



THE NEXT GREAT FRONTIER: DESIGNING MANAGERIAL AND SOCIAL SYSTEMS, PART 1

BY JAY W. FORRESTER



The continued search for better understanding of social and economic systems represents the next great frontier in human development. Frontiers of the past have included creating the written literatures, exploring the geographical limits of earth and space, and penetrating the mysteries of physical science. Those are no longer frontiers; they have become a part of everyday activity. By contrast, insights into behavior of social systems have not advanced in step with our understanding of the natural world. To quote B. F. Skinner:

Twenty-five hundred years ago it might have been said that man understood himself as well as any other part of his world. ... Today he is the thing he understands least. Physics and biology have come a long way, but there has been no comparable development of anything like a science of human behavior. ... Aristotle could not have understood a page of modern physics or biology, but Socrates and his friends would have little trouble in following most current discussions of human affairs.

Consider the contrast between great advances during the last century in understanding technology and the relative lack of progress in understanding economic and managerial systems. Why such a difference? Why has technology advanced so rapidly while social systems continue to exhibit the same kinds of misbehavior decade after decade? I believe the answer lies in failing to recognize that countries and corporations are indeed systems. There is an unwillingness to accept the idea that families, corporations, and governments belong to the same general class of dynamic structures as do chemical refineries and autopilots for aircraft. To admit the existence of a social system is to admit that the relationships between its parts have a strong influence over individual human behavior.

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The idea of a social system implies sources of behavior beyond that of the individual people within the system. Something about the structure of a system determines what happens beyond the sum of individual objectives and actions. In other words, the concept of a system implies that people are not entirely free agents but are substantially responsive to their surroundings.

To put the matter even more bluntly, if human systems are indeed systems, it implies that people are at least partly cogs in a social and economic machine. People play their roles within the totality of the whole system, and they respond in a significantly predictable way to forces brought to bear on them by other parts of the system. This is contrary to our cherished illusion that people freely make their individual decisions. I suggest that the constraints implied by the existence of systems are true in real life. As an example, we see the dominance of the political system over the individual in the evolution of the Federal budget deficit. Every presidential candidate since 1970 has campaigned with the promise to reduce the federal deficit. But the deficit has on the average doubled every four years. The social forces, rather than the president, have been controlling the outcome. How to harness those social forces has not been effectively addressed.

Designing Managerial and Social Systems

In designing an engineering system such as a chemical plant, engineers realize that the dynamic behavior is complicated and that the design cannot be successfully based only on rules of thumb and experience. There would be extensive studies of the stability and dynamic behavior of the chemical processes and their control. Computer models would be built to simulate behavior before construction of even a pilot plant. Then, if the plant were of a new



type, a small pilot plant would be built to test the processes and their control.

But observe how differently social systems are designed. Although political, economic, and managerial systems are far more complex than engineering systems, only intuition and debate have ordinarily been used in building social systems. We change laws, organizational forms, policies, and personnel practices on the basis of impressions and committee meetings, usually without any dynamic analysis adequate to prevent unexpected consequences.

“Designing” social systems or corporations may seem mechanistic or authoritarian. But all governmental laws and regulations, all corporate policies that are established, all computer systems that are installed, and all organization charts that are drawn up constitute partial designs of social systems. Such redesigns are then tested experimentally on the organization as a whole without dynamic modeling of the long-term effects and without first running small-scale pilot experiments. For example, bank deregulation and the wave of corporate mergers in the 1980s constituted major redesigns of our economy with inadequate prior consideration for the results. All systems within which we live have been designed. The shortcomings of those systems result from defective design, just as the shortcomings of a power plant result from inappropriate design.

Effects of Feedback Structure

The feedback structure of an organization can dominate decision making far beyond the realization of people in that system. By a feedback structure, I mean a setting where existing conditions lead to decisions that cause changes in the surrounding conditions, that influence later decisions. That is the setting in which all our actions take place.

We do not live in a unidirectional world in which a problem leads to an action that leads to a solution. Most discussions, whether in board meetings or cocktail parties, imply a structure which suggests that the world is unidirectional, that the problem is static and we need only act to achieve a desired result (see “Open-Loop Impression of the World”).

Instead, we live in an ongoing circular environment in which each action is based on current conditions, such actions affect conditions, and the changed conditions become the basis for future action (see “Closed-Loop Structure of the World”). There is no beginning or end to the process. People are interconnected. Through long, cascaded chains of action, each person is continually reacting to the echo of that person’s past actions as well as to the past actions of others.

In general, social systems carry a set of common characteristics:

- Most difficulties are internally caused, even though there is an overwhelming and misleading

tendency to blame troubles on outside forces.

- The actions that people know they are taking, usually in the belief that the actions are a solution to difficulties, are often the cause of the problems being experienced.
- The very nature of the dynamic feedback structure of a social system tends to mislead people into taking ineffective and even counter-productive action.
- People are sufficiently clear and correct about the reasons for local decision making—they know what information is available and how that information is used in deciding on action. But people often do not understand correctly what overall behavior will result from the complex interconnections of known local actions. ■

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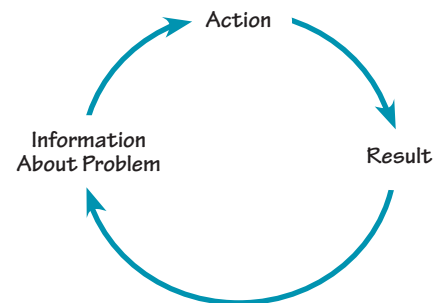
PART TWO OF THIS ARTICLE WILL APPEAR IN THE MAY ISSUE.

OPEN-LOOP IMPRESSION OF THE WORLD



The prevailing view is that the world is unidirectional—a problem leads to an action that leads to a solution.

CLOSED-LOOP STRUCTURE OF THE WORLD



In reality, we live in an ongoing circular environment in which each action is based on current conditions, such actions affect conditions, and the changed conditions become the basis for future action.