive capacity greater than its manufacturing output, to then increase output. But this example immediately implies a question about the ability or willingness of the task environment to absorb such increased output. Under rationality norms, there must be some balance not only of component capacities but also between output and demand.

One major device for balancing the capacities of the organization against demand is to stimulate demand to the point where it equals capacity, but balancing technological capacity against demand does not automatically guarantee that output channels will be fully utilized. Another possibility is to equate output-channel capacity with demand, but this does not guarantee that the core technology will be fully employed. Even if such devices were adequate to balance the several component capacities and demand, the balance is not likely to be a stable one, for demand can and does change as a result of factors which no organization can forestall, even if it can forecast them. Moreover, advances in the technical process itself may result in increased capacity, thereby upsetting the balance.

Proposition 4.3: Organizations with capacity in excess of what the task environment supports will seek to enlarge their domains.

Excess capacity has frequently occurred among integrated industrial organizations, not only to individual firms but to entire industries from time to time: oil, power machinery, agricultural products, electrical and electronics, and so on (Chandler, 1962). It has also plagued railroads, telegraph firms, and such organizations as the National Foundation (Sills, 1957). A widespread response to excess capacity has been the redesign of the organization by diversification, the development of new products or services. Since we have argued that diversification is closely allied and easily adapted. With gasoline, for example, the major oil processes, equipment, and raw materials—such as household heating oil, diesel fuel, and high-octane gasoline for aircraft.

A somewhat more drastic form of diversification in output channels and takes the form from quite different technologies but as far as the demand environment is concerned, does not make as much of a difference as window and plate glass (Companies originally offering a single line, such as Schenley distilleries, into multiple-line companies offering a wide range through the same marketing channels.

On other occasions, diversification springs out of demand which either technology or readily converted. Thus Schenley diversified into antibiotics when the demand emerged and long experience with fermentation.

Occasionally diversification organization in completely settling the demand. For example, the National Foundation for Quality Townsen movement (Messinger, 1954) apparently failed to diversify in this case apparent that polio was on the very edge of and YMCA has effectively offered new services to the population throughout its history.

Diversification is most noticeable perhaps because it is often accomplishes acquisitions or mergers of well-known process is found in other types of organization.

American universities in the last half of the 20th century, a great variety of new departments, instead of large investments may be mobile in the sense that one organization can divest itself of these to another organization. Nevertheless, any technology complicated enough to require a complex organization usually calls for a combination of components of varying capacities, varying lengths of usefulness, varying costs, and varying ease of divestment.

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Organizational Design

or services. Since we have argued that domain is defined, in part, by the services or products offered, diversification by definition involves enlargement of domain if not the development of multiple domains.

Perhaps the simplest form of diversification springs from excess technological capacity and results in new products to which that capacity is closely allied and easily adapted. When depression reduced demand for gasoline, for example, the major oil firms, using the same refining processes, equipment, and raw materials, developed other refined products—such as household heating oil, diesel oil for railroads and utility firms, and high-octane gasoline for aircraft (Chandler, 1962).

A somewhat more drastic form of diversification springs from excess capacity in output channels and takes the form of products which are from quite different technologies but associated with original products so far as the demand environment is concerned. Thus Pittsburgh Plate Glass, to make fuller use of its marketing resources, developed a line of paints, brushes, and related items that could be sold through the same channels as window and plate glass (Chandler, 1962). Insurance companies originally offering a single line, such as fire insurance, developed into multiple-line companies offering a variety of types of insurance through the same marketing channels.

On other occasions, diversification springs from a newly emergent demand to which either technology or output-channel capacity can be readily converted. Thus Schenley distilleries were prepared to diversify into antibiotics when the demand emerged because of Schenley's mastery of and long experience with fermentation processes (Penrose, 1959).

Occasionally diversification springs from the very success of an organization in completely settling the demand it originally set out to meet; for example, the National Foundation for Infantile Paralysis became the National Foundation and entered several new disease domains as it became apparent that polio was on the verge of disappearing. Although the Townsend movement (Messinger, 1955) and the WCTU (Gusfield, 1955) apparently failed to diversify in the face of declining demand, the YMCA has effectively offered new services appealing to new categories of the population throughout its history (Zald and Denton, 1963).

Diversification is most noticeable among business organizations, perhaps because it is often accomplished through widely publicized acquisitions or mergers of well-known firms. But the diversification process is found in other types of organizations as well.

American universities in the last half-century have proliferated with a great variety of new departments, institutes, and schools. In some cases
these simply reflect the intensification of knowledge which results in new disciplines, and are structural reactions to unwieldy categories of knowledge. Political science has emerged out of the field of history and is now regarded as something different and separable. This type of splintering springs from developments in the university's technology rather than from attempts to capture new markets; although once the process begins, other universities may follow in order to retain their drawing power. But the proliferation of institutes and schools in business administration, industrial and labor relations, international relations, public affairs, and administration, etc., represents diversification to appeal to new elements of the task environment. These schools and institutes rest on commitments of resources in new combinations, appealing to new sources of support in order to more productively employ resources.

Hospitals may open new outpatient clinics or establish new services—for example, in nervous diseases—to round out utilization of services (Perrow, 1961b); and welfare organizations may extend domains to new clientele with new services.

