

Government Support of Civilian R&D: The Importance of "Legitimacy"

Doug Walgren

From a national point of view, few areas of science are more critical than materials research and development.

Over the last decade, our basic understanding of materials has exploded beyond all expectations. From composites to ceramics, from polymers to plastics, new technology and applications—that could never have been anticipated before—have now become possible. With the realization that resistance-free electrical transmission through superconductivity may be achieved at manageable temperatures, materials research holds out the promise of literally changing the world through a revolution of new technology.

The potential of materials science has become a major factor in international relations and global economic competition. At a time when important sectors of U.S. manufacturing are in decline, and U.S. producers face foreign competition often stacked against them, the new potentials of materials science are sources of both hope and apprehension.

We know we are in an uncertain time of change and that the leadership of U.S. industry is being challenged as never before. And yet, even in the face of this uncertainty, we have developed no more than a tentative commitment to the importance and even the legitimacy of federal funding for civilian research and development.

Although research programs in materials science do exist at the National Science Foundation, the Department of Energy, and the National Institute of Standards and Technology, none are of the scale or discipline of purpose that drives research programs in materials science abroad. Program-by-program comparisons are terribly embarrassing. For example, while our administration objected to \$7 million of federal matching funds for steel-related re-

search for fear of engaging in "industrial policy," the Japanese government was in full stride supporting a similar program at a level of \$67 million. And that is one of the better comparisons from the U.S. standpoint.

Everyone should ask, "How will the U.S. economy be able to compete when other nations begin to benefit from the innovation and increases in productivity that flow from these kinds of investments in research?"

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Something is fundamentally wrong when over 70% of all basic research in our nation is funded by government, and there is almost no understanding or appreciation of the need for major government funding of civilian research. Why there is so little recognition of such an important government role is a puzzle that needs real attention.

In recent times, when science needed to be done, we have instinctively turned to the military for a variety of reasons—most

of which fall under the category of being the easy way out, or the easiest way to secure necessary political support. From the Synthetic Fuels Program's demonstration of coal liquefaction in the late 1970s to the development of computer security systems for government processing of civilian information, Congress has instinctively turned to the military for research and development programs that were clearly for civilian purpose and civilian use. Why? "Because," as Willie Sutton said when asked why he robbed the bank, "that's where the money is."

But we are beginning to see that our country is paying a high price for taking the easy way out. Because we have turned to military budgets and rationales so repeatedly to support needed research, the civilian agencies that should be our strongest assets in supporting science are largely undeveloped. And, without basic recognition by the public of the importance of government support of funding for civilian scientific research, we are simply unable to respond to the wide range of research needs.

Although a compelling case can be made for materials science, no one should assume that important research will be properly supported. Think of what has happened to federal support for science education. Eight years ago the administration eliminated the National Science Foundation's program in undergraduate science education wholesale, despite the compelling logic to support it. And now, despite the reversal of the administration's philosophy, NSF's support for science education as a targeted program has stalled at one-half the level of effort made in the mid-1960s. And this is the "high-water" mark of our response, even in the face of secondary performances in international comparisons of the brightest U.S. high school students.

And we all know, especially in science, that an opportunity missed diminishes all future possibilities. Opportunities we fail to develop in one period leave us poorer in the next, without the foundation that may be critical for the success of future efforts. The mainstream of the advance of science must be based on the steady piecing together of the foundation for the next level of inquiry. Even momentary lapses in the current of advance deprives us of important scientific advantage.

The United States has missed important opportunities in the past. Even at the start of our history, Presidents Washington and Jefferson both tried to establish a "National University" to pursue "knowledge and science." Both failed because of the paralysis of political will in the Congress then, ironi-

cally, also enmeshed in the difficulty of dealing with a government in unusual debt. As a result, a "National University" simply never was. Imagine how different things might be if somehow we had developed the tradition of national pursuit of science in our early years.

But the magic of our democracy is that our fate lies in our own hands rather than in someone else's control. How we succeed depends largely on how those close to science meet their responsibility in developing public appreciation of the importance of government support for civilian research and development.

We should take heart from past difficulties. Even in retrenchment, important initiatives have emerged. Among other

important steps, Congress has broadened the authority and responsibility of federal agencies for civilian research in important ways, setting the stage for larger steps when a new administration is willing to go forward.

We have extended the mandate of the National Science Foundation's charter to cover "engineering" as well as "science," in recognition of the essential unity of science and technology and the fact that abstract definition should not block pragmatic possibilities. This change could provide the authority for much broader support of civilian science by the Foundation if someone would use it.

Congress also re-cast the "National Bureau of Standards" as the "National Insti-

tute of Standards and Technology," creating at the same time an "Advanced Technology Program" with the authority to act broadly in support of the development of civilian technology.

Despite the hostility of recent administrations, Congress has forced acceptance of both a funding agency and a National Institute ready to openly support civilian research in ways we have not in the past. It only remains for all of us to give life to this responsibility of government.

Doug Walgren was a member (1976 through 1990) of the U.S. House of Representatives from Pittsburgh, Pennsylvania, and served as chairman of the Subcommittee on Science, Research and Technology of the House Committee on Science, Space and Technology.

Fleischer Starts as Bulletin Editor

As part of the evolution and growth of the *MRS Bulletin*, Elizabeth L. Fleischer has been appointed to the new staff position of technical editor. In making the announcement, Bulletin Editorial Boards Chairman Elton Kaufmann said, "We are extremely pleased to have Betsy on the staff of the *Bulletin*. This new position brings to the staff technical knowledge as well as additional publishing expertise to give added momentum to the *Bulletin* coverage of materials."

An active MRS member since 1987, Betsy recently received her PhD from Cornell University in materials science and engineering with a minor in biomechanics. Her research, directed by James W. Mayer, focused on mechanical properties and structure of ion-beam-modified metals and ceramics. She also spent a summer, during her undergraduate years, working for Bell Laboratories in Murray Hill, NJ, developing contacts to GaAs for integrated circuit technology.

While Betsy directed her formal education towards science, she also pursued writing and newspaper work. As an undergraduate at the University of Pennsylvania, she spent most of her spare hours as production manager and then as advertising director of the school paper. While in graduate school she became an integral part of the evolution and production of an emerging monthly publication in Ithaca, New York, called *Community Ink*. She wrote environmental articles and coordinated production of the paper.

In 1989 Betsy was selected as a Mass Media, Science, and Engineering Fellow by the American Association for the Advance-



Technical Editor Betsy Fleischer with Bulletin Editorial Boards Chairman Elton N. Kaufmann.

ment of Science. The AAAS program is designed to give science and engineering graduate students an opportunity to communicate science through the media. Her fellowship took her to Portland, Oregon, where she wrote weekly science articles for *The Oregonian*.

In the coming months, Betsy will be expanding international coverage, maintaining close tabs on materials issues in Washington, DC, and covering broader news issues related to materials science. "The *Bulletin* needs to evolve to reflect the changing interests of the Society, the field, and the readers," she emphasized. "I look forward to the challenge and am eager to hear ideas and comments from the readers."

**1991
MRS Spring Meeting
Anaheim, California
April 29 - May 3, 1991**

**Plenary Speaker
Wednesday, May 1**

Erich W. Bretthauer, Assistant Administrator for Research and Development, U.S. Environmental Protection Agency

**"Environmental Challenges
of the 1990s and Beyond"**

Bretthauer will talk about the environmental challenges facing us in the next decade, the role science will play in meeting these challenges, and the commitment of the Environmental Protection Agency in addressing societal choices.