

A Preview of
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Research and Development FY 2002

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This document, ordering information for *AAAS Report XXVI*, the full text of *AAAS Report XXVI*, detailed agency materials, and supplemental data and charts on federal funding for R&D are available on the World Wide Web at:

<http://www.aaas.org/spp/R&D>

This analysis is a preview of *AAAS Report XXVI: R&D FY 2002*, a comprehensive analysis of R&D in the FY 2002 budget produced by AAAS in collaboration with 23 other science and engineering societies. The 280-page book will be available in mid-June in print and on the AAAS R&D Web site.

(This AAAS analysis supersedes previous preliminary analyses of R&D in the FY 2002 budget. It contains **revised AAAS estimates of R&D**, based on agency data obtained after the release of the President’s budget; DOD and summary data will be revised again when the Department of Defense releases its revised FY 2002 budget request)

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Highlights

On April 9, President Bush released a fiscal year (FY) 2002 budget request containing overall increases for the federal investment in research and development (R&D), but cuts in most of the major R&D funding agencies. The budget calls for tax cuts totaling \$1.6 trillion over ten years, an extra \$153 billion over ten years for Medicare, a reserve for unanticipated needs, and the retirement of \$2.0 trillion in publicly held debt over ten years. These proposals, however, leave little room for increases in discretionary spending.

Discretionary spending, the one-third of the budget subject to annual appropriations decisions by Congress and the President, is the part of the budget out of which nearly all federal R&D is funded. The Bush budget calls for discretionary spending to rise 4.0 percent or \$26 billion in FY 2002 to \$661 billion. But the entire increase would go just to the top priorities of the Department of Defense (DOD), the Department of Education, the National Institutes of Health (NIH), and a reserve for emergencies, leaving all other discretionary programs, including most federal R&D programs, with flat or declining funding overall. (References in *italics* are to chapters in the full report.)

- Because DOD and NIH are the two largest funding sources of federal R&D, the special treatment given to them in the budget would allow total federal R&D to increase in FY 2002. The request for **total federal R&D** in FY 2002 is a record \$96.5 billion, \$5.6 billion or 6.1 percent more than FY 2001 (see Table 1). The expected rate of inflation is 2.1 percent.
- The proposed increases for DOD (\$3.6 billion) and NIH (\$2.7 billion) would be more than the overall \$5.6 billion increase, leaving all other R&D funding agencies combined with less money than in FY 2001. **Six of the 11 largest R&D funding agencies would see their R&D decline in FY 2002** (see Figure 1, next page). NIH, DOD, the Department of Transportation (DOT), the National Aeronautics and Space Administration (NASA), and the Department of Veterans Affairs (VA) would see increases, but the National Science Foundation (NSF), the Environmental Protection Agency (EPA), and the Departments of Energy, Agriculture, Commerce, and Interior would see their R&D budgets decline.
- Nondefense R&D would increase by 4.3 percent to \$47.1 billion. NIH would receive a 13.6 percent increase in its R&D funding to \$22.4 billion; NIH would make up almost half of the entire nondefense R&D portfolio. **Excluding NIH, however, all other nondefense R&D would fall by 3.0 percent to \$24.7 billion**, a loss of \$752 million (see Table 1).
- **Defense R&D** would increase 8.0 percent to reach \$49.4 billion. The Bush Administration would fulfill a campaign promise by aggressively expanding defense R&D investments. DOD did not submit a full FY 2002 budget in April; the agency is conducting a major review of defense priorities that will result in a full FY 2002 budget request in May. Most of the DOD request consists of placeholder figures assuming the FY 2001 budget plus inflation, but there is also a request for an extra \$2.6 billion in unallocated funds for development (*see Chapter 6*). Defense R&D in the Department of Energy (DOE) would grow by a modest 1.2 percent to \$3.5 billion.
- The federal investment in **basic research** would grow by 6.0 percent or \$1.3 billion to an all-time high of \$23.3 billion, primarily because of a 12.4 percent requested increase for basic research in NIH (see Table 2 and *Chapter 3*). NIH would provide the majority (56 percent) of federal basic research. Although other federal agencies have enjoyed increases for their basic research programs in the last few years, **basic research excluding NIH would decline 1.0 percent** to \$10.4 billion in FY 2002. The total **federal investment in research** (basic and applied research) would increase 5.4 percent to \$45.8 billion (see Table 2), but excluding a large increase for NIH all other federal research would fall 0.7 percent to \$23.8 billion.
- The AAAS analysis of the **outyear projections** in the FY 2002 budget shows that nondefense R&D would increase from \$45.1 billion in FY 2001 to \$55.5 billion in FY 2006, a 10.9 percent gain after adjusting for expected inflation (see Table 3 and *Chapter 3*). NIH would be responsible

for the increase. The budget assumes NIH funding would double between FY 1998 and 2003 and hold steady with inflation thereafter; excluding NIH, nondefense R&D would fall 2.8 percent in inflation-adjusted terms between FY 2001 and FY 2006. Most nondefense R&D agencies, with the exception of NASA and NIH, would see their R&D funding lose ground to inflation.

