AAAS R&D Budget and Policy Program

Congressional Action on Research and Development in the FY 2001 Budget

Kei Koizumi
Albert H. Teich
Stephen D. Nelson
Joanne Padrón Carney

in cooperation with the
Intersociety Working Group

American Association for the Advancement of Science

The AAAS Board of Directors, in accordance with Association policy, has approved publication of this report as a contribution to the understanding of an important process. The interpretations and conclusions are those of the authors and do not purport to represent the views of the Board or the Council of the Association.

Printed in the United States of America

International Standard Serial Number 1041-8857

Printed on recycled, acid-free paper

Contents

PART III: Appendices

Foreword

This *Congressional Action* report describes the results of congressional action on President Clinton's proposed budget for research and development (R&D) for fiscal year (FY) 2001. It reviews the course of events taken by the congressional budget process during the past year and compares the congressionally approved FY 2001 funding levels for major R&D agencies and programs with the President's request and with estimated FY 2000 levels.

The *Congressional Action* report completes the series of AAAS reports on R&D in the FY 2001 budget. It is a companion piece and follow-up to *AAAS Report XXV: Research and Development FY 2001*, published in April 2000. Supplementary information, including historical data and the complete text of both reports, is available on the AAAS R&D Web site (http://www.aaas.org/spp/R&D; see Appendix 3). Readers of these two reports will also be interested in the *AAAS Science and Technology Policy Yearbook 2001*, which is a collection of articles on the major science and technology policy issues of the past year. The above-named reports, as well as the three-book series from previous years, are available for purchase from the AAAS Distribution Center, P.O. Box 521, Annapolis Junction, MD 20701 (phone 1-800-222-7809; fax 301-206-9789.)

This report was prepared in collaboration with the Intersociety Working Group, whose organizations are listed on the following page, and under the auspices of the AAAS Committee on Science, Engineering, and Public Policy, which initiated the R&D Budget and Policy Project in 1976 and continues to oversee it. The authors are grateful to the members of these bodies who have contributed to the effort, as well as to individuals in federal agencies and on congressional staffs, especially the staff in the Energy and Science Division of the Office of Management and Budget.

Kei Koizumi
Albert H. Teich
Stephen D. Nelson
Joanne Padrón Carney

Washington, DC
December 2000

Intersociety Working Group

American Association for the Advancement of Science

American Astronomical Society

American Chemical Society

American Educational Research Association

American Geological Institute

American Geophysical Union

American Institute of Aeronautics and Astronautics

American Institute of Physics

American Meteorological Society

American Physical Society

American Psychological Association

American Society of Mechanical Engineers

Association of American Universities

Computing Research Association

Council of Professional Associations on Federal Statistics

Ecological Society of America

Federation of Behavioral, Psychological and Cognitive Sciences

Industrial Research Institute

Institute of Electrical and Electronics Engineers

Joint Policy Board for Mathematics

National Academy of Sciences / National Academy
of Engineering / Institute of Medicine

National Association of State Universities and Land-Grant Colleges

Part I

Congressional Action

1

Highlights

The outgoing 106th Congress and President Clinton agreed to provide record increases for R&D programs throughout the federal government, and provided substantial increases to nearly all categories of R&D spending and most R&D funding agencies.

- In FY 2001, total federal support for R&D exceeds $90 billion for the first time, thanks to a record dollar increase of $7.6 billion over FY 2000. Because of increases across the entire breadth of R&D programs in the federal portfolio, federal R&D totals $90.9 billion in FY 2001, an increase of 9.1 percent (see Table 1).

- The FY 2001 R&D total far exceeds the $85.4 billion President's request, primarily because Congress allocated far more for R&D in the Department of Defense (DOD) and the National Institutes of Health (NIH), the two largest R&D funding agencies, than the Administration requested (see Table 1).

- Nearly every major R&D funding agency receives a substantial increase over FY 2000, and most receive more than the request. Of the major R&D funding agencies, only the National Science Foundation (NSF) receives less for R&D than requested, but NSF still receives 13.2 percent more for R&D than in FY 2000.

- Nondefense R&D increases by more than 11 percent to reach $45.3 billion, a boost of $4.6 billion. In addition to a 14.6 percent or $2.5 billion increase in NIH R&D, there are substantial increases for other nondefense agencies. R&D in the Department of Energy (DOE) increases by 12.3 percent to reach $8.0 billion, including a 13.8 percent boost to programs in the Office of Science; NSF R&D increases by 13.2 percent to $3.2 billion, with substantial increases for all the research directorates; and Science, Aeronautics and Technology R&D in the National Aeronautics and Space Administration (NASA) increases by nearly 11 percent.

- Defense R&D increases by a smaller but still substantial 7.0 percent to $45.5 billion, bringing defense and nondefense R&D near parity for the first time in 20 years. DOD basic research ("6.1") jumps by nearly 13 percent, while applied research ("6.2") increases by nearly 8 percent. DOE's defense R&D continues the gains of recent years with a 12.0 percent increase in FY 2001.

- Basic research receives large increases in FY 2001 appropriations. Federal support for basic research is expected to total $21.2 billion in FY 2001, up $2.2 billion or 11.8 percent (see Table 2). There are across-the-board increases for agencies' basic research-oriented programs, including increases greater than 10 percent for basic research in NIH, NSF, and DOD.

- The Clinton Administration's multi-agency initiatives do well in FY 2001, though funding levels fall short of the requested increases. The new nanotechnology initiative grows from $247 million in FY 2000 to an estimated $418 million in FY 2001, a 55 percent increase. The Information Technology R&D initiative sees its funding climb nearly 24 percent to $2.1 billion in FY 2001, including a dramatic jump from $90 million to $215 million for NSF's IT Research component.

- Health-related R&D and defense R&D both rise by nearly $3 billion in FY 2001 (see Table 3). Most other functional categories of R&D also see large increases, including a 13.5 percent increase to $6.2 billion for general science R&D because of large increases for NSF and DOE's Science programs.

- Nondefense R&D reaches an all-time high in FY 2001, the fifth year in a row that it has increased in inflation-adjusted terms. Much of the recent increase, however, has been due to steady growth in the NIH budget. NIH R&D has become nearly as large as all other nondefense agencies' R&D combined. The large FY 2001 increases for non-NIH nondefense agencies follow several years of stagnant or declining budgets.

2

Overview of R&D Trends

The FY 2001 Congressional Budget Process

For the federal budget, success followed on success in 2000 as rising revenues once again caused budget surpluses to increase. The federal government recorded a budget surplus last year for the third year in a row, even without counting the Social Security program's surplus. The $237 billion fiscal year (FY) 2000 surplus was the largest in history, and was nearly double the FY 1999 surplus. The non-Social Security surplus was $87 billion, up dramatically from a bare $1 billion in FY 1999, marking the first consecutive non-Social Security surpluses since the 1950s. The federal government paid down the national debt to the public for the third year in a row, and as a share of the economy the national debt shrank dramatically. In this flush fiscal environment, federal support of research and development (R&D) eventually flourished in FY 2001 appropriations, as election pressures, the temptation to spend projected surpluses, and a complete breakdown in fiscal discipline prompted President Clinton and the 106th Congress to spend and spend. But the final result was delayed by a deadlocked election and negotiations over non-spending issues.

As President Clinton leaves office, he can lay claim to a remarkable fiscal legacy or an astonishing run of good luck, or a little of both. When he took office in 1993, the federal budget had just amassed a record deficit of $290 billion in FY 1992, and the baseline deficit (the deficit assuming continuation of current policies) for FY 2000 was $455 billion -- just one year in a string of endless projected deficits. But he became the only President in history to see the deficit decline or the surplus increase in every year of his administration, and the actual surplus in FY 2000 of $237 billion marked a record eighth consecutive year of fiscal improvement in an uninterrupted path from a record deficit to a record surplus.

Economic analysts give nearly all the credit for the current era of surpluses to a booming U.S. economy that in February 2000, officially entered its longest-ever expansion phase. The economy, at least until late 2000, regularly surprised economists and budget forecasters by delivering unexpected growth and thus surging tax revenues to the U.S. Treasury. Far more than tax increases or spending cuts, it was these revenues that delivered the federal budget to the promised land of surpluses.

The question of what to do with these surpluses has become the paramount question in the annual federal budget process, and the FY 2001 budget process was no exception. Save it; spend it; give it back to taxpayers; these three options were debated throughout the year, and in the end Congress and the President chose a mixture of the first two options, including additional spending on R&D.

In February, President Clinton released his budget request for FY 2001. Its R&D portion contained substantial requested increases, and was notable in its call for a 'more balanced' research portfolio (for details of the request, please see *AAAS Report XXV: R&D FY 2001*.) The rhetoric reflected increasing concern within the science and engineering communities that federal support for biomedical research had increased disproportionately because of large increases at the National Institutes of Health (NIH) over the past several years, while R&D support from other agencies in non-biomedical fields had stagnated or declined. The budget proposed a relatively modest increase for NIH but substantial increases for research in non-life sciences disciplines, including large increases for R&D in the Department of Energy (DOE) and the National Science Foundation (NSF). The request contained large increases for R&D in multi-agency initiatives, including those on information technology, nanotechnology, and global climate change.

In the overall budget, President Clinton called for a set of modest tax cuts as well as increased discretionary spending and a Medicare prescription-drug benefit. But to seal off other options, including Republicans plans for large tax cuts, his budget presented a plan to completely eliminate the national debt by 2013, an idea that would have been unthinkable even a year or two ago. By reserving all Social Security surpluses and some non-Social Security surpluses for debt reduction, the budget presented a timetable for paying off the $3.7 trillion national debt to the public.

The President's budget proposed $622 billion in discretionary budget authority for FY 2001, within which nearly all federal R&D would be funded, up from $586 billion in FY 2000. Although President Clinton and Congress had agreed on a balanced budget law in 1997 that set annual caps (spending limits) on discretionary spending through FY 2002, each year since then Congress and the President had circumvented them through elaborate budgetary maneuvers, reaching a new frenzy in the conclusion of the FY 2000 budget process when the final total exceeded the cap by nearly $50 billion. President Clinton skirted the $542 billion cap for FY 2001 by proposing to raise the cap by an astonishing $80 billion up to the level of his request.

The Republican-controlled Congress criticized the President's request for spending too much. While Congress tried to craft a more restrained alternative, it was clear that it, too, would have to raise the cap. When congressional leaders originally drew up their spending plans for FY 2001 in April, the Congressional Budget Office (CBO) had projected only a $15 billion on-budget surplus in FY 2001, assuming discretionary spending grew at the rate of inflation (to $611 billion), leaving little to no room to enact tax cuts without dipping into the now-sacred Social Security surplus. The congressional budget resolution therefore set a discretionary spending target and new proposed cap of $601 billion to allow for more tax cuts in FY 2001. Congressional committees then drafted several tax cut bills following the blueprint of the budget resolution, most of them designed to cost relatively little in FY 2001 and FY 2002 but with revenue losses ballooning in subsequent years, when projected on-budget surpluses were much higher.

When it came time to actually write the appropriations bills, however, congressional appropriators found that the $601 billion limit was too low, especially since Republicans were determined to give defense spending, which makes up half of all discretionary spending, a substantial increase. This plan would have forced steep cuts in domestic programs. In May and June, appropriators reluctantly complied with the limits. The original House or Senate versions of the appropriations bills contained flat or declining funding for many domestic programs. President Clinton issued veto threats for most of these bills, ensuring that Congress would have to add more money before they would get signed into law.

As in past years, the growing economy offered Congress a way out of its dilemma. In July, CBO issued a revised budget forecast. In three short months between April and July, the economy had grown so much faster than previously anticipated, boosting expected tax revenues, that the surplus outlook had improved dramatically. CBO projected an on-budget surplus in FY 2001 (assuming current policies, and assuming discretionary spending of $611 billion) of $102 billion. CBO projected that these surpluses would grow every year for a cumulative $2.2 trillion over the next ten years. Including the Social Security surpluses, combined federal budget surpluses over the next ten years would total $4.6 trillion.

The new forecasts unleashed billions in spending, and fiscal restraint evaporated. When Congress returned to session after Labor Day, the money started pouring out: appropriations bills started to come out of House-Senate conference, and in program after program funding levels exceeded not only the House and Senate original levels, but even the President's request. Not only were the budget projections favorable, but congressional leaders were intensely focused on the November elections: they desperately wanted to adjourn and spend the month of October campaigning, armed with news of increased spending on popular programs. While negotiations on tax cuts, Medicare, and other uses of the surplus went nowhere, Congress padded appropriations with billions of dollars in additional discretionary spending, secure in the forecast that the Social Security surplus would still be safe.

It was widely expected that by October, when FY 2001 started, Congress would be forced to bundle several unfinished or vetoed bills together into an omnibus appropriations bill, negotiated in a frenzy behind closed doors by congressional leaders and Clinton Administration officials, and loaded with enough additional funds to break congressional spending limits. But this year, defying all expectations, Congress found that a public distracted by the close presidential election campaign, the Olympics, the World Series, and other news events was not particularly concerned with the outcome of budget negotiations in Washington. Congressional leaders were also able to arrange schedules so that vulnerable incumbents could return to their districts for long weekends to campaign. Without a pressing need to finish, negotiations on the final appropriations bills stayed deadlocked. In late October, with 6 of the 13 appropriations bills unfinished, Congress decided to postpone the remaining appropriations

decisions until after the election. By that point, final funding levels had been all but settled, but there were still disagreements on non-spending matters such as immigration and ergonomics attached to the appropriations bills.

Before leaving for the final stretch of the campaign, Congress and the President quietly inserted a provision into an appropriations bill that raised the FY 2001 cap to $640 billion, nearly $100 billion more than the existing cap and nearly $20 billion more than the President's request. This was clearly a sign that fiscal discipline had broken down; barely a peep of protest was heard from even fiscal conservatives.

Then, reality became even stranger. Congress had planned to return the week after Election Day in a 'lame-duck' session to complete FY 2001 appropriations and other matters of the 106th Congress, but an unusually close, chaotic election threw these plans completely out the window. America woke up on November 8, the day after the election, with the presidential race deadlocked, its outcome resting on a minuscule vote margin in Florida; several House races were too close to call, although the Republican majority appeared to be safe; and one Senate race was too close to call, but its outcome held the potential to leave the Senate evenly matched between Democrats and Republicans.

A week later, America had plunged into the maelstrom of legal battles and recount struggles in Florida between Vice President Gore and Governor Bush. Although the appropriations battles were for the current President and Congress and not the newly elected ones, lawmakers found themselves so distracted by the unfinished election that they postponed budget negotiations again, until December. But even on December 5th, when Congress returned to session, the outcome of the presidential race was still in doubt and the unprecedented case of *Bush v. Gore* was before the U.S. Supreme Court. Although congressional leaders and President Clinton met for negotiations, primarily on non-appropriations issues, final agreements could not be reached and discretionary programs in the unsigned appropriations bills continued to operate on a record series of 21 continuing resolutions (temporary extensions of funding for unsigned appropriations bills).

