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A Revolution in Organizational Concepts

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The postwar period has been variously referred to as the postindustrial age or the age of the computer. However, to best appreciate the fundamental changes characteristic of our era, we must address ourselves to the revolutionary new kinds of thinking being considered and adopted throughout our society. Analyzing traditional patterns of thought and conceptualization, Dr. Ackoff demonstrates how modern approaches to problem solving differ fundamentally in philosophic terms from past practices. He suggests that all major organizational questions facing us today relate either to system design or the relationship of the organization with its human and natural environments.

A REVOLUTION IN ORGANIZATIONAL CONCEPTS

An article

by

Professor Russell L. Ackoff

A person's ability to manage his own affairs or those of any public or private organization or institution depends less on the methods, techniques, and tools that he employs than on his understanding of, and attitudes toward, the world that contains him and the groups of which he is a part. Put another way, his success depends more on his *weltanshauung*—his view of the world, and the philosophy he lives by, than it does on his science. The reasons for this are neither complex nor obscure.

Successful management of any individual or collective effort requires finding the right solutions to the right problems. We fail more often because we obtain the right solutions to the wrong problems than because we get the wrong solutions to the right problems. The present worldwide concern with readjusting both personal and public priorities derives from recognition of this fact; it reflects a greater and more pervasive concern with the problems we have failed to face than with those we have faced unsuccessfully.

The problems to which we address ourselves and the way we formulate them depend more on our philosophy and world-view than on our science. Furthermore, our ability to use science effectively even on the right problems depends critically on our philosophy and world-view. Both of these in turn depend on the concepts we use to organize our perceptions of the world. Changes in these *organizing concepts* move societies from one era to another and move individuals from one stage of development to another. We are now in the early phases of a change from one era to another and hence are in the midst of a change of organizing

concepts, philosophy, and world-view. These changes are both the producers and the products of a new technology that is transforming the First into the Second Industrial Revolution.

For more than a century preceding World War II our organizing concepts were provided by the physical sciences. These concepts were *matter* and *force*. Man developed an image of Nature that consisted of indivisible particles of matter and forces which they exerted on each other. Particles and forces were related by deterministic causal laws in such a way as to yield a mechanical clocklike image of the world. (This clock was usually taken to have been wound by God, although some, like LaPlace, believed it to be a self-winding mechanism.) In this view the present state of the world was taken to be completely determined by the past and the future to be completely determined by the present. Choice and free will were treated either as illusions or an as yet unexplained mechanical phenomenon.

Matter and *force* were used both literally and figuratively to describe and explain every type of phenomenon, including the psychological and social. For example, Freud conceptualized personality as having three individual parts —the id, ego, and superego--and a set of drives, needs, desires, instincts, and motives or, in short, forces that these parts exerted on each other. Social physicists treated communities like planets with their masses concentrated at their center of gravity and applied the laws of gravity to them; for example, "the amount of travel between two communities is directly proportional to the size of their populations and inversely proportional to the square of the distance between them."

The mode of thought by which the concepts *matter* and *force* were dealt with was analytical. Objects, events, and their properties were decomposed (reduced) into simpler (if not ultimately simple) parts. Efforts were then made to understand these parts. The explanations of these parts, once obtained, were assembled into an explanation of the whole. Problems were similarly treated. They were "broken down to size"; that is, decomposed or reduced to smaller problems, each of which could be solved. These partial solutions were then hopefully organized into a solution of the whole.

The First Industrial Revolution was both a producer and product of the concepts *matter* and *force*, the mechanical image of Nature based on them, and the analytical mode of thought. This revolution consisted of the development and use of machines to replace man as a source of physical work; the movement of matter through space. Through work study, physical work was reduced to a set of work elements. Machines were developed to perform as many of these as were technologically and economically feasible. Men and machines, each usually performing only one work element repetitively, were organized into mass-production processes. The epitome of this process was the assembly line.

In the process of substituting machines for men, men were increasingly treated like machines. The work they were given to do was dehumanized because it was as simple and repetitive as possible and thus allowed little or no room for discretion or judgment. Man's work required as few of his distinctively human characteristics as possible.

The hardware of the First Industrial Revolution consisted of machines that generated power (force) and machines that used this power to move or alter matter (materials). The software of this revolution consisted of the knowledge provided by the application of science to analysis of the work process and the organization of the elements such analysis yielded. The profession which arose to provide this software came to be known as industrial engineering.

