The 1970s

PHOTO NSF collection

TURBULENCE AND TRANSITION

As American involvement in the Vietnam War continued, conflict over the war dominated national life. Soon after President Richard M. Nixon was re-elected in 1972, the Watergate scandal further divided the Nation and eroded the public's confidence in government. The Administration sought to deploy an antiballistic missile (ABM) system and to develop a supersonic transport (SST) aircraft, projects that ran into scientists' technical criticisms. The public also was disillusioned with technology projects that seemed too far removed from the riots, poverty, racial injustice, and pollution that were blighting America's promise. As a result, many in Washington and around the country pressured NSF to undertake work perceived to be more relevant to national needs. The Foundation did attempt new programs during these tense times, though real growth in NSF's budget would not resume until FY1983.

The Mansfield Amendment

In FY1968, NSF's budget grew to $505 million but inflation was such that, in constant dollars, the amount awarded was less than the year before. The next year was no better. Late in 1969, an amendment to the Military Authorization Act, introduced by Senator Mike Mansfield (D-WA), confused and alarmed both the defense and civilian research enterprises. The amendment barred the Defense Department from using its funds "to carry out any research project or study unless such project or study has a direct and apparent relationship to a specific military function." The impact on the Foundation was potentially enormous, since Mansfield estimated that certain research projects, which amounted to $311 million, could be dropped or picked up by other agencies, mainly by NSF.

Board member Norman C. Hackerman, chemist and president of Rice University, recalls that the Board debated objecting to "the intrinsic philosophy" of the Mansfield amendment, but decided instead to simply restate its long-held view that many federal agencies should support basic research, not just one. In the end, the Foundation took over sponsorship of some major materials research laboratories, but did not otherwise expand.

Growth Stops and the Board Protests

In 1966, the Board Chair was biologist Philip Handler, who also became president of the National Academy of Sciences in 1969. Handler protested the slowdown in funding for research and graduate education, but President Nixon seemed deaf to his concerns. In 1968, a Board Commission on the Social Sciences proposed twenty-five social science institutes at a cost of $10 million a year, but these were not funded. The Board's second annual report, which advocated expansion in physical sciences, got an icy note from the director of BOB stating that it failed "to acknowledge the broad range of pressures on the Federal Government for funding and the increasing problem of choices among national programs." On January 22, 1970, the Board sent the President a letter

1970 First Earth Day; Clean Air Act passed; Environmental Protection Agency established

1970 Scanning electron microscope invented

1970 Temin and Baltimore discover reverse transcriptase (Nobel 1975)

1971 First year of International Decade of Ocean Exploration

1970 1971

NSB Chair Carter

NSF Director McElroy

"Having so much opportunity to interact with twenty-four people of such varied experience is a boon to any Director."

H. Guyford Stever, NSF Director (1972-1976)

proposing a new super agency for support of graduate and postgraduate education across the full range of fields. This idea, too, was stillborn.

Then the budget office (which in July 1970 became the Office of Management and Budget, or OMB) made clear it would not allow funds for new graduate traineeships. The economy was in recession, especially in the aerospace sector; scientists and engineers suffered unemployment in record numbers. On March 27, 1970, Handler sent a plea for reinstatement of the graduate traineeships, even though the President had just given an address on higher education that did not mention them.

When they met with President Nixon on May 22, 1970, Board members hoped to discuss the "instability of Federal institutions as a result of present Federal funding procedures" and other issues close to their hearts. But the correspondence suggests that Nixon did not address this or any other prominent science-related issue.

A "Political" Director?

NSF Director Leland Haworth's term was due to end in May 1969. Seeking a successor, Nixon's Science Advisor (and former Board member) Lee A. DuBridge, asked chemist Franklin A. Long of Cornell University if he would come to Washington to meet the President about becoming NSF Director. But another Nixon aide told Long before the meeting that the President would nominate Long only if he publicly supported the ABM system. Long took offense and stormed back to Cornell.

In an unprecedented open letter, the Board protested this political litmus test. According to historian Milton Lomask, Nixon met with DuBridge and Handler and "confessed he had been wrong in his handling of the Long appointment." He agreed the Director's job should be nonpolitical. The Board's Executive Committee went to work sounding out other candidates.

