Science-Engineering-Technology
Congressional Visits Day
May 1-2, 2001

Participant Briefing Materials

Contents

*** For participants only – not for Hill use ***

About Science-Engineering-Technology Congressional Visits Day . . .

Objective

To underscore the importance of science, engineering, and technology through meetings with congressional decision makers.

Core Message

Federally funded research is the Nation's foundation for future innovation.

Other Messages

All participants will advance the "Core Message." To provide flexibility and to acknowledge the fact that many diverse groups will be participating in this effort, each team will decide which additional specific issues it would like to advance. Briefing materials are provided on a variety of federal agencies and partnership programs.

Participants

Members of the Coalition for Technology Partnerships and the Science-Engineering-Technology Work Group and their colleagues in the science, engineering, and technology enterprise.

Schedule (tentative)

Tuesday, May 1, 2001

1:00 – 2:30 pm
Renaissance Hotel
999 9th St, NW
Metro Stop: Gallery Place – 9th & G St. Entrance

3:00 - 5:00 pm
Congressional Briefing
Renaissance Hotel
999 9th St, NW
Metro Stop: Gallery Place – 9th & G St. Entrance

5:30 - 7:30 pm
Reception and Awards Ceremony
Room 216, Hart Senate Office Building
Metro Stop: Union Station

Wednesday, May 2, 2001

8:00 - 9:30 a.m.
CVD Breakfast Briefing
Caucus Room, Russell Senate Office Building, 3rd floor
Metro Stop: Union Station

9:30 a.m. - 5:00 p.m.
Congressional Visits

The **Coalition for Technology Partnerships** is a group of small, medium, and large businesses and trade associations. These groups have joined forces to demonstrate that partnerships between government and industry reflect the realities of today's budget climate and technology development mechanisms. Contact: Kathleen N. Kingscott - Phone 202-515-5193 - Fax 202-515-4943.

The **Science-Engineering-Technology Work Group** is an information network comprising professional, scientific, and engineering societies, higher education associations, institutions of higher learning, and trade associations. The Work Group is concerned about the future vitality of the U.S. science, mathematics, and engineering enterprise. Contacts: Debbie Rudolph (Phone 202-785-0017, Fax 202-785-0835, E-Mail d.rudolph@ieee.org) and Kevin Marvel (Phone 202-328-2010, E-Mail marvel@aas.org).

Briefings Schedule (tentative)

Tuesday, May 1, 2001

Renaissance Hotel, 999 9th Street, NW ***Metro Stop: Gallery Place – 9th & G St. Entrance***

1:00 pm - 2:30 pm Administration Briefing

- Dr. Joseph Bordogna, Deputy Director, National Science Foundation
- Mr. Daniel Goldin, NASA Administrator
- Kevin Kolevar, Department of Energy, Senior Policy Advisor
- Karen Brown, Acting Director, National Institute of Standards and Technology
- Marcus Peacock, Associate Director, Office of Management & Budget.

2:30 pm – 3:00 pm Coffee Break

Renaissance Hotel, 999 9th Street, NW ***Metro Stop: Gallery Place – 9th & G St. Entrance***

3:00 pm - 5:00 pm Welcome & Acknowledgments
The Protocol of Congressional Visits
Federal R&D Recap
Kei Koizumi, AAAS
The Insider's View Panel
David Goldston, Majority Staff Director, House Science Committee
Bob Palmer, Minority Staff Director, House Science Committee
David Hanegan, Staff Scientist, Senate Energy and Natural Resources Committee
Bob Simon, Minority Staff Director, Senate Energy and Natural Resources Committee (invited)
Cheh Kim, Majority Staff, Senate VA, HUD Appropriations Subcommittee (invited)
Closing Remarks and Logistics Discussion

Room 216, Hart Senate Office Building ***Metro Stop:Union Station***

5:30 pm - 7:30 pm Congressional Visits Day Reception and Award Ceremony
Hosted by CTP and SETWG Member Organizations
Presentation of George E. Brown Jr. Science-Engineering-Technology Leadership Award to

- The Honorable Christopher Bond (R-MO)
- The Honorable Barbara Mikulski (D-MD)

Wednesday, May 2, 2001

Caucus Room, Russell Senate Office Building (3rd floor) ***Metro Stop: Union Station***

8:00 am - 9:30 am CVD Breakfast Briefing
Continental Breakfast

- Remarks by Representative Sherwood Boehlert (R-NY),Chairman, House Science Committee

Team Logistics

9:30am - 5:00 pm Congressional Visits -- House and Senate

The Coalition for Technology Partnerships

CTP is a group of small, medium, and large businesses, trade associations, and technical societies that have joined forces to advocate science and technology partnerships -- a vital part of our innovation engine. For further information on the Coalition's activities, contact Kathleen N. Kingscott (CTP Chair) at 202-515-5193 or email: tking@us.ibm.com.

Agere Systems	Breinigsville, PA
Agilent Technologies	San Jose, CA
Corning	Corning, NY
Dow Chemical Company	Midland, MI
Eastman Kodak Corporation	Rochester, NY
General Electric Corporation	Niskayuna, NY
IAP Research, Inc.	Dayton, OH
IBM Corporation	Armonk, NY
LumiLeds Lighting	San Jose, CA
National Association of Manufacturers	Washington, DC
Nortel Networks	McLean, VA
Ohio Aerospace Institute	Cleveland, OH
Optoelectronics Industry Development Association	Washington, DC
Physical Optics Corporation	Torrance, CA
PlugPower Corporation	Albany, NY
Semiconductor Industry Association	San Jose, CA
Rockwell Collins	Cedar Rapids, IA
Texas Instruments	Dallas, TX

The Science-Engineering-Technology Work Group

SETWG is an information network comprising professional, scientific, and engineering societies, higher education associations, institutions of higher learning, and trade associations. The Work Group is concerned about the future vitality of the U.S. science, mathematics, and engineering enterprise. The **Science-Engineering-Technology Work Group** contacts are Debbie Rudolph (Phone 202-785-0017, Fax 202-785-0835, email d.rudolph@ieee.org) and Kevin Marvel (Phone 202-328-2010, email marvel@aas.org).

American Association for the Advancement of Science
American Astronomical Society
American Educational Research Association
American Chemical Society
American Electronics Association
American Geological Institute
American Geophysical Union
American Institute of Aeronautics & Astronautics
American Institute of Biological Sciences
American Institute of Chemical Engineers
American Institute of Physics
American Mathematical Society
American National Standards Institute
American Physical Society
American Society of Agronomy
American Soc. for Biochemistry & Molecular Biology
American Society for Engineering Education
American Society for Microbiology
American Society for Testing and Materials
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society of Plant Physiologists
Association for Women in Mathematics
Association of American Universities
Association of Environmental Engineering and Science Professors
Coalition on Funding Agricultural Research Missions
Consortium of Social Science Associations
Council for Chemical Research
Council for Undergraduate Research
Council on Agricultural Science & Technology
Council of Graduate Schools
Council of Scientific Society Presidents
Crop Science Society of America
Ecological Society of America
Federation of American Societies for Experimental Biology
Federation of Animal Science Societies
Federation of Materials Societies
Industrial Research Institute
Institute of Electrical & Electronics Engineers - Unites States of America
Massachusetts Institute of Technology
Materials Research Society
The 'M Companies
NACE International
National Academy of Engineering
National Academy of Sciences
National Association of State Universities and Land Grant Colleges
National Groundwater Association
National Research Council
National Society of Professional Engineers
National Technology Transfer Center
North Carolina State University
Optical Society of America
RAND
Society of Manufacturing Engineers
Soil Science Society of America
SPIE - The International Society for Optical Engineering
The Science Coalition
University of California Riverside
University of Central Florida

Organizing your Visit

Before going into a Congressional Office, choose a leader who will be the focal point of the group. It is best to choose someone from the Member's state or district.

Use the "3" Rule:

Structure your visit into 3 main parts

*1. Who**

- Thank the ***congress/staff person*** for taking the time to meet with your group
- Introduce ***the meeting participants*** – Both name and organization
- Mention the broader scientific community, making note of the more than 250 scientists participating in the ***SET Congressional Visits Day*** effort, who represent more than 2 million US scientists.

2. What

- Science, engineering, and technology are crucial to the nation, as well as the Member's state/district.
- Give examples of ***national SET importance*** (e.g., use CVD leave-behind materials)
- Give examples of ***state/district importance*** (e.g., use information about your own work/organization).

3. How

- ***Ask*** your senator/representative/staffer to maintain a commitment to science, engineering, and technology funding in the FY 2001 budget
- ***Offer*** to serve as a resource on SET-related issues.
- Follow-up: ***invite*** the legislator/staff to visit your facility. Seeing is believing!

* Be sure to acknowledge the legislator's past support for SET, and be specific. If the legislator is already a champion – ask how you can help him or her advance SET among their congressional colleagues.

Rules "of the Game" for your Meeting

1. Be on time and be prepared to wait. Changes in the legislative calendar and office activity often mean Members and staff must deal with other things.

2. You must be prepared and succinct. *If you do not know the answer, be honest! Always commit to finding out the answer and follow up*

3. Explain how what you are talking about affects the Senator's or Representative's state or district with a **short anecdote** or facts about the district. (e.g., how many people work for your company/university and their economic impact)

4. Limit the presentation; not everyone needs to speak to get the point across.

5. Never be negative about politicians; do not whine or lecture to Members or staffers; do not imply that R&D funding is or should be an entitlement.

After the meeting, follow up! Send a letter of thanks to the Member and staffer offering to be a source of information in the future.

How Congress Works

Members and staff are very busy and deal with many other issues in addition to your main issue of concern. They are "jacks of all trades, masters of few or none." Acknowledging the limitations on their time and resources and offering to be a source of information is vital and helps to build a strong working relationship.

1. The legislative process is designed to be complex and deliberative, ensuring that all parties have an opportunity to comment on legislation. Legislation is considered in subcommittees, committees, and on the floor of both the Senate and House, and must be signed by the President. Most proposed laws are never acted upon and few ever become law.

2. Members look to their colleagues for guidance; influencing one may, in fact, influence many.

3. Staffers are often very influential in advising Members on votes.

4. All government is political and, in the immortal words of former House Speaker Thomas P. "Tip" O'Neill, "all politics is local."

5. Legislative proposals are weighed subjectively. Members of Congress not only consider proposals on their merits but also on these basic political questions:

    - How will the bill affect the legislator's re-election prospects?
    - Is this issue consistent with the legislator's previous votes/positions on related matters, and with his/her political and economic philosophies?
    - What would be the impact on the Member's local economy and jobs?
    - What are the constituents saying, the news media and local interest groups recommending?
    - What are the legislative staff and advisors recommending?

The Legislative Process

There are essentially two types of legislation, both of which follow the same route into law:

1) ***Authorization bills*** -- establish programs and policies, also set recommended budget levels.
2) ***Appropriations bills*** -- provide the actual funding for government programs and agencies on an annual basis

Step 1 - Committees

Most legislative activity occurs in Committee, thus giving Committee members greater influence on specific legislation. Most legislation is given public hearings by subcommittees and full committees of both the House and Senate. Amendments to legislation can be made to the bill in subcommittee and/or full committee during special Committee meetings called "mark ups."

Step 2 - The Floor

Once a bill passes through the committee process, it may be amended further on the floor of either the House or Senate.

Step 3 - Conference Committee

When both the House and Senate have passed versions of the same legislation that are different, a "Conference Committee" of both Representatives and Senators meets to work out the differences -- often additional changes are made during Conference. Both chambers must approve the new version of the legislation.

Step 4 - The President

The President can sign or veto any piece of legislation. The Congress can attempt to override a veto with a 2/3 vote. Congress can also try to amend the legislation in a manner to the President's liking or send it back through the entire committee process. Only if the President signs a bill or a veto is overridden does the legislation become law.

Members of Congress and staff often note how little people know about the legislative process. Showing that you have some knowledge will impress them, leaving a positive impact.

Building Relationships with Legislators

Before academe and industry address legislators and their staff about a particular issue, it is helpful if a professional relationship has already been established. Strong personal relationships are the best means of influencing legislative decision-making. Personal visits, letters, phone calls, and other forms of communication also are important, especially when they come from constituents who are well-known, highly regarded, and have gone out of their way to be helpful in a variety of ways in the past. Building relationships takes time and careful effort, but it is the most effective way to shape the thinking of those who decide public policy.

How do you go about building such relationships? In much the same way as you cultivate friendships: by being friendly and personally helpful, by being a useful and trustworthy source of sound information and insight, and contributing your personal time to professional and political needs and interests. Your own party affiliation should not restrict you. Every elected officeholder represents an entire state, legislative district, or local government--Republicans, Democrats, and independents alike. You do not have to be a member of the legislator's political party to work together and even to become friends.

