7. PROMOTING RESEARCH

Over the past fifty years our commitment to science has strengthened this country in countless ways. Scientific research has created vast new industries, millions of jobs, allowed America to produce the world's most bountiful food supplies and remarkable tools for fighting disease. Think of what today's investments will yield.

President Clinton
June 1998

In the last one hundred years, science and technology have fundamentally transformed our lives, from the ways we travel and communicate, to the food we eat; from the manner in which we learn, to the quality of our health care and our ability to create a cleaner environment. The next century offers new fields of research and innovation and potential solutions to some of society's most pressing challenges. Technological advances continue to strengthen the ties between Americans and the rest of the world, enabling new business endeavors, providing access to news and information from anywhere on the globe, and improving cultural understanding. As the forces of innovation and globalization gain momentum, the 21st Century promises to be an era of great opportunity for the entire world, propelled by new and remarkable developments.

In the latter half of this century, the Federal Government has played a critical role in spurring and sustaining scientific and technological advances. Among other feats, Government-sponsored research and development put Americans on the moon, explored the oceans, boosted agricultural productivity, harnessed the atom, devised more effective treatments for cancers, found the remains of lost civilizations, tracked weather patterns and earthquake faults, created the Internet, and deciphered the chemistry of life. Numerous studies show technological innovation and scientific discovery generated at least half of the Nation's productivity growth over the last 50 years, created millions of high-skill, high-wage jobs, and improved the quality of life in America.

In the last year alone, research and development have produced numerous impressive results, including the first photograph of a planet outside our own solar system, the creation of the world's fastest supercomputer, the identification of the gene that causes Parkinson's Disease, and a host of other notable achievements.

The future holds even greater possibilities. Scientists and engineers in many disciplines are within reach of even more exciting advances. Building on decades of experimentation and theoretical developments, they will be able to rely on new and sophisticated research tools for future discoveries—supercomputers that can make trillions of calculations in a second, particle accelerators and electron microscopes that can decipher atoms and the nature of matter, and space telescopes that can reach to parts of the universe previously unexplored. In particular, computational science—supercomputer modeling of extremely complex systems such as the global climate, the human body, and galaxies—is emerging as a new and significant branch of research, providing insights not likely to occur through experimentation or theorizing alone.

Continued leadership in science and technology is a cornerstone of the President and the Vice President's vision for America. During the past six years, the Administration has provided substantial growth for science and technology programs. The budget strengthens these vital investments, contributing to many broader Administration goals for the economy, education, health care, the environment, and national defense. The budget

also takes steps to ensure that everyone—regardless of economic status, education, location, gender, ethnicity or race—can reap the benefits of technological innovation.

The 2000 Budget maintains the course established in last year's budget, in which the President proposed the largest increase in history for civilian research programs, plotting a bold course of strategic growth. This budget proposes funding levels across a broad range of civilian agencies consistent with the increases projected in the 1999 Budget. The continuing centerpiece of the Administration's commitment to science and technology is the 21st Century Research Fund, which provides stability and growth for the highest priority research programs. The budget provides $38.1 billion for the Fund—a three-percent increase above last year. (See Table 7–1 for details on the Fund.)

This budget also reflects an effort to re-establish an optimum balance between health care research and other scientific disciplines—a concern voiced in recent years throughout the science community. Substantial recent increases to the National Institutes of Health (NIH) have advanced the President's commitment to increase long-term NIH funding well ahead of schedule. The budget adds prudently to the NIH while providing a seven-percent boost for the National Science Foundation (NSF), which supports a broad range of university research in areas other than health.

A Bold, New Information Technology Initiative

The budget proposes a bold, new Information Technology Initiative that will invest in long-term, fundamental research in computing and communications, and will increase development and purchases of extremely fast supercomputers to support a broad range of civilian research and development. Long-term information technology research will strengthen America's leadership in an industry that accounts for one-third of our economic growth, create high-tech, high-wage jobs, and improve our quality of life. This research may also lead to breakthroughs such as: computers that are easier to use, including by people with disabilities; high-speed wireless networks that can bring telemedicine to rural communities; the successor to the transistor; and software that is much more dependable and reliable. High-speed supercomputers will allow scientists and engineers to develop life-saving drugs more rapidly, provide earlier warnings for tornadoes and design more fuel efficient, safer automobiles. The initiative will also provide for fundamental research that could lead to major breakthroughs in the next generation of supercomputers, networks, and applications—research that, without Federal support, would not otherwise be funded. Consistent with the Administration's approach, the initiative emphasizes the inter-dependency of scientific disciplines—that innovation in one field is often made possible by innovations in other fields. And it lays the groundwork for a flourishing of the computational sciences in the 21st Century, and for advances that will contribute to our health and well-being in the future. (See Chart 7–1 for information on computing and communications R&D.)