Handler's feelings were evident in what he told biophysicist William D. McElroy of Johns Hopkins University, when he telephoned McElroy to ask if he would consider the job. Handler said, "the Science Foundation was going to hell, support of science was going to hell, and they had to have somebody at NSF who could do the job." However, as time would tell, the Board's involvement in the selection of a new Director was not a guarantee of good relations.

1972 Harmful effects of acid rain documented

1972 Invention of laser discs

1972

Competing Priorities

McElroy had been one of NSF's early stars, supported for work on bioluminescence in the 1950s. Upon becoming Director in 1969, McElroy broke with the Waterman-Haworth tradition in which NSF Directors sailed close to the preferences of academic science. From his visits on Capitol Hill, McElroy knew that the Foundation was expected to expand its applied research portfolio, as had been requested by the 1968 Daddario amendments. The winds of change were not lost on the Board. In March 1970, after careful study, the Board agreed to establish Interdisciplinary Research Relating to the Problems of Society (IRRPOS). The next year, when the Foundation asked for $13 million for IRRPOS, Congress showered it with $34.2 million.

Then on December 13, 1970, when Foundation officials were engaged in the yearly budget struggle, OMB told McElroy the President would ask for a multimillion dollar increase for FY1972 if the Foundation mounted an aggressive program to harness science to national needs. McElroy put the general idea to the Board on December 17; the Board "approved the Director's general organizational and program plans for expanding support in applied areas." Only after that meeting did McElroy tell the Board Chair the specific amount he had discussed with OMB: $81 million in a total proposed FY1972 budget of $622 million. Such a large applied program raised fears around the Foundation that the agency would be pulled away from its core mission in the basic sciences.

Sensing the unease but eager to gain the funding, McElroy appointed a task force that in some secrecy finished a plan on December 28 for a program entitled Research Applied to National Needs (RANN), encompassing applied projects meant to be of more immediate use to industry and the public. Board Chair Herbert E. Carter, a chemistry professor from the University of Illinois, personally approved the idea and the name on January 2, 1971.

Never warmly welcomed into the Foundation's scientist-dominated culture, RANN lurched forward until 1977, when it was discontinued at the recommendation of a special Board committee. Though it was supported by some colleges and universities whose students and administrators wanted more socially relevant research, RANN was constantly scrutinized by those who feared popular programs of applied research would reduce funding for basic research and graduate education. Historian Dian O. Belanger writes, "there was always at least a minority on the Board unhappy with RANN." In her view, "McElroy's failure to bring the NSB into the earliest policy- and program-forming process had to bear part of the blame…. [C]hange had been imposed, not negotiated, or even discussed."

NSF Collection

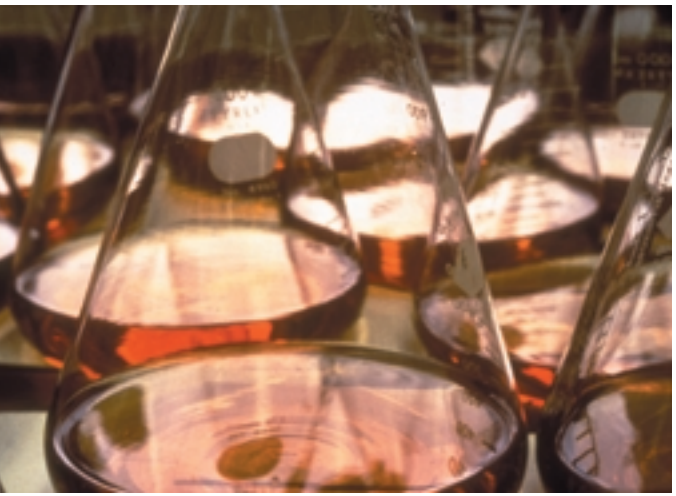
1973 Oil-exporting nations of OPEC raise prices, set off energy crisis

1973 Mathematics of solid modeling; eventually leads to CAD/CAM design in manufacturing

1973

NSB Chair Carter

NSF Director Stever



NSF Collection

The Board's Bestseller

In 1972, the Board welcomed as NSF Director physicist H. Guyford Stever, former president of Carnegie Mellon University. Board members had been debating possible topics for the fifth annual NSB report. Member Roger W. Heyns, a social psychologist and president of the American Council on Education, suggested that the Board regularly publish data on scientific manpower and funds. Stever recalls that the idea was adopted quickly, with Heyns tapped to head the project.

