

physics in particular—have experienced virtually flat budgets for a decade, when inflation is taken into account.

In an attempt to acquire larger budget allocations from Congress, which has been growing increasingly restive about funding basic research in a period of severe fiscal restraint, Massey launched an internal examination of NSF's programs early last year. The study was undertaken also to serve in developing a plan, given the title of "Strategic Vision," in anticipation of hearings by Congress this year to write reauthorization legislation for NSF. The new reauthorization would broadly spell out the types of programs NSF should support. This exercise, conducted every five years, involves three committees of Congress—one in the House and two in the Senate (because of overlapping jurisdictions over the agency's education programs).

Creating controversy

Meantime, ever since last August, when Massey described his own vision of NSF's future in a memorandum to the National Science Board, he has been the center of a ruckus. In his memo, Massey argued that NSF is uniquely placed to enlarge the scope of its operations by "fostering links between research and technology." Of three options that Massey outlined, he would continue NSF's traditional investigator-initiated basic research programs and introduce programs that encourage transferring academic discoveries into commercial technologies (see *PHYSICS TODAY*, September 1992, page 53). Massey's position received strong backing in Congress from the Senate Appropriations Committee and the House Committee on Science, Space and Technology, both of which had demanded that NSF shift some programs into research more relevant to industry.

The reaction to this from the scientific community was fierce. To fend off further opposition, Massey organized a commission of scientists and industrialists to study NSF's future. Three months later, the commission issued an endorsement of basic research, which reinforced statements by corporate scientists that NSF should continue to train creative researchers and not attempt to pick which technologies have the greatest commercial potential (see *PHYSICS TODAY*, December 1992, page 70). Massey's responses to the commission's report were ambiguous, however, causing trepidation among the foundation's academic clients.

Massey's new position at Califor-

nia, which combines the title of vice president with that of provost for the first time, also is a hot seat. The system embraces nine campuses with a combined enrollment of 166 000 students, with 7700 faculty members and with a current budget of \$7.5 billion. It also operates three Energy Department laboratories (Lawrence Berkeley, Lawrence Livermore and Los Alamos) on contracts totaling \$2.5 billion. (For more on the university's operation of the labs see page 80.) Massey's job includes overseeing the management of the labs. He has experience doing this. He directed Argonne for four years and then kept an eye on it for another seven years while he was vice president for research at the University of Chicago, before joining NSF (see *PHYSICS TODAY*, October 1990, page 55).

Massey will find the University of California is in more immediate financial turmoil than NSF. In the past three years, the state has reduced its allocation to the university system by \$254 million, and this year it may cut another \$138 million, bringing its contribution down to \$1.74 billion of the total \$7.5 billion budget. "These are very difficult times for most universities and perhaps even more so for the University of California, given the condition of California's economy," said Massey. "But I feel confident that in the long run the state will turn around, and I think UC will play a major role in revitalizing California. I feel very excited that I could be a part of that."

The job puts Massey in line to succeed the university's president, Jack W. Peltason, who will be 70 in August. Peltason was summoned only last October from the university campus at Irvine, where he was chancellor, after David Gardner resigned as president. Massey finished first in

a field of nearly 150 candidates screened by a system-wide search committee. Massey was endorsed by the board of regents on 18 February.

A previous search committee had picked Peltason after a deadlock over two other candidates. Peltason was always considered an interim choice—though the board of regents granted him a waiver to serve for three more years, well beyond the mandatory retirement age of 67 for university administrators. Those who know Massey best believe he would not have accepted the offer from California if the top job had not been used as bait.

A statement issued by the university quotes Massey as exulting: "It's an opportunity that I cannot pass up." By contrast to his annual NSF income of \$133 600 (reflecting the \$4100 increase that went into effect on 1 January for Federal executives at his level), Massey will be paid \$190 000 per year at California.

Taken aback by Massey's action, the White House, which had expected (and wanted) him to stay on, is now actively seeking Massey's successor. John H. Gibbons, President Clinton's new science adviser, will be central in the choice. He already has received a short list of candidates for the job from the Science Board, which is required by statute to recommend the NSF director. Other names have been sent to Gibbons by the National Academy of Sciences and by scientific societies. Under normal circumstances, the agency's deputy director, Frederick Bernthal, would take over as acting director until Clinton names a replacement. But Bernthal is himself an appointee of the Bush Administration and has no set term, serving at the pleasure of the President.

—IRWIN GOODWIN

BUSH'S WHITE HOUSE PANEL EXHORTS RESEARCH UNIVERSITIES TO CUT BACK

America's research universities are exemplars around the world—except in the US it seems. Of the nation's 3000 colleges, universities, specialized institutions and professional schools, some 170 are considered research intensive, each devoting more than \$3 million of their annual operating budgets to science and engineering. This prestigious group of universities receive 90% of all Federal R&D expenditures, mostly in the form of grants for basic research. They turn out 90% of the nation's PhDs, with foreign citizens making up as much as 60% of

the doctorates in some fields. To be sure, the university research enterprise has expanded so greatly to meet the demands for new scientific knowledge and more professional talent that the system is now roughly three times the size it was 30 years ago.