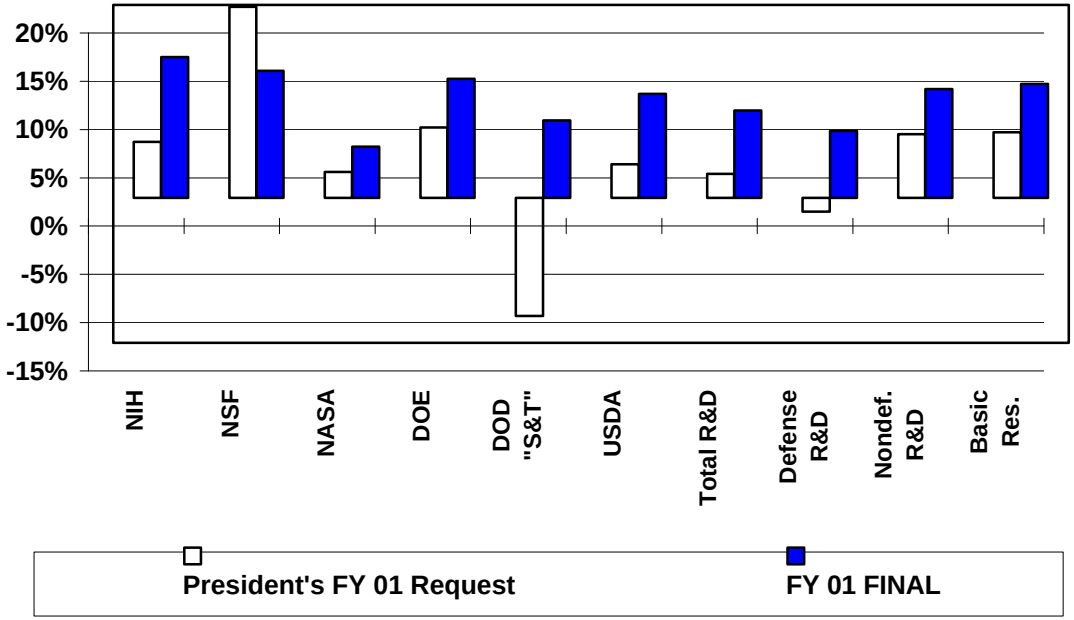
Yet after all the delays, the end came quickly, in a blur of activity that contrasted sharply with the sloth of the previous weeks. In one

momentous week, the U.S. Supreme Court ruled in favor of Governor Bush by a 5-4 vote, Vice President Gore conceded, George W. Bush was declared the next President of the United States five weeks after Election Day, President Clinton and the Congress came to final agreements on appropriations and other legislative issues, Congress drafted and approved the last four appropriations bills and other legislation into one big package, and the 106th Congress left Washington for good. President Clinton signed the appropriations bills into law a few days later, and appropriations were finally complete, 72 days into FY 2001.

After all was said and done, federal R&D did remarkably well, as the rest of this report shows. Shattering all previous plans and caps, Congress and the President agreed to spend $633 billion in discretionary budget authority in FY 2001, an increase of 8 percent over FY 2000. This amount was well below the new $640 billion cap because, with a Bush victory assued, fiscal discipline gained the upper hand at the last minute. Fiscal conservatives in Congress pushed successfully to scale back some of the previously agreed-upon increases for education spending, and also inserted an across-the-board cut of 0.22 percent for most discretionary programs.

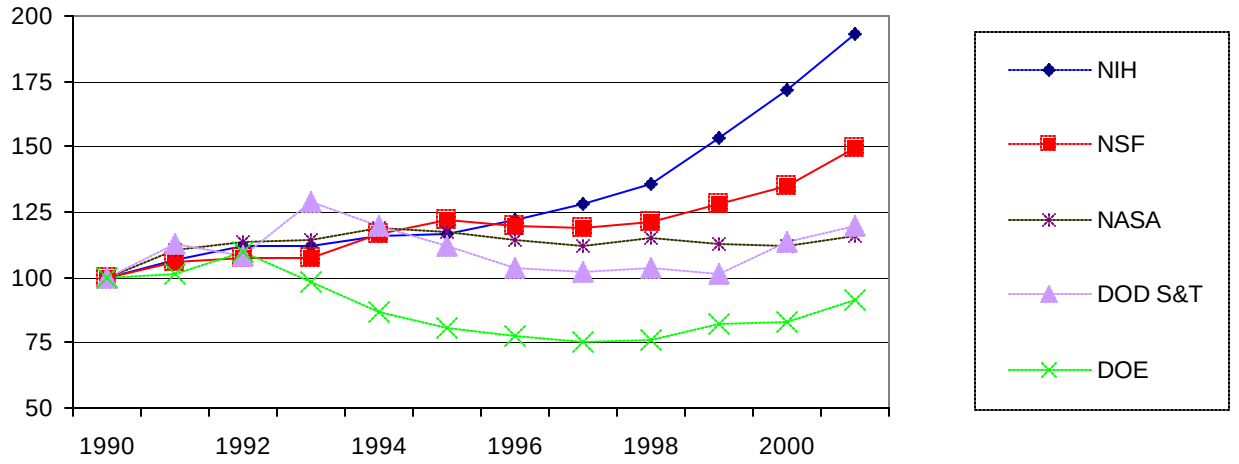
Looking to the future, the 107th Congress takes office with the narrowest margins in recent history between the two parties. The Senate is divided 50-50 between the parties; it faces a year in which Vice President Cheney will be called upon frequently to provide his tie-breaking vote, and the death or retirement of any Senator could cause an instant shift in party control, with the slight chance that party control could shift more than once in the next two years. The House is split Republican-Democratic 221-212 with two independents; Republican majorities will be extremely hard to form on controversial issues, and Democrats will be working to peel away Republican moderates' votes. All this is likely to make the upcoming FY 2002 budget process even more difficult and unpredictable than the previous year.

Figure 1. FY 2001 R&D Appropriations
Percent Change from FY 2000



AAAS estimates of R&D based on OMB R&D budget data and final FY 2001 appropriations bills.
DOD S&T = DOD R&D in "6.1" through "6.3" categories, plus medical research.

Figure 2. Trends in Federal R&D, FY 1990-2001
selected agencies in constant dollars, FY 1990=100



Source: AAAS analyses of R&D in AAAS Reports VIII- XXV. FY 2001 figures are AAAS estimates of R&D in final FY 2001 appropriations; FY 2000 figures are latest estimates.

Table A. Historical Table: Federal R&D by Agency, FY 1989-2001 in millions of constant FY 2000 dollars

(in millions of constant FY 2000 dollars)	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000**	2001***
DOD	49,116	46,448	44,012	43,677	43,804	39,139	38,156	37,894	38,776	38,627	39,469	39,282	41,024
NASA	7,536	8,723	9,609	9,878	9,939	10,367	10,210	9,989	9,738	10,025	9,862	9,777	10,096
DOE	7,964	8,571	8,681	9,403	8,394	7,463	6,925	6,643	6,474	6,530	7,070	7,117	7,837
NIH *	9,613	9,944	10,619	11,127	11,152	11,544	11,617	12,099	12,722	13,479	15,220	17,102	19,212
NSF	2,243	2,120	2,240	2,280	2,270	2,472	2,586	2,532	2,525	2,571	2,710	2,863	3,177
USDA	1,450	1,500	1,645	1,756	1,654	1,685	1,605	1,575	1,621	1,605	1,670	1,763	1,915
Interior	611	651	733	743	732	780	721	605	616	551	506	573	585
DOT	415	434	486	718	700	706	719	636	637	606	616	606	687
EPA	506	520	543	569	560	648	598	511	620	655	679	647	672
Commerce	543	555	635	674	894	1,126	1,207	1,023	1,004	1,122	1,100	1,073	1,089
All Other *	1,846	2,032	2,113	2,346	2,131	2,408	2,238	1,900	2,255	2,310	2,467	2,532	2,812
Total R&D	81,843	81,499	81,316	83,172	82,230	78,338	76,581	75,407	76,987	78,080	81,370	83,334	89,107
Defense R&D	52,936	50,262	47,757	47,668	47,485	42,214	40,837	40,734	41,701	41,714	42,715	42,583	44,649
Nondef. R&D	28,906	31,237	33,559	35,504	34,745	36,125	35,744	34,672	35,286	36,367	38,655	40,751	44,458
Basic Res.	13,518	13,834	14,676	14,964	15,159	15,093	14,866	15,294	15,579	15,960	17,693	18,965	20,791

Source: AAAS Reports VII through XXV, based on OMB and agency R&D budget data.

Constant dollar conversions based on OMB's GDP deflators from the FY 2001 budget.

* Between FY 1991 and 1992, R&D from ADAMHA (HHS) transferred to NIH. ADAMHA R&D included in NIH totals for all years.

** - Latest estimate for FY 2000. *** - AAAS estimates of R&D in final FY 2001 appropriations.

The full version of this table ('76-'01) is available on the World Wide Web at www.aaas.org/spp/R&D/.

Trends in Total R&D

Table 1 summarizes congressional action on R&D funding by agency. Figure 1 compares agencies' FY 2001 R&D budgets to FY 2000 funding levels and to the President's request; Figure 2 shows funding trends for R&D in selected agencies from 1990 to 2001, and Table A shows inflation-adjusted funding histories for the major R&D funding agencies over the past decade. (Detailed historical tables and other supplementary material are available on the AAAS R&D Web site.)

- In FY 2001, **total federal support of R&D exceeds $90 billion** for the first time, thanks to a record dollar increase of $7.6 billion over FY 2000. Because of increases across the entire breadth of R&D programs in the federal portfolio, federal R&D totals $90.9 billion in FY 2001, an increase of 9.1 percent (see Table 1). **This total far exceeds the request** for $85.4 billion, primarily because Congress allocates far more for R&D in the Department of Defense (DOD) and the National Institutes of Health (NIH), the two largest R&D funding agencies, than requested.

- **Nearly every major R&D funding agency receives a substantial increase over FY 2000**, and most receive more than the Clinton Administration request (see Figure 1). Of the major R&D funding agencies, only the National Science Foundation (NSF) receives less for R&D than requested, but NSF still receives 13.2 percent more for R&D than in FY 2000.

- **Nondefense R&D increases by more than 11 percent** to reach $45.3 billion, a boost of $4.6 billion. In addition to a 14.6 percent or $2.5 billion increase in NIH R&D, there are substantial increases for other nondefense agencies. R&D in the Department of Energy (DOE) increases by 12.3 percent to reach $8.0 billion, including a 13.8 percent boost to programs in the Office of Science; NSF R&D increases by 13.2 percent to $3.2 billion, with substantial increases for all the research directorates; and Science, Aeronautics, and Technolgy (SAT) R&D in the National Aeronautics and Space Administration (NASA) increases by nearly 11 percent.

- **Defense R&D increases by a smaller but still substantial 7.0 percent** to $45.5 billion, bringing defense and nondefense R&D near parity for the first time in 20 years. Although defense R&D has exceeded nondefense R&D every year since the defense buildup of the early 1980s, the gap has narrowed in recent years. **DOD basic research ("6.1") increases by nearly 13 percent**, while applied research ("6.2") jumps by nearly 8 percent. Although the Clinton Administration requested a steep cut in DOD's "S&T" investments (basic and applied research plus exploratory development), Congress awarded an 8.0 percent increase (see Figure 1).

- In his budget request, **President Clinton placed a strong emphasis on achieving a better balance among science and engineering disciplines**. A series of large increases for the National Institutes of Health (NIH) has resulted in an emphasis on biomedical and life sciences research in recent years within the federal research portfolio, and in response the FY 2001 budget proposed large increases for R&D programs in non-life sciences disciplines. Although NIH receives a nearly 15 percent increase for the third year in a row, non-biomedical research also wins big this year. NSF, the only R&D funding agency responsible for the entire range of science and engineering disciplines, with a particular emphasis on fundamental research and non-life sciences disciplines, receives the largest dollar increase in history. DOE's Science programs, which support fundamental research in the physical sciences, receive a 13.8 percent boost to $3.0 billion. As a result, nondefense R&D excluding NIH increases by 8.9 percent in FY 2001, a smaller increase than NIH but a sharp contrast to stagnant or declining funding in recent years.

- The Clinton Administration's **multi-agency initiatives do well in FY 2001**, though funding levels fall short of the dramatic increases the Administration requested. The Administration's new **Nanotechnology** initiative proposed to double funding for existing nanotechnology programs from $247 million in FY 2000 to $495 million for new and continuing programs in FY 2001; the final FY 2001 total is an estimated $418 million, up 55 percent

over last year. NSF's leading role was reduced from a proposed $217 million to $150 million, but this still represents a more than 50 percent boost over the $97 million FY 2000 funding level.

- The **Information Technology R&D** initiative also does well in FY 2001: NSF's $215 million for IT Research, a key component of the initiative, represents a dramatic jump from $90 million in FY 2000. Total IT R&D spending should total $2.1 billion in FY 2001, an increase of nearly 24 percent over FY 2000. The largest supporter of IT R&D is DOE with $657 million, including substantial investments in both its defense and science portfolios.

- **Basic and applied research receive large increases in FY 2001 appropriations** (see Table 2). Federal support of basic research, the majority of which is performed in the nation's colleges and universities, increases by 11.8 percent or $2.2 billion to $21.2 billion. There are across-the-board increases for agencies' basic research-oriented programs, including increases of greater than 10 percent for basic research in NIH, NSF, and DOD. Total federal support of research (basic and applied) is $41.2 billion in FY 2001, a jump of $4.7 billion or 12.8 percent over FY 2000. Again, there are across-the-board increases to agencies' research portfolios, with six agencies (NIH, NSF, DOE, DOD, NASA, DOT) receiving increases greater than 10 percent.

- **Nondefense R&D reaches an all-time high in FY 2001**, the fifth year in a row that it has increased in inflation-adjusted terms (see Table A). Much of the recent increase, however, has been due to steady growth in the NIH budget, including increases of nearly 15 percent for three years in a row (see Figure 2). As a result, NIH R&D has become nearly as large as all other nondefense agencies' R&D funding combined. Funding for nondefense R&D excluding NIH has stagnated in recent years; after steady growth in the 1980s, funding peaked in FY 1994 and then declined sharply as a result of tight budget conditions in the mid-1990s. After hitting bottom in FY 1996, small increases from FY 1997 through FY 2000 barely kept pace with inflation. The FY 2001 increases for non-NIH agencies, while large, just barely

brings these agencies back to the funding levels of the early 1990s.

- Most categories of **R&D by function** rise in FY 2001 (see Table 3). Health and defense-oriented R&D both rise by nearly $3 billion. General science R&D increases by 13.5 percent to $6.2 billion because of large increases for NSF and DOE's Science programs.

