

General Systems Theory: Applications for Organization and Management

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General systems theory has been proposed as a basis for the unification of science. The open systems model has stimulated many new conceptualizations in organization theory and management practice. However, experience in utilizing these concepts suggests many unresolved dilemmas. Contingency views represent a step toward less abstraction, more explicit patterns of relationships, and more applicable theory. Sophistication will come when we have a more complete understanding of organizations as total systems (configurations of sub-systems) so that we can prescribe more appropriate organizational designs and managerial systems. Ultimately, organization theory should serve as the foundation for more effective management practice.

Biological and social scientists generally have embraced systems concepts. Many organization and management theorists seem anxious to identify with this movement and to contribute to the development of an approach which purports to offer the ultimate—the unification of all science into one grand conceptual model. Who possibly could resist? General

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systems theory seems to provide a relief from the limitations of more mechanistic approaches and a rationale for rejecting "principles" based on relatively "closed-system" thinking. This theory provides the paradigm for organization and management theorists to "crank into their systems model" all of the diverse knowledge from relevant underlying disciplines. It has become almost mandatory to have the word "system" in the title of recent articles and books (many of us have compromised and placed it only in the subtitle).¹

But where did it all start? This question takes us back into history and brings to mind the long-standing philosophical arguments between mechanistic and organismic models of the 19th and early 20th centuries. As Deutsch says:

Both mechanistic and organismic models were based substantially on experiences and operations known before 1850. Since then, the experience of almost a century of scientific and technological progress has so far not been utilized for any significant new model for the study of organization and in particular of human thought [12, p. 389].

General systems theory even revives the specter of the "vitalists" and their views on "life force" and most certainly brings forth renewed questions of teleological or purposeful behavior of both living and nonliving systems. Phillips and others have suggested that the philosophical roots of general systems theory go back even further, at least to the German philosopher Hegel (1770-1831) [29, p. 56]. Thus, we should recognize that in the adoption of the systems approach for the study of organizations we are not dealing with newly discovered ideas—they have a rich genealogy.

Even in the field of organization and management theory, systems views are not new. Chester Barnard used a basic systems framework.

A cooperative system is a complex of physical, biological, personal, and social components which are in a specific systematic relationship by reason of the cooperation of two or more persons for at least one definite end. Such a system is evidently a subordinate unit of larger systems from one point of view; and itself embraces subsidiary systems—physical, biological, etc.—from another point of view. One of the systems comprised within a cooperative system, the one which is implicit in the phrase "cooperation of two or more persons," is called an "organization" [3, p. 65].

And Barnard was influenced by the "systems views" of Vilfredo Pareto and Talcott Parsons. Certainly this quote (dressed up a bit to give the term "system" more emphasis) could be the introduction to a 1972 book on organizations.

Miller points out that Alexander Bogdanov, the Russian philosopher, developed a theory of tektology or universal organization science in 1912 which foreshadowed general systems theory and used many of the same concepts as modern systems theorists [26, p. 249-250].

¹ An entire article could be devoted to a discussion of ingenious ways in which the term "systems approach" has been used in the literature pertinent to organization theory and management practice.

However, in spite of a long history of organismic and holistic thinking, the utilization of the systems approach did not become the accepted model for organization and management writers until relatively recently. It is difficult to specify the turning point exactly. The momentum of systems thinking was identified by Scott in 1961 when he described the relationship between general systems theory and organization theory.

The distinctive qualities of modern organization theory are its conceptual-analytical base, its reliance on empirical research data, and above all, its integrating nature. These qualities are framed in a philosophy which accepts the premise that the only meaningful way to study organization is to study it as a system . . . Modern organization theory and general system theory are similar in that they look at organization as an integrated whole [33, pp. 15-21].

Scott said explicitly what many in our field had been thinking and/or implying—he helped us put into perspective the important writings of Herbert Simon, James March, Talcott Parsons, George Homans, E. Wight Bakke, Kenneth Boulding, and many others.

But how far have we really advanced over the past decade in applying general systems theory to organizations and their management? Is it still a "skeleton," or have we been able to "put some meat on the bones"? The systems approach has been touted because of its potential usefulness in understanding the complexities of "live" organizations. Has this approach really helped us in this endeavor or has it compounded confusion with chaos? Herbert Simon describes the challenge for the systems approach:

In both science and engineering, the study of "systems" is an increasingly popular activity. Its popularity is more a response to a pressing need for synthesizing and analyzing complexity than it is to any large development of a body of knowledge and technique for dealing with complexity. If this popularity is to be more than a fad, necessity will have to mother invention and provide substance to go with the name [35, p. 114].

