# S. 296

#### IN THE HOUSE OF REPRESENTATIVES

 $\begin{array}{c} {\rm JULY~27,~1999} \\ {\rm Referred~to~the~Committee~on~Science} \end{array}$ 

# AN ACT

To provide for continuation of the Federal research investment in a fiscally sustainable way, and for other purposes.

- 1 Be it enacted by the Senate and House of Representa-
- 2 tives of the United States of America in Congress assembled,
- 3 SECTION 1. SHORT TITLE.
- 4 This Act may be cited as the "Federal Research In-
- 5 vestment Act".

### 1 SEC. 2. GENERAL FINDINGS REGARDING FEDERAL INVEST-

2	MENT IN RESEARCH.
3	(a) VALUE OF RESEARCH AND DEVELOPMENT.—The
4	Congress makes the following findings with respect to the
5	value of research and development to the United States:
6	(1) Federal investment in research has resulted
7	in the development of technology that saved lives in
8	the United States and around the world.
9	(2) Research and development investment
10	across all Federal agencies has been effective in cre-
11	ating technology that has enhanced the American
12	quality of life.
13	(3) The Federal investment in research and de-
14	velopment conducted or underwritten by both mili-
15	tary and civilian agencies has produced benefits that
16	have been felt in both the private and public sector.
17	(4) Discoveries across the spectrum of scientific
18	inquiry have the potential to raise the standard of
19	living and the quality of life for all Americans.
20	(5) Science, engineering, and technology play a
21	critical role in shaping the modern world.
22	(6) Studies show that about half of all United
23	States post-World War II economic growth is a di-
24	rect result of technical innovation; and science, engi-
25	neering, and technology contribute to the creation of

new goods and services, new jobs and new capital.

- 1 (7) Technical innovation is the principal driving 2 force behind the long-term economic growth and in-3 creased standards of living of the world's modern in-4 dustrial societies. Other nations are well aware of 5 the pivotal role of science, engineering, and tech-6 nology, and they are seeking to exploit it wherever 7 possible to advance their own global competitiveness.
  - (8) Federal programs for investment in research, which lead to technological innovation and result in economic growth, should be structured to address current funding disparities and develop enhanced capability in States and regions that currently underparticipate in the national science and technology enterprise.
- 15 (b) STATUS OF THE FEDERAL INVESTMENT.—The
  16 Congress makes the following findings with respect to the
  17 status of the Federal Investment in research and develop18 ment activities:
  - (1) Federal investment of approximately 13 to 14 percent of the Federal discretionary budget in research and development over the past 11 years has resulted in a doubling of the nominal amount of Federal funding.
  - (2) Fiscal realities now challenge Congress to steer the Federal government's role in science, engi-

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- 1 neering, and technology in a manner that ensures a 2 prudent use of limited public resources. There is 3 both a long-term problem—addressing the ever-increasing level of mandatory spending—and a near-5 term challenge—apportioning a dwindling amount of 6 discretionary funding to an increasing range of tar-7 gets in science, engineering, and technology. This 8 confluence of increased national dependency on tech-9 nology, increased targets of opportunity, and de-10 creased fiscal flexibility has created a problem of na-11 tional urgency. Many indicators show that more 12 funding for science, engineering, and technology is 13 needed but, even with increased funding, priorities 14 must be established among different programs. The 15 United States cannot afford the luxury of fully fund-16 ing all deserving programs.
- 17 (3) Current projections of Federal research 18 funding show a downward trend.

