R&D Budget: Growth in Hard Times

The 1995 budget request rewards research agencies that do the most to improve technology; that's good news for NSF and NIH, bad news for NASA and DOE

If your research is funded by the National Science Foundation (NSF), you may view the Clinton Administration's budget for fiscal year 1995 with some disappointment. It includes a 6% increase for NSF—a far cry from the 16% increase President Bill Clinton requested last year and far below the trajectory of a 5-year doubling promised by President Bush. But before you complain too hard, take a look at what's being proposed for most other federal agencies. The discretionary budgets of half the government's 14 Cabinet-level departments would be cut, and three more would get increases below the anticipated 3% inflation rate, and at least 300 programs are slated for surgery, including 100 that would be terminated. Perhaps that 6% increase isn't so bad after all.

Welcome to the world of zero-growth budgeting. By law, the 1995 budget must hold "discretionary" spending—that part of the total $1.518 trillion budget that isn't distributed by formula or paid out as interest on the national debt—to $542 billion, some $8 billion less than this year. Add inflation, and the result is what Alice Rivlin, deputy director of the Office of Management and Budget (OMB), calls a "negative-sum game." Economic hardball might be a better description: Clinton must identify cuts to offset every increase he proposes, and then he will have to persuade Congress to go along—a tough proposition since many of the programs he wants to prune have substantial political support.

Given that harsh environment, the sums requested for R&D start to look better and better. Clinton is proposing a 3% overall increase in government R&D, to $73 billion, after a 2% dip in 1994. This includes boosts of 8% at the Environmental Protection Agency, a whopping 80% for the National Institute of Standards and Technology (NIST), 21% for the Human Genome Project, 24% for the global change research program, and 23% for high-performance computing and communications. Even the National Institutes of Health (NIH)—which traditionally gets short shrift on the assumption that Congress will add money to whatever the president has requested—would get a 4.7% increase.

The picture isn't uniformly rosy, of course. These increases are largely driven by the desire to harness science to economic growth, which means that applied research and development would get a 5% boost while basic research would go up by only 2%. Space scientists won't be delighted: An overall cut in the budget for the National Aeronautics and Space Administration (NASA) will put the squeeze on researchers. And physicists supported by the Department of Energy (DOE) would see their budgets shrink—cancellation of the Superconducting Super Collider (SSC) hasn't freed up any money for other DOE science programs.

R&D: THE BIG PICTURE
(Dollars in millions)

SOURCE: OMB

	1993 Actual	1994 Appropriated	1995 Proposed	Change 1994-95
Civilian	**28,335**	**30,349**	**31,500**	**4%**
Basic Research	11,951	12,578	12,880	2%
Applied R&D	16,384	17,770	18,621	5%
Defense	**41,415**	**38,136**	**39,528**	**4%**
Basic Research	1,411	1,212	1,232	2%
Applied R&D	40,004	36,923	38,296	4%
TOTAL R&D	**69,750**	**68,484**	**71,029**	**4%**
R&D + Facilities	**72,478**	**71,073**	**73,045**	**3%**

Much of the 1995 budget request follows trends established in Clinton's 1994 proposals, with one conspicuous exception: defense R&D. Clinton has repeatedly promised to even out the 60:40 ratio of military to civilian R&D spending he inherited from Bush, and last year he seemed well on the way: The ratio changed from 57:43 in 1993 to 53:47 in 1994. But the 1995 request includes a 4% boost for defense R&D, which would leave the ratio unchanged. Part of the proposed increase is designed to offset deep cuts imposed by Congress last year, and part is due to a substantial boost in support for "dual use" technologies that have both civilian and military applications. But there are also some surprising requests, including a proposed $360 million increase in funding for ballistic missile defense R&D—the revamped Strategic Defense Initiative.

Asked what has happened to Clinton's promise to shift funds from military to civilian R&D, presidential science adviser Jack Gibbons urges scientists to take a long view. "I think that in FY 1996 you'll see another dramatic change in the ratio toward civilian research," he says. "If it were up to me, I'd love to see a 60:40 ratio in favor of civilian re-

NIH OVERVIEW
(Dollars in millions)