Science and Technology Themes

Federal investments in science and technology contribute to the Administration's economic, educational, health, environmental, and national security goals. The budget proposes increases for a host of important activities. (For total Federal R&D funding, see Table 7–2; for science and technology highlights, see Table 7–3.)

Increasing Total Support for Science and Technology: The budget proposes $38.1 billion for programs in the 21st Century Research Fund, $1.2 billion, or three percent, more than in 1999, exceeding last year's projected increases. The budget provides an increasing share for civilian R&D investments, which now comprise 51 percent of the total—a substantial increase from 42 percent in 1993, in keeping with the Administration's efforts to place additional emphasis on civilian R&D activities.

Boosting Funding for Basic Research: The budget proposes $18.2 billion for basic research, an increases of $727 million, or 4.2 percent, over 1999. These investments—the highest level ever proposed for basic research—reflect the Administration's commitment to obtaining knowledge that will provide

Table 7–1. 21st CENTURY RESEARCH FUND

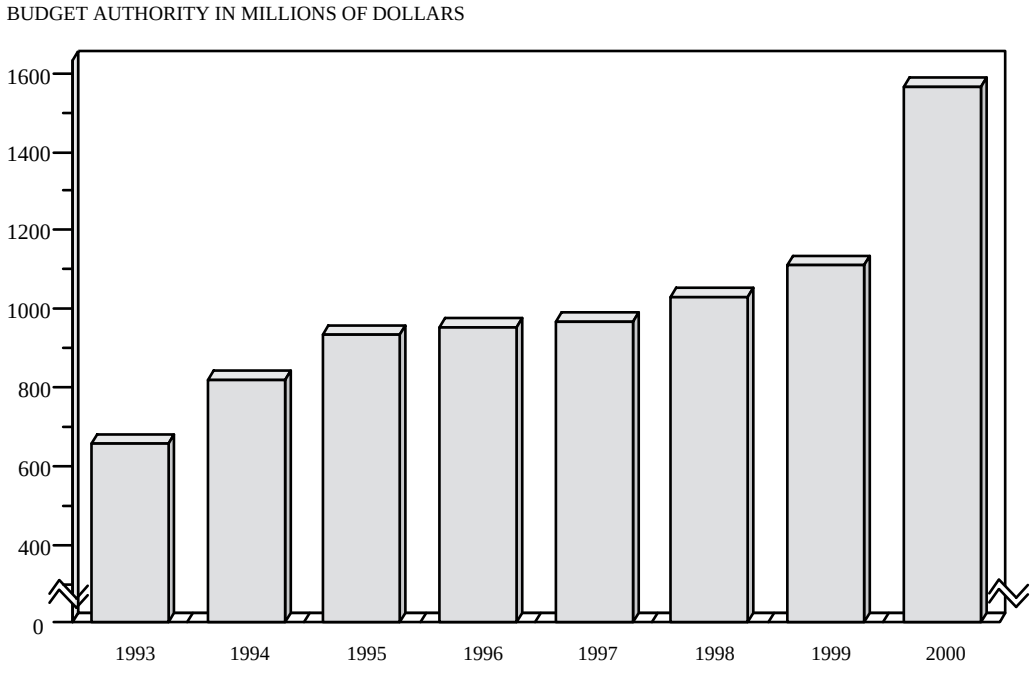
(Budget authority, dollar amounts in millions)

