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News and Comment

NSF: 14th Annual Report Reveals Efforts To Devise New Techniques in Science–Government Relations

The 14th annual report* of the National Science Foundation received scarcely any public attention last week when President Johnson routinely forwarded it to Congress. But in many respects it is an extremely significant document in the relationship between the scientific community and its principal patron, the federal government. For in the report, NSF director Leland J. Haworth implicitly acknowledges that American science has passed through the postwar phase of rapid growth and now must devote attention to some serious administrative problems that have developed along the way.

The report, which covers Haworth's first full year as director, addresses itself to three questions which over the past couple of years have become subjects for concern in the scientific community and in Congress:

"Should the Foundation attempt to devise new or modified support programs rather than continuing to rely mainly on the project grant method?

"How can one be sure that the relative amounts of support being provided by NSF to the various fields are approximately correct?

"What changes, if any, should NSF make in its policies and procedures in response to the increasing concern over geographical concentration of Federal funds for research and development activities?"

* *NSF-65-1*, 14th Annual Report, available for 45 cents from the Government Printing Office, Washington, D.C. 20402. An accompanying publication, *Grants and Awards, NSF-65-2*, is available for $1. It lists all NSF-supported projects and investigators for fiscal 1964.

Having stated the questions, Haworth at once makes it clear that the Foundation isn't moving toward any radical revision of its policies, but at the same time he reflects the feeling that the administrative processes that brought American science to its present point may not be adequate for the coming years. Haworth, for example, states his support for the project system, under which, in theory, the federal research grant is intended to do no more than finance a promising project. The theory has a lot of political and scientific attractiveness to it, since, by dealing only with the researchers and his project, the granting agencies are able to avoid involvement in controversies over federal aid to education; and, since it is the scientist and his project that is being supported, the project system provides insulation against political pressure to distribute funds on a geographical basis. But the project system, for all its political utility and scientific soundness, has, as Haworth points out, produced tensions and pressures that are becoming quite disruptive at many universities.

The system creates a situation, he notes, in which persons outside an institution determine the amount of support to be made available for its various parts. As a result, "the institutional leadership has either limited or no opportunity to make decisions relative to assuring balanced growth in the various departments and other units." Another problem, he continues, is that "scientists or administrators may alter the preferred balance of research in order to favor those efforts they judge most likely to receive federal support." Furthermore, since outside panelists generally determine who is to get federal research grants, "younger, unknown investigators have difficulty obtaining support." With funds channeled through the project system, "it is difficult for an institution to establish new activities, such as interdisciplinary units or programs." And, finally, "funds are often not available for flexible use . . . to support activities of common benefit to several projects—for example, libraries, shops, and electronic computers."

The existence of these problems became apparent almost as soon as the federal government became the main source of funds for university-based research, and various efforts have been made to obtain money and flexibility for coping with them. NSF and other granting agencies have provided institutional grants which are designed to give universities unattached funds to work out the imbalances that may result from sudden affluence coming to one segment of an institution. But the amounts have been limited, since Congress is generally wary of providing federal funds for loosely specified purposes. As a result, NSF's allowable maximum for institutional grants is $150,000. In fiscal 1964 this amount was provided for only four of the 370 institutions that receive these grants. For 165 of them, the grants ranged between $10,000 and $20,000.

The easiest answer would, of course, be more money with fewer strings. But the science-government relationship is politically a long way from the point where large amounts of U.S. funds will be put into university treasuries to be dispensed at the discretion of local authorities. Rather, as Haworth states—though it could be either in advocacy or in resignation—,the project grant should remain at the core of the system, while supplementary methods are worked out to correct the difficulties that it creates. "There is no simple way to overcome these defects," he warns, and then he goes on to discuss the available remedies, noting, however, that, in the absence of more money and fewer restrictions, they are "partial solutions," and that they "still leave something to be desired."

