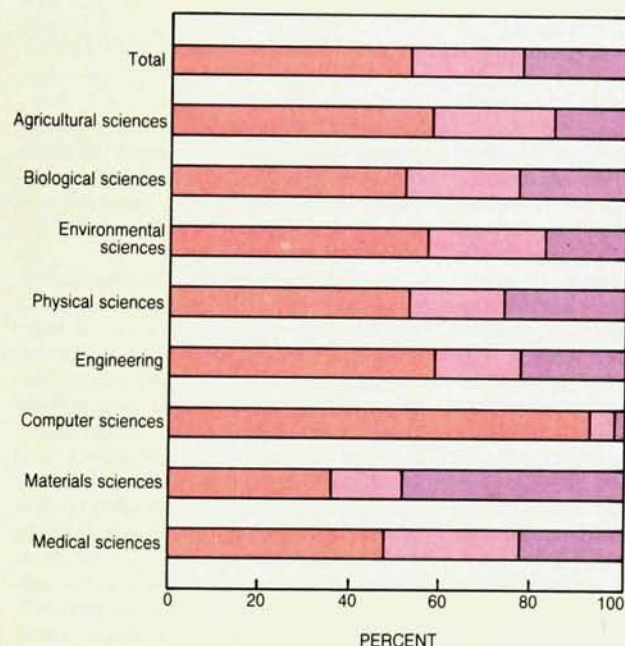


White House panel urges curatives for research universities

Research universities in the US are in rapidly failing health. The outlook isn't terminal, though, and if the government adopts the restoratives proposed by a panel of the White House Science Council, chances are excellent that all will yet be well in academe. The panel's eagerly awaited report is a careful, fairly comprehensive and disquietingly clear-eyed examination of the condition of that part of the nation's higher-education enterprise responsible for science and engineering. "Our university system remains unmatched in the world," the report says at the start, then quickly observes that it is not at all certain the system's continued superiority can be taken for granted to produce the scientific and technological knowledge and talent needed in the coming decades. That the report bears the optimistic title *A Renewed Partnership* is more of a prognosis than a diagnosis, for the panel is worried about the physical afflictions of the nation's research universities and only hopeful that the quantity and quality of students and faculty will not worsen.

The report will make its formal appearance in public before the end of March, but a penultimate draft was discussed in an open meeting of the White House Science Council on 17 January. Its timing is out of joint with events. Just two days earlier, the Office of Management and Budget, in conjunction with the Congressional Budget Office, revealed the arithmetic for lopping \$11.7 billion off Federal spending commitments (allowing for exceptions such as Social Security and interest on the national debt) in fiscal 1986—budget reductions that Congress would inflict under the Gramm-Rudman-Hollings deficit-reduction law. In such circumstances it is likely to be difficult to swallow the panel's choice of curatives, which would involve large expenditures in the next few years. Even so, the report is bound to achieve a crucial purpose: to sensitize members of Congress and ordinary citizens to the need to strengthen science and technology in the nation's universities and colleges.



Scientific instruments for research are aging in university laboratories. Red bars indicate equipment younger than 5 years; magenta, 6-10 years old; and violet, older than 10 years. The figure comes from a set of estimates made for the National Science Foundation in 1983 at 157 of the nation's largest research universities and 92 leading medical schools. Per capita spending on scientific instruments averaged about \$7200 in 1983, up from \$6900 a year before. (Data from National Science Board, *Science Indicators 1985*.)

The panel was appointed in May 1984 after George A. Keyworth II, then the President's science adviser, directed the council to look closely at whether universities are doing their job of attracting and retaining the best and brightest for science and engineering and, if not, to recommend ways of improving the situation. The council was also to propose how to advance the relationships between the Federal government and academic establishment, "especially as they affect the US ability to create scientific and technical talent and to conduct the research needed to sustain America's leadership in industry and defense."

