

Calendar No. 697

105TH CONGRESS
2^D SESSION

S. 2217

[Report No. 105-364]

A BILL

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

OCTOBER 2, 1998

Reported with an amendment

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

IN THE SENATE OF THE UNITED STATES

JUNE 25, 1998

Mr. FRIST (for himself, Mr. ROCKEFELLER, Mr. DOMENICI, Mr. LIEBERMAN, Mr. BURNS, Mr. BINGAMAN, Mr. GRAMM, Mr. BREAUX, Mr. CLELAND, Mr. D'AMATO, Mr. MOYNIHAN, Mr. KERRY, Ms. MOSELEY-BRAUN, Mr. KERREY, Mr. ALLARD, Mr. ABRAHAM, Mrs. BOXER, Mr. DEWINE, Ms. SNOWE, Mrs. FEINSTEIN, Mrs. HUTCHISON, Mr. DURBIN, Mr. FAIRCLOTH, Mr. DODD, Mr. COCHRAN, Mr. ASHCROFT, Ms. LANDRIEU, Mr. WARNER, Mr. THOMPSON, Mr. AKAKA, Mr. SANTORUM, Mr. SARBANES, Mr. COVERDELL, and Mr. ROBB) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Technology

OCTOBER 2, 1998

Reported by Mr. MCCAIN, with an amendment

[Strike out all after the enacting clause and insert the part printed in *italic*]

A BILL

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”.

6 **SEC. 2. GENERAL FINDINGS REGARDING FEDERAL INVEST-**
7 **MENT IN RESEARCH.**

8 (a) VALUE OF RESEARCH AND DEVELOPMENT.—The
9 Congress makes the following findings with respect to the
10 value of research and development to the United States:

11 (1) Federal investment in research has resulted
12 in the development of technology that saved lives in
13 the United States and around the world.

14 (2) Research and development investment
15 across all Federal agencies has been effective in cre-
16 ating technology that has enhanced the American
17 quality of life.

18 (3) The Federal investment in research and de-
19 velopment conducted or underwritten by both mili-
20 tary and civilian agencies has produced benefits that
21 have been felt in both the private and public sector.

22 (4) Discoveries across the spectrum of scientific
23 inquiry have the potential to raise the standard of
24 living and the quality of life for all Americans.

1 (5) Science, engineering, and technology play a
2 critical role in shaping the modern world.

3 (6) Studies show that about half of all United
4 States post-World War II economic growth is a di-
5 rect result of technical innovation; and science, engi-
6 neering, and technology contribute to the creation of
7 new goods and services, new jobs and new capital.

8 (7) Technical innovation is the principal driving
9 force behind the long-term economic growth and in-
10 creased standards of living of the world's modern in-
11 dustrial societies. Other nations are well aware of
12 the pivotal role of science, engineering, and tech-
13 nology, and they are seeking to exploit it wherever
14 possible to advance their own global competitiveness.

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 develop-
18 ment activities:

19 (1) Federal investment of approximately 13 to
20 14 percent of the Federal discretionary budget in re-
21 search and development over the past 11 years has
22 resulted in a doubling of the nominal amount of
23 Federal funding.

24 (2) Fiscal realities now challenge Congress to
25 steer the Federal government's role in science, engi-

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-in-
4 creasing 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. ADDITIONAL FINDINGS REGARDING THE LINK BE-**
20 **TWEEN THE RESEARCH PROCESS AND USE-**
21 **FUL TECHNOLOGY.**

22 The Congress makes the following findings:

23 (1) **FLOW OF SCIENCE, ENGINEERING, AND**
24 **TECHNOLOGY.**—The process of science, engineering,
25 and technology involves many steps. The present

1 Federal science, engineering, and technology struc-
2 ture reinforces the increasingly artificial distinctions
3 between basic and applied activities. The result too
4 often is a set of discrete programs that each support
5 a narrow phase of research or development and are
6 not coordinated with one another. The government
7 should maximize its investment by encouraging the
8 progression of science, engineering, and technology
9 from the earliest stages of research up to a pre-com-
10 mercialization stage, through funding agencies and
11 vehicles appropriate for each stage. This creates a
12 flow of technology, subject to merit review at each
13 stage, so that promising technology is not lost in a
14 bureaucratic maze.

15 (2) EXCELLENCE IN THE AMERICAN RESEARCH
16 INFRASTRUCTURE.—Federal investment in science,
17 engineering, and technology programs must foster a
18 close relationship between research and education.
19 Investment in research at the university level creates
20 more than simply world-class research. It creates
21 world-class researchers as well. The Federal strategy
22 must continue to reflect this commitment to a strong
23 research infrastructure. Furthermore, the United
24 States must find ways to extend the excellence of its
25 university system to primary and secondary edu-

1 eational institutions and to better utilize the commu-
2 nity college system to prepare many students for vo-
3 cational opportunities in an increasingly technical
4 workplace.