In hindsight, the need for a popular publication with regularly updated data series was obvious. Though the Foundation had gathered some data since the beginning, as required by the 1950 Act, the Board and others still did not have systematic information with which to bolster their arguments concerning funding and manpower needs. How many students were in the educational pipeline? How many graduates in science and engineering were jobless or underemployed? Statements such as Chairman Handler's 1970 letter to Congressman Joe L. Evins (D-TN) that "the total magnitude of this crisis is unknown, but the level of apprehension across the country is very high" did not enhance credibility.

Science Indicators 1972 was published in early 1973 to immediate acclaim. At its October meeting, the Board approved an every-other-year publication schedule. Renamed *Science and Engineering Indicators* in 1984, the series continues to be a widely used resource around the world. The irony is that the Board, which had resisted a prominent role for social sciences at NSF, acted on the suggestion of one of its few social scientist members and created one of its most valuable contributions to the Nation.

Supporting the Director as Science Advisor

In January 1973, simmering tensions between the Nixon White House and the university scientific community came to a boil. Press leaks showing that members of the PSAC were critical of the SST and ABM projects angered President Nixon; PSAC's abolition was imminent. Seeing the writing on the wall, the President's Science Advisor, Edward E. David Jr., formerly of Bell Laboratories, had resigned on January 2. Nixon also planned to dismantle the Office of Science and Technology.

In the midst of this turmoil, William O. Baker, a former Board member, suggested to Nixon that he could ask the Director of NSF to serve simultaneously as his science advisor, since the NSF Act gave the Foundation the job of advising on national policy and evaluating government research programs. When Treasury Secretary George P. Shultz, in his capacity as a special assistant to the President, asked Stever to become science advisor, Stever expressed interest, saying he wanted to consult with the Board.

1974 Crutzen, Rowland and Molina describe the formation and decomposition of atmospheric ozone (Nobel 1995)

1974 Nixon resigns, Ford becomes President

1975 The MITS Altair 8800 is hailed as the first "personal" computer

1974 1975

NSB Chair Hackerman

NSF Director Stever

Shultz told Stever not to tell the Board. Stever, nonetheless, arranged for Shultz himself to brief the Board at its next regular meeting, days away. Recognizing that the new arrangement was now perhaps the only way the President had of receiving science-related national policy advice, the Board voted to assist Stever in his new, second role.

The Board created a National Science Policy Subcommittee, which discussed publishing white papers or issuing policy statements on major subjects. The subcommittee hoped the Board could serve as an "early warning system" for the Science Advisor about upcoming issues of importance, and be available for "informal and confidential consultation." The subcommittee was succeeded by the Committee on National Science Policy, headed by geologist Frank Press of MIT. At the same time, the Board uncovered a number of never-released PSAC papers that had been written but not cleared by the White House. Stever and the Board released some of the PSAC papers on their own, such as "Chemicals and Health," one of the few authoritative warnings at the time that some synthetic chemicals could be harmful to humans.

To assist Stever, in 1973 the Board helped to create two NSF offices—for science policy and for energy policy. The latter was very active when the oil embargo hit later that year, raising questions about the Nation's energy research priorities. Several RANN projects dealing with energy proved their worth at this time.

But Watergate was enmeshing the Nixon presidency. As it became clear that President Nixon might be impeached or resign, some in Congress and the science world met with Vice President Gerald R. Ford, the Michigan congressman appointed to the vice presidency in 1973. Ford agreed that the Foundation was not the right place for the science advisor. When Ford became President, Stever and the Board worked with his aides on legislation that succeeded in returning the science advisor to a stronger position within the White House. On October 1, 1976, Stever resigned as NSF Director to become Ford's full-time science advisor, signaling a thaw in relations between the White House and the science community.

At one point, Stever showed President Ford a chart from NSF's *Science Indicators* highlighting Japan and Europe's rising R&D compared to the sinking trend in the U.S. Stever believes that "from that point, he [Ford] began to think about" reversing the declining federal investment in research.

