

# The Times, They are a Changin'

An Insider Indicates Where Federal Funding of Science and Engineering May be Heading

BY JANET RALOFF

Every time a new administration takes office, it likes to think it's going to have a dramatic and lasting impact. Listening to George Keyworth, one gets the impression that Ronald Reagan may, much more successfully than his predecessors, bring about radical changes in the way the federal government feeds and fosters science. And Keyworth ought to know. He's the man Reagan chose and is briefing to become his personal science adviser (SN: 7/18/81, p. 45).

"As government support has proceeded to dominate basic research in the latter half of this century, we must ask ourselves if we have apportioned resources wisely. My own perception," asserts Keyworth, "is that whereas the present distribution of resources is reasonable, the future will require difficult choices and reapportionment."

For the next three years at least, those choices and reapportionments will reflect in large part the philosophy of the Reagan administration, with economic recovery being the number-one priority and a strong defense being number two. "We judge a large share of the issues in this office by those two criteria," says Keyworth. And pragmatism seems to guide all those judgments.

The revised fiscal-year 1982 budget proposal that President Reagan sent to Congress last March is "heavily influenced by needs, by applications down the road," Keyworth explains. "To emphasize mathematical and physical sciences relative to the behavioral sciences," as the Reagan budget does, has to do with pragmatism—"the role of the government and an interpretation of past payoffs from support in those areas."

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"Nobody is going to dispute that this country needs to have an active, healthy program in the social sciences," Keyworth says, "because the social sciences represent a large part of what we simply call education." And "nobody is going to dispute that this is an area where America has preeminence, leadership, top quality status. The real question is whether it is the government's role to support social science. And as a corollary—and this is a question to which I don't have an answer (I'm not sure anybody does)—what is the government's role in education?"

Similarly, he says, "Within the fields of

mathematical and physical sciences there is a very high density of what I would call rich turf — of tremendous promise." But even within promising fields, Keyworth cautions an eye must be kept peeled to see that federal dollars are spent wisely

For instance, Keyworth says the budget figure President Reagan tendered for laser-fusion research — \$108.2 million, down 18 percent from the amount Jimmy Carter had proposed for FY '82 — is "entirely justifiable." The reason, he explains, is that "the laser-fusion program has been dominated for 10 years by tremendous investments in new lasers, and in my opinion, an inadequate effort toward trying to understand the physics. I want to see us take these gigantic lasers that have been built and are being completed and use them to explore the unique physics that's available."

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Because Keyworth headed the laser fusion and physics divisions at Los Alamos National Laboratory immediately prior to his accepting the bid to become the President's science adviser, this assertion probably offers the best gauge as to how well Keyworth shares the President's pragmatic approach. Keyworth says he even supported the FY '82 projected cuts for laser fusion "from Los Alamos when I was running the Los Alamos program and when I would have had to cut people from the program."

There are several other notable examples of how Keyworth's attitudes mesh snugly with administration priorities:

- **solar energy.** "I think passive solar heating is a viable option in some parts of the country," but not the Northeast. And regarding the Carter administration's goal to meet 20 percent of all U. S. energy needs by the year 2000 with solar and renewable energy sources (SN: 6/30/79, p. 420), "I feel that very few scientists could support that statement with any credibility. And I will contend that very few scientists did support that statement. It was totally unfounded in fact." He said that unless major breakthroughs are made in photovoltaics technology, solar energy cannot play a dominant role in the near future.

- **nuclear power.** "The nuclear industry in

this country is so demoralized and so close to sinking that I think most of us are more concerned about revitalizing the nuclear industry than we are worrying about down-the-road" nuclear technologies like the breeder reactor. "Now it is true that the seeds for the future have to be planted today. And that's why we are supporting the Clinch River [breeder reactor] project. But although "the breeder is to me very important, it doesn't obsess me as much as revitalizing the nuclear industry."

- **national defense.** "What I believe that the country owes first and foremost to its people is security. Security comes from having an adequate — not excessive — military capability." Keyworth believes "our country's military might should be second to none" because "[i]f we can maintain peace through such strength, we also buy the time to use science and technology to improve the condition of mankind throughout the world. And this is the path to lasting peace."

