Science Budget: Coping with Austerity

Basic research fares relatively well in Reagan's budget squeeze; defense would get 61 percent of all R & D funds

At first glance, it looks as though science and technology have fared well in the budget that President Reagan sent to Congress on 8 February. Total expenditures on research and development (R & D) are scheduled to rise from $38.8 billion in fiscal year (FY) 1982 to $43.0 billion in FY 1983—a 10.8 percent increase at a time when the federal budget is under a tight squeeze.*

But first glances can be deceptive. Military programs would account for the entire increase, while nondefense R & D would get essentially level funding. This means, of course, that support for civilian science and technology would decline in real terms as inflation takes its bite.

The budget proposals offer few real surprises. They reinforce two trends that were evident in the spending program that Reagan skillfully rammed through Congress last year: a massive shift of scientific and technological resources into the military, and the phasing out of support for many development programs that the Administration believes should be left to private industry. Within all this, basic research is relatively protected, for it emerges with an increase that may be just enough to keep abreast of inflation.

George Keyworth, President Reagan's science adviser, proclaimed himself "delighted" with the way the budget turned out. Pointing to large increases in support for space science and high energy physics—which received an additional $65 million in the late stages of the budget process—and reductions in many energy projects, he said that it conforms with his intention of emphasizing areas deemed especially fruitful and cutting back lower priority programs.

If Reagan gets his way with Congress, the federal government will devote 61 percent of its total R & D funds to military programs in FY 1983. Two years ago, in FY 1980, the military's share was 47 percent. This growing militarization of the R & D budget is a consequence of huge increases in funds for defense programs, coupled with declining support for nondefense R & D. According to a recent analysis by the American Association for the Advancement of Science (AAAS), while military R & D has enjoyed real growth of 22.2 percent between FY 1980 and FY 1982, civilian R & D has declined by 16.1 percent. Reagan's proposals for FY 1983 continue these trends. Defense R & D (including military programs run by the Department of Energy) is set to climb to $26.2 billion—an increase of $4.2 billion—while nondefense R & D would remain at $16.8 billion, about the level it has been for the past 2 years.

The squeeze on the civilian R & D budget is highly uneven. Many energy and environmental programs would be cut back sharply, largely on the grounds that private industry should take them over. These shifts, according to the budget documents, reflect "a clearer delineation than has been the case in the past between the responsibilities of the federal government and those of the private sector." Non-nuclear energy programs, in particular, seem to fall on industry's side of the line, for they would be all but eliminated from the federal budget.

As for basic research, the picture is much less gloomy than many researchers had feared. Budgets for basic research are set to rise by about 8 percent, to $5.8 billion. (Actual expenditures next year would increase by only about 5 percent, however—an amount that is unlikely to keep pace with inflation.) Most of this increase would come from departments and agencies that support primarily physical sciences and engineering, however. Funds for basic biomedical research, which come chiefly from the National Institutes of Health (NIH), are scheduled to rise by only about 3 percent—well below inflation.

The relative parsimony toward NIH is explained by Keyworth as reflecting the fact that support for the biomedical sciences rose steadily in the 1970's, while that for physics and engineering increased more slowly. "We felt that the overall health of the physical sciences was low," Keyworth said, thus they received more generous treatment.

The social and behavioral sciences would get virtually no increase, but at least that is an improvement over last year, when the Administration targeted those disciplines for deep cuts.

The Department of Defense is playing a growing role in the nation's total spending on basic research. Although it devotes only a trivial fraction of its huge R & D budget to fundamental research—less than 3 percent—it is planning to raise its basic research budget

*The figures are for budgetary authority, not outlays. They do not include funds for R & D facilities, which are budgeted at $1.3 billion in FY 1983.

CONDUCT OF BASIC RESEARCH BY MAJOR DEPARTMENTS AND AGENCIES

(In millions of dollars)

Department or agency	Obligations			Outlays		
	1981 actual	1982 estimate	1983 estimate	1981 actual	1982 estimate	1983 estimate
Health and Human Services	1,955	2,000	2,069	1,944	1,978	2,034
(National Institutes of Health)	(1,767)	(1,839)	(1,897)	(1,750)	(1,813)	(1,869)
National Science Foundation	898	912	984	830	972	861
Defense-military functions	603	673	781	554	616	712
Commerce	608	665	762	614	670	759
(Energy Research and Technology Administration)	(591)	(647)	(741)	(597)	(652)	(737)
National Aeronautics and Space Administration	532	580	682	538	575	661
Agriculture	314	332	359	302	337	354
Interior	80	73	68	79	73	69
Smithsonian Institution	44	45	51	41	44	51
Veterans Administration	15	13	14	15	13	14
Education	17	14	14	18	18	22
Environmental Protection Agency	10	15	10	12	12	10
All other	32	27	28	29	29	28
Total	**5,108**	**5,348**	**5,821**	**4,975**	**5,337**	**5,574**

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next year by 16 percent, to $781 million.

