

SCIENCE . . .

and Public Policy

By Emilio Q. Daddario



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This subject—science and public policy—needs discussion. Not that it hasn't received plenty in the past several years. Almost every time we turn around, we run into some sort of exposition dealing with science and government or science and the national economy or science and the utilization of manpower or science and American education or something similar.

Of course, each of these is a part of science and public policy. Yet the fact that we have discussed these topics at length and in a variety of ways does not at all mean that there is no necessity for further discussion and, indeed, penetrating analysis. I believe there is. But, I would like to suggest to you, today, that the principal production of most of the discussion up to this time is a realization that we do not yet really know just what the component parts and values of our main equation are—let alone its solution. To put it bluntly, we are looking about in our efforts to describe the terms of our "science and public policy" model. We cannot say what our problems in this area are going to be in the future or even accurately identify all of our present ones.

I do not intend this as a criticism. On the contrary, I think it is a very natural process—a point on which I shall enlarge in a moment.

What we are witnessing, I believe, is a kind of symbolic groping toward a new way of life in a very complex world. And we vaguely suspect that while technology is improving our standard of living, it is also tending to produce conditions of concentrated living which somehow make us less free than our forebears. This worries us, and it should.

In fiction, science often is cast in the role of Frankenstein. The same thing could happen in fact—and I remind you that "1984" is only twenty years away. Science, grown and used unwisely, is a dismal prospect from a social point of view.

Aside from the somewhat nebulous but very real problems involving the broad relationship between public policy and science, we are even now confronted with some remarkably concrete difficulties that science and technology must help us solve.

The Subcommittee on Science, Research, and Development, which I chair, in its initial hearings held in October and November, 1963, listed some of the problem areas which scientists and the public (through government) are going to have to work on together.

I would like to mention a few.

(1) One very urgent problem is that of environmental pollution. This is, of course, being attacked in a variety of ways—but it has yet to be treated as a system where air, water, and soil each have their effect upon the other. The latter method, we think, must come, and the first real

The House Committee on Science and Astronautics and the Daddario Subcommittee

The House of Representatives established its standing Committee on Science and Astronautics in 1958 under a broad charter giving the committee general legislative jurisdiction over the nation's scientific affairs, including scientific research and development, scholarships in the sciences, the exploration and control of outer space, and other science-related activities. Because of its broad powers, the committee can be expected to be increasingly influential in decisions involving the appropriation of funds for science. In 1963, the committee's chairman, Representative George P. Miller (D-Calif.), organized the Subcommittee on Science, Research, and Development, of which Representative Daddario is chairman, to share the full committee's general responsibilities in dealing with science. The announced objectives of the subcommittee in-

clude: (1) the over-all evaluation of scientific research and development throughout the country; (2) the strengthening of congressional sources of information and advice in the fields of science and technology; (3) the achievement of the most effective utilization of the scientific and engineering resources of the United States in the effort to accomplish national goals which affect the lives of all Americans; and (4) the congressional oversight of the National Science Foundation. In a self-definition of purpose, the subcommittee has stated that it has a "mandate to focus its attention on science and technology per se, and on the many administrative and operational facets of science in its relationship to government, as well as on specific scientific disciplines, and interdisciplinary approaches to government needs."

pilot study to use it is now under way, through the cooperation of Dr. Hornig's Office of Science and Technology and the National Academy of Sciences.

(2) A second problem area is transportation, which may be critical in the decade ahead. We must have breakthroughs in all phases of transportation—land, sea, and air—if we are not to become more and more mired in our contemporary maze of jammed highways, antiquated railways, bottle-neck airports, and slow water journeys. Up to now we have run hard to stay almost even with the more serious demands placed upon our transportation systems. Yet we appear to be slipping behind more rapidly as time goes on, and one of the reasons can be attributed to the fact that we are not doing our best to learn the answers to difficult problems in this area. For example, while we spend \$5 billion on highway construction, the total research and development on highways—such questions as how to build better highways—is less than \$30 million a year. This may not be a sufficient percentage for such an important segment of our economy.