- **women and minorities programs.** "We badly need more highly talented people in the sciences and engineering. My interest is largely a pragmatic one. If we have pools upon which we are not drawing adequately, we're making a mistake. (This applies to minorities and women.) But I think the way you exploit [these insufficiently tapped talent pools] is by education, not by subsidy."

- **NSF education programs.** In recent years the share of National Science Foundation support for science and engineering education programs has dwindled markedly. Considered "diffuse" and not very effective, even by M. Kent Wilson, NSF's Director of Planning and Resources,

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many still find the programs valuable on symbolic grounds. Not, however, George Keyworth:

"I am a scientist. I don't react to symbolic value very heavily. You ask me why we support particle physics and I can give you a set of answers — tangible, concrete answers. If you ask me why we support the education programs in the National Science Foundation, I'd have to work an awful lot harder to come up with an answer. And I'm liable to come up with very hollow answers — like symbolism. To me, when I'm trying to defend one program relative (Continued on page 63)

(continued from page 59)

to another, that's much too hollow an answer.

"Now, if I could turn and say, 'Look what we have done. We have been able to increase the number of first-class female engineers or women scientists because of these programs,' that's what I'd call a clear payoff." But Keyworth says, "I have not seen, nor am I even aware of a very convincing analysis of the payoff of the social, education programs at NSF." As a result, he foresees a coming re-evaluation and redefinition of NSF's role in education.

Keyworth has no trouble dismissing some policy questions that have recently gained national notoreity and provoked scientific commentary. His retort when asked about abortion is terse: "When life begins is not a scientific but a moral issue." And on evolution, "Creationism is not based on science, but on faith." Darwinism, on the other hand, is a valid scientific theory, he says.

He has considerably more trouble, however, dismissing what he considers to be vexing but valid policy-oriented dimensions of the science adviser's domain — the nation's growing science and technical illiteracy (SN: 11/1/80, p. 276), the upcoming shortage of trained engineers and the problem of how to fund psychology (with federal or private funds).

What promises to be an additional headache for the President's science adviser is the response such changes in

federal-funding priorities are likely to shower upon his doorstep. And representatives of some potentially disenfranchised communities are already seeding the clouds.

Robert Lowman, who heads scientific affairs for the American Psychological Association, told SCIENCE NEWS "We're in the process of contacting people around the country to put together a short series of papers that would demonstrate some examples of how behavioral and social-science research have had dramatic impacts on productivity." The first paper, "Psychology and Society: How we benefit from research," was just completed. In an effort to see that behavioral research does not get shortchanged in the federal budgeting process, it has been targeted at members of Congress, their staffs and other public officials.

There shouldn't be any question about whether the federal government should fund social-science research, Lowman feels, because it clearly advances both of the administration's top aims. He points out that an estimated 16.8 percent of all federally funded psychology research projects are paid for by the Defense Department. And in terms of dollars, the figure is likely to be much higher because while only 54 percent of psychology research is federally funded, that research accounts for an estimated 81 percent of all spending on psychology research. Addressing the administration's other cen-

tral target — economic recovery — Lowman has this to say: "The tacit assumption is that somehow the behavioral and social sciences don't make a contribution to national productivity. That's simply wrong, dead wrong." He says that whenever the administration talks about increasing productivity, cost effectiveness, safety and prevention of disease, "They're talking behavioral science, whether they know it or not." So cutting back federal funding of this research is likely to be unproductive.

Shirley Malcom of the Opportunities in Science program at the American Association for the Advancement of Science sees an equally defensible reason for not only maintaining a federal presence in science and engineering education, but also for materially strengthening it. "It's not Utah's problem, it is not Alabama's problem, it is not Maryland's problem whether or not there is going to be an adequate supply of trained, qualified diversely represented persons in scientific and technical careers. That is America's problem," she says. "And as America's problem, it has to receive attention at a federal level. It can not be relegated only to the states and local governments."

The science adviser's office will no doubt be barraged with similar defenses for every program slated to suffer under the budget-cutters' knives. And the eventual apportionment of funds will not please all. But that's not the science adviser's task, only his dream. □

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