- The **"21st Century Research Fund" rises by 12.1 percent in FY 2001** to $44.9 billion (see Table 1). Most of this increase is due to a 14.4 percent increase to the total NIH budget, although there are increases for nearly all the programs in the Fund. The Clinton Administration created the Fund to highlight programs that it considers important to the nation's science and technology enterprise. The Fund includes both R&D and non-R&D items while excluding large parts of the federal R&D portfolio (primarily in development). "FS&T," another alternative measure of the federal investment in science and technology proposed by the National Academy of Sciences, increases by 10.9 percent to $57.6 billion. (See Appendix 1 for details.)

Total U.S. R&D in 2000

As the federal investment in R&D, the U.S. economy, and the federal budget surplus all expand, and the national debt continues to shrink, there is also good news from U.S. industry. Once again, the **total U.S. R&D** enterprise continues to grow. Recently, the National Science Foundation (NSF) released its preliminary projections for total U.S. R&D in calendar years 1999 and 2000, including industry-funded R&D. NSF estimates that total U.S. R&D performance in 2000 will be $264 billion (see Figure 3 and Table B). This represents a 7.9 percent or nearly $20 billion increase over the $245 billion total in 1999, which itself was a 7.5 percent increase over 1998.

As shown in Figure 3, since 1994 total U.S. R&D has expanded dramatically due almost entirely to substantial increases in R&D funding from industrial firms. In 2000, U.S. industry is expected to spend $179 billion on R&D with its own funds, an increase of 10.3 percent over the

previous year, far outstripping the more modest growth in federal R&D. As Figure 3 shows, industry has consistently expanded its share of total U.S. R&D over the past four decades, and now funds two-thirds of total U.S. R&D. Other funding sources for R&D, though far smaller in dollar terms, are also expected to increase their R&D spending. This remarkable growth in industry R&D has been fueled by a record-setting economic expansion over the past ten years, the rapid growth of technology-dependent industries such as information technology and biotechnology relying heavily on R&D for future growth, and the ever-increasing importance of new technology as a key element in economic competition for a broad range of industries.

These increases in U.S. R&D spending cover all character-of-work categories. Despite worries in the mid 1990s that industry would cut back on its support of basic research, according to the NSF analysis industrial firms are expected to fund $14.8 billion of basic research in 2000, an increase of 10.0 percent. This increase is far higher than the increase in federal support of basic research (up 5.1 percent), although the federal government continues to be the majority sponsor of basic research. Applied research and development are also expected to grow.

Because growth in total R&D is once again expected to exceed growth in the U.S. economy as a whole as measured by the Gross Domestic Product (GDP), NSF estimates that total U.S. R&D will reach 2.72 percent of GDP in 2000, up from 2.65 percent in 1999 and the highest share since 1967.

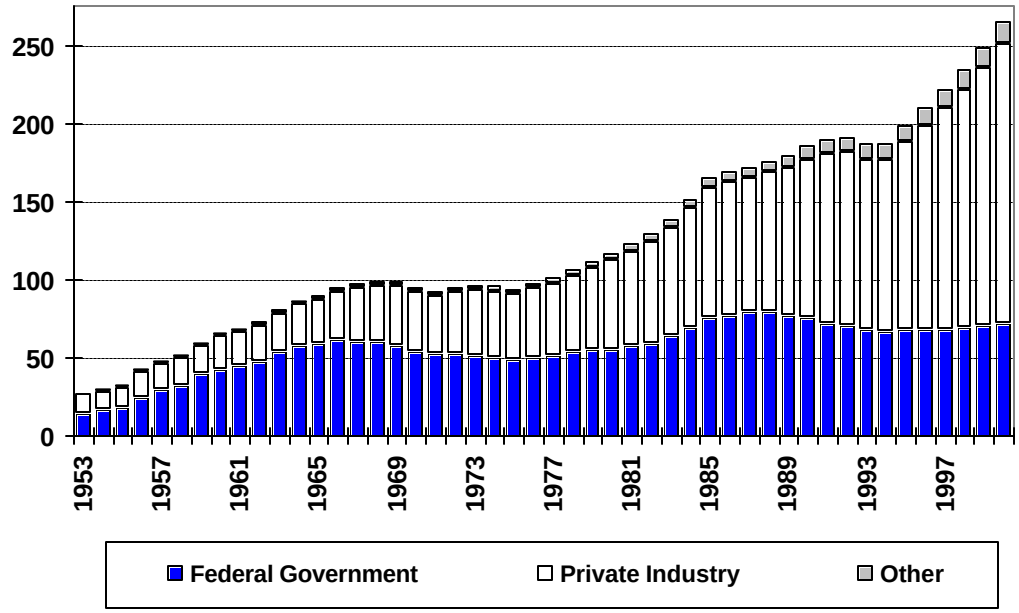
Heading into 2001, however, there is some doubt as to whether these large increases for industrial R&D can be sustained. In late 2000, there were abundant signs that the decade-long U.S. economic expansion was, if not coming to an end, at least entering a period of slower growth. Historically, industrial R&D has closely tracked the business cycle, so an economic slowdown may lead many companies to curtail their R&D activities. There is some question as to whether this historical correlation will hold up in the next economic slowdown or recession; some economists believe that heavily R&D-dependent high-tech industries will continue to invest heavily in R&D in the search for new technological breakthroughs regardless of economic conditions.

Table B. Total U.S. R&D, 1998-2000
(expenditures in millions of dollars)

(calendar years)	1998 Actual	1999 Preliminary	**2000 Preliminary**	% Change 1999-2000	% Share of Total ('00)
U.S. R&D by funding source:					
Federal Government	66,522	69,494	**71,162**	2.4%	26.9%
Industry	147,829	162,280	**178,959**	10.3%	67.7%
Universities and Colleges	5,166	5,534	**5,951**	7.5%	2.3%
Nonprofits	5,006	5,376	**5,770**	7.3%	2.2%
Nonfederal Government	1,993	2,143	**2,322**	8.4%	0.9%
Total U.S. R&D	226,515	244,828	**264,165**	7.9%	100.0%
U.S. R&D by performer:					
Federal Government	17,403	18,114	**17,777**	-1.9%	6.7%
Industry	167,102	182,017	**199,170**	9.4%	75.4%
Universities and Colleges	26,547	28,255	**30,090**	6.5%	11.4%
FFRDCs *	8,264	8,671	**8,954**	3.3%	3.4%
Nonprofits	7,198	7,772	**8,174**	5.2%	3.1%
Total U.S. R&D	226,515	244,828	**264,165**	7.9%	100.0%
U.S. R&D by character of work:					
Basic Research	40,892	42,515	**45,471**	7.0%	17.2%
(from federal sources)	*20,289*	*21,361*	***22,441***	*5.1%*	*8.5%*
(from industry sources)	*13,366*	*13,436*	***14,777***	*10.0%*	*5.6%*
Applied Research	45,866	52,269	**56,704**	8.5%	21.5%
Development	139,757	150,043	**161,990**	8.0%	61.3%
Total U.S. R&D	226,515	244,828	**264,165**	7.9%	100.0%
U.S. GDP** (**billions**)	8,760	9,255	**9,708**	4.9%	
U.S. R&D / GDP	2.59%	2.65%	**2.72%**		

Source: National Science Foundation, *National Patterns of R&D Resources 2000.*
The complete data are available at http://www.nsf.gov/sbe/srs/stats.htm.
* Federally Funded Research and Development Centers.
** Gross Domestic Product.
These data are based on performer surveys of expenditures for calendar years, and thus differ from data presented elsewhere in this report (agency budget authority data by fiscal year). These data also exclude R&D facilities.

Figure 3. U.S. R&D Funding by Source, 1953-2000
Expenditures in Billions of Constant 2000 Dollars



Source: National Science Foundation, *National Patterns of R&D Resources 2000* (1999 and 2000 data are preliminary).

3

Agency R&D Budgets

Department of Defense (DOD)

In FY 2001, Congress once again opened the purse strings for DOD, and DOD's R&D programs shared in the outpouring of generosity. In a year when the question of whether the U.S. military's readiness had declined to dangerous levels became a presidential campaign issue, President Clinton and Congress agreed to continue the recent trend of awarding large increases to defense spending to partially reverse a decade-long series of post Cold War cuts. In the FY 2001 budget debate, President Clinton requested cuts in DOD's R&D budget for the sixth year in a row, and for the sixth year in a row the Republican-controlled Congress granted an increase. This year's increase, however, topped the other ones in size. Congress granted DOD $41.8 billion for R&D in FY 2001, $2.5 billion or 6.4 percent more than last year (see Tables 4 and 5). The appropriation is $3.3 billion more than the request, spread over all categories of DOD spending.

After many years of flat or declining funding, DOD funding of basic and applied research now appears to be on a sustained upswing. For the first time in more than a decade, both the President and Congress competed to award large increases to DOD's basic and applied research programs. DOD's basic research ("6.1") totals $1.3 billion, a substantial 12.8 percent above FY 2000 (see Table 4). In recent years, the President has proposed small increases to basic research, the House has proposed cuts, the Senate has proposed increases, and the final appropriations have split the difference, but this year there was a bidding war of sorts to see who could award the largest increases. The President requested a 4.9 percent increase in February, the Senate proposed 10.5 percent and the House proposed 11.5 percent in June, and the final DOD budget bill in August came in at 13.1 percent, later reduced to the final 12.8 percent because of an across-the-board cut. The applied research ("6.2") total is $3.7 billion, an increase of $262 million or 7.7 percent.

The "6.1" and "6.2" accounts provide a significant share of federal support for several key science and engineering disciplines. DOD provides nearly a third of all federal support for engineering research, and a majority of federal support for some key engineering subfields. DOD also provides more than 40 percent of total federal support for computer sciences research, and plays a strong funding role in other disciplines such as mathematics, oceanography, medical sciences, chemistry, physics, and environmental sciences. The "6.1" and "6.2" accounts are also important for the nation's colleges and universities, which perform more than half of "6.1" research and roughly 20 percent of "6.2" research. In recent years, cuts in "6.1" and "6.2" have resulted in shrinking DOD support for many of these disciplines, especially engineering research. The FY 2000 and 2001 increases for DOD research should help to reverse the downward trends, but will still leave support for these disciplines well below mid-1990s levels.

The FY 2001 DOD budget contains a separate $348 million appropriation, outside the regular R&D accounts, for medical R&D (see Table 4) plus another $66 million for medical-related information technology development for a total of $414 million. This appropriation for peer-reviewed, competitively awarded research grants continues the expansion of DOD's medical research which began in the early 1990s. The final Defense spending bill divides the $348 million medical R&D total into $175 million for breast cancer research (up from $172 million in FY 2000), $100 million for prostate cancer research (up from $74 million), $12 million for ovarian cancer research, $6 million for other cancer research, and more than $50 million for peer reviewed medical research on other topics. The final DOD budget also contains numerous congressionally designated medical research grants in DOD's regular accounts, including R&D on HIV, alcoholism, neuroscience, and laboratory facilities. Counting these projects, DOD will fund nearly $750 million in congressionally designated medical research in FY 2001.

The "6.1," "6.2," and "6.3" categories are often grouped together as "Science and Technology" (S&T). This category encompasses basic research, applied research, and generic technology development, which contribute to a broad knowledge base with potential applications to a wide variety of military as well as civilian uses. DOD S&T declined steeply in the 1990s (see Figure 2), but in FY 2001 DOD S&T, including the medical research appropriations formerly appropriated within the "6.3"

category, totals $9.4 billion, up 8.0 percent. The result gratified a broad range of worried observers, including universities, science and engineering societies, and military associations, who have warned that post-Cold War cuts in S&T have imperiled the new knowledge base DOD needs to meet the warfighting challenges of the 21st century. The FY 2001 appropriation spurred these organizations to call for a $10 billion S&T budget in FY 2002 to continue rebuilding DOD's knowledge base.

Among the Defense Agencies, the budget of the Defense Advanced Research Projects Agency (DARPA) increases by 6.4 percent to $2.0 billion (see Table 5). DARPA receives $53 million for the second year of Extensible Information Systems (up from $30 million), a key part of the multi-agency Information Technology initiative. Computing Systems and Communications Technology, another key IT initiative component, rises from $321 million to $334 million.

The Ballistic Missile Defense Organization's (BMDO) budget also increases substantially, by 22.4 percent to $4.2 billion. This appropriation includes $1.9 billion for development of a national missile defense system. Although recent, widely publicized failures of missile defense tests and slower-than-expected development of key systems led President Clinton to defer a decision on whether to deploy a national defense system to the next President, BMDO will continue its extensive development and testing efforts.

Total DOD R&D is on an upswing after a decade of post-Cold War cuts. The FY 2001 DOD budget for R&D is 20 percent below the FY 1987 peak funding level in real terms, but the trend in recent years has been upward after hitting bottom in FY 1996 (see Table A). For S&T, the large increase in FY 2001 brings the total to just below the peak FY 1994 funding level in inflation-adjusted terms, nearly recovering the losses from steep cuts through most of the 1990s (see Figure 2).

National Institutes of Health (NIH)

NIH is once again the beneficiary of strong congressional support for biomedical research. The final appropriation of $20.4 billion keeps the agency on track to double its budget between FY 1998 and FY 2003, and is $1.6 billion above the President's request. In February, President Clinton's proposed FY 2001 budget requested $18.8 billion. Although this

would have been a $1 billion increase for the agency, the percentage increase of 5.6 percent would have been well below the nearly 15 percent increases of the past two years.

NIH classifies 96 percent of its budget as R&D; the remainder is for research training and overhead costs. NIH R&D totals $19.6 billion, up $2.5 billion or 14.6 percent from FY 2000.

Every institute receives an increase greater than 13 percent, and three receive increases greater than 20 percent (see Table 8). The largest percentage increase goes to the new National Center for Complementary and Alternative Medicine (NCCAM), which receives $89 million for its third year, a substantial increase of $20 million or 29.3 percent reflecting strong congressional support for its work in reviewing complementary and alternative therapies. The National Institute of Environmental Health Sciences (NIEHS) sees its budget jump 27.8 percent to $566 million. In addition to its regular appropriation in the Labor-HHS bill, NIEHS receives an additional $63 million in the VA-HUD bill for research it performs on behalf of the Environmental Protection Agency's Superfund program. The National Human Genome Research Institute (NHGRI), NIH's contributor to the Human Genome Project, receives a 21.1 percent boost to $382 million to help it finish its work sequencing the human genome. Most of the other institutes receive increases between 13.4 and 14.7 percent.