The projected 8 percent overall rise in basic research support should, however, be seen in the light of recent trends. According to the budget analysis prepared by the AAAS, funds for basic research have declined, in real terms, by 5.5 percent since FY 1980. Thus, after inflation is taken into account next year, the increase will not be sufficient to offset the losses during the past 2 years. But at least in comparison with others who rely on the federal government for support, researchers have fared well.

How will Congress treat the R & D proposals? At this stage, it is difficult to predict, but it is worth noting that last year Congress shaved some off the totals proposed for defense R & D and added a little to those for civilian science and technology. The same pattern is likely this year, especially since the massive overall increases in defense spending will be treated with some skepticism in an election year when many social programs are being butchered. Congress has also traditionally regarded non–nuclear energy programs with considerable favor, and it is likely to reorder priorities in the energy R & D budget a little. And finally, the National Institutes of Health usually emerge from the appropriations mill with more money than the Administration requests.

But, with official projections of a $91.5 billion deficit next year, and several unofficial projections suggesting it will go even higher, Congress is unlikely to loosen the purse strings by very much, even in an election year.—COLIN NORMAN

NSF

The new Reagan budget allots the National Science Foundation (NSF) $1.07 billion for fiscal year (FY) 1983, a 7.7 percent increase over the current year and slightly above the estimated 6.5 percent inflation rate. Within the confines of what NSF Director John B. Slaughter called a "tightly constructed budget," the foundation managed a somewhat larger increase for support of engineering and basic research in the natural sciences.

Confirmed as the major loser in the Administration's budget plans is science and engineering education. The lone surviving program in that category is graduate fellowships, which received $15 million. In FY 1981, the science education directorate got some $70 million for activities including research and curriculum development. Last year the total was down to $20.9 million, including some $16.8 million for graduate fellowships and other related programs.

Another conspicuous cut came in ocean drilling programs which were allocated $14 million compared to the $20 million called for in the current budget. The reduction reflects a decision to abandon plans for the so-called ocean margin drilling project (*Science*, 6 November 1981, p. 637), which hinged on substantial industry support that was not forthcoming. Funds in the new budget are intended to finance a final year of the present deep sea drilling program and to allow the foundation to explore ways to replace the aging drilling ship *Glomar Challenger* with the more capable but more expensive to operate *Glomar Explorer*.

In general, the NSF budget bears out the promises of Administration spokesmen that support of fundamental science would be protected. The constraints of what Slaughter called "concern about holding down the growth of the federal budget" clearly deterred the foundation from launching any major new programs, but Slaughter identified several priorities he said NSF will pursue, albeit under existing programs. He noted, for example, that the foundation will give special attention to the problem of obsolete equipment and research facilities in universities. No "set-aside" will be made for such expenditures, however, and they will have to be funded through research grants. The shortage of faculty in particular specialties in engineering and computer science has spurred an effort by NSF to provide incentives for graduates in these fields to follow careers in academic science. In promoting industry-university cooperation, NSF will fund another industry-university cooperative research center, the sixth. Slaughter also said that the foundation will try harder to enlist the participation of outside organizations in the cooperative effort.

In remarks on NSF priorities at a budget briefing Slaughter emphasized the importance of programs to enable women and minorities to make careers in science. He pointed to increases in the 1983 budget in funds for several programs for women and minorities, amounting to a partial restoration of funding in an area hard hit by cuts in the first two Reagan budgets.

In discussing the state of science and technology education, decimated in earlier Reagan budgets, Slaughter affirmed that the federal government has a "role of leadership in science education." He indicated that the Commission on Precollege Education in Mathematics, Science and Technology established by the National Science Board in January will be expected to provide a convincing rationale for NSF science education activities in the future.—JOHN WALSH

Health

The Reagan Administration has proposed a $3.75 billion budget for the National Institutes of Health (NIH) for the next fiscal year, granting the institutes a 3 percent increase over the fiscal year (FY) 1982 budget. The raise, if approved by Congress, would be in keeping with NIH's modest growth over the past two years. In terms of real growth, however, the increase would be swallowed by the 6.5 percent inflation that the Administration projects for FY 1983.