Talent dependent. When Keyworth approached the council for this study, some vital statistics on university research already indicated that things were improving. After living for a decade on a relatively flat budget, R&D at universities began growing again in the 1980s at an average annual rate of 2.8% in constant dollars. Between 1984 and 1985 total spending for aca-

ademic R&D expanded by 7% to reach a total of \$4.1 billion in constant 1972 dollars. In terms of actual dollars, support for academic R&D had reached a historic high of \$8 billion in 1984, with Federal sources accounting for two-thirds of the total. But this sum needs to be held against some \$97 billion that was spent for the nation's entire R&D—a comparison suggesting to the panel an expenditure at universities "that simply does not reflect our dependence on the availability of the most able technical talent."

To correct this imbalance, the panel urges the Federal government to "make substantially greater investments in our centers of learning in the 1980s and 1990s than in the 1970s." During the 1970s different occupants of the White House and Congress either cut back or cut out government programs, intent on squaring the account for campus demonstrations against the Vietnam War. One such riposte was the Mansfield Amendment (introduced by Montana's Senator Mike Mansfield,

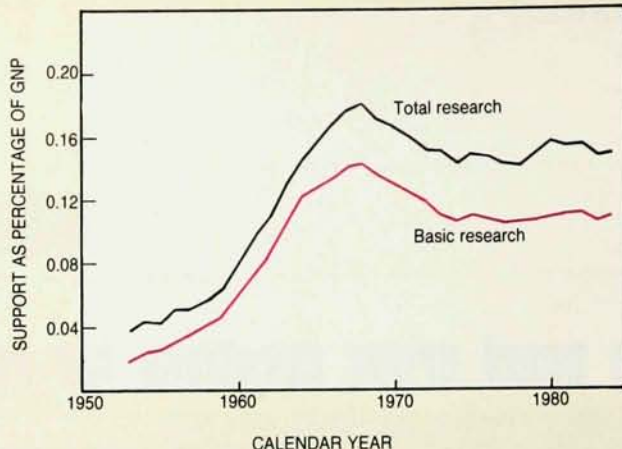
now US ambassador to Japan), prohibiting the Defense Department from sponsoring research not directly related to specific missions or functions. The problem goes beyond the Defense Department. Edward Knapp, former director of NSF, calculates that since the 1966-68 period the foundation's budget has grown by only 2% against the level of the nation's economic activity.

But when the White House panel weighs this problem against the Federal deficit, it is realistic about finding more money for universities. "The source of such funding in these times of fiscal stringency is not obvious," it writes. "Reallocation of R&D appropriations appears to be the most probable source, but we believe that incremental new funding will be required."

The report puts the case bluntly: "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 10 years. More rapid growth is essential if our universities are to meet the burgeoning demands being made upon them from almost every sector of our society. The Federal government is the only practical source of funding for the major part of this growth" if the US is to maintain its economic prosperity and military strength in the decades ahead.

The panel consists of a distinguished group of business and academic leaders, some with experience in Washington's corridors of power. At its head is David Packard, board chairman of Hewlett-Packard and former deputy Defense secretary. The panel's vice-chairman is D. Allan Bromley of Yale University. Among the other 11 members are Luis Alvarez of Lawrence Berkeley Laboratory, Isadore M. Singer of MIT and Edward E. David, president of Exxon Research and Engineering Co and science adviser to President Nixon. It also includes four university presidents: Paul E. Gray of MIT, Joshua Lederberg of Rockefeller University, Peter Likens of Lehigh and David V. Ragone of Case Western Reserve.

To the panel's credit, the report is a model of clarity and brevity. But it says little that is unfamiliar. Among the most obvious academic woes: deteriorating research facilities, obsolete scientific instruments and serious shortages of science and engineering faculty and postdocs. The report has plenty of blame to spread around. It states, as a major premise, that ups and downs in Federal support have not enabled universities to meet the demands for new talent and new knowledge, while academic operations have been snarled in bureaucratic red tape, preventing universities from making the best use of their resources. Accordingly, says the report, "Our conclusion



R&D to GNP ratio continues to rise, though recent increases resulted from the steady expansion of university research relative to slower annual growth of GNP. (Data from White House Science Council.)

is clear: Our universities today simply cannot respond to society's expectations for them or discharge their national responsibilities in research and education without substantially increased support."