Presidents and deans, he says, should realize that they don't have to become the victims of the talented grantsmen on their faculties. They "are being reminded," he explains, "that they must concur in the submission to the Foundation of research proposals; they can therefore, if they feel sufficiently strongly about a given case, refuse to forward to NSF a proposal which they do not think would fit into the long-range plans of the institution." Whether, in such circumstances, the dean or president can expect to get off with no more than being burned in effigy, Haworth doesn't say.

Another "partial solution" involves efforts to "broaden" project grants "so that in many cases fairly large areas can be encompassed within a single grant, thus assuring consideration for and coordination between relevant groups. . . ." In addition, Haworth said, NSF is trying to work out "new administrative devices" that will permit it to provide assurance of long-term support. At present, it generally has to tell its grantees that it can offer no assurance of support beyond a few years.

In regard to geographic distribution of funds, many science administrators once argued, and a few still do, that the problem is a product of the imaginations of pork-barrelling congressmen. But many, including Haworth, hold to the view that the problem is real and that the task ahead is to cope with it without diverting funds from existing centers of excellence. The project system, Haworth states, isn't designed for building new centers. Rather, the main device for this purpose will be the Science Development Program which is designed to provide up to $5 million, covering 3 to 5 years, for institutions that show promise of achieving marked improvement; and he revealed that, as a follow-up to this program, NSF is thinking about a program of "smaller, renewable grants [that] would be made to a somewhat larger number of institutions to enable departments or groups constituting 'pockets of strength' to accelerate qualitative growth to a point where they can become significant centers of research and education." He added, however, "It would be premature to predict a specific time when NSF will find it possible to make grants of this kind."

Again, looking into the future, Haworth revealed that the foundation is "attempting to formulate an approach" to what he called "interfield priority assessment which would take into account the probable contributions of NSF-supported basic research to the solution of a variety of national problems. Thus, for example," he went on, "it is possible that a whole cluster of basic research activities might justifiably be supported in several fields of the behavioral and environmental sciences, all of which would in one way or another shed light on what is now called the 'transportation-urbanization problem.' "

And, on the subject of determining the "correct" amount of support for research, he revealed that the foundation is examining the question, "How can we best determine when a 'proper balance' of support has been achieved among the various fields of science?"

"It may turn out in the long run," he said, "that the correct answer to this question is 'We cannot.' But additional efforts to arrive at more nearly optimal levels of support—given limited resources—seem desirable. . . . The techniques for obtaining reliable data in this area are still relatively primitive, but we believe that they can be improved and that a substantial progress

can be made in a few years toward a system which will be somewhat more clearly rational than that which we are now forced to use. Thus, we hope eventually to be able to cite fairly precise figures relative to the average amount of total research support available to academic scientists, by field of science, and to augment such data with judgments from competent people in the various fields on the question of reasonable ranges of support levels for each discipline."

While the foundation and other granting agencies seek ways to deal with the problems that Haworth covers in his report, it is worth speculating on the origins of these problems and on whether the leadership of the scientific community actually had to wait until this late date to seek ways to come to grips with them. Congressional insistence on keeping tight strings on federal funds has unquestionably contributed to the distortions that the grant system has created in the academic community. But it can be argued that a number of the problems which now trouble the Washington advisory set were, by and large, within its control throughout the postwar growth period of federal support for science. Why, for example, is the foundation only now acknowledging the fact that the granting system has functioned so that "younger, unknown investigators have difficulty obtaining support"? The admission doesn't conform with the long-standing contention that the panel and study-section systems judge the applicant and his project on scientific merit alone. And if, as Haworth correctly points out, "scientists and administrators may alter the preferred balance of research in order to favor those efforts they judge most likely to receive Federal support," why has the foundation permitted itself to be a party to such a process?

