

Attendee Listing (First Page)

Meeting Minutes Text

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Report of the NSB Committee on Excellence

In Science and Engineering

Charge to the Committee

On September 27, 1984, the Chairman of the National Science Board established an ad hoc Committee on Excellence in Science and Engineering. He charged this committee to recommend the proper role and policy for the National Science Foundation in addressing the issue of educational institutions attempting to bypass merit-based review through the legislative process. The Committee was also asked to address the underlying factors that have given rise to this situation and examine alternative solutions to them.

our report begins with a presentation of the magnitude of the merit review bypass activities used to obtain funds for major facilities at educational institutions and the implications of this practice for the future of excellence in science and engineering in the United States. Next, the underlying factors are discussed, followed by our recommendations to reaffirm merit-based review and identify options for facilities support.

Magnitude of the Problem

A growing number of educational institutions have attempted to secure funding for facilities by bypassing the merit-based review system. and appealing directly to Congress.

In the past ten years, fifteen universities have obtained direct Congressional authorization or appropriation for academic projects valued at over 8100 million (see summary listing in appendix B, Table III). These projects, which are described in Table II, relate to scientific and engineering facilities and research. in some cases, universities have hired professional lobbyists, and many have exerted pressure on their representatives.

The Committee believes that these actions establish a dangerous precedent. Because of the need for new and renovated facilities, university administrators will be pressured by their faculties and others to follow the example of the major universities that have successfully secured funding for facilities by appealing directly to Congress. If this becomes common practice, it could seriously undermine the U.S. system of merit competition for research funding that has been so successful during the recent period of U.S. scientific dominance.

Implications of special Interest Funding for Scientific Research

The direct appeal to Congress by educational institutions for funding scientific facilities undermines the peer review process, which has proved to be the most reliable guarantor of excellence in scientific funding (decisions, diverts scarce research and education dollars to projects of questionable scientific merit and seriously affects the direction and priorities of scientific research. This could well threaten the integrity of the U.S. scientific enterprise that is the basis of the scientific, technical, and economic competitive position of the U.S. in the world.

Equally important, widespread circumvention of the merit review process will erode the basis of the system of federal support for basic research. That system has rested on a delicate balance between federal funding of research and federal control of research and has trusted the scientific community to determine the nature of that research and ensure its excellence. Increased resort by the scientific community to direct political measures would destroy the perception of its objectivity and integrity, erode the trust with which it has been vested, imperil its autonomy, and forfeit its right to play a significant role in federal resource decision-making.

In the near term, the recent activities also raise apprehensions regarding the potential impact on new research programs, such as the NSF's supercomputer program and engineering research centers and the possibility that facilities funded by direct Congressional action will later induce Congress to further action and allocate funds for programmatic research to the selfsame institutions without merit review.

Underlying factors

The Committee on Excellence has concluded that the present spurt of direct appeals for Congressional action on academic projects is symptomatic of an underlying need in many U.S. academic institutions for facilities support. This need is not adequately addressed by present funding mechanisms in either the public or the private sector. Thus, opportunistic solutions, i.e., political action, become compelling.

Congressional responses to constituent pressures are an established part of the decision-making process in such public works projects as highways, mass transit, dams, harbor and river activities. Academic and research programs have received some such special-interest funding, particularly for applied research, from agencies where peer review is not the dominant method for making decisions on grants. Funding decisions made by state governments and legislatures have also often been subject to local constituency pressures.

In contrast, scientific funding at the federal level, particularly for basic research, has enjoyed considerable freedom from special interest

politics, and has been allocated on the basis of merit. Since the federal government, after the second world war, assumed a major role in the funding of basic scientific research at universities, science has enjoyed considerable autonomy in planning and supporting research. But, even with respect to basic scientific research, consideration other than scientific excellence, such as geographic distribution and equal opportunity, have been a consistent part of the decision making process. In fact, the NSF criteria for merit review make allowance for these considerations, but always coupled and in conjunction with scientific merit determination. The significance of the incidents since FY 1983 is that such considerations have superseded, rather than supplemented, merit based review. This threatens the integrity of what has been an effective and successful system for funding the highest quality research in science and engineering at universities.

The current magnitude of this threat reflects an underlying need. While no recent comprehensive survey of facilities requirements for educational institutions has been conducted, available evidence indicates a serious need for facilities. Hearings on "Improving the Research Infrastructure at U.S. Universities and Colleges," held before the House Committee on Science and Technology on May 8, 1984, provided an indication of this need, as did the deliberations of the National Science Board at its June 1984 meeting addressing "Academic Science and Engineering: Physical Infrastructure." (Appendix C) Federal support for university facilities, significant during the 1960's, all but ceased by the early seventies. In many universities, the need for facilities to house new research initiatives combines with the deterioration and obsolescence of existing structures to put considerable pressure on scarce resources that are inadequately supplemented by state and private funding. This pressure may also have been accentuated by increased funding for science and engineering research without a balanced consideration of the resulting demand on inadequate facilities. In addition, the cost of facilities and equipment has increased more rapidly than that of human resources. The maintenance, renovation, and acquisition of research facilities have become primary concerns for many educational institutions.

Recommendations

There are three primary recommendations. They address: the reinforcement of merit review, the possible solutions to the facilities problem, and the continuous review and improvement of the merit review system at NSF.

A. Reinforcement of merit Review:

Self-regulation has been an essential component of the success of the post-war scientific and engineering research enterprise. The continued commitment by universities and the research community to self-regulation is essential to its health and vitality.