You will need to do some homework about the key issues, economic facts, employment, industry, etc. that are important to the interests and viewpoint you represent. At the same time, familiarize yourself about the legislators with whom you want to build relationships.

Become a fountain of facts. Know the number of employees you represent in the official's state or district, the annual payroll and taxes paid, expenditures for local supplies, materials and services, investments, and philanthropic contributions and corporate sponsorships. Also, be aware of the community improvement projects that your company/university or employees support, environmental investments, contributions and activities, and facts about local safety and health standards and performance.

Some relationship-building activities are:

1. Write and/or call legislators on current issues.
2. Make personal visits either in Washington, D.C. or in the home district offices to discuss current issues or broad problems.
3. Organize group visits on issues of mutual importance.
4. Invite legislators to tour local plants and facilities, research and teaching laboratories, and meet with management and employees for discussion of problems and issues.
5. Get personally involved in legislators' campaigns and the activities of your political party.

Here are some ways you can work with your organization's government relations staff to build relationships at the federal level:

1. Develop resource relationships which officeholders can call upon at will for reliable and authoritative economic/technical information.
2. Leverage legislative influence through effective coalitions and third-party activities.
3. Provide financial support for legislators' campaigns, through individual contributions or through your organization's political action committee.

These steps will progressively build your credibility with the officeholder. Establishing a reputation as an objective data source, for example, builds credibility for subsequent communications expressing opinions on issues. Political activity establishes you as a friend whose views are likely to receive more weight than someone who writes from time to time.

Using Economic Data

Economic data and technical information are often essential to support your case on key issues. Use the data you have about operating in your area or state to illustrate how much your organization contributes in terms of wages and benefits, local purchases, taxes, and other concerns. The data can be presented as a sentence or two in a letter to a legislator, as a brief paragraph in position papers, press releases and personal visits, or in a brochure for the public or government audiences.

If scientific data are necessary to address specific issues, they must be used with sophistication. Technical experts on the staffs of policymakers may comprehend and delight in complex charts and tables, but the decision makers themselves have very low tolerance for such detail. When using charts to convey information, avoid using scientific jargon. If such terms are required, you should explain them so that a non-technical audience can understand.

When using economic and technical data, use exactly the information you need to build credibility and make the case, and then stop. Stretching data to fit the need would strain your credibility. Test the presentation by showing it to a few friends or neighbors beforehand. If they find it tiresome or confusing, there is a good chance that your target audience would, too.

Personal Visits

There is no better way to effectively make your case on issues with legislators and staff than personal visits. Such visits also are a good way to introduce yourself as a constituent. Personal meeting can be difficult to accomplish with the policymaker's busy schedule, but remember that you are offering an important business contact. You can arrange the meeting with the policymaker directly or through staff aides.

The following suggestions will help make the best use of your time and the legislator's:

1. Always make an appointment. Arranging the first meeting may require patience on your part, but be persistent. Later, as you become known as a resource, gaining appointments will be less difficult. This will occur especially if you also become known as a campaign contributor, political activist, or civic leader who can muster support on the issues from a wide variety of groups through your coalition activities.

2. Be prepared to meet with key legislative personnel or committee staff members if the legislator is unavailable at the last moment. Briefing these people before your visit also may be useful so that they can prepare the legislator. Staff aides are often more knowledgeable about details of a specific issue than lawmakers themselves.

3. If several individuals join you in the visit, decide in advance who will be the principal spokesperson. That individual, of course, should encourage others to participate in the discussion to share particular expertise or experiences.

4. If you want to discuss a specific issue, make sure you are thoroughly familiar with all aspects of it before going into the meeting.

5. When talking to legislators, try to be concise, well organized, and mindful of the other person's time. State your view firmly, but be attentive to the policy-maker's position also.

6. Open the discussion by reminding the legislators who you are, whom you represent (i.e., the Coalition for Technology Partnerships or the SET Work Group), and why you are there. Know the issue and the bill number. State your concern about the issue, how it will affect you and your organization, and the community.

7. Always be truthful and never mislead. Your personal credibility and that of the organization you represent is at stake. If you do not have the answer to a question, do not improvise. Promise to get back to the questioner with the necessary information, and be sure to do so promptly.

8. Come prepared with a brief (one-page) position paper that summarizes your points with facts, and leave it behind with the legislators or staff aides. If a lengthier document or answers to questions is relevant, send it later with a "thank-you" note.

9. To gain a favorable vote, follow up with letter(s) and calls to legislators and their key staff advisors at appropriate points as the issue progresses.

10. Maintain the relationship. Get your name on legislative mailing lists. Find occasions to see the legislators again in appropriate circumstances, and write to them on the issues from time to time. If you obtain reports or data that will be useful to legislators and their aides and that you can share with them, send those documents with a brief personal cover note. Eventually, you may even find policymakers coming to you for information, help, or your point of view on new issues.

R&D Is An Investment

Federally funded research is the Nation's foundation for future innovation.

Our core message packs a big idea into a small number of words, but it sums up the common denominator between all of the organizations participating in Congressional Visits Day. *Research should be viewed as an investment, not an expense.*

Our groups recognize that federal support for basic research in a wide variety of scientific and technological disciplines has led to the economic success our Nation enjoys today. Federal expenditure in this area is not an expense, but an investment in the future. Research takes time and only the Federal government can maintain the levels necessary to perform the very basic R&D efforts that lead to long-term national benefits.

Although some legislators and their staff are aware of the long-term nature of federally funded R&D efforts, many are not. This is the single most important message for all CVD participants to convey, that long term, steady investment is required for the Nation's research enterprise.

The federal government supports a unique research and education enterprise that fuels the American economy. This enterprise provides the underpinning of high-technology industries, expands the frontiers of knowledge, and trains future generations of scientists, engineers, and mathematicians.

Despite these facts, funding cuts loom on the horizon. It is up to the scientific and R&D community to carry the investment message to Congress. Be sure to highlight this important message in your visit with our Nation's legislators.

The Return on Federal R&D Investment

More than 50 percent of all industrial innovation and growth in the United States since World War II can be attributed to advances pioneered through scientific research.

The list of achievements is long and increases every day. Results happen -- sometimes through serendipity and sometimes by design, sometimes in a few years and sometimes not for decades. We do not know *when* they will occur, but we do know that they will.

Whether the applications are broad and enabling, or part of a new product or process, publicly funded science is at the core of our society's progress to date.

Achievements such as computer modeling of chemical structures to design drugs, the Internet, lasers, magnetic resonance imaging, and global environmental monitoring and management are well known.

> A 1997 study prepared for the National Science Foundation by CHI Research found that 73% of scientific articles cited in patent applications are based on research funded by government or foundations, showing industry's dependence on public science in developing the next generation of products and processes.[1]
>
> A five-year study released in 1997 showed that technology transfer from academic research added more than $21 billion – supporting 180,000 jobs – to the American economy each year.[2]

Although some in Congress are aware of these important facts, many are not. It is up to CVD participants to help carry this concept to policy makers. Remember our Core Message:

Federally funded research is the Nation's foundation for future innovation.

[1] The Increasing Linkage between US Technology and Public Science, by Francis Narin, et al., CHI Research (March 1997).

[2] Association of University Technology Managers Licensing Survey, FY 1991– FY 1995 (February 1997).

The Cycle of Innovation

Basic research, applied research, and development constitute a cycle which gives rise to new products and processes, new ideas and understanding, and new researchers and teachers. Each part of this cycle depends on every other. Basic research produces fundamental discoveries which underpin applied research and the development process. The resulting innovations drive economic growth, leading to new jobs and a higher quality of life. These latter stages of the cycle, in turn, stimulate questions and provide advances in instrumentation which produce new avenues for basic research. In addition, research performed at universities and colleges serves to educate the scientific and technical workforce, on which every stage of the cycle depends. This cycle of innovation is a positive-feedback loop, constantly expanding the frontiers of knowledge. Examples of innovations that followed this pattern abound:

Internet • Internet - Electronic mail, the World Wide Web, and better international telephone communications all depend on the use of tightly focused laser beams channeled through tiny strands of glass - optical fibers thinner than a human hair yet stronger than steel. These world-shrinking developments came from fundamental discoveries into the nature of light nearly a century ago.

GPS • Basic research into atomic clocks combined with satellite navigation technology led to development of the global positioning system (GPS). The ability to locate an object with pinpoint accuracy gives GPS a wide range of civilian and military uses, including aircraft navigation and collision-avoidance systems, rescue of ships lost at sea, and monitoring forest fires. This new technology has also become an important tool for basic research into earthquakes and volcanoes.

Human Genome • The sequencing and analysis of the human genome, which promises major advances in human health, has involved huge amounts of data-processing made possible only by recent advances in information technology (IT). The dramatic release of a draft sequence of the human genome earlier this year thus could not have occurred without the revolution in IT that has at its roots discoveries in basic physics.

Federal Funding of R&D

Federal funding of research and development comes in many forms. Most federal R&D funding is mission-oriented. That is, it serves to advance the goals and objectives of the agency that provides the funds. NASA, for example, funds basic research, applied research, and development as part of its broad goal of exploring space. The only federal agency that funds R&D that is not mission-oriented is the National Science Foundation, whose mission is to support basic and applied research, research facilities, and education across a wide range of science and engineering disciplines.

The federal investment of public funds in the early stages of the innovation cycle stands out as a vitally important element of the nation's scientific enterprise. While federal funding accounts for only about a quarter of total R&D in the U.S., it pays for over half of basic research. Similarly, less than seven percent of industry R&D funding goes to basic research, while nearly a quarter of federal R&D does.[3]

[3] *AAAS Report XXV: Research & Development FY 2001*, pp. 46, 75, 81 (http://www.aaas.org/spp/dspp/rd/contents.htm).

R&D in the FY 2002 Federal Budget

A Summary

For a detailed analysis of R&D in the FY 2002 budget request, please refer to the Appendix.

In recent years, the federal investment in R&D has increased significantly, rising by $7.6 billion to $90.9 billion in fiscal year (FY) 2001. This year, however, despite estimates of a large surplus, the outlook is cloudier. On April 9, President Bush released a FY 2002 budget request containing overall increases for R&D, but cuts in most of the major R&D funding agencies.

The President's budget calls for a large tax cut of $1.6 trillion over ten years, $153 billion over ten years for Medicare, a reserve for unanticipated needs, and the retirement of $2.0 trillion in publicly held debt over 10 years. These expansive proposals, however, leave little room for increases in discretionary spending, which is the one-third of the budget subject to annual appropriations decisions by Congress and the President, and is the part of the budget out of which nearly all federal R&D is funded. The budget calls for overall discretionary spending to rise 4.0 percent or $26 billion in FY 2002 to $661 billion. However, the entire increase would go just to the President's top priorities: the Department of Defense (DOD), the Department of Education, the National Institutes of Health (NIH), and a reserve for emergencies. This leaves all other discretionary programs, including R&D programs outside NIH and DOD, with flat or declining funding.

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 overall federal R&D to increase in FY 2002. But the other R&D funding agencies would decline in funding. Total R&D would increase $5.2 billion (5.8 percent) to $95.3 billion, while DOD and NIH R&D together would rise by $6.3 billion. Nondefense R&D excluding NIH, therefore, declines by about $1 billion, or 4.2 percent. As indicated in the chart below, this includes a decline in R&D funding at major agencies like the National Science Foundation, the Department of Energy, and NASA, as well as agencies with smaller R&D programs, such as the Commerce and Agriculture Departments. These numbers, however, will likely go through many changes as Congress works its will on the budget. It is crucial, therefore, to explain why this request fails to provide sufficient investment in R&D.

Highlights of R&D Funding in the FY 2002 Budget Request (billions of dollars)

Key Federal R&D Agencies	**FY 2001**	**FY 2002 Request**	**Change, FY 01-02**
Department of Defense	41.6	45.2	8.6%
Defense S&T (6.1-6.3)	*9.0*	*9.2*	*2.2%*
National Institutes of Health	19.7	22.4	13.6%
NASA	9.6	9.3	-3.3%
Department of Energy	7.7	7.4	-3.3%
Energy and Science Programs	*4.3*	*4.0*	*-7.0%*
National Science Foundation	3.3	3.2	-1.7%
Total R&D	90.0	95.3	5.8%
Defense R&D	*44.9*	*48.6*	*8.1%*
Nondefense R&D	*45.1*	*46.7*	*3.6%*
Nondefense R&D excluding NIH	*25.3*	*24.3*	*-4.2%*

Source: *AAAS Preliminary Analysis of R&D in the FY 2002 Budget* (Reproduced in full in the appendix to this briefing packet).