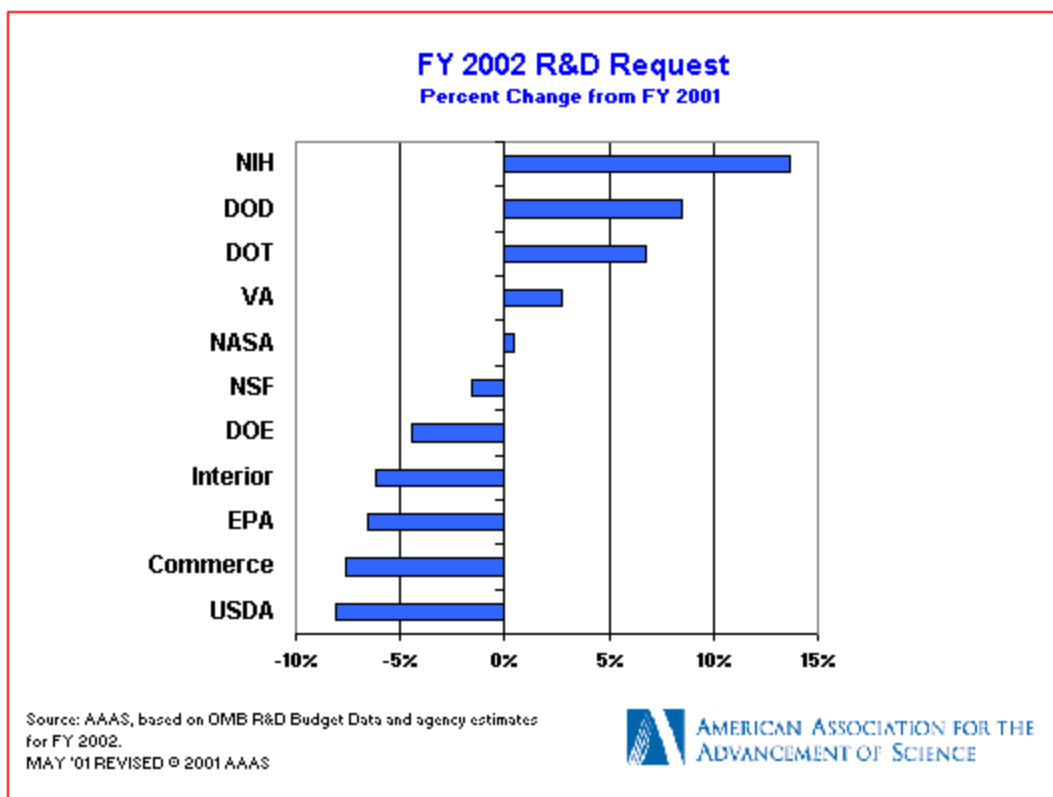


Figure 1.

- Two major multi-agency initiatives would receive increases in the FY 2002 budget. After nearly doubling from \$270 million to \$446 million in FY 2001, funding for the **Nanoscale Science, Engineering, and Technology Initiative** would rise by 8.1 percent to \$482 million in FY 2002 (see Chapter 25). Within a shrinking research budget, NSF's lead contribution would rise by 16.1 percent to \$174 million. After a nearly 30 percent increase last year, the **Networking and Information Technology R&D** initiative would rise by a more modest 2.1 percent to \$2.0 billion (see Chapter 24). The **U.S. Global Change Research Program** would see its funding drop 4.4 percent to \$1.6 billion, mostly because of steep cuts to NASA's Earth Science program, the largest component of the initiative (see Chapter 15).
- The high priority placed by the Bush Administration on defense and health is evident in Table 4 (see Chapter 3), which shows federal **R&D by national mission**. Defense R&D (up 8.0 percent) and health R&D (up 12.4 percent) would increase substantially and would together make up more than three-quarters of the federal R&D portfolio. **R&D funding for most of the other national missions would decline**. There would be steep cuts to energy-related R&D (down 25.8 percent), commerce-related R&D (down 29.1 percent), and agriculture R&D (down 9.5 percent).
- **Industry support for R&D** continues to grow far faster than federal R&D or the U.S. economy as a whole. U.S. industry-funded R&D increased by 10.8 percent to \$181 billion in 2000, following similar increases in the previous five years; private industry now funds 68 percent of all U.S. R&D. Total U.S. R&D reached \$265 billion in 2000, and further increases are expected in 2001 (see Table 5 and Chapter 4).

Agency Highlights

- The **National Institutes of Health (NIH)** would receive \$23.1 billion for its total budget in FY 2002, an unprecedented increase of \$2.8 billion (13.5 percent) that would keep NIH on track to double its budget between FY 1998 and 2003. NIH R&D would rise 13.6 percent to \$22.4 billion. Most of the institutes would receive increases between 11.5 and 12.5 percent. The NIH budget would emphasize investments in R&D facilities, both for extramural research facilities grants (\$100 million, up from \$78 million) and intramural construction (\$307 million, double the FY 2001 funding level). Funding for the Office of Research on Women's Health within the Office of the Director would more than double, and the new National Institute of Minority Health and Health Disparities would receive a 20 percent boost in its budget to \$158 million. The new National Institute of Biomedical Imaging and Bioengineering would receive \$40 million, up from \$2 million. (*See Chapter 8.*)
- The **Department of Defense (DOD)**, the largest federal sponsor of R&D, did not submit a full FY 2002 budget; DOD is conducting a major review of defense spending priorities that is expected to result in a full FY 2002 request in May. In the meantime, most of the DOD request consists of placeholder figures assuming the FY 2001 budget plus inflation, but there is also a request for an extra \$2.6 billion in unallocated funds for DOD development. DOD R&D would increase 8.5 percent because of the special request, for a total of \$45.9 billion. Much of the \$2.6 billion special request may eventually be allocated to national missile defense in the Ballistic Missile Defense Organization (BMDO). (*See Chapter 6.*)
- Although the **National Science Foundation (NSF)** enjoyed a nearly 13 percent increase in its budget and its R&D funding in FY 2001, the total NSF budget would barely increase in FY 2002 and NSF's R&D investments would actually decline 1.6 percent to \$3.2 billion (see Figure 1 and Table 1). There would be an expansion of NSF's science and mathematics education activities, but most of the research directorates in Research and Related Activities (R&RA; down 0.5 percent to \$3.3 billion) would face budget cuts. Only mathematics and nanotechnology-related research would receive inflationary increases, leaving research in nearly 30 other program areas such as information technology research, physics, and the social sciences with flat or declining funding. (*See Chapter 7.*)
- The **National Aeronautics and Space Administration (NASA)** would see its total budget increase by 1.8 percent to \$14.5 billion in FY 2002. NASA's R&D would increase 0.4 percent to \$10.0 billion. NASA proposes a major restructuring of its accounts to incorporate formerly separate mission support costs into program costs. While Space Science would increase by 6.2 percent to \$2.8 billion, there would be cuts totaling \$201 million in the Earth Science enterprise (down 11.7 percent to \$1.5 billion). Biological and Physical Research (formerly Life and Microgravity Sciences) would decline 4.7 percent to \$361 million. Aero-Space Technology would increase 7.3 percent to \$2.4 billion because of a 75 percent increase to \$475 million for the Space Launch Initiative to explore technologies for reusable launch vehicles. While the budget contains a \$2.1 billion request for the International Space Station (down 1.2 percent), there are few details for FY 2002 because the entire project is currently undergoing a major review which will likely result in a heavily restructured and scaled-down station. (*See Chapter 10.*)
- The **Department of Energy (DOE)** would see its R&D programs decline 4.5 percent to \$7.4 billion after a 12 percent increase last year. Most programs in the Office of Science would receive level or slightly increasing funding. Funding for the Spallation Neutron Source would rise \$13 million to \$291 million. Energy R&D, however, would suffer steep cuts: solar and renewable energy R&D would drop by 30.8 percent, nuclear energy R&D would fall 29.4 percent, and energy conservation R&D would fall 28.3 percent. In Fossil Energy, a new \$150 million coal grants program would only partially offset steep cuts in gas, oil, and other fossil energy R&D program areas. Fossil Energy R&D would decline 25.3 percent. In DOE's defense programs,