Notwithstanding all the superlatives, research universities are stressed out. The troubles are evident in the accusations by Congress of scientific misconduct and accounting malpractice, in the complaints by research scientists of funding inadequacies and equipment deficiencies,

and in the perceptions by the public of ever higher tuitions and ever lower standards. In the last four years the National Academy of Sciences has examined the problems in academic research several times and found enough faults for all—government, universities, industry, professional societies and even students and their parents—to share the blame.

The most recent criticism of research universities comes from an unlikely source—D. Allan Bromley, who was President Bush's science adviser, and the other members of the President's Council of Advisers on Science and Technology. They challenge the traditional assumption that the more academic research capacity there is the better it will be for the US. In a 55-page report, "Renewing the Promise: Research-Intensive Universities and the Nation," PCAST frets about the current state of research universities, warns that more stringent Federal and state budget limits are imminent and exhorts the academic system to trim back or cut out science and engineering departments that are no longer world-class.

Ironically, the report was issued on 21 December, just one month before Bromley returned to Yale University at the end of the Bush years. Still, in releasing the report to the news media, Bromley left the incoming Clinton Administration a parting shot: "If we do not ensure the health and vitality of this crucial set of institutions, it is at our own peril."

While PCAST members continue their Presidential appointments until June, it is not likely that the Clinton Administration will reassemble them—though the advice the group offers is both pertinent and practical to the new occupants of 1600 Pennsylvania Avenue and its environs. "The message is simple: We do not expect that the expansive days of the 1960s and of the early 1980s will be characteristic of the next decade," said Harold T. Shapiro, Princeton University's president and vice chairman of the PCAST panel that prepared the report. "We urge each university to adopt a strategy for itself, based on a realistic appraisal of future resources, and to commit to meet world-class standards in all programs that they decide to keep or begin," Shapiro said. For many universities, this will mean eliminating or downsizing departments, emphasizing the research that they do best. "The solution will be different for each university," said Shapiro, who is now engaged in restructuring Princeton along the lines laid out in the report.

This isn't the first time a White

House panel has urged government and universities to take action. In 1986 Federal support for university research buildings and facilities had fallen to such a low level that a panel of President Reagan's White House Science Council, led by David Packard, chairman of Hewlett-Packard and former deputy secretary of defense, put the case in blunt terms: "Federal investment, at minimum, must keep pace with the overall national investment in R&D; at the current rate of growth it will double in ten years. More rapid growth is essential if our universities are to meet the burgeoning demands being made upon them from almost every sector of society." The Packard panel, with Bromley serving as its vice chairman and principal author, didn't let the universities off easily. It admonished them for "attempting to ride out what were hoped to be temporary shortfalls" by mortgaging their research futures, "too often using limited funds to maintain research personnel rather than investing in needed instrumentation and facilities." (See PHYSICS TODAY, March 1986, page 65.)

Confronting issues head-on

PCAST updates the 1986 findings of the Packard-Bromley report and goes well beyond the earlier recommendations. It is the work of a presidentially appointed group that includes a half dozen university representatives and an equal number with long experience in industry. They held six hearings at institutions around the country and received statements from nearly 200 academic scientists, administrators and students.

To its credit, PCAST confronts head on the issue of teaching science and engineering at several levels: The entire educational system—from elementary schools through two-year community colleges and on to doctoral institutions—has a stake in providing high-quality instruction in science and technology to all. Ensuring that science education is "a continuing component of the life of each of our citizens," says PCAST, will produce scientifically literate citizens who can participate in public policy debates, will provide background for demanding jobs in high-technology manufacturing industries and will provoke some of the best students to become teachers.

The reemphasis on teaching at universities, the report admits, most likely will mean cutting back on research. "It is critical to the nation's future that universities reemphasize their educational mission and apply their unique

resources to society's educational requirements. PCAST believes that increased attention to educational activities need not drive up the costs of education and need not be at the expense of the net research output of truly valuable new knowledge."

While the report calls on the government to "continue to invest enough in basic research to sustain world-class accomplishments in all major areas of science and technology," it makes no recommendation to enlarge the public purse for R&D. The omission of such a plea will surely disappoint many scientists who have been demanding funding increases of as much as 10% per year for a decade. The report also warns universities and Federal agencies to "refrain from developing or implementing research or education programs that would increase the net capacity of the system of research-intensive universities." For universities this means resisting the temptation to found new research centers and programs. It carries the implication that universities ought not lobby Congress for pork-barrel projects that circumvent merit-based competition. For the government it means ceasing to launch initiatives that would expand the size of the academic research base without making compensatory cuts.

PCAST is right to express its worry about prominent universities that achieve notoriety for scientific and financial scandals. "Public confidence in universities is eroding," says the report. To address the public's increasing discontent, universities need to establish rigorous policies to protect against fraud and misconduct, says PCAST.

Though there is much that will cause fear and loathing in the report, there also is much that faculty and administrators will find appealing. The panel calls on Federal agencies to pay all research costs, including legitimate indirect costs. Federal agencies also should create a temporary facilities fund, equally matched with university money, to rebuild decaying or decrepit university laboratories and facilities. PCAST recommends that some \$4 billion of Federal money should be devoted to this purpose in the next decade, to be matched in each project by funds from states, universities and other sources. It also says that all research funds, whether for individuals, groups or universities, should be granted only through competitive reviews based on scientific merit, not on political considerations.

—IRWIN GOODWIN ■