The National Cancer Institute (NCI) once again has the largest budget with $3.8 billion, an increase of $446 million or 13.5 percent. The budget of the National Institute of Allergy and Infectious Diseases (NIAID), NIH's primary supporter of HIV/AIDS research, exceeds $2 billion for first time with an appropriation of $2.0 billion, 13.7 percent more than FY 2000. Congress appropriated HIV/AIDS research funds within individual institute budgets, instead of in a consolidated account as the Administration proposed. The Administration proposed $2.1 billion within a consolidated account, but the final bill provides $2.3 billion for HIV/AIDS research dispersed among the institutes, for an increase of 13 percent over the comparable FY 2000 investment.

Congress appropriated $154 million for Buildings and Facilities, which will allow construction to begin on NIH's proposed National Neuroscience Research Center ($47 million in FY 2001). In addition to these intramural

construction funds, the bill provides $75 million in the National Center for Research Resources (NCRR) budget to support extramural research facilities construction, slightly above $73 million in FY 2000. The NCRR appropriation also provides $100 million (up dramatically from $40 million) for the Institutional Development Award (IDeA) program. IDeA seeks to broaden the geographic distribution of NIH grants by enhancing the research competitiveness of institutions which have traditionally been less successful in obtaining NIH funding, and is similar to the Experimental Program to Stimulate Competitive Research (EPSCoR) programs run by NSF and other agencies.

There are two new NIH institutes in FY 2001. On November 22, President Clinton signed into law a bill creating the National Center on Minority Health and Health Disparities. The new Center will fund research targeting diseases and conditions that disproportionately affect minority groups and other populations with health disparities, and will also fund research on why some minority groups suffer disproportionately from certain diseases. Funding for these programs was formerly in the Office of the Director; the new Center has an initial budget of $130 million. The budget of the Office of the Director drops to $214 million to reflect the funding shift. On December 29, President Clinton signed another bill creating a National Institute of Biomedical Imaging and Bioengineering; because he signed the bill after NIH appropriations were completed, FY 2001 funding for the new institute will be transferred from the budgets of other institutes.

Although NIH has come under increasing congressional scrutiny over the past year because of controversies in areas such as gene therapy research, stem cell research, and the use of fetal tissue, the final NIH appropriations bill is relatively free of legislative provisions to restrict the types of research NIH can fund. The only major provision is the restatement of an existing ban on NIH using its funds to create human embryos for research purposes or to fund any research in which human embryos are destroyed.

Left out of the final budget is any provision blocking NIH from funding stem cell research, although lawmakers had threatened to attach one. To forestall such provisions and objections from anti-abortion lawmakers, who object to embryonic stem cell research because it requires the use of cells from aborted fetuses or discarded human embryos, Senators Specter

(R-PA) and Harkin (D-IA) introduced legislation this spring to allow government-funded scientists to perform research on privately derived stem cells. The legislation did not get through Congress this year. This past summer, NIH proceeded on its own with plans to eventually allow federally funded stem cell research. Following on an earlier legal opinion finding that stem cell research did not violate the existing ban on federally funded human embryo research, NIH issued guidelines on stem cell research drawing a fine line between the derivation of stem cells, which must be with private funds under specific conditions, and stem cell use in research, which can be publicly funded. NIH also set up a review board to approve stem cell research, which could begin approving experiments in early 2001. But obstacles to federally funded stem cell research still remain: President-elect Bush has stated that he may block such research when he assumes office.

There are large increases for R&D programs in other agencies within the Department of Health and Human Services (HHS; see Table 9). R&D in the Centers for Disease Control and Prevention increases by 22.7 percent to $585 million. R&D in the Agency for Healthcare Research and Quality (AHRQ) increases dramatically to $229 million (up 36.4 percent), thanks to a last-minute addition of $50 million for research on medical errors reduction. The Health Resources and Services Administration (HRSA) receives $47 million for its R&D, triple the FY 2000 funding level, primarily because of a $25 million congressional earmark for construction of a biotechnology science center. Total HHS R&D rises 15.2 percent to $20.8 billion.

National Aeronautics and Space Administration (NASA)

NASA tried to shake off the aftermath of a disastrous 1999 when two Mars spacecraft were lost and the International Space Station struggled to stay on schedule. In 2000, NASA came back with a redesigned Mars program, dramatic images from past Mars missions, and the arrival of the first permanent crew on the now-functional Space Station. Late in the year, good news came in the form of the FY 2001 budget as well. After several years of lean budgets, NASA's FY 2001 budget jumps by $653 million or 4.8 percent to $14.3 billion (see Table 6). Total NASA R&D, which excludes the Space Shuttle program and its mission support costs, climbs 5.3 percent to $10.3 billion, including double-digit percentage increases for key NASA science programs (see Table 6).

The big winner is the Science, Aeronautics, and Technology (SAT) account, which funds nearly all of NASA's R&D not related to the Space Station. SAT receives $6.2 billion, well above the request and a stunning 10.7 percent or $596 million above the FY 2000 funding level. Within SAT, Space Science receives a generous $2.5 billion, 13.2 percent more than FY 2000, including $75 million for the Mars Lander 2003 program. The new Mars Lander was proposed by NASA after the original budget request was submitted in February, and is part of a redesigned Mars program resulting from thorough reviews after the losses of the Mars Orbiter and the Polar Lander last year. The new plan is for six Mars missions this decade, including the launch of an orbiter in 2001 and two landers in 2003. The Space Science budget also funds ongoing Mars missions, including the Mars Global Surveyor which continues to transmit stunning photographs of the Martian surface. In 2000, the mission offered new evidence suggesting that Mars may recently have had abundant surface water. The Space Science budget also includes the requested $20 million for the first year of the "Living with a Star" initiative, which envisions a multi-year program to understand the sun's impact on the Earth and the space environment through a variety of missions to study solar variability.

The Life and Microgravity Sciences and Applications (LMSA) account within SAT receives $314 million, an increase of 14.2 percent. This program funds ground and space-based research to advance the health and safety of astronauts in space, but covers investigations on a variety of life, medical, and microgravity sciences research topics. Aero-Space Technology jumps 10.3 percent to $1.2 billion, including $290 million for the Space Launch Initiative, which funds R&D efforts for reusable launch vehicle technology.

The FY 2001 NASA budget contains $2.1 billion for continued development and construction of the International Space Station, $213 million or 9.2 percent less than FY 2000 because of a planned reduction in costs after several cost overruns in FY 2000. The Space Station now has a permanent three-person crew inhabiting three connected modules, and additional modules will be launched in 2001 including a science module. The non-R&D Space Shuttle program, the other major program within Human Space Flight, increases by 5.1 percent to $3.1 billion; many of the Space Shuttle flights in 2001 will be to the Space Station.

The generous FY 2001 appropriation is welcome news for NASA, whose budget has stagnated in recent years both because of tight fiscal policies for all discretionary programs and because of NASA's goal of doing more with less. After adjusting for inflation, NASA's R&D has been essentially flat at $10 billion in today's dollars since FY 1992 (see Figure 2 and Table A). NASA's R&D grew dramatically from the mid-1980s to the mid-1990s, first because of the development of a new Space Shuttle after the 1986 Challenger disaster, and then because of the International Space Station and the expansion of NASA's earth science activities.

Although much of NASA's R&D funds development projects such as the Space Station, NASA is also an important source of federal support for basic and applied research. Engineering research makes up the largest part of the agency's portfolio. NASA funds approximately a third of total federal support for engineering research, and is the second largest agency sponsor after DOD. It is also the leading federal sponsor of the environmental sciences (oceanography, atmospheric sciences, geological sciences). The environmental sciences are about a quarter of NASA's portfolio, but NASA funds nearly 40 percent of total federal support for environmental sciences research. NASA also invests heavily in the physical sciences (astronomy, chemistry, and physics). Approximately two-thirds of NASA's physical sciences funding goes to astronomy, and most of the remaining third goes to physics. NASA is the second largest federal sponsor of physical sciences behind the Department of Energy, and is the leading sponsor of astronomy research.

Department of Energy (DOE)

DOE went from crisis to crisis in 2000 as the allegations from 1999 of lax security and thefts of classified nuclear information at its three weapons laboratories played out. The three labs (Los Alamos and Sandia in New Mexico, and Lawrence Livermore in California) are operated by contractors but are owned by DOE, report to DOE management, and perform much of DOE's R&D. 2000 brought additional challenges, including misplaced nuclear weapons code hard drives; a forest fire that forced the evacuation of Los Alamos; a highly publicized preparation for the trial of Wen Ho Lee, a Los Alamos scientist accused of espionage; and allegations of discrimination against Asian Americans at the labs. DOE also had to manage the creation of the National Nuclear Security Administration (NNSA) as a semi-autonomous agency within DOE to

take over the department's nuclear weapons activities, including R&D at the three weapons labs, and the agency had to deal with cost overruns and project delays in the National Ignition Facility.

In 1999, Congress created NNSA within DOE. NNSA is responsible for ensuring the security and reliability of the nation's nuclear weapons stockpile and promoting nuclear safety in a manner consistent with environmental protection and national security. NNSA started formal operations on March 1 under General John Gordon, a presidentially-appointed and Senate-confirmed Under Secretary for Nuclear Security who also serves as Administrator for Nuclear Security in NNSA. All NNSA employees and NNSA contractors report only to this new Administrator and no one in the non-NNSA parts of DOE except the Secretary of Energy, who retains ultimate control of NNSA and the rest of DOE. The DOE budget was reorganized so that NNSA now has its own budget accounts within DOE. Most of DOE's defense R&D (in Atomic Energy Defense Activities in Table 7) is now part of the NNSA.

While the Wen Ho Lee case ultimately did not go to trial and the NNSA reorganization appeared to go smoothly, lingering questions remain about whether DOE can continue to manage both groundbreaking science and national security, while keeping morale high at the laboratories. At the end of the year, there was another morale crisis at the laboratories over news that the FY 2001 defense authorization bill will require an additional 5,000 lab employees to undergo polygraph tests; it seems likely that 2001 will bring further turmoil to the weapons labs as further security regulations are phased in.

Amid the confusion and crisis, there was much good news for the DOE budget. Total DOE R&D in FY 2001 rises a staggering $878 million or 12.3 percent to $8.0 billion (see Table 7). There are double-digit percentage increases for all three DOE missison areas of defense, energy, and science.

In the Science account, Congress provides $3.0 billion for R&D, a substantial 13.8 percent or $363 million boost over FY 2000. President Clinton made DOE's science programs a centerpiece of his FY 2001 proposal to achieve a more balanced research portfolio by balancing past increases for NIH with large increases for key supporters of non-biomedical research such as DOE and NSF. President Clinton requested

a 12.6 percent increase for Science R&D as part of this balancing effort, and Congress added even more money. The big winner in Science is Basic Energy Sciences, which receives $1.0 billion for R&D in FY 2001, an increase of 29.7 percent. Most of the increase is for the Spallation Neutron Source, which receives $279 million, nearly double the FY 2000 funding level. Of the total funding for this large scientific user facility, to be built at Oak Ridge National Laboratory in Tennessee, $260 million is for construction and the remaining $19 million for development work.

Other Science programs also receive large increases. R&D funding in Advanced Scientific Computing Research, recently renamed from Computing and Technology Research, increases from $128 million to $168 million, a boost of 31.2 percent that will allow DOE to expand substantially its participation in the multi-agency Information Technology R&D initiative. The Biological and Environmental Research (BER) R&D programs receives an increase of $61 million or 14.1 percent to $494 million, mostly because of congressionally designated projects at colleges and universities. Other Science programs increase only modestly.

DOE's defense R&D programs receive large increases, consistent with increases for defense spending in DOD, despite the controversy over the weapons labs. Total DOE defense R&D jumps 12.0 percent to $3.7 billion.

Most of DOE's defense R&D is now funded within NNSA. In FY 2001, NNSA is responsible for $6.6 billion, or roughly a third, of the total DOE budget. The Weapons Activities program, the cornerstone of NNSA's mission to use science-based methods to ensure the safety and reliability of the nation's nuclear stockpile, receives $2.5 billion for its R&D activities, a boost of 13.7 percent. The Accelerated Strategic Computing Initiative (ASCI; $477 million, a boost of $80 million above the FY 2000 funding level) continues its effort to develop the next generation of supercomputers to simulate nuclear explosions without nuclear testing. ASCI is a major part of the IT R&D initiative.

Despite controversies over ballooning project costs and construction delays, construction of the National Ignition Facility (NIF) receives $199 million, less than the $247 million for FY 2000 but far more than the original $74 million request. After the February release of the budget, DOE requested more money because of a series of cost overruns and

delays which have now pushed the total project cost to $3.5 billion from an original $2.0 billion estimate and which have delayed the completion date to 2008 from 2004. Congress responded angrily to these developments, and although Congress grudgingly allocated more funding it comes with several conditions. Only half the funds are available immediately, while the release of the other half in March, 2001, depends on NNSA supplying a new project plan, a new budget plan, a certification of construction progress, and a study on possible cheaper alternatives to the project.

There are also increases for DOE's energy-related R&D programs, including $444 million for R&D in Energy Supply (up 21.9 percent) to fund solar and renewables R&D programs and R&D on nuclear energy. There are also substantial increases for R&D in the Energy Conservation program (up 6.3 percent to $458 million) and the Fossil Energy program (up 3.4 percent to $339 million).

DOE's R&D budget has had an up-and-down history over the past several years. Because of the end of the Cold War, DOE defense R&D declined sharply from FY 1992 to FY 1995, but has increased since then as the Stockpile Stewardship (now Weapons Activities) program's budget has grown to reflect DOE's commitment to rely on science instead of nuclear testing. The large FY 2001 increase brings DOE defense R&D nearly back to its Cold War funding levels. DOE nondefense R&D also peaked in FY 1992 but then suffered a steeper and more prolonged decline that lasted until FY 1998. Initially, the cuts were driven by the cancellation of the Superconducting Super Collider in 1993. But after the Republican takeover of Congress in 1994, DOE nondefense R&D declined further because of tight restrictions on domestic discretionary spending aimed at achieving a balanced budget and because of Republican animosity toward DOE itself. In the last few years, DOE nondefense R&D has begun to inch back toward previous funding levels. Taken together, total DOE R&D has been increasing in real terms for the past four years but remains below the funding levels of the early 1990s (see Figure 2).

National Science Foundation (NSF)

Congress provided NSF with a large increase in FY 2001 that many advocates in the science and engineering communities hope will be the

first installment of a plan to double the NSF budget over the next five years. The NSF budget for FY 2001 of $4.4 billion represents an increase of 13.3 percent or $519 million over FY 2000. NSF's R&D funding, which excludes NSF's education and training activities and overhead costs, totals $3.2 billion, an increase of $377 million or 13.2 percent (see Table 10).