construction of the troubled National Ignition Facility would continue with a 24 percent boost to \$245 million. (See Chapter 9.)

- R&D in the **U.S. Department of Agriculture (USDA)** would fall 8.1 percent in FY 2002 to \$1.8 billion, reversing a similarly-sized increase last year. Funding for competitive research grants in the National Research Initiative (\$106 million) and formula research funds in the Hatch Act (\$180 million) would stay even with FY 2001; the Bush Administration would find savings by not renewing more than \$120 million in congressionally designated research projects. Intramural research in the Agricultural Research Service would stay even with FY 2001 at \$852 million, but there would be \$44 million in cuts to ARS Buildings and Facilities (down 27.2 percent to \$118 million). R&D projects in the competitively awarded, mandatory Initiative for Future Agriculture and Food Systems program would stay level at \$64 million. (See Chapter 11.)
- **Department of Commerce** R&D funding would decline 7.6 percent to \$1.1 billion. The budget would eliminate R&D in the Advanced Technology Program at the **National Institute of Standards and Technology (NIST)**. Intramural R&D in the NIST laboratories, however, would increase 8.9 percent to \$292 million. **National Oceanic and Atmospheric Administration (NOAA)** R&D would increase 6.4 percent to \$772 million, including substantial program increases for Oceanic and Atmospheric Research (OAR; up 7.8 percent to \$290 million) and the National Marine Fisheries Service (NMFS; up 6.0 percent to \$329 million). (See Chapter 12.)
- R&D in the **Department of the Interior** would fall 6.1 percent to \$593 million, but steeper cuts would fall on Interior's lead science agency, the **U.S. Geological Survey (USGS)**. USGS R&D would fall 10.7 percent to \$491 million. R&D in all four USGS divisions would decline, but hardest hit would be programs in Water Resources (down 25.5 percent from the elimination of some programs and dramatic reductions in the National Water Quality Assessment program) and Biological Research (down 7.0 percent because of the elimination of the National Biological Information Infrastructure program). (See Chapter 12.)
- **Department of Transportation (DOT)** R&D funding would climb 6.8 percent to \$798 million. Many DOT programs do not compete with other discretionary programs for funding because they rely on guaranteed spending from transportation trust funds. Because transportation tax revenues have been rising steadily, R&D funding would also rise. (See Chapter 12.)
- The **Environmental Protection Agency (EPA)** R&D budget would fall 6.5 percent to \$569 million, mostly because of the elimination of dozens of congressionally designated research projects. EPA's core research programs would mostly be held to level funding. (See Chapter 12.)
- In other agencies, the **Department of Veterans Affairs** would increase its R&D funding 2.7 percent to \$722 million. About half of this amount is for medical and prosthetic research programs; the other half pays for clinical and other support costs and for VA researchers' salaries. While the **Smithsonian Institution's** overall R&D budget of \$118 million would remain unchanged in FY 2002, there would be reorganizations of its science centers, including a proposed closing of the Conservation Research Center that has generated a great deal of controversy and protest. Although education funding would be a high priority for the Bush Administration, R&D in the **Department of Education** would decline 2.3 percent to \$259 million because of a proposed cut in funding for the Office of Educational Research and Improvement. (See Chapter 12.)

The Budgetary Context for FY 2002: Tax Cuts and Three Priorities Squeeze Out Other Programs

The FY 2002 Bush budget proposes **discretionary spending of \$661 billion** in FY 2002, an increase of \$26 billion or 4.0 percent over FY 2001 (see Figure 2). But the entire increase would go to the Bush Administration's top three priorities in discretionary spending, the Department of Defense (DOD, up \$14 billion), the Department of Education (up \$5 billion), and the National Institutes of Health (NIH, up \$2.8 billion), plus a separate \$5 billion contingency fund intended to provide for emergencies such as farm aid

or natural disaster relief. This would leave all other discretionary programs with \$1 billion less than FY 2001, for a total of \$277 billion. Non-NIH nondefense R&D joins other programs such as foreign aid, immigration, justice programs, national parks, and environmental protection in a competition for shrinking resources. Not surprisingly, then, NIH and DOD R&D programs would receive substantial increases while other agencies' R&D programs would decline.

