

in practice and increasingly more so in the recent past. In all likelihood, such advances will be still more usable in the years ahead, if we take the trouble to make them so.

Time Delay in the Impact of Major Social Science Advances

Like all advances in any science, social science advances take time before they have any identifiable impact on a broader field of scientific activity or on the practical affairs of society. Our estimates of this delay for each of the advances on our list are given in the last column of Table 1.

For the period 1900-65 as a whole, the minimum delay of the impact for nearly three-quarters of the major advances was less than 10 years, the median delay was about 10 years, and the maximum delay was in the neighborhood of 15 years. These figures may understate the true length of the delay because for the recent period, as for any time-limited study, the achievements with longer delays are less likely to be recognized and are underrepresented. As a practical rule of thumb it may be safer, therefore, to expect the first major impact of a social science

advance to be delayed by 10 to 15 years after its inception.

Nevertheless, the delays in the recent period seem to have been decreasing, as might be expected in a society with greatly increased higher education and faster communications networks. The most frequent median delay time dropped from between 11 and 20 years in the years 1900-29 to less than 10 years in the years 1930-65; and the most frequent maximum delay time declined from about 25 years before 1930 to about 15 years in the more recent period. If one wishes to extrapolate from these data, one might surmise that the time lags of impact may be further shortened in the future. However, part of this decrease in the time delay may be due to the tendency of research institutions or governments today to support research that is expected to have an early impact on practical affairs, and it may not be characteristic of more fundamental contributions.

These time data suggest the desirability of extending the support of fundamental social science research efforts in the form of 10- or 15-year programs at clearly favorable locations. This more sustained support might encounter political and bureaucratic difficulties,

but it would seem to be the most promising strategy for making and consolidating advances like those described here in our basic understanding of social relationships and in our ability to solve pressing social problems.

The radical increase in natural science knowledge and in its application has produced a radical increase in the problems of coordination in all industrialized societies. To cope with this radical increase in urgent problems it seems essential to produce an early and large increase in social science knowledge and its constructive applications. The evidence here suggests that the intellectual and organizational means for such an increase are at hand if we care to use them.

References and Notes

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NEWS AND COMMENT

'72 Budget: Nixon Proposes Modest Increases for Science

President Nixon's budget for fiscal year (FY) 1972 proposes selective increases for research and development which would start the federal science budget upward again after several years of virtually static financing.

The impact on actual spending in FY 1972—which roughly covers the 1971-72 academic year—would not be dramatic since there is a lag of as much as 2 or 3 years between the obligation and actual spending of funds for science, but the budget does serve as a declaration of intentions by the Administration.

Since the Nixon Administration has now been through the budget-making process twice, it has had the oppor-

tunity to leave its imprint clearly on the budget, and the new one does reveal some identifiable marks of a Nixon policy in science. In general, the Administration shows an inclination to maintain high-quality capabilities for research but to restrain expansion of research and, particularly, of manpower training except in areas judged to contribute to the solution of major national problems.

Administration priorities are indicated by the choices of agencies and programs for major increases:

- The National Science Foundation (NSF) budget would go over the \$600 million mark for the first time. A major portion of the increase would

go into additional support of research grants, and there would be further cutbacks in traineeship and fellowship programs.

- A new cancer research program would be in line for \$100 million in funding; an additional \$95 million would be directed into support of financially hard-pressed medical schools and other institutions that train health professionals.

- Substantial percentage increases would be provided in funds for research on environmental problems, highway safety, air traffic control, and reduction of crime.

- Defense Department spending on research and development would be substantially increased. The additional funds would be split roughly between work on strategic and on tactical weapons. Expenditures on basic research would remain about level.

In discussing the new budget, Administration officials have stressed funds to be obligated but not necessarily spent in the coming fiscal year. Under the Nixon FY '72 budget, obligatory authority for the total federal