	1993 Actual	1998 Actual	1999 Estimate	2000 Proposed	Percent Change: 1999 to 2000
Health and Human Services:					
National Institutes of Health	10,335	13,648	15,612	15,933	+2%
National Science Foundation	2,750	3,429	3,672	3,921	+7%
Department of Energy (DOE):					
Science Programs	3,066	2,468	2,685	2,835	
Solar and Renewable R&D	249	272	336	399	
Energy Conservation R&D	346	457	526	647	
DOE Total	3,661	3,197	3,547	3,881	+9%
National Aeronautics and Space Administration (NASA):					
Space Science	1,770	2,034	2,119	2,197	
Earth Science	996	1,417	1,414	1,459	
Advanced Space Transportation	115	417	423	254	
Aeronautics	769	920	786	620	
Life and Microgravity Sciences	195	214	264	256	
NASA Total	3,845	5,002	5,006	4,786	–4%
Department of Defense (DOD):					
Basic Research	1,314	1,012	1,108	1,113	
Applied Research	3,549	2,910	3,151	2,956	
DOD Total	4,863	3,922	4,259	4,069	–4%
Department of Agriculture (USDA):					
CSREES Research and Education [1]	433	430	476	475	
Economic Research Service	59	54	54	56	
Agricultural Research Service	661	745	809	837	
Forest Service Research	183	188	197	235	
USDA Total	1,336	1,417	1,536	1,603	+6%
Department of Commerce:					
Oceanic and Atmospheric Research	202	278	287	283	
National Institutes of Standards and Technology [2]	364	565	540	635	
Commerce Total	566	843	827	918	+11%
Department of the Interior: U.S. Geological Survey	579	759	798	838	+5%
Environmental Protection Agency (EPA):					
Office of Research and Development.	517	573	562	535	
Climate Change Technology programs	.....	90	109	216	
EPA Total	517	663	671	751	+12%
Department of Veterans Affairs: Medical Research	232	272	316	316	.....
Department of Education: Research programs	117	196	210	265	+26%
Department of Transportation (DOT):					
Highway Research	310	288	338	661	
Aviation Research	230	199	150	173	
DOT Total	540	487	488	834	+71%
21st Century Research Fund	**29,341**	**33,835**	**36,942**	**38,115**	**3%**

[1] Does not include funds proposed for the recently authorized Integrated Research, Education, and Extension Competitive Grants Program, a portion of which would be used for R&D activities.

[2] Does not include the Manufacturing Extension Partnership.

Chart 7-1. COMPUTING AND COMMUNICATIONS RESEARCH AND DEVELOPMENT



Note: Includes High Performance Computing and Communications (excluding DOE's defense-related activities), the Information Technology Initiative, and other related civilian activities.

future economic and social benefits and improve our ability to meet economic needs without adversely affecting health and the environment (see Chart 7–2).

Strengthening University-Based Research: University-based research is key to America's future. While fostering innovation and expanding the scientific frontier, university-based research also trains the next generation of scientists and engineers. The budget proposes $15.5 billion, an increase of $353 million over 1999.

Protecting Human Health: The budget reflects the Administration's continued focus on R&D to protect human health. It funds research programs at NIH that have made the United States the world's leader in medical research. It also supports the development of an AIDS vaccine, the fight against emerging infectious diseases, research on cancer and diabetes, efforts to reduce the demand for illicit drugs, and a food safety initiative.

Investing in Innovation to Create New Jobs and Industries: Many of the new private-sector jobs created under this Administration have been high-tech, high-wage jobs in industries like biotechnology and computing. The budget maintains a strong investment in technology to foster these high-priority, civilian science and technology industries and jobs. The budget continues funding for the Department of Commerce's Advanced Technology Program and Manufacturing Extension Partnerships to help firms develop and adopt modern technologies.

Investing in Environmental Research: The budget supports vital research on safe and clean food, air, and water, and on ecosystem management, biological diversity, climate change, natural disasters, energy efficiency, and renewable energy. These investments provide a scientific basis for developing cost-effective environmental policies, produce the knowledge base for citizens to make wise environmental decisions, and enable better approaches to environmental protection. The budget pro-

Table 7–2. RESEARCH AND DEVELOPMENT INVESTMENTS

(Budget authority, dollar amounts in millions)

