5. RESEARCH AND DEVELOPMENT

I. INTRODUCTION

U.S. investments in science and technology in past decades have greatly enhanced the standard of living and quality of life we enjoy today and have generated significant economic growth in the United States. Advances have been possible only with the support of both public and private investment in research and development (R&D).

The U.S. Government boasts the highest level of R&D investment in the world: $132 billion. However, unlike 40 years ago, when Federal R&D expenditures were double those of the private sector, industry R&D spending now exceeds Federal Government R&D spending.

While the U.S. investment is, by a wide margin, the largest in the world, we also strive to make sure it is going to the highest priority and highest quality work. The President's 2006 Budget maintains a strong focus on winning the war against terrorism, while moderating the growth in overall spending, and this focus is reflected in the R&D the Administration proposes for 2006. In addition, recognizing that fundamental research fuels future innovation and technology development, the Administration has maintained high levels of support for priority R&D areas such as nanotechnology, information technology, hydrogen energy, and space exploration.

The Federal Government funds many types of R&D. First, the Government is the primary supporter of basic research, which is directed toward greater understanding of fundamental scientific phenomena. Basic research is the source of tomorrow's discoveries and new capabilities, and this long-term research will fuel further gains in economic productivity, quality of life, and homeland and national security. The Government has an important role in supporting applied research, which is driven by more targeted scientific questions and specific needs, and development, which applies scientific knowledge and technology to specific needs. Together, these R&D activities are critical for ensuring that agencies effectively implement their missions.

In addition to direct R&D investments, the Federal Government also helps stimulate private investment and provide incentives for private sources to continue to fuel the discovery and innovation of tomorrow. The Administration proposes to do this, for instance, by permanently extending the Research and Experimentation Tax Credit.

The Administration continues to meet the President's charge to improve the management, performance, and results of the Federal Government. By strengthening effective programs and addressing lower performers through reforms or reallocations to higher performers, we will increase the productivity of the Federal R&D portfolio and transcend the attention given to year-to-year marginal increases or decreases. Additionally, while it can be difficult to assess the outcomes of some research programs, many of which may not fully pay off for years, agencies can establish meaningful program goals and measure annual progress and performance in appropriate ways.

Towards that end, the Administration continues to implement and improve investment criteria for R&D programs across the Government as part of the President's Management Agenda. Further, the Government will coordinate interrelated and complementary R&D efforts among agencies, combining programs where appropriate to improve effectiveness and eliminate redundancy, to leverage these resources to the greatest effect.

This chapter discusses how the Administration will improve the performance of R&D programs through investment principles and other means that encourage and reinforce quality research. Highlights of the coordination of multi-agency R&D priority areas are also included. The chapter concludes with details of R&D funding across the Federal Government.

II. IMPROVING THE PERFORMANCE OF R&D PROGRAMS

R&D is critically important for keeping our Nation economically competitive, and it will help solve the challenges we face in health, defense, energy, and the environment. Therefore, and consistent with the Government Performance and Results Act, every Federal R&D dollar must be invested as effectively as possible. The discussion below will focus on the use of R&D investment criteria and the effect on overall performance of research earmarks on the Federal R&D portfolio.

R&D Investment Criteria

The Administration is improving the effectiveness of the Federal Government's investments in R&D by applying transparent investment criteria in analyses that inform recommendations for program funding and management. R&D performance assessment must be done with care. Research often leads scientists and engineers down unpredictable pathways with unpredictable results. This outcome can require special consideration when measuring an R&D program's performance against its initial goals.

With this in mind, the Administration is improving methods for setting priorities based on expected results, including applying specific criteria that programs or projects must meet to be started or continued, clear milestones for gauging progress, and improved metrics for assessing results.