In this article we will explore the issue of whether we are providing substance for the term *systems approach* as it relates to the study of organizations and their management. There are many interesting historical and philosophical questions concerning the relationship between the mechanistic and organismic approaches and their applicability to the various fields of science, as well as other interesting digressions into the evolution of systems approaches. However, we will resist those temptations and plunge directly into a discussion of the key concepts of general systems theory, the way in which these ideas have been used by organization theorists, the limitations in their application, and some suggestions for the future.

KEY CONCEPTS OF GENERAL SYSTEMS THEORY

The key concepts of general systems theory have been set forth by many writers [6, 7, 13, 17, 25, 28, 39] and have been used by many organization and management theorists [10, 14, 18, 19, 22, 23, 24, 32]. It is not our purpose here to elaborate on them in great detail because we anticipate that most readers will have been exposed to them in some depth. Figure 1

provides a very brief review of those characteristics of systems which seem to have wide acceptance. The review is far from complete. It is diffi-

FIGURE I
Key Concepts of General Systems Theory

Subsystems or Components: A system by definition is composed of interrelated parts or elements. This is true for all systems—mechanical, biological, and social. Every system has at least two elements, and these elements are interconnected.

Holism, Synergism, Organicism, and Gestalt: The whole is not just the sum of the parts; the system itself can be explained only as a totality. Holism is the opposite of elementarism, which views the total as the sum of its individual parts.

Open Systems View: Systems can be considered in two ways: (1) closed or (2) open. Open systems exchange information, energy, or material with their environments. Biological and social systems are inherently open systems; mechanical systems may be open or closed. The concepts of open and closed systems are difficult to defend in the absolute. We prefer to think of open-closed as a dimension; that is, systems are relatively open or relatively closed.

Input-Transformation-Output Model: The open system can be viewed as a transformation model. In a dynamic relationship with its environment, it receives various inputs, transforms these inputs in some way, and exports outputs.

System Boundaries: It follows that systems have boundaries which separate them from their environments. The concept of boundaries helps us understand the distinction between open and closed systems. The relatively closed system has rigid, impenetrable boundaries; whereas the open system has permeable boundaries between itself and a broader supra-system. Boundaries are relatively easily defined in physical and biological systems, but are very difficult to delineate in social systems, such as organizations.

Negative Entropy: Closed, physical systems are subject to the force of entropy which increases until eventually the entire system fails. The tendency toward maximum entropy is a movement to disorder, complete lack of resource transformation, and death. In a closed system, the change in entropy must always be positive; however, in open biological or social systems, entropy can be arrested and may even be transformed into negative entropy—a process of more complete organization and ability to transform resources—because the system imports resources from its environment.

Steady State, Dynamic Equilibrium, and Homeostasis: The concept of steady state is closely related to that of negative entropy. A closed system eventually must attain an equilibrium state with maximum entropy—death or disorganization. However, an open system may attain a state where the system remains in dynamic equilibrium through the continuous inflow of materials, energy, and information.

Feedback: The concept of feedback is important in understanding how a system maintains a steady state. Information concerning the outputs or the process of the system is fed back as an input into the system, perhaps leading to changes in the transformation process and/or future outputs. Feedback can be both positive and negative, although the field of cybernetics is based on negative feedback. Negative feedback is informational input which indicates that the system is deviating from a prescribed course and should readjust to a new steady state.

Hierarchy: A basic concept in systems thinking is that of hierarchical relationships between systems. A system is composed of subsystems of a lower order and is also part of a supra-system. Thus, there is a hierarchy of the components of the system.

Internal Elaboration: Closed systems move toward entropy and disorganization. In contrast, open systems appear to move in the direction of greater differentiation, elaboration, and a higher level of organization.

Multiple Goal-Seeking: Biological and social systems appear to have multiple goals or purposes. Social organizations seek multiple goals, if for no other reason than that they are composed of individuals and subunits with different values and objectives.