	1993 Actual	1998 Actual	1999 Estimate	2000 Proposed	Percent Change: 1999 to 2000	Percent Change: 1993 to 2000
Funding by Agency:						
Defense	38,898	37,568	37,204	35,064	–6%	–10%
Health and Human Services	10,472	13,860	15,792	15,984	+1%	+53%
National Aeronautics and Space Administration	8,873	9,753	9,714	9,771	+1%	+10%
Energy	6,896	6,483	7,240	7,465	+3%	+8%
National Science Foundation	2,012	2,528	2,721	2,934	+8%	+46%
Agriculture	1,467	1,561	1,796	1,718	–4%	+17%
Commerce	793	1,091	1,075	1,162	+8%	+47%
Transportation	613	859	891	1,230	+38%	+101%
Interior	649	472	517	590	+14%	–9%
Environmental Protection Agency	511	636	669	645	–4%	+26%
Veterans Affairs	253	587	674	663	–2%	+162%
Other	1,055	928	974	1,016	+4%	–4%
Total	72,492	76,326	79,267	78,242	–1%	+8%
Total, without Defense development	36,966	41,779	45,140	46,256	+2%	+25%
Funding by R&D Type:						
Basic Research	13,362	15,658	17,499	18,226	+4%	+36%
Applied Research	13,608	15,144	16,134	16,169	.....	+19%
Development	42,795	42,721	42,490	40,799	–4%	–5%
Equipment	[1]	994	977	1,063	+9%	NA
Facilities	2,727	1,809	2,167	1,985	–8%	+12%
Total	72,492	76,326	79,267	78,242	–1%	+8%
Total, without Defense development	36,966	41,779	45,140	46,256	+2%	+25%
Funding by Civilian Theme:						
Basic Research	11,951	14,592	16,341	17,074	+4%	+43%
Applied Research	9,130	10,936	11,603	11,598	.....	+27%
Development	7,269	8,174	8,363	8,813	+5%	+21%
Equipment	[1]	656	650	748	+15%	NA
Facilities	1,979	1,398	1,672	1,528	–9%	+15%
Subtotal	30,329	35,756	38,629	39,761	+3%	+31%
Funding by Defense Theme:						
Basic Research	1,411	1,066	1,158	1,152	–1%	–18%
Applied Research	4,478	4,208	4,531	4,571	+1%	+2%
Development	35,526	34,547	34,127	31,986	–6%	–10%
Equipment	[1]	338	327	315	–4%	NA
Facilities	748	411	495	457	–8%	+3%
Subtotal	42,163	40,570	40,638	38,481	–5%	–9%
Funding by R&D Share:						
Defense	42,163	40,570	40,638	38,481	–5%	–9%
Civilian	30,329	35,756	38,629	39,761	+3%	+31%
Total	72,492	76,326	79,267	78,242	–1%	+8%
Civilian (percent)	42%	47%	+49%	+51%		
R&D Support to Universities	11,674	13,693	15,124	15,477	+2%	+33%
Merit (Peer) Reviewed R&D Programs	NA	23,123	25,542	26,409	+3%	NA

NA = Not Applicable.
[1] Equipment and facilities data were not collected separately in 1993.

Table 7–3. SELECTED PROGRAM HIGHLIGHTS

(Budget authority, dollar amounts in millions)