#### 19 SEC. 3. SPECIAL FINDINGS REGARDING HEALTH-RELATED

- 20 RESEARCH.
- The Congress makes the following findings with rezerote to health-related research:
- 23 (1) HEALTH AND ECONOMIC BENEFITS PRO-24 VIDED BY HEALTH-RELATED RESEARCH.—Because 25 of health-related research, cures for many debili-

- tating and fatal diseases have been discovered and deployed. At present, the medical research community is on the cusp of creating cures for a number of leading diseases and their associated burdens. In particular, medical research has the potential to develop treatments that can help manage the escalating costs associated with the aging of the United States population.
  - (2) Funding of Health-Related Research.—Many studies have recognized that clinical and basic science are in a state of crisis because of a failure of resources to meet the opportunity. Consequently, health-related research has emerged as a national priority and has been given significantly increased funding by Congress in fiscal year 1999. In order to continue addressing this urgent national need, the pattern of substantial budgetary expansion begun in fiscal year 1999 should be maintained.
  - (3) Interdisciplinary nature of health-Related research.—Because all fields of science and engineering are interdependent, full realization of the nation's historic investment in health will depend on major advances both in the biomedical sciences and in other science and engineering disciplines. Hence, the vitality of all disciplines must be

- preserved, even as special considerations are given to the health research field.
- 3 SEC. 4. ADDITIONAL FINDINGS REGARDING THE LINK BE-
- 4 TWEEN THE RESEARCH PROCESS AND USE-
- 5 FUL TECHNOLOGY.
- 6 The Congress makes the following findings:
- 7 (1) Flow of science, engineering, and 8 TECHNOLOGY.—The process of science, engineering, 9 and technology involves many steps. The present 10 Federal science, engineering, and technology struc-11 ture reinforces the increasingly artificial distinctions 12 between basic and applied activities. The result too 13 often is a set of discrete programs that each support 14 a narrow phase of research or development and are 15 not coordinated with one another. The government 16 should maximize its investment by encouraging the 17 progression of science, engineering, and technology 18 from the earliest stages of research up to a pre-com-19 mercialization stage, through funding agencies and 20 vehicles appropriate for each stage. This creates a 21 flow of technology, subject to merit review at each 22 stage, so that promising technology is not lost in a 23 bureaucratic maze.
  - (2) Excellence in the American Research infrastructure.—Federal investment in science,

- engineering, and technology programs must foster a close relationship between research and education. Investment in research at the university level creates more than simply world-class research. It creates world-class researchers as well. The Federal strategy must continue to reflect this commitment to a strong geographically-diverse research infrastructure. Furthermore, the United States must find ways to extend the excellence of its university system to primary and secondary educational institutions and to better utilize the community college system to prepare many students for vocational opportunities in an increasingly technical workplace.
  - (3) Commitment to a broad range of research initiatives.—An increasingly common theme in many recent technical breakthroughs has been the importance of revolutionary innovations that were sparked by overlapping of research disciplines. The United States must continue to encourage this trend by providing and encouraging opportunities for interdisciplinary projects that foster collaboration among fields of research.
  - (4) Partnerships among industry, universities, and federal laboratories.—Each of these contributors to the national science and tech-

1 nology delivery system has special talents and abili-2 ties that complement the others. In addition, each 3 has a central mission that must provide their focus and each has limited resources. The nation's investment in science, engineering, and technology can be 5 6 optimized by seeking opportunities for leveraging the 7 resources and talents of these three major players 8 through partnerships that do not distort the mis-9 sions of each partner. For that reason, Federal dol-10 lars are wisely spent forming such partnerships.

## 11 SEC. 5. MAINTENANCE OF FEDERAL RESEARCH EFFORT;

- 12 GUIDING PRINCIPLES.
- 13 (a) Maintaining United States Leadership in
- 14 Science, Engineering, and Technology.—It is im-
- 15 perative for the United States to nurture its superb re-
- 16 sources in science, engineering, and technology carefully
- 17 in order to maintain its own globally competitive position.
- 18 (b) Guiding Principles.—Federal research and de-
- 19 velopment programs should be conducted in accordance
- 20 with the following guiding principles:
- 21 (1) Good Science.—Federal science, engineer-
- ing, and technology programs include both knowl-
- edge-driven science together with its applications,
- and mission-driven, science-based requirements. In
- general, both types of programs must be focused,