SOURCE: HHS

	1993 Actual	1994 Appropriated	1995 Request	Change 1994-95
Research Project Grants	**5,658**	**5,938**	**6,210**	**4.6%**
[# of Noncompeting]	[17,803]	[17,782]	[16,598]	[-1,184]
[# of New/Competing]	[6,149]	[6,203]	[7,293]	[+1,090]
Centers	**903**	**981**	**1,042**	**6.2%**
Research Training	**351**	**373**	**379**	**1.6%**
R&D Contracts	**694**	**771**	**811**	**5.2%**
Intramural Research	**1,161**	**1,211**	**1,243**	**2.6%**
Research Management	**493**	**498**	**507**	**1.8%**
National Library of Medicine	**112**	**130**	**149**	**14.6%**
Office of the Director	**176**	**234**	**260**	**11.1%**
Women's Health Study	[43]	[61]	[61]	[—]
Minority Health Study	[41]	[56]	[66]	[17.9%]
Other Research	**678**	**719**	**768**	**6.8%**
Buildings and Facilities	**109**	**111**	**114**	**2.7%**
SUBTOTAL NIH	**10,335**	**10,966**	**11,483**	**4.7%**
Full-time staff	**17,105**	**16,804**	**16,393**	**-411**

search, but in any case, we're well on our way to achieving a balance by the promised date of FY 1998, if not sooner."

Here are highlights of the budgets of some of the major federal science agencies:

NIH. At 4.7%, the increase requested in an overall NIH budget of $11.482 billion won't support any big, new initiatives, but it could have been much worse. At one point late in the budget cycle, NIH was allocated a measly 2.7% increase, but when NIH appealed, Health and Human Services Secretary Donna Shalala "spoke up for us before the president," says NIH Director Harold Varmus. "We have a lot to thank [Shalala] for."

A substantial portion of this increase would flow to areas where research has strong political support. Funding for AIDS research, for example, would rise by $78 million (6%), to $1.379 billion; breast cancer research would grow by $84 million (28%), to $383 million, with $10 million earmarked for Shalala's as-yet unwritten "National Action Plan on Breast Cancer"; the minority health initiative would rise by 18% to $66 million; the National Center for Human Genome Research by 18% to $152 million; and high-performance computing by 41% to $82 million.

There's also some good news for those who like to rate NIH's fiscal health by the number of new and competing grants it funds: A record 7293 is expected in 1995. Part of the reason is that a large number of existing grants will expire this year, so that the total of supported grants will drop slightly, from 23,985 to 23,891. While Varmus concedes that this is essentially a flat rate, he argues that the shift will allow room for "a lot of new stuff," which he calls "a healthy sign."

NSF. Double-digit percentage increases may be history, but NSF is still a favored child in the president's R&D family. Its 6% overall increase would provide for an 8.9% boost in research funds, to a total of $2.418 billion. Leading the way are two initiatives close to the heart of Vice President Al Gore—global change and a national information highway. NSF's global change program would get a hefty 46% increase, to $207 million, while its high-performance computing initiative would grow by 23%, to $328 million.

Although Congress usually trims the Administration's requests for big increases in NSF's research programs, it traditionally ups the ante for two politically popular programs: science education, for which Clinton has proposed a 2.9% increase to $587 million, and academic research facilities, which the president wants to trim from $100 million to $55 million. This year is expected to be no exception to the pattern.

NATIONAL SCIENCE FOUNDATION
(Dollars in millions)

Program	FY 94 approp.	FY 95 proposed	% change over 94
Research programs	**$2,220**	**$2,418***	**+8.9**
Biology	$288	$314	+9.0
Computing	$240	$273	+12.1
Engineering	$294	$320	+8.8
Geosciences	$404	$443	+9.7
Math/phys. sciences	$620	$658	+6.1
Social sciences	$98	$112	+14.6
Polar programs	$221	$225	+1.8
Education	**$569**	**$586**	**+3.0**
Academic infrastructure	**$100**	**$55**	**-45.0**
Salaries & other	**$128**	**$142**	**+10.8**
TOTAL	**$3,018**	**$3,200**	**+6.0**

*Includes $70 million in new account for major equipment Source: NSF

DOE. A flat research budget in 1995 contains no new starts to bolster the spirits of a physics community still smarting from the congressional cancellation of the SSC. DOE would, however, get $44 million to start construction of the $200 million B factory at the Stanford Linear Accelerator Center and $67 million to begin building the $700 million Tokamak Physics Experiment at Princeton. Oak Ridge National Laboratory would get a second chance at a down payment on its $2.7 billion Advanced Neutron Source; last year Congress voted down a request for slightly more than the $27 million Clinton is now asking for. As for the SSC, it would get $180 million in 1995 to continue an "orderly termination" begun this year with $640 million.