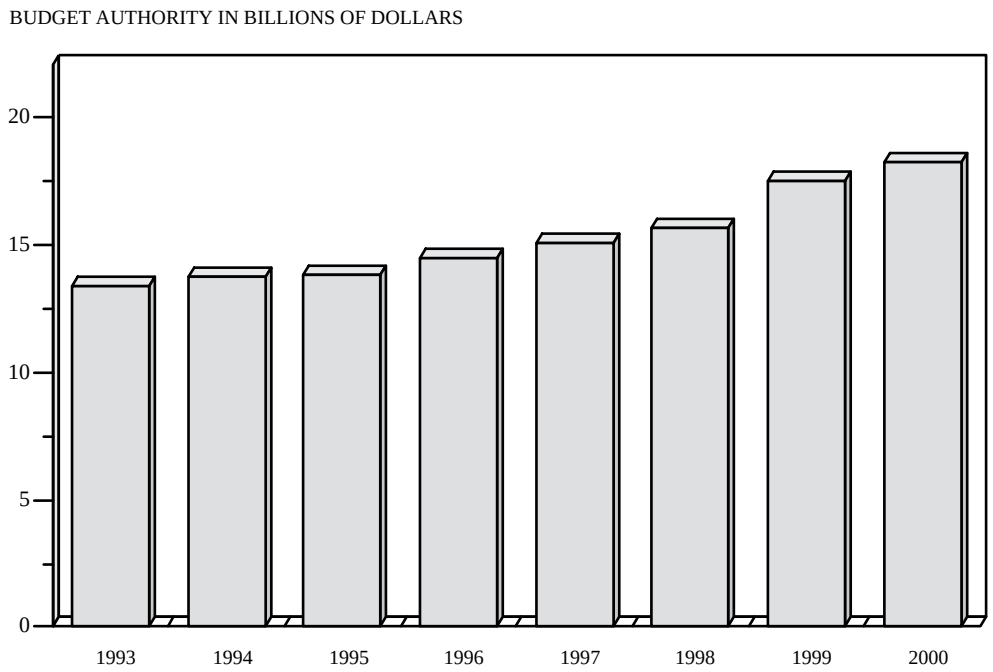
	1998 Actual	1999 Estimate	2000 Proposed	Dollar Change: 1999 to 2000	Percent Change: 1999 to 2000
National Aeronautics and Space Administration:					
International Space Station	2,441	2,305	2,483	+178	+8%
Department of Commerce:					
Advanced Technology Program	193	203	239	+36	+18%
National Telecom. and Info. Admin. NII Grants	20	18	20	+2	+11%
Department of Transportation:					
Highway Research and Deployment Initiative	121	162	390	+228	+141%
Intelligent Transportation System Initiative	167	177	271	+94	+53%
National Science and Technology Council Initiatives:					
High Performance Computing and Communications:					
Defense	220	168	207	+39	+23%
Health and Human Services	98	111	115	+4	+4%
National Aeronautics and Space Administration	120	93	136	+43	+46%
Energy (Civilian programs)	115	126	116	–10	–8%
Energy (Defense - Advanced Strategic Computing Initiative)	374	484	543	+59	+12%
National Science Foundation	265	301	314	+13	+4%
Commerce	20	27	27	.....	.....
Environmental Protection Agency	3	4	4	.....	.....
Subtotal	1,215	1,314	1,462	+148	+11%
Information Technology Initiative:					
National Science Foundation	.....	.....	146	NA	NA
Defense	.....	.....	100	NA	NA
Energy	.....	.....	70	NA	NA
National Aeronautics and Space Administration	.....	.....	38	NA	NA
Commerce	.....	.....	6	NA	NA
National Institutes of Health	.....	.....	6	NA	NA
Subtotal	NA	NA	366	NA	NA
U.S. Global Change Research Program:					
National Aeronautics and Space Administrati	1,210	1,177	1,219	+42	+4%
Energy	106	114	125	+11	+10%
National Science Foundation	167	182	187	+5	+3%
Agriculture	53	54	88	+34	+63%
Health and Human Services	35	40	40	.....	.....
Commerce	60	63	70	+7	+11%
Interior	26	27	27	.....	.....
Environmental Protection Agency	13	17	23	+6	+35%
Smithsonian Institution	7	7	7	.....	.....
Subtotal	1,677	1,681	1,786	+105	+6%
Partnership for a New Generation of Vehicles	220	240	264	+24	+10%
Climate Change Techology Initiative	819	1,021	1,368	+347	+34%
Integrated Science for Ecosystem Challenges[1]	.....	.....	96	NA	NA

NA = Not applicable

[1] Amount reflects new activities in 2000, but does not include related, ongoing activities in 2000 and prior years.

poses $96 million for Integrated Science for Ecosystem Challenges (ISEC) to develop an environmental information infrastructure and modeling framework to manage and preserve the Nation's natural resources. In 2000, ISEC will address four priority areas: invasive species, biodiversity and species decline; harmful algal blooms, hypoxia and eutrophication; habitat conservation and ecosystem productivity; and information management, monitoring,

Chart 7-2. BASIC RESEARCH SUPPORT



and integrated assessments. This research will allow resource managers to predict and assess the environmental and economic impacts of stress on vulnerable ecosystems and will also provide information to guide public and private land planning, management, and acquisition.

Investing in a 21st Century Education: Through the Education Technology Initiative, the Government is helping to ensure that America's classrooms are equipped with modern computers and connected to the Internet, that educational software becomes an integral part of the curriculum, and that teachers are ready to use and teach with technology. Federal science and technology investments such as the Education Research Initiative—an Education Department and NSF partnership—also contribute to these goals.

Investing in Research to Keep Our Nation Secure: The budget invests in defense research to ensure that our military maintains its technological superiority, providing $1.1 billion for basic research and $3.0 billion for applied research at the Defense Department. The budget also supports programs that will keep nuclear weapons out of the hands of terrorists, use science-based techniques to ensure the safety and reliability of our nuclear weapons stockpiles, promote global stability by bolstering strong international science and technology partnerships, and increase research and development on critical infrastructure protection to improve the safety and security of the Nation's physical infrastructure and information and communications systems.

Agency Highlights

NIH: The budget continues its commitment to biomedical research that promotes innovations to improve health and prevent disease. It provides an increase of $320 million over the 1999 level for NIH. This funding level will support research on diabetes, brain disorders, cancer, genetic medicine, disease prevention strategies, and development of an AIDS vaccine. NIH's highest priority continues to be investigator-initiated, peer-reviewed research project grants. In the last year, NIH research on traumatic spinal cord injury revealed that

it may actually be possible to regenerate nerve cells. More research may yield ways to repair damaged spinal cords and eventually permit the restoration of some degree of function to paralyzed patients.