Equifinality of Open Systems: In mechanistic systems there is a direct cause and effect relationship between the initial conditions and the final state. Biological and social systems operate differently. Equifinality suggests that certain results may be achieved with different initial conditions and in different ways. This view suggests that social organizations can accomplish their objectives with diverse inputs and with varying internal activities (conversion processes).

cult to identify a "complete" list of characteristics derived from general systems theory; moreover, it is merely a first-order classification. There are many derived second- and third-order characteristics which could be considered. For example, James G. Miller sets forth 165 hypotheses, stemming from open systems theory, which might be applicable to two or more levels of systems [25]. He suggests that they are *general* systems theoretical hypotheses and qualifies them by suggesting that they are propositions applicable to general systems *behavior* theory and would thus exclude non-living systems. He does not limit these propositions to individual organisms, but considers them appropriate for social systems as well. His hypotheses are related to such issues as structure, process, subsystems, information, growth, and integration. It is obviously impossible to discuss all of these hypotheses; we want only to indicate the extent to which many interesting propositions are being posed which might have relevance to many different types of systems. It will be a very long time (if ever) before most of these hypotheses are validated; however, we are surprised at how many of them can be agreed with intuitively, and we can see their possible verification in studies of social organizations.

We turn now to a closer look at how successful or unsuccessful we have been in utilizing these concepts in the development of "modern organization theory."

A BEGINNING: ENTHUSIASTIC BUT INCOMPLETE

We have embraced general systems theory but, really, how completely? We could review a vast literature in modern organization theory which has explicitly or implicitly adopted systems theory as a frame of reference, and we have investigated in detail a few representative examples of the literature in assessing the "state of the art" [18, 19, 22, 23, 31, 38]. It was found that most of these books professed to utilize general systems theory. Indeed, in the first few chapters, many of them did an excellent job of presenting basic systems concepts and showing their relationship to organizations; however, when they moved further into the discussion of more specific subject matter, they departed substantially from systems theory. The studies appear to use a "partial systems approach" and leave for the reader the problem of integrating the various ideas into a systemic whole. It also appears that many of the authors are unable, because of limitations of knowledge about subsystem relationships, to carry out the task of using general systems theory as a conceptual basis for organization theory.

Furthermore, it is evident that each author had many "good ideas" stemming from the existing body of knowledge or current research on organizations which did not fit neatly into a "systems model." For example, they might discuss leadership from a relatively closed-system point of view

and not consider it in relation to organizational technology, structure, or other variables. Our review of the literature suggests that much remains to be done in applying general systems theory to organization theory and management practice.

SOME DILEMMAS IN APPLYING GST TO ORGANIZATIONS

Why have writers embracing general systems theory as a basis for studying organizations had so much difficulty in following through? Part of this difficulty may stem from the newness of the paradigm and our inability to operationalize "all we think we know" about this approach. Or it may be because we know too little about the systems under investigation. Both of these possibilities will be covered later, but first we need to look at some of the more specific conceptual problems.

Organizations as Organisms

One of the basic contributions of general systems theory was the rejection of the traditional closed-system or mechanistic view of social organizations. But, did general systems theory free us from this constraint only to impose another, less obvious one? General systems theory grew out of the organismic views of von Bertalanffy and other biologists; thus, many of the characteristics are relevant to the living organism. It is conceptually easy to draw the analogy between living organisms and social organizations. "There is, after all, an intuitive similarity between the organization of the human body and the kinds of organizations men create. And so, undaunted by the failures of the human-social analogy through time, new theorists try afresh in each epoch" [2, p. 660]. General systems theory would have us accept this analogy between organism and social organization. Yet, we have a hard time swallowing it whole. Katz and Kahn warn us of the danger:

There has been no more pervasive, persistent, and futile fallacy handicapping the social sciences than the use of the physical model for the understanding of social structures. The biological metaphor, with its crude comparisons of the physical parts of the body to the parts of the social system, has been replaced by more subtle but equally misleading analogies between biological and social functioning. This figurative type of thinking ignores the essential difference between the socially contrived nature of social systems and the physical structure of the machine or the human organism. So long as writers are committed to a theoretical framework based upon the physical model, they will miss the essential social-psychological facts of the highly variable, loosely articulated character of social systems [19, p. 31].

In spite of this warning, Katz and Kahn do embrace much of the general systems theory concepts which are based on the biological metaphor. We must be very cautious about trying to make this analogy too literal. We agree with Silverman who says, "It may, therefore, be necessary to drop the analogy between an organization and an organism: organizations may be systems but not necessarily *natural* systems" [34, p. 31].