R&D Linkages to Education

Strengthening science, mathematics, engineering and technology (SMET) education is of critical importance to the future of our nation. Too many children now leave school without the scientific literacy necessary to deal with new technologies and their far-reaching societal implications. Our high-tech industries are starved for talent because too few Americans choose to study science and engineering. This ultimately compromises our competitive advantage in an increasingly global economy. The continued vitality of the federal research enterprise depends on a steady stream of new scientists emerging from our education system.

As Congress revises federal funding for the K-12 education system, it is clear that solutions to these pressing educational problems cannot be found in education programs alone – **support for SMET education at the K-12, undergraduate and graduate level must go hand in hand with strong federal investment in basic research**.

At the K-12 level, partnerships with research institutions can provide a hands-on experience that excites students, and gives teachers the up-to-date knowledge and enthusiasm to excite their students. The research community can lend its expertise to the K-12 system in developing curricula, teaching materials and assessments, and expanding teacher subject knowledge. At the undergraduate and graduate level, federally supported research cultivates the scientists and science educators of the future, simultaneously maintaining a vibrant research community, which creates public excitement about research and draws students to science.

1. **Elementary and Secondary Education Act (ESEA) Reauthorization**: Congress is currently rewriting the ESEA, the primary source of funding for the Department of Education (DoEd).
   - The Eisenhower professional development program (for mathematics and science teachers) would be replaced by a new "Math and Science Partnerships" program, which provides funds for partnerships between States, school districts, the mathematics or science department of an institute of higher education, and other groups. Partnerships would provide teacher professional development, recruit math and science majors to teaching, and put teachers in contact with active research. Proposed funding is $500M in the Senate and $370M in the House. The House funding structure, with grants allocated by States rather than centrally by DoEd, would result in a more widespread impact.
   - Science has been added to the core student testing provisions required of States, in addition to reading and mathematics. Concern remains that the President's proposal for additional annual testing in mathematics and reading will reduce available classroom time for science.
   - Existing teacher programs (including Eisenhower) are consolidated into a new $2.6 to $3 Billion "Teacher Quality" program. Local districts may use funds for teacher recruitment, retention and professional development.

2. **NSF Education Budget:** NSF graduate fellowship stipends would be increased, but other existing program areas within the EHR (Education and Human Resources) Directorate cut, with $100M reallocated to a new $200M Math & Science Partnerships program. "Infrastructure Partnerships" would focus on statewide planning, coordination and advisory activities, and "Action Partnerships" on locally centered efforts to improve math and science teaching and learning.

3. **Other SMET legislation:** Around 20 other new bills relate to SMET education, among them bills introduced by scientists Vern Ehlers and Rush Holt. More attention will be paid to these after ESEA reauthorization is complete. Ehlers currently has 40 cosponsors for his bills, Holt 20 cosponsors.

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The Importance of Partnerships

Research conducted in government, industrial and academic laboratories varies in style and objective. Each sector's efforts complement the others' and reinforce the excellent R&D enterprise of the United States. With recent changes in commercial and financial markets, however, industry is forced to reshape its R&D goals. Not only are foreign competitors challenging U.S. industry's stature in world markets, the pressure for short-term returns from U.S. capital markets forces the Nation's industry to focus its investment on development, which is closer to the marketplace.

> "The United States has unparalleled resources of science and technology. Its industrial research capability, universities, nonprofit research institutions, and federal laboratories are great national treasures. But in a time of severe financial constraints and heightened international competition, the Nation must maximize its returns on those assets...The time is ripe for bold steps to capitalize on the promise of partnership."
>
> **State-Federal Technology Partnership Task Force Report, co-chaired by former Governors Dick Thornburgh (R-PA) and Richard Celeste (D-OH)**

The federal government plays a crucial role in R&D partnerships. It can create an environment conducive to collaborations among federal, industrial, and academic researchers. For example, **Cooperative Research and Development Agreements** give companies access to the expertise and facilities of federal labs for specified R&D. The Department of Energy's Stockpile Stewardship Program creates partnerships with industry and universities to manage our nation's nuclear weapons and develop the most advanced supercomputing capability.

Under the National Institute of Standards and Technology's **Advanced Technology Program**, the federal government shares the costs of research on high-risk technologies that underlie a broad spectrum of potential new applications, commercial products, and services. The **Manufacturing Extension Program** aims to accelerate the transfer of advanced manufacturing technology to small and medium-sized, U.S.-based manufacturing firms.

The newly introduced **National Nanotechnology Initiative** largely is directed toward university-based research across a variety of disciplines. Many advances will come at the interfaces between areas and will require multidisciplinary partnerships involving federal-university-industry teams.

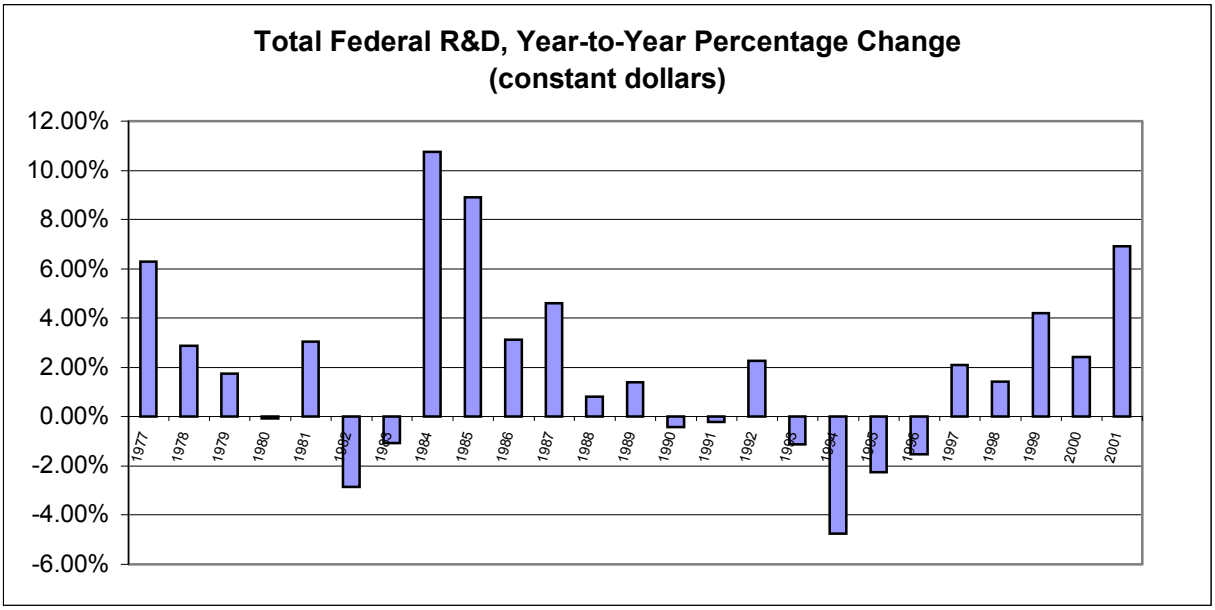
Seven federal agencies support the **Experimental Program to Stimulate Competitive Research** (EPSCoR), a federal-state partnership that provides funds for research activities at universities and non-profit organizations in those states that historically have not received significant federal R&D funding.

The Coalition for Technology Partnerships and the Science-Engineering-Technology Work Group encourage legislators to sustain and enhance the federal government's role in R&D partnerships.

The Nation Needs a Sustained Federal Investment in Research

Over the last several years, a call has gone out from the research community for a doubling of federal science agency budgets. The National Research Investment Act of 1999, passed in the 106th Senate, called for doubling, over eleven years, of all agency budgets that support non-defense science. Lately, there have been calls for doubling, over five years, the budgets of specific science agencies: NIH, NSF, and the Office of Science of DOE.

Rhetoric for doubling science budgets is an outgrowth of the frustration of the scientific community and others, because of the **lack of a comprehensive, consistent federal plan to support science, mathematics and engineering research.** One easily discerns this from considering the chart below.



Simply doubling agency science budgets is only a short-term fix. Yes, many agencies' science budgets have dropped precipitously over the last ten years. These drops in funding should be remedied by quick enhancements.

However, once the enhancements are completed (soon we hope) **a long-term comprehensive and consistent plan is needed**. Arguments for such a plan are all around us: the maintenance of the U.S. leadership in science, medicine, and technology, the security of a constantly enhanced quality of life, the overall economic well being of our Nation, and, of course, national security.

Federally funded research is the Nation's foundation for future innovation.

Department Of Agriculture R&D

Budgetary Issues

The proposed FY2002 budget for USDA is $94.9 billion (program level). About a third, or $32.0 billion, is discretionary while about two-thirds, or $62.8 billion, is mandatory spending.

Most of the basic and applied research in the Department is administered through the Research, Education, and Economics (REE) mission area. Its four agencies are responsible for the discovery, application, and dissemination of information and technologies spanning the biological, physical, and social sciences through agricultural research, education and extension activities as well as economic and statistical analysis.

REE is slated to receive $2.1 billion, or 2.3% of the total USDA budget, a reduction of 7% from its 2001 budget and about the same level as provided in 2000. The FY2002 request for each of the four REE agencies is:

- Agricultural Research Service (ARS): $969 million
- Cooperative State Research, Education and Extension Service (CSREES): $994 million
- Economic Research Service (ERS): $67 million
- National Agricultural Statistics Service (NASS): $114 million

USDA's ARS is the principal in-house natural and biological sciences research agency, while its CSREES provides funding for projects conducted at the State Agricultural Experiment Stations, State Cooperative Extension Systems, land-grant universities, and other research and education institutions.

Funding for the two major competitive grant programs within CSREES, the National Research Initiative (NRI) and the Initiative for Future Agriculture and Food Systems (IFAFS), is requested at the 2001 funding levels of $106 million and $120 million, respectively. An additional $30 million will be available for the Fund for Rural America, a portion of which will also be used to support competitive grants.

R&D is also conducted in USDA's Forest Service (FS) although its funding is appropriated by the House and Senate Appropriations Subcommittees on Interior rather than on Agriculture. FS Forest and Rangeland Research comprises four categories: vegetation management and protection; wildlife, fisheries, and air; resource valuation and use; and inventory and monitoring.

The FY2002 USDA Forest Service budget request is $235 million, which is not changed from last year's level and represents only a 2.5% increase above its FY2000 funding level. The only increase this year is an additional $6 million for uncontrollable costs.

Background Information

The scientific discoveries and innovations achieved through agricultural research are essential for the United States to maintain a safe, nutritious, abundant and relatively inexpensive food supply while reducing environmental pollution and remaining competitive in international trade.

Increase requests this year for specific research in areas such as alternative energy sources, animal health, and biotechnology should not come at the expense of other REE programs.

Champions and Players

Senate Agriculture, Nutrition and Forest Committee	
Richard Lugar (R-IN), Chair	Tom Harkin (D-IA), Ranking Member
Senate Appropriations Subcommittee on Agriculture, Rural Development and Related Agencies	
Thad Cochran (R-MS), Chair	Herbert Kohl (D-WI), Ranking Member
House Agriculture Committee	
Larry Combest (R-TX), Chair	Charles Stenholm (D-TX), Ranking Member
House Appropriations Subcommittee on Agriculture, Rural Development, FDA, and Related Agencies	
Henry Bonilla (R-TX), Chair	Marcy Kaptur (D-OH), Ranking Member

Department Of Commerce R&D

National Institute for Standards and Technology

The National Institute of Standards and Technology (NIST) is an agency of the U.S. Department of Commerce. Its primary mission is to promote U.S. economic growth and competitiveness by working with industry to develop and apply technology, measurements, and standards. NIST also assists industry through the Manufacturing Extension Partnership (MEP), which makes technological information and expertise available to smaller manufacturers, and the Advanced Technology Program (ATP), which supports businesses' development of pre-competitive technologies.

In 2002: NIST laboratories will offer 1,350 standard reference materials and 68 standard reference data titles, a 2.7 percent and three percent increase, respectively, over the 2001 level. MEP will serve more than 37,000 clients, increase their sales by $24 million, and generate $134 million in additional capital investments. New ATP awards will be suspended. The program will be reevaluated to determine whether it is still warranted.

The FY 2002 budget request of $487.5 million for NIST is divided into three appropriations:

$347.3 million for efforts under the Scientific and Technical Research and Services (STRS) appropriation that includes funding for (1) the NIST Laboratories ($336.9 million), (2) the Baldrige National Quality Program ($5.4 million) and (3) the Critical Infrastructure Protection Grants Program ($5 million).

