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EDITORIAL

Science and Technology Policy

Scientists and engineers in academia and elsewhere are encountering changing policies that can profoundly affect their careers. Effects of the end of the Cold War continue to be manifest. The squeeze on federal discretionary funds is likely to be tightened. Enforcement of the Government Performance and Results Act of 1993 (*Science*, 6 January, page 20) could have important consequences.

The 37 chapters of a well-edited, recently published AAAS book* describe much of what happened affecting science and technology policy up to and including 1994. It portrays contrasting opinions of many policy-makers. Authors include President Clinton, Vice President Gore, and Democratic Congress people. Experts from academia, industry, and think tanks also participated. None of the current Republican leadership were authors, but there is little indication that their attitudes differ decisively from those of the Democrats. Their future budget cutting could badly damage research and development institutions.

In the federal government, there are many unneeded, invisible bureaucrats. If the Government Performance and Results Act is appropriately administered, they will be identified. But both the National Institutes of Health and the National Science Foundation have often been in the spotlight, and they are not in need of detailed congressional command and control. However, the NIH and NSF now find it necessary to begin to formulate results-oriented criteria for awarding grants. The NSF has begun to develop goals for its science and technology centers at universities. One of the proposed criteria on which centers would be judged would be that "nearly all graduates" become "outstanding contributors" to the work force. Grant funds are often used to pay stipends of graduate students. In the past, some faculties have indoctrinated them in the view that the only respectable career was that of a tenured professor. Now, faculties should consider how better to prepare students and help them to find distinguished work outside of the campus.

Research in the physical sciences has led to enormous societal benefits. Prospects are good that exploratory (basic) research in chemistry, condensed matter physics, and materials science will lead to important commercial applications. If basic research in the physical and biological sciences is curtailed, the United States will find itself outdistanced by more vigorous competition. At present, the United States is competing fairly well in high-technology products. However, Pacific Rim countries are achieving competence in high technology, and governments are supportive of industrial initiatives. Economies and exports are growing rapidly. In the United States, politicians have repeatedly announced goals of high paying jobs and global competitiveness. There has been more talk than useful action.

When contemplating options and legislation, politicians should be aware of the attitude of the Industrial Research Institute. Members of this institute come from companies that create a very large fraction of high technology products. The institute has stated that a principal product it wishes from universities is well-trained people. Young graduates can bring with them information and skills arising from the latest developments in science and technology. However, they can do so only if they have been trained where world-class research is being conducted.

As a result of the restructuring of many companies, the levels of their efforts in basic research have been attenuated. Their dependence on university research has increased. Industry has expanded its support of university research and entered into many hundreds of collaborative arrangements. About 35 percent of all U.S. patents issued to industry have arisen from collaborations between basic scientists working in universities and industrial scientists working in their laboratories.

The United States has been a world leader in basic research. Knowledge has been quickly transferred to industry by graduates, faculty consultants, and others. Why are so many breakthroughs made in the United States commercialized in other countries? Many reasons have been put forth. Poor leadership in industry, Wall Street, and a national lack of savings have been blamed. But what about government? Is it not time for the politicians to do some soul-searching? How do the rules of the game in the United States hinder innovation?

Philip H. Abelson

*A. H. Teich, S. D. Nelson, C. McEnaney, Eds., *AAAS Science and Technology Policy Yearbook 1994* (AAAS, Washington, DC, 1994) For more information, call 1-800-222-7809.