Secretary of Health and Human Services Richard Schweiker said at a press briefing that "NIH is the most cost-effective program we have [in the department] . . . I would have liked to have had more growth at NIH," but it couldn't be done in light of cuts in other departmental programs. He said, "I went to the mat three times with OMB [Office of Management and Budget] over NIH and I think we came out okay." The proposed budget comes at a time when NIH is still without a permanent director, although James Wyngaarden, chairman of the department of medicine at Duke University Medical Center, is expected to be officially nominated soon.

The Administration proposes that each of the 11 institutes be allotted some increase with a majority receiving 3 percent raises. The exceptions are the National Cancer Institute and the National Institute for Allergy and Infectious Diseases. The cancer institute's budget would be kept to a 1 percent increase at $955 million. The allergy institute, slated for a $246 million budget, would land the highest increase of all at 4 percent.

The Administration is requesting cutbacks in two areas of the NIH programs—competing research grants and training awards. The number of competing research grants would be shaved to 4100 from last year's figure of 4700. This seems to make meaningless the target number of 5000 grants agreed to 3 years ago by the Health and Human Services Department in order to stabilize long-range planning of research. Indeed, science adviser George Keyworth said in an interview that the goal of 5100 grants has been abandoned. The Reagan budget sets aside $492 million for competing grants, a drop of $35 million or 7 percent

from last year. To get funds for 500 to 600 of the 4100 grants, NIH trimmed indirect cost reimbursement by 10 percent of the present rate.

The Administration is also asking that the number of research trainee awards be decreased from 9700 to 8900 next year. Expenditures for these awards would total $152 million, a decline of 3 percent.

Although NIH received some increases, other federal research institutes related to health took substantial cuts. The budget of the National Institute of Mental Health, under the Alcohol, Drug Abuse and Mental Health Administration (ADAMHA), would be cut sharply by 13 percent to $196 million, primarily because of the elimination of clinical training programs. Overall research and research training expenditures for ADAMHA, however, would increase by 12 percent to $246 million.

The National Institute for Occupational Safety and Health, a part of the Centers for Disease Control, faces an even bigger budget cutback than the mental health institute. The agency budget would be slashed 15 percent to $51 million. About half the reduction is related to the phaseout of occupational safety and health training programs.

—MARJORIE SUN

Defense

The one sector of government that encounters no hardships in the 1983 budget is the Department of Defense (DOD). Figures released on 8 February by DOD's Deputy Secretary Frank Carlucci show that outlays on military programs will grow from $183 billion to $216 billion in 1983, an increase of 18 percent. (The figure does not include approximately $5 billion in nuclear weapons material costs, carried this year in the Department of Commerce budget.)

Spending authorization grows even faster, reflecting the Administration's determination to commit the United States to a massive weapons-building program while public support appears strong. Many new contracts will be signed in 1983, and the bills will come due in later years. Thus, the authorization budget grows by 20 percent, from $214 billion to $257 billion.

DOD is a large bureaucracy. Most of its budget provides for routine institutional needs: pensions for retirees, pay for those on active duty, large operation and maintenance costs. However, the single category of the budget receiving the largest increase this time is weapons procurement—up $20 billion in constant dollars. Operation and maintenance comes second, increasing by $4 billion. Third is research and development, which grows by $3 billion. Other categories grow by less than $2 billion.

One important new program appearing in the budget this year is the plan to build a long-range strategic bomber to replace the B-52. A modified version of the B-1 rejected by President Carter, this new plane, called the B-1B, seems destined for a rather short life. Soviet air defenses are expected to improve sufficiently to make the new bomber obsolete by the early 1990's. By then DOD intends to have yet another strategic bomber under construction: the Stealth. In the meantime, the Administration is spending $1.6 billion in 1982 to buy the first B-1B. In 1983, DOD will spend another $4 billion for seven copies. And in 1984, it will spend $6 billion for another 10 planes. Funding for research and development on the Stealth begins officially in 1983 with $60 million.

Although the Reagan Administration decided to scrap the costly Carter plan for basing the strategic MX missiles in desert bunkers, it has not decided where it will put them. DOD plans to make its first purchase of 9 MX missiles in 1983, at a cost of $1.5 billion.