Department or agency	Obligations			Expenditures		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Defense—Military functions	7,338	7,400	8,309	7,424	7,543	7,734
National Aeronautics and Space Administration	3,825	3,382	3,215	3,699	3,319	3,109
Health, Education, and Welfare	1,251	1,506	1,637	1,235	1,359	1,477
Atomic Energy Commission	1,346	1,307	1,251	1,346	1,307	1,251
Transportation	315	468	566	246	414	543
National Science Foundation	288	343	495	293	330	403
Agriculture	289	312	321	288	309	314
Interior	160	188	213	153	188	207
Commerce	124	157	181	118	133	151
Environmental Protection Agency	75	118	132	38	82	96
Office of Economic Opportunity	101	116	100	76	88	94
Veterans Administration	59	62	62	58	61	62
Housing and Urban Development	30	52	49	14	55	50
Smithsonian Institution	20	22	31	20	24	31
Justice	10	11	25	5	14	21
Labor	21	24	25	20	24	25
All other	79	87	125	64	82	98
Total	15,331	15,555	16,737	15,098	15,332	15,666

science budget would rise to \$16.7 billion from \$15.6 billion in FY '71, but estimated expenditures would rise only from \$15.3 billion to \$15.6 billion. NSF would get obligational authority of \$622 million in FY '72 but would spend an estimated \$546 million. In the case of the new cancer research program, some \$30 million of the \$100 million would be available for expenditure.

It must be recalled that a President's budget is merely a request for funds and that Congress must provide the actual appropriations. There are always tensions when a President of one party holds the White House and Congress is controlled by another, but

the situation prevailing in the new session of Congress is likely to be particularly complex.

Politically, intimations of the 1972 presidential election are likely to sharpen partisanship on legislative issues, and the President's and Vice President's campaigning against liberal candidates last fall may have cooled some liberal Democrats' willingness to cooperate with the Administration on its proposals for science.

Probably more important, Congress faces a session that may simply overload its circuits. Unfinished business from the last session includes such difficult, unresolved issues as the trade bill and welfare reform. The compro-

mise on SST funding patched together in the last session expires on 31 March, and the Administration request for some \$235 million in FY '72 to continue the project is certain to meet strong opposition. Events in Cambodia and Laos seem likely to involve the Congress and the Administration in further serious debate on foreign policy. The President's proposals for revenue sharing and for a major reorganization of the federal bureaucracy seem unlikely to receive definitive action in the first session of the new Congress, but a good deal of time and energy will probably be spent in discussing the proposals.

Between now and the '72 elections, health issues and particularly the question of national health insurance programs are almost certain to gain major political importance. The Administration's course in coming months is likely to become clearer when the President sends Congress his message on health, which has been in preparation for several months and is expected to contain Administration views on health insurance.

Not until the health message appears are details of the new cancer program likely to emerge. The extra \$100 million appears as an item in the National Institutes of Health (NIH) budget, but it is a separate item and not, as some expected, included in the National Cancer Institute's budget. Since obligational authority for the cancer institute was boosted some \$50 million in FY '71 to an estimated \$230 million total, the additional \$100 million program raises questions of whether effective use can be made of the extra funding.



BUDGET PROGRAM COMPARISONS FY 1970–1972

(MILLIONS OF DOLLARS)

PROGRAMS	ACTUAL FY 1970	ESTIMATE FY 1971	ESTIMATE FY 1972
SCIENTIFIC RESEARCH AND			
FACILITIES SUPPORT	\$168.2	\$181.7	\$263.6
NATIONAL AND SPECIAL RESEARCH			
PROGRAMS	78.6	117.7	198.9
NATIONAL RESEARCH CENTERS	27.2	37.1	40.4
INSTITUTIONAL SUPPORT FOR SCIENCE	44.7	34.5	12.0
SCIENCE EDUCATION SUPPORT	120.2	100.6	77.3
PROGRAM DEVELOPMENT AND MANAGEMENT	21.7	23.7	27.0
SUBTOTALS	460.6	495.3	619.2
MISCELLANEOUS ADJUSTMENTS	-22.6	8.6	-0.2
TOTAL SALARIES AND EXPENSES	438.0	503.9	619.0
FOREIGN CURRENCY APPROPRIATION	2.0	2.0	3.0
TOTAL NSF PROGRAMS	440.0	505.9	622.0

The idea of a major concerted effort to "cure cancer" is not without antecedents. A number of congressional resolutions have called for such an effort, and the concept of a mobilization of resources such as that which produced the atomic bomb or the moon landing has frequently been discussed. A commission established by former Texas Senator Ralph Yarborough (*Science*, 16 October 1970) recommended creation of a massive cancer research pro-

gram administered by a NASA-like agency independent of NIH. This project approach is favored by biomedical research partisans associated with Mrs. Mary Lasker. Senators Edward M. Kennedy (D-Mass.) and Jacob K. Javits (R-N.Y.) have cosponsored a Conquest of Cancer Act (S. 34) incorporating the commission's recommendations. The bill calls for an independent cancer agency which would be provided with open-ended appropria-

tions beginning with \$200 million to \$400 million the first year and rising to \$600 million in the third year.