(3) A third problem area is new power sources. Every projection of power demands shows very clearly that our conventional sources will be inadequate in a relatively few years. Moreover, the undesirable by-products of contemporary fossil fuels are likely to become intolerable. We need a lot more research in the nuclear area, plasma, fuel cells, and fossil fuels themselves.

(4) A fourth problem involves the extent to which we may want to develop and use automation and cybernetics. How far *must* we go in placing re-

liance on machines and where do we draw the line at mechanized decision-making? This has become a very important matter.

(5) A fifth problem, and one involved in all the others, is that of priorities. We know now that there are more good scientific and technical projects than there is money to spend on them. Even government funding has reached such a point. So which ones do we choose and how do we go about it? This is one of the most crucial policy situations which science and government must face together.

I touch on a few cases before our Committee only to emphasize the nature of the problems ahead for us. In each case they will require both the foundation of a public policy and the application of a scientific solution.

Now, let's look for just a moment at what methods are being employed to arrive at some sort of a working relationship between government and science.

While I cannot pretend that the steps which have been taken approach the ultimate or are even very efficient, they do represent honest beginnings and, for the most part, progress. They are evidence that an evolution is under way, uncertain though it may be at the present time.

I am not able to comment with any expertise on what may be taking place at state and local levels. But I do know that the legislature of this state of New York is sufficiently aware of the government-science syndrome to create for itself a science advisory staff. And my own state of Connecticut is in the process of establishing a State Science Commission with the objective of

serving as a knowledgeable government agent in scientific and technological matters. I know also that many local managers and town councils are making ever-increasing use of the scientific consultant in correlating their specialized problems. I suspect that this sort of thing is being repeated and paralleled all across the country.

So far as the federal government is concerned, we are all familiar with the fifteen percent of our total federal budget which goes into science, research, and development. But aside from money aspects, the true impact of the technological revolution can probably be more clearly seen from the organizational structure set up to deal with it.

Looking first at the Executive Branch, and more particularly the Executive Office of the President, we find an organizational evolution which is both interesting and significant.

I know that you are all familiar with the President's Science Adviser and with the President's Science Advisory Committee. These offices were established some years ago when it became apparent that, in his consideration and determinations of federal programs, the President needed help in a scientific and technological vein. After these offices had been established and in operation for some time, the Federal Council for Science and Technology was organized. This lesser-known group was designed to coordinate action on the scientific problems faced by the various federal departments.

Finally, we have seen the creation of the Office of Science and Technology, which is also within the Executive Office of the President, and which appears to represent a mark of maturity for the development of the science advisory mechanism at the White House. The OST, for the first time, provides a link between scientific specialists in the White House and Congress and the public. This is partly because the same man, currently Dr. Hornig, chairs all of these groups. But since the culmination of the arrangement in OST, he is able to have direct liaison with all competent parties interested in scientific affairs outside the Executive Branch.

During this same period, we have seen a good deal of similar ferment within the various federal departments. Virtually all of the old-line departments now have some science advisers or divisions devoted exclusively to handling the scientific affairs of the respective agencies.

The Department of Defense, for example, has long since depended on a heavy concentration of scientific advisers, as had each branch of the Service individually. Of course, the Department of De-

fense is completely mission-oriented, which means that the scope of its interest is somewhat narrow so far as basic research is concerned. Nevertheless, the development of such offices as Defense Research and Engineering and the Advanced Research Projects Agency, are striking illustrations of how much the nation's security is bound up with technology.

Another example, which I am particularly pleased about, is that the Department of Commerce has created an assistant secretary for science and technology. The point of the post is to help obtain the benefits of research in the interests of national production, national income, and the American consumer.

The State Department, which only a short time ago indulged itself only to the extent of a single science adviser, has also moved ahead in this field and has created a special Office of International Scientific Affairs. The headquarters of this group is in Washington, but it also governs the activities of science attaches all around the world. Where only a short time ago such attaches existed only in London, Paris, and Rome, we now have them in Bonn, Stockholm, Moscow, Tokyo, Bern, Buenos Aires, Rio de Janeiro, Canberra, Cairo, Karachi, New Delhi, and Tel Aviv. The activities and knowledge developed by these scientific offices have quickly become an important part of our capability in the field of international cooperation.