There are a few bright spots. Funding for Cooperative Research and Development Agreements with industry would rise 5%, to $275 million, part of DOE's plan to make technology transfer a primary mission of its national laboratories. And DOE's component of the Human Genome Project would rise nearly $20 million, to $89 million.

NASA. Space science has dodged the bullet it expected in the president's request for $14.3 billion for the agency—$251 million less than 1994. Researchers were expecting a big cut in their programs, but NASA officials say some last-minute pleading won them a request for a 2.5% increase, to $1.77 billion. The additional money is, however, more than accounted for by a new mission to partially replace the lost Mars Observer. NASA wants $78 million to begin developing a smaller, cheaper replacement that will carry roughly half the instruments of the Mars Observer and could be launched in 1996. It will be followed in 1998 by a smaller orbiter/lander mission.

The rest of the space science budget is flat, with $1.059 billion (down $9 million) for physics and astronomy. Life sciences and microgravity research would decline by $90 million (25%), largely because much of their work for the international space station will now be done on Russia's Mir. But Mission to Planet Earth, a series of environmental remote sensing missions, would climb 25%, to $1.238 billion.

This year's respite is likely to be brief, warns NASA chief scientist France Cordova. Funding for space science is slated to drop 15% over the next 2 years, to about $1.5 billion. And the knives could be out even earlier: The chairmen of the congressional appropriations committees have said they will be hard-pressed to muster more than $13.8 billion for NASA, in which case space science could hardly escape radical surgery.

SELECTED ITEMS AND PROGRAMS
(Dollars in millions)

	1994 Appropriation	1995 Proposed	Change 1994-95
University research	**11,719**	**12,156**	**4%**
NIST R&D programs	**490**	**874**	**78%**
Human Genome Program	**199**	**241**	**21%**
NIH	129	152	18%
DOE	70	89	27%
Space Station	**2,104**	**2,121**	**1%**
Nat'l Info. Infrastructure	**938**	**1,154**	**23%**
Global change research	**1,446**	**1,794**	**24%**
Health research	**11,033**	**11,484**	**4%**

SOURCE: OMB

USDA. While the Agriculture Department is one of the biggest losers in the 1995 budget, dropping $3.6 billion (5.5%), competitive research would be spared the ax. The National Research Initiative (NRI) would get $130 million, an increase of $17.8 million, for competitive, peer-reviewed agricultural projects ranging from natural resources and environment to food safety and health. USDA is also proposing to spend $13 million to fund the mapping of economically important crop

plant genes. The big research loser would be the Special Research Grants programs for land-grant universities; it would drop from $72.9 million to $29.7 million. But don't count it out yet: Congress traditionally rides to the program's rescue.

EPA. The Environmental Protection Agency's beleaguered Office of Research and Development (ORD), the agency's main research arm, is scheduled to get a booster shot: a 13% increase, to $382.7 million. And EPA Administrator Carol Browner is hoping to ease the burden on staff scientists by filling 250 new slots with "the best available people." The scientific windfall reflects EPA's favored status. It is in line for an 8% increase, to $7.2 billion. "We hit a home run for the environment," beams Browner.

Commerce. The Advanced Technology Program (ATP)—the Clinton Administration's favorite tool for shifting U.S. industry from a military to a civilian technology base—would get an increase of 150%, to $451 million, after tripling in size in 1994. ATP, which funds joint projects with industry, fuels nearly half of the 18% increase for the entire $4.2 billion department. Its growth reflects the "strategic shift in thinking" about how the federal government spends its research dollars, says Arati Prabhakar, director of the National Institute of Standards and Technology (NIST), which runs ATP.

The next step. Whether or not your research falls in one of the areas favored by the Administration, remember that this budget is just the first shot in a fiscal battle that will occupy Congress for months. The president's proposals will be divided among 13 appropriations subcommittees, each with a fixed amount of money to spend, and the final numbers won't emerge until fall, around the time the 1995 fiscal year begins on 1 October.

–Jeffrey Mervis

With reporting by Christopher Anderson, Eliot Marshall, Lisa Seachrist, and Richard Stone.