Although eras do not have precise beginnings or ends, World War II can be said to have brought with it the beginning of a new era. Thinking men began to develop and employ new organizing concepts. (Only a few of the highlights are cited here.) In 1941 Suzanne Langer argued that over the preceding two decades philosophy had developed a new theme based on the adoption of a new kind of element to replace point-particles as the focus of intellectual man's attention: the *symbol.* Charles W. Morris (1946) laid the foundation for a science of symbols and signs (semiotic) that was concerned with the structure and functioning of these elements and the wholes of which they were a part, *languages.* In 1949 Claude Shannon published his mathematical theory of *communication* which focused attention on this more general process. Norbert Wiener (1948), who had collaborated with Shannon, saw communication as an aspect of a still larger process, *control.* He was particularly interested in control of what he called teleological mechanisms, mechanisms whose behavior could not be satisfactorily explained within a deterministic image of Nature. (He called the science of control through communication Cybernetics.) E.A. Singer, Jr. had been writing since the turn of this century on the need for a conceptual system in which purpose and choice had a part. Portions of his work appeared between 1900 and the posthumous publication of his system in 1959. G. Sommerhoff (1950) had reached a similar conclusion quite independently of Singer, and he too developed a conceptual system that incorporated goal-seeking, but not purposeful, behavior. In the 1950's it became increasingly clear that the element which all these and related conceptual developments had in common was that they were concerned with what we call *systems,* particularly systems that seek goals and pursue purposes. Interest in systems grew steadily during the 1950's while Ludwig von Bertalanffy laid the groundwork for what was to emerge as General System Theory.

A *system* is a set of interrelated entities, interrelated in the sense that the effect that any element has on the behavior of the whole depends on at least one other element of the set. That is, no element of the set has an independent effect on the whole, and every element has some effect on the whole. Furthermore, the set cannot be divided into subsets which have independent effects on the whole. For example, the way that the marketing department of a corporation affects the corporation's performance depends on what at least one other department (e.g., production) does, each department affects corporate performance, and these departments cannot be subgrouped so that these subgroups are independent of each other.

Thus a system is an irreducible whole. (Recall that a point-particle is an irreducible part.) Although the parts of a system may themselves be systems, they cannot be independent of each other. However, every system, except the all-inclusive system, is a part of a larger system.

In *systems* thinking the whole replaces the part as the center of attention. This new mode of thinking is based on synthesis rather than on analysis. In the analytic mode, it will be recalled, a problem is decomposed into parts, the solutions to which are assembled into a solution of the whole. In the synthetic mode a problem is treated as part of a larger problem to which a solution is sought, which, when found, is decomposed to obtain a solution to the original part. Analysis is, so to speak, "top down" thinking; synthesis is "bottom up" thinking.

The synthetic mode of thought, when applied to organizational problems, is sometimes called the *systems*

approach to problems.* This approach is based on the observation that the best possible performances of each part of a system taken relative to their objectives seldom add up to the best possible performance of the system as a whole. This is a consequence of the fact that the sum of the objectives of the parts is seldom equal to the objectives of the whole. Correlatively, when a system is operating as well as it can, its parts seldom are operating as well as they can relative to their objectives.

The validity of these assertions can be simply demonstrated as follows. Suppose we collect one each of every model of currently available automobile in one large garage. Suppose that we then engage some topflight automotive engineers to determine which of these cars has the best carburetor. When they have done so, we note the result. Then we ask them to do the same for transmissions, and so on through each part required to make an automobile. When completed, we ask them to detach the best parts they have found and assemble them into what we might expect to be the best possible automobile. They would not be able to do so because the parts would not fit together. In a system, performance of the whole depends critically on how the parts fit together and not merely on how they perform individually. Even if the parts selected in our experiment could be fitted together, we would not be likely to obtain a good automobile because the parts would not work well together. Again, the relationship between the parts is as critical as the performance of the parts taken separately.

In the mechanistic mode of thought, cause-effect is the central relationship, but in the teleological mode it is producer-product. A cause is a necessary and sufficient condition for its effect; without the cause the effect could not occur and with it, it must occur. A producer is a necessary but insufficient condition for its product; without the producer the product could not occur but with it, it may or may not occur, depending on other conditions. Hence production is probabilistic or nondeterministic causality. An acorn, for example, is necessary but insufficient for an oak; many environmental conditions (e.g., moisture, nutrients, et cetera) must be satisfied before an oak is produced.