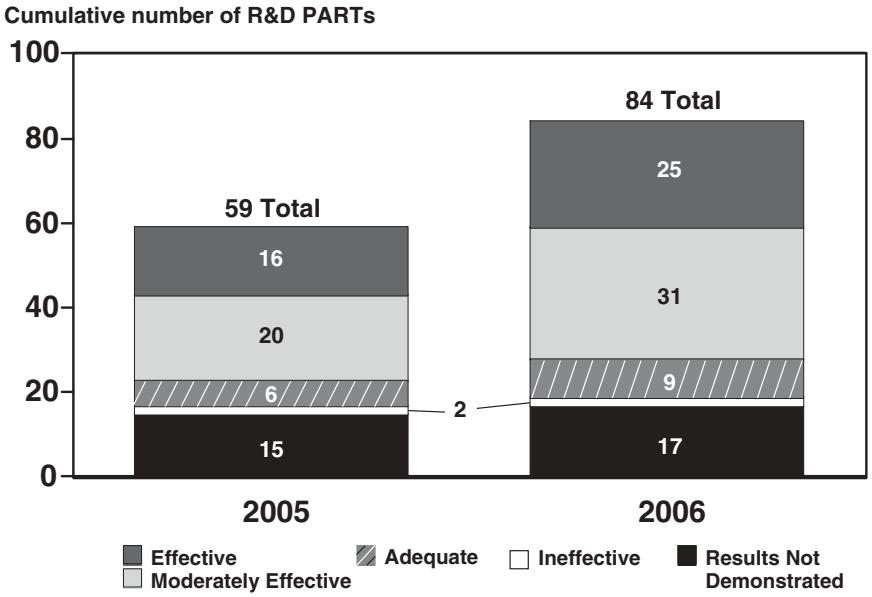
As directed by the President's Management Agenda, the R&D Investment Criteria accommodate the wide range of R&D activities, from basic research to development and demonstration programs, by addressing three fundamental aspects of R&D:

- *Relevance*—Programs must be able to articulate why they are important, relevant, and appropriate for Federal investment;
- *Quality*—Programs must justify how funds will be allocated to ensure quality; and
- *Performance*—Programs must be able to monitor and document how well the investments are performing.

In addition, R&D projects and programs relevant to industry are expected to apply criteria to determine the appropriateness of the public investment, enable comparisons of proposed and demonstrated benefits, and provide meaningful decision points for completing or transitioning the activity to the private sector.

As discussed throughout the 2006 Budget, the Office of Management and Budget (OMB) and the agencies are working on other initiatives as part of the President's Management Agenda. For the Budget and Performance Integration initiative, the Administration developed the Program Assessment Rating Tool (PART) to consistently assess the effectiveness of programs. A section of the PART specifically addresses the assessment of R&D program management and performance and is aligned with the R&D Investment criteria. In the last three years, agencies have completed PART assessments of 84 R&D programs. The results of these PART assessments may be found on the web at http://www.whitehouse.gov/omb/part/.

Chart 5-1. Scores of R&D PART Assessments



Performance assessments help policy makers identify those programs that are the most effective and worthy of funding; however, the Administration does not allocate funding levels and initiate management reforms strictly by formula or based solely on PART results. For instance, funding may be reduced for "effective" programs that have achieved what they set out to do, and "ineffective" programs might receive more money if it is clear it would help them become more effective. The PART provides information that leads to more informed decisions. For example, as a result of the PART review process, the Department of Veterans Affairs designed new performance measures that will enable its senior management to better assess the agency's overall research direction and its contributions to the health of veterans and the general population. In another case, the PART informed a decision in the 2006 Budget to eliminate funds for the Department of Energy's oil and gas R&D programs, which were determined to often duplicate private-sector R&D efforts and generate benefits primarily for the private sector.

R&D agencies will continue to integrate the R&D Criteria more meaningfully into the budget formulation process in the coming year. Interagency R&D initiatives use the R&D Criteria in developing plans and reports, such as "A 21st Century Frontier for Discovery: The Physics of the Universe." Based on lessons learned and other feedback from experts and stakeholders, the Administration will continue to improve the R&D Investment Criteria and their implementation to achieve more effective management of R&D programs and better-informed budget-allocation decisions.

President's Management Agenda Initiative

Research and Development Investment Criteria

FY 2005, Quarter 1 Status: RED, Progress: YELLOW

The initiative's red status score reflects the limited success many agencies have had in the Government-wide implementation of the initiative. The yellow progress score indicates that the initiative has momentum, as some agencies have made improvements this year, including the National Science Foundation and the Department of Energy. More R&D agencies are using the criteria to assess their programs, due to the improved alignment of the R&D Investment Criteria with the R&D PART for program-level assessments. All of the top 13 R&D agencies are using the R&D PART to assess their programs this year. Most of the major R&D agencies submitted 2006 Budget requests that, to varying degrees, observe the principles of the Investment Criteria. To achieve a yellow status score, half of the R&D programs assessed for each agency using the R&D PART must receive at least a Moderately Effective rating, which is proving to be a challenging requirement. Agencies must also integrate the R&D Criteria framework into their budget proposals, including using detailed criteria-based assessments to justify specific requests or allocation changes.