NSF: The budget provides $3.92 billion—seven percent more than in 1999—for NSF, whose broad mission is to promote science and engineering research and education across all fields and disciplines. In 1998, NSF-funded scientists determined that the years 1997, 1995, and 1990 were the warmest since 1400 A.D., providing further evidence of recent human influence on the global climate system. The budget provides $146 million for NSF to play a lead role in the Administration's information technology initiative, focusing on long-term computer science research and providing scientists access to world-class supercomputers. The budget also increases funding for biocomplexity research to promote understanding of the complex biological, physical, chemical, and social interactions within and among the Earth's ecosystems.

Department of Energy (DOE): The budget provides $2.84 billion, a six-percent increase over 1999, for DOE's research programs in physics, chemistry, materials, biology, computer science, fusion, and other areas. DOE operates large scientific user facilities to enable research in these fields, as well as fields ranging from biomedicine to agriculture. The budget provides for the construction of new scientific facilities, including the Spallation Neutron Source and the Large Hadron Collider (in partnership with other countries), and the development of advanced computing and networking capabilities. In the past year, DOE-funded scientists achieved many notable successes, such as discovering how genetic material replicates and developing an atom-by-atom model of the enzyme responsible. In 2000, DOE will operate the newly constructed Relativistic Heavy Ion Collider to simulate conditions that existed in the universe in the first millionth of a second after the Big Bang. In addition, the budget includes $543 million for the Advanced Strategic Computing Initiative in support of nuclear weapon stockpile stewardship.

National Aeronautics and Space Administration (NASA): The budget funds several ongoing and new activities in support of NASA's missions, including $2.48 billion for the International Space Station, which began assembly in orbit in 1998 with the launch of the first U.S. and Russian elements. The Russian economic situation has increased uncertainty about Russia's ability to meet future critical milestones in this international development program. While the Administration remains committed to Russia's participation in this multi-national partnership, the budget reflects key steps taken to help ensure the ultimate success of this complex international program. By increasing funding for the Space Station, the Administration will help to maintain the construction schedule and enable development of backup capabilities in the event of potential shortfalls in Russian contributions. In addition to this "backup strategy," the Administration is also concerned about Space Station cost growth due to domestic problems, and has established oversight of the Space Station as a Priority Management Objective, as discussed in Section IV, "Improving Performance Through Better Management." The Administration will work closely with the Congress on any future issues to enable the program's success.

The NASA budget also includes: $2.2 billion—a four-percent increase over 1999—for Space Science, a program that made several significant discoveries in 1998, including the first confirmable evidence of ice on the moon; $1.46 billion—a three-percent increase over 1999—for Earth Science, which seeks to understand the influence of natural processes and human activities on the global environment and which will launch in 2000 the first in a new series of faster, cheaper satellites, known as Earth System Science Pathfinders; $254 million for Advanced Space Transportation Technology, which in 1999 will initiate development of the first in a new series of reusable launch vehicle demonstrations, known as Future-X; $620 million for Aeronautics Research and Technology programs, including Aviation Safety R&D; and $1.2 billion in funds after 2000 to support new launch vehicles to lower NASA's launch costs. Finally, the budget includes a $463 million, five-year technology investment to leverage recent successes in Space Science, like Mars

Pathfinder, and to enable robotic scientific outposts throughout the solar system.

Department of Defense (DOD): The budget funds $1.1 billion in basic research and $3.0 billion in applied research, and $3.3 billion in advanced technology development, providing options for new defense strategies and laying the groundwork for procuring next-generation defense systems. Because of DOD's emphasis on the physical sciences, its research and development investments are vital to the nation's engineering, mathematics, and computer science efforts. The budget supports the Dual Use Science and Technology program and the Commercial Operations and Support Savings Initiative, which put commercial industry's technical know-how and economies of scale to the service of national defense. The budget proposes $118 million to conduct Advanced Concept Technology Demonstrations (ACTDs), which bring technology experts and military operators together early in technology system development to eliminate communication barriers, improve management of development programs, and address key warfighter challenges. Forty-four ACTDs are now under way, and 13 have been completed. Recent DOD technological accomplishments include development of a vaccine effective against the infectious hepatitis A virus, a vaccine recently approved by the Food and Drug Administration and now commercially available for military and civilian use. Similarly, DOD has demonstrated the efficacy of a genetically engineered vaccine to protect against malaria. In addition, the Department has funded the development of a new material for body armor that provides lighter-weight protection against projectiles such as bullets or shrapnel.

