Computing initiative gets top billing and biomedical research gets short shrift in a very uncertain budget year

2000 Budget Plays Favorites

When Clinton Administration science officials gathered on Monday to unveil the president's fiscal year 2000 R&D budget proposal, the lineup of speakers symbolized what's hot this season—and what's not. On hand to highlight their agencies' spending plans were National Science Foundation (NSF) chief Rita Colwell and Energy Secretary Bill Richardson (DOE). But conspicuously absent was National Institutes of Health (NIH) head Harold Varmus, one of the featured speakers last year as Vice President Al Gore announced plans for a record dollar increase for biomedical research spending and hefty boosts for other major science agencies. This year, Clinton is asking Congress for a meager 2.1% increase for NIH, to $15.9 billion—and Varmus decided to honor a previous commitment to speak at a scientific conference in Colorado.

Charting a course. Energy Secretary Bill Richardson and senior Administration officials discuss FY 2000 budget that shows rise in spending on basic science.

NIH officials insist that the size of their proposed budget is not related to Varmus's absence. (NIH deputy director, Ruth Kirschstein, sat at the podium but was the only one of seven senior science officials who did not offer prepared remarks.) But Varmus would have had a hard time putting a positive spin on the comparison between NIH and the other major R&D agencies. If approved by Congress, NSF would get a 7% hike in its research budget—the biggest percentage growth of any major science agency—as part of a 6% overall increase. And despite a relatively skimpy 3% raise proposed for DOE's $7.2 billion R&D budget, Richardson believes "science has done relatively well in the early skirmishes" of what promises to be an uncertain budget year for research funding. Administration officials also spoke repeatedly about their support for basic research, up 4% to $18.2 billion, most of it university based and awarded competitively after peer review. Even NASA Administrator Dan Goldin and Department of Defense (DOD) R&D chief Jacques Gansler, whose budgets are declining, managed to praise the Administration's support for science.

Overall, the White House is asking Congress to trim federal spending on R&D by about $1 billion in the budget year that begins in October (see table). But civilian R&D is slated for a 3% increase, to $39.8 billion, while defense R&D—most of which is at the applied research and development end of the spectrum—would decline by $2.2 billion. In the unlikely prospect that those numbers hold up in Congress, the Administration would reach a long-held goal: For the first time since the late 1970s civilian research would claim a majority—51% to 49%—over defense R&D.

A more sensitive ratio is the growth in biomedical research compared with the rest of the scientific landscape. Colwell noted a recent NSF study that showed a spectacular growth in the share of federal funds going to biomedical research between 1970 and 1997, from 29% to 43%, at the same time the share going to the physical sciences and engineering dropped from 50% to 33%. (The slice for the social sciences has also shrunk slightly, while computer science has grown.) "Society cannot live by biomedical bread alone," she intoned. Presidential science adviser Neal Lane said that the 2000 request is intended to reestablish "an optimum balance between health care research and other scientific disciplines." But he added that an increase for NIH beyond the 2% requested "would be fine" as long as Congress meets the Administration's requests for the other agencies.

The unquestioned star of the show was a previously announced computing initiative called Information Technology^2 (IT^2) that aims to wire the entire nation to a faster, more capable electronic highway (*Science*, 29 January, p. 613). But even Washington insiders remain confused about whether the $366 million request for the six-agency initiative, to be led by NSF, represents "new money," as the Administration claims. "It looks like a grab bag of some new programs and some old, but it's hard to tell," said one congressional aide. Brushed aside like an old toy is the Administration's previous favorite computing initiative, the Next Generation Internet, pegged for level funding at $110 million to continue hooking leading research sites up with faster connections.

Another cross-agency initiative, this one an ecological research program, was crafted in response to a presidential advisory report last year calling for more biodiversity research (*Science*, 14 August 1998, p. 895). Called Integrated Science for Ecosystem Challenges, the $96 million initiative will target such areas as harmful algal blooms, invasive species, habitat conservation, and information management and monitoring. The Interior and Agriculture departments get the largest shares in the five-agency effort.