Distinction between Organization and an Organization

General systems theory emphasizes that systems are organized—they are composed of interdependent components in some relationship. The social organization would then follow logically as just another system. But, we are perhaps being caught in circular thinking. It is true that all systems (physical, biological, and social) are by definition organized, but are all systems organizations? Rapoport and Horvath distinguish “organization theory” and “the theory of organizations” as follows:

We see organization theory as dealing with general and abstract organizational principles; it applies to any system exhibiting organized complexity. As such, organization theory is seen as an extension of mathematical physics or, even more generally, of mathematics designed to deal with organized systems. The theory of organizations, on the other hand, purports to be a social science. It puts real human organizations at the center of interest. It may study the social structure of organizations and so can be viewed as a branch of sociology; it can study the behavior of individuals or groups as members of organizations and can be viewed as a part of social psychology; it can study power relations and principles of control in organizations and so fits into political science [30, pp. 74-75].

Why make an issue of this distinction? It seems to us that there is a vital matter involved. All systems may be considered to be organized, and more advanced systems may display differentiation in the activities of component parts—such as the specialization of human organs. However, all systems *do not* have purposeful entities. Can the heart or lungs be considered as purposeful entities in themselves or are they only components of the larger purposeful system, the human body? By contrast, the social organization is composed of two or more purposeful elements. “An organization consists of elements that have and can exercise their own wills” [1, p. 669]. Organisms, the foundation stone of general systems theory, do not contain purposeful elements which exercise their own will. This distinction between the organism and the social organization is of importance. In much of general systems theory, the concern is primarily with the way in which the *organism* responds to environmentally generated inputs. Feedback concepts and the maintenance of a steady state are based on internal adaptations to environmental forces. (This is particularly true of cybernetic models.) But, what about those changes and adaptations which occur from *within* social organizations? Purposeful elements within the social organization may initiate activities and adaptations which are difficult to subsume under feedback and steady state concepts.

Opened and Closed Systems

Another dilemma stemming from general systems theory is the tendency to dichotomize all systems as opened or closed. We have been led to think of physical systems as closed, subject to the laws of entropy, and to think of biological systems as open to their environment and, possibly, becoming negentropic. But applying this strict polarization to social organizations creates many difficulties. In fact, most social organizations and their subsystems are “partially open” and “partially closed.” Open and closed

are a matter of degree. Unfortunately, there seems to be a widely held view (often more implicit than explicit) that *open-system thinking is good and closed-system thinking is bad*. We have not become sufficiently sophisticated to recognize that both are appropriate under certain conditions. For example, one of the most useful conceptualizations set forth by Thompson is that the social organization *must seek* to use closed-system concepts (particularly at the technical core) to reduce uncertainty and to create more effective performance at this level.

Still Subsystems Thinking

Even though we preach a general systems approach, we often practice subsystems thinking. Each of the academic disciplines and each of us personally have limited perspective of the system we are studying. While proclaiming a broad systems viewpoint, we often dismiss variables outside our interest or competence as being irrelevant, and we only open our system to those inputs which we can handle with our disciplinary bag of tools. We are hampered because each of the academic disciplines has taken a narrow "partial systems view" and find comfort in the relative certainty which this creates. Of course, this is not a problem unique to modern organization theory. Under the more traditional process approach to the study of management, we were able to do an admirable job of delineating and discussing planning, organizing, and controlling as separate activities. We were much less successful in discussing them as integrated and interrelated activities.

How Does Our Knowledge Fit?

One of the major problems in utilizing general systems theory is that we know (or think we know) more about certain relationships than we can fit into a general systems model. For example, we are beginning to understand the two-variable relationship between technology and structure. But, when we introduce another variable, say psychosocial relationships, our models become too complex. Consequently, in order to discuss all the things we know about organizations, we depart from a systems approach. Perhaps it is because we know a great deal more about the elements or subsystems of an organization than we do about the interrelationships and interactions between these subsystems. And, general systems theory forces us to consider those relationships about which we know the least—a true dilemma. So we continue to elaborate on those aspects of the organization which we know best—a partial systems view.