The appearance of the Nixon cancer research proposal as a separate item in the budget leaves open the possibility that the Administration is thinking of a drastic reorganization of cancer research. But biomedical research officials in the government have generally resisted this approach mainly on the grounds that the necessary fundamental principles were understood for the Manhattan project and the Apollo program but that such is not the case with curing cancer. Health, Education, and Welfare officials, and particularly NIH planners, are now engaged in working out ways to implement the President's proposal.

In the last year's budget NSF was given a modest increase in funding and a somewhat expanded role, and this year's budget carries those initiatives further. The trend in NSF is toward increased support of research projects and away from programs that have the effect of expanding training and research capacity. Direct support of graduate students and postdoctoral fellows is being further reduced. Ph.D. candidates and postdocs will be expected to obtain support under research grants and, presumably, NSF will be able to nudge both research and training in directions it considers important. The Administration is apparently carrying through on its announced intention to give NSF a larger total role in federal science. From the Defense Department, NSF is taking over funding of the National Magnet Laboratory and the interdisciplinary labs devoted to materials research at major universities. And obligations for research bearing directly on major national problems are scheduled to rise from \$29 million this year to \$74 million in FY '72.

The Atomic Energy Commission (AEC) budget reflects the same emphasis on research relevant to practical problems. Funds for development of a liquid-metal breeder power reactor would be raised by 20 percent, or about \$18 million. This year's \$1.7 billion total R & D budget would be reduced by nearly \$200 million, much of the reduction being accounted for by decreases in funds for R & D facilities made possible by completion of projects begun in years past. The 1972 budget does include \$48 million for construction work on the 200-Gev accelerator at Batavia, Illinois.

Pine Bluff Saved, Detrick Critical

One of the Army's biological warfare centers appears to have been saved from the scrap heap by President Nixon's proposed budget for fiscal year 1972, but another of the highly sophisticated facilities seems to have moved a step closer to extinction. The center that will be saved is the Pine Bluff (Arkansas) Arsenal, which will be converted to a civilian facility devoted to the study of the health effects of chemicals. The center that appears doomed is Fort Detrick, the Army's high hazard biological laboratory in Frederick, Maryland.

The Army centers have been in jeopardy ever since President Nixon, in November 1969, announced a total ban on offensive biological warfare. Since that time, teams of scientists and government officials have inspected the secret installations to see if the facilities might be converted to civilian use. The result of the Nixon Administration's review of the facilities became apparent last week.

On 27 January, the White House announced that the Pine Bluff center would be converted to a National Center for Toxicological Research under the administration of the Food and Drug Administration (FDA). The announcement said that the Army would remain at Pine Bluff for about a year in order to destroy biological weapons in accord with the President's order, and that the FDA would occupy the excess facilities as the Army vacates them. The FDA is expected to take over the entire facility by fiscal 1973.

James Grant, deputy director of FDA, told *Science* he expects the newly converted center to perform as much as \$10 million worth of civilian research in fiscal 1972, of which perhaps \$4 to \$6 million would be funded by FDA and perhaps \$4 million by the Environmental Protection Agency (EPA). An ad hoc scientific committee has been established to coordinate the work of agencies that might be interested in using the facilities, including the National Institutes of Health, the National Institute of Environmental Health Sciences, and the Agriculture Department. Cooperation with industry and the academic community is also being considered.

Research at the new center will include studies of the mechanisms of action of chemicals found in pesticides, food additives, and possibly drugs; their effects on animal metabolism; and their rates of absorption and excretion. The arsenal's extensive animal facilities will be used for studies of the effects of long-term exposure to low doses of chemicals.

While Pine Bluff seems to have been saved, the outlook for Fort Detrick has become still bleaker. There is no money in the President's budget for converting Detrick to civilian use, and while there is a chance that Congress might appropriate conversion funds anyway, this must be considered an outside possibility at best. Detrick's problem appears to be that it is simply too specialized and sophisticated for most civilian agencies to use, and it would cost more to operate than most civilian agencies are willing to spend (see *Science*, 22 January).