When introducing his budget request in February, President Clinton made NSF the centerpiece of his budget for R&D, which placed a strong emphasis on achieving a better balance among science and engineering disciplines. Although a series of large increases for NIH has resulted in a pronounced emphasis on biomedical and life sciences research in recent years within the federal research portfolio, the FY 2001 budget proposed large increases for R&D programs in non-life sciences discplines. Because NSF is the only R&D funding agency responsible for the entire range of science and engineering disciplines, with a mission of supporting fundamental research and non-life sciences disciplines, the budget request singled out NSF for an unprecedented $675 million or 17.3 percent increase in its total budget with special attention to the agency's leading role in several multi-agency initiatives.

Congress provided less than the request, but the final NSF budget contains substantial increases for most NSF programs. The Research and Related Activities (R&RA) account, which funds most of NSF's R&D, receives $3.3 billion, 13.0 percent or $384 million above the FY 2000 funding level.

Two research directorates receive increases of approximately 20 percent. The big winner is the Computer and Information Science and Engineering (CISE) directorate, which receives $483 million for an increase of 24.5 percent. The appropriation should allow CISE to expand dramatically both its core research programs and its participation in the multi-agency information technology research (ITR) initiative, for which CISE funding jumps from $90 million to $215 million. Another big winner is the Social, Behavioral, and Economic Sciences (SBE) directorate, which receives $176 million for a boost of 20.6 percent. Congress directed SBE to start a Children's Research Initiative, with instructions for NSF to expand this effort in the FY 2002 budget request and in future years.

The Clinton Administration proposed a new Nanotechnology initiative in February, and Congress approved $150 million for NSF's leading role in the multi-agency effort, far above the FY 2000 comparable funding level of $97 million. The initiative aims to expand fundamental research in nanoscience and nanoengineering on manipulating objects at the molecular level to create machines or other structures with new properties and capabilities. Most of NSF's nanotechnology effort is funded through the Mathematical and Physical Sciences (MPS) directorate (up 11.4 percent to $844 million total) and Engineering (ENG; up 8.3 percent to $414 million).

The Major Research Equipment account, which funds construction of large-scale scientific facilities, receives $121 million, nearly a third more than FY 2000. This total includes $45 million in FY 2001 for the Terascale Computing Systems project, part of the ITR initiative. The FY 2000 budget provided $36 million to build an initial terascale (trillions of computing operations a second) computing site, while the FY 2001 appropriation provides funds for a second site. Research instrumentation and other small-scale scientific equipment is funded through the Major Research Instrumentation (MRI) program within the Integrative Activities account. The MRI program receives $75 million, $25 million more than FY 2000.

NSF's Education and Human Resources directorate receives $786 million, well above $691 million in FY 2000, including $75 million for the Experimental Program to Stimulate Competitive Research (EPSCoR; up from $60 million) and another $10 million for the Office of Innovation Partnerships. Both programs aim to improve the research competitiveness of 18 states (and Puerto Rico) and research institutions traditionally underrepresented as recipients of federal research funding.

The generous FY 2001 appropriation continues the recent trend of large increases for NSF (see Figure 2 and Table A). The NSF budget grew steadily in the 1980s and until FY 1995, but then stagnated and even declined because of severe budget pressures in the mid-1990s as the federal government restrained discretionary spending to achieve a balanced budget. NSF resumed its long-term growth trend after FY 1998, when the government entered the current age of surpluses. The FY 2001 increase brings the NSF budget to an all-time high in real terms.

The large increase for NSF may be the first year of an effort by NSF supporters to double the NSF budget in five years. Over the summer, several Senators led a so-far unsuccessful effort to commit Congress to that goal, patterning their effort after an informal commitment made three years ago by NIH supporters to double the NIH budget in five years, an effort that remains on track. The FY 2001 increase could be seen as the first installment of the doubling effort, but NSF appropriations will have to be decided annually by future Congresses and Presidents.

Other Agencies

The **U.S. Department of Agriculture** (USDA) funds agricultural research in universities and in its own laboratories, and forestry research through the Forest Service. Thanks to a windfall of congressionally designated projects and a last-minute decision to allow a new mandatory grants program to proceed, in FY 2001 USDA R&D totals $2.0 billion, a large boost of $190 million or 10.8 percent over the FY 2000 funding level (see Table 12).

Congress allowed two mandatory (non-appropriated) grants programs to spend their R&D funds after earlier attempts to cancel them. The Initiative for Future Agriculture and Food Systems (IFAFS) was created in June, 1998, as a mandatory program of $120 million a year for five years on competitively awarded grants for agricultural research, to be administered by USDA's Cooperative State Research, Education and Extension Service (CSREES). The Appropriations Committees were upset that this program, created by the House and Senate Agriculture Committees, would take some agricultural research spending decisions out of their jurisdictions, so they blocked USDA from spending the first $120 million installment of these funds in FY 1999. But because these funds were made available by law for two years, the FY 1999 money became available in FY 2000 and was distributed. Last year, Congress blocked the FY 2000 funds but again only for one year, so USDA anticipates that these FY 2000 funds will become available this year to fund the FY 2001 round of grants.

While the House would have blocked the program from spending any of its funds, the Senate would have blocked only the FY 2001 funds for a year, allowing USDA to spend its FY 2000 funds in FY 2001 as planned.

The final Agriculture spending bill takes the Senate position. (To reflect more accurately when the money will be spent, Table 12 shows $120 million in FY 1999 funds in the FY 2000 column and the FY 2000 funds in the FY 2001 columns.)

Similarly, the Fund for Rural America in the Office of the Secretary was reauthorized in June, 1998, for five years, but FY 1999 spending was blocked and became available in FY 2000. Congress blocked the FY 2001 funds, but allowed half the FY 2000 funds to be spent in FY 2001 and the other half in FY 2002. (Table 12 includes half the FY 2000 funds in the FY 2001 column to reflect more accurately when the money will be spent.)

While competitively awarded grants in the above two programs fare well in FY 2001, other competitively awarded research grants decline. CSREES also administers appropriated research grants programs. The National Research Initiative (NRI), the existing competitive research grants program IFAFS was designed to supplement, receives only $106 million, far below $119 million in FY 2000 and nearly a third below the $150 million request. Instead of competitively awarded grants, Congress directs funds toward Special Research Grants, which receive $85 million, $21 million or 33.6 percent more than FY 2000 and $79 million more than the request. These funds go to 170 itemized projects, nearly all of which are for geographically specific congressionally designated projects. There are also numerous other congressionally designated projects in other parts of the CSREES budget.

Agricultural Research Service (ARS) R&D totals $994 million in FY 2001, a substantial increase of 9.7 percent. ARS funds intramural research through a nationwide network of intramural laboratories and agricultural experiment stations.

Other R&D funding agencies within USDA include the Economic Research Service (ERS), a leading supporter of research in economics, particularly agricultural economics. ERS receives $67 million in FY 2001, an increase of $3 million. The Forest Service supports ecosystems and forestry research, and receives $237 million for its R&D in FY 2001, a boost of 12.4 percent.

Total R&D spending in the Office of the Secretary is $58 million in FY 2001, nearly six times the FY 2000 total of $10 million. In addition to the Fund for Rural America, the FY 2001 total includes $51 million in one-time appropriations for congressionally designated R&D projects that are part of a crop insurance bill signed into law in June.

The FY 2001 increase for USDA R&D continues a trend of increases over the past few years. USDA R&D peaked in FY 1992 and declined for several years before hitting a low in FY 1996 (see Table A). Since then, the funding trend has been generally upward. In FY 2000 and 2001, the release of IFAFS funds has allowed USDA to exceed its early 1990s funding levels.

Advocates of expanded agricultural research have called for USDA to boost its investments in agricultural R&D to meet the challenges of maintaining U.S. leadership in agriculture and ensuring food safety, but USDA has been stymied in its efforts to boost its competitively awarded research grants. NRI has never received more than $120 million a year despite the original vision of its authorizers in the 1990 Farm Act of a $500 million a year program. IFAFS was originally designed to increase spending on competitive grants, but the program has endured numerous congressional attempts to block its funding. The FY 2001 budget contains good news for IFAFS, but support for NRI still languishes.

The **Department of Commerce** receives $1.1 billion for its R&D in FY 2001, $38 million or 3.5 percent more than FY 2000 (see Table 11).

The National Institute of Standards and Technology (NIST) receives $419 million for its R&D activities in FY 2001, a cut of 8.5 percent because NIST's Construction of Research Facilities declines from $107 million to $35 million. NIST requested only $36 million because most of the FY 2000 funding was a one-time appropriation to fund the construction of a new Advanced Measurement Laboratory (AML) at NIST headquarters in Maryland. Congress funded most of the request, but diverted $14 million for congressionally designated projects.

Congress did not provide funds for a proposed Institute for Information Infrastructure Protection (IIIP), in contrast to a $50 million request out of which $44 million would have funded R&D. IIIP would have supported

research and technology development to protect critical information and telecommunications infrastructures from attack or other failures. Instead of IIIP, Congress allocated $5 million within NIST's intramural research account for infrastructure protection research.

NIST intramural laboratory research programs grow by 8.8 percent to $257 million for R&D in the Measurement and Standards Laboratories. R&D in the Advanced Technology Program (ATP) also grows, by 6.8 percent to $123 million. While this appropriation falls far short of the request, it is far better than the original House appropriation which would have eliminated the program. The House has repeatedly voted to terminate the program, but the Senate and the Clinton Administration have always managed to preserve it in final Commerce budgets.

The National Oceanic and Atmospheric Administration (NOAA) has an R&D budget of $638 million in FY 2001, an increase of $47 million or 8.0 percent over FY 2000. Congress boosted funding for NOAA's main R&D account, Oceanic and Atmospheric Research (OAR), from $301 million in FY 2000 to $323 million. Included is a boost in Climate and Air Quality Research from $130 million to $144 million.

The National Telecommunications and Information Administration (NTIA) increases its support of R&D from $20 million to $49 million, In addition to its support for telecommunications sciences research, NTIA nearly triples its support of Technology Opportunity Grants from $16 million to $46 million. These grants fund the development of innovative technology systems to provide the benefits of information technology to Americans in under-served communities.

The FY 2001 increase keeps Commerce R&D at a stable funding level after adjusting for inflation. Mostly because of strong Clinton Administration support for NIST programs, and secondarily because of bipartisan support for NOAA's R&D programs in the early 1990s, Commerce R&D in FY 2001 is nearly double the funding level of a decade ago (in inflation-adjusted terms; see Table A). Commerce is now one of seven agencies to fund more than $1 billion in R&D annually. However, Commerce R&D peaked in FY 1995 and has been up and down since then because partisan disagreements on the proper federal role in commercial technology have made ATP a contentious political issue, because Republican hostility toward some environmental R&D

programs have resulted in cuts to NOAA, and because tight discretionary spending caps have limited the pool of money available for NIST and NOAA.

The **Department of the Interior** has an R&D budget of $597 million in FY 2001, $24 million or 4.2 percent more than FY 2000 (see Table 14).

The U.S. Geological Survey (USGS) is the primary sponsor of R&D in Interior. Its total FY 2001 appropriation is $883 million, a substantial 8.5 percent increase over FY 2000 that nearly matches the President's request for $895 million. Nearly two-thirds of the USGS budget is for R&D activities, for a total of $543 million, a substantial increase of 8.1 percent over FY 2000.

USGS is one of the leading federal sponsors of earth sciences research, along with DOE, NSF, and NASA. Within the earth sciences, USGS is particularly important in geological hazards research, including research on earthquakes and volcanoes. The earth sciences program in USGS receives a 4.9 percent increase over the comparable amount in FY 2000. USGS is also a leading sponsor of water resources research, which receives a 1.9 percent increase, and biological research, which increases substantially by 14.1 percent to $156 million. Most of this research is conducted within Interior labs to address the science needs of Interior's other agencies, such as the Fish and Wildlife Service and the Bureau of Land Management.

The FY 2001 increase enables Interior R&D to stay just ahead of inflation. Interior R&D has declined sharply since FY 1994 (see Table A), primarily because of the elimination of the Bureau of Mines in FY 1996 and the merger of the National Biological Service into USGS. Since then, Interior R&D funding has been flat.

Congress approved $686 million in FY 2001 for the R&D activities of the **Environmental Protection Agency (EPA),** $39 million or 6.0 percent more than last year, in contrast to a requested cut (see Table 15). Congress approved a total EPA budget of $7.8 billion, a boost of $379 million or 5.1 percent over FY 2000.

EPA's final R&D total exceeds the request of $673 million, but Congress reduced the request for the transportation research program in the Climate Change Technology Initiative (CCTI) by $26 million down to $39 million, which still leaves funding well above $30 million in FY 2000. CCTI is a multi-agency initiative to address global warming through partnerships with locally based organizations, research on energy efficient technologies, and tax incentives for energy efficiency. Most of the increase in R&D funding over FY 2000 goes to more than 30 congressionally designated research projects, leaving most other EPA R&D programs with level funding.

In the overall EPA budget, Congress mostly stuck to EPA's priorities for FY 2001, except for a boost in funding for State and Tribal Assistance Grants. Although EPA requested a cut in this program from $3.4 billion to $2.9 billion, the final EPA spending bill provides $3.6 billion, a 5.1 percent boost over FY 2000. Most of this money goes to state and local governments, and is perennially more popular with Congress than EPA. For Environmental Programs and Management, which funds most of EPA's operating expenses, Congress appropriated $2.1 billion, a substantial 9.9 percent increase, partly because of more than 100 congressionally designated projects. Congress trimmed $78 million from the request for CCTI programs. Combined with CCTI R&D programs, total CCTI funding for FY 2001 is $123 million, up from $103 million in FY 2000 but little more than half the $227 million request.

The Superfund program stays even at $1.2 billion in FY 2001. Superfund continues to fund $37 million (down $1 million from FY 2000) in research on hazardous substances. The Superfund program traditionally transfers another part of its appropriation to the National Institute of Environmental Health Sciences (NIEHS, part of NIH) for activities including R&D, but Congress chose to appropriate these funds directly to NIEHS in FY 2001. (These funds are included in the NIH table (Table 8) rather than the EPA table (Table 15).)

The EPA research portfolio is balanced between the environmental sciences, the life sciences, and engineering research. Although EPA is the major environmental regulatory agency in the federal government, its R&D is primarily oriented toward its regulatory mission. Many other agencies (NOAA, NASA, Interior) fund environmental research related to their missions of research, resource stewardship, and economic

management of the natural environment, so EPA is a relatively small part of federal environmental R&D. Nearly half of EPA's R&D is performed in the agency's own laboratories, while about a third is performed in the nation's colleges and universities, a share that has been growing in recent years. The remainder is performed by industrial firms and nonprofit institutions.

EPA's R&D funding has been stagnant for the last few years following steady growth until FY 1994 (see Table A). After the 1994 elections when the Republican Party gained control of Congress, EPA's R&D budget declined sharply and bottomed out in FY 1996. EPA's R&D budget increased again after that but in FY 2001 is still barely above the FY 1994 funding level in inflation-adjusted terms.