Research Earmarks

The Administration strongly supports awarding research funds based on merit review through a competitive process. Such a system generally ensures that the best research is supported. Research earmarks—in general the assignment of money during the legislative process for use only by a specific organization or project—are counter to a merit-based competitive selection process. Earmarks signal to potential investigators that there is an acceptable alternative to creating quality research proposals for merit-based consideration, including the use of political influence or appeals to parochial interests. Such an alternative is seldom the most effective use of taxpayer funds.

Unfortunately, the practice of earmarking to colleges, universities and other entities for specific research projects has expanded dramatically in recent years. The American Association for the Advancement of Science (AAAS) recently estimated that R&D earmarks total $2.1 billion in 2005, an increase of nine percent over the Association's 2004 estimate.

Some argue that earmarks help spread the research money to states or institutions that would receive less research funding through other means. *The Chronicle of Higher Education* reports that this is not the main role earmarks play; often only a minor portion of academic earmark funding goes to the states with the smallest shares of Federal research funds. Meanwhile, earmarks help some rich institutions become richer.

Some proponents of earmarking assert that earmarks provide a means of funding unique projects that would not be recognized by the conventional peer-review process. To address this concern, a number of research agencies have procedures and programs to reward "out-of-the-box" thinking. For example, within the Department of Defense (DOD), the Defense Advanced Research Projects Agency seeks out high risk, high payoff scientific proposals, and program managers at the National Science Foundation (NSF) set aside a share of funding for higher-risk projects in which they see high potential.

Often Congressional direction has little to do with an agency's mission. In addition to earmarked funding noted above, the Congress also directed DOD to fund research on a wide range of diseases, including breast cancer, ovarian cancer, prostate cancer, diabetes, leukemia, and muscular dystrophy. Funding at DOD for such research totals about $900 million in 2005 alone, an increase of about $200 million in just one year. While research on these diseases is very important, it is generally not unique to the U.S. military and can be better carried out and coordinated within civil medical research agencies, without disruption to the military mission. At the same time, intrusion of earmarks into the peer-review processes of civilian medical research agencies would have a significant detrimental impact on funding the most important and promising research.

The Administration will continue to work with the Congress, academic organizations, colleges and universities to discourage the practice of research earmarks and to achieve our common objectives.

III. PRIORITIES FOR FEDERAL RESEARCH AND DEVELOPMENT

The 2006 Budget requests $132 billion for Federal R&D funding, which targets key research investments within agencies such as NSF, the National Aeronautics and Space Administration, the Department of Commerce's National Institute of Standards and Technology, and the National Institutes of Health (Table 5–2 provides details by agency).

The "Federal Science and Technology" (FS&T) budget (shown in Table 5–3) highlights the creation of new knowledge and technologies more consistently and accurately than the traditional R&D data collection. The FS&T budget emphasizes research, does not count funding for defense development, testing, and evaluation, and totals less than half of Federal R&D spending. The 2006 Budget requests $61 billion for FS&T.

Over the last year, the Office of Science and Technology Policy and OMB have worked with the Federal agencies and the science community to identify top priorities for Federal R&D. These are in areas critical to the Nation, such as information technologies, and in emerging fields, such as nanotechnology, that will provide new breakthroughs across many fields. Some priorities, such as hydrogen R&D, address newly recognized needs. The discussion below focuses on five multi-agency priority areas and concludes with how the Federal Government stimulates private R&D investment.

Multi-Agency R&D Priorities

The 2006 Budget targets important research investments that must be coordinated across multiple agencies. Three of these multi-agency initiatives—nanotechnology, information technology R&D, and climate change science—are coordinated by three separate dedicated offices to ensure unified strategic planning and implementation. The Administration is strengthening interagency coordination for other priority areas—such as combating bioterrorism. The Administration will continue to analyze other areas of critical need that could benefit in the future from improved focus and coordination among agencies.

Combating Terrorism R&D: Since September 2001, the Administration increased its focus on R&D that aids in securing the homeland. Research programs across the Federal Government are being coordinated to develop systems to help prevent future terrorist attacks, minimize our Nation's vulnerability to terrorist acts, and respond and recover if an attack should occur.