- peer- and merit-reviewed, and not unnecessarily duplicative, although the details of these attributes must vary with different program objectives.
  - (2) FISCAL ACCOUNTABILITY.—The Congress must exercise oversight to ensure that programs funded with scarce Federal dollars are well managed. The United States cannot tolerate waste of money through inefficient management techniques, whether by government agencies, by contractors, or by Congress itself. Fiscal resources would be better utilized if program and project funding levels were predictable across several years to enable better project planning; a benefit of such predictability would be that agencies and Congress can better exercise oversight responsibilities through comparisons of a project's and program's progress against carefully planned milestones.
  - (3) Program effectiveness.—The United States needs to make sure that government programs achieve their goals. As the Congress crafts science, engineering, and technology legislation, it must include a process for gauging program effectiveness, selecting criteria based on sound scientific judgment and avoiding unnecessary bureaucracy. The Congress should also avoid the trap of meas-

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uring the effectiveness of a broad science, engineering, and technology program by passing judgment on individual projects. Lastly, the Congress must recognize that a negative result in a well-conceived and executed project or program may still be critically important to the funding agency.

(4) Criteria for government funding.— Program selection for Federal funding should continue to reflect the nation's 2 traditional research and development priorities: (A) basic, scientific, and technological research that represents investments in the nation's long-term future scientific and technological capacity, for which government has traditionally served as the principle resource; and (B) mission research investments, that is, investments in research that derive from necessary public functions, such as defense, health, education, environmental protection, and raising the standard of living, which may include pre-commercial, pre-competitive engineering research and technology development. Additionally, government funding should not compete with or displace the short-term, market-driven, and typically more specific nature of private-sector funding. Government funding should be restricted to precompetitive activities, leaving competitive activities 1 solely for the private sector. As a rule, the govern-2 ment should not invest in commercial technology 3 that is in the product development stage, very close to the broad commercial marketplace, except to meet 5 a specific agency goal. When the government pro-6 vides funding for any science, engineering, and tech-7 nology investment program, it must take reasonable 8 steps to ensure that the potential benefits derived 9 from the program will accrue broadly.

#### 10 SEC. 6. POLICY STATEMENT.

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- (a) Policy.— This Act is intended to—
- (1) assure a base level of Federal funding for basic scientific, biomedical, and pre-competitive engineering research, with this base level defined as a doubling of Federal basic research funding over the 11 year period following the date of enactment of this Act;
  - (2) invest in the future economic growth of the United States by expanding the research activities referred to in paragraph (1);
- (3) enhance the quality of life and health for all people of the United States through expanded support for health-related research;

1	(4) allow for accelerated growth of agencies
2	such as the National Institutes of Health to meet
3	critical national needs;
4	(5) guarantee the leadership of the United
5	States in science, engineering, medicine, and tech-
6	nology; and
7	(6) ensure that the opportunity and the support
8	for undertaking good science is widely available
9	throughout the United States by supporting a geo-
10	graphically-diverse research and development enter-
11	prise.
12	(b) AGENCIES COVERED.—The agencies intended to
13	be covered to the extent that they are engaged in science,
14	engineering, and technology activities for basic scientific,
15	medical, or pre-competitive engineering research by this
16	Act are—
17	(1) the National Institutes of Health, within the
18	Department of Health and Human Services;
19	(2) the National Science Foundation;
20	(3) the National Institute for Standards and
21	Technology, within the Department of Commerce;
22	(4) the National Aeronautics and Space Admin-
23	istration;
24	(5) the National Oceanic and Atmospheric Ad-
25	ministration, within the Department of Commerce;