The **Department of Transportation** (DOT) has an R&D budget of $701 million in FY 2001, a substantial boost of 15.5 percent or $94 million over FY 2000 (see Table 13). The large increase for DOT R&D mirrors the large increase to the total DOT budget, which rises by 15.4 percent or $7.7 billion to $58.0 billion thanks to guaranteed funding increases provided in recent highway and aviation authorization bills.

Transportation spending began rising dramatically in 1998 with the enactment of the Transportation Equity Act for the 21st Century (TEA-21). TEA-21, a six-year reauthorization bill for most highway and transit programs, dedicates all highway and transit trust fund receipts for transportation and creates two new categories of discretionary spending (highways and transit programs) for that purpose. Spending in these two categories is determined by receipts from transportation taxes and not by legislative limits.

Because transportation revenues have been rising and all these revenues are required to be spent on transportation, there are large budget increases for the two primary beneficiaries of TEA-21 spending, the Federal Highway Administration (FHWA; $33.4 billion, up 16.2 percent) and the Federal Transit Administration (FTA; $6.3 billion, up 8.2 percent). In FY 2001, the Federal Aviation Administration (FAA) receives an even larger percentage increase (up 19.9 percent to $12.0 billion) because the Aviation Investment and Reform Act for the 21st Century (AIR21) signed into law earlier this year provides TEA-21-like guarantees of increased

funding for FAA programs. Other DOT agencies, funded primarily from general funds, also do well in FY 2001 because most of them deal with transportation safety, a high priority for congressional appropriators.

FHWA's R&D programs receive $272 million, a gain of $15 million or 5.8 percent over FY 2000, mostly because of the guaranteed funding in TEA-21. The Administration's request was for $314 million. In the request, DOT had proposed to reallocate a portion of unexpected additional revenues from the highway trust fund toward uses not specified in TEA-21, including a significant diversion of funds to R&D. Congress rejected this proposal, and distributed all the additional revenue to the states according to the TEA-21 distribution formula, just as Congress rejected a similar proposal in 1999.

The Federal Aviation Administration (FAA), because of the increased guaranteed funding in AIR21, receives $292 million for R&D, a substantial boost of 29.3 percent. FAA's R&D, however, totaled over $300 million annually in the early 1990s until FY 1995, and then declined sharply due to budget cuts. The increase recovers some of the lost ground, and goes to research in areas such as aircraft safety technology, aging aircraft, system security

The majority of DOT's R&D is performed by intramural laboratories and industrial performers. Universities and colleges perform about a tenth of DOT's R&D, and a similar proportion is performed by state and local governments.

Although DOT wins a large increase in FY 2001, its support of R&D is still well below the levels of the mid-1990s in inflation-adjusted terms. DOT's R&D peaked in FY 1995 and then suffered a steep decline, particularly in the FAA, as a result of efforts to bring the federal budget into surplus (see Table A). The large increase, especially in FAA, helps to bring total DOT R&D back toward early 1990s funding levels.

Part II

Tables

Table 1. Total R&D by Agency

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Department of Defense (military)	39,282	38,576	**41,846**	3,270	8.5%	2,564	6.5%
("S&T" 6.1,6.2,6.3 + Medical)	*8,667*	*7,609*	***9,363***	*1,754*	*23.1%*	*696*	*8.0%*
(All Other DOD R&D)	*30,615*	*30,967*	***32,482***	*1,516*	*4.9%*	*1,868*	*6.1%*
National Aeronautics and Space Admin.	9,777	10,040	**10,298**	258	2.6%	521	5.3%
Department of Energy	7,117	7,639	**7,994**	355	4.7%	878	12.3%
Health and Human Services	18,082	19,168	**20,829**	1,661	8.7%	2,747	15.2%
(National Institutes of Health)	*17,102*	*18,094*	***19,597***	*1,503*	*8.3%*	*2,495*	*14.6%*
National Science Foundation	2,863	3,431	**3,240**	-190	-5.5%	377	13.2%
Department of Agriculture	1,763	1,824	**1,953**	129	7.1%	190	10.8%
Department of the Interior	573	590	**597**	7	1.2%	24	4.2%
Department of Transportation	606	778	**701**	-78	-10.0%	94	15.5%
Environmental Protection Agency	647	673	**686**	13	2.0%	39	6.0%
Department of Commerce	1,073	1,148	**1,111**	-37	-3.3%	38	3.5%
(NOAA)	*591*	*594*	***638***	*44*	*7.5%*	*47*	*8.0%*
(NIST)	*458*	*497*	***419***	*-78*	*-15.7%*	*-39*	*-8.5%*
Department of Education	233	271	**263**	-8	-2.9%	30	13.0%
Agency for International Development	122	98	**124**	26	26.6%	2	1.7%
Department of Veterans Affairs	655	655	**684**	29	4.5%	29	4.5%
Nuclear Regulatory Commission	53	53	**53**	0	-0.2%	0	-0.2%
Smithsonian Institution	113	122	**119**	-3	-2.3%	6	5.5%
Tennessee Valley Authority	33	32	**32**	0	0.0%	-1	-3.0%

(continued)

Table 1. (continued)

	FY 2000 Estimate	FY 2001 Request	Action by Congress: FY 2001 Approved	Chg. from Request: Amount	Chg. from Request: Percent	Chg. from FY 2000: Amount	Chg. from FY 2000: Percent
Corps of Engineers	53	42	**39**	-3	-7.1%	-14	-26.4%
Labor	71	42	**42**	0	0.0%	-29	-40.8%
Housing and Urban Development	45	62	**53**	-9	-13.9%	8	18.6%
Justice	77	74	**128**	54	73.4%	51	66.6%
U.S. Postal Service [1]	45	45	**45**	0	0.0%	0	0.0%
Social Security Administration	25	42	**30**	-12	-28.6%	5	20.0%
Treasury	6	6	**6**	0	0.0%	0	0.0%
All Other	21	17	**18**	1	4.1%	-3	-15.7%
TOTAL R&D	83,334	85,427	**90,891**	5,464	6.4%	7,557	9.1%
Defense R&D	42,583	41,981	**45,543**	3,562	8.5%	2,960	7.0%
Nondefense R&D	40,751	43,446	**45,348**	1,901	4.4%	4,597	11.3%
"21st Century Research Fund" [2]	40,028	42,918	**44,861**	1,943	4.5%	4,833	12.1%
"FS&T" [3]	51,975	53,702	**57,639**	3,937	7.3%	5,664	10.9%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2001 Approved figures are adiusted to reflect a 0.22 percent across-the-board cut to most discretionary programs.

[1] Financed out of postal revenues.

[2] An alternative measure of the federal investment in science and technology proposed by the Clinton Administration. Includes both R&D and non-R&D programs. Please see Appendix 1 for details.

[3] An alternative measure of the federal investment in science and technology proposed by the National Academy of Sciences. Please see Appendix 1 for details.

Table 2. Estimated Basic Research by Agency

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Health and Human Services	9,834	10,399	**11,255**	856	8.2%	1,422	14.5%
(National Institutes of Health)	*9,832*	*10,397*	***11,252***	*855*	*8.2%*	*1,421*	*14.5%*
National Science Foundation	2,492	2,987	**2,831**	-156	-5.2%	339	13.6%
Department of Defense ("6.1")	1,161	1,217	**1,310**	93	7.6%	149	12.8%
Department of Energy	2,237	2,376	**2,412**	37	1.6%	176	7.9%
National Aeronautics & Space Admin.	1,947	1,895	**1,981**	87	4.6%	35	1.8%
Department of Agriculture	692	740	**756**	16	2.1%	64	9.2%
Department of the Interior	61	63	**64**	1	2.0%	4	5.8%
Smithsonian Institution	102	108	**105**	-3	-2.5%	3	3.2%
Environmental Protection Agency	58	58	**62**	5	8.0%	4	7.3%
Department of Commerce	41	53	**51**	-2	-4.6%	10	25.1%
All Other	342	363	**378**	15	4.3%	36	10.7%
TOTAL Est. Basic Research	18,965	20,259	**21,207**	948	4.7%	2,242	11.8%

AAAS estimates of basic research based on FY 2001 appropriations bills and historical trends for agencies and programs.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2001 Approved figures adjusted to reflect 0.22 percent across-the-board cut for most discretionary programs.

Table 3. Major Functional Categories of R&D

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Defense [1]	42,583	41,981	**45,543**	3,562	8.5%	2,960	7.0%
Nondefense [2]	40,751	43,446	**45,348**	1,901	4.4%	4,597	11.3%
Space	8,746	9,106	**9,324**	218	2.4%	578	6.6%
Health	18,663	19,742	**21,422**	1,680	8.5%	2,759	14.8%
Energy	1,264	1,350	**1,381**	31	2.3%	117	9.3%
General Science	5,501	6,400	**6,241**	-159	-2.5%	740	13.5%
Natural Resources & Environment	2,076	2,136	**2,199**	63	2.9%	123	5.9%
Agriculture	1,552	1,587	**1,716**	129	8.1%	164	10.6%
Transportation	1,637	1,712	**1,675**	-38	-2.2%	37	2.3%
Commerce	481	553	**471**	-82	-14.8%	-10	-2.0%
International	142	114	**140**	26	22.9%	-2	-1.3%
All Other	690	746	**779**	33	4.5%	89	12.9%
TOTAL R&D	83,334	85,427	**90,891**	5,464	6.4%	7,557	9.1%

AAAS estimates of R&D in FY 2001 appropriations bills based on historical trends for agencies and programs.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

Includes conduct of R&D and R&D facilities. Classifications generally follow the government's budget function categories except health (which here includes health R&D in HHS and VA).

[1] Includes DOD R&D and atomic energy defense R&D in DOE.

[2] Includes all R&D not in defense (domestic and international discretionary programs).

Table 4. Department of Defense by Program
Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Research, Development, Test, and Evaluation:							
Basic Research ("6.1")	1,161	1,217	**1,310**	93	7.6%	149	12.8%
Applied Research ("6.2")	3,410	3,144	**3,673**	528	16.8%	262	7.7%
Advanced Tech. Development ("6.3")	3,826	3,182	**3,967**	785	24.7%	141	3.7%
TOTAL Science and Technology	8,397	7,543	**8,949**	1,406	18.6%	552	6.6%
Demonstration/Validation ("6.4")	6,524	6,810	**7,800**	991	14.5%	1,276	19.6%
Engineering and Manuf. Dev. ("6.5")	8,689	8,661	**8,641**	-20	-0.2%	-48	-0.6%
RDT&E Management Support ("6.6")	2,552	2,434	**2,614**	180	7.4%	62	2.4%
Operational Systems Dev. ("6.7")	12,188	12,415	**12,780**	366	2.9%	593	4.9%
BA Adjustment	68	1	**0**	--	--	--	--
TOTAL RDT&E	38,419	37,863	**40,785**	2,922	7.7%	2,366	6.2%
Other Appropriations [1]	655	647	**647**	0	0.0%	-8	-1.3%
Medical research [2]	270	66	**414**	348	527.4%	144	53.4%
TOTAL DOD R&D	39,344	38,576	**41,846**	3,270	8.5%	2,502	6.4%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities. All figures are rounded to the nearest million. Changes calculated from unrounded figures. FY 2001 Approved figures adjusted to reflect rescissions and general reductions.

[1] R&D support in military personnel, military construction, and other DOD appropriations.

[2] Medical research appropriated in Defense Health Programs, not RDT&E. These funds are not included in "6.2."

Table 5. Department of Defense by Agency

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Research, Development, Test, and Evaluation:							
Army	5,204	5,260	**6,242**	981	18.7%	1,038	19.9%
Navy	9,001	8,477	**9,372**	895	10.6%	371	4.1%
Air Force	14,487	13,686	**13,926**	241	1.8%	-561	-3.9%
Defense Agencies	9,431	10,238	**11,019**	780	7.6%	1,588	16.8%
(Defense Adv. Research Projects Agcy.)	*1,876*	*1,951*	***1,997***	*46*	*2.4%*	*121*	*6.4%*
(Ballistic Missile Defense Organization)	*3,428*	*3,943*	***4,195***	*252*	*6.4%*	*768*	*22.4%*
(Other)	*4,127*	*4,344*	***4,826***	*482*	*11.1%*	*699*	*16.9%*
Director of Test and Evaluation	265	0	**0**	0	- -	-265	-100.0%
Dir. of Operational Test & Evaluation	31	202	**227**	25	12.4%	196	630.8%
TOTAL RDT&E	38,419	37,863	**40,785**	2,922	7.7%	2,366	6.2%
Other Appropriations [1]	655	647	**647**	0	0.0%	-8	-1.3%
Medical research [2]	270	66	**414**	348	527.4%	144	53.4%
TOTAL DOD R&D	39,344	38,576	**41,846**	3,270	8.5%	2,502	6.4%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities. All figures are rounded to the nearest million. Changes calculated from unrounded figures. FY 2001 Approved figures adjusted to reflect rescissions and general reductions.

[1] R&D support in military personnel, military construction, and other DOD appropriations.

[2] Medical research appropriated in Defense Health Programs, not RDT&E.

Table 6. National Aeronautics and Space Administration

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Summary of R&D by Appropriation:							
1. Human Space Flight (HSF)							
Space Station	2,323	2,115	**2,110**	-5	-0.2%	-213	-9.2%
Other	10	20	**20**	0	0.0%	10	93.7%
Total R&D HSF	2,333	2,135	**2,130**	-5	-0.2%	-204	-8.7%
2. Science, Aeronautics, and Technology (SAT)							
Space Science	2,193	2,399	**2,483**	84	3.5%	290	13.2%
Life & Microgravity Sciences	275	302	**314**	11	3.7%	39	14.2%
Earth Science	1,443	1,406	**1,483**	77	5.5%	40	2.8%
Aeronautics and Space Transp.	1,125	1,193	**1,241**	48	4.0%	116	10.3%
Mission Communications Serv.	406	529	**524**	-6	-1.1%	118	28.9%
Academic Programs	139	100	**133**	33	32.9%	-6	-4.2%
Total R&D SAT	5,581	5,929	**6,177**	248	4.2%	596	10.7%
3. Mission Support R&D	1,862	1,976	**1,991**	15	0.7%	128	6.9%
TOTAL NASA R&D	9,777	10,040	**10,298**	258	2.6%	521	5.3%

(continued)

Table 6. (continued)

			Action by Congress				
	FY 2000 Estimate	FY 2001 Request	FY 2001 Approved	Chg. from Request Amount	Chg. from Request Percent	Chg. from FY 2000 Amount	Chg. from FY 2000 Percent
NASA Non-R&D Activities:							
Space Shuttle (in HSF)	2,980	3,166	**3,132**	-34	-1.1%	152	5.1%
Other Non-R&D in HSF	155	200	**189**	-10	-5.2%	34	22.3%
Mission Support Non-R&D	670	608	**612**	4	0.7%	-58	-8.6%
Inspector General	20	22	**23**	1	4.3%	3	14.7%
Total NASA Non-R&D Activities	3,824	3,995	**3,956**	-39	-1.0%	132	3.5%
TOTAL NASA Budget	13,601	14,035	**14,254**	219	1.6%	653	4.8%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2001 Approved figures are adjusted to reflect an across-the-board cut.