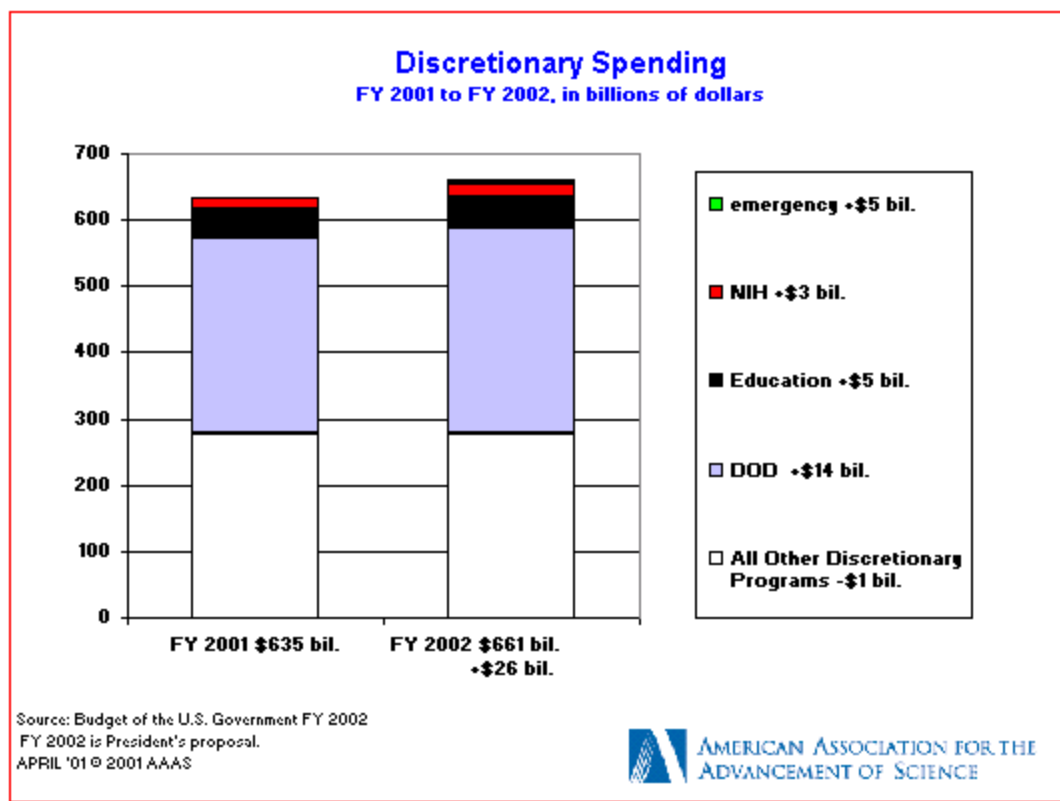


Figure 2.

Holding overall discretionary spending growth to 4.0 percent in FY 2002 and roughly the rate of inflation thereafter allows President Bush to spend the bulk of projected budget surpluses on **tax cuts and debt reduction**. The FY 2002 budget projects baseline budget surpluses of \$5.6 trillion over ten years (FY 2002-2011; the baseline projection is one which assumes no changes in current tax or entitlement policies, only inflationary growth in discretionary spending, and moderate economic growth and inflation over the next decade). The FY 2002 budget proposes to allocate this 10-year surplus as follows: \$1.6 trillion in tax cuts, \$0.4 trillion in additional debt service costs resulting from tax cuts and additional spending, \$153 billion for Medicare reform and a possible prescription drug benefit, a \$0.8 trillion reserve for contingencies (future priorities, emergency spending, etc.), and just \$30 billion for additional discretionary spending over ten years above inflationary growth. This would leave \$2.6 trillion in surpluses from the Social Security trust funds, all of which automatically become Social Security-held debt. Of the \$2.6 trillion, the President proposes to use \$2.0 trillion to pay down the national debt to the public, and \$0.6 trillion to keep as a cash reserve for Social Security reform, including possible use for private Social Security accounts.

The Bush budget has little to no margin for error. On-budget (non Social Security) surpluses are expected to total only \$30 to \$60 billion a year for the next several years, and even these small surpluses will shrink or disappear if any of the contingencies should materialize, or if discretionary spending rises above the request level. For example, even within the next two months several events could vaporize the surpluses: defense observers expect DOD's strategic review to result in even higher DOD requests in FY 2002 and future years than in the current budget; there is growing pressure in Congress to spend billions immediately on aid to farmers; and unforeseen natural disasters such as the current flooding of the Mississippi have in each of the past several years added far more to spending than the \$5 billion set aside for FY 2002. There is

also widespread agreement that even a minimal prescription-drug benefit for Medicare will require more than double the \$153 billion over ten years set aside in the budget, and many Republicans in Congress would like to expand tax cuts beyond \$1.6 trillion; even the Bush proposal, if enacted as is, will probably require alternative-minimum tax (AMT) reform of \$400 billion or up over 10 years to prevent middle-class families from becoming having to pay the AMT.

The FY 2002 budget also depends crucially on continuing economic growth to keep the budget in surplus. Even a slight economic slowdown in a \$10 trillion U.S. economy would lower tax revenues enough to easily wipe out projected on-budget surpluses. Although the U.S. budget shifted to surplus because higher-than-expected economic growth resulted in unexpected tax revenues, this year the process could shift into reverse and plunge the U.S. budget back into deficits. With a U.S. economic slowdown looking increasingly likely this year, projections of a \$59 billion FY 2002 on-budget surplus could easily disappear even before additional spending and tax cut proposals can be considered.

Outyear Projections for Federal R&D to FY 2006

The FY 2002 budget also contains detailed projections for nondefense federal spending to FY 2006. (Detailed defense projections will not be available until completion of the Defense Strategy Review in late May.) Although these projections are mostly mere extrapolations of current policies, they are a statement of the Bush Administration's priorities and their implications for the future. The AAAS analysis of these outyear projections reveals that the Bush budget would hold most discretionary programs to at best inflationary growth over the next several years; most R&D programs would fall behind expected inflation and see real losses in the longer term while entitlement programs, annual revenue losses from tax cuts, defense spending, and debt reduction would all increase over the next several years.