The President issued 12 Homeland Security Presidential Directives (HSPD) that call for, among other things, increased interagency coordination of R&D to defend against biological threats to our people, economy, agriculture, food and water supplies. For example, one HSPD, *Defense of United States Agriculture and Food,* establishes a national policy to provide protection against an attack on the agriculture and food systems.

In 2004, multi-agency efforts made significant progress. For example, the Department of Homeland Security established both the National Biodefense Analysis and Countermeasures Center to study biological agents and the National Bioforensic Analysis Center to provide a world class forensics center. These centers join other DOD, U.S. Department of Agriculture, and National Institutes of Health facilities at Fort Detrick to create a National Interagency Biodefense Campus that will become a focal point for countermeasures research. Together, these agencies will establish research priorities to reduce the threat of biological terrorism.

Networking and Information Technology R&D: The budget provides $2 billion for the multi-agency Networking and Information Technology Research and Development (NITRD) program, which focuses and coordinates agency research efforts in advanced computing systems, networks, software, and information-management technologies. The agencies involved in this program work together enabling more rapid advancement than they could achieve working on their own. These advances have an impact on virtually every sector of the economy.

In 2004, agencies with responsibilities for high-end computing—ultra-powerful supercomputers, components and software—made significant progress in implementing the recommendations of the interagency High-End Computing Revitalization Task Force. For example, new supercomputing activities at both NASA and the Department of Energy (DOE) were begun and will be managed in accord with the Federal Plan for High-End Computing.

To enable a better understanding of the potential scientific impact of high-end capability computing, the NITRD National Coordination Office will commission a National Academy of Sciences study that identifies and categorizes important scientific questions and technological problems for which an extraordinary advancement in our understanding is difficult or impossible without leading-edge scientific simulation capabilities.

Nanotechnology R&D: The budget provides $1 billion for the multi-agency National Nanotechnology Initiative (NNI). The NNI focuses on R&D that creates materials, devices, and systems that exploit the fundamentally distinct properties of matter as it is manipulated at the atomic and molecular levels. The results of NNI-supported R&D could lead to breakthroughs in disease detection and treatment, manufacturing at the nanoscale level, environmental monitoring and protection, energy production and storage, and creating electronic devices that have even greater capabilities than those available today.

Guided by the NNI, participating agencies will continue to focus on fundamental and applied research through investigator-led activities, multidisciplinary centers of excellence, education and training of nanotechnology workers, and infrastructure development, including user facilities and networks that are broadly available to researchers from across the sci-

entific research community. For example, the 2006 Budget provides funding for DOE to complete construction on four new major nanoscale science research centers located around the country. In addition, agencies continue to maintain a focus on the responsible development of nanotechnology, with attention to the human and environmental health impacts, as well as ethical, legal, and other societal issues.

Climate Change R&D: The 2006 Budget for the Climate Change Science Program (CCSP) continues to support the goals outlined in the CCSP Strategic Plan, which was released in July 2003. The Budget reflects the coordinated planning efforts of the 13 departments and agencies that participate in CCSP. Beginning in FY 2006, CCSP will formally track the expected actions, deliverables, and milestones for each of its programs in order to assess overall performance. Additional detail on individual agency activities will be provided in the Administration's FY 2006 edition of *Our Changing Planet*.

The Climate Change Technology Program (CCTP) continues to prioritize the portfolio of Federally funded climate change technology R&D consistent with the President's National Climate Change Technology Initiative (NCCTI). In 2005, the CCTP will publish a draft Strategic Plan and solicit comments from the scientific community and the public. The CCTP will also identify within its portfolio a subset of NCCTI priority activities, defined as discrete R&D activities that address technological challenges, which, if solved, could advance technologies with the potential to dramatically reduce, avoid, or sequester greenhouse gas emissions.

Hydrogen R&D: In 2004, the Hydrogen R&D Interagency Task Force, established by the Office of Science and Technology Policy, initiated a plan to coordinate agency efforts in key research areas, such as novel materials for fuel cells and hydrogen storage, inexpensive and durable catalysts, and hydrogen production from alternative sources. In 2005, the task force will implement this plan and expand public outreach and collaboration with the private sector, state agencies, and other stakeholders. The U.S., through the Department of Energy, will continue to lead the International Partnership for the Hydrogen Economy, established in 2003 to coordinate hydrogen research among 15 nations representing two thirds of global energy consumption.