$119.3 million for technology development and industrial outreach under the Industrial Technology Services (ITS) appropriation that includes (1) cost-shared funding to industry for high-risk research and development through the Advanced Technology Program ($13 million, plus carryover from the previous year and recoveries coming to a total operating budget of $79.9 million); and (2) widely distributed services and hands-on technical assistance to small and medium-sized manufacturers through a nationwide network of centers under the Manufacturing Extension Partnership ($106.3 million).

$20.9 million under the Construction of Research Facilities (CRF) appropriation to address the highest priority safety, capacity, maintenance and major repair projects required to operate NIST's research facilities in Gaithersburg, Md., and Boulder, Colo., some of which are 30 to 45 years old.

ATP supports market incentives and encourages companies to invest for the long-term, high-risk, high-payoff technologies. It is a cost-effective means for promoting research that strengthens US industry. By sharing at least half of the cost of research, the program encourages firms to develop technologies that they would be unable to do alone, and the cost-share requirement encourages university-industry partnerships. If US industry is to compete effectively with other nations, programs such as the ATP must have continued strong support from the federal government.

National Oceanic and Atmospheric Administration (NOAA)

Budgetary and Other Issues - UPDATED

The president has requested $3.15 billion, a $61 million (1.8%) cut from FY 2001 levels, for the National Oceanic and Atmospheric Administration (NOAA), also an agency within the Department of Commerce. Approximately 20 percent of that total is allocated to R&D. Increases are focused on severe weather prediction, coastal conservation, living marine resources, and climate. NOAA's Office of Oceanic and Atmospheric Research (OAR) would receive $340.8 million, a $11.2 million (3.4%) increase. The OAR request includes $158.5 million for Climate and Air Quality Research, a $14.4 million increase over FY 2001; $51.8 million for Atmospheric Programs, up $3.7 million; and $119.8 million for Oceans and Great Lakes Programs, down $2.5 million. Within that total, the Ocean Exploration Program would receive $14.0 million, up 250%. These funds will be used to deploy six missions to map the physical, geological, biological, chemical, and archaeological aspects of the Exclusive Economic Zone – the offshore area surrounding the US. Elsewhere in NOAA, large cuts go to the National Estuarine Research Reserve program, down 52.7% to $26.3 million.

NOAA supports environmental assessment and prediction through research on both weather - short-term, seasonal to interannual, and decadal to centennial - and safe navigation. NOAA also promotes environmental stewardship through building sustainable fisheries, sustaining healthy coasts, and recovering protected species. In addition, NOAA educates students and teachers through the National Sea Grant Program. The administration requested a slight increase in base funding for Sea Grant, from $62.3 million in FY01 to $62.4 million for FY02. Sea Grant is a partnership between the nation's universities and NOAA that began in 1966. The program comprises research activities and education programs at the graduate and undergraduate level, as well as K-12 curriculum development and teacher training.

Champions and Players for NIST and NOAA

House Appropriations Subcommittee on Commerce, Justice, State and Judiciary	
Frank Wolf (R-VA), Chair	José Serrano (D-NY), Ranking Member
Senate Appropriations Subcommittee on Commerce, Justice, State and Judiciary	
Judd Gregg (R-NH), Chair	Ernest Hollings (D-SC), Ranking Member
House Environment, Technology, and Standards Subcommittee	
Vernon Ehlers (R-MI), Chair	James Barcia (D-MI), Ranking Member
House Fisheries Conservation, Wildlife and Oceans Subcommittee	
Wayne Gilchrest (R-MD), Chair	Robert Underwood (D-GU), Ranking Member
Senate Commerce, Science and Transportation Committee	
John McCain (R-AZ), Chair	Ernest Hollings (D-SC), Ranking Member

A House Oceans Caucus aimed at increasing House of Representative awareness about ocean policy is co-chaired by Rep. Curt Weldon (R-PA), Rep. Sam Farr (D-CA), Rep. Jim Greenwood (R-PA), and Rep. Tom Allen (D-ME).

Department Of Defense R&D

Budgetary Issues

Although R&D in the Department of Defense (DOD) increased during FY2001, it is still below the FY1993 funding level in real dollars. Last year, Congress passed generous increases for both basic research (6.1) and applied research (6.2) allocations. In the end, 6.1 allocations received a 14.2% or $166 million increase to total $1.3 billion, and 6.2 allocations received a 9.0% or $308 million increase to total $3.7 billion.

The President's budget outline released in February included $2.6 billion over last year for a Department of Defense (DOD) research and development initiative. However, because the Department of Defense is awaiting the results of the defense strategy review currently underway, a full budget proposal has not yet been released.

Administration sources estimate it will be May or June before any specific defense budget numbers are released. The President's proposed defense R&D initiative will include funding for "missile defense alternatives and new technologies to support the transformation of U.S. military capabilities." It is unclear what portion of the defense R&D initiative will go to the basic and applied research accounts.

The long-term erosion of DOD R&D has garnered attention on and off Capitol Hill. In 1998, the Defense Science Board (DSB) published a report warning that the Department was not investing enough in its science and technology (S&T) programs. Using the amounts invested in R&D by successful advanced technology industries as its yardstick, the DSB report recommended that DOD should invest approximately $8 billion in S&T for FY2000.

In response to concerns that defense R&D was being cut too deeply, Congress mandated in the 1999 Defense Authorization bill that the Pentagon increase defense S&T programs by 2% above inflation annually. Congress also required the establishment of an independent committee to provide oversight of Defense S&T programs.

Supporting Arguments and Background Information

The DOD basic research budget is approximately 0.5% of the total DOD budget, and until recently has not drawn much attention from members of Congress. The primary objective of 6.1 and 6.2 programs is to provide the means to develop new technologies and capabilities that can be used by the military in order to maintain a technologically superior military force.

By making an investment in scientific research, DOD is able to better understand the fundamentals of the areas of science relevant to the military and help cultivate the scientific and engineering human resources needed by the Nation.

Most DOD basic research is performed in academia thus providing a major federal investment in the university research infrastructure and in future US scientists and engineers. Over 250 US universities received research funding from DOD.

The Department invests in many fields and is a significant source of funding for engineering (39% of all federal funding, according to NSF Science & Engineering Indicators - 2000), electrical engineering (65%), computer science (48%), mathematics (18%), environmental sciences (15%), physical sciences (9%), cognitive sciences (7%), and the life sciences (2%).

Champions and Players

House Appropriations Subcommittee on Defense	
Jerry Lewis (R-CA), Chair	John Murtha (D-PA), Ranking Member
House Armed Services Subcommittee on Military Research and Development	
Duncan Hunter (R-CA), Chair	Neil Abercrombie (D-HI), Ranking Member
Senate Appropriations Subcommittee on Defense	
Ted Stevens (R-AK), Chair	Daniel Inouye (D-HI)
Senate Armed Services Subcommittee on Emerging Threats and Capabilities	
Pat Roberts (R-KS), Chair	Mary Landrieu (D-LA), Ranking Member

During the recent Senate debate on the budget resolution, Senator Rick Santorum (R-PA) successfully offered an amendment to increase funding for Department of Defense basic research conducted in universities by $353 million over FY 2001 levels. Other champions of DOD research programs include Senators Jeff Bingaman (D-NM), Joseph Lieberman (D-CT), and Representatives Curt Weldon (R-PA) and Tony Hall (D-OH).

Department Of Energy R&D

Budgetary Issues

Reductions to the Department of Energy's (DOE) R&D budget proposed by the Administration would damage operation of major national user facilities, hamper the ability of universities to educate and train the next generation of scientists and place at risk our nation's energy security and environmental quality. In opposition, the Senate unanimously adopted a 15 percent increase for DOE Science in the Budget Resolution.

The President's FY 2002 request would reduce the DOE budget by $500 million or 2.5 percent. Excluding the emergency appropriation for the Cerro Grande fire in FY 2001, the DOE budget would still experience a decline of $300 million.

To achieve the necessary savings, the Administration would cut Renewable Energy by 36.4 percent, Nuclear Energy by 9.3 percent and Conservation R&D by 46.3 percent. While Fossil Fuel R&D would drop by $92 million or 17.1 percent, Clean Coal Technology would rise $200 million.

The budget would provide the Office of Science with a 0.1 percent increase, but accounting for administrative costs, research would actually decline by 0.8 percent.

To accommodate the construction cost for the Spallation Neutron Source project and to allow Fermilab and the Stanford Linear Accelerator Center to bring their new high-energy physics detectors on line, the Department would be forced to scale back university research by as much as 5 percent. It would also have to reduce operating time at the Brookhaven Relativistic Heavy Ion Collider by 25 percent and defer until future years $9.9 million of the U.S. construction commitment to the international Large Hadron Collider project at CERN in Geneva, Switzerland.

In contrast with civilian R&D, DOE's Defense Programs would receive 4.1 percent more for Stockpile Stewardship and 11.5 percent more for construction of the National Ignition Facility.

Supporting Arguments

The DOE is the third largest federal sponsor of basic research and the largest supporter of research in the physical sciences. In addition to its extramural programs, DOE maintains major research facilities -- widely considered jewels in the federal science enterprise -- that are used by universities, industries and other government agencies, including the National Institutes of Health.

The Department is also charged with studying and developing reliable and affordable fuel sources that are essential for safeguarding national security, supporting a high quality of life, increasing productivity, improving economic competitiveness, and protecting the environment.

These goals require a balanced portfolio of energy technologies, including advanced fossil fuels, nuclear fission and fusion, solar, renewables and conservation. In 1998 the President's Advisory Council on Science & Technology (PCAST) stated, "For reasons of economy, environment, security, and stature as a world power

alike, the United States must maintain its leadership in the science and technology of energy supply and use." The Cheney Energy Task Force is expected to echo this sentiment.

Champions and Players

House Appropriations Subcommittee on Energy & Water Development	
Pete Domenici (R-NM), Chair	Harry Reid (D-NV), Ranking Member
Senate Appropriations Subcommittee on Energy & Water Development	
Sonny Callahan (R-AL), Chair	Peter Visclosky (D-IN), Ranking Member

Domenici, a founding member of the bipartisan Senate Science and Technology Caucus and chair of the Energy and Water Appropriations Subcommittee, is regarded by his colleagues as one of the most forceful advocates of scientific research throughout government. His state is home to two DOE weapons laboratories, Los Alamos and Sandia, but his support for the Department goes much deeper than its defense programs.

Department of the Interior R&D

Budgetary Issues

The vast majority of Interior's research is conducted by the U.S. Geological Survey (USGS), for which the President has requested $813.4 million, a decrease of $70 million (8%) from FY2001. The actual decrease is $93.7 million, because the Administration's budget also proposes to fund "uncontrollables" such as salary increases from program and research funding. The Administration states that the decrease returns USGS to FY2000 levels, but the 7% increase in FY2001 merely compensated for years of stagnant budgets at USGS. It also fails to adjust the FY2000 appropriated funding level for two years of inflation.

The request for the Biological Resources Division is $149.3 million, down 7.0%. The Geologic Division would receive $213.8 million, down 5.1 % from FY 2001. The Water Resources Division is by far the hardest hit of the four divisions, taking a 21.6 % reduction to $159.5 million in FY 2002. The National Mapping Division would receive $123.7 million, a 5.2 % cut.

Some of the specific programs that will be affected by these cuts are:

In the Biological Resources Division
- The National Biological Information Infrastructure ($5 million) would be eliminated.
- The Gap Analysis Program (GAP) reverts to FY2000 levels, which would slow completion of the terrestrial analysis in eight states, delay the southwest regional GAP, and eliminate the aquatic GAP ($3.5 million).
- Research on the treatment of ballast water to prevent the spread of non-native invasive species would be jeopardized ($0.5 million).
- The Center for Biological Informatics would close ($1.5 million). CBI supports the Integrated Taxonomic Information System (ITIS)- a partnership of six Federal agencies jointly working with the world taxonomic community to create a widely accessible taxonomic and nomenclatural standard reference for biota; the National Park Service Vegetation Mapping Program, the Invasive Species website, and Frogweb are also services of CBI.

In the Geologic Division
- The National Cooperative Geologic Mapping program would receive a $6 million cut.
- The USGS partnership with the Central Great Lakes Geologic Mapping Coalition would be eliminated, saving USGS $0.5 million.
- Global change research would be reduced by $3 million.
- The international minerals information program ($2 million) would be eliminated.