Federal support for nondefense R&D is projected to increase from \$45.1 billion in FY 2001 to \$55.5 billion in FY 2006, a 10.9 percent increase after adjusting for expected inflation (see Table 3). As shown in Figure 3, the Bush Administration would fulfill a campaign pledge to complete the doubling of the NIH budget between FY 1998 and FY 2003; although NIH funding would only stay even with inflation thereafter, the large increases in FY 2002 and FY 2003 would allow NIH R&D to increase 28.4 percent ahead of inflation between FY 2001 and FY 2006. Excluding NIH, however, nondefense R&D would fall 2.8 percent in inflation-adjusted terms over this time period. Most nondefense R&D agencies, with the exception of NASA and NIH, would see their R&D funding lose ground to inflation (see Table 3 and Figure 3), mostly through cuts in FY 2002 and steady funding thereafter.

Included in the budget projections are a few increases.¹ NASA R&D would increase from \$9.9 billion in FY 2001 to \$11.4 billion in FY 2005 (up 3.4 percent after inflation; see Figure 3). The increase is even larger for key R&D programs because the International Space Station would see its R&D budget nearly halved over the next five years as development and construction wind down, leaving more room for other programs. NASA plans a dramatic expansion of the Space Science program from \$2.6 billion in FY 2001 to \$4.0 billion in FY 2006 (37.6 percent after inflation). NASA Aero-Space Technology would jump from \$2.2 billion to \$3.4 billion (up 38.5 percent after inflation) because of efforts to develop a new generation of reusable launch vehicles. Other programs slated for increases include: intramural research in NIST, up 7.2 percent after inflation; NOAA R&D (up 4.3 percent); and DOT highway R&D (up 11.1 percent).

Most other programs' projections generally show cuts in FY 2002 and increases at the rate of inflation thereafter. NSF's R&D would fall in FY 2002 but would keep pace with inflation thereafter to end up 3.1 percent below the FY 2001 level after adjusting for inflation (see Figure 3). Some programs would face steep cuts over the next several years, mostly in DOE: energy supply R&D (down 31.5 percent FY 2001 to FY 2006), fossil energy R&D (down 26.5 percent), and energy conservation R&D (down 19.0 percent) would all fall steeply. (See Chapter 3.)

¹ For a program-by-program look at the outyear projections, please see the detailed analysis of projected nondefense R&D, available on the AAAS Web site at <http://www.aaas.org/spp/R&D> in the "Guide to R&D Funding Data - Outyear Projections" section.

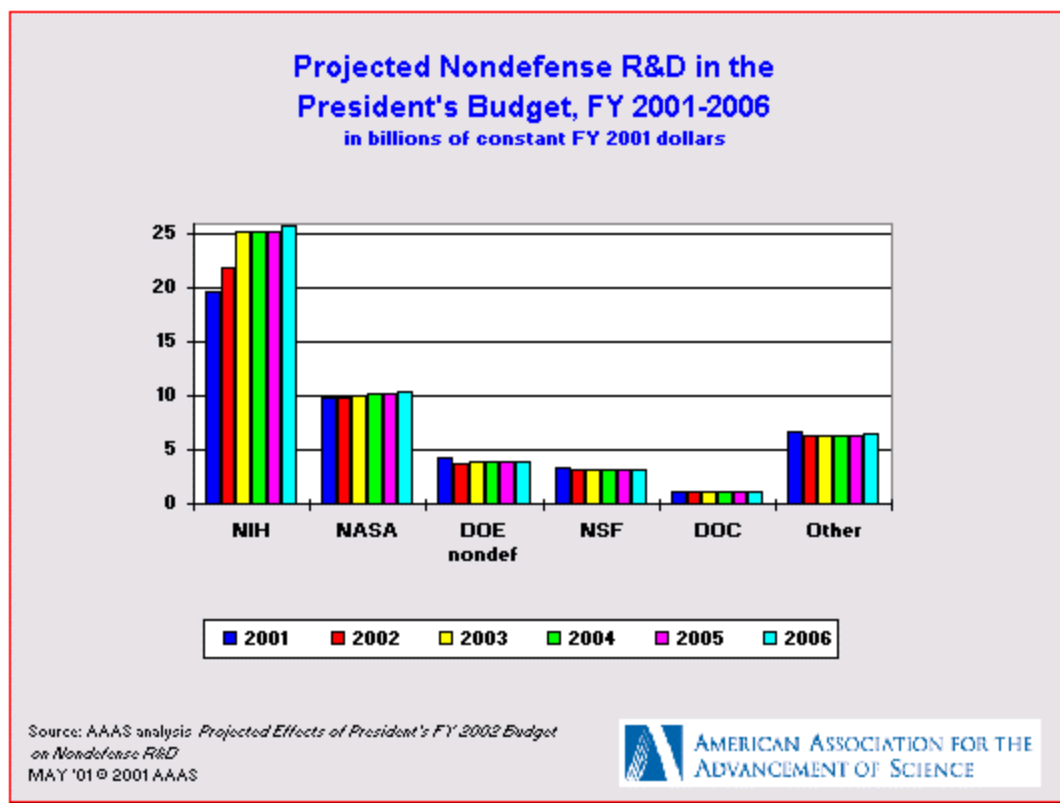


Figure 3.

U.S. Industry Support for R&D

Including non-federal funding sources, the U.S. invested an estimated \$265 billion in R&D in 2000 (up 7.1 percent; see Table 5). This represents 2.66 percent of the nation's Gross Domestic Product (GDP). The largest share of this money (about 68 percent; total \$181 billion) came from industrial firms. Most of the balance (26 percent) came from the federal government. Colleges and universities, private foundations, other nonprofit institutions, and state and local governments provided the remainder.