5 (3) COMMITMENT TO A BROAD RANGE OF RE-
6 SEARCH INITIATIVES.—An increasingly common
7 theme in many recent technical breakthroughs has
8 been the importance of revolutionary innovations
9 that were sparked by overlapping of research dis-
10 ciplines. The United States must continue to encour-
11 age this trend by providing and encouraging oppor-
12 tunities for interdisciplinary projects that foster col-
13 laboration among fields of research.

14 (4) PARTNERSHIPS AMONG INDUSTRY, UNIVER-
15 SITIES, AND FEDERAL LABORATORIES.—Each of
16 these contributors to the national science and tech-
17 nology delivery system has special talents and abili-
18 ties that complement the others. In addition, each
19 has a central mission that must provide their focus
20 and each has limited resources. The nation's invest-
21 ment in science, engineering, and technology can be
22 optimized by seeking opportunities for leveraging the
23 resources and talents of these three major players
24 through partnerships that do not distort the mis-

1 sions of each partner. For that reason, Federal dol-
2 lars are wisely spent forming such partnerships.

3 **SEC. 4. MAINTENANCE OF FEDERAL RESEARCH EFFORT;**
4 **GUIDING PRINCIPLES.**

5 (a) **MAINTAINING UNITED STATES LEADERSHIP IN**
6 **SCIENCE, ENGINEERING, AND TECHNOLOGY.**—It is im-
7 perative for the United States to nurture its superb re-
8 sources in science, engineering, and technology carefully
9 in order to maintain its own globally competitive position.

10 (b) **GUIDING PRINCIPLES.**—Federal research and de-
11 velopment programs should be conducted in accordance
12 with the following guiding principles:

13 (1) **GOOD SCIENCE.**—Federal science, engineer-
14 ing, and technology programs include both knowl-
15 edge-driven science together with its applications,
16 and mission-driven, science-based requirements. In
17 general, both types of programs must be focused,
18 peer- and merit-reviewed, and not unnecessarily du-
19 plicative, although the details of these attributes
20 must vary with different program objectives.

21 (2) **FISCAL ACCOUNTABILITY.**—The Congress
22 must exercise oversight to ensure that programs
23 funded with scarce Federal dollars are well man-
24 aged. The United States cannot tolerate waste of
25 money through inefficient management techniques,

1 whether by government agencies, by contractors, or
2 by Congress itself. Fiscal resources would be better
3 utilized if program and project funding levels were
4 predictable across several years to enable better
5 project planning; a benefit of such predictability
6 would be that agencies and Congress can better ex-
7 ercise oversight responsibilities through comparisons
8 of a project's and program's progress against care-
9 fully planned milestones.

10 (3) PROGRAM EFFECTIVENESS.—The United
11 States needs to make sure that government pro-
12 grams achieve their goals. As the Congress crafts
13 science, engineering, and technology legislation, it
14 must include a process for gauging program effec-
15 tiveness, selecting criteria based on sound scientific
16 judgment and avoiding unnecessary bureaucracy.
17 The Congress should also avoid the trap of measur-
18 ing the effectiveness of a broad science, engineering,
19 and technology program by passing judgment on in-
20 dividual projects. Lastly, the Congress must recog-
21 nize that a negative result in a well-conceived and
22 executed project or program may still be critically
23 important to the funding agency.

24 (4) CRITERIA FOR GOVERNMENT FUNDING.—
25 Program selection for Federal funding should re-

1 quire a long-term horizon, with specific relevance to
2 a Federal mission requirement, or with broad knowl-
3 edge-based goals. Additionally, government funding
4 should not compete with or displace the short-term,
5 market-driven, and typically more specific nature of
6 private-sector funding. Government funding should
7 be restricted to pre-competitive activities, leaving
8 competitive activities solely for the private sector. As
9 a rule, the government should not invest in commer-
10 cial technology that is in the product development
11 stage, very close to the broad commercial market-
12 place, except to meet a specific agency goal. When
13 the government provides funding for any science, en-
14 gineering, and technology investment program, it
15 must take reasonable steps to ensure that the poten-
16 tial benefits derived from the program will accrue
17 broadly.