In the Water Resources Division
- The Toxic Substances Hydrology program ($10 million) would be eliminated.
- The National Water-Quality Assessment (NAWQA) program would be reduced by $20 million, effectively halting its next phase. These programs are being cut because they primarily benefit entities outside the Department -- including other federal agencies, state and local government, and foreign governments. USGS is expected to seek funding from the partners who "rely on USGS to provide information to help them fulfill their own mission-critical responsibilities," although some of those agencies, such as the EPA, are faced with deep budget cuts, too.

In the National Mapping Division
- The request eliminates funding for the OhioView consortium ($3 million).
- The Urban Dynamics program ($1.1 million) would be dropped.
- The Mapping Information and Delivery program loses $2.5 million.
- Another $2 million for Mapping State Planning Partnerships would be eliminated - all part of "shifting the costs of information delivery to the program beneficiaries."

Although USGS is the sole science-oriented agency within DOI, other Interior agencies, such as the Minerals Management Service (MMS) and the National Park Service, do fund small amounts of R&D. Resource Stewardship at the National Park Service supports a few R&D projects related to the Natural Resources Challenge, a five-year action plan for improving resource management at parks.

Supporting Arguments

With no regulatory or management functions, the USGS is the principal source of independent scientific data on the nation's fresh water, natural hazards, and energy and mineral resources. Research conducted by USGS generates information needed to reduce risks to people from environmental hazards such as earthquakes and floods. It also helps find solutions to challenging environmental problems ranging from drinking water quality to the management of natural resources. The USGS also monitors the nation's supply of water, energy, and mineral resources. USGS research is critical to proper management of the 650 million acres of land managed by the U.S. Fish and Wildlife Service, National Park Service, U.S. Forest Service, and Bureau of Land Management, and is increasingly used by state and local planners across the country. The Biological Resources Division is comprised of the research scientists from the DOI natural resource and land management agencies who first formed the National Biological Survey, later renamed the National Biological Service, and eventually became part of USGS in 1995.

Champions and Players

House Appropriations Subcommittee on Interior & Related Agencies	
Joe Skeen (R-NM), Chair	Norm Dicks (D-WA), Ranking Member
Senate Appropriations Subcommittee on Interior & Related Agencies	
Conrad Burns (R-MT), Chair	Robert Byrd (D-WV), Ranking Member
House Resources Committee	
James Hansen (R-UT), Chair	Nick Rahall II (D-WV), Ranking Member
Senate Energy and Natural Resources Committee	
Frank Murkowski (R-AK), Chair	Jeff Bingaman (D-NM), Ranking Member
Senate Environment and Public Works Committee	
Robert Smith (R-NH), Chair	Harry Reid (D-NV), Ranking Member

Department of Transportation R&D

Budgetary Issues

Research and Development for the Department of Transportation would increase 7.0 percent in fiscal year 2002 to $795 million. Following are some key areas of interest:

- Intelligent Transportation Systems (ITS) would receive $253.2 million; an increase of 32 percent over the FY2001 enacted level. ITS supports development of technologies to enhance the safety and efficiency of surface transportation infrastructure, including interactive traffic controls, traveler information systems and advanced automated toll clearance systems.
- Next Generation High-Speed Rail research would receive $25 million, the same level as FY2001.
- Within the National Highway Traffic Safety Administration, $57 million is requested for the National Transportation Biomechanics Research Center (NTBRC), which studies the effects on the human body of highway crashes, leading to safer vehicle design. The NTBRC also performs crash avoidance research to support programs such as the effectiveness of anti-lock braking systems, light vehicle rollover, and heavy vehicle visibility. Further initiatives include tire safety, dynamic rollover, and child safety seat testing.
- Aviation research funding within the Federal Aviation Administration would receive a minimal increase, $1 million, above the FY2001 enacted level of $187 million. This includes research into aircraft structures and materials, explosive detection technologies, and other security initiatives.

Issues to Know About

Those CVD participants visiting representatives who are members of the House Transportation and Infrastructure Committee or the Senate Commerce, Science, and Transportation Committee, should request support for the full amount of transportation R&D funding requested by the administration and authorized by the TEA-21 bill (see below).

Authorization for Department of Transportation R&D programs was completed with passage of the landmark, 6-year Transportation Efficiency Act for the 21st Century (TEA-21) in 1998.

Even though TEA-21 authorizes funding for DOT programs, appropriations legislation must originate in the House Appropriations Subcommittee on Transportation and Related Agencies, chaired by Congressman Harold Rogers (R-KY).

Champions and Players

House Appropriations Subcommittee on Transportation and Related Agencies	
Harold Rogers (R-KY), Chair	Martin Olav Sabo (D-MN), Ranking Member
Senate Appropriations Subcommittee on Transportation and Related Agencies	
Richard Shelby (R-AL), Chair	Frank Lautenberg (D-NJ), Ranking Member

National Aeronautics and Space Administration

Budgetary Issues and Issues to Know About

The President has requested $14.5 billion for NASA in FY2002, of which AAAS estimates $9.3 billion would go for R&D (down 3.3 percent from enacted FY2001 levels). NASA has proposed a major restructuring of its accounts, which would move mission support costs into specific program costs. This has confused the exact comparison between this year and prior year budgets. Space science increases by about 6.2% to $2.8 billion. Earth science sees large decreases of nearly 12% to $1.5 billion. The former enterprise of Life and Microgravity Sciences has been renamed Biological and Physical Research and sees a decline of 4.7% to $361 million overall. Aerospace Technology sees an increase of about 7% to $2.4 billion. This large increase is due to a large increase for the Space Launch Initiative to develop reusable launch vehicles.

The International Space Station (ISS or 'Station') will receive a cut of 1.2% to a funding level of $2.1 billion. There are no details in the President's budget request for the ISS, as the entire project is undergoing a major review. Due to continuing cost overruns, it is likely the station will be seriously scaled-down.

In a House Science Committee Hearing in March of this year, Chairman Boehlert and other committee members stressed that the science and technology research efforts taking place at NASA were not to be cut back to cover the expanding costs of the ISS. This "firewall" concept guarantees the preservation of the scientific research efforts at NASA, despite cost Station cost overruns.

Supporting Arguments

NASA's support for basic scientific research has stretched the vistas of imagination, expanding our knowledge of the solar system and the universe — answering questions and creating new ones. NASA has developed a strong strategic plan that continues to guide the agency in fulfilling its mission. This strategic plan has resonated with OMB and Congress and is heavily focused on science and technology research.

A well-balanced and vigorous civil aeronautics and space program is critical for advancing science and technology and for improving economic competitiveness. Investments in civil aerospace R&D help to maintain our leadership in the modern world. Support for Earth Science programs has allowed us to improve our understanding of our own planet, including its weather, atmospheric, oceanic and geophysical processes. NASA is one of the most liked Federal agencies by the American public.

Champions and Players

House Science Committee	
Sherwood Boehlert (R-NY), Chair	Ralph Hall (D-TX), Ranking Member
Dana Rohrabacher (R-CA), Space Subcmte. Chair	Bart Gordon (D-TN), Space Subcmte. Ranking Member
House Appropriations Subcommittee on VA/HUD & Independent Agencies	
James Walsh (R-NY), Chair	Alan Mollahan (D-WV), Ranking Member
Senate Appropriations Subcommittee on VA/HUD & Independent Agencies	
Christopher Bond (R-MO), Chair	Barbara Mikulski (D-MD)*

* Sen. Mikulski remains one of the strongest voices for NASA and especially the Goddard Space Flight Center, which is the center for all earth-science programs, including ESE.

National Institutes of Health

Budgetary Issues

Congressional support for NIH continues to be strong, as demonstrated by ~14% increase afforded NIH in FY2001. In addition to being mentioned as one of President Bush's campaign promises, the continued bipartisan commitment of several leading members of Congress to double NIH support by FY 2003 continues.

For FY2002, the Administration has proposed a 13.5% increase for NIH, considerably more than last year's initial proposed increase of 5.6% (which was dramatically increased by Congress). The rapid increase in support for NIH may now serve as a liability as the promise of a tax cut forces budget cutters to search everywhere for possible savings. Some members of Congress are also skeptical about the ability of NIH to manage large funding increases.

NIH would receive $23.042 billion under the President's request. The FY 2002 request represents the fourth installment in a five-year plan to double the budget of the NIH. It remains open to debate what will happen to NIH's budget after the fifth year of this period of ramped up growth.

Supporting Arguments

NIH-supported basic research is the foundation of our nation's healthcare effort. Such research provides a basis not only for improved health and well-being, but also for economic savings and enhanced global competitiveness. (Examples include billions of dollars in savings from the test of transfusion blood for AIDS, and the positive balance of trade of the pharmaceutical and biotechnology industries.) If the dramatic advances of the last decade are to continue, this research must receive adequate and stable support. It should also be noted that 82% of the research funds for NIH go to its extramural programs, which support research at universities and medical schools across the country.

Champions and Players

Senate Appropriations Subcommittee on Labor, Health & Human Services, Education	
Arlen Specter (R-PA), Chair	Tom Harkin (D-IA), Ranking Member
House Appropriations Subcommittee on Labor, Health & Human Services, Education	
Ralph Regula (R-OH), Chair	David Obey (D-WI), Ranking Member

Other champions include Senator Barbara Mikulski (D-MD), in whose state NIH is located, Rep. Connie Morella (R-MD), in whose district NIH is located, and Sen. Connie Mack (R-FL), who co-chairs the Senate Cancer Coalition.

National Science Foundation

Budgetary Issues and Issues to Know About

For FY 2002, the President has requested $4.47 billion for the NSF, a $56 million or 1.3% increase over FY 2001 appropriated levels. This budget is in contrast to the $519 million (13.3% increase) above the FY 2000 budget the NSF received in FY 2001. New initiatives include *Math and Science Partnerships*, *Financial Support for Graduate Students*, and *Interdisciplinary Mathematics*. Priority areas, carried over from the FY 2001 initiatives, are *Biocomplexity in the Environment*, *Information Technology Research*, *Nanoscale Science and Engineering*, and *Learning for the 21st Century*.

Supporting Arguments

Over the past half century, the NSF has had monumental impact on our society. Investment in the NSF has paid dividends in building the infrastructure of the individual scientific disciplines, as well as laid the groundwork for innovative interdisciplinary research to meet modern day scientific and technical challenges. Many new methods and products arise from the NSF investment in research, such as geographic information systems, World Wide Web search engines, automatic heart defibrillators, product bar codes, computer aided modeling (CAD/CAM), retinal implants, optical fibers, magnetic resonance imaging technology, and composite materials used in aircraft. NSF-sponsored research has triggered huge advances in understanding our planet's natural processes, which provides a sound scientific framework for better decision-making about Earth's natural environment.

These methods, products, and advances in understanding accrue from basic research performed over many years, not always pre-determined research efforts aimed toward a specific result. Furthermore, the NSF traditionally receives high marks for efficiency – less than four percent of the agency's budget is spent on administration and management.

Background Information

The NSF is the fifth-largest source of research funding in the federal government, the primary source of federal support for non-medical basic research in colleges and universities, and is the sole federal agency tasked with maintaining the health of basic research and science education. The Foundation funds research and education in the sciences and engineering through peer-reviewed grants and cooperative agreements to more than 2000 colleges, universities, K-12 schools, businesses, and other research institutions. Approximately 10,000 new grant awards are supported each year and during any given year, approximately 20,000 awards support almost 200,000 people. NSF also invests in many large, multi-user, state-of-the-art research facilities that are vital to the progress of research in many areas of science.

Champions and Players

Most members of Congress readily acknowledge that federal support for basic research and education is important, particularly for the programs supported through the NSF. Over the last two years, two strong

Congressional advocates for NSF have stepped forward, Senators Christopher "Kit" Bond (R-MO) and Barbara Mikulski (D-MD).

Senators Bond and Mikulski advocate for the doubling of the NSF budget over five years. These two Senators were instrumental helping the NSF receive its largest budget increase ever in FY 2001. Other Members of Congress publicly supporting the NSF are Representatives David Wu (D-OR), Eddie Bernice Johnson (D-TX), James Walsh (R-NY), and Sherwood Boehlert (R-NY).

House Appropriations Subcommittee on VA/HUD & Independent Agencies	
James Walsh (R-NY), Chair	Alan Mollahan (D-WV), Ranking Member
Senate Appropriations Subcommittee on VA/HUD & Independent Agencies	
Christopher Bond (R-MO), Chair	Barbara Mikulski (D-MD)*

APPENDIX

AAAS Preliminary Analysis of R&D in the FY 2002 Budget

Bush Administration Proposes Cuts to Most R&D Agencies

(All figures in this analysis are **preliminary** and will be revised in later AAAS releases. This analysis is a preview of the forthcoming *AAAS Report XXVI: Research and Development FY 2002*, a comprehensive look at the President's budget for R&D in FY 2002. More tables and continually updated supplemental materials on R&D in the FY 2002 budget can be found on the AAAS R&D Web site at http://www.aaas.org/spp/R&D.)