DOE will continue the President's Hydrogen Fuel Initiative to accelerate the worldwide availability and affordability of hydrogen-powered fuel cell vehicles. The initiative, which includes an 11-percent increase in targeted basic research investments in 2006, focuses on research to advance hydrogen production, storage, and infrastructure. The Initiative complements the Department's FreedomCAR Partnership with the auto industry, which is aimed at developing viable hydrogen fuel cell vehicle technology.

Stimulating Private Investment

Along with direct spending on R&D, the Federal Government has sought to stimulate private R&D investment through incentives in the Internal Revenue Code. Current law provides a 20-percent tax credit for private research and experimentation expenditures above a certain base amount. The credit, which expired in June 2004, was extended again for another 18 months, through 2005, in the Working Families Tax Relief Act of 2004. The budget proposes to make the Research and Experimentation (R&E) tax credit permanent. The proposed extension will cost nearly $30 billion over the period from 2006 to 2010. In addition, a permanent tax provision lets companies deduct, up front, the costs of certain kinds of research and experimentation, rather than capitalize these costs. Also, equipment used for research benefits from relatively rapid tax depreciation allowance. Table 5–1 shows a forecast of the costs of the tax credit.

Table 5–1. PERMANENT EXTENSION OF THE RESEARCH AND EXPERIMENTATION TAX CREDIT

(Revenue loss, dollar amounts in millions)

	2005	2006	2007	2008	2009	2010	2006–10
Current Law	5,080	2,100	910	390	180	50	3,630
Proposed Extension	.....	2,097	4,601	5,944	6,889	7,669	27,200
Total	5,080	4,197	5,511	6,334	7,069	7,719	30,830

IV. FEDERAL R&D DATA

Federal R&D Funding

R&D is the collection of efforts directed towards gaining greater knowledge or understanding and applying knowledge toward the production of useful materials, devices, and methods. R&D investments can be characterized as basic research, applied research, development, R&D equipment, or R&D facilities, and OMB has used those or similar categories in its collection of R&D data since 1949.

Basic research is defined as systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind.

Applied research is systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

Development is systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

Research and development equipment includes acquisition or design and production of movable equipment, such as spectrometers, microscopes, detectors, and other instruments.

Research and development facilities include the acquisition, design, and construction of, or major repairs or alterations to, all physical facilities for use in R&D activities. Facilities include land, buildings, and fixed capital equipment, regardless of whether the facilities are to be used by the Government or by a private organization, and regardless of where title to the property may rest. This category includes such fixed facilities as reactors, wind tunnels, and particle accelerators.

There are over twenty Federal agencies that fund R&D in the U.S. The nature of the R&D that these agencies fund depends on the mission of each agency and on the role of R&D in accomplishing it. Table 5–2 shows agency-by-agency spending on basic and applied research, development, and R&D equipment and facilities.

Table 5–2. FEDERAL RESEARCH AND DEVELOPMENT SPENDING

(Budget authority, dollar amounts in millions)

	2004 Actual	2005 Estimate	2006 Proposed	Dollar Change: 2005 to 2006	Percent Change: 2005 to 2006
By Agency					
Defense	65,462	70,422	70,839	417	1%
Health and Human Services	28,047	28,752	28,807	55	.....
NASA	10,574	10,990	11,527	537	5%
Energy	8,779	8,629	8,528	–101	–1%
National Science Foundation	4,160	4,082	4,194	112	3%
Agriculture	2,222	2,415	2,039	–376	–16%
Homeland Security	1,053	1,185	1,467	282	24%
Commerce	1,137	1,134	1,013	–121	–11%
Transportation	661	748	808	60	8%
Veterans Affairs	866	784	786	2	.....
Interior	627	615	582	–33	–5%
Environmental Protection Agency	661	572	569	–3	–1%
Other	1,089	1,243	1,145	–98	–8%
Total	**125,338**	**131,571**	**132,304**	**733**	**1%**
Basic Research					
Defense	1,358	1,513	1,319	–194	–13%
Health and Human Services	14,780	15,124	15,246	122	1%
NASA	2,473	2,368	2,199	–169	–7%
Energy	2,847	2,887	2,762	–125	–4%
National Science Foundation	3,524	3,432	3,480	48	1%
Agriculture	829	851	788	–63	–7%
Homeland Security	68	85	112	27	32%
Commerce	43	58	71	13	22%
Transportation	20	38	41	3	8%
Veterans Affairs	347	315	315	.....	.....
Interior	37	36	30	–6	–17%
Environmental Protection Agency	113	66	70	4	6%
Other	149	155	175	20	13%
Subtotal	**26,588**	**26,928**	**26,608**	**–320**	**–1%**