FOUNDATIONS

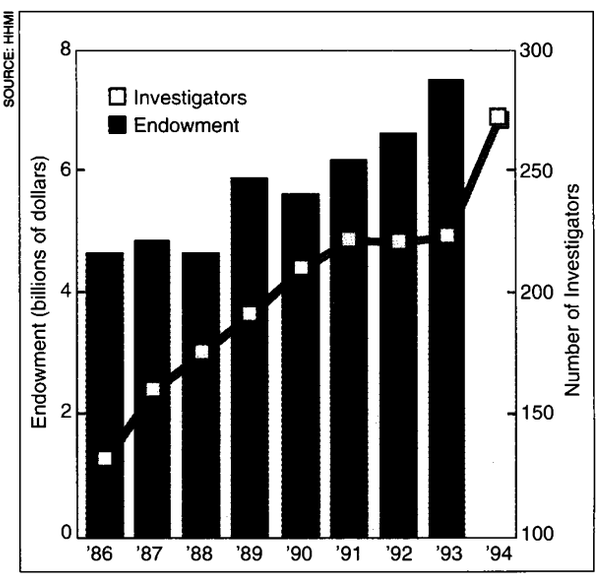
Hughes to Add 49 New Investigators

Even for the Howard Hughes Medical Institute (HHMI)—the nation's largest private philanthropy, one accustomed to big numbers—1993 was more than just a good year. The institute moved into sumptuous new quarters in Chevy Chase, Maryland, saw its endowment grow by $780 million, and watched its assets climb to a total of $7.8 billion. According to HHMI president Purnell Choppin, this good fortune is now going to be shared with the biomedical community: Choppin announced this week that the institute intends to add 49 investigators to its burgeoning ranks of 225 scientists. It will be HHMI's biggest expansion since it was formally established in 1953.

The new appointees—to include 20 women and six minority scientists—have already been chosen. Their names will be released in the next few weeks as the investigators pin down the often-complex arrangements with their home institutions. HHMI investigators become full-time employees of the institute, receiving a salary and some laboratory support for 3, 5, or 7 years, depending on rank. They continue to run their labs at their home campuses, however, where they hold an academic post.

Some expansion was inevitable given Hughes' record-setting financial performance. Under an agreement with the Internal Revenue Service (IRS), HHMI must spend 3.5% of its endowment each year. But Choppin says that HHMI's spending has routinely exceeded this minimum level, and the expansion goes further than IRS requires. This year, the recruitment of new staff includes replacements to fill in for a higher-than-usual turnover in the scientific faculty. A few investigators left after receiving poor reviews—evaluations come at the end of the fixed appointment period—and others departed when they were asked to take on new duties at their home institutions. Choppin points out that HHMI requires investigators to spend 75% of their time on research and to avoid significant paperwork chores given to department chairs and deans. So when investigators get academic promotions, as some did last year, they often give up HHMI funding.

In looking for new investigators, Choppin explains, the institute followed its policy of seeking "highly creative scientists" who are engaged in full-time research—people "who are going to make original contributions in one of our major areas of emphasis." These five areas—intended to embrace most of biomedicine—are cell biology and regulation, genetics, immunology, neuroscience, and structural biology. This year, new appointments are being made in all five categories; Choppin anticipates no shift in overall emphasis. The institute, which also runs a program of grants and fellowships to support young scientists and college biology programs, will be expanding this part of its portfolio, though not as dramatically.



Boom times. The recruitment of 49 new investigators was made possible by a sharp rise in Hughes' endowment.

The recruitment of new investigators began early in 1993, says Choppin. Even before HHMI knew just how good a year it would be, it had decided to make a modest expansion by recruiting five new investigators. Soon, HHMI realized that it could afford to bring in a much larger cadre in 1994 in "one fell swoop" and launched a sort of academic sweepstakes to fill another 44 positions, inviting 200 research institutions to submit two nominees apiece. After receiving 285 entries, HHMI narrowed the semifinalists to 110, then made a final selection of 49. The recruits will join the 2000-strong HHMI staff (including postdocs, technicians, and support staff), which already includes five Nobel laureates and 41 members of the National Academy of Sciences.

The beauty of HHMI funding, says 10-year veteran Randall Reed, a Johns Hopkins University researcher on olfaction, is that "you have great freedom... to move in exciting new directions" without a lot of new paperwork at each turn in the path. Choppin adds that, unlike the government, HHMI does not follow research fads or political mandates. For example, nowhere in the Hughes literature is there any mention of "economic competitiveness" or the need for industrial relevance.

The Hughes program differs from the government's in another way: It is expanding rapidly while the budget of the National Institutes of Health is slated to grow by only 4.7% next year (see page 745). "We are delighted that, at a time when so many exciting opportunities are available, we are able to expand our efforts to pursue basic research," says Choppin, putting the emphasis on "basic."

–Eliot Marshall