In 2000, industry support of R&D grew by 10.8 percent, the sixth consecutive year with increases at or near double-digit levels. A recent forecast by the Industrial Research Institute predicts that this growth will continue in 2001, but perhaps at a slower rate. Battelle Memorial Institute forecasts that industry's funding of R&D will rise 6.0 percent in 2001.

The fastest rising component of this growth in industrial R&D was basic research, which increased 142 percent over the past five years, followed by development, which rose 61 percent; development accounts for the vast majority of industrial R&D (*See Chapter 4*).

Historical Trends and Outlook

Increases for NIH over the past few decades have resulted in a dramatic expansion in federal support for health research, an expansion which has accelerated in the past few years with the effort to double the NIH budget in five years beginning in FY 1998 (see Figure 4). Other national missions, funded by agencies with stagnant or declining budgets, have not fared as well in recent years; as a result, health is now the majority of the nondense R&D portfolio.

As shown in Figure 4, the relative priority of different areas of R&D has varied over the years, reflecting changing national priorities. Nondense R&D reached a high point in the mid-1960s, declining for several

years thereafter. After several years of significant growth in the late 1980s and late 1990s, nondefense R&D would finally exceed the mid-1960s funding levels in FY 2002.

Priorities, however, are different now than they were in the 1960s. Space was the dominant mission in the 1960s in the heyday of the Apollo program. Energy R&D gained priority following the oil shortages in the 1970s and then retreated. Health R&D, meanwhile, has shown practically uninterrupted growth over four decades, a trend the Bush Administration would continue.

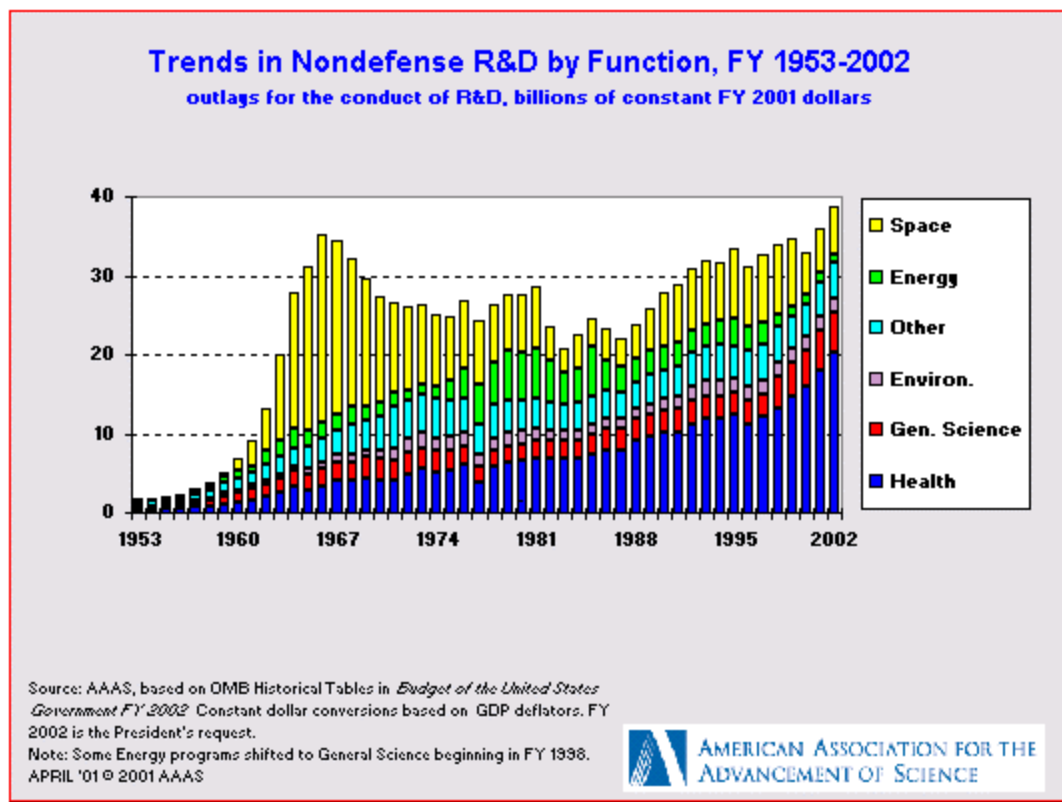


Figure 4.

The President's budget is now under consideration in Congress. In April, the House of Representatives approved a budget resolution closely following the President's plan. But the Senate voted to increase FY 2002 discretionary spending to \$688 billion, \$27 billion above the President's request. In order to stay within projected surpluses, the Senate then had to lower its 10-year tax cut to \$1.2 trillion instead of \$1.6 trillion. Within the next few weeks, Congress is expected to hammer out a compromise final FY 2002 budget resolution setting out broad spending targets for the appropriations process. The House and Senate are expected to meet somewhere in the middle for both the total tax cut and the FY 2002 discretionary spending level. After that, Congress will begin the arduous task of setting appropriations for individual programs within the broad spending targets.

Wherever the final budget resolution sets discretionary spending, Congress is likely to draft appropriations bills providing more than the request for R&D in agencies such as DOE, NSF, and USDA. Whether these increases can be sustained will depend on how insistent President Bush and congressional fiscal conservatives will be on restraining government spending, and how willing they will be to compromise on tax cuts. For federal R&D programs, the only thing certain is that NIH will eventually receive its request and probably even more. For other agencies, Congress may disagree with the President, and the flat or declining funding for most nondefense R&D programs may change before the FY 2002 budget process is over. But with tax cut proposals competing for spending proposals for a share of projected surpluses that could disappear quickly, R&D and other programs will face steep competition.