Other major expenses in this category cover the new, more accurate strategic submarine missile (the Trident II), two more Trident submarines, two aircraft carriers, conventional ships and planes for the rapid deployment force, cruise missiles, and a thorough overhaul of the strategic communications system.

Authorization for research and development funding at DOD grows from around $17 billion to $20 billion in 1983. Roughly $712 million pays for basic research. The areas of research given the highest priority are programs involving directed energy (particle beams and lasers), sensors and targeting systems for precision guided weapons, advanced materials (i.e., those that can deceive a radar scanner), chemical warfare, and very high-speed integrated electronic circuits.

In the annual report, the secretary notes that he intends to create a new post: assistant secretary for research and technology. This official would serve as director of the Defense Advanced Research Projects Agency and as an immediate subordinate to the under secretary for research and engineering. One purpose of the change, according to the annual report, is to speed up the pace at which new ideas are incorporated in military equipment.

Probably the most controversial item in the R & D budget is the nerve gas program. The annual report asserts that the Soviet Union is "much better prepared than the United States or our allies to wage chemical warfare and fight in a chemically contaminated environment." Although the United States would like to ban the use of such weapons, the report says, because of the failure of recent negotiations, "we cannot be optimistic of success." Therefore the DOD plans to keep pace with the Soviets by spending $32 million in 1983 for "expedited research and development" of more effective chemical weapons.

—ELIOT MARSHALL

Space

Financially, the National Aeronautics and Space Administration did well under the new budget plan—the $6.6 billion request represents an 11 percent increase over fiscal year 1982—but nonetheless, the agency will continue to coast. No new projects are proposed, and for the first time there is no allowance made for new starts in estimates of future budgets.

The $3.5 billion space transportation budget continues its shift away from space shuttle development and production, toward shuttle operations. The first operational flight of the shuttle (the fifth flight in the series) is scheduled for November; the new fiscal year will see a total of five flights.

The White House again turned down NASA's request for a fifth orbiter. However, the agency is still studying the savings potential of a "block buy"—purchasing parts for both a fourth and a fifth orbiter simultaneously—and expects to make a decision by June.

NASA has also dropped plans to develop the liquid-fueled Centaur upper stage for boosting payloads into orbits that the shuttle itself cannot reach. On the other hand, the agency will continue its studies of a large, permanent space platform—the "space operations center"—in both its manned and unmanned versions. Preparations are also under way to demonstrate the shuttle's capability for on-orbit repair with a mission to rescue the ailing Solar Maximum Mission satellite.

With one exception, things continue on track within the newly-reorganized Office of Space Science and Applications. Major missions such as Landsat-D (launch in 1982), Space Telescope (1985), Galileo (1985), Voyager's Uranus encounter (1986), and the Gamma Ray

Observatory (1988) are all on schedule.

As expected, however, that one exception is planetary science. The Office of Management and Budget canceled the Venus Orbiting Imaging Radar project and very nearly did the same to the Galileo Jupiter mission. It seems likely that the agency will have to cease data acquisition from the Pioneer Venus Orbiter and from Pioneers 10 and 11, which are still returning information on the particles and fields environment of the outer solar system.

Also, cuts in the research and analysis budget have fallen hardest in planetary science. This is the money that pays for the analysis of the planetary data already collected and for the planning of future missions. The budget was $46.7 million in fiscal 1982, and $35.5 million in the fiscal 1983 plan. Scientists both inside and outside the agency are concerned that cutting such relatively small amounts of money now will erode NASA's ability to sustain any kind of planetary program, however modest, in the future.

Among the probable consequences of this cutback will be the closing of the Lunar Curatorial Facility in Houston, which houses the moon rocks, and the Infrared Telescope Facility (IRTF) on Mauna Kea, Hawaii. IRTF, completed in 1979, has been widely hailed as the finest such instrument in the world (*Science*, 4 December 1981, p. 1110). NASA Administrator James M. Beggs says that he assumes the National Science Foundation will pick up IRTF, but admits that he has not talked to NSF directly about it. NSF, meanwhile, says that it has no intention of taking over the facility.

NASA will continue laboratory development of the 30/20 gigahertz communications technology, but has dropped plans for testing it on a satellite. That, says Beggs, will be left up to industry. Guided by that same philosophy, the agency will step up its basic research on aeronautics, but will withdraw from such applied projects as advanced turboprop development and large-scale composite structures. Its technology transfer program has also been eliminated.