Table 5–2. FEDERAL RESEARCH AND DEVELOPMENT SPENDING—Continued

(Budget authority, dollar amounts in millions)

	2004 Actual	2005 Estimate	2006 Proposed	Dollar Change: 2005 to 2006	Percent Change: 2005 to 2006
Applied Research					
Defense	4,351	4,851	4,139	–712	–15%
Health and Human Services	13,007	13,274	13,410	136	1%
NASA	3,006	2,497	3,233	736	29%
Energy	2,693	2,760	2,709	–51	–2%
National Science Foundation	266	279	276	–3	–1%
Agriculture	1,055	1,093	942	–151	–14%
Homeland Security	247	346	399	53	15%
Commerce	828	825	763	–62	–8%
Transportation	349	423	494	71	17%
Veterans Affairs	476	430	433	3	1%
Interior	538	530	495	–35	–7%
Environmental Protection Agency	423	365	386	21	6%
Other	599	562	553	–9	–2%
Subtotal	**27,838**	**28,235**	**28,232**	**–3**	
Development					
Defense	59,701	63,903	65,331	1,428	2%
Health and Human Services	41	54	28	–26	–48%
NASA	3,189	3,727	3,511	–216	–6%
Energy	1,992	1,846	1,959	113	6%
National Science Foundation					
Agriculture	159	157	146	–11	–7%
Homeland Security	481	599	746	147	25%
Commerce	152	149	90	–59	–40%
Transportation	279	269	254	–15	–6%
Veterans Affairs	43	39	38	–1	–3%
Interior	49	46	54	8	17%
Environmental Protection Agency	125	141	113	–28	–20%
Other	324	495	396	–99	–20%
Subtotal	**66,535**	**71,425**	**72,666**	**1,241**	**2%**
Facilities and Equipment					
Defense	52	155	50	–105	–68%
Health and Human Services	219	300	123	–177	–59%
NASA	1,906	2,398	2,584	186	8%
Energy	1,247	1,136	1,098	–38	–3%
National Science Foundation	370	371	438	67	18%
Agriculture	179	314	163	–151	–48%
Homeland Security	257	155	210	55	35%
Commerce	114	102	89	–13	–13%
Transportation	13	18	19	1	
Veterans Affairs					N/A
Interior	3	3	3		
Environmental Protection Agency					N/A
Other	17	31	21	–10	–32%
Subtotal	**4,377**	**4,983**	**4,798**	**–185**	**–4%**

Table 5–3. FEDERAL SCIENCE AND TECHNOLOGY BUDGET

(Budget authority, dollar amounts in millions)

	2004 Actual	2005 Estimate	2006 Proposed	Dollar Change: 2005 to 2006	Percent Change: 2005 to 2006
By Agency					
National Institutes of Health	**27,878**	**28,444**	**28,607**	**163**	**1%**
NASA	**9,231**	**9,116**	**9,493**	**377**	**4%**
Science	5,600	5,527	5,476	–51	–1%
Aeronautics	1,057	906	852	–54	–6%
Exploration Systems	2,574	2,683	3,165	482	18%
National Science Foundation	**5,578**	**5,473**	**5,605**	**132**	**2%**
Defense	**5,709**	**6,363**	**5,458**	**–905**	**–14%**
Basic Research	1,358	1,513	1,319	–194	–13%
Applied Research	4,351	4,850	4,139	–711	–15%
Energy [1]	**5,494**	**5,635**	**5,357**	**–278**	**–5%**
Science Programs	3,484	3,600	3,463	–137	–4%
Energy Supply: Renewables	357	380	354	–26	–7%
Energy Supply: Electricity Transmission & Distribution	81	101	84	–17	–17%
Energy Supply: Nuclear Energy	292	386	390	4	1%
Energy Conservation [2]	607	596	576	–20	–3%
Fossil Energy	673	572	491	–81	–14%
Agriculture	**2,047**	**2,127**	**1,922**	**–205**	**–10%**
CSREES Research and Education [3]	629	670	560	–110	–16%
Economic Research Service	71	74	81	7	9%
Agricultural Research Service [4]	1,081	1,102	996	–106	–10%
Forest Service: Forest and Rangeland Research	266	276	285	9	3%
Interior (USGS)	**938**	**935**	**934**	**–1**	.....
Commerce	**965**	**992**	**858**	**–134**	**–14%**
NOAA: Oceanic & Atmospheric Research	393	404	361	–43	–11%
NIST: Intramural Research and Facilities	401	451	485	34	8%
NIST: Advanced Technology Program	171	137	.....	–137	–100%
Environmental Protection Agency [5]	**826**	**780**	**792**	**12**	**2%**
Veterans Affairs [6]	**866**	**784**	**786**	**2**	.....
Transportation	**683**	**694**	**673**	**–21**	**–3%**
Highway research [7]	564	566	543	–23	–4%
Federal Aviation Administration: Research, Engineering, and Development	119	131	130	–1	–1%
Education	**350**	**355**	**345**	**–10**	**–3%**
Special Education Research and Innovation	78	83	73	–10	–12%
National Institute on Disability and Rehabilitation Research	107	108	108	.....	.....
Research, Development, and Dissemination [8]	165	164	164	.....	.....
Total	**60,565**	**61,696**	**60,819**	**–877**	**–1%**