How these and other initiatives will fare in Congress, however, remains to be seen. While Clinton has promised to use most of a $76 billion surplus to shore up the Social Security retirement system, Republican leaders are calling for tax cuts. If the White House cannot reach a deal with Congress, all bets are off. Some researchers take heart from a similar impasse last year, which ended in a raid on the surplus, resulting in major increases for NIH and other science programs.

Here are highlights of the overall R&D request by individual agencies:

- **NIH:** Presenting the Department of

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Health and Human Services budget, Secretary Donna Shalala admitted that she wasn't happy about what was happening to biomedical research. An overall 2.1% raise for NIH would fail to keep pace with the rate of inflation in the biomedical sector, she noted. And it would result in a sharp drop from last year's peak in the number of new and competing grants awarded next year to independent biomedical researchers—from 9171 to 7617. NIH's total portfolio would stay at a record level of about 30,000 grants, however.

As Kirschstein explained, a flat budget would force NIH to trim the rate of new awards in order to make good on its commitments to earlier grants, which last an average of 4 years. As part of the year 2000 chill, NIH has proposed no compensation for inflation in grants this year.

"This business of going up and down on NIH budgets and science budgets in general is something that every college president wrings their hands about," Shalala conceded. "I don't think the roller coaster [approach] is an effective way to invest in this nation's scientific infrastructure." However, she noted that NIH "did go up very high last year," and that the Administration's request would still keep NIH on track for a 50% increase in its budget by 2003.

Biomedical research activists—who earlier set a goal of increasing NIH's budget by 15%—are already mobilizing. William Brinkley, a cell biologist at Baylor College of Medicine in Houston and president of the 56,000-member Federation of American Societies for Experimental Biology (FASEB), said, "We are disappointed that the president has not chosen to maintain the momentum that we helped create last year in favor of doubling the NIH budget." Brinkley was preparing to fly to Washington to join with other societies on a campaign for a 15% hike, the next step on the road to doubling. He said he was worried about the confusing message this budget proposal would send to students considering careers in science.

• **NSF:** The agency is placing its heaviest bets in two areas, information technology and biocomplexity, that are favorites of its new director, Rita Colwell. Thanks to some creative bookkeeping, NSF has calculated that activities in these two categories alone would receive slightly more than the overall $217 million increase for the agency's entire budget, which would rise by 5.8% to $3.95 billion. (The discrepancy is explained in part by NSF's decision to absorb two programs highlighted last year—Knowledge and Distributed Intelligence and Life and Earth Environments—into the new initiatives.)

Numbers aside, NSF hopes to sell the idea that information technology benefits every discipline, and that the whopping 41% increase—an extra $110 million—for software and networking research in its computer science directorate will also help biologists, geologists, and astronomers despite anemic increases ranging from 2.6% to 4.5% for NSF's six other directorates. "It will transform the way we do science," says Colwell. In particular, NSF hopes for $36 million to buy or lease a 5-teraflops machine that would be available to all researchers on a competitive basis.

The $50 million biocomplexity initiative is spread among several directorates, notably biology and geosciences. It will encompass such activities as robotic exploration of hostile environments, remote sensing, and genomics as well as long-term ecological studies and inventories. Colwell has also put her stamp on an education initiative that she inherited from her predecessor, Neal Lane, by trumpeting $7.5 million for fellowships to graduate students who want to teach in elementary and secondary schools. "It will have an impact well beyond the dollars spent," she says, "by improving science content in the classroom and making these students better teachers."

NSF's major research facilities account includes $7.7 million to build a nationwide $75 million earthquake engineering simulation network, $16 million to continue funding detectors for CERN's Large Hadron Collider, $8 million for final design of the antennae on the proposed millimeter array telescope, and $17.4 million for the new South Pole station and added logistical support in Antarctica. A tight budget forced NSF officials to delay plans to begin building a $70 million plane for atmospheric research, and a $25 million Polar Cap Observatory is off the table after continued congressional opposition led by Senator Ted Stevens (R–AK).

