

7. RESEARCH AND DEVELOPMENT FUNDING

Investments in scientific discovery and technological development—both public and private—have driven economic growth and improvements in the quality of life in America for long as our Nation has existed. In the last 50 years, developments in science and technology have generated at least half of the Nation's productivity growth, creating millions of high-skill, high-wage jobs and leading to advances in the economy, national security, the environment, transportation and medical care. Federal government support for science and technology has helped put Americans on the moon, boosted agricultural productivity, harnessed the atom, devised more effective treatments for cancers, tracked weather patterns and earthquake faults, and deciphered the chemistry of life.

Because technological advances are key to progress and economic growth, in 1993 President Clinton took office committed to expanding Federal investment in civilian research and development. The President's economic strategy relied upon the critical element of investing in people and proposed targeted investments to help the Nation compete in the global economy and improve our quality of life.

The Administration's support for R&D has been essential to the flow of innovative ideas, which have resulted in everything from the discovery of the first multi-planet system beyond our own to unraveling human, plant and microbial genomes, a critical step in understanding the function of genes, and, in turn, potentially treating and curing diseases that are now beyond the reach of medical science. Investments in science and technology can bring us breakthroughs in the areas of the environment, health, national security, and more, including, for example: fuel economies that are double those of today; a strong defense that continually hones its technological edge; and fundamental research that may be able to unlock the answers to some of the most basic questions: why cells age and die, how human beings learn and remember information, and whether there is life on other planets.

Over the last several years, private industry has expanded its support for research and development, but most of these efforts focus on bringing new products to market rather than funding the basic research that can lead to break-through applications in a wide range of fields. By supporting fundamental research that can provide the foundation for tomorrow's technologies, the Federal Government can act as a catalyst for these breakthroughs. Federal investment in basic research increased by nearly 45 percent from 1993 to 2000, with emphasis on health research. The budget proposes

\$20.3 billion to advance a balanced portfolio in basic research, an increase of \$1.3 billion, or 7 percent, over 2000.

Basic university-based research plays a special role in the development of scientific advances. The competitive grants process upon which university research relies fosters innovation and expands scientific frontiers. At the same time, these research grants provide a training ground for the next generation of scientists and engineers. Funding support for universities has grown to roughly \$17.8 billion, a 53 percent increase, since 1993. Funding the academic researcher through a peer-reviewed, merit-based competitive process is the Federal government's strategy for pursuing the most promising long-term research. Researchers at national laboratories, in the private sector, and at non-profit companies may also be funded through such a competition. In 2001, \$28.2 billion in research funds will be awarded through a peer-reviewed, merit-based competitive process.

Other processes for allocating research dollars are appropriate in special cases. For example, agencies may decide that they wish to spearhead research in a particularly risky, but highly promising, field that can further the agency's mission. Agency program managers with in-depth knowledge and expertise are likely to have the best judgement for making such decisions. One example of this approach is the National Science Foundation, where program managers may award up to 5 percent of their funds through "Small Grants for Exploratory Research," which are made at the program manager's discretion, without peer review. In other agencies, there are well-known centers of excellence at the national laboratories, where there are unique capabilities. An agency may determine that maintaining and exploiting this excellence requires long-term financial stability for expensive world-class machines that will ultimately benefit many researchers.

In the appropriations process, Congress may require awards to be made to a single performer or collection of performers without competitive selection. This Congressional direction may be established in law, report language, or by other means. As a result of a recommendation in the National Science and Technology Council's report on the Government-University Partnership, agencies have reported the amount of funding that was awarded through such Congressional direction. The Administration is in the process of developing consistent measures across Federal agencies for these latter two categories of research, in order to publish the data in the 2002 budget.

The tables below provide data on Federal spending for research and development. Table 7-1 shows agency-by-agency spending on basic and applied research, development, and equipment and facilities. Table 7-2

shows agency-by-agency spending for two initiatives of the National Science and Technology Council, which are required by statute.

Table 7-1. FEDERAL RESEARCH AND DEVELOPMENT SPENDING

(Budget authority, dollar amounts in millions)