On April 9, President Bush released a FY 2002 budget request containing overall increases for the federal investment in R&D, but cuts in most of the major R&D funding agencies. The full request follows on a February 28 budget 'blueprint' offering the broad outlines of his FY 2002 budget. The budget calls for a large tax cut of $1.6 trillion over ten years, $153 billion over ten years for Medicare, a reserve for unanticipated needs, and the retirement of $2.0 trillion in publicly held debt over 10 years. These expansive 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 budget calls for overall 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 R&D programs outside NIH and DOD, with flat or declining funding.

R&D in the FY 2002 Budget: Increases for NIH and DOD, Cuts for Other Agencies

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 overall federal R&D to increase in FY 2002. But the other R&D funding agencies would fare slightly worse than other, non-priority discretionary programs and

would decline in funding. (All figures in this release are preliminary and will be revised in later AAAS releases with revised agency data.)

- The request for **total federal R&D** in FY 2002 is a record $95.3 billion, $5.2 billion or 5.8 percent more than FY 2001 (see Table 1). The proposed increases for DOD ($3.6 billion) and NIH ($2.7 billion) account for more than the overall $5.2 billion increase, leaving all other R&D funding agencies combined with less money than in FY 2001.

- **Seven of the 10 largest R&D funding agencies would see their R&D decline** in FY 2002 (see Figure 1, next page). Only NIH, DOD, and the Department of Transportation (DOT, because of guaranteed funding from transportation trust funds) would see increases.

- **Nondefense R&D** would increase by 3.6 percent or $1.6 billion to $46.7 billion, an increase greater than the expected rate of inflation of 2.1 percent. 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 4.2 percent** to $24.3 billion, a loss of $1.1 billion.

- **Defense R&D** would jump by 8.1 percent or $3.6 billion to reach $48.6 billion. Although defense and nondefense R&D reached parity in FY 2001 for the first time in twenty years, a Clinton Administration goal, the Bush Administration would aggressively expand defense R&D investments. DOD did not submit a full FY 2002 budget this week; the agency is currently undergoing a major review of defense spending priorities that is expected to result in a full FY 2002 request in May. Most of the DOD request consists of placeholder figures assuming the FY 2001 budget plus inflation, but there is also a special request for an extra $2.6 billion in unallocated funds for DOD development. Defense R&D in the Department of Energy (DOE) would grow by a modest 1.3 percent to $3.4 billion.

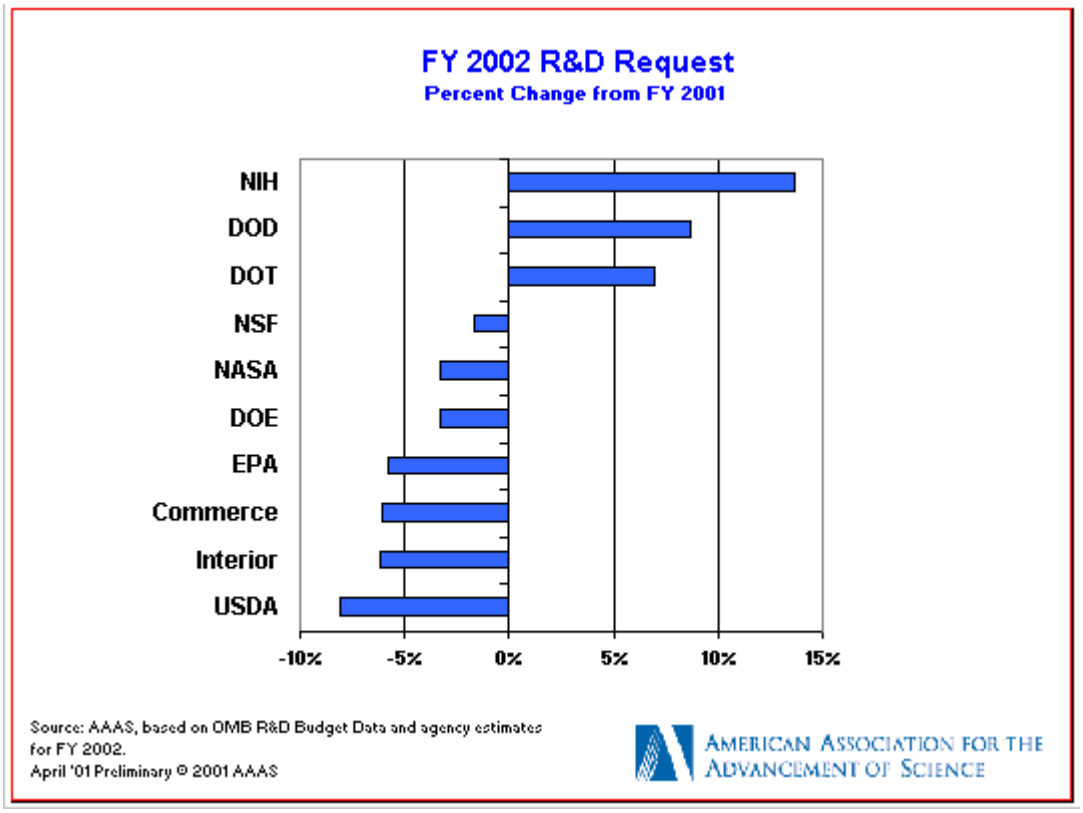


Figure 1.

- The federal investment in **basic research** would grow by 6.1 percent or $1.3 billion to an all-time high of $23.4 billion, primarily because of a 12.4 percent requested increase for basic research in NIH (see Table 2). Because of annual increases of over 10 percent for NIH for the past several years, NIH has supported the majority of federal basic research since FY 2000 and in FY 2002 would provide 56 percent of all federal support. Although other federal agencies have enjoyed smaller increases in their basic research programs for the past several years, **basic research excluding NIH would decline 1.0 percent** to $10.4 billion in FY 2002. Compared to a more than 10 percent increase in FY 2001, the National Science Foundation (NSF), the second largest funding source for basic research, would see its investments barely increase by 0.1 percent in FY 2002.

- The total federal investment in **research** (basic and applied research) would increase 5.0 percent to $44.9 billion in FY 2002 (see Table 2), but again a large increase for NIH (up 12.9 percent to $22.0 billion) is responsible. **Without NIH, total federal research would fall 1.5 percent** or $357 million to $22.9 billion.

- The high priority placed by the Administration on defense and health is evident in Table 3, which shows federal **R&D by mission area**. Defense R&D (up 8.1 percent) and health R&D (up 11.8 percent) would increase substantially. Space R&D would increase slightly by 1.1 percent to $8.8 billion because of major shifts in the National Aeronautics and Space Administration's (NASA) R&D toward space and away from aeronautics (transportation), but **R&D funding for all the other major mission areas would decline**. There would be particularly steep cuts to energy-related R&D

(down 19.0 percent), transportation R&D (down 21.8 percent), and commerce-related R&D (down 17.6 percent).

- 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. Within a shrinking research budget, NSF's lead contribution to the initiative would rise by $24 million or 16.1 percent to $174 million. After a nearly 30 percent increase last year, funding for the **Networking and Information Technology R&D** initiative would rise by a more modest 2.1 percent to $2.0 billion. Much of the increase would be in NIH's contribution, while other agencies would each receive a few million dollars more. The **U.S. Global Change Research Program** would see its funding decline by 4.4 percent to $1.6 billion, mostly because of steep cuts in NASA's Earth Science program, the largest component of the initiative.

- The Office of Management and Budget (OMB) has introduced a new 'Federal Science and Technology' (FS&T) budget in the FY 2002 budget (see Table 4). The **FS&T budget** is successor to the Clinton Administration's "21st Century Research Fund" and contains most of the same programs. FS&T is a collection of selected R&D and non-R&D programs that emphasize basic and applied research and the creation of new knowledge or technologies. It also includes some S&T education and training activities but excludes most development, and is designed to be an alternative measure for the federal investment in science and technology. (This FS&T budget has a similar emphasis but different definitions from the FS&T concept proposed in 1995 by the National Academy of Sciences as a subset of federal R&D). FS&T would increase 5.3 percent to $49.7 billion in FY 2002, but would fall 0.9 percent without NIH.

Highlights of the Major R&D Funding Agencies

- 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 in the five years 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 nearly 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.

- The **Department of Defense (DOD)**, the largest federal sponsor of R&D, did not submit a full FY 2002 budget this week; the agency is currently undergoing 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 special request for an extra $2.6 billion in unallocated funds for DOD development,

presumably for national missile defense and other Administration priorities. DOD R&D would increase 8.6 percent because of the special request, for a total of $45.2 billion. The placeholder budget assumes for the moment that basic research, applied research, and individual agencies such as the Defense Advanced Research Projects Agency (DARPA) would all grow by 2.1 percent in FY 2002. Much of the $2.6 billion special request may end up eventually being allocated to the Ballistic Missile Defense Organization (BMDO).

- 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 1.7 percent to $3.2 billion (see Figure 2). 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 astronomy, mathematics, and nanotechology-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. The budget would also cut NSF's investments in research instrumentation by a third and Major Research Equipment by more than 20 percent.

- The **National Aeronautics and Space Administration (NASA)** would see its total budget increase by 1.8 percent to $14.5 billion in FY 2002, but NASA's R&D (two-thirds of the agency's budget) would decline 3.3 percent to $9.3 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 $200 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 more than $200 million 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 no 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.

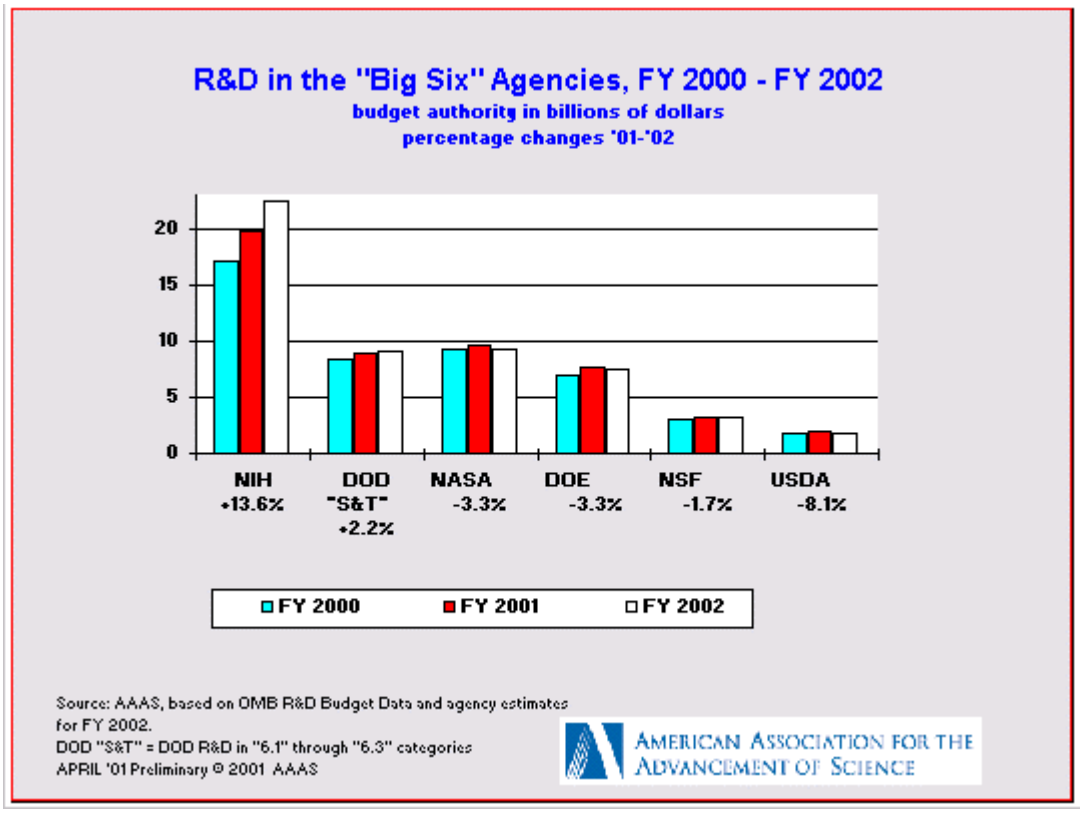


Figure 2.