Failure to Delineate a Specific System

When the social sciences embraced general systems theory, the total system became the focus of attention and terminology tended toward vagueness. In the utilization of systems theory, we should be more precise in

delineating the specific system under consideration. Failure to do this leads to much confusion. As Murray suggests:

I am wary of the word "system" because social scientists use it very frequently without specifying which of several possible different denotations they have in mind; but more particularly because, today, "system" is a highly cathected term, loaded with prestige; hence, we are all strongly tempted to employ it even when we have nothing definite in mind and its only service is to indicate that we subscribe to the general premise respecting the interdependence of things—basic to organismic theory, holism, field theory, interactionism, transactionism, etc. . . . When definitions of the units of a system are lacking, the term stands for no more than an article of faith, and is misleading to boot, insofar as it suggests a condition of affairs that may not actually exist [27, pp. 50-51].

We need to be much more precise in delineating both the boundaries of the system under consideration and the level of our analysis. There is a tendency for current writers in organization theory to accept general systems theory and then to move indiscriminately across systems boundaries and between levels of systems without being very precise (and letting their readers in on what is occurring). James Miller suggests the need for clear delineation of levels in applying systems theory, "It is important to follow one procedural rule in systems theory in order to avoid confusion. Every discussion should begin with an identification of the level of reference, and the discourse should not change to another level without a specific statement that this is occurring" [25, p. 216]. Our field is replete with these confusions about systems levels. For example, when we use the term "organizational behavior" are we talking about the way the organization behaves as a system or are we talking about the behavior of the individual participants? By goals, do we mean the goals of the organization or the goals of the individuals within the organization? In using systems theory we must become more precise in our delineation of systems boundaries and systems levels if we are to prevent confusing conceptual ambiguity.

Recognition That Organizations Are "Contrived Systems"

We have a vague uneasiness that general systems theory truly does not recognize the "contrived" nature of social organizations. With its predominate emphasis on natural organisms, it may understate some characteristics which are vital for the social organization. Social organizations do not occur naturally in nature; they are contrived by man. They have structure; but it is the structure of events rather than of physical components, and it cannot be separated from the processes of the system. The fact that social organizations are contrived by human beings suggests that they can be established for an infinite variety of purposes and do not follow the same life-cycle patterns of birth, growth, maturity, and death as biological systems. As Katz and Kahn say:

Social structures are essentially contrived systems. They are made of men and are imperfect systems. They can come apart at the seams overnight, but they can also outlast by centuries the biological organisms which originally created them. The cement which holds them together is essentially psychological rather than biological. Social systems are anchored in the attitudes, perceptions, beliefs, motivations, habits, and expectations of human beings [19, p. 33].

Recognizing that the social organization is contrived again cautions us against making an exact analogy between it and physical or biological systems.

Questions of Systems Effectiveness

General systems theory with its biological orientation would appear to have an evolutionary view of system effectiveness. That living system which best adapts to its environment prospers and survives. The primary measure of effectiveness is perpetuation of the organism's species. Teleological behavior is therefore directed toward survival. But, is survival the only criterion of effectiveness of the social system? It is probably an essential but not all-inclusive measure of effectiveness.

General systems theory emphasizes the organism's survival goal and does not fully relate to the question of the effectiveness of the system in its suprasystem—the environment. Parsonian functional-structural views provide a contrast. "The *raison d'être* of complex organizations, according to this analysis, is mainly to benefit the society in which they belong, and that society is, therefore, the appropriate frame of reference for the evaluation of organizational effectiveness" [41, p. 896].

But, this view seems to go to the opposite extreme from the survival view of general systems theory—the organization exists to serve the society. It seems to us that the truth lies somewhere between these two viewpoints. And it is likely that a systems viewpoint (modified from the species survival view of general systems theory) will be most appropriate. Yuchtman and Seashore suggest:

The organization's success over a period of time in this competition for resources—i.e., its bargaining position in a given environment—is regarded as an expression of its overall effectiveness. Since the resources are of various kinds, and the competitive relationships are multiple, and since there is interchangeability among classes of resources, the assessment of organizational effectiveness must be in terms not of any single criterion but of an open-ended multidimensional set of criteria [41, p. 891].

This viewpoint suggests that questions of organizational effectiveness must be concerned with at least three levels of analysis. The level of the environment, the level of the social organization as a system, and the level of the subsystems (human participants) within the organization. Perhaps much of our confusion and ambiguity concerning organizational effectiveness stems from our failure to clearly delineate the level of our analysis and, even more important, our failure really to understand the relationships among these levels.

Our discussion of some of the problems associated with the application of general systems theory to the study of social organizations might suggest that we completely reject the appropriateness of this model. On the contrary, we see the systems approach as the new paradigm for the study of organizations; but, like all new concepts in the sciences, one which has to be applied, modified, and elaborated to make it as useful as possible.