The panel also doesn't let the universities off easily. It chastises 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." Researchers themselves are taken to task for being too conservative in their research approaches and goals, "too often [forgoing] high-risk exploratory research, which, were it to succeed, could have impressive payoff."

Plain talk. Its cavils aside, the Packard-Bromley panel accepts as axiomatic the proposition that the government and the academic community have a common interest in maintaining university research at its most robust. Indeed, the objectives of both will be unattainable if the research enterprise collapses. The panel speaks plainly about the care and feeding of research universities not being the sole responsibility of Washington. "State and local governments as well as private philanthropy play a vital role," says the report. "Their initial investments develop the structures and programs that make universities competitive for Federal investment, and they provide resources by which academic institutions preserve their autonomy and diversity. Moreover, such support is a major element of the shared responsibility that typifies the present university-Federal government partnership."

Along with this, the panel calls for increased industrial participation to help revitalize universities. It observes that "strong university-government-industry partnerships are fundamental to meeting our goals in economic competitiveness, national security, agriculture, health and in improving the

quality of life of our citizens." It proposes several methods for industry to engage in university research. The easiest involves continuing higher-education programs to update and upgrade industrial scientists and engineers. Another is for the Federal government to support "a major initiative to establish university-based, interdisciplinary, problem-oriented research and technology centers directed to broad national needs and relevant to industrial technology."

This recommendation appears to be partly in place in the form of the National Science Foundation's six Engineering Research Centers. NSF plans to create more centers this year and next. There also is a bold proposal, made last November by Keyworth and NSF Director Erich Bloch, to set up "Basic Science and Technology Centers," which would be funded by reallocating applied R&D programs in Federal agencies. One rumor in Washington has the proposed new centers requiring expenditures of \$500 million per year for a five-year period—or about one-third of NSF's entire research budget. The White House panel isn't specific about the type and scope of centers it suggests, but the idea of Keyworth and Bloch would seem to do the job.

Another recommendation that may appeal to industrial backers of academic R&D calls for changes in the Federal tax code. The White House panel suggests adopting a 25% non-incremental tax credit for companies that fund university research and support maintenance and servicing of university equipment. What's more, it proposes a tax deduction equal to the full market value of all research equipment contributed by industrial firms to universities. This may stimulate US firms to increase their contributions to academic research. Indeed, NSF recently reported that US industry contributed just under 5% of university R&D outlays in 1982, and there has

been little change since.

To help restore and rebuild the decrepit buildings on many campuses and to replace the outmoded research apparatus in labs (PHYSICS TODAY, October, page 59), the Packard-Bromley panel argues that "the portion of Federal research grants and contracts that reimburse universities for use or depreciation of facilities and equipment (use allowances) be based on realistic useful lifetimes." It suggests that the useful life of buildings and facilities should be reduced from the current 50 years to 20 years and that equipment life should be lowered from today's level of 15 years to 5-10 years, depending on the type of instrument. Of course, such changes will increase substantially the indirect proportion of grants and contracts, which, the panel urges, "should not be drawn from direct research costs but from a reallocation of funds from other sources."

'Facilities fund.' What the panel has in mind to restore academic infrastructures in a timely manner is a "facilities fund" that would be dispensed by NSF over the next 10 years. The concept is notably different from the plan for restoring campus buildings that Representative Don Fuqua, a Florida Democrat, introduced last June as his University Research Facilities Revitalization Act of 1985 (HR 2823). Fuqua's bill would provide \$10 billion over a decade, priming the pump the first year by adding about \$470 million to the overall science budget. The trouble with Fuqua's idea is that it would require the six leading R&D agencies (NSF, Defense, Energy, NASA, Agriculture and Health and Human Services) to set aside 10% of their research dollars in a systematic investment program to modernize university buildings and laboratories. In effect, say its critics, Fuqua's bill would reduce the amount of money available for research by robbing Peter to pay Paul.