- The **Department of Energy (DOE)** would see its R&D programs decline 3.3 percent to $7.4 billion after a 12 percent increase last year (see Figure 2). Most programs in the Office of Science would receive level or slightly increasing funding, including Basic Energy Sciences (up 1.3 percent to $1.0 billion), Advanced Scientific Computing Research (unchanged at $166 million), Nuclear Physics (unchanged at $361 million), and High Energy Physics (up 1.3 percent to $721 million). Biological and Environmental Research would fall 8.2 percent to $443 million, mostly because of the deletion of congressionally designated projects. 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 more than a third, nuclear energy R&D would be almost halved, and energy conservation R&D would fall by nearly 25 percent. In Fossil Energy, a new Coal for Clean Power Initiative of competitive, cost-shared R&D grants funded at $150 million would offset steep cuts in gas, oil, and other fossil energy R&D program areas. In DOE's defense programs, construction of the troubled National Ignition Facility would continue with a 24 percent boost to $245 million, while the Advanced Simulation and Computing Initiative (ASCI) would receive $738 million, a slight decrease.

- 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 (see Figure 2). 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 projects in ARS Buildings and Facilities (down 27 percent to $118 million), many of them congressionally designated. In addition to the $1.8 billion shown in Table 1, USDA will spend $135 million in mandatory funds for competitive research grants in FY 2002, up $5 million from FY 2001.

- **Department of Commerce** R&D programs would decline 6.1 percent in FY 2002 to $1.0 billion. The budget would all but eliminate the Advanced Technology Program (ATP) at the **National Institute of Standards and Technology (NIST)** in FY 2002 (down 91 percent to $13 million) and would allow FY 2001 funds to be used only to fund existing ATP awards. Intramural R&D in the NIST laboratories, however, would increase 11 percent. **National Oceanic and Atmospheric Administration (NOAA**) R&D would increase by 2.2 percent to $649 million, including program increases for Oceanic and Atmospheric Research (OAR).

- R&D in the **Department of the Interior** would fall 6.2 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 or $59 million to $491 million. Hardest hit would be programs in Water Resources (down 21.6 percent as a result of 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).

- The **Environmental Protection Agency (EPA)** R&D budget would fall 6.1 percent to $575 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. The overall EPA budget would decline from $7.8 billion in FY 2001 to $7.3 billion in FY 2002.

- **Department of Transportation (DOT)** R&D funding would climb 7.0 percent to $795 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. Federal Highway Administration (FHWA) R&D would increase by 27.6 percent to $374 million, including a 32 percent boost to $253 million for Intelligent Transportation Systems.

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 3). But the entire increase and then some 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.

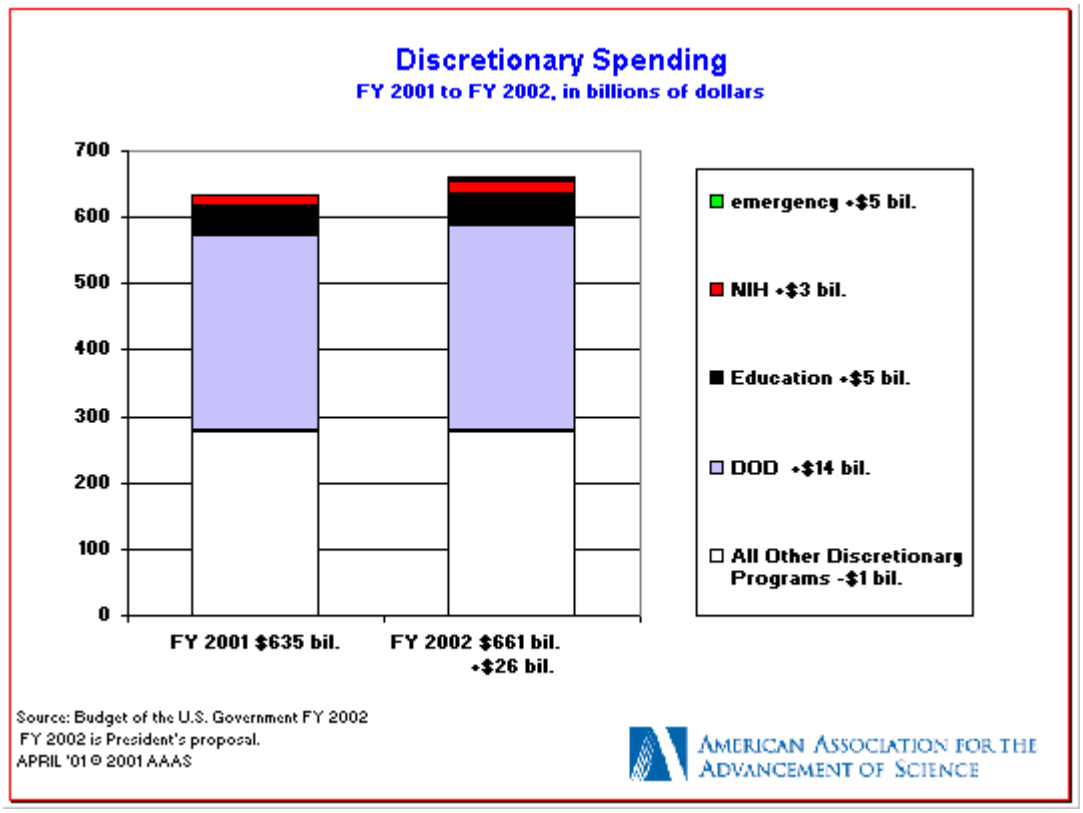


Figure 3.

Since the appearance of federal budget surpluses in FY 1998, lawmakers have been able to award substantial increases to discretionary spending. Between FY 2000 and 2001, discretionary spending grew by more than 9 percent, an increase in which federal R&D fully shared. Although budget surpluses are expected to continue, the FY 2002 budget aims to slow down this growth overall and reverse it for most programs.

Holding overall discretionary spending growth to 4.0 percent in FY 2002 and 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.

Figure 4 shows clearly the effects of the tax cuts and other proposals on budget surpluses. The steady trend of fiscal improvement from FY 1992 to FY 2001 would, without policy changes, continue in a straight line upward in future years. The Bush proposals for tax cuts and Medicare reform would cause surpluses to dip beginning in FY 2002 and then rise more slowly than the status-quo scenario. By bipartisan agreement, all Social Security surpluses (the area between the two lines in Figure 4) would be dedicated to paying down the national debt to the public, although Bush proposes to use some of these surpluses for Social Security reform. As a result, the Bush Administration is committed to balancing the budget without the Social Security surpluses, meaning preserving the non-Social Security (or on-budget) surplus (the lower line in Figure 4). The area under the lower line represents the $0.8 trillion reserve for contingencies, money that has not yet been allocated but which the budget assumes could be spent if necessary.

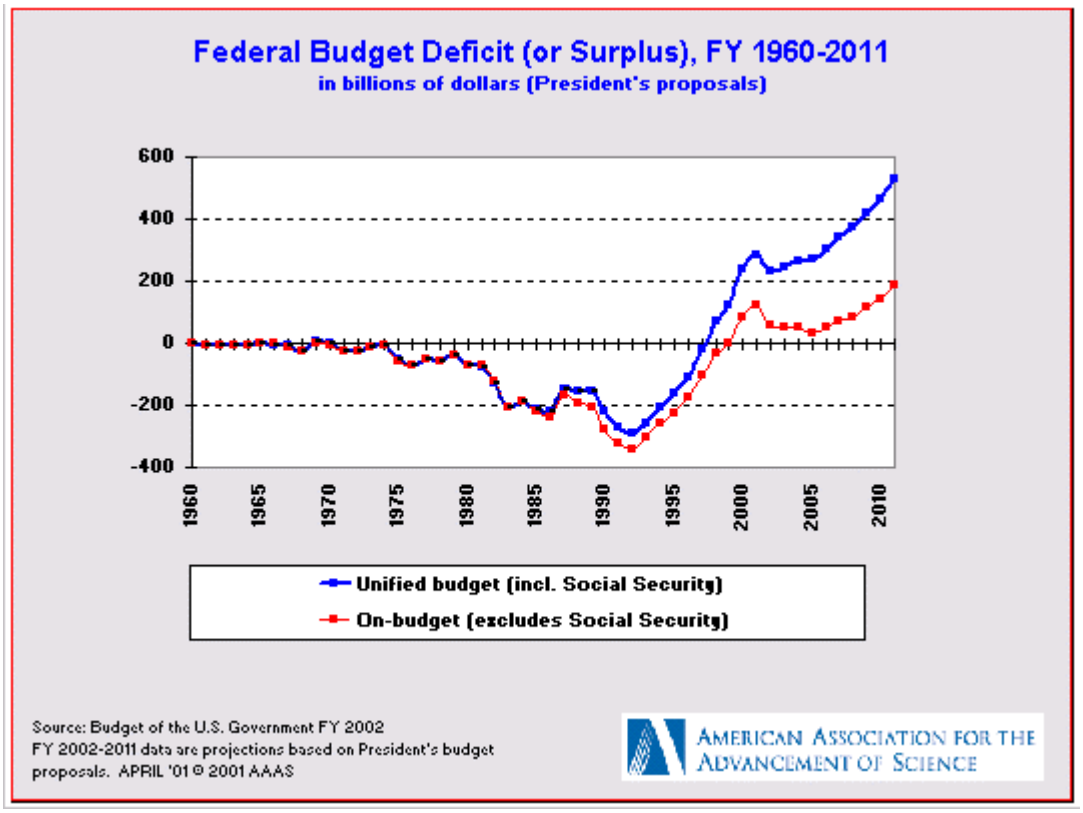


Figure 4.

As Figure 4 shows, the Bush budget has little to no margin for error. On-budget 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 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.

Impacts of Funding Trends on the Federal Research Portfolio

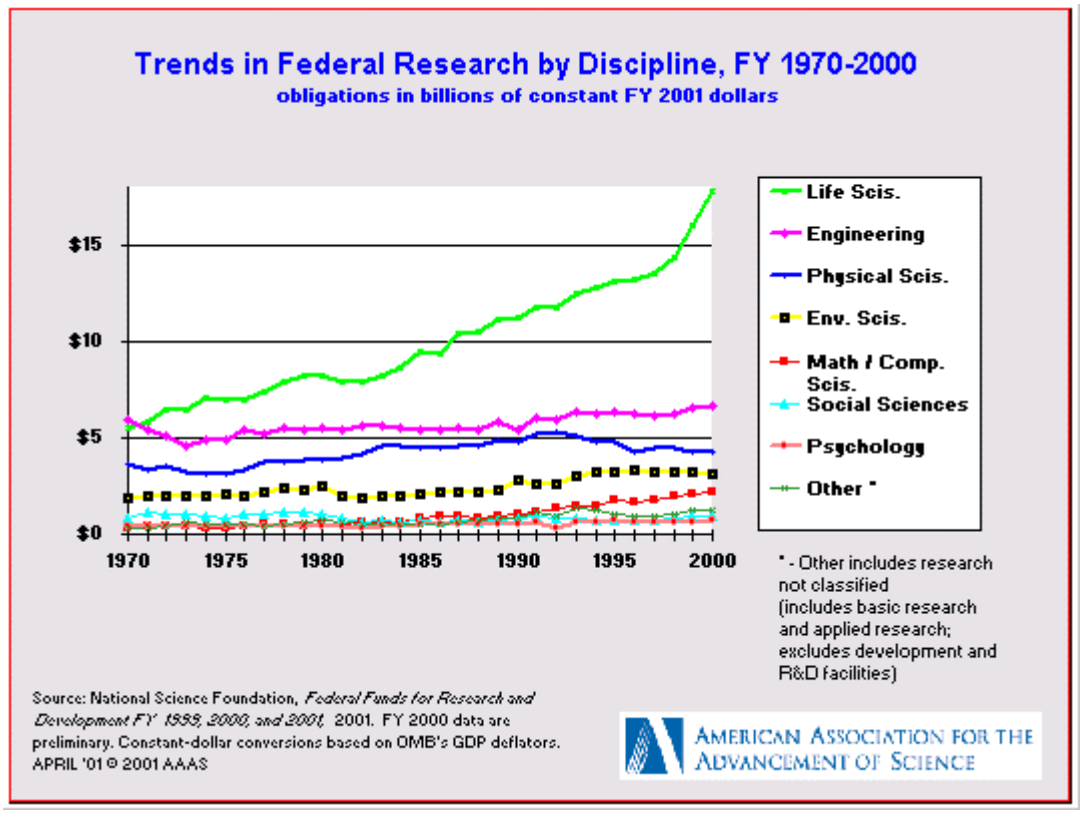


Figure 5.