Department of Commerce:

National Institute of Standards and Technology (NIST): The budget provides $239 million—an 18-percent increase over 1999—for NIST's Advanced Technology Program to promote unique, rigorously competitive, cost-shared R&D partnerships that develop technologies promising widespread economic benefits. The budget provides $396 million—a 17-percent increase over 1999—for research and facilities at NIST's Measurement and Standards Laboratories. In 1998, NIST improved our understanding of what happens when atoms approach each other at very slow speeds, building on the 1997 Nobel Prize winning work of NIST's Dr. William Phillips. This research is critical to both theoretical physics and future generations of time standards. In 2000, NIST will conduct additional research on fundamental physical constants, refined standards for weight and electricity, and critical infrastructure protection.

Manufacturing Extension Partnership: The budget proposes $100 million for this Nationwide network of 75 centers and over 325 field offices offering technical assistance to help the Nation's 382,000 small manufacturers compete more effectively, leading to stronger economic growth and job creation. This funding is matched by States and localities.

National Oceanic and Atmospheric Administration/Office of Oceanic and Atmospheric Research: The budget provides $283 million for research to provide a scientific basis for national policy decisions in areas such as climate change, air quality, and stratospheric ozone depletion, as well as research to promote economic growth through efforts in marine biotechnology and environmental technologies.

National Telecommunications and Information Administration's National Information Infrastructure Grants Program: The budget proposes $20 million—an 11-percent increase over 1999—for grants to fund innovative projects that demonstrate how information technology can improve the delivery of educational, health, and other social services. These grants are highly competitive and have stimulated several hundred million dollars in non-Federal matching funds.

Department of Agriculture (USDA): The budget provides $837 million for the Agricultural Research Service, $28 million more than in 1999, and $56 million for the Economic Research Service, which together conduct a broad range of food, farm, and environmental research programs. The budget also provides $475 million for Research and Education Programs of the Cooperative State Research, Education, and Extension Service (CSREES), including $200 million for the National Research Initiative (NRI), a 68-percent increase over the 1999 level. CSREES provides grants for agri-

cultural, food, and environmental research, and for higher education. NRI competitive research grants improve the quality and increase the quantity of USDA's farm, food, and environmental research. The budget also proposes increases for high priority research in areas such as nutrition, food safety, climate change, air and water quality, food quality protection, agricultural genomes, sustainable ecosystems, and the Forest Service's Forest and Rangeland Research program. An additional $120 million in mandatory funding will be available in 2000 under the Agricultural Research Extension and Education Reform Act of 1998.

Environmental Protection Agency (EPA): The budget provides $535 million for EPA's Office of Research and Development (ORD), which performs the majority of EPA's research and provides a sound scientific and technical foundation for environmental policy and regulatory decision-making. ORD also provides technical support for EPA's mission, integrates the work of its own scientific partners, and provides leadership in addressing emerging environmental issues, thereby assisting EPA in protecting human health and the environment. In the last year, EPA researchers discovered a method to render lead-contaminated soil safe for humans, thereby potentially decreasing the number of children suffering from lead poisoning.

Department of the Interior's U.S. Geological Survey (USGS): The budget provides $838 million—a five-percent increase over 1999—for science that supports natural resource and environmental decision making. In 1998, USGS science efforts provided critical information to restore the Florida Everglades and respond to Hurricane Bonnie and Hurricane Mitch. The budget supports research on enhanced understanding of species habitat, invasive species, and declines in amphibians and coral reefs. The budget also supports research and technical assistance on the scientific needs of land managers and local land-use planners. In 2000, this information will promote local planning and conservation efforts to protect the most valuable open spaces and critical habitat. USGS will use its mapping, remote sensing, and natural resources monitoring capabilities to develop new ways to improve the availability and dissemination of domestic natural disaster hazard and earth science information, as well as to support NASA's Earth Observing System satellites.

Department of Veterans Affairs' Medical Research: The budget provides $316 million—about a third of the Department's overall $1 billion research program—for clinical, epidemiological, and behavioral studies across a broad spectrum of medical research disciplines. Among the agency's top research priorities are improving the translation of research results into patient care, geriatrics (including end-of-life care and Alzheimer's disease), and treatment of Parkinson's disease and Persian Gulf Veterans' illnesses.