SYSTEMS THEORY PROVIDES THE NEW PARADIGM

We hope the discussion of GST and organizations provides a realistic appraisal. We do not want to promote the value of the systems approach as a matter of faith; however, we do see systems theory as vital to the study of social organizations and as providing the major new paradigm for our field of study.

Thomas Kuhn provides an interesting interpretation of the nature of scientific revolution [20]. He suggests that major changes in all fields of science occur with the development of new conceptual schemes or "paradigms." These new paradigms do not just represent a step-by-step advancement in "normal" science (the science generally accepted and practiced) but, rather, a revolutionary change in the way the scientific field is perceived by the practitioners. Kuhn says:

The historian of science may be tempted to exclaim that when paradigms change, the world itself changes with them. Led by a new paradigm, scientists adopt new instruments and look in new places. Even more important, during revolutions scientists see new and different things when looking with familiar instruments in places they have looked before. It is rather as if the professional community has been suddenly transported to another planet where familiar objects are seen in a different light and are joined by unfamiliar ones as well. . . . Paradigm changes do cause scientists to see the world of their research-engagement differently. Insofar as their only recourse to that world is through what they see and do, we may want to say that after a revolution scientists are responding to a different world [20, p. 110].

New paradigms frequently are rejected by the scientific community. (At first they may seem crude and limited—offering very little more than older paradigms.) They frequently lack the apparent sophistication of the older paradigms which they ultimately replace. They do not display the clarity and certainty of older paradigms which have been refined through years of research and writing. But, a new paradigm does provide for a "new start" and opens up new directions which were not possible under the old. "We must recognize how very limited in both scope and precision a paradigm can be at the time of its first appearance. Paradigms gain their status because they are more successful than their competitors in solving a few problems that the group of practitioners has come to recognize as acute. To be more successful is not, however, to be either completely successful with a single problem or notably successful with any large number" [20, p. 23].

Systems theory does provide a new paradigm for the study of social organizations and their management. At this stage it is obviously crude and lacking in precision. In some ways it may not be much better than older paradigms which have been accepted and used for a long time (such as the management process approach). As in other fields of scientific endeavor, the new paradigm must be applied, clarified, elaborated, and made more precise. But, it does provide a fundamentally different view of the

reality of social organizations and can serve as the basis for major advancements in our field.

We see many exciting examples of the utilization of the new systems paradigm in the field of organization and management. Several of these have been referred to earlier [7, 13, 19, 22, 23, 24, 31, 38], and there have been many others. Burns and Stalker made substantial use of systems views in setting forth their concepts of mechanistic and organic managerial systems [8]. Their studies of the characteristics of these two organization types lack precise definition of the variables and relationships, but their colleagues have used the systems approach to look at the relationship of organizations to their environment and also among the technical, structural, and behavioral characteristics within the organization [24]. Chamberlain used a system view in studying enterprises and their environment, which is substantially different from traditional microeconomics [9]. The emerging field of "environmental sciences" and "environmental administration" has found the systems paradigm vital.

Thus, the systems theory paradigm is being used extensively in the investigation of relationships between subsystems within organizations and in studying the environmental interfaces. But, it still has not advanced sufficiently to meet the needs. One of the major problems is that the practical need to deal with comprehensive systems of relationships is overrunning our ability to fully understand and predict these relationships. *We vitally need the systems paradigm but we are not sufficiently sophisticated to use it appropriately.* This is the dilemma. Do our current failures to fully utilize the systems paradigm suggest that we reject it and return to the older, more traditional, and time-tested paradigms? Or do we work with systems theory to make it more precise, to understand the relationships among subsystems, and to gather the informational inputs which are necessary to make the systems approach really work? We think the latter course offers the best opportunity.

Thus, we prefer to accept current limitations of systems theory, while working to reduce them and to develop more complete and sophisticated approaches for its application. We agree with Rapoport who says:

The system approach to the study of man can be appreciated as an effort to restore meaning (in terms of intuitively grasped understanding of wholes) while adhering to the principles of *disciplined* generalizations and rigorous deduction. It is, in short, an attempt to make the study of man both scientific and meaningful [7, p. xxii].

We are sympathetic with the second part of Rapoport's comment, the need to apply the systems approach but to make disciplined generalizations and rigorous deductions. This is a vital necessity and yet a major current limitation. We do have some indication that progress (although very slow) is being made.