If it is unhappy about applicants drawing up research proposals to conform to the foundation's interests, perhaps it had better consider whether it's been interested in the right things. It is easy to say that things would be easier if Congress would appropriate more money for science, but it might as well be recognized that Congress will never appropriate enough to please everyone, and that, in the absence of unlimited funds, the scientific community could profit from more sensitive management of those things that are wholly in its control.

—D. S. GREENBERG

Congress: One New Member Brings an Engineering Ph.D., Background in Research, Business to the Job

Weston E. Vivian is a first-term congressman from Michigan who, according to the Legislative Reference Service of the Library of Congress, which keeps tabs on such things, is the only man in Congress with a Ph.D. in engineering. He seems to be the first national legislator—in recent memory, at least—to hold a doctorate in science or technology.

Vivian, a Democrat, left an upper-echelon job in a flourishing electronics company in Ann Arbor to run and win in a district with a history as a Republican fief. His assignment to the House Science and Astronautics Committee promises to enable him to make direct use of his professional background, an opportunity which newcomers to Congress do not always enjoy.

Of medium height and build, Vivian has the look and the brisk manner of the young engineers with dispatch cases you see at the airports at Washington and the aerospace and electronics cities. And on the record, his career, until last spring, was broadly typical of the generation of successful technical men produced by World War II and its aftermath.

Now 40, Vivian was 17 when he joined the Navy in 1943 and was put into the V-12 program—the Navy's wartime way of mass-producing ensigns—at Union College in Schenectady. In 1946, out of the Navy, with a B.S. and married, he got a job at the Sperry plant on Long Island. He worked on gyroscope drives and soon decided that he needed more education in electronics than he'd acquired as an undergraduate.

He went back to school, to M.I.T., spent a lot of time in the old buildings which had housed the Radiation Lab during the war, and earned an M.S. in electrical engineering in 1949.

The next stop was the West Coast. Like a lot of others then and after, he was attracted by the "mountains, ocean, and change." He wound up at Boeing working on research in radar scattering and involved in preliminary design on the Bomarc missile system.

It may have been partly the work on missiles that made him reach the conclusion at this time that nothing was more important than the country's international and national policies. He debated whether to become a lawyer and go into politics or become a research scientist, still keeping the politics option open.

He chose research, feeling that either research or law could provide an assured income in case of reverses in politics. His wife Anne was from Michigan, so it was eastward to Ann Arbor and work at the University of Michigan aeronautics research center as a research engineer. By the mid 1950's he had shifted into the university's electrical engineering department and set his sights on a Ph.D., concentrating on engineering physics.

He got into politics quite literally at the neighborhood level when his wife joined a drive to get sidewalks in their part of town, in the interest of the children, including their own. Vivian went on to run twice—both times unsuccessfully—for councilman, and then got interested in working with the Democratic mayor on an urban renewal project for the town. Becoming active in local party affairs, he served as Democratic city chairman in 1959–60.

During this period he was holding down a full-time job as well as working on his thesis. In 1959 he was awarded his Ph.D. in engineering. The next year, when the Conductron Corporation was formed, he was one of the first half-dozen employees. A "spinoff" firm drawing its original engineering talent from the university, Conductron was financed largely by Paramount Pictures (which no longer holds any voting stock).

Conductron concentrated in the field of electromagnetic scattering and surveillance radar. Most of its business has been done directly or indirectly with the government, and the firm has prospered. From $1 million in 1961, Conductron has roughly doubled its gross each year, reaching $8 million in 1964. Vivian was vice-president for engineering and one of three company members on the eight- or nine-man board of directors. He was deeply involved in engineering planning and in selling his firm's product, and he traveled a good deal.

Then a year ago with the elections coming up, party leaders in the district asked Vivian to run for the Michigan Second District seat in Congress. The incumbent was Republican George Meader, an attorney who was in his seventh term in Congress and who appeared to be deeply dug in.

Prospects for a Vivian candidacy did not seem brilliant. Redistricting had slightly changed the boundaries of the Michigan second, which now covers