DOD Funds More Research in Universities

Vietnam-era sentiment against military subsides, but new kind of adversarial relations could grow

The Reagan Administration's 1982 budget calls for $316 million in Department of Defense (DOD) support of basic research in the universities. This is $58 million more than in the current budget and about triple the 1976 amount. And DOD, Congress, and the universities show a readiness to see this support further expanded.

Increased DOD funding would appear to be a boon to universities that face sharp cuts in other federally funded programs. Not long ago, however, adverse reactions on campus would have been expected since DOD-university ties were a target of anti-Vietnam protesters. At least partly as a result, a major decline hit DOD funding of university research in the late 1960's and early 1970's.

That attitudes on campus have changed was signaled by the appearance of a delegation of university presidents before a House Armed Services subcommittee in early April. They were seeking greater DOD support for university research.

The lead witness, Rutgers President Edward J. Bloustein, stated the group's main theme—that the "disrepair" of university research posed a serious threat both to the country's economy and to national security. Others in the group* discussed the implications of the decline of investment in research, shortages of scientific and engineering manpower, particularly in fields important to industrial productivity and defense, and the obsolescence of research equipment and facilities in the universities.

Only passing mention was made of tensions between government and universities. But, while Vietnam-era strictures against dealing with DOD seem to have eased, other worries about such dealings have arisen.

At the hearing, Rochester's Sproull said, "The great crisis of ideology during Vietnam has all but evaporated among faculty, students, and staff. There remains one concern; research and training programs on campus must be unclassified because universities must be able to teach and perform research and publish the results in an open environment."

Concern has focused recently on clashes between government and universities over national security considerations. Differences have arisen over restrictions on research in cryptography and on control of information about technical data, particularly microelectronics research.

George Gamota

Director of DOD research office

But both sides now seem anxious to see the relationship restored to its pre-Vietnam state. DOD funding of basic research peaked in the mid-1960's. In terms of constant 1982 dollars, the allocation for basic research in universities in 1965 was $394 million. In 1976 the figure was $164 million.

By the mid-1970's, therefore, officials at DOD feared that the United States would fall behind in the ideas on which the military technology of the future depends. A start was made under President Ford to reverse the trend. After the Carter Administration took office, the President's science adviser Frank Press set up an advisory group on basic research in DOD; the group recommended a buildup of basic research funding and broader DOD contacts with the university research community. Carter's Defense Secretary Harold Brown made it a matter of policy to revive the emphasis on basic research and increase the percentage of such funds allocated to universities rather than DOD in house laboratories or industry. The universities' percentage was about 32 percent in 1976; in the Administration's budget requests for 1982, the universities' share would be 44 percent.

To coordinate the effort on behalf of basic research, DOD management created a research office under George Gamota, a former Bell Labs physicist. Gamota's responsibilities extend over basic research performed in DOD's laboratories and industry as well as in the universities. The total for basic research in the 1982 budget is $723 million in current dollars; in 1976 it was $328 million.

Gamota, however, is leaving DOD in June to head the Institute of Science and Technology at the University of Michigan. This does not mean that DOD's new management's interest in basic research is flagging. It appears that a new post, assistant secretary for research and technology, will be created to oversee the territory. The new assistant secretary would also act as director of the Defense Advanced Research Projects Agency (DARPA), which serves a kind of corporate research function for DOD, passing promising ideas on to the individual ser-

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Editorial Note

On 18 January and 29 August 1980, *Science* published articles about the circumstances surrounding the admission of Mohammed Reza Pahlavi, the late Shah of Iran, to the United States. The articles dealt in part with the medical diagnoses and treatment of the Shah rendered by a New York physician, B. H. Kean. Dr. Kean is Professor of Tropical Medicine and Public Health (Emeritus) at Cornell University Medical College and Attending Physician at The New York Hospital. He has had a long and distinguished career as a physician, author, teacher, and scientist.

Because a definitive diagnosis of the Shah's complex illness was not made in Mexico, *Science* criticized the Administration's decision to admit the Shah to the United States on an emergency medical basis and further cast doubt on Dr. Kean's performance.