Recommendation 1: Directly, indirectly through scientific societies and summit organizations, and jointly with such organizations, the Director and members of the National Science Board should continue to speak out on the

self-defeating consequences of circumventing the merit review system. Specific actions should include communication with university representatives, scientific advisory groups, Members of Congress, and coordinating and planning boards of state governments.

B. Review of NSF Merit Evaluation Processes:

Merit review, which is central to decisions on grants at NSF and several other agencies, is recognized as a key factor in assuring the quality of U.S. academic research and is being Emulated by other countries. The current need to reassert the importance of the merit review system with respect to funding research facilities underscores the need for such continuing scrutiny and improvement. In particular, we need to:

1. Analyze how comprehensive merit review applies to diverse activities, such as general research grants, instrumentation awards, facilities and special programs (e.g. international, women and minority programs);
2. Understand and analyze the differences between the implementation of comprehensive merit review among various NSF directorates and federal agencies.

Recommendation 2: The Director should appoint a committee to review evaluation processes within NSF, review other agencies' approaches and recommend any modifications that it judges desirable.

C. Characterizing and Attacking the Facilities Problem:

Attacking the facilities problem will require the concerted efforts of universities, states, the Federal Government, and the private sector. The National Science Board, working with other organizations such as the Office of Science and Technology Policy, the White House Science Council, the National Academies of Sciences and Engineering, the Research roundtable, and the National Research Council, should provide leadership in (1) characterizing the nature of the problem, and (2) developing politically feasible solutions.

1. Characterizing the Problem: The "facilities problem" is in part a need for renovation of existing facilities, in part a need for upgrading existing facilities, and, in part a need for new facilities. The National Science Board discussion in June 1984 of academic infrastructure needs in science and engineering has laid the basis for understanding the problem and has resulted in an NSF pilot program for the renovation and reconstruction of research related facilities in select fields. However, important questions remain to be answered. Are some aspects of the problem more pressing than others? or does the nature of the problem vary with institution?
2. Developing Feasible Solutions: The potential solutions must be considered from two viewpoints: near-term quick fixes and more long-range total solutions. The most commonly discussed options are competitive

grants, adjustment of the indirect cost reimbursements to universities, and changes in the tax code to permit universities to issue tax-exempt bonds to finance facilities. What are their advantages and disadvantages?

These options assume that the Federal Government will play the major role in attacking the facilities problem. But given current fiscal constraints, state governments and universities themselves will also have to play prominent, if not lead, roles. What should be the nature of those roles? Are "creative financing" options available to universities and states regardless of whether or not the Federal Government plays a major role?

Recommendation 3: To address these issues and to launch actions to solve them, the National Science Board, the National Academies, and the Office of Science and Technology Policy should call for a conference among the interested parties to be held as soon as possible. The Conference on Academic Research Facilities should draw on the NSB study on academic research infrastructure and on talent from the financial community, Congress, state governments, federal agencies, academic institutions and business to define the problem and propose politically feasible solutions.

NSB Statement on Bypassing Merit Review in the Funding of Academic Research Facilities

Recent efforts by educational institutions to secure funding by appealing directly to Congress and bypassing the merit based review system represent the wrong solution to a real and urgent problem. The problem of deteriorating university research facilities threatens the health of the Nation's science and engineering base. To generate better solutions, the parties involved should meet to plan new initiatives that support university research without threatening the established science and engineering priority setting process that has served so well to promote excellence.

In the past two years, fifteen universities have bypassed that process and secured over \$100 million for construction of facilities by appealing directly to Congress. In a number of cases, the funds were diverted from other scientific activities that had been selected on the basis of their merit.

The National Science Board has examined the implications of this development for the excellence and productivity of U.S. science and engineering, which today is the strongest in the world. -As the challenge to America's competitiveness in defense and industry grows, so too does the Nation's reliance on its science and engineering strength. Bypassing the normal standards of scientific excellence through merit review procedures in science and engineering research jeopardizes this strength.

The problem is not yet severe, but the precedent has been established; lobbyists sense a source of funds, and each new circumvention increases pressure on schools that have so far resisted the temptation to pursue the same course. The question facing American universities today is this: Will they retain responsibility for the excellence of U.S. science and engineering, or will they cede it to purely political processes. The choice is in the hands of the science and engineering community. The trend is in the wrong direction.

The circumventions of merit review are being triggered by a serious problem: At many universities, facilities are deteriorating. until this problem is addressed, the erosion of merit review will continue. A concerted effort -- by universities themselves as well as state and Federal Government -- to attack the facilities problem must be launched. For this, universities will indeed have to exert their political influence. -But that influence must be directed at a long-term solution, not at the short-term and ultimately self-defeating steps of the past two years.

Too much is at stake to continue on the present course. -As university facilities deteriorate, U.S. science and engineering will lose its grip on world leadership. If universities respond to deteriorating facilities by circumventing merit review, the decline in U.S. leadership will accelerate, and excellence will deteriorate into mediocrity.

To address these issues and to launch actions to solve them, the National Science Board:

- a) Will continue to press the scientific community for strict self-regulation. It urges all professional societies, associations, academies, industry researchers, faculty and principal investigators to act in concert and support the peer review system.
- b) Will evaluate the comprehensive merit review process, as part of a continuing process of scrutiny and improvement and as a reflection of the need to reassert the importance of the merit review system. Based on the evaluation, changes and improvements will be made, if required.
- c) Calls for a Conference on Academic Research Facilities among the interested parties, to be sponsored by the NSB, the National Academies, and the office of Science and Technology Policy. The conference should be held as soon as possible, utilizing talent from the financial community, Congress, state governments, federal agencies, academic institutions and business to define the problem and propose solutions.