AAAS Analysis of R&D in the FY 2002 Budget

Table 1. R&D in the FY 2002 Budget by Agency
(budget authority in millions of dollars)

	FY 2000	FY 2001	FY 2002	Change FY 01-02	
	Actual	Estimate	Budget	Amount	Percent
Total R&D (Conduct and Facilities)					
Defense (military) 1/	39,959	42,258	45,855	3,597	8.5%
S&T (6.1-6.3 + medical) 1/	8,603	9,392	9,589	197	2.1%
All Other DOD R&D 1/	31,356	32,866	36,266	3,400	10.3%
Health and Human Services	18,182	20,859	23,496	2,637	12.6%
Nat'l Institutes of Health	17,234	19,710	22,395	2,685	13.6%
NASA	9,494	9,925	9,967	41	0.4%
Energy	6,956	7,744	7,399	-346	-4.5%
NNSA and other defense	3,201	3,499	3,542	42	1.2%
Energy and Science programs	3,755	4,245	3,857	-388	-9.1%
Nat'l Science Foundation	2,931	3,279	3,226	-52	-1.6%
Agriculture	1,776	1,961	1,803	-158	-8.1%
Commerce	1,174	1,201	1,110	-91	-7.6%
NOAA	643	726	772	47	6.4%
NIST	471	421	313	-108	-25.7%
Interior	618	631	593	-39	-6.1%
Transportation	607	747	798	51	6.8%
Environ. Protection Agency	558	609	569	-40	-6.5%
Veterans Affairs	645	703	722	19	2.7%
Education	238	265	259	-6	-2.3%
All Other	630	704	663	-41	-5.8%
Total R&D	83,769	90,887	96,459	5,572	6.1%
Defense R&D	43,160	45,757	49,397	3,639	8.0%
Nondefense R&D	40,609	45,130	47,062	1,933	4.3%
Nondefense R&D excluding NIH	23,374	25,420	24,668	-752	-3.0%
Basic Research	19,468	22,014	23,343	1,329	6.0%
Applied Research	18,957	21,439	22,458	1,019	4.8%
Development	40,425	42,367	45,561	3,195	7.5%
R&D Facilities and Equipment	4,919	5,068	5,097	29	0.6%

Source: AAAS, based on OMB data for R&D for FY 2002, agency budget justifications, and information from agency budget offices.

1/ FY 2002 DOD figures represent a projection from FY 2001 funding levels plus inflation, plus an additional \$2.6 billion (in development) for unspecified projects. The revised FY 2002 request will be released in May upon completion of the Defense Strategy Review.

May 1, 2001 - REVISED DATA

AAAS Analysis of R&D in the FY 2002 Budget

Table 2. Research in the FY 2002 Budget
(budget authority in millions of dollars)

	FY 2000 Actual	FY 2001 Estimate	FY 2002 Budget	Change FY 01-02	
				Amount	Percent
BASIC RESEARCH					
Defense (military) 1/	1,136	1,317	1,345	28	2.1%
Health and Human Services	10,099	11,537	12,973	1,436	12.4%
<i>Nat'l Institutes of Health</i>	10,097	11,535	12,971	1,436	12.4%
NASA	2,148	2,556	2,466	-90	-3.5%
Energy	2,263	2,372	2,347	-25	-1.1%
Nat'l Science Foundation	2,540	2,796	2,799	3	0.1%
Agriculture	684	742	717	-25	-3.4%
Commerce (NIST)	39	42	40	-2	-4.3%
Interior	52	57	54	-3	-5.1%
Transportation	10	17	21	4	23.4%
Environ. Protection Agency	58	105	98	-7	-6.7%
Smithsonian	103	105	102	-3	-2.9%
Veterans Affairs	266	290	304	14	4.8%
All Other	69	78	77	-1	-1.3%
Total Basic Research	19,468	22,014	23,343	1,329	6.0%
<i>Basic research excluding NIH</i>	9,370	10,478	10,372	-107	-1.0%
RESEARCH (basic + applied)					
Defense (military; incl. medical) 1/	4,840	5,393	5,514	121	2.2%
Health and Human Services	17,886	20,575	23,046	2,471	12.0%
<i>Nat'l Institutes of Health</i>	16,993	19,478	21,988	2,510	12.9%
NASA	3,690	4,243	4,277	34	0.8%
Energy	4,149	4,597	4,474	-123	-2.7%
Nat'l Science Foundation	2,724	3,016	3,017	1	0.0%
Agriculture	1,518	1,664	1,546	-118	-7.1%
Commerce	896	995	987	-8	-0.8%
NOAA	601	692	741	49	7.1%
NIST	278	296	239	-57	-19.2%
Interior	572	594	557	-37	-6.2%
Transportation	407	477	530	53	11.0%
Environ. Protection Agency	445	475	442	-33	-6.9%
Veterans Affairs	633	689	707	18	2.6%
Education	153	167	169	2	1.2%
Agency for Int'l Develop.	194	213	203	-10	-4.7%
Smithsonian	103	105	102	-3	-2.9%
All Other	214	250	230	-20	-8.0%
Total Research	38,425	43,453	45,801	2,349	5.4%
<i>Total research excluding NIH</i>	21,432	23,974	23,813	-161	-0.7%

Source: AAAS, based on OMB data for R&D for FY 2002, agency budget justifications, and information from agency budget offices.

1/ FY 2002 DOD figures represent a projection from FY 2001 funding levels plus inflation

A revised FY 2002 request will be released in May upon completion of the Defense Strategy Review.