Because producer-product deals with what is necessary but insufficient, it is an open rather than a closed system concept. A closed system is one that has no environment, no external influences over its behavior. An open system does have such influences operating on it. Every producer must have at least one coproducer (e.g., its environment). How coproducers interact is critical. Hence production is a systems-oriented relationship.

The concepts *symbol, communication, control,* and *system,* together with the producer-product relationship, are both producers and products of the Second Industrial Revolution. But this relationship is also based on three technological developments, the first two of which occurred during the First Industrial Revolution.

The first technology emerged with the invention of the telephone by Bell in 1876 followed by that of the wireless by Marconi in 1895. These were followed by radio and television. Such devices mechanized communication, the transmission of symbols. Since symbols have no mass, their movement through space does not constitute physical work. The significance of this fact was not appreciated at the times of invention of communication machines.

The second technology emerged with the development of devices which observe and record the properties of ob-

*C.W. Churchman, *The Systems Approach* (New York: Delacourt Press, 1968); Fred E. Emery, ed., *Systems Thinking* (Harmondsworth, Eng.: Penguin, 1969).

jects and events, instruments of observation. Such machines generate symbols that we call data. The thermometer, humidistat, pressure gauge, ohmmeter, speedometer, and odometer are familiar examples of such instruments. Such instruments were developed to observe either what the human could not observe without mechanical aids or magnitudes or differences too large or small for human observation. Note that observing instruments, like instruments of communication, do not do physical work.

The third and key technology emerged in the second half of the 1940's with the development of the electronic digital computer. This was a machine that could manipulate symbols logically. For this reason it is frequently referred to as a thinking machine.

These three "hardware" developments made it possible to observe, to communicate, and to manipulate symbols logically; they made it possible to mechanize mental work. And this is what the Second Industrial Revolution is all about. We call such mechanization automation.

The development and exploitation of this hardware have required an understanding of the mental processes that are involved in observing, recording, and processing data, communicating it, and using it to make decisions and control our affairs. Many new types of inquiry emerged to provide the necessary understanding. These include inferential statistics and decision theory, communication and information sciences, cybernetics, systems engineering, and operations research. These are increasingly gathered under the umbrella of the *management* or *systems sciences.* These scientific activities, unlike most of their predecessors, are not disciplinary but are interdisciplinary in character. They are the product of a philosophy of science that is integrative and systemic, not reductionist and analytic. This change in the organization of scientific efforts and its products is one of the revolutions with which we should be concerned.

Each new era brings with it solutions to some old problems, or at least the instruments and means by which some of them can be solved. It also brings with it awareness of a host of new problems that are yet to be solved. The problems that are perceived and the way they are formulated are greatly influenced by the organizing concepts of the era.

Among the newly perceived or formulated problems associated with our new era are several major organizing problems, large system problems which enable us to organize the large number of smaller problems by which we are confronted. Through an understanding of these very general and very fundamental problems of our time, we can gain an understanding of the revolutions we are in and what we can do about them.

It should be noted that perception and formulation of problems are the result of an evolutionary, if not a revolutionary, process. The old order does not give up its perceptions of problems or solutions easily. The differences in the perceptions and formulations of problems between the *young* and the *old* is the source of the much publicized *generation gap.* This gap is not a fiction, it is very real. Today it separates children of the First and Second Industrial Revolutions, whatever their ages.

There are many who do not sense that we are in a revolutionary process, or if they do, they do not understand its nature. To these the newfangled ideas and the causes of those who sense the nature of the revolution are the problem. To the new generation the reluctance of the old to change their perceptions is the problem. A revolutionary society is necessarily a divided one; one divided by perceptions, conceptions, and resulting philosophies. Debate

between the parties is usually fruitless because there are few if any commonly accepted assumptions on which agreement can be based. Hence debate becomes ritualized, the taking of a well-defined sequence of verbal postures. When communication breaks down, as it has, public demonstrations and the use of force are resorted to by the weaker of the parties. The only alternative to members of the weaker group is abdication of responsibility for what is going on, often accompanied by voluntary exile from or within the society involved. This phenomenon of "copping out" may express itself in the formation of subcultures (e.g., hippies) or in the use of such instruments of escape as drugs.

Communication between the adversaries in a revolution is essential if survival, let alone progress, of a society is to be realized. Advocates of the *old way* generally do not perceive the needs put into focus by advocates of the *new*, and hence they attempt to protect old values. But they have great skill and knowledge about how to get things accomplished within the system as it exists. That is, they know how to change the system but are not motivated to do so. Advocates of the new, on the other hand, generally perceive the needs but do not know how to go about changing the system to satisfy them.