Table 7. Department of Energy
Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
DOE Appropriations Containing R&D:							
1. Energy Supply R&D	364	468	**444**	-24	-5.1%	80	21.9%
2. Fossil Energy R&D	328	293	**339**	46	15.7%	11	3.4%
3. Energy Conservation	431	465	**458**	-6	-1.3%	27	6.3%
4. Science	2,638	2,969	**3,001**	31	1.1%	363	13.8%
5. Atomic Energy Defense Activities	3,301	3,405	**3,697**	293	8.6%	396	12.0%
6. Clean Coal Technology [1]	0	0	**0**	0	- -	0	- -
7. Radioactive Waste Management	55	40	**55**	15	38.8%	0	0.0%
TOTAL DOE R&D	7,117	7,639	**7,994**	355	4.7%	878	12.3%
Detail of selected appropriations:							
1. Energy Supply R&D							
Solar and Renewables	272	376	**344**	-32	-8.4%	72	26.3%
Nuclear Energy	92	92	**100**	8	8.4%	8	8.7%
TOTAL Energy Supply	364	468	**444**	-24	-5.1%	80	21.9%
4. Science							
High Energy Physics	693	704	**707**	3	0.4%	15	2.1%
Nuclear Physics	348	364	**359**	-5	-1.3%	12	3.3%

(continued)

Table 7. (continued)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Fusion Energy Sciences	245	244	**249**	5	1.9%	4	1.6%
Advanced Scientific Computing Research	128	182	**168**	-14	-7.8%	40	31.2%
Bio. and Environmental Research	433	444	**494**	50	11.2%	61	14.1%
Basic Energy Sciences	772	1,008	**1,000**	-7	-0.7%	229	29.7%
(Spallation Neutron Source)	*118*	*281*	***279***	*-2*	*-0.9%*	*161*	*136.3%*
Energy Research Analyses	1	1	**1**	0	-1.3%	0	-0.4%
Multiprogram Lab Support	19	22	**22**	0	-0.2%	3	15.3%
TOTAL Science	2,638	2,969	**3,001**	31	1.1%	363	13.8%
5. Atomic Energy Defense Activities							
National Nuclear Security Administration (NNSA) [2]							
Naval Reactors	655	656	**667**	11	1.7%	13	2.0%
Weapons Activities	2,201	2,273	**2,502**	230	10.1%	301	13.7%
(Nat'l Ignition Facility Construction)	*247*	*74*	***199***	*125*	*168.1%*	*-48*	*-19.6%*
Nonproliferation & Verification R&D	183	191	**207**	16	8.3%	24	13.0%
Fissile Materials Disposition	63	71	**71**	0	0.0%	9	13.7%
Total NNSA R&D [2]	3,101	3,191	**3,448**	257	8.0%	347	11.2%
Nuclear Safeguards and Security	27	26	**26**	0	-0.2%	-2	-5.7%
Intelligence	5	5	**5**	0	0.0%	0	0.0%
Environmental Management	167	182	**218**	36	19.8%	51	30.7%
TOTAL Atomic Defense R&D	3,301	3,405	**3,697**	293	8.6%	396	12.0%

Table 7. (continued)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
DOE R&D by Budget Function:							
Defense	3,301	3,405	**3,697**	293	8.6%	396	12.0%
General Science	2,638	2,969	**3,001**	31	1.1%	363	13.8%
Energy	1,178	1,265	**1,296**	31	2.5%	118	10.0%
DOE "FS&T" [3]	6,372	6,881	**7,225**	344	5.0%	853	13.4%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2001 Approved figures adjusted to reflect general reductions in Science and Atomic Energy Defense accounts, and a 0.22 percent across-the-board reduction for all accounts.

[1] Budget authority is negative for some years because of enacted or proposed deferrals of previously appropriated funds. Table does not reflect enacted or proposed deferrals. FY 2001 deferral is $67 million.

[2] New semi-autonomous agency within DOE. FY 2000 figures adjusted for comparability with new account structure.

[3] An alternative measure of the federal investment in science and technology proposed by the National Academy of Sciences. Please see Appendix 1 for details.

Table 7a. Department of Energy Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Weapons Activities (NNSA)	4,321	4,594	**5,004**	410	8.9%	683	15.8%
Other NNSA Activities	1,375	1,584	**1,571**	-13	-0.8%	196	14.2%
Defense Environmental Restoration	4,466	4,552	**4,964**	412	9.1%	498	11.2%
Nuclear Waste and Other Defense	1,827	2,196	**1,961**	-236	-10.7%	134	7.3%
Total DOE defense	11,988	12,926	**13,499**	574	4.4%	1,511	12.6%
Science	2,815	3,151	**3,180**	29	0.9%	366	13.0%
Energy Supply	643	765	**660**	-105	-13.7%	17	2.7%
Fossil Energy	404	376	**433**	57	15.2%	29	7.1%
Energy Conservation	759	851	**813**	-37	-4.4%	55	7.2%
Other Energy Programs	298	472	**439**	-33	-7.0%	141	47.4%
Nondefense Environmental Mngmt.	307	286	**277**	-9	-3.1%	-30	-9.8%
Power Marketing Administrations	230	200	**200**	0	0.2%	-30	-13.2%
Departmental Administration	110	118	**106**	-11	-9.5%	-3	-2.9%
Total DOE Budget	17,553	19,142	**19,608**	466	2.4%	2,055	11.7%

Source: Department of Energy budget justification and FY 2001 appropriations bills.

DOE appropriations only (does not include offsets and other mandatory).

Includes R&D and non-R&D programs. FY 2001 Approved figures are adjusted to reflect a 0.22 percent across-the-board cut.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

Excludes deferrals of funds in Clean Coal Technology and other deferrals. FY 2001 CCT deferral is $67 million.

Table 8. National Institutes of Health
Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Cancer	3,312	3,505	**3,757**	252	7.2%	446	13.5%
Heart, Lung and Blood	2,026	2,137	**2,300**	163	7.6%	273	13.5%
Dental and Cranofacial Research	269	284	**306**	22	7.8%	37	13.8%
Diabetes, Digestive and Kidney	1,141	1,209	**1,303**	94	7.8%	162	14.2%
Neurological Disorders and Stroke	1,030	1,085	**1,176**	92	8.4%	147	14.3%
Allergy and Infectious Diseases	1,797	1,906	**2,043**	137	7.2%	247	13.7%
General Medical Sciences	1,354	1,428	**1,536**	108	7.5%	182	13.4%
Child Health & Human Development	859	905	**976**	72	7.9%	117	13.6%
Eye	450	474	**511**	37	7.7%	61	13.4%
Environmental Health Sciences [1]	443	469	**566**	97	20.7%	123	27.8%
Aging	688	726	**786**	60	8.3%	98	14.3%
Arthritis & Musculoskeletal & Skin	349	369	**397**	28	7.6%	47	13.5%
Deafness and Comm. Disorders	264	278	**301**	23	8.1%	37	14.0%
Mental Health	975	1,031	**1,107**	76	7.3%	132	13.6%
Drug Abuse	687	725	**781**	56	7.7%	94	13.7%
Alcoholism and Alcohol Abuse	293	309	**341**	32	10.4%	47	16.2%
Nursing Research	90	93	**104**	12	12.8%	15	16.6%
Research Resources	675	714	**817**	103	14.5%	142	21.1%
Human Genome Research	336	358	**382**	25	6.9%	47	13.9%
Fogarty International Center	43	48	**51**	3	5.2%	7	16.6%

(continued)

Table 8. (continued)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
National Library of Medicine	215	230	**247**	17	7.2%	32	14.7%
Office of the Director	282	309	**214**	-95	-30.9%	-68	-24.3%
Office of AIDS Research [2]	0	[2,111]	**0**	- -	- -	- -	- -
Buildings and Facilities [3]	165	149	**154**	5	3.3%	-12	-7.0%
Complementary and Alternative Medicine	69	72	**89**	17	23.2%	20	29.3%
Minority Health and Health Disparities [4]	0	0	**130**	130	- -	130	- -
TOTAL NIH Budget	17,813	18,813	**20,376**	1,563	8.3%	2,563	14.4%
Subtract:							
Estimated Research Training	*550*	*564*	***611***	*47*	*8.3%*	*60*	*11.0%*
Other Non-R&D	*161*	*155*	***168***	*13*	*8.3%*	*7*	*4.4%*
TOTAL NIH R&D	17,102	18,094	**19,597**	1,503	8.3%	2,495	14.6%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

[1] FY 2001 Approved includes $63 million appropriated to NIEHS in the VA-HUD bill.

[2] The FY 2001 request consolidates NIH-wide AIDS research into the Office of AIDS Research ($2.1 bil.). FY 2001 request figures adjusted for comparability with FY 2000 and FY 2001 Approved figures, which distribute AIDS funds among the institutes.

[3] FY 2000 includes advance appropriation of $40 million. FY 2001 figures do not include $26 million advance appropriation requested but not granted for FY 2002.

[4] New institute for FY 2001 created by Public Law 106-525. Comparable FY 2000 and FY 2001 request funding is in Office of the Director. Another new institute, the National Institute of Biomedical Imaging and Bioengineering, was created in December, 2000. FY 2001 funding will be transferred from other institutes' budgets.

Table 9. Department of Health and Human Services
Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
National Institutes of Health	17,102	18,094	**19,597**	1,503	8.3%	2,495	14.6%
Centers for Disease Control	477	518	**585**	67	13.0%	108	22.7%
Food and Drug Administration	135	146	**140**	-6	-4.3%	5	3.4%
Health Care Financing Admin.	61	55	**89**	34	62.4%	28	46.4%
Health Resources & Services Admin.	15	15	**47**	32	213.3%	32	213.3%
Healthcare Research and Quality [1]	168	209	**229**	20	9.6%	61	36.4%
Admin. for Children & Families	41	43	**51**	8	19.6%	10	25.4%
Office of Aging	33	38	**40**	2	4.6%	7	20.4%
Departmental Administration	50	50	**50**	0	0.0%	0	0.0%
TOTAL HHS R&D	18,082	19,168	**20,829**	1,661	8.7%	2,747	15.2%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

[1] Formerly the Agency for Health Care Policy and Research.

Table 10. National Science Foundation

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Research and Related Activities [1] :							
Mathematical and Physical Sciences	758	881	**844**	-37	-4.2%	86	11.4%
Engineering	382	457	**414**	-43	-9.4%	32	8.3%
Biological Sciences	414	511	**476**	-35	-6.8%	62	14.9%
Geosciences	488	583	**556**	-27	-4.7%	68	13.9%
Computer and Info. Science and Eng.	388	529	**483**	-46	-8.6%	95	24.5%
Social, Behavioral and Econ. Scis.	146	175	**176**	1	0.7%	30	20.6%
US Polar Programs	253	285	**282**	-3	-1.1%	29	11.6%
Integrative Activities	129	119	**111**	-8	-6.9%	-18	-14.1%
Total Research and Related Activities [1]	2,958	3,541	**3,343**	-198	-5.6%	384	13.0%
Major Research Equipment	94	139	**121**	-17	-12.4%	28	29.8%
Education and Human Res. R&D	121	110	**118**	9	7.8%	-2	-1.9%
Subtract Non-R&D in R&RA [1]	*-309*	*-358*	***-342***	*17*	*-4.6%*	*-32*	*10.5%*
TOTAL NSF R&D	2,863	3,431	**3,240**	-190	-5.5%	377	13.2%

(continued)

Table 10. (continued)

	FY 2000 Estimate	FY 2001 Request	Action by Congress: FY 2001 Approved	Chg. from Request: Amount	Chg. from Request: Percent	Chg. from FY 2000: Amount	Chg. from FY 2000: Percent
Non-R&D Programs and Activities:							
Non-R&D in R&RA [1]	309	358	**342**	-17	-4.6%	32	10.5%
Other Education and Human Res.	570	619	**667**	48	7.8%	97	17.0%
Salaries and Expenses	149	158	**161**	3	1.7%	12	7.8%
Inspector General	5	6	**6**	0	-0.2%	1	15.0%
Total NSF Non-R&D Activities	1,034	1,142	**1,176**	34	3.0%	142	13.7%
TOTAL NSF Budget	3,897	4,572	**4,416**	-156	-3.4%	519	13.3%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2001 Approved figures are adjusted to reflect an across-the-board cut.

[1] R&RA funds are not appropriated by directorate. The FY 2001 Approved directorate figures are AAAS estimates based on language in the FY 2001 appropriations bill.

Table 11. Department of Commerce
Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
National Oceanic and Atmospheric Administration (NOAA):							
TOTAL NOAA R&D	591	594	**638**	44	7.5%	47	8.0%
National Institute of Standards and Technology (NIST):							
Scientific & Technical Research	236	269	**257**	-12	-4.6%	21	8.8%
Advanced Technology Program R&D	115	148	**123**	-25	-17.1%	8	6.8%
IIIP [1]	0	44	**5**	-39	-89.7%	5	- -
Construction	107	36	**35**	-1	-3.0%	-72	-67.4%
TOTAL NIST R&D	458	497	**419**	-78	-15.7%	-39	-8.5%
(STRS, ATP Non-R&D Activities)	*74*	*94*	***73***	*-21*	*-22.1%*	*-1*	*-0.7%*
(Manufacturing Extension Partnership)	*104*	*114*	***105***	*-9*	*-8.1%*	*1*	*0.7%*
(Total NIST Budget)	*636*	*705*	***597***	*-108*	*-15.3%*	*-39*	*-6.1%*
Technology Administration	1	1	**1**	0	0.0%	0	0.0%
Bureau of the Census	2	2	**2**	0	0.0%	0	0.0%
National Telecomm. and Info. Admin.	20	53	**49**	-4	-6.8%	29	147.0%
Economic Development Administration	1	1	**1**	0	0.0%	0	0.0%
TOTAL Commerce R&D	1,073	1,148	**1,111**	-37	-3.3%	38	3.5%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities. All figures are rounded to the nearest million. Changes calculated from unrounded figures. FY 2001 Approved figures adjusted to reflect across-the-board cut.

[1] Institute for Information Infrastructure Protection. FY 2001 Approved represents information infrastructure R&D in STRS.