**Some Limitations**

While it has been easy to cite examples fitting the above propositions, it would not be difficult to find examples of organizations which have not taken the steps indicated and apparently have not even sought to take them. Unless we can identify the conditions under which our propositions do hold, they have little merit.

To the student of American organizations, probably the most striking feature is the constraint exercised on organizations by governments, especially in the economic sector. National legislation has had the effect of reducing "combinations in restraint of trade," and on occasion, legal action under such legislation has sought to undo actions which had been consistent with our hypotheses. Governmental intervention to constrain the actions of organizations does not destroy our propositions; indeed, the growth of such legislation indicates that the kinds of tendencies we are dealing with are real and strong. But in addition to governmental constraints, there are other conditions that limit the application of our propositions.

No matter how crucial a capacity or activity, the organization need not attempt to incorporate it if the organization can be certain of its availability, when needed, on reasonable terms. Thus the organization with power relative to another which controls a needed activity need not formally incorporate that activity (Props. 3.1, 3.2, 3.3).

**Organizational Design**

Lack of power to achieve the desired changes, units in vertical integration or through available resources, sometimes more than Saturation of existing markets can come of facilities for purchasing, introducing quantity or varieties of offerings. But the most demanding move. It means entering a territory or insufficient, and entails investment in supplies, advertising, displays, demonstrations (Knaurht, 1956). The decision to proceed requires a commitment to a host of such which may be too costly. Thus the metro be tempted to become a residential unit, not a noneducational forces on students), but laboratories, dining halls, etc., extremely costly.

The norm of rationality may be seen negating the patterns suggested in our paper. may commit itself not to providing the education to commuter, part-time, which has been a family-controlled enterprise, and family control than on rationality, the family's ability to control. At the point take effect, the required resources might be selling stock to outsiders; a commitment this (Landes, 1951).

Finally, the design of an organizational logical and effective may be slow to error because the administrative process mistrusts hind sight. To arrive at our simple prop thestrat a few significant variables from a administrative processes operate within contains masses of ambiguous and som process of refining these crude data into orization may be slow and halting (Dale, 19

Although complex organizations cannot options on what things to do for themself
Lack of power to achieve the designs suggested above could obviously prevent the indicated changes. The creation or acquisition of units in vertical integration or through expansion may require considerable resources, sometimes more than an organization can mobilize. Saturation of existing markets can come incrementally, through addition of facilities for purchasing, introducing better service, or increasing quantity or varieties of offerings. But territorial expansion is a much more demanding move. It means entering a territory where facilities are lacking or insufficient, and entails investment in personnel, warehouses, supplies, advertising, displays, demonstrations, and perhaps in service facilities (Knauth, 1956). The decision to place boundaries around clients requires a commitment to a host of supporting facilities and services which may be too costly. Thus the metropolitan-commuter university may be tempted to become a residential university (reducing the impact of noneducational forces on students), but may find the provision of dormitories, dining halls, etc., extremely costly.

The norm of rationality may be subordinated to other norms, thus negating the patterns suggested in our propositions. The urban university may commit itself not to providing the best possible education but to providing education to commuter, part-time students. The business firm which has been a family-controlled enterprise may place higher priority on family control than on rationality, and resist growing beyond the family’s ability to control. At the point where our propositions would take effect, the required resources might necessitate “going public” by selling stock to outsiders; a commitment to family control can prevent this (Landes, 1951).

Finally, the design of an organization which, in hindsight, appears logical and effective may be slow to emerge or may not emerge at all because the administrative process must operate without the benefit of hindsight. To arrive at our simple propositions we have sought to abstract a few significant variables from already-distilled sources. But the administrative processes operate within a detailed environment which contains masses of ambiguous and sometimes contradictory data. The process of refining these crude data into a decision to redesign an organization may be slow and halting (Dale, 1960; Chandler, 1962).

RECAPITULATION

Although complex organizations cannot be self-sufficient, they may have options on what things to do for themselves and what things to depend on
from others. Under norms of rationality (Prop. 4.1), organizations seek to place their boundaries around those activities which if left to the task environment would be crucial contingencies. Because different types of technologies pose different kinds of crucial contingencies, we expect the direction of this boundary expansion to be patterned according to the kind of core technologies used in the organization.

The acquisition of components to handle otherwise crucial contingencies frequently forces organizations to acquire components of unequal capacities, and this raises balancing problems. We expect organizations subject to rationality norms (Prop. 4.2) to seek to grow until the least-reducible component is approximately fully occupied. If necessary in order to achieve this state (Prop. 4.3), organizations with excess capacity will seek to enlarge their domains.

Although governmental constraints or lack of power or administrative insight may prevent these propositions from operating universally, we believe that the technological pressures toward reduction of uncertainty, coupled with the uncertainties and contingencies inherent in environment, generate pressures for organizations to grow, and that the direction of growth is not random but is guided by the nature of the technology and of the task environment.

If organizations vary in design, they must also vary in structure, and we turn to this possibility in the following chapter.

The major components of a complex organization are further segmented, or departmentalized within and between departments, and patterning of relationships that we are establishing will focus on the impact of technical and environmental influences, the technical we will consider environmental influence of both technical and environmental factors.

In considering structure we are involved in those components of an organization human resources or facilities. For present purposes, will be on differentiation and linkages of