The Packard-Bromley panel opposes a 10% reduction in research budgets. It wants to protect the base of research funds and so it calls for a distinctly separate account for rebuilding university facilities. The panel and Fuqua agree that whatever scheme is finally adopted should have a 50% matching requirement from the institutions,

states and private sources. Both also share the concern that all proposals for facilities funds should be subjected to peer review by the scientific or technological community that has a stake in the outcome.

A few of the panel's recommendations are bound to be controversial. One concerns reimbursements to universities for administrative costs incurred in conducting Federally funded research, now governed by Circular A-21 of the Office of Management and Budget. The panel proposes that such costs be fixed at a uniform percentage of modified total direct costs of the research. It suggests the percentage should be determined by calculating the mean national percentage over a five-year historical period and should be phased in over a two-year period to enable universities that are charging more than the new fixed rate to plan to a reduction. The panel suggests eliminating faculty effort reporting—a practice that academic researchers and administrators find meaningless at best and mischievous at worst. In urging an end to the inequity and paperwork, the panel urges that all agencies supporting research adopt NSF's practice of including indirect costs in the project budget.

When he was the President's science adviser, Keyworth argued that capping the reimbursement rate and eliminating effort reporting would go a long way toward removing "the primary source of acrimony and suspicion between university administrators, their faculty and the Federal government." The recommendations of the Packard-Bromley panel were accepted in part by OMB. In the 12 February *Federal Register*, OMB published a proposal to limit reimbursements for indirect costs of research grants and contracts to 26%, thus ending the traditional practice of each university separately negotiating its rate. The new cap would go into effect on 1 April, OMB stated, and the following April it would lower the maximum rate to 20%, "except that a lower rate shall be applicable where such a rate is currently in effect," in an effort to control the rapidly increasing costs of performing research. OMB claims that administrative payments equal roughly 46% of

the \$3.7 billion the government spent in 1983 on university research. The fixed rate, says OMB, would save some \$100 million in fiscal 1987 and \$200 million the following year.

University officials complain that OMB ignores the diversity of institutions and forces them to pay from their own pockets for the extra costs of doing Federally funded research. The Association of American Universities called on its member universities to seek to negotiate changes in the OMB rule and, in any case, to try to delay its implementation. For its part, the White House panel argues that accepting limitations on reimbursements is a price universities should be prepared to pay for less management and paperwork imposed by Federal agencies.

Peer review. Another arguable recommendation calls for Federal agencies to "place substantially more emphasis upon the research history of the investigator and less on the proposed research project" in the peer review process. Some researchers would argue that this would favor the "haves" and "old-boy networks" and hurt the "have-nots" as well as neophytes and scientists outside the mainstream.

The panel also recommends a vast talent search to identify and educate the ablest 1% of the nation's high-school seniors who want to study mathematics, natural science or engineering at colleges and universities. This program would pay the way of about 2000 students through four years of higher education. At an average of \$15 000 per year for tuition, room and board, the total cost of the program would come to as much as \$120 million each year. The panel also proposes "substantial, multiyear, merit-based fellowships" for graduate students in science and engineering, to be sponsored by government and industry.

The report does not deal with how university curricula or secondary schools should prepare scientists and engineers—no doubt because the panel found it impossible to examine and evaluate such broad questions. It also doesn't come to grips with Keyworth's question of what universities ought to do to sustain US science and technology.

—IRWIN GOODWIN

Cornell and DOE seek to return pork delivered by Congress

Notwithstanding the howls of protest from virtually every major academic and scientific association whenever Congress ignores the customary merit review process and dips into its "pork barrel" to fund projects at colleges and universities, old habits die hard. So it was on 19 December, when the Senate

and House, already exhausted by two all-night meetings and eager to adjourn the first session of the 99th Congress, approved without debate a catchall spending bill for several Federal departments that had not yet received appropriations. In doing so, the members also handed out Christmas

gifts worth \$65.6 million to 10 universities. The money is earmarked to come from the Defense Department's \$935.6 million research budget for fiscal 1986.

It is simply the latest example of a common practice. Members of Congress, who are accustomed to sponsoring such pet projects as waterways