MACOS Tests the Board's Oversight

Before Board members had a chance to enjoy the balmier climate, however, the MACOS controversy took them by storm. In March 1975, during what was to be a routine hearing before a subcommittee of the House Science and Technology Committee, Congressmen John B. Conlan (R-AZ) and Robert E. Bauman (R-MD) complained that some parents were protesting about a fifth- and sixth-grade anthropology course, developed with NSF funds, that conveyed what they saw as disturbing and un-American values. Foundation leaders at the hearing were caught off guard.

In *Man, A Course of Study* (MACOS), Harvard professor and education theorist Jerome Bruner and colleagues wanted to show different values in other cultures. Most of the material was inoffensive, but a few segments, including one that mentioned wife-sharing among Arctic tribes, proved shocking to some. NSF had supported the development of MACOS, along with dozens of other curriculum materials meant to boost learning in science and mathematics; the course was then being taught in thousands of schools.

The standard practice for proposals submitted to NSF was to subject them to peer review. Thousands of qualified researchers, painstakingly chosen by NSF, reviewed applications in a process that was designed to protect reviewers' identities and encourage candor. But after the House Committee hearing, NSF leaders discovered that negative comments by some reviewers of MACOS had been obscured by NSF staffers, who neglected to include the criticisms in the review summaries they sent forward.

In the aftermath, Board Chair Norman C. Hackerman warned his fellow members that "[T]hese recent events highlight the need for the Programs Committee to exercise its oversight role to a greater degree with respect to ongoing programs." At first blush, Congress appeared unwilling to wait, threatening to require that all 15,000 grant applications be screened on Capitol Hill prior to peer review at NSF. That idea died, but the Board conducted its own examination of the peer review system. Board members concluded that the system generally worked very well (a finding with which the National Academy of Sciences, in its own study, agreed). However, the Board ultimately voted to end the staff practice of crafting review summaries, recognizing their potential to mislead. Reviewers' comments would henceforth be forwarded to applicants verbatim.

Congress now gave the Board an explicit role overseeing peer review at NSF. Historian George Mazuzan writes that from the MACOS episode forward, the Foundation would be under "new pressure for accountability."

Steady State, Steady Strain

During its tenure in the late 1970s, the Carter Administration was well disposed toward NSF. President Jimmy Carter made former Board member Frank Press, a strong proponent of basic research, his science advisor. The White House and Congress increased current dollar funds for the agency, though rampant inflation took away any real gain.

Richard C. Atkinson, a Stanford University psychologist who had been Stever's Deputy Director, became NSF Acting Director in 1976 (he was confirmed as Director in May 1977, the first behavioral scientist to hold that position). Hackerman, the Board's chairman at the time, helped steer the Foundation among competing pressures. Some universities, for example, were calling for more applied programs within NSF. A number of Congressmen—with MACOS fresh in their minds—were pushing for greater public participation in NSF deliberations. In June 1977, the Board passed a resolution welcoming the appointment to the Board of "nonscience or public members." President Carter appointed more industry representatives to the Board so as to encourage more input from that important sector.

The Board also held hearings around the country, to learn what states and localities wanted from the Foundation. Hackerman favored new approaches to raising the quality of research and education in regions that normally did not succeed in the fierce competition for NSF funds. "The Foundation's awards are an educational tool, not just a scientific tool," he says today. "If you look at the roster of faculty of the top six or ten institutions, they come from everyplace…. So you have to cast the net broadly, to catch the neophyte who will be a good scientist or engineer."

In 1979, the Foundation launched the Experimental Program to Stimulate Competitive Research (EPSCoR). The program funds partnerships among colleges and universities, state governments, and industry in states that get the fewest NSF awards—eighteen states in the program's first year. During the program's initial decade, the Foundation's $43 million investment in EPSCoR attracted an additional $149 million worth of state spending.

The 1970s had been a rough-and-tumble ride, but with the Board's help, the Foundation emerged with a more socially relevant agenda, broader geographic distribution in funding, and the agency's commitment to basic science intact.

1979 First U.S. cases of AIDS reported by Centers for Disease Control and Prevention

1979

NSB Chair Hackerman
NSF Director Slaughter