—PHILIP M. BOFFEY

The FY '72 budget for NASA seems to reflect no major changes in the Administration's post-Apollo plans. Funding would be held at slightly over \$3 billion in FY '72. Three more moon landings are still scheduled, although a stretch-out in launch dates of Apollo 15, 16, and 17 is contemplated. Work on a manned orbiting space station called "Skylab" is going forward, but a cut from \$190 million to \$100 million in FY '72 funds for a two-stage reusable space shuttle indicates that on the shuttle the Administration desires mainly to be keeping its options open. "Grand tour" unmanned missions to the planets are still scheduled for the later 1970's. Funds for basic research would be cut from \$286 million in the current year to \$234 million next year, but it is too early to detail where these cuts would fall.

Research on environmental problems and consumer protection is a growth area of the budget, and this is especially evident in new agencies whose research budgets show the effects of program transfers. The Environmental Protection Agency, which finances R & D in the areas of water and air pollution, pesticides, radiation, and solid wastes, would have a research budget of \$155 million. Research on highway safety in the Department of Transportation will double, with an increase of \$28 million.

At a budget briefing last week, presidential science adviser Edward E. David, Jr., emphasized that the budget is a "policy document," and said it testified that R & D was a high-priority item to the Nixon Administration and proved that the Administration was determined that the United States

should "maintain and widen" its world position in basic research. He added that the budget was a message to the scientific community that it "can look to the future with confidence."

It must be observed, however, that, although significant funding increases are in the budget, they are, so to speak, far from in the bag. An upturn in science funding still seems to depend on the two factors that caused the plateau in R & D spending—Vietnam and inflation. The new science budget is part of an expansionary economic policy designed to fight unemployment but hold inflation at a tolerable rate. If deficits grow too great this year or next, science spending, which remains one of the most readily controllable federal expenditures, will still be one of the most vulnerable to cutbacks.

—JOHN WALSH

Corporate Responsibility: Group Rates Company Social Performance

Public concern over what corporations do besides making money has found increasingly sophisticated and effective expression in recent years. Most efforts made on behalf of the consumer, such as those of Ralph Nader and the Project on Corporate Responsibility (Campaign GM), are geared for attack and are inclined toward litigation or pressure tactics. Now a quiet supplement to the consumer advocacy movement, the Council on Economic Priorities (CEP), is setting out to show that facts, if furnished to the right people, can help redirect the priorities of corporate America.

CEP is a research and information group whose aim is to find out what companies are doing in four areas of social responsibility: pollution control, minority employment policies, foreign investments (company policy in countries with repressive regimes), and involvement in the production of war materials.

Although only a little over a year old, the council has already had some impact. As a result of a report that revealed Honeywell Corporation to be a large manufacturer of antiper-

sonnel weapon parts, CEP says, a major mutual fund in New York City (which asked CEP that its name be withheld) unloaded all its Honeywell holdings.

The council's reports are read by people in corporations, universities, investment companies, government agencies, and social action groups, as well as by individual investors.

One subscriber is Roger Murray, who until recently headed Columbia University's \$1.5 billion College Retirement Equities Fund. Murray regards CEP as a valuable source of information which, he has found, is otherwise very difficult to obtain. Information on the minority hiring policies of a company has influenced at least one of his investment decisions.

The Chase Manhattan Bank uses CEP as a source of information in its Technical Assistance Division, a new department designed to evaluate the impact of the bank's money on environmental quality and to structure programs of financial aid aimed at accelerating a given company's pollution control efforts. Robert Aldrich of the bank says CEP is off to a "fine start"

in contributing to the "dialogue that is being set up between the public and industry."

The group has issued two large research reports up to now. One of them, published in book form by Harper & Row, contains profiles of 105 corporations under the title *Efficiency in Death: the Manufacturers of Anti-Personnel Weapons*. It lists the dollar value of and the equipment manufactured under each company's "anti-personnel" contracts, as well as each company's products, sales, financial worth, and the names of its officers and directors. The other report, entitled "Paper Profits," is a 400-page, statistic-laden rundown of the efforts of 24 major pulp and paper producers and their 131 mills in combating their own pollution. Released in December, the report has given CEP its widest publicity so far. Soon to be completed is a report that relates the activities, in the four areas of social responsibility, of 50 of the nation's largest corporations in six major industries: automobile, paper, steel, oil, airline, and chemicals.

The idea for such an information organization had been germinating for some time in the minds of several anti-war activists. But it was formed largely through the zeal of Alice Pepper, a brainy, winsome, 26-year-old Wellesley graduate. Miss Pepper was a securities analyst for a small Boston firm when a Jewish synagogue approached her, \$250,000 in hand, and asked for a list