About the Systems System

Computerized hair-tearing called systems analysis is tackling problems that make humans tremble.

by Jonathan Eberhart

Trying to decide what color necktie to wear to the office is a simple matter. All you have to consider are what other colors and patterns you'll be wearing, what tie you wore yesterday, and perhaps, to really complicate things, whether your secretary shares your taste for blue.

The people trying to decide whether to send wheat to India, however, or how to build a moon rocket, or why a letter can get across the country faster than it can reach the next town, don't have it so easy. Many of these problems are so vast that no one has any idea of all the contributing sub-problems, which can run into the tens of thousands in a good, meaty foreign affairs dilemma.

In sending food to a foreign country, for example, planners must consider, besides the obvious things such as cost and means of shipping, items such as: whether religious taboos would allow the citizens to work in a food processing plant; what country made the trucks used to transport the food inland from the docks; whether the food, if it is to be planted in the new country, will respond well to fertilizers in case the new climate doesn't suit it and even, in some cases, the day of the week on which the food is delivered.

None of these items seems particularly likely to be overlooked, but when they are multiplied by reality, the task becomes more difficult. This gives rise to makeshift solutions at best. Expert opinions based on what the jargon calls an "overview" have had to substitute for accurate analysis of all the little factors that affect the outcome of the main problem.

In recent years a new science has evolved, tailored in the process to come to the aid of all the other sciences. Called systems analysis, it has gotten its biggest boost from the space industry, which could scarcely hope that huge rockets and space vehicles, made in pieces by 40 or 50 subcontractors, would work when put together without some overall way of keeping track of all the loose ends.

Systems analysis has all the trappings of a full-fledged science. It has its own jargon, its own experts, its own societies, its own national meetings. An entire branch of the Air Force, as well as parts of the Army, Navy and Coast Guard, are devoted to it.

At the sprawling meeting of the American Association for the Advancement of Science, the systems approach cropped up in a wide range of otherwise unrelated sessions. Geologists, psychologists, biochemists and even theologians endeavored to apply the order of systems theory to the cumbersome problems of their various disciplines.

Even the Department of State was interested. It has recently established a Center for International Systems Research to see if the problems of foreign

Systems says you live here

affairs can be made into mathematical models and solved by computer.

The State Department, in fact, has carried the technique farther than any of its other users have dared. Howard E. Ball, director of the center, stood up at one of the few AAAS sessions devoted especially to systems research, and declared that "the world as we know it is a multi-layered interlocking set of event systems."

He then produced the incredibly complicated diagram shown above: IntWorld '66. Decisions in IntWorld, he said, are "certainly in the hundreds of thousands," and a world-sized system, he admitted, "can be distracting to those who want to emphasize the rational aspects of human behavior." In fact, the system is so involved that it would cost the U.S. about $37 a head annually to run things that way.

Prior to World War II such an idea was not dreamed of. Foreign affairs, said government management specialist Richard Barrett, amounted to "a set of sophisticated, professional diplomats on one side of the ocean dealing with a set of sophisticated, professional diplomats on the other side of the ocean."

Today things are different, but not different enough to suit the systems people. In fact, their concern with formulas, graphs, charts and computers has caused some experts, including Ball's second-in-command John Golden, to warn against "a megalomania on the part of some of my colleagues who are talking about fully-automated foreign policy.
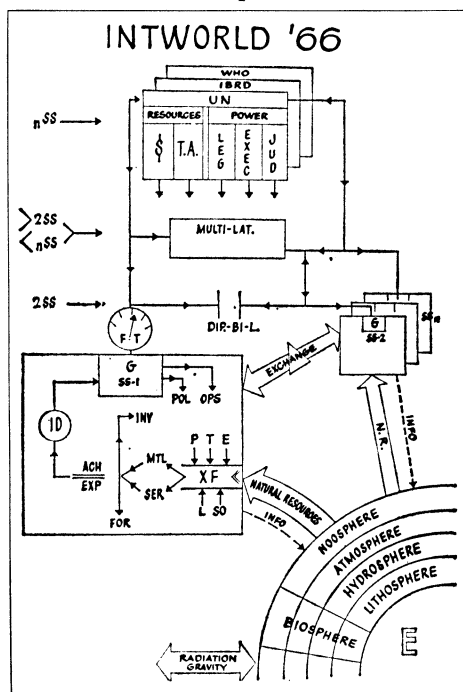
"It's fine to put information into a machine, but I don't think we should crawl in after it," echoed the chief planner of the National Institute of Mental Health, Dr. Theodore Vallance. "And what if social science does succeed, and we find ways of engineering changes of attitude?" he asked. "It's fine if one is the influencer, but . . ."

The youth of the systems idea is indicated by its one fully interdisciplinary national organization, the Society for General Systems Research, which is only 12 years old, compared to, say, the American Chemical Society, founded in 1876. Its sessions at the meeting were greeted with surprise by a number of scientists who had had no idea that there was any such thing. "I thought we were all alone," cried a pleased member of the American Psychiatric Association, which will hold its second annual systems conference in May.

Some problems, unfortunately, are just too complicated even for systems analysis—or perhaps especially for systems analysis.

The world food situation may take so long to systematize that it will be completely out of hand before the systems approach can get down to solving it.

"But then," said one speaker sadly, "there is some doubt whether all approaches put together will solve it."