Book Review

Cure for Chaos. By Simon Ramo. David McKay Company, Inc., New York (1969). 116 pp. $3.95.

This little book is a straightforward, if somewhat optimistic, account of systems analysis for the layman. Dr. Ramo explains what systems analysis is: how it attempts to deal with problems globally and coherently instead of in fragmented pieces. He succeeds in giving a feel for how systems engineers go about their business—how they use computers, and statistics, and component engineers, and social scientists. The description is elementary and perhaps a little too general; still I think Dr. Ramo succeeds well in conveying to the reader what systems engineering is all about.

The book is entitled *Cure for Chaos*. And, insofar as a coherent, far-reaching analysis of any complex situation helps avoid some unforseen chaotic consequences of technological advance, systems analysis is a cure for chaos. In fact, no one can be against systems analysis. I happen to prefer the more general description, coherent doctrine; but it all adds to the same thing: systematic, interdisciplinary, far-reaching attacks on problems are to be preferred to unsystematic, disciplinary, nearsighted attacks.

Yet I am troubled by Dr. Ramo's great optimism about systems analysis. In the first place, some problems are much more susceptible than others to resolution by the methods of systems engineering. It is not that a systems approach doesn't clarify every problem; it is that in some cases the system is better defined and analyses of it can be implemented much better than in others. Devising an ICBM or even a telephone system where, in both cases, the system is pretty well closed and the decisions as to implementation are in the hands of a single organization, is a different story than is rebuilding the city with its many overlapping jurisdictions. What I am objecting to, though mildly since Dr. Ramo presents his case modestly, is the tendency of some systems analysts to claim for their methodology the qualities of a magical panacea. It would be well for systems analysts to read the admonition contained in the National Academy report, "A Strategic Approach to Urban Research and Development": ". . . some limited success has been achieved in transferring . . . [systems analysis] to very specific subjects, such as transportation, sanitation, and, to a lesser extent, the housing market, by approaching them as 'closed system' problems. The adequacy of the models developed for analysis of these particular problem areas is open to question. What is not a matter of dispute, however, is that they are based on oversimplified assumptions about the patterns and processes of collective behavior."[1]

[1]Report of the Committee on Social and Behavioral Urban Research to the Department of Housing and Urban Development, page 18, National Academy of Sciences, Washington, D.C. (1969).

My second point therefore turns on possibilities other than the "systems approach" for improving things. The antithesis of the systems approach is the "technological fix"—a technological device that doesn't claim to restore order out of chaos, but does remove some of the deleterious effects of chaos. To the systems analysts, and to most social scientists for that matter, such "fixes" are poison. Yet in cases where the system is very complex, and involves too many conflicting aspirations and interests, the "fix" could well be more appropriate and practical than the "system." Take auto transportation, a topic that Ramo rightfully points out is aching for a thorough systems approach. As the author concedes, this is going to take a long time; in the meantime, 50 000 Americans die on the highways every year. A technological fix—a safer car—seems to me to be the realistic thing to do immediately while we wait on the systems engineers.

My final criticism of the systems engineering approach is really more fundamental, and is appreciated by Dr. Ramo. As he says, "Even if we were to conjure up by magic all the statistical data, *our goals are far from clear.*" And this, in many cases, is the nub of the matter. Systems engineering does not establish goals; it provides alternatives. Every systems engineer realizes this, and Ramo is perfectly honest on this point. Yet, in some of the misinformed talk about systems engineering as a near panacea for resolving our social problems, the centrality of goals and values is rather understated. No matter the cleverness of the system and its engineers, every venture in social engineering implies a set of values. Systems engineering for all its elegance and common sense can't really get at the normative questions. These questions have always been the stuff of politics; they will remain to vex us, and to remind us that the systems approach, useful though it may be, can never be the whole answer to the great social problems.

Alvin M. Weinberg

Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

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About the Reviewer: The author of this thoughtful and thought-provoking review is Director of the Oak Ridge National Laboratory, co-author, with Eugene Wigner, of the outstanding book on nuclear chain reactions and a member of the Editorial Advisory Committee of this Journal. Dr. Weinberg is very well known in the scientific community for his perspective regarding science policy and the problems of "big science."