Increases for NIH over the past few decades have resulted in a dramatic expansion in federal support for life sciences research, nearly three-quarters of which is funded by NIH (see Figure 5). Other disciplines, funded by agencies with stagnant or declining budgets, have not fared as well; while the Clinton Administration called for a 'balanced research portfolio' of large increases for non-NIH

agencies explicitly to reverse these trends, the FY 2002 budget would reverse the Clinton Administration goal by awarding large increases for federal funding in the life sciences and cuts in funding for most other sciences.

The upward trend in federal support for life sciences research (see Figure 5) mirrors the steady growth in the NIH budget over the past three decades. The last two years of the chart show an even sharper upward spike in life sciences funding as a result of the first two years of the NIH doubling effort; because of a similar NIH increase in FY 2001 and the proposed boost for FY 2002, future data should show further increases along this new trajectory. This trend is remarkable when contrasted with how other disciplines have fared during this time period. Federal support for engineering research, which was greater than life sciences support in FY 1970, has stagnated for three decades and would decline even further in the FY 2002 budget because of cuts in NASA, NSF, and DOE. Support for the physical sciences (physics, chemistry, astronomy, etc.) showed slow but steady increases until the early 1990s, but has declined since then due to cuts in DOE, NASA, and especially DOD. Cuts in DOE and NASA in the FY 2002 budget would further reduce physical sciences support in FY 2002. Even smaller disciplines, which have shown early 1990s growth, such as environmental sciences, and recent growth, such as computer sciences, would most likely drop in FY 2002 because of cuts to non-NIH R&D funding agencies.

Outlook for the FY 2002 Budget Process

The FY 2002 budget now moves to Congress. Currently, Congress is debating the FY 2002 budget resolution, Congress' own blueprint of its budget priorities for FY 2002 and beyond. The House passed a budget resolution sticking to the Bush proposals for tax cuts and discretionary spending, but the Senate last week passed a budget resolution trimming the tax cuts to $1.3 trillion and boosting discretionary spending for areas such as general science. With the slim margins between parties in the House and especially the Senate, approval of a final, compromise budget resolution could be a protracted affair. Whether the final budget resolution sets discretionary spending at the President's level or at a higher level, many Republicans, especially those on the Appropriations Committees, would like to see more discretionary spending and will likely draft appropriations bills providing far more than the request for domestic programs, including NSF, DOE, and USDA. With so little room for error in the budget and a commitment from the Administration to settle for nothing less than $1.6 trillion in tax cuts, it remains to be seen whether appropriators will be successful in boosting discretionary spending.

For federal R&D programs, the only thing certain is that NIH will eventually receive its requested $23.1 billion, and perhaps even more. For other agencies, congressional appropriators 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 momentum building for some form of a large tax cut and the real possibility of an economic slowdown depressing tax revenues, R&D and other programs will face steep competition in the annual race for funding.

- April 12, 2001

(More materials on R&D in the FY 2002 budget, historical data and charts, and more information on *AAAS Report XXVI: Research and Development FY 2002*, can be found on the AAAS R&D Web site at http://www.aaas.org/spp/R&D, or by calling 202-326-6607.)

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

	FY 2000 Actual	FY 2001 Estimate	FY 2002 Budget	Change FY 01-02 Amount	Change FY 01-02 Percent
Defense (military) 1/	39,664	41,571	**45,159**	3,588	8.6%
- S&T (6.1-6.3) 1/	*8,312*	*8,980*	***9,175***	*195*	*2.2%*
- All Other DOD R&D 1/	*31,352*	*32,591*	***35,984***	*3,393*	*10.4%*
Health and Human Services	18,051	20,805	**23,313**	2,508	12.1%
- Nat'l Institutes of Health	*17,158*	*19,715*	***22,400***	*2,685*	*13.6%*
NASA	9,242	9,632	**9,311**	-321	-3.3%
Energy	6,892	7,692	**7,435**	-257	-3.3%
- NNSA and other defense	*3,242*	*3,375*	***3,420***	*45*	*1.3%*
- Energy and Science programs	*3,650*	*4,317*	***4,015***	*-302*	*-7.0%*
Nat'l Science Foundation	2,947	3,297	**3,242**	-55	-1.7%
Agriculture	1,773	1,961	**1,803**	-158	-8.1%
Commerce	1,110	1,096	**1,029**	-67	-6.1%
- NOAA	*596*	*635*	***649***	*14*	*2.2%*
- NIST	*454*	*406*	***355***	*-51*	*-12.6%*
Interior	618	632	**593**	-39	-6.2%
Transportation	603	743	**795**	52	7.0%
Environ. Protection Agency	559	610	**575**	-35	-5.7%
All Other	1,679	1,971	**1,998**	27	1.4%
Total R&D	83,138	90,010	**95,253**	5,243	5.8%
Defense R&D	42,906	44,946	**48,579**	3,633	8.1%
Nondefense R&D	40,232	45,064	**46,674**	1,610	3.6%
- Nondefense R&D excluding NIH	*23,074*	*25,349*	***24,274***	*-1,075*	*-4.2%*
Basic Research	19,421	22,018	**23,352**	1,334	6.1%
Applied Research	18,466	20,734	**21,553**	819	4.0%
Development	40,524	42,594	**45,954**	3,360	7.9%
R&D Facilities and Equipment	4,727	4,664	**4,394**	-270	-5.8%

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.
April 12, 2001 - Preliminary - will be revised

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	Change FY 01-02 Percent
Defense (military) 1/	1,136	1,317	**1,345**	28	2.1%
Health and Human Services	10,062	11,544	**12,980**	1,436	12.4%
- Nat'l Institutes of Health	*10,060*	*11,542*	***12,978***	*1,436*	*12.4%*
NASA	2,137	2,548	**2,465**	-83	-3.3%
Energy	2,262	2,378	**2,344**	-34	-1.4%
Nat'l Science Foundation	2,540	2,796	**2,799**	3	0.1%
Agriculture	684	742	**717**	-25	-3.4%
Commerce (NIST)	42	40	**46**	6	15.0%
Interior	52	57	**54**	-3	-5.3%
Transportation	10	17	**21**	4	23.5%
Environ. Protection Agency	58	106	**98**	-8	-7.5%
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	19,421	22,018	**23,352**	1,334	6.1%
Basic research excluding NIH	*9,361*	*10,476*	***10,374***	*-102*	*-1.0%*
RESEARCH (basic + applied)					
Defense (military) 1/	4,541	4,981	**5,086**	105	2.1%
Health and Human Services	17,754	20,459	**22,804**	2,345	11.5%
- Nat'l Institutes of Health	*16,916*	*19,483*	***21,993***	*2,510*	*12.9%*
NASA	3,671	4,231	**4,276**	45	1.1%
Energy	4,136	4,563	**4,364**	-199	-4.4%
Nat'l Science Foundation	2,724	3,016	**3,017**	1	0.0%
Agriculture	1,515	1,664	**1,546**	-118	-7.1%
Commerce	822	869	**866**	-3	-0.3%
- NOAA	*539*	*578*	***583***	*5*	*0.9%*
- NIST	*265*	*284*	***276***	*-8*	*-2.8%*
Interior	572	594	**557**	-37	-6.2%
Transportation	406	473	**528**	55	11.6%
Environ. Protection Agency	446	475	**447**	-28	-5.9%

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	217	253	**233**	-20	-7.9%
Total Research	37,887	42,752	**44,905**	2,153	5.0%
Total research excluding NIH	*20,971*	*23,269*	***22,912***	*-357*	*-1.5%*

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.
April 12, 2001 - Preliminary - will be revised

Table 3. Major Functional Categories of R&D (budget authority in millions of dollars)

	FY 2000 Actual	FY 2001 Estimate	FY 2002 Budget	Change FY 01-02 Amount	Change FY 01-02 Percent	% Share of Total ('02)
Defense [1]	42,906	44,946	**48,579**	3,633	8.1%	51.0%
Nondefense [2]	40,232	45,064	**46,674**	1,610	3.6%	49.0%
Space	8,182	8,706	**8,800**	94	1.1%	9.2%
Health	18,627	21,452	**23,989**	2,537	11.8%	25.2%
Energy	1,090	1,409	**1,142**	-267	-19.0%	1.2%
General Science	5,591	6,285	**6,212**	-73	-1.2%	6.5%
Environment [3]	2,036	2,182	**2,113**	-69	-3.2%	2.2%
Agriculture	1,558	1,716	**1,553**	-163	-9.5%	1.6%
Transportation	1,663	1,669	**1,306**	-363	-21.8%	1.4%
Commerce	513	460	**379**	-81	-17.6%	0.4%
International	200	216	**206**	-10	-4.6%	0.2%
All Other	772	969	**974**	5	0.5%	1.0%
Total R&D	83,138	90,010	**95,253**	5,243	5.8%	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.

April 12, 2001 - preliminary - will be revised

Table 4. "Federal Science and Technology Budget" by Agency (budget authority in millions of dollars)

	FY 2000 Actual	FY 2001 Estimate	FY 2002 Budget	Change FY 01-02 Amount	Change FY 01-02 Percent
Health and Human Services	17,827	20,361	**23,112**	2,751	13.5%
- (National Institutes of Health)	*17,827*	*20,361*	***23,112***	*2,751*	*13.5%*
National Science Foundation	3,897	4,416	**4,472**	56	1.3%
Department of Energy	4,353	4,910	**4,682**	-228	-4.6%
-(Science programs)	*2,788*	*3,179*	***3,160***	*-19*	*-0.6%*
- (Energy supply)	*584*	*661*	***494***	*-167*	*-25.3%*
- (Energy conservation)	*577*	*625*	***484***	*-141*	*-22.6%*
- (Fossil energy)	*404*	*445*	***544***	*99*	*22.2%*
National Aeronautics & Space Admin.	6,389	6,957	**7,038**	81	1.2%
- (Space Science)	*2,524*	*2,658*	***2,786***	*128*	*4.8%*
- (Earth Science)	*1,675*	*1,702*	***1,496***	*-206*	*-12.1%*
- (Aero-Space Technology)	*1,834*	*2,205*	***2,376***	*171*	*7.8%*
- (Biological and Physical Res.)	*356*	*393*	***380***	*-13*	*-3.3%*
Department of Defense	4,541	4,981	**5,086**	105	2.1%
- (Basic Research)	*1,136*	*1,317*	***1,345***	*28*	*2.1%*
- (Applied Research)	*3,405*	*3,664*	***3,741***	*77*	*2.1%*
Agriculture	1,739	1,831	**1,759**	-72	-3.9%
- (CSREES Res. And Edu.)	*487*	*513*	***416***	*-97*	*-18.9%*
- (Economic Research Service)	*64*	*66*	***67***	*1*	*1.5%*
- (Agricultural Research Service)	*830*	*897*	***916***	*19*	*2.1%*
- (Mandatory research grants (net))	*140*	*130*	***135***	*5*	*3.8%*
- (Forest Service Research)	*218*	*225*	***225***	*0*	*0.0%*
Commerce	819	809	**711**	-98	-12.1%
- (Oceanic and Atmos. Res. NOAA)	*285*	*315*	***330***	*15*	*4.8%*
- (NIST minus MEP)	*534*	*494*	***381***	*-113*	*-22.9%*
Interior (USGS)	813	883	**813**	-70	-7.9%
Environ. Protection Agency (S&T)	683	732	**679**	-53	-7.2%
Veterans Affairs (Med. & Prosthetic)	321	350	**360**	10	2.9%
Education	317	363	**368**	5	1.4%

- (Spec. Edu. Res. And Innov.)	*64*	*77*	***70***	*-7*	*-9.1%*
- (Disability and Rehab. Research)	*86*	*100*	***110***	*10*	*10.0%*
- (Res., Dev., and Dissemination)	*167*	*186*	***188***	*2*	*1.1%*
Transportation	646	621	**631**	10	1.6%
- (Highway Research)	*490*	*437*	***443***	*6*	*1.4%*
- (FAA Res., Eng. And Develop.)	*156*	*184*	***188***	*4*	*2.2%*
Total "FS&T"	42,345	47,214	**49,711**	2,497	5.3%
FS&T excluding NIH	*24,518*	*26,853*	***26,599***	*-254*	*-0.9%*

OMB data from the Budget of the U.S. Government FY 2002: Analytical Perspectives Chapter 7.
The programs in the Federal Science and Technology Budget do not correspond to definitions of R&D. The FS&T Budget contains selected R&D and non-R&D programs with an emphasis on basic and applied research and the creation of new knowledge or technologies. The programs in this table were selected by OMB, and differ from the original definitions of FS&T proposed by the National Academy of Sciences.
April 12, 2001