Our hope in this effort is to provide both sides with a better understanding of the other so that they might come together sufficiently to begin to develop joint programs for an orderly and efficient transition from one era to another. This could enable us to embrace the new without destroying all that is old.

As indicated above, there are three major organizing problems which the new era has raised to consciousness among those who perceive its nature. These are (1) the planning-system design problem, (2) the humanization-of-organizations problem, and (3) the environmentalization-of-organizations problem.

The Planning-System Design Problem. It was characteristic of the analytical mode of thought to break down unsatisfactory states or situations into a set of problems to be solved relatively independently of each other. Thus problem solving became a focus of both the practical man of affairs and the principled man of ideas. The philosophy of science emerged as a discipline devoted to the development of methods of solving problems more effectively. The technical outputs of these efforts were popularized as "the art of problem solving." Managers of organizations, institutions, and societies were bombarded with advice as to how to go about handling their problems more effectively.

This emphasis was epitomized by the emergence of the case method of instruction at Harvard University. From exposure to descriptions of real problems, the student was expected to learn how to cope with problems, not what the solutions were. Orderly, logical, and systematic procedures for formulating and solving problems were widely sought. On the technical side, theories of inference (e.g., decision theory) emerged at the center of the stage. Great attention was given to the nature of a solution to a problem and to ways of determining whether a problem had any or a unique solution, and if so, how to recognize it when it was obtained. Methods of *satisfying*, getting a good enough solution, and *optimizing*, getting the best possible solution, were proposed, evaluated, and used.

A new view of problems and their solutions is arising, however. This view is based on two observations. First, a problem is not a given starting point of inquiry but the result of abstraction; it is a part of an unsatisfactory situation extracted from it by analysis. The prob-

lematic situation from which problems are abstracted is now conceptualized as a *system of problems* and hence is now taken as being incapable of being decomposed into independent problems. Thus the currently perceived need is for the ability to cope with systems of problems in an integrated way.

Treatment of a system of problems as a system is called *planning*. To plan is to cope with a system of problems as a system, as an indivisible whole which is a part of a larger system of problems.

Secondly, in the era in which the world was viewed as a closed system to be understood by analysis, ultimate and final solutions to problems, true solutions were accepted as attainable and real. It was an era which John Dewey characterized by its "quest for certainty."

In an era in which systems are perceived as open and hence dynamic, problems and their solutions are perceived as still photographs of a moving process. Both problems and their solutions are in constant flux. Problems do not stay solved. The systems that have them are constantly changing and so are their environments. Thus, not only do solutions become obsolete, but so do the problems to which they are addressed.

For these reasons the new perception of need is for problem solving or, better still, planning systems; that is, for systems which can anticipate or detect problems, solve them under existing conditions, and keep them solved under changing conditions. In brief, problem solving and planning is no longer conceptualized as a discrete process with a beginning and end, but as a continuous process, and not as a process conducted independently for different problems, but as one which is a part of a system of solving a system of problems.

Humanization of Organizations. During the First Industrial Revolution we tended to think of organized human activities and the organizations that contained them (be they institutions, governments, or corporations) as though they were *mechanisms* or *organisms*. Both are functioning wholes whose parts have a necessary but insufficient function to perform relative to that of the whole. A mechanism is an entity which may serve the purposes of another but which has no purpose of its own. An organism may have purposes of its own and hence seems to be a better analog to organizations. But it is a misleading analog. Organisms have functioning parts, organs, but these have no purposes of their own. The parts of an organization do.

Treating an organization as a mechanism or organism leads to treatment of its parts, which are human beings, as dehumanized entities. We have already remarked that in the First Industrial Revolution humans were often treated like the machines that were used to replace them. This was true particularly for those who were considered to be a part of the group called labor, the ones who performed physical work. Those who were engaged in mental work—clerks, staff and managerial personnel—were usually treated more like organs; components whose adherence to organizational needs were taken for granted with little or no concern for their own needs or objectives. Such treatment of managers is described by E.E. Jennings as follows:

> Company took precedence over family. The most loyal came to work early, stayed late, took their work home, worked weekends and seldom took a vacation. Where they lived, how they lived, what they did in the community, evidenced this devotion to company. Private life ceased to exist apart from company life. The higher a man went, the more responsibility and, hence, less freedom to live privately.