1	(6) the Centers for Disease Control, within the
2	Department of Health and Human Services;
3	(7) the Department of Energy (to the extent
4	that it is not engaged in defense-related activities);
5	(8) the Department of Agriculture;
6	(9) the Department of Transportation;
7	(10) the Department of the Interior;
8	(11) the Department of Veterans Affairs;
9	(12) the Smithsonian Institution;
10	(13) the Department of Education;
11	(14) the Environmental Protection Agency; and
12	(15) the Food and Drug Administration, within
13	the Department of Health and Human Services.
14	(c) Damage to Research Infrastructure.—A
15	continued trend of funding appropriations equal to or
16	lower than current budgetary levels will lead to permanent
17	damage to the United States research infrastructure. This
18	could threaten American dominance of high-technology in-
19	dustrial leadership.
20	(d) FUTURE FISCAL YEAR ALLOCATIONS.—
21	(1) Goals.—The long-term strategy for re-
22	search and development funding under this section
23	would be achieved by a steady 2.5 percent annual in-
24	crease above the rate of inflation throughout a 11-
25	year period.

1	(2) Inflation assumption.—The authoriza-
2	tions contained in paragraph (3) assume that the
3	rate of inflation for each year will be 3 percent.
4	(3) Authorization.—There are authorized to
5	be appropriated for civilian research and develop-
6	ment in the agencies listed in subsection (b)—
7	(A) \$39,790,000,000 for fiscal year 2000;
8	(B) \$41,980,000,000 for fiscal year 2001;
9	(C) \$44,290,000,000 for fiscal year 2002;
10	(D) \$46,720,000,000 for fiscal year 2003;
11	(E) \$49,290,000,000 for fiscal year 2004;
12	(F) \$52,000,000,000 for fiscal year 2005;
13	(G) \$54,870,000,000 for fiscal year 2006;
14	(H) \$57,880,000,000 for fiscal year 2007;
15	(I) \$61,070,000,000 for fiscal year 2008;
16	(J) \$64,420,000,000 for fiscal year 2009;
17	and
18	(K) \$67,970,000,000 for fiscal year 2010.
19	(4) Acceleration to meet national
20	NEEDS.—
21	(A) In general.—If the amount appro-
22	priated for any fiscal year to an agency for the
23	purposes stated in paragraph (3) increases by
24	more than 8 percent over the amount appro-
25	priated to it for those purposes for the pre-

ceding fiscal year, then the amounts authorized by paragraph (3) for subsequent fiscal years for that agency and other agencies shall be determined under subparagraphs (B) and (C).

- (B) EXCLUSION OF AGENCY IN DETER-MINING OTHER AGENCY AMOUNTS FOR NEXT FISCAL YEAR.—For the next fiscal year after a fiscal year described in subparagraph (A), the amount authorized to be appropriated to other agencies under paragraph (3) shall be determined by excluding the agency described in subparagraph (A). Any amount that would, but for this subparagraph, be authorized to be appropriated to that agency shall not be appropriated.
- (C) Resumption of Regular Treat-Ment.—Notwithstanding subparagraph (B), an agency may not be excluded from the determination of the amount authorized to be appropriated under paragraph (3) for a fiscal year following a fiscal year for which the sum of the amounts appropriated to that agency for fiscal year 2000 and all subsequent fiscal years for the purposes described in paragraph (3) does not exceed the sum of—

- 1 (i) the amount appropriated to that 2 agency for such purposes for fiscal year 2000; and 3 (ii) the amounts that would have been appropriated for such purposes for subse-6 quent fiscal years if the goal described in 7 paragraph (1) had been met (and not ex-8 ceeded) with respect to that agency's fund-9 ing. 10 (D) NO LIMITATION ON OTHER FUND-11 ING.—Nothing in this paragraph limits the 12 amount that may be appropriated to any agency 13 for the purposes described in paragraph (3). 14 (e) Conformance with Budgetary Caps.—Not-15 withstanding any other provision of law, no funds may be made available under this Act in a manner that does not 16 conform with the discretionary spending caps provided in the most recently adopted concurrent resolution on the 18
- 21 (f) BALANCED RESEARCH PORTFOLIO.—Because of 22 the interdependent nature of the scientific and engineering 23 disciplines, the aggregate funding levels authorized by the 24 section assume that the Federal research portfolio will be 25 well-balanced among the various scientific and engineering

budget or threatens the economic stability of the annual

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budget.