Recently, medical colleagues of Dr. Kean's and a U.S. government official provided *Science* with affidavits indicating that Dr. Kean was fully cognizant of the many possible serious disorders from which the Shah might have been suffering, that he was thorough in his review of all possible diagnoses, and that he was prudent in recommending that the Shah be transferred to a major medical center where sophisticated tests could be performed.

Science has no reason now to believe that Dr. Kean acted other than according to accepted medical and diagnostic procedure and the ethics of his profession.

vices. The assistant secretary would report to the Under Secretary for Defense Research and Engineering Richard De Lauer.

Gamota observes that the problem of increasing basic research in the universities has not been limited just to persuading universities to expand their DOD-sponsored activities. The military have near-term problems for which they want solutions, he says, and it is difficult for them to choose to put the money into long-term work. His job is "not so much convincing the universities to do research as to convince the military that it's to their advantage to do it."

Historically, the Navy has invested more heavily in basic research than the other services. In 1981, Navy funding of research in the universities amounted to $129 million, while the Air Force spent $79 million and the Army $55 million. The difference is partly attributable to a big Navy oceanography program currently funded at $50 to $60 million a year. DARPA is spending $19 million in 1981.

The military supports basic work in a broad spectrum of disciplines. Of a dozen categories, the biggest sums in the coming year are slated for physics, $88 million; mechanical or energy conversion, $78 million; and electronics, $76 million. At the bottom of the scale are social sciences, $22.8 million (up 10 percent), and aeronautical sciences, $13 million. The last is somewhat misleading since Air Force–sponsored research in several categories contributes to aeronautical science.

DOD research interests change. In past years, DOD-funded research contributed importantly to the development of computers, lasers, and integrated circuits. Industry now funds much of this research. Current DOD interests include naval hydrodynamics, satellite technology, and chemical defense.

Because DOD's patronage of basic research declined in the late 1960's, today it ranks fourth among federal agencies that support basic science; the National Science Foundation, the National Institutes of Health, and Department of Energy outspend DOD. But DOD funding has been particularly significant in some areas of research. Data in the mid-1970's showed that DOD provided about 60 percent of the funds for academic research in electronics, 33 percent in aeronautics, and 30 percent in computers.

Prospects for increased funding for universities appear strong. The House Armed Services research and development subcommittee's interest in the subject was stimulated by earlier hearings on the industrial research base. The panel was told that industry's problems with research, particularly with a shortage of research manpower, could be traced to the universities. The legislators were also apparently persuaded by the analysis of the delegation of university presidents, who appeared on behalf of the Association of American Universities and other higher education organizations. The forthcoming report of the committee on the DOD authorization bill is expected to include a request that the Secretary of Defense convene a Defense Science Board panel to make recommendations for corrective measures to be included in the 1983 budget.

A potential conflict, however, seems to be growing as universities increase the amount of work they do in applied science and technology supported by industry and federal agencies. In part, this work is being done because of the need to meet mounting financial pressures.

As opportunities for DOD- and industry-supported work increase, Gamota says that the universities have two choices. They can allow faculty to work with industry as consultants or they can accommodate such projects on campus. The latter course is being more widely chosen these days.

Such work will inevitably raise issues of proprietary interest as well as security considerations. The potential conflict between national security and the freedom of research is hinted at in the emerging debate over use of the DOD International Traffic in Arms Regulations; these regulations may be applied to control the spread of technical information that has military applications, in this case research on very high-speed integrated circuits (*Science*, 1 May, p. 523).

Gamota acknowledges that expansion of research in technology is likely to increase such conflicts. He says that microelectronics just happened to be the first area of research involved. The "same questions" could develop, for example, in materials research in areas such as composite materials or rapid solidification technology.

Gamota thinks that it is possible to reconcile the interests of DOD and universities. He says that the process has already begun, noting that a DOD-sponsored task force is at work on the topic.

The DOD seems to be ready to make a bigger investment in basic research in the universities not only to ensure that it gets "seed corn" ideas in specific fields but also to help maintain the research base in the universities. The universities, for their part, seem more willing today to do science for the sake of the economy or national security. And, as some higher education officials concede, the universities need the money. But there is also a wariness about the strings attached. What seems to have started is an effort to redefine the quid pro quo that governs this increasingly complicated relationship.—JOHN WALSH

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