• **DOE:** On paper, DOE's request is down $14 million from last year. But after subtracting several one-time expenses (including 1999 money to buy radioactive material from Russia), the department reasons that its $17.84 billion request is a 4.1% boost. The nuclear weapons stockpile stewardship program will get $131 million of the new money, pushing its allotment to $4.5 billion. Another $208 million will fund projects to promote energy efficiency

HIGHLIGHTS FROM THE PRESIDENT'S REQUEST

Agency	FY 1999	2000	% Change
National Institutes of Health	$15.65 billion	$15.97 billion	+2.1%
# of new and competing grants	9171	7617	–16%
National Science Foundation	$3.74 billion	$3.95 billion	+5.8%
Research	$2.81 billion	$3.00 billion	+6.9%
Education	$689 million	$711 million	+3.2%
Department of Defense R&D	$37.4 billion	$34.4 billion	–8.3%
Basic research	$1.1 billion	$1.1 billion	+0.1%
DARPA	$1.9 billion	$2.0 billion	+3.6%
Department of Energy	$17.85 billion	$17.84 billion	–0.01%
Science programs	$2.69 billion	$2.84 billion	+5.6%
Spallation Neutron Source	$130 million	$214 million	+65%
NASA	$13.67 billion	$13.58 billion	–0.7%
Space science	$2.1 billion	$2.2 billion	+3.6%
Earth science	$1.4 billion	$1.5 billion	+3.2%
Life and microgravity research	$264 million	$256 million	–3.0%
International space station	$2.3 billion	$2.5 billion	+8.0%
Department of Commerce			
NIST	$641 million	$735 million	+15%
NOAA	$2.26 billion	$2.56 billion	+13%
Environmental Protection Agency			
R&D	$562 million	$535 million	–4.8%
Department of the Interior			
U.S. Geological Survey	$798 million	$838.5 million	+5.1%
Department of Agriculture			
National Research Initiative	$119 million	$200 million	+68%
Multiagency Research Initiatives			
Information Technology[2]	NA	$366 million	
Bio- and cyber-terrorism	NA	$2.85 billion	
Global change research	$1.68 billion	$1.78 billion	+6.2%
Ecosystem challenges	NA	$96 million	
Total Defense R&D	**$40.64 billion**	**$38.48 billion**	**–5.3%**
Total Civilian R&D	**$38.63 billion**	**$39.76 billion**	**+3.0%**
Total R&D	**$79.27 billion**	**$78.24 billion**	**–1.3%**

SOURCE: OFFICE OF MANAGEMENT AND BUDGET, FY 2000 BUDGET

and renewable energy resources, in part to reduce CO_2 emissions.

The $1.3 billion Spallation Neutron Source at Oak Ridge National Laboratory in Tennessee, which would deliver streams of neutrons for materials, biological, and other research, is penciled in for $214 million this year, up from $130 million. DOE's share of the IT^2 program, which it calls the Scientific Simulation Initiative, would put $23 million toward modeling complex systems, including climate and combustion engines, and $47 million to develop ultrafast computers and the tools to use them.

• **EPA:** Officials play down a drop, from $562 million to $535 million, in the budget for the Environmental Protection Agency's Office of Research and Development (ORD) by noting that the 1999 figure included $50 million Congress added for 1-year projects that EPA did not request. "Take earmarks away, and it's really about a 4.4% increase," says ORD Assistant Administrator Norine Noonan. About $61 million will fund studies of the health effects of fine soot to help the office implement a National Research Council–designed research program. The total also includes $110 million, a 15% increase, for the extramural grants program; about $6.5 million for a new coastal environmental monitoring program; and—as part of new Administration cross-agency initiatives—$2 million for studies of pollutants and asthma and $5 million for ecosystem studies.

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>
> —William Brinkley, FASEB

• **DOD:** A 2% rise in the overall defense budget masks an 8% decline in the amount for research, development, testing, and evaluation. Within this $34.4 billion R&D figure, basic research remains level at $1.1 billion. A few high-visibility programs such as bioweapons and computer technology defenses are targeted for raises. But they don't grow by enough to cheer big research institutions that rely on DOD support. Basic defense science is "essentially flat funded," says George Leventhal of the Association of American Universities, who sees "not a lot of joy" in this budget. He will be visiting Congress to argue that military threats facing the nation are technology-related, requiring a larger investment in science.