Without regard to the effect on

his marriage and his family, the husband often was sent away on trips and ordered dictatorially to pack up family and move here or there. Rejection of a promotion, or a move, was an unpardonable sin. The excuse that the wife did not want to move was not considered legitimate, as it indicated that a man could not manage his wife and family. If he could not get the loyalty of his wife and family, how could he expect to get the loyalty of his subordinates? Family life became just another cog in the corporate machine.*

Life of the university or government administrator was not significantly different from that of the corporate manager.

The physicobiological orientation toward organizations and their personnel led to significant increases in productivity during the age of mechanization. But it has become increasingly clear that previous rates of increase in productivity are no longer being attained. The declining rate of productivity is being explained by the increasing incompatibility of personal and organizational objectives.

With increasingly sophisticated machines and automations, the portion of the work force engaged in physical work has decreased, and the portion engaged in mental work has increased. The level of competence required of workers has thus increased, and it has done so more rapidly than have their skills. Hence there is a growing shortage of competence. Those who are competent tend to be more mobile and less inclined to act out of loyalty to organizations. They consider themselves to be professionals and, as such, direct their principal loyalties to concepts of self-realization. Thus their interests have become increasingly relevant to organizations seeking their skills. E.E. Jennings described this change vividly:

> Then came World War II, and masses of people were on the move. Labor went to the munitions factories, wives broke out of their traditional roles to flood the work force, children and families were uprooted, and sons went off to war, many never to return to their place of birth.
>
> Economic growth exploded, and corporations discovered that they had to have more thinkers at the top. And innovation was needed at all levels; no one person could possibly know enough to maintain corporate viability.
>
> Corporations began placing their chips on young men not yet mesmerized by the loyalty ethic.
>
> The massive geriatric hypo bred the youngest generation of top executives in our history. The average age of new presidents dropped from 57 to 49 between 1949 and 1969. Rather than taking 30 years to climb to the top, it now took 20 years.
>
> Young executives grew self-confident that they could manage their own careers. They were no longer content to sit and wait for a truck to run over a superior who was a few years older or younger. When they saw their upward mobility arrested, they opted for opportunities elsewhere . . .
>
> The most mobile had the best chance to achieve and acquire experience; mobility bred competency that in turn bred mobility. Rapid executive changeover became a fact of life.*

The young, competent, and mobile generation was raised in predominantly permissive families. People under 30 are

*E.E. Jennings, "The Worlds of the Executive," *TWA Ambassador*, 4, 1971, p. 29.

**Ibid.*

sometimes referred to as the "Spock Generation." Those over 30, or at least 35, and under 65, spent part of their youth in the Great Depression during which permissiveness to youth was a luxury that could not be afforded. In addition, the 1920's and 1930's were too close to the Victorian era to have completely broken with the authoritarian concept of the family. The family was a kingdom ruled by a father. Clarence Day pictured the prototype in his *Life with Father.*

The products of permissiveness are not about to accept dictation by others, individuals or organizations. Hence the almost universal sequence of protests on behalf of *participation.* Throughout the world, young people and those who have been suppressed or exploited have been raising their voices in demands for a voice in the processes that produce decisions that affect their futures.

The young want to vote, help run their schools, and have a say as to which wars they will or will not fight in. The disadvantaged, like the Blacks, Mexicans, and Puerto Ricans in the United States, want to control the efforts to elevate and develop them. One Black self-development group operates under the slogan: "Plan or be planned for." To be planned for, however well, is no longer acceptable. To plan for oneself, however poorly, is more acceptable.

Women around the world are trying to "liberate" themselves, but "liberation" is synonymous with equal participation to them.

Still another aspect of the past has contributed to this emerging demand for participation. Consider the development of governmental structure. When the United States attained its independence and formed its government, its population was about 2½ million. The government created had three levels: local, State, and Federal. Because the basic unit of government was small, significant participation in its decision-making by the citizenry was possible.

The structure of our government has not changed despite a growth in population of almost a hundred times. Many cities now have a population that exceeds by several times that of the whole country at the time the government was formed. Members of units of government that are as large as ours now are, can have little or no sense of participation in that government. They cannot seriously accept its claim to be a government for and by the people.

Institutions and organizations other than those of governments have been equally unresponsive to the need for relevant participation. The university is a conspicuous example. Most universities have the same structure they had when their student bodies numbered a few hundred. A student who is one of several hundred, if not several thousand, following a curriculum can have little sense of participation in the direction of that curriculum.