WHAT DO WE NEED NOW?

Everything is related to everything else—but how? General systems theory provides us with the macro paradigm for the study of social organizations. As Scott and others have pointed out, most sciences go through a macro-micro-macro cycle or sequence of emphasis [33]. Traditional bureaucratic theory provided the first major macro view of organizations. Administrative management theorists concentrated on the development of macro “principles of management” which were applicable to all organizations. When these macro views seemed incomplete (unable to explain important phenomena), attention turned to the micro level—more detailed analysis of components or parts of the organization, thus the interest in human relations, technology, or structural dimensions.

The systems approach returns us to the macro level with a new paradigm. General systems theory emphasizes a very high level of abstraction. Phillips classifies it as a third-order study [29] that attempts to develop macro concepts appropriate for all types of biological, physical, and social systems.

In our view, we are now ready to move down a level of abstraction to consider second-order systems studies or midrange concepts. These will be based on general systems theory but will be more concrete and will emphasize more specific characteristics and relationships in social organizations. They will operate within the broad paradigm of systems theory but at a less abstract level.

What should we call this new midrange level of analysis? Various authors have referred to it as a “contingency view,” a study of “patterns of relationships,” or a search for “configurations among subsystems.” Lorsch and Lawrence reflect this view:

During the past few years there has been evident a new trend in the study of organizational phenomena. Underlying this new approach is the idea that the internal functioning of organizations must be consistent with the demands of the organization task, technology, or external environment, and the needs of its members if the organization is to be effective. Rather than searching for the panacea of the one best way to organize under all conditions, investigators have more and more tended to examine the functioning of organizations in relation to the needs of their particular members and the external pressures facing them. Basically, this approach seems to be leading to the development of a “contingency” theory of organization with the appropriate internal states and processes of the organization contingent upon external requirements and member needs [21, p. 1].

Numerous others have stressed a similar viewpoint. Thompson suggests that the essence of administration lies in understanding basic configurations which exist between the various subsystems and with the environment. “The basic function of administration appears to be co-alignment, not merely of people (in coalitions) but of institutionalized action—of technology and task environment into a viable domain, and of organizational design and structure appropriate to it [38, p. 157].

Bringing these ideas together we can provide a more precise definition of the contingency view:

The contingency view of organizations and their management suggests that an organization is a system composed of subsystems and delineated by identifiable boundaries from its environmental suprasystem. The contingency view seeks to understand the interrelationships within and among subsystems as well as between the organization and its environment and to define patterns of relationships or configurations of variables. It emphasizes the multivariate nature of organizations and attempts to understand how organizations operate under varying conditions and in specific circumstances. Contingency views are ultimately directed toward suggesting organizational designs and managerial systems most appropriate for specific situations.

But, it is not enough to suggest that a "contingency view" based on systems concepts of organizations and their management is more appropriate than the simplistic "principles approach." If organization theory is to advance and make contributions to managerial practice, it must define more explicitly certain patterns of relationships between organizational variables. This is the major challenge facing our field.

Just how do we go about using systems theory to develop these mid-range or contingency views. We see no alternative but to engage in intensive comparative investigation of many organizations following the advice of Blau:

A theory of organization, whatever its specific nature, and regardless of how subtle the organizational processes it takes into account, has as its central aim to establish the constellations of characteristics that develop in organizations of various kinds. Comparative studies of many organizations are necessary, not alone to test the hypotheses implied by such a theory, but also to provide a basis for initial exploration and refinement of the theory by indicating the conditions on which relationships, originally assumed to hold universally are contingent. . . . Systematic research on many organizations that provides the data needed to determine the interrelationships between several organizational features is, however, extremely rare [5, p. 332].

Various conceptual designs for the comparative study of organizations and their subsystems are emerging to help in the development of a contingency view. We do not want to impose our model as to what should be considered in looking for these patterns of relationships. However, the tentative matrix shown in Figure II suggests this approach. We have used as a starting point the two polar organization types which have been emphasized in the literature—closed/stable/mechanistic and open/adaptive/organic.

