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Federally Funded Research

The Congress of the United States is likely to have an expanded role in detailed decisions with respect to federal support for research. When hearings are organized, congressional staff will have as a trusted resource a document recently issued by the Office of Technology Assessment.* The OTA is an arm of Congress, and the report was produced following a 1989 request by the Committee on Science, Space, and Technology. The document of 314 pages is well written and includes about 700 footnotes that contain about 1000 citations. It is likely to influence the climate on Capitol Hill for 5 years or more.

In its beginning sentence the report states, "Research provides extraordinary benefits to society through the creation of new knowledge and the training of scientists and engineers." But the tone of the document is captured in part by a foreword by John H. Gibbons, Director of OTA. He wrote, "Given the exceptional history, strength, and character of U.S. research, there will always be more opportunities than can be funded, more deserving researchers competing than can be sustained, and more institutions seeking to expand than the prime sponsor—the federal government—can fund."

Often when reports are prepared concerning science policy, the authors seem to be uncertain about who is the target audience—scientists, the federal agencies, or the Congress. The OTA designs its reports for Capitol Hill. Accordingly part of the current document is devoted to the desirability of obtaining sufficient detailed data from federal agencies to enable Congress to have a larger role in decisions with respect to research.

The other major components in the document include setting priorities in funding, understanding trends in research expenditures, and preparing human resources for the future research work force. The report concedes that scientific merit should have a dominant role in decisions within scientific fields. However, it states that the application of additional criteria would help meet future objectives. The two named were strengthening education and human resources at all stages of study and building regional and institutional capacity (including economic development by matching federal research support with funds from state, corporate, and nonprofit sources). As for setting priorities among fields, "Congress and the executive branch have found that the scientific community cannot make crosscutting priority decisions in science." "Therefore, while recognizing the preferences of researchers, the federal government must set priorities at two levels, among scientifically meritorious research areas and megaprojects and among agency programs."

A substantial portion of the document is devoted to costs of research and the locale and circumstances in which it is conducted. In constant dollars cost rose from \$8 billion in 1960 to over \$21 billion in 1990. Along with the increase in research funding the number of academic researchers grew. In the interval 1977 to 1987 the increase was 60%. Research funds grew but not as fast as the number of academic researchers. Accordingly competition for research funds intensified. The report notes the deleterious effects on morale when only a declining fraction of meritorious proposals are funded. There is considerable variability among and within agencies, but a rough number of the proposals now funded is 30%. The OTA did not investigate in depth the morale effects at the research universities. However, it did conduct interviews at the University of Michigan and at Stanford University. These have been among the leaders in receiving federal funds. In the past the success rate for proposals was about 80%. In recent years the rate has fallen to about 67%. Thus they have enjoyed a rate much higher than the average. However, human nature is such that OTA found that research personnel at the two universities were experiencing "relative deprivation." Another phenomenon that OTA interviewers noted was competition among faculty members to expand the size of their research groups. Once a faculty member in a department or related field succeeds in expanding his or her group, the other professors also seek to expand their groups to keep pace. Virtually all new Ph.D.'s in science and engineering have ambitions of a career like their mentors. The report states that 80% of Ph.D. scientists and engineers are in academia. An implication is that other sectors of society are not receiving their share of this educational output. Perhaps the research universities should consider whether their indoctrination and training of scientists and engineers is rendering optimal service to the nation.—PHILIP H. ABELSON

*U.S. Congress, Office of Technology Assessment, *Federally Funded Research: Decisions for a Decade*, OTA-SET-490 (U.S. Government Printing Office, Washington, DC, May 1991).