[1] Data do not reflect actual transfers to Science Programs from other Department of Energy R&D programs to support the Small Business Innovation Research and the Small Business Technology Transfer programs.

[2] Excludes weatherization and state grant programs.

[3] Includes receipts and interest for Native American Endowment: $11 million in 2004; $14 million in 2005; $15 million in 2006.

[4] Excludes buildings and facilities.

[5] Includes the medical care and prosthetic research appropriation and VA medical care support transfer to research.

[6] Science and Technology, plus Superfund transfer.

[7] Includes research and development funding for the Federal Highway Administration, the Federal Motor Carrier Safety Administration, and the National Highway Traffic Safety Administration.

[8] Does not include funding for Regional Educational Labs.

Table 5–4. AGENCY DETAIL OF SELECTED INTERAGENCY R&D EFFORTS

(Budget authority, dollar amounts in millions)

	2004 Actual	2005 Estimate	2006 Proposed	Dollar Change: 2005 to 2006	Percent Change: 2005 to 2006
Networking and Information Technology R&D					
Defense [1]	241	277	294	17	6%
National Science Foundation	773	795	803	8	1%
Health and Human Services [2]	542	573	551	–22	–4%
Energy	343	383	355	–28	–7%
Commerce	47	58	61	3	5%
National Aeronautics and Space Administration	258	192	57	–135	–70%
Environmental Protection Agency	2	4	6	2	50%
Total	**2,206**	**2,282**	**2,127**	**–155**	**–7%**
National Nanotechnology Initiative					
National Science Foundation	256	338	344	6	2%
Defense	291	257	230	–27	–11%
Energy	202	210	207	–3	–1%
Health and Human Services [3]	108	145	147	2	1%
Commerce (NIST)	77	75	75	.....	.....
National Aeronautics and Space Administration	47	45	35	–10	–22%
Agriculture	2	3	8	5	167%
Environmental Protection Agency	5	5	5	.....	.....
Justice	2	2	2	.....	.....
Homeland Security	1	1	1	.....	.....
Total	**991**	**1,081**	**1,054**	**–27**	**–2%**
Climate Change Science Program					
National Aeronautics and Space Administration	1,321	1,264	1,162	–102	–8%
National Science Foundation	215	198	197	–1	–1%
Commerce (NOAA)	116	124	181	57	46%
Energy	133	129	132	3	2%
Agriculture	70	73	88	15	21%
National Institutes of Health	61	65	65	.....	.....
Interior (USGS)	28	24	24	.....	.....
Environmental Protection Agency	22	20	21	1	5%
Smithsonian	6	6	6	.....	.....
U.S. Agency for International Development	6	6	6	.....	.....
Transportation	1	3	3	.....	N/A
State	1	1	1	.....	.....
Total	**1,975**	**1,913**	**1,886**	**–27**	**–1%**
Subtotal, CCRI (included in CCSP total)	**168**	**221**	**183**	**–38**	**–17%**

[1] In 2006, DOD will reassess which of its IT R&D programs are appropriate to count as part of the NITRD program, and any changes will be reported in subsequent NITRD publications.

[2] Includes funds from offsetting collections for the Agency for Healthcare Research and Quality.