We will consider the environmental suprasystem and organizational subsystems (goals and values, technical, structural, psychosocial, and managerial) plus various dimensions or characteristics of each of these systems. By way of illustration we have indicated several specific subcategories under the Environmental Suprasystem as well as the Goals and Values subsystem. This process would have to be completed and extended to all of the subsystems. The next step would be the development of appropriate descriptive language (based on research and conceptualization) for each relevant characteristic across the continuum of organization types. For example, on the "stability" dimension for Goals and Values we would

FIGURE II

Matrix of Patterns of Relationships between Organization Types and Systems Variables

<i>Organizational Supra- and Subsystems</i>	<i>Continuum of Organization Types</i>	
	<i>Closed/Stable/Mechanistic</i>	<i>Open/Adaptive/Organic</i>
Environmental relationships		
General nature	Placid	Turbulent
Predictability	Certain, determinate	Uncertain, indeterminate
Boundary relationships	Relatively closed; limited to few participants (sales, purchasing, etc.); fixed and well-defined	Relatively open; many participants have external relationships; varied and not clearly defined
Goals and values		
Organizational goals in general	Efficient performance, stability, maintenance	Effective problem-solving, innovation, growth
Goal set	Single, clear-cut	Multiple, determined by necessity to satisfy a set of constraints
Stability	Stable	Unstable
Technical		
Structural		
Psychosocial		
Managerial		

have High, Medium, and Low at appropriate places on the continuum. If the entire matrix were filled in, it is likely that we would begin to see discernible patterns of relationships among subsystems.

We do not expect this matrix to provide *the* midrange model for everyone. It is highly doubtful that we will be able to follow through with the field work investigations necessary to fill in all the squares. Nevertheless, it does illustrate a possible approach for the translation of more abstract general systems theory into an appropriate midrange model which is relevant for organization theory and management practice. Frankly, we see this as a major long-term effort on the part of many researchers, investigating a wide variety of organizations. In spite of the difficulties involved in such research, the endeavor has practical significance. Sophistication in the study of organizations will come when we have a more complete understanding of organizations as total systems (configurations of subsystems) so that we can prescribe more appropriate organizational designs and managerial systems. Ultimately, organization theory should serve as the foundation for more effective management practice.

APPLICATION OF SYSTEMS CONCEPTS TO MANAGEMENT PRACTICE

The study of organizations is an applied science because the resulting knowledge is relevant to problem-solving in on-going institutions. Contributions to organization theory come from many sources. Deductive and inductive research in a variety of disciplines provide a theoretical base of propositions which are useful for understanding organizations and for managing them. Experience gained in management practice is also an important input to organization theory. In short, management is based on the body of knowledge generated by practical experience *and* eclectic scientific research concerning organizations. The body of knowledge developed through theory and research should be translatable into more effective organizational design and managerial practices.

Do systems concepts and contingency views provide a panacea for solving problems in organizations? The answer is an emphatic *no*; this approach does not provide "ten easy steps" to success in management. Such cookbook approaches, while seemingly applicable and easy to grasp, are usually shortsighted, narrow in perspective, and superficial—in short, unrealistic. Fundamental ideas, such as systems concepts and contingency views, are more difficult to comprehend. However, they facilitate more thorough understanding of complex situations and increase the likelihood of appropriate action.

It is important to recognize that many managers have used and will continue to use a systems approach and contingency views intuitively and implicitly. Without much knowledge of the underlying body of organization

theory, they have an intuitive "sense of the situation," are flexible diagnosticians, and adjust their actions and decisions accordingly. Thus, systems concepts and contingency views are not new. However, if this approach to organization theory and management practice can be made more explicit, we can facilitate better management and more effective organizations.

Practicing managers in business firms, hospitals, and government agencies continue to function on a day-to-day basis. Therefore, they must use whatever theory is available, they cannot wait for the *ultimate* body of knowledge (there is none!). Practitioners should be included in the search for new knowledge because they control access to an essential ingredient—organizational data—and they are the ones who ultimately put the theory to the test. Mutual understanding among managers, teachers, and researchers will facilitate the development of a relevant body of knowledge.

Simultaneously with the refinement of the body of knowledge, a concerted effort should be directed toward applying what we do know. We need ways of making systems and contingency views more usable. Without oversimplification, we need some relevant guidelines for practicing managers.

The general tenor of the contingency view is somewhere between simplistic, specific principles and complex, vague notions. It is a midrange concept which recognizes the complexity involved in managing modern organizations but uses patterns of relationships and/or configurations of subsystems in order to facilitate improved practice. The art of management depends on a reasonable success rate for actions in a probabilistic environment. Our hope is that systems concepts and contingency views, while continually being refined by scientists/researchers/theorists, will also be made more applicable.

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