- 1 disciplines, and geographically dispersed throughout the
- 2 States.

#### 3 SEC. 7. PRESIDENT'S ANNUAL BUDGET REQUEST.

- 4 The President of the United States shall, in coordina-
- 5 tion with the President's annual budget request, include
- 6 a report that parallels Congress' commitment to support
- 7 federally-funded research and development by providing—
- 8 (1) a detailed summary of the total level of
- 9 funding for research and development programs
- throughout all civilian agencies;
- 11 (2) a focused strategy that reflects the funding
- projections of this Act for each future fiscal year
- until 2010, including specific targets for each agency
- that funds civilian research and development;
- 15 (3) an analysis which details funding levels
- across Federal agencies by methodology of funding,
- including grant agreements, procurement contracts,
- and cooperative agreements (within the meaning
- given those terms in chapter 63 of title 31, United
- 20 States Code); and
- 21 (4) specific proposals for infrastructure develop-
- 22 ment and research and development capacity build-
- ing in States with less concentrated research and de-
- velopment resources in order to create a nationwide
- research and development community.

1	SEC. 8. COMPREHENSIVE ACCOUNTABILITY STUDY FOR
2	FEDERALLY-FUNDED RESEARCH.
3	(a) Study.—The Director of the Office of Science
4	and Technology Policy, in consultation with the Director
5	of the Office of Management and Budget, shall enter into
6	agreement with the National Academy of Sciences for the
7	Academy to conduct a comprehensive study to develop
8	methods for evaluating federally-funded research and de-
9	velopment programs. This study shall—
10	(1) recommend processes to determine an ac-
11	ceptable level of success for federally-funded re-
12	search and development programs by—
13	(A) describing the research process in the
14	various scientific and engineering disciplines;
15	(B) describing in the different sciences
16	what measures and what criteria each commu-
17	nity uses to evaluate the success or failure of a
18	program, and on what time scales these meas-
19	ures are considered reliable—both for explor-
20	atory long-range work and for short-range
21	goals; and
22	(C) recommending how these measures
23	may be adapted for use by the Federal govern-
24	ment to evaluate federally-funded research and
25	development programs;

1	(2) assess the extent to which agencies incor-
2	porate independent merit-based review into the for-
3	mulation of the strategic plans of funding agencies
4	and if the quantity or quality of this type of input
5	is unsatisfactory;
6	(3) recommend mechanisms for identifying fed-
7	erally-funded research and development programs
8	which are unsuccessful or unproductive;
9	(4) evaluate the extent to which independent,
10	merit-based evaluation of federally-funded research
11	and development programs and projects achieves the
12	goal of eliminating unsuccessful or unproductive pro-
13	grams and projects; and
14	(5) investigate and report on the validity of
15	using quantitative performance goals for aspects of
16	programs which relate to administrative manage-
17	ment of the program and for which such goals would
18	be appropriate, including aspects related to—
19	(A) administrative burden on contractors
20	and recipients of financial assistance awards;
21	(B) administrative burdens on external
22	participants in independent, merit-based evalua-
23	tions;
24	(C) cost and schedule control for construc-
25	tion projects funded by the program;

1	(D) the ratio of overhead costs of the pro-
2	gram relative to the amounts expended through
3	the program for equipment and direct funding
4	of research; and
5	(E) the timeliness of program responses to
6	requests for funding, participation, or equip-
7	ment use.
8	(6) examine the extent to which program selec-
9	tion for Federal funding across all agencies exempli-
10	fies our nation's historical research and development
11	priorities—
12	(A) basic, scientific, and technological re-
13	search in the long-term future scientific and
14	technological capacity of the nation; and
15	(B) mission research derived from a high-
16	priority public function.
17	(b) Alternative Forms for Performance
18	GOALS.—Not later than 6 months after transmitting the
19	report under subsection (a) to Congress, the Director of
20	the Office of Management and Budget, after public notice,
21	public comment, and approval by the Director of the Of-
22	fice of Science and Technology Policy and in consultation
23	with the National Science and Technology Council shall
24	promulgate one or more alternative forms for performance
25	goals under section 1115(b)(10)(B) of title 31, United