—M. MITCHELL WALDROP

Energy

The budget proposals for the Department of Energy (DOE) have an air of unreality about them. For one thing, DOE will no longer be in existence by the time fiscal year (FY) 1983 rolls around, if the Administration gets its way. And for another, the cuts proposed for non–nuclear energy programs are so sweeping that Congress almost certainly will not agree to them.

Keyworth and Isabelle

A $65-million increase for high energy physics, but not enough to build the Isabelle accelerator.

Energy R & D programs, which would be transferred to the Department of Commerce under the Administration's plans, would be slashed by about $1 billion, to $2.184 billion, with funding for fossil energy, conservation, and solar power bearing the brunt of the reductions. This would bring about a major reordering of R & D priorities, with nuclear power climbing to some 66 percent of the total.

These moves are consistent with the Administration's oft-repeated philosophy that rising energy prices will be sufficient to spur conservation and encourage the use of alternative energy resources.

Consequently, the budget for research on fossil fuels would be slashed to $107 million in FY 1983, down from $566 million this year and $994 million in FY 1981. Spending on conservation R & D would be virtually eliminated, and the budget for solar and other renewable energy resources would be a mere $83 million. When Carter left office, the solar budget was headed toward $1 billion.

The nuclear budget includes $577 million for breeder reactor R & D. About half of this would be spent on the Clinch River Breeder Reactor in Tennessee, a project that has already consumed $1.2 billion in government funds.

A major change is being proposed for funding waste management R & D. The Administration is planning to collect revenues from the utility industry to fund studies at candidate disposal sites. The collection of these funds, which are expected to grow from $300 million in FY 1983 to $659 million in FY 1987, would begin to shift some of the burden for waste management operations to the utilities.

Some significant changes have been made to the budget for magnetic fusion. Overall spending would be $444 million, the same as this year, but some $25 million would be taken from the proposed mirror machine at the Lawrence Livermore Laboratory and be reprogrammed among other elements of the fusion program. This would delay the start-up of the Livermore machine by about 1 year, DOE officials estimate. The total funding for fusion falls well below the level authorized by Congress in 1980 when it passed an omnibus fusion energy bill. This fact, together with the changes in priority, which were largely made by the Office of Management and Budget (OMB), prompted the head of the fusion program, Edwin Kintner, to resign last month.

The budget for the high energy physics program, which is among those proposed for transfer to the Department of Commerce, would be boosted by $65 million, to $429 million. This surprisingly large increase would permit the completion of work on the energy saver and the Tevatron I and II projects at Fermilab, and enable R & D work to go ahead on the proposed Stanford Linear Collider project at Stanford University. It would not, however, be enough to permit construction to continue on the Isabelle accelerator at Brookhaven. Alvin Trivelpiece, head of DOE's Office of Energy Research, says, however, that there is money in the budget to continue work on superconducting magnets at Brookhaven and that the Isabelle project has for the moment been put "in mothballs."

The energy R & D budget faces rough sledding on Capitol Hill. Already, a letter drafted by Richard Ottinger (D–N.Y.) and signed by 150 other members of Congress, has been sent to OMB director David Stockman serving notice that the massive cutbacks in conservation and solar programs will be contested.

—COLIN NORMAN

Environment

Administrator Anne M. Gorsuch was out of town so it fell to comptroller Morgan Kinghorn to announce the Environmental Protection Agency's bare bones budget for fiscal 1983. The cuts were slightly larger than advance figures circulated by individuals who have been alarmed at the fate of the agency under an Administration that so far has demonstrated little interest in environmental protection.

The total operating budget requested is $961.3 million, down from Reagan's revised 1982 budget of $1.086 billion. Compared with the 1981 budget of $1.3 billion, and adjusting for inflation, this amounts to about a 40 percent cut in EPA's purchasing power at a time when the agency's work load should be doubling, according to critics.

In announcing the proposals, EPA officials stated that the big priorities for next year are capital expenditures for the Superfund for cleaning up old hazardous waste dumps, for which $230 million has been requested for the third year of this 5-year program; the other big expenditure is a requested $2.4 billion for sewage treatment construction grants to the states. Both of these are outside the operating budget.