• **NASA:** For the sixth straight year, NASA Administrator Dan Goldin will face trying to do more with less. The space agency's overall budget would decline by 1% and science and technology programs by 4% to $5.4 billion, with several research programs facing major cuts to free up more than $1 billion toward completion of the international space station. The money will be used to build several major components—including a propulsion module—that the Russian government was scheduled to provide. But as Russia's economic woes have mounted, members of Congress and some Administration officials have pressed Goldin to make backup plans, and next year's budget drops a $600 million bailout that Goldin proposed last year.

Scientists planning experiments aboard the station would be among those hardest hit by the cuts. The station research program will lose $200 million next year, or about one-third of its funding. Goldin put a positive spin on the reduction, saying that delaying the science would put it "more in phase with" station construction, aiming at completion in 2003. "We didn't want the research equipment to be ahead of the assembly," he said, hinting that the research funds could be restored later.

Several programs to develop new high-speed airplanes were also victims of the station's problems, and canceling them allowed the agency to save $162 million. Earth and space sciences were spared, registering small increases. Some of the funds will be used to launch the first three of a new generation of relatively inexpensive Earth-observing satellites, part of NASA's continuing efforts to stretch sparse budgets. The increases also reflect a busy year in 2000, with planned launches of a host of spacecraft to explore Mars and other celestial bodies.

• **NIST:** As in recent years, the White House is again calling for a healthy budget increase for the National Institute of Standards and Technology, up $94 million this year to $735 million. A large chunk of that boost—$55 million—will provide more money to build a $218 million electronics measurement and standards laboratory at NIST's Gaithersburg, Maryland, facility. The agency's core lab program would get a $9 million boost, to $285 million.

Continuing its phoenixlike rise from the dead, NIST's Advanced Technology Program (ATP) is again on the wing. The program was targeted for death by congressional Republicans 4 years ago but withstood the attack by trimming its plan for ambitious growth. Now, the Administration is asking for $239 million, an 18% increase over last year. Acknowledging that ATP "has not been a terribly popular program among some folks on the Hill," NIST director Ray Kammer says the increase is "ambitious, but I believe it is strongly justified by the results" of individual projects, which join companies and university researchers working in a variety of fields.

• **NOAA:** The forecast is less rosy for research at the National Oceanic and Atmospheric Administration. Research is slated to go up a meager $5 million from last year, to $292.6 million. Much of that increase is slated for GEOSTORM, a satellite program to monitor solar winds. Within the oceans and atmospheric research area, the agency plans to shift some money around, adding roughly $23 million to climate and air quality research—including a new climate modeling supercomputer—while docking oceans and Great Lakes research virtually the same amount. Elsewhere within the budget, the agency plans to spend $51.6 million to start building the first of four "acoustically quiet" research ships for fisheries research and stock assessment.

• **USDA:** The Department of Agriculture's peer-reviewed research program would get a 68% boost to $200 million under the Administration request. The Administration is hoping that Congress has finally seen the light on this program: Last year, it approved a $22 million increase, to $119 million, the first significant rise in a program begun in 1991. Food safety research, focused on fruit and vegetable contamination, would get an additional $15 million, to $36 million.

• **Geological Survey:** The Department of Interior's natural science agency budget has requested $838.5 million, an increase of $40.6 million, or 5%, over last year. The plan provides $18.5 million more for research on the management of resources and ecosystems, adds $13.5 million to improve the nation's natural disaster warning and response system, and injects $10 million for mapping the landscape and its biological resources. The Administration is also requesting $5.6 million for research and monitoring of declining amphibian populations. These increases would be offset by major cuts in coastal and mineral studies, research on ecosystems and their habitats, and marine research in the North Pacific and Bering Sea.

All these proposals were delivered on Monday to a bitterly divided Congress, from a president on trial in the Senate for perjury and obstruction of justice, in a fiscal climate characterized by tight budget limits and record surpluses. Given those variables, even seasoned Washington hands are reluctant to predict how they will fare.

—DAVID MALAKOFF

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