May 1, 2001 - REVISED DATA

AAAS Analysis of R&D in the FY 2002 Budget

Table 3. AAAS Analysis of the Outyear Projections for R&D in the FY 2002 Budget
(budget authority in millions of dollars)

	FY 2001 Estimate	FY 2002 Budget	FY 2003 Projected	FY 2004 Projected	FY 2005 Projected	FY 2006 Projected	% Change FY 01-06 current \$	constant \$
Total R&D (Conduct and Facilities)								
Defense (military) *	--	--	--	--	--	--	--	--
Health & Human Services	20,859	23,496	27,503	28,013	28,632	29,265	40.3%	26.5%
<i>Nat'l Institutes of Health</i>	19,710	22,395	26,383	26,873	27,472	28,084	42.5%	28.4%
NASA	9,925	9,967	10,493	10,808	11,034	11,385	14.7%	3.4%
Energy (nondefense only)	4,245	3,857	3,986	4,078	4,170	4,264	0.4%	-9.5%
Nat'l Science Foundation	3,279	3,226	3,298	3,371	3,447	3,524	7.5%	-3.1%
Agriculture	1,961	1,803	1,842	1,880	1,922	1,963	0.1%	-9.7%
Commerce	1,201	1,110	1,134	1,161	1,184	1,210	0.7%	-9.2%
Interior	631	593	606	620	633	647	2.5%	-7.6%
Transportation	747	798	765	784	804	824	10.3%	-0.6%
Environ. Protection Agcy.	609	569	582	595	608	621	2.1%	-8.0%
Veterans Affairs	703	722	738	754	772	788	12.1%	1.1%
All Other	969	922	943	966	988	1,011	4.4%	-5.9%
Nondefense R&D	45,130	47,062	51,890	53,030	54,195	55,503	23.0%	10.9%
<i>Nondef. R&D minus NIH</i>	<i>25,420</i>	<i>24,668</i>	<i>25,507</i>	<i>26,157</i>	<i>26,723</i>	<i>27,419</i>	<i>7.9%</i>	<i>-2.8%</i>

Source: AAAS analyses of defense and nondefense R&D, based on detailed budget account projections in the Public Budget Database of the *Budget of the United States Government FY 2002*.

FY 2001 figures represent latest agency estimates of R&D. FY 2002 figures represent latest revised agency requests. Constant dollar conversions based on GDP deflators from OMB.

* **DOD outyear projections will not be available until completion of the Defense Strategy Review (late May). All defense R&D (DOD + DOE defense) excluded from this table.**

This table will be revised to include defense R&D when DOD data become available.

The detailed analysis of nondefense R&D containing agency details and methodology

and other outyear projections data are available on the World Wide Web at

<http://www.aaas.org/spp/R&D/> in the "Guide to R&D Funding Data" section (see "Outyear Projections").

May 1, 2001 - preliminary

AAAS Analysis of R&D in the FY 2002 Budget

Table 4. Major Functional Categories of R&D
(budget authority in millions of dollars)

	FY 2000	FY 2001	FY 2002	Change FY 01-02		% Share of Total ('02)
	Actual	Estimate	Budget	Amount	Percent	
Defense ¹	43,160	45,757	49,397	3,639	8.0%	51.2%
Nondefense ²	40,609	45,130	47,062	1,933	4.3%	48.8%
Space	8,437	8,986	9,076	90	1.0%	9.4%
Health	18,758	21,506	24,173	2,667	12.4%	25.1%
Energy	1,146	1,340	994	-346	-25.8%	1.0%
General Science	5,593	6,234	6,156	-77	-1.2%	6.4%
Environment ³	2,082	2,271	2,230	-41	-1.8%	2.3%
Agriculture	1,561	1,716	1,553	-163	-9.5%	1.6%
Transportation	1,664	1,686	1,688	2	0.1%	1.7%
Commerce	530	475	337	-138	-29.1%	0.3%
International	200	216	206	-10	-4.6%	0.2%
All Other	637	700	649	-51	-7.3%	0.7%
Total R&D	83,769	90,887	96,459	5,572	6.1%	100.0%

Source: Authors' estimates based on data from OMB and agency budget justifications.

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

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

¹ FY 2002 DOD figures represent a projection from FY 2001 funding levels plus inflation

A revised FY 2002 request will be released in May upon completion of the Defense Strategy Review.

² Includes all R&D not in defense.

³ Includes natural resources R&D.

May 1, 2001 - REVISED DATA

AAAS Analysis of R&D in the FY 2002 Budget

Table 5. Total U.S. R&D, 1998-2000
(expenditures in millions of dollars)

(calendar years)	1998 Actual	1999 Actual	2000 Preliminary	% Change 1999-2000	% Share of Total ('00)
U.S. R&D by funding source:					
Federal Government	66,827	67,711	69,627	2.8%	26.3%
Industry	147,867	163,397	181,040	10.8%	68.4%
Universities and Colleges	5,183	5,562	5,969	7.3%	2.3%
Nonprofits	5,007	5,390	5,789	7.4%	2.2%
Nonfederal Government	1,987	2,083	2,197	5.5%	0.8%
Total U.S. R&D	226,872	244,143	264,622	8.4%	100.0%
U.S. R&D by performer:					
Federal Government	17,362	18,332	19,143	4.4%	7.2%
Industry	167,102	180,450	197,280	9.3%	74.6%
Universities and Colleges	26,664	28,363	30,154	6.3%	11.4%
FFRDCs *	8,510	8,980	9,294	3.5%	3.5%
Nonprofits	7,234	8,017	8,750	9.1%	3.3%
Total U.S. R&D	226,872	244,143	264,622	8.4%	100.0%
U.S. R&D by character of work:					
Basic Research	41,294	44,625	47,903	7.3%	18.1%
<i>(from federal sources)</i>	20,613	22,140	22,310	0.8%	8.4%
<i>(from industry sources)</i>	13,397	14,667	16,223	10.6%	6.1%
Applied Research	45,702	51,632	55,041	6.6%	20.8%
Development	139,875	147,886	161,679	9.3%	61.1%
Total U.S. R&D	226,872	244,143	264,622	8.4%	100.0%
U.S. GDP** (billions of dollars)	8,790	9,299	9,963	7.1%	
U.S. R&D / GDP	2.58%	2.63%	2.66%		

Source: National Science Foundation, *National Patterns of R&D Resources 2000*, 2001.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.

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