	1999 Actual	2000 Estimate	2001 Proposed	Dollar Change: 2000 to 2001	Percent Change: 2000 to 2001
By Agency					
Defense	38,850	38,719	38,640	-79	0%
Health and Human Services	15,797	18,063	18,998	935	5%
National Aeronautics and Space Administration	9,715	9,753	10,035	282	3%
Energy	6,992	7,091	7,655	564	8%
National Science Foundation	2,702	2,903	3,464	561	19%
Agriculture	1,645	1,773	1,828	55	3%
Commerce	1,084	1,073	1,152	79	7%
Interior	786	585	731	146	25%
Transportation	670	648	679	31	5%
Veterans Affairs	644	655	655	0	0%
Environmental Protection Agency	500	584	590	6	1%
Education	205	233	271	38	16%
Other	752	664	635	-26	-4%
TOTAL	80,342	82,744	85,333	2,589	3%
Basic Research					
Defense	1,082	1,175	1,230	55	5%
Health and Human Services	8,642	9,857	10,422	565	6%
National Aeronautics and Space Administration	1,981	1,947	1,895	-52	-3%
Energy	2,228	2,242	2,379	137	6%
National Science Foundation	2,330	2,512	3,000	488	19%
Agriculture	634	692	740	48	7%
Commerce	39	39	52	13	33%
Transportation	42	46	69	23	50%
Environmental Protection Agency	57	58	76	18	31%
Veterans Affairs	263	268	268	0	0%
Interior	50	61	63	2	3%
Education	2	2	2	0	0%
Other	118	128	132	4	3%
SUBTOTAL	17,468	19,027	20,328	1,301	7%
Applied Research					
Defense	3,064	3,383	3,087	-296	-9%
Health and Human Services	4,998	5,728	5,935	207	4%
National Aeronautics and Space Administration	2,306	2,365	2,817	452	19%
Energy	1,810	1,913	2,174	261	14%
National Science Foundation	147	164	193	29	18%
Agriculture	743	807	821	14	2%
Commerce	799	770	834	64	8%
Transportation	368	384	477	93	24%
Environmental Protection Agency	401	387	377	-10	-3%
Veterans Affairs	365	370	370	0	0%
Interior	418	482	486	4	1%
Education	141	150	165	15	10%
Other	355	290	290	0	0%
SUBTOTAL	15,915	17,193	18,026	833	5%
Development					
Defense	34,423	33,913	33,937	24	0%
Health and Human Services	1,919	2,229	2,408	179	8%
National Aeronautics and Space Administration	5,092	5,093	4,920	-173	-3%
Energy	2,003	2,036	2,163	127	6%
National Science Foundation	0	0	0	0	NA
Agriculture	109	109	118	9	8%
Commerce	137	106	176	70	66%
Transportation	161	145	171	26	18%
Environmental Protection Agency	96	93	84	-9	-10%

Table 7-1. FEDERAL RESEARCH AND DEVELOPMENT SPENDING—Continued

(Budget authority, dollar amounts in millions)

	1999 Actual	2000 Estimate	2001 Proposed	Dollar Change: 2000 to 2001	Percent Change: 2000 to 2001
Veterans Affairs	16	17	17	0	0%
Interior	25	24	34	10	42%
Education	62	81	104	23	28%
Other	259	225	189	-36	-16%
SUBTOTAL	44,302	44,071	44,321	250	1%
Facilities and Equipment					
Defense	281	248	386	138	56%
Health and Human Services	238	249	233	-16	-6%
National Aeronautics and Space Administration	336	348	403	55	16%
Energy	951	900	939	39	4%
National Science Foundation	225	227	271	44	19%
Agriculture	159	165	149	-16	-10%
Commerce	109	158	90	-68	-43%
Transportation	215	10	14	4	40%
Environmental Protection Agency	116	110	142	32	29%
Veterans Affairs	0	0	0	0	NA
Interior	7	17	7	-10	-59%
Education	0	0	0	0	NA
Other	20	21	24	3	14%
SUBTOTAL	2,657	2,453	2,658	205	8%

NA = Not applicable.

Table 7-2. AGENCY DETAIL OF MAJOR INITIATIVES

(Budget authority, dollar amounts in millions)

	1999 Actual	2000 Estimate	2001 Proposed	Dollar Change: 2000 to 2001	Percent Change: 2000 to 2001
Information Technology R&D*					
National Science Foundation	393	517	740	223	43%
Energy (Defense—Advanced Strategic Computing Initiative)	301	397	477	80	20%
Energy (Civilian programs)	139	120	190	70	57%
Defense	215	282	397	115	41%
Health and Human Services	118	191	233	42	22%
National Aeronautics and Space Administration	106	174	230	56	32%
Commerce	25	36	44	8	22%
Environmental Protection Agency	4	4	4	0	0%
TOTAL	1,301	1,721	2,315	594	35%
U.S. Global Change Research Program					
National Aeronautics and Space Administration	1,155	1,173	1,149	-24	-2%
National Science Foundation	182	187	187	0	0%
Energy	114	120	123	3	2%
Commerce	63	67	93	26	39%
Agriculture	52	53	85	32	60%
Health and Human Services	40	46	48	2	4%
Interior	27	27	25	-2	-7%
Environmental Protection Agency	17	21	23	2	10%
Smithsonian Institution	7	7	7	0	0%
TOTAL	1,657	1,701	1,740	39	2%

* Merges both the High Performance Computing and Communications program and the Information Technology Initiative (IT²).