Department of Transportation: The budget proposes a total of $390 million for the Highway Research and Deployment Initiative—a $228 million increase over the 1999 level. This funding will support activities such as improving the durability of pavement and bridges, enhancing pedestrian safety, and refining air quality analysis models. The budget also includes $271 million for the Intelligent Transportation System (ITS) initiative—a package of technologies to enhance the safety and efficiency of surface transportation infrastructure. This ITS total includes $113 million for continued deployment of integrated "intelligent infrastructure," such as interactive traffic signals, traveler information systems, and advanced electronic motor carrier toll clearance systems in urban and rural areas and the commercial vehicle industry.

Department of Education: The budget proposes a $45 million increase for the National Education Research Institutes. The increase includes $25 million for the agency's contribution to the second year of the Education Research Initiative, a collaborative effort with NSF. The initiative will continue to support large-scale research focused on the best approaches to raising student achievement. Activities will focus on applying the latest research findings to the development, implementation, and evaluation of new program models in three areas: increasing readiness for reading and mathematics, sustaining reading and mathematics skills in grades K-3, and improving teacher preparation. The proposed increase for the Institutes will also support additional research on comprehensive school reform, and new research on English language skills acqui-

sition for children with limited English proficiency.

National Science and Technology Council Interagency Initiatives

The National Science and Technology Council provides management oversight that will ensure efficient and effective coordination for key multi-agency initiatives, including:

High Performance Computing and Communications (HPCC) and the Information Technology Initiative: The budget provides $1.8 billion for these programs, including $366 million for the Information Technology Initiative, a bold, new effort focused on two, interrelated topics: 1) fundamental research that could lead to major breakthroughs in the next generation of supercomputers, networks and applications—research that is too high-risk and/or long-term for private sector funding; and 2) development of extremely powerful supercomputers, hundreds of times more powerful than today's best, for applications in a variety of civilian fields. Resulting advances in these fields could lead, for example, to better predictions of global warming and regional weather, as well as improved pharmaceutical development. The continuing HPCC program will pursue breakthroughs in high-end computing and computation, large-scale networking, and high-confidence systems. This ongoing work includes the Next Generation Internet Initiative. In the last year, the program demonstrated many key components of the Next Generation Internet, including ultra-high-speed switching devices, and various data-intensive applications ranging from medical imaging to advanced storm forecasting.

U.S. Global Change Research Program (USGCRP): The budget proposes $1.8 billion—a six-percent increase over 1999—to observe, understand, predict, and assess the state of the Earth and how it changes in response to natural and human-induced forces. USGCRP science was critical in the accurate prediction of the 1997–98 El Niño event and other resulting climate anomalies, allowing for advanced preparations and, in some cases, minimization of human and economic losses. In 2000, the USGCRP will address a range of critical unanswered scientific questions: the origins of natural and human-caused changes; the role of multiple stresses on the rate and severity of environmental change; how climate change may vary by region and over time scales of decades, rather than centuries; and the potential for abrupt and surprising changes in the global climate. In 2000, the program will also focus on how the terrestrial biosphere produces and consumes carbon dioxide on a regional scale, to increase our understanding of the role of biological processes on the Earth's climate.

Climate Change Technology Initiative: The budget proposes $1.8 billion for the second year of this research and technology initiative to promote energy efficiency, develop low-carbon energy sources, and develop and demonstrate technologies to reduce greenhouse gas emissions. Led by DOE and EPA, the effort also includes USDA, the Department of Housing and Urban Development, and NIST. Of the amount proposed, $1.4 billion is for R&D spending on energy efficiency and renewable energy technologies, sequestration (storage) of carbon, extending the useful life of existing nuclear plants, and development of highly efficient fossil fuel technologies. The remainder, $0.4 billion, is for tax credits to stimulate the adoption of energy efficient technologies in buildings, homes, industrial processes, vehicles, and power generation.

Partnership for a New Generation of Vehicles: The budget proposes $264 million—$24 million more than in 1999—for this cost-shared, industry partnership, which centers on three research goals: to develop advanced manufacturing techniques; to use new technologies for near-term emissions improvements; and to develop production prototype vehicles three times more fuel-efficient than today's cars, with no sacrifice in comfort, performance, or price. Federal funding focuses mainly on the third goal. In the last year, the automobile companies completed hybrid drivetrain prototype development and have moved further development in-house, requiring no more Federal support for these activities. Federal funding is now focusing on timely development of crucial components such as low-emissions direct-injection engines, fuel cells, power electronics, batteries, and lightweight materials. The program will lead to concept cars in 2000, and production prototypes in 2004.