Table 12. Department of Agriculture

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Agricultural Research Service (ARS)							
Programs [1]	853	917	**920**	3	0.3%	67	7.8%
Buildings and Facilities	53	39	**74**	35	89.8%	21	39.7%
Total ARS R&D	906	956	**994**	38	4.0%	88	9.7%
Cooperative State Research, Education and Extension Service (CSREES):							
Total CSREES R&D	538	523	**559**	36	7.0%	21	4.0%
(National Research Initiative)	*119*	*150*	***106***	*-44*	*-29.5%*	*-13*	*-11.1%*
(Special Research Grants)	*64*	*6*	***85***	*79*	*1236.9%*	*21*	*33.6%*
(Initiative for Future Agri. [2])	*120*	*120*	***120***	*0*	*0.0%*	*0*	*0.0%*
(CSREES Non-R&D Programs)	*528*	*562*	***540***	*-22*	*-4.0%*	*12*	*2.4%*
(Total CSREES Budget)	*1,066*	*1,085*	***1,099***	*14*	*1.3%*	*34*	*3.2%*
Forest Service	211	237	**237**	0	0.0%	26	12.4%
Economic Research Service	64	55	**67**	12	21.6%	3	4.5%
Agricultural Marketing Service	5	6	**6**	0	-2.5%	1	17.0%

(continued)

Table 12. (continued)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Foreign Agricultural Service	1	1	**1**	0	0.0%	0	0.0%
Nat'l Agricultural Statistics Service	4	4	**4**	0	0.0%	0	0.0%
Grain Inspection	3	6	**6**	0	0.0%	3	100.0%
Animal & Plant Inspection Service	21	21	**21**	0	0.0%	0	0.0%
Office of the Secretary [3]	10	15	**58**	43	286.7%	48	480.0%
Total USDA R&D	1,763	1,824	**1,953**	129	7.1%	190	10.8%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2001 Approved figures adjusted to reflect across-the-board cut.

[1] Includes spending from trust funds.

[2] Mandatory (non-appropriated) program of competitive grants for agricultural research.

[3] Fund for Rural America, a mandatory program.
FY 2001 Approved includes $50.5 million in R&D appropriations enacted in Public Law 106-224.

Table 13. Department of Transportation
Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Federal Aviation Administration	226	284	**292**	8	2.9%	66	29.3%
Federal Highway Administration	257	314	**272**	-42	-13.5%	15	5.8%
Federal Transit Administration	17	14	**14**	0	-0.2%	-3	-17.1%
Nat'l Highway Traffic Safety Admin.	51	95	**58**	-38	-39.6%	7	13.8%
Federal Railroad Administration	25	29	**28**	-2	-5.2%	3	11.7%
Coast Guard	20	23	**22**	0	-0.2%	2	11.3%
Research and Special Programs	7	13	**11**	-3	-18.7%	4	54.0%
Office of the Secretary	3	5	**3**	-2	-32.5%	0	0.0%
Total DOT R&D	606	778	**701**	-78	-10.0%	94	15.5%
DOT Budget (includes R&D components):							
Federal Aviation Administration	9,997	11,222	**11,983**	761	6.8%	1,985	19.9%
Federal Highway Administration	28,727	30,358	**33,373**	3,014	9.9%	4,646	16.2%
Federal Transit Administration	5,785	6,321	**6,257**	-64	-1.0%	472	8.2%
Coast Guard	4,022	4,609	**4,509**	-100	-2.2%	487	12.1%
Federal Railroad Administration	735	1,056	**724**	-332	-31.4%	-11	-1.5%
All Other	989	1,186	**1,143**	-43	-3.6%	154	15.6%
Total DOT Budget	50,255	54,751	**57,989**	3,238	5.9%	7,734	15.4%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities. FY 2001 Approved figures adjusted to reflect across-the-board cut. Figures rounded to the nearest million. Changes calculated from unrounded figures.

DOT figures include budget authority (regular and emergency), limitations on obligations, and other budgetary resources.

Table 14. Department of the Interior

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
U.S. Geological Survey:							
Surveys, Investigations, and Research (SIR):							
National Mapping	23	38	**31**	-6	-16.9%	9	37.7%
Geologic Resources	211	218	**222**	4	1.8%	10	4.9%
Water Resources	131	132	**133**	1	1.0%	2	1.9%
Biological Research	137	151	**156**	5	3.6%	19	14.1%
Total USGS R&D	502	539	**543**	4	0.8%	41	8.1%
(USGS Non-R&D SIR Acitivities)	*312*	*357*	***340***	*-17*	*-4.7%*	*29*	*9.2%*
(Total USGS SIR Budget)	*813*	*895*	***883***	*-13*	*-1.4%*	*69*	*8.5%*
Bureau of Reclamation	5	6	**7**	1	16.7%	2	40.0%
National Park Service	31	31	**31**	0	0.0%	0	0.0%
Bureau of Land Management	3	3	**3**	0	0.0%	0	0.0%
Minerals Management Service	32	11	**13**	2	18.2%	-19	-59.4%
TOTAL Interior R&D	573	590	**597**	7	1.2%	24	4.2%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2001 Approved figures include emergency and supplemental appropriations, and are adjusted to reflect an across-the-board cut.

Table 15. Environmental Protection Agency

Congressional Action on R&D in the FY 2001 Budget (budget authority in millions of dollars)

			Action by Congress				
	FY 2000	FY 2001	FY 2001	Chg. from Request		Chg. from FY 2000	
	Estimate	Request	Approved	Amount	Percent	Amount	Percent
Science and Technology [1]	497	493	**537**	44	8.9%	41	8.2%
Superfund	38	36	**36**	1	1.7%	-1	-3.9%
Leaking Underground Storage Tanks	1	1	**1**	0	-14.3%	0	0.0%
Oil Spill Response	1	1	**1**	0	-10.0%	0	0.0%
Other R&D Support Costs	111	142	**111**	-31	-22.0%	0	0.0%
TOTAL EPA R&D	647	673	**686**	13	2.0%	39	6.0%
EPA Budget:							
Science and Technology (incl. non-R&D) [2]	681	710	**732**	22	3.1%	51	7.5%
Environ. Progs. and Management	1,895	2,099	**2,083**	-16	-0.7%	188	9.9%
Superfund [2]	1,232	1,302	**1,231**	-71	-5.4%	-1	-0.1%
State and Tribal Assistance Grants	3,446	2,907	**3,621**	714	24.6%	175	5.1%
Buildings and Facilities	62	24	**24**	0	-0.5%	-38	-61.5%
Leaking Underground Storage Tanks	70	72	**72**	0	-0.1%	2	2.8%
Oil Spill Response	15	16	**15**	-1	-6.5%	0	-0.2%
Inspector General	32	34	**34**	0	0.1%	2	6.3%
TOTAL EPA Budget	7,433	7,163	**7,812**	648	9.0%	379	5.1%

AAAS estimates of R&D in FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities. FY 2001 Approved adjusted to reflect across-the-board and supplementals. All figures are rounded to the nearest million. Changes calculated from unrounded figures.

[1] Does not include transfers from Superfund.

[2] Transfers from Superfund to S&T account recorded under S&T. All figures exclude funds ($138 million in FY 2001) appropriated directly or transferred to NIEHS (in NIH) and Agency for Toxic Substances and Disease Registry.

Part III

Appendices

Appendix 1:
Methodology and Data Sources

Within the federal budget there is no separately identified R&D budget as such; nor are most appropriations for R&D so labeled except for certain program areas, such as defense. Consequently, most funds for R&D are not line items in an agency's budget but are included within general program funding. The Office of Management and Budget (OMB) requires agencies whose annual R&D funding is greater than $10 million to submit data on their R&D programs as part of their annual budget submissions. Specifically, the agencies provide data (reported on MAX Schedule C as part of the budget process) on funding levels for basic research, applied research, development, R&D facilities, and R&D support to universities and colleges (see Appendix 2: Definitions). However, agencies differ in their reporting. For example, some agencies classify program direction or management support as R&D; others do not.

In the data tables, the columns "FY 2000 Estimate" and "FY 2001 Request" represent the agencies' best estimates of actual and proposed federal funding for R&D collected during the winter and spring by OMB and AAAS. These figures incorporate information provided to OMB by 26 agencies accounting for more than 99 percent of all federal R&D and information collected by AAAS from individual agencies after the budget is prepared. Some adjustments to these figures have been made during 2000 to reflect agency revisions, supplemental appropriations, and rescissions. "FY 2001 Approved" figures are AAAS estimates of R&D contained in FY 2001 appropriations bills and their accompanying committee reports as approved by Congress and signed by the President in the fall of 2000, and reflect rescissions and emergency supplementals (including contingent emergency appropriations) enacted at that time. For FY 2001, they also reflect a 0.22 percent across-the-board cut to most discretionary programs; the cut has been distributed proportionately.

Due to rounding in the tables, the detail may not add to the totals, and the percentage changes may not correspond to the difference shown. Most figures are rounded to the nearest million; totals and changes are calculated from unrounded figures. In the tables, subtotals are occasionally provided for additional detail. These subtotals are shown in italics to indicate that they do not add into the totals.

Special Note on Tables 1 and 7. "FS&T" refers to an alternative measure of the federal investment in science and technology developed by the National Academy of Sciences in its 1995 report *Allocating Federal Funds for Science and Technology* (National Academy Press, Washington DC, 1995). "FS&T" is defined in the report as a subset of total federal R&D. (Since the release of the report, the Academy has revised its original definition of "FS&T". The tables reflect these revisions.) "FS&T" excludes advanced development, testing and evaluation work in DOD and DOE. In DOD, "FS&T" excludes R&D funding in the "6.4" through "6.7" categories, and R&D in non-RDT&E accounts. In DOE, "FS&T" excludes the Naval Reactors program and testing and readiness components of Weapons Activities.

Special Note on Table 1. "The 21st Century Research Fund" refers to an alternative measure of the federal investment in science and technology proposed by the Clinton Administration in 1999. The Fund is a collection of selected R&D and non-R&D programs with a science and technology-oriented mission. There is no formal definition for the Fund; the programs in the Fund do not correspond to definitions of R&D.

Special Note on Table 2. Basic Research by Agency. Most R&D programs contain a mix of basic research, applied research, and development. Agencies determine what proportion of a program's R&D is basic research. "FY 2001 Approved" figures for basic research are AAAS estimates of basic research contained in FY 2001 appropriations bills as approved by Congress and signed by the President in the fall of 2000, based on historical trends in basic research and agency budget documents.

Special Note on Table 3. Major Functional Categories of R&D. All activities in the federal budget are classified into 20 broad functional categories. (AAAS separates the general science, space, and technology function into its subfunctions of General Science and Space). Each function often includes programs from several agencies. Each R&D program is assigned to only one function, even though the R&D activity may address several functional concerns.

Appendix 2:
Definitions

In this report, R&D refers to actual research and development activities as well as R&D facilities. These definitions are used by the Office of Management and Budget, the National Science Foundation, and AAAS.

Research is systematic study directed toward more complete scientific knowledge or understanding of the subject studied. The federal government classifies research as either basic or applied according to the objective of the sponsoring agency.

- In **basic research** the objective is to gain knowledge or understanding of phenomena without specific applications in mind.

- In **applied research** the objective is to gain knowledge or understanding necessary for meeting a specific need.

Development is the systematic use of the knowledge or understanding gained from research directed toward the production of materials; devices; systems; or methods, including design, development, and improvement of prototypes and new processes. It excludes quality control, routine product testing, and production.

R&D funding normally includes those personnel, program supervision, and administrative support costs directly associated with R&D activities. Laboratory equipment is also included. Defense R&D also includes testing, evaluation, prototype development, and other activities which precede actual production.

Funding for **R&D facilities** includes construction, repair, or alteration of physical plant (*e.g.*, reactors, wind tunnels, particle accelerators, or laboratories) used in the conduct of R&D.

The federal R&D funding data in this report are presented in terms of **budget authority**. Budget authority is the initial budget parameter for congressional action on the President's proposed budget. Other R&D data sources may express R&D funding in terms of obligations or

outlays. There are also R&D data sources which obtain funding data from funding **recipients** (companies, universities) rather than from funding **sources** (agencies).

Budget authority is the legal authorization to expend funds.

Obligations represent orders placed, contracts awarded, services received, and similar transactions during a given period, regardless of when the funds were appropriated and when the future payment of money is required.

Outlays represent checks issued and cash payments made during a given period, regardless of when the funds were appropriated or obligated. Some surveys refer to outlays as expenditures.

As an example, Congress may appropriate $100 million to NASA in FY 1999 for an R&D laboratory. NASA may then issue contracts to build the lab and sign $50 million of the contracts in FY 1999 and $50 million in FY 2000. Upon completion of the lab in FY 2001, NASA may then write checks to the contractors for a total of $100 million. Budget authority would be $100 million in FY 1999; obligations would be split $50 million each in FY 1999 and FY 2000; outlays would be $100 million in FY 2001. In the federal budget process, there is normally a lag between budget authority and outlays for large capital projects and research contracts; budget authority and outlays usually occur in the same year for recurring expenses such as staff salaries.

(Definitions adapted from National Science Foundation, *Federal R&D Funding by Budget Function: Fiscal Years 1999-2001*, Arlington, VA, 2000.)

Appendix 3:
Related Publications

AAAS Report XXV: Research and Development FY 2001, Intersociety Working Group, 2000. $19.95; $15.96 for AAAS members. AAAS Publication Number: 00-02S. (Companion to this volume, a comprehensive analysis of the President's proposed budget for R&D for FY 2001 by agency, issue area, and discipline. The full text is available on line on the AAAS R&D Web site.)

AAAS Science and Technology Policy Yearbook 2000, Albert H. Teich, Stephen D. Nelson, Celia McEnaney, Tina Drake, editors, 2000. $24.95; $19.95 for AAAS members. AAAS Publication Number 00-03S. (A collection of writings on the major science and technology policy issues of 1999 including selections from the proceedings of the 24th Annual AAAS Colloquium on Science and Technology Policy. The full text is also available on line on the AAAS R&D Web site.)

Working with Congress: A Practical Guide for Scientists and Engineers, Second Edition, William G. Wells, Jr., 1996. AAAS Publication Number: 96-2S. $15.95; $12.76 for AAAS members.

The above publications may be ordered from the AAAS Distribution Center. Please add $4.00 for postage and handling per order. Orders must be prepaid by check or accompanied by purchase order payable to AAAS. Address: AAAS Distribution Center, P.O. Box 521, Annapolis Junction, MD 20701. For VISA / Mastercard orders call 1-800-222-7809 (8:30 AM - 5:00 PM ET). Fax orders to 301-206-9789. For shipments to CA and DC, add applicable sales tax. For shipments to Canada, add the GST. Please allow 2-3 weeks for delivery.

AAAS World Wide Web Site

Updated information on federal funding for R&D, including the **complete text of this book, detailed agency analyses, revised historical tables, and supplementary materials**, is available on the AAAS R&D Budget and Policy Program home page at:
http://www.aaas.org/spp/R&D

Further information on the activities and publications of the AAAS Directorate for Science and Policy Programs is available on the AAAS Web site at:
http://www.aaas.org/spp/