Meanwhile, the period since World War II has seen the origin of a number of major federal agencies which deal expressly in science and technology. These are the National Science Foundation, the Atomic Energy Commission, and the National Aeronautics and Space Administration. In addition, certain offices within other departments, such as the Bureau of Standards, now act more or less independently and provide special scientific services to any agency of the government or segment of private industry which may require them.

I probably should not close this recitation without mentioning that other private or quasi-government organizations in Washington are also heavily involved in the government-science relationship. These include, for example, the Smithsonian Institution which is in the process of administering and improving the Science Information Exchange. I should also mention the National Academy of Sciences which is providing an increasingly important and active link between the scientific community, the executive agencies, and the Congress. While it is not yet an accomplished fact, it appears that before too long Congress may be asked to charter a new National Academy of

Engineering structured along the lines of the National Academy of Sciences.

A look at the Legislative Branch finds both houses more and more involved in scientific and technological matters. To meet the challenge, a whole series of events has taken place. Although the old committees still function in a most forceful way in well-established fields of jurisdiction such as agriculture, commerce, banking, taxes, defense, public works, and education, obvious changes have come about.

There are now two committees which deal exclusively in scientific affairs. The first to be organized was the Joint Committee on Atomic Energy. The more recent is the Committee on Science and Astronautics of the House of Representatives, the composition of which was the first concrete instance in which Congress undertook to deal with science *per se*. While a corresponding committee does not now exist in the Senate, I should not be surprised if one were created before too long. The present Senate Committee on Aeronautical and Space Sciences, for example, could very easily have its jurisdiction broadened to become a counterpart of the House Committee. Senator Clinton P. Anderson of New Mexico, the Committee's chairman, has scientific interests which extend far beyond the national space program, and he has been an outstanding leader in this field, helping the Congress to adapt itself in a better way to the scientific and technical age in which it must act.

A third committee, the Select Committee on Government Research of the House, was created about a year ago to make special inquiries into federal research policies. While this committee is temporary and is presently scheduled to go out of existence in January, the fact of its creation and the important work it has been assigned to do, represent again the awareness of Congress for an understanding of what research and development is all about.

It is further significant, I think, that the Library of Congress several weeks ago created a new Science Policy Research Division in the Legislative Reference Service. The head of the new division, incidentally, will also serve as special adviser to the librarian in science and engineering. It is expected that the new division will build up slowly and will not, in any case, require a large number of scientists and engineers to serve it. Nevertheless, this is a step which our committee and others have advocated for some time—and the fact that the appropriations committees saw fit to approve the arrangement at a time when many other im-

portant matters were clamoring for their attention is indicative of both the needs and the mood of Congress.

Let me conclude here by giving you a brief summary of the work of my own Subcommittee on Science, Research, and Development, which is a permanent subcommittee created a year ago last summer. In our own way, we too have been endeavoring to bridge whatever gaps may exist between scientific endeavor and public policy. We have done this first by seeking a new kind of outside help.

For example, we have worked out a unique arrangement for continuing help on matters of basic research from the National Academy of Sciences. This has been accomplished through a contract between our Committee and the Academy, the first of its kind in the 101-year history of the Academy.

Secondly, we have worked out a plan with the National Science Foundation to feed us a continuing study on the status, needs, and problems of science education throughout the United States at all levels.

Thirdly, we have organized a Research Management Advisory Panel, consisting of seven outstanding scientist-administrators, which will help us to prepare ourselves as we look ahead to the big, expensive applied research programs of the future.

Meanwhile, as I indicated earlier, our subcommittee is identifying a host of important government-science problem areas which need study. We have already done work on two of these—the geographical distribution of federal funds and overhead cost limitations involved in federal grants. The basic hearings on these subjects have been completed, and our reports on them will be issued very soon.

I have wanted here to give some idea of the struggle we are having in the Congress to meet the challenge which has come about through the growth of science and technology and the complexities caused as it relates itself to the government, industrial, and academic communities. The magnitude of our interest in science is great. From it has developed the intention of government to formulate some reasonable policy in regard to scientific research where such policy is clearly called for.

While we are not certain of our course or even of our end objectives, we are not standing still. Perhaps in this respect we are a little bit like Columbus. We don't know just where we will end up, but we know it is important to be on our way.