All EPA's research, monitoring, and enforcement programs are to be cut; $184 million has been requested for air quality (down from $220 million for 1982); and $186 million for water quality (a $51 million cut). A $4 million reduction to $103 million is requested for the Resources Conservation and Recovery Act (RCRA), dealing with existing hazardous waste facilities, for which implementation is beginning this year. For implementation of the Toxic Substances Control Act (TSCA), $78 million (a $9 million reduction from 1982) is requested. The pesticides program is to be reduced $3 million to $51 million.

As for enforcement, consolidation of activities is to lead to a budget of $88 million, down from $104 million. Grants to states are to undergo a decrease to $182 million, reflecting an accelerating decline from the peak funding year of 1979—this despite the fact that a theme of this year's presentation was the need to turn over monitoring and enforcement functions to the states.

EPA officials held fast to the line that the reductions will not impair the agency's functioning, but will actually lead to improved efficiencies. They said this would be possible through extensive "streamlining" of procedures as well as increased "flexibility" in the form of reduced reporting requirements and less detailed federal overviews.

Money for research and development in all program areas is being reduced in the request from $270 million in 1982 to $207 million in 1983. The largest single research cut is on the abatement of pollution from "futuristic" energy technologies, particularly synthetic fuels.

The object of EPA's R & D program, budget documents explain, will be to improve the scientific credibility of regulations and supply data directly relevant to regulatory needs, including the need for "less burdensome regulatory strategies." Documents explain that many research programs, such as test methods development for analyzing toxic substances, have been completed.

As for personnel, a reduction from this year's total of 9281 employees to 8645 in 1983 is still planned. However, owing to a last minute reallocation of $16 million, no firings are planned in 1983 and no further reductions in force are anticipated in 1984. Although EPA's attrition rate has been reported as having doubled, Kinghorn reported at the briefing that in fact it has been no higher this fiscal year than the "historical" rate of about 100 a month.

Despite official assurances, environmentalists are so worried about the apparent dismantling of the agency that the National Wildlife Federation has sponsored the preparation of an alternative budget for EPA, compiled by a team of analysts headed by former EPA assistant administrator William Drayton. The NWF analysis states that an adequate 1983 budget for the agency would be more like $2.18 billion. It calls for program budgets that are in most cases two to three times the Administration's requests. It points out that the control of toxic substances, which has been added by Congress to most of the basic environmental protection laws, requires major additions in both personnel and money. For example, implementation of RCRA, it says, will require $347 million. Implementation of TSCA, says NWF, requires $255 million as opposed to the requested $69 million.

Democrats in Congress appear to be getting mobilized to defend EPA. The week before the budget was unveiled, members of the House held a press conference to publicize the NWF budget. House speaker Thomas P. (Tip) O'Neill (D–Mass.) accused the Administration of "breaking a century of bipartisanship" by engaging in an attempt to "repeal indirectly laws that the Administration knows the public would never allow to be repealed."—CONSTANCE HOLDEN

A French Connection in High Tech for LDC's

The French government will underwrite the establishment in Paris of a world center devoted to the application of information technology to education and training in both the industrial and less developed countries (LDC's). President François Mitterrand has given his personal backing to the project, which stems from the ideas of author-politician Jean-Jacques Servan-Schreiber, who will serve as chairman of the center.

Some of the aims of the center, according to remarks by Servan-Schreiber quoted in the 29 January *Le Monde*, are to develop a new personal computer; to serve as a base for pilot programs in LDC's utilizing electronic technology which the French call *micro-informatique*; and to conduct "social experimentation" to benefit the young, the unemployed, and the aged.

The project fits in well with the socialist government's declared intentions in foreign policy of closer cooperation with LDC's and its stress in domestic affairs on the importance of the use of computers to shape social and economic change. In addition, the center should provide a boost for the French in high technology competition with Japan and the United States.

The center has already achieved an international dimension, notably through the enlistment of two highly regarded M.I.T. faculty members in leading roles. Nicholas Negroponte, a professor of computer graphics at M.I.T., has been named first director of the center and Seymour Papert, a professor of education and mathematics at M.I.T. and former research colleague of French psychologist Jean Piaget, will serve as chief scientist. Both have applied for leaves of absence from M.I.T.; their association with the center at this point represents individual initiatives and not an institutional link.

Servan-Schreiber is probably best known as former editor of the news magazine *l'Express* and author of *The American Challenge*, the book that sparked debate in the mid-1960's on the so-called "technology gap" between Europe and the United States. His briefly successful career in national politics put him at the center-right of

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