To summarize, in the past it was assumed, and usually correctly, that humans would accommodate their objectives to those of the organizations and institutions of which they are part. This assumption was realistic in a period when *economic insecurity* was pervasive. With increased education and social security, the threat of economic destitution has diminished for most in our society. Hence there is a growing concern with bringing organizational objectives into accord with individual objectives and with giving members of organizations a voice in its control. This concern we call a concern with the *humanization of organizations.*

Environmentalization of Organizations. In the last era, organizations were conceptualized in such a way as to minimize, if not obscure, the significance of their interactions with their environments. Each organization was expected to look out for itself and to be concerned with others only insofar as its specified function required it. For

example, an industrial organization was expected to concern itself only with external suppliers of the resources it needed and with consumption of its goods or services. Its function was taken to be to produce goods or services profitably and thus produce wealth to be distributed to its owners. If it pursued this objective in accordance with the laws of the land, it was required to give no further consideration to what effects its activity might have on its social or physical environment. With typically analytical rationalization, it was argued that if each element of the economic system (supplier, producer, and consumer) pursued its objectives as efficiently as possible the system as a whole would prosper maximally.

Furthermore, the economic system that contained such firms was kept as closed as possible. We tried to develop an autonomous, self-sufficient economic system, one protected from the international economic environment by tariffs and laws. To the extent possible, we tried to produce and consume our own wealth and let other economic systems solve their own problems.

The complacency bred by this brand of economic thinking has been severely disturbed by those who have failed to share in the fruits of the economy produced by this kind of thinking. The poor in developed economies are forcing diversion of attention from the production of wealth to its distribution, and this is an environmental problem.

Furthermore, as our capacity to produce and consume grew we became increasingly dependent on foreign sources of supply and foreign markets for consumption of our output. Economic growth and economic isolation could not be maintained simultaneously. As a result we have begun to think of the world as an economic system and of our economy as a part of it, a part that is highly interactive with other parts.

Similarly, we have experienced the emergence of the multinational firm, the likes of which account for a very rapidly increasing portion of the world's GNP. Such firms must conceptualize themselves and their environments as open systems.

Economic organizations have always had to consider their customers but not their needs or best interests, except as they affected their propensity to consume. This is rapidly being changed by the rise of *consumerism*, a movement which holds the producer responsible for the direct and indirect physical and psychological consequences of use or consumption of its products or services.

Still another pressure on economic organizations is being applied by the ecological movement which accuses industry of indiscriminately polluting our air, land, and water. Legislation littered products, products that burden our solid-waste systems, and contaminators are increasing rapidly. All this is forcing firms to become more aware of their interaction with their physical environment.

BIOGRAPHIC SUMMARY

Professor Russell L. Ackoff did both his undergraduate and graduate work at the University of Pennsylvania, earning his Ph.D. from that institution in 1947. He has served on the faculties of Wayne University, Case Institute of Technology, the University of Birmingham, England; and since 1964 has been with the University of Pennsylvania as Professor of City Planning, thence as Chairman of the Department of Statistics and Operations Research, and presently as member of the faculty of the Wharton School of Finance and Commerce. Some of Professor Ackoff's publications include *A Manager's Guide to Operations* (1963) (coauthor), *Fundamentals of Operations Research* (1968) (coauthor), and *A Concept of Corporate Planning* (1970).

In brief, we are being forced to reconceptualize our economic organizations and the economies that contain them as open systems that are interactive with their environments in ways that are critical for our well-being, if not survival.

Economic institutions are by no means the only ones that were thought of as essentially closed or as part of a larger closed system. Schools and school systems, universities and the communities that contain them, transportation modes and transportation systems, doctors, hospitals and health systems, and criminals and the correctional system were all thought of in this way. The results of so doing are becoming more and more apparent in the deterioration of the quality of our social and physical environment. Our problem is to make organizations within our social system interact with their environments in more constructive ways without destroying the effectiveness of such organizations relative to the purpose for which they were created.

Conclusion. Further studies will show that the various revolutions we face today can be traced to one or some combination of the three problems that we have discussed in this paper: planning-system design, humanization of organizations, and environmentalization of organizations. Thus the challenge confronting those who would lead America through this period of transition is to seek understanding of the issues involved in these revolutions, the nature of the change in our society, and the means by which these issues might be directed into progressive and constructive directions.

Ψ

Whatever tends to standardize the community, to establish fixed and rigid methods of thought, tends to fossilize society. . . . It is the ferment of ideas, the clash of disagreeing judgments, the privilege of the individual to develop his own thoughts and shape his own character, that makes progress possible.

Calvin Coolidge, 6 October 1919; "Calvin Coolidge," p. 374