- 1 States Code, based on the recommendations of the study
- 2 under subsection (a) of this section. The head of each
- 3 agency containing a program activity that is a research
- 4 and development program may apply an alternative form
- 5 promulgated under this section for a performance goal to
- 6 such a program activity without further authorization by
- 7 the Director of the Office of Management and Budget.
- 8 (c) Strategic Plans.—Not later than one year
- 9 after promulgation of the alternative performance goals in
- 10 subsection (b) of this section, the head of each agency car-
- 11 rying out research and development activities, upon updat-
- 12 ing or revising a strategic plan under subsection 306(b)
- 13 of title 5, United States Code, shall describe the current
- 14 and future use of methods for determining an acceptable
- 15 level of success as recommended by the study under sub-
- 16 section (a).
- 17 (d) Definitions.—In this section:
- 18 (1) Director.—The term "Director" means
- the Director of the Office of Science and Technology
- Policy.
- 21 (2) Program activity.—The term "program
- activity" has the meaning given that term by section
- 23 1115(f)(6) of title 31, United States Code.
- 24 (3) Independent merit-based evalua-
- 25 Tion.—The term "independent merit-based evalua-

1	tion" means review of the scientific or technical
2	quality of research or development, conducted by ex-
3	perts who are chosen for their knowledge of sci-
4	entific and technical fields relevant to the evaluation
5	and who—
6	(A) in the case of the review of a program
7	activity, do not derive long-term support from
8	the program activity; or
9	(B) in the case of the review of a project
10	proposal, are not seeking funds in competition
11	with the proposal.
12	(e) Authorization of Appropriations.—There
13	are authorized to be appropriated to carry out the study
14	required by subsection (a) \$600,000 for the 18-month pe-
15	riod beginning October 1, 2000.
16	SEC. 9. EFFECTIVE PERFORMANCE ASSESSMENT PROGRAM
17	FOR FEDERALLY-FUNDED RESEARCH.
18	(a) In General.—Chapter 11 of title 31, United
19	States Code, is amended by adding at the end thereof the
20	following:
21	"§ 1120. Accountability for research and develop-
22	ment programs

"(a) Identification of Unsuccessful Pro-

GRAMS.—Based upon program performance reports for

1116, the Director of the Office of Management and Budget shall identify the civilian research and development program activities, or components thereof, which do not meet an acceptable level of success as defined in section 1115(b)(1)(B). Not later than 30 days after the submission of the reports under section 1116, the Director shall furnish a copy of a report listing the program activi-8 ties or component identified under this subsection to the President and the Congress. 10 "(b) ACCOUNTABILITY  $\mathbf{IF}$ No **IMPROVEMENT** Shown.—For each program activity or component that is identified by the Director under subsection (a) as being 12 below the acceptable level of success for 2 fiscal years in a row, the head of the agency shall no later than 30 days 14 after the Director submits the second report so identifying the program, submit to the appropriate congressional com-16 mittees of jurisdiction: 17 18 "(1) a concise statement of the steps necessary 19 to— "(A) bring such program into compliance 20 21 with performance goals; or 22 "(B) terminate such program should com-23 pliance efforts fail; and "(2) any legislative changes needed to put the 24 25 steps contained in such statement into effect.".

1	(b) Conforming Amendments.—
2	(1) The chapter analysis for chapter 11 of title
3	31, United States Code, is amended by adding at
4	the end thereof the following:
	"1120. Accountability for research and development programs".
5	(2) Section 1115(f) of title 31, United States
6	Code, is amended by striking "through 1119," and
7	inserting "through 1120".
	Passed the Senate July 26, 1999.
	Attest: GARY SISCO,
	Secretary.