Commission Meets on Future of NSF: MRS Submits Comments to Commission

In light of the rise of a global economy, the end of the Cold War, and the growing emphasis on the link between science and technology, the National Science Foundation is developing a long-range strategy that will help frame its future activities and strengthen its ability to serve the nation. According to NSF director Walter Massey, "the plan must be grounded in continued strong support for academic research, but it must also recognize the changing nature of research and the changing context in which research is conducted."

To help map out a new strategic course for the 21st century, the National Science Board, at Massey's request, appointed a 15-member commission of scientists, industrialists, and academic leaders to examine how NSF can best meet the nation's challenges in research and education. The Commission on the Future of the National Science Foundation is chaired by William H. Danforth and Robert W. Galvin. As part of the commission's deliberation, it held three meetings, on September 17, October 16, and November 7, to develop its proposals for NSF's future. These meetings, which were open to the public, were intended to focus on two key questions: *How can NSF maintain and enhance the health of the academic system in the United States?* and *Should NSF pursue a broader array of research and education objectives and do more to link academia and industry and, if so, how?*

A final written report from the commission is due November 20. Information about the commission can be obtained by contacting the Office of Legislative and Public Affairs at (202) 357-9838.

MRS president, G. Slade Cargill, attended the first meeting, and MRS subsequently sent a letter to the commission, signed by Cargill, by past president James B. Roberto, and by president-elect S. Thomas Picraux. The full text of the letter follows.

Dear Commission Members:

Thank you for the opportunity to offer this statement concerning the mission and activities of the National Science Foundation.

Views from University, Industry, and Government Communities

As officers of the Materials Research Society, we have a special interest in the NSF and in the nation's universities. Ours is a rapidly growing organization of more than 10,000 scientists and engineers involved in research on advanced materials, and about 45% of our members are university faculty, research staff, and graduate students. Further, with 30% of our members in industry and 20% in national labs, we are dedicated to maintaining a vital and productive relationship between universities, industries, and the Federal government. Our membership includes university-based producers of fundamental research and educators of future scientists and engineers, as well as the industry-based user community where research is applied to advance technology and where most university-trained scientists and engineers are employed in industrial research, development, and manufacturing.

Role of Federal Support for University Research

We agree that it is important to foster stronger links between universities and industries and between research and technology, and that NSF can play an important role in this process. Better coupling between research and technology will enhance the effectiveness of Federal support for university research in science and engineering in providing a fundamental knowledge base for the nation's commercial and government activities, and in providing well-trained people to work in industry and government and to staff our colleges and universities. Achieving these goals is key to the economic well-being and industrial competitiveness of the United States.

Funding for University Researchers

It is widely recognized that university research and graduate education are suffering from shortfalls and uncertainties in Federal funding in the current depressed U.S. economy. This has led to disappointment and disillusionment of large numbers of talented faculty members who want to teach and carry out research, but for whom competing for funding has become an all-consuming activity with dwindling odds of success. We believe that the nation can benefit from additional resources being devoted to support adequately the best, most creative, and most productive individuals and groups of university-based researchers.

Current Manpower Imbalance

There is currently an imbalance between the number of qualified PhD level graduates and the much smaller number of job openings in many areas of science and engineering, as a result of downsizing in industrial R&D activities and in many university faculties. It is important that highly trained scientists and engineers, who will certainly be needed when U.S. industry and the U.S. domestic economy recover, not be lost from the nation's talent pool because of the current manpower imbalance. Likewise, it is important that top students in our high schools and colleges not be discouraged from pursuing studies in science and engineering because the present imbalance in supply and demand suggests that science and engineering do not offer rewarding and long-term career opportunities for talented, dedicated, and well-trained individuals.

A partial solution to these problems may be increased NSF funding for postdoc positions in university research and in university/industry/national laboratory research collaborations, coupled with scaling back new admissions to graduate programs in these areas. With its dual missions in graduate-level research and education, the NSF can play an important role in coping with the present difficulties and in developing methods for anticipating and minimizing such problems in the future.

University/Industry/National Lab Partnerships and Interdisciplinary Research

If universities are to achieve their potential as key contributors in the U.S., we need improved Federal support, but we also need improved coupling of research and technology, e.g., through strategic university/industry/national laboratory partnerships, and increased emphasis on interdisciplinary research.

We in universities, industry, and government must together do a better job of determining what areas of university research are most likely to benefit technology, and we must do a better job of conveying information from university research to potential users in industry and government. A new paradigm is needed for strategic university/industry/government partnerships. NSF can act as a catalyst for this. Joint programs are needed in areas of national importance, with a central role for government laboratories. Materials Research Society and other professional societies can provide forums for discussions among these groups and can facilitate collaborations among them.

One way for NSF to foster university-industry partnerships is by soliciting joint proposals from teams of researchers that include both university and industry participation. NSF can fund the university-based part of the proposed research, with industry or other government agencies funding the industry-based part. Researchers from national laboratories can also participate in such partnerships. Peer review and competition between these proposals and proposals for other, fully university-based research should be used to insure that only high-quality work is being supported.

Most of today's challenges and opportunities in developing, improving, and exploiting materials require knowledge, talents, and

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activities that are not confined to a single technical discipline, and we believe that this is also true for many other areas of science and technology. It is important that the organization and programs of both universities and federal funding agencies, including NSF, be structured to encourage research, which naturally bridges the boundaries of traditional disciplines. For example, expansion of the NSF's program of Materials Research Laboratories can be used to foster interdisciplinary collaboration in fundamental research by building on the very successful MRL model.

Resource Limits and Realistic Expectations

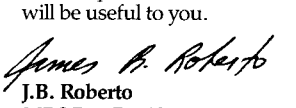
The extent to which the NSF can take on the mission of developing better links between universities and industry depends on the level of resources available to NSF. The core mission of NSF should remain support of fundamental research and education in science and engineering at the nation's universities, and this mission should not be diluted. The NSF mission should be expanded only in concert with a corresponding expansion of resources.

In any efforts to increase linkage between university research and industrial needs, whether by NSF or other government agencies, it is important that the focus be on long-term research and long-term needs, rather than efforts to use universities as substitutes for industrial research and development. Federal support for research in universities should be viewed, and its success should be evaluated, as an investment in training people and in developing the fundamental knowledge base for guiding and enabling product development and manufacturing in industry. It should not be viewed as a procurement process for either development services or advanced technology.

Conclusions and Caveats

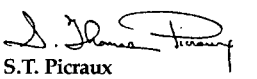
University research and graduate education in science and engineering are critical to our economic well-being and industrial competitiveness. Increased emphasis on interdisciplinary research, establishment of a system of strategic university/industry/national laboratory partnerships, and improved Federal support are all needed if universities are to achieve their potential as key contributors in the United States. The NSF should maintain its role as the premier supporter of research and education for science and engineering in the nation's universities. If additional funding is available to fulfill this mission adequately and to expand NSF's efforts for strengthening links between academic science and industry, NSF should participate together with other Federal agencies in fulfilling this additional important mission. With its long-term experience in identifying and supporting high-quality science and engineering in our universities, NSF brings valuable skills to the task of fostering science-technology linkage.

We hope that these comments and cautions will be useful to you.



J.B. Roberto
MRS Past-President

G.S. Cargill III
MRS 1992 President



S.T. Picraux
MRS President-Elect

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