[3] Includes funds from both the National Institutes of Health and National Institute of Occupational Safety and Health.

V. ALLOCATION OF RESEARCH FUNDING

Federal funds appropriated to Executive Branch agencies may be used in different ways, ranging from grants awarded to university researchers to supporting research at Federal laboratories. The Administration strongly supports the competitive, merit review process for funding research in most cases. However, there are appropriate roles for other modes of allocating research funding in some circumstances, such as funding research at specific facilities that have unique capabilities. In such cases, however, the proposed allocation should be reviewed by scientific or technological experts, as well as mangement and program experts.

In order to better understand and characterize the methods agencies use to allocate their research funding, agencies reported how research funds are allocated by the following five categories:

Research performed at congressional direction consists of intramural and extramural research programs where funded activities are awarded to a single performer or collection of performers with limited or no competitive selection or with competitive selection but outside of the agency's primary mission, based on direction from the Congress in law, in report language, or by other direction.

Inherently unique research is intramural and extramural research programs where funded activities are awarded to a single performer or team of performers without competitive selection. The award may be based on the provision of unique capabilities, concern for timeliness, or prior record of performance (e.g., facility operations support for a unique facility, such as an electron-positron linear collider; research grants for rapid-response studies to address an emergency).

Merit-reviewed research with limited competitive selection is intramural and extramural research programs where funded activities are competitively awarded from a pool of qualified applicants that are limited to organizations that were created to largely serve Federal missions and continue to receive most of their annual research revenue from Federal sources. The limited competition may be for reasons of stewardship, agency mission constraints, or retention of unique technical capabilities (e.g., funding set aside for researchers at laboratories or centers of DOD, NASA, EPA, NOAA, and NIH; Federally Funded Research and Development Centers; formula funds for USDA).

Merit-reviewed research with competitive selection and internal (program) evaluation is intramural and extramural research programs where funded activities are competitively awarded following review for scientific or technical merit. The review is conducted by the program manager or other qualified individuals from within the agency program, without additional independent evaluation (e.g., merit-reviewed research at DOD).

Merit-reviewed research with competitive selection and external (peer) evaluation is intramural and extramural research programs where funded activities are competitively awarded following review by a set of external scientific or technical reviewers (often called peers) for merit. The review is conducted by appropriately qualified scientists, engineers, or other technically-qualified individuals who are apart from the people or groups making the award decisions, and serves to inform the program manager or other qualified individual who makes the award (e.g., NSF's single-investigator research; NASA's research and analysis funds).

Table 5–5 lists how Federal R&D agencies report allocating research funding among these categories.

Table 5–5. ALLOCATION OF FEDERAL RESEARCH FUNDING, 2004 AND 2005

(Percent of Agency Research)

	Research Performed at Congressional Direction		Inherently Unique Research		Merit Reviewed Research with Limited Competitive Selection		Merit Reviewed Research with Competitive Selection and Internal Evaluation		Merit Reviewed Research with Competitive Selection and External Evaluation	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
By Agency										
Health & Human Services	.....	1%	1%	1%	12%	12%	.....	.....	86%	86%
Defense	17%	12%	9%	8%	6%	6%	65%	72%	3%	3%
Energy	5%	4%	23%	23%	51%	52%	4%	4%	18%	17%
NASA	4%	9%	1%	2%	10%	11%	35%	26%	51%	52%
National Science Foundation	.....	.....	.....	.....	6%	6%	21%	21%	73%	73%
Agriculture	17%	17%	55%	52%	14%	14%	.....	.....	13%	17%
Commerce	6%	6%	41%	44%	15%	14%	18%	18%	22%	18%
Veterans Affairs	.....	.....	.....	.....	.....	.....	.....	.....	100%	100%
Interior	7%	7%	30%	30%	33%	33%	27%	27%	2%	2%
Transportation	13%	15%	17%	23%	1%	1%	69%	61%	.....	.....
Homeland Security	.....	24%	.....	.....	30%	23%	48%	36%	22%	16%
Environmental Protection Agency	8%	.....	3%	7%	44%	50%	12%	15%	32%	28%
Research Funding (dollars in millions)	**2,312**	**2,427**	**3,965**	**4,101**	**8,174**	**8,414**	**7,587**	**7,888**	**32,398**	**32,549**
Percentage of Federal Research	**4%**	**4%**	**7%**	**7%**	**15%**	**15%**	**14%**	**14%**	**60%**	**59%**