18 **SEC. 5. POLICY STATEMENT.**

19 (a) **POLICY.**—This Act is intended—

20 (1) to encourage, as an overall goal, the dou-
21 bling of the annual authorized amount of Federal
22 funding for basic scientific, medical, and pre-com-
23 petitive engineering research over the 12-year period
24 following the date of enactment of this Act;

1 (2) to set a minimum level of investment in
2 order to maintain the high priority that science, en-
3 gineering, and technology had previously been af-
4 farded in the Federal budget;

5 (3) to invest in the future of the United States
6 and the people of the United States by expanding
7 the research activities referred to in paragraph (1);

8 (4) to enhance the quality of life for all people
9 of the United States; and

10 (5) to guarantee the leadership of the United
11 States in science, engineering, medicine, and tech-
12 nology.

13 (b) AGENCIES COVERED.—The agencies intended to
14 be covered by this Act are—

15 (1) the National Institutes of Health, within the
16 Department of Health and Human Services;

17 (2) the National Science Foundation;

18 (3) the National Institute for Standards and
19 Technology, within the Department of Commerce;

20 (4) the National Aeronautics and Space Admin-
21 istration;

22 (5) the National Oceanic and Atmospheric Ad-
23 ministration, within the Department of Commerce;

24 (6) the Centers for Disease Control, within the
25 Department of Health and Human Services;

1 (7) the Department of Energy (to the extent
2 that it is not engaged in defense-related activities);
3 (8) the Department of Agriculture;
4 (9) the Department of Transportation;
5 (10) the Department of the Interior;
6 (11) the Department of Veterans Affairs;
7 (12) the Smithsonian Institution;
8 (13) the Department of Education; and
9 (14) the Environmental Protection Agency (to
10 the extent that it is engaged in science, engineering,
11 and technology activities for basic scientific, medical,
12 or pre-competitive engineering research).

13 (c) HISTORICAL INVESTMENT TREND.—

14 (1) Over the past 20 years, the percentage of
15 the civilian discretionary budget allocated to re-
16 search and development efforts has increased stead-
17 ily from approximately 10 percent in 1980 to ap-
18 proximately 14 percent for fiscal year 1998. The in-
19 crease in Federal investment in civilian research and
20 development from fiscal years 1988 through 1998
21 resulted in an overall doubling of funding across the
22 major federal research and development agencies.

23 (2) The investment in civilian research and de-
24 velopment efforts for fiscal year 1998 is 2.11876
25 percent of the overall Federal budget.

1 (d) DAMAGE TO RESEARCH INFRASTRUCTURE.—A
2 continued trend of funding appropriations equal to or
3 lower than current budgetary levels will lead to permanent
4 damage to the United States research infrastructure. This
5 could threaten American dominance of high-technology in-
6 dustrial leadership.

7 (e) INCREASE FUNDING.—In order to maintain and
8 enhance the economic strength of the United States in the
9 world market, funding levels for fundamental, scientific,
10 and pre-competitive engineering research should be in-
11 creased to equal approximately 2.6 percent of the total an-
12 nual budget.

13 (f) FUTURE FISCAL YEAR ALLOCATIONS.—

14 (1) GOALS.—

15 (A) The long-term strategy for research
16 and development funding under this section
17 would be achieved by a steady 2.5 percent an-
18 nual increase above the rate of inflation
19 throughout a 12-year period.

20 (B) There is a minimum threshold below
21 which long-term harm to both the research in-
22 frastructure and economic strength of the
23 United States would be caused; therefore it
24 shall be the goal of the President and Congress
25 to prevent the total amount of Federally-funded

1 research and development from falling below
 2 2.1 percent of the overall Federal budget at any
 3 point in the budget process.

4 (2) INFLATION ASSUMPTION.—The authoriza-
 5 tions contained in paragraph (3) assume that the
 6 rate of inflation for each year will be 3 percent.

7 (3) AUTHORIZATION.—Therea reauthorized to
 8 be appropriated for civilian research and develop-
 9 ment in the agencies listed in subsection (b)—

10 (A) \$37,720,000,000 for fiscal year 1999;

11 (B) \$39,790,000,000 for fiscal year 2000;

12 (C) \$41,980,000,000 for fiscal year 2001;

13 (D) \$42,290,000,000 for fiscal year 2002;

14 (E) \$46,720,000,000 for fiscal year 2003;

15 (F) \$49,290,000,000 for fiscal year 2004;

16 (G) \$52,000,000,000 for fiscal year 2005;

17 (H) \$54,870,000,000 for fiscal year 2006;

18 (I) \$57,880,000,000 for fiscal year 2007;

19 (J) \$61,070,000,000 for fiscal year 2008;

20 (K) \$64,420,000,000 for fiscal year 2009;

21 and

22 (L) \$67,970,000,000 for fiscal year 2010.

23 (g) CONFORMANCE WITH BUDGETARY CAPS.—Not-
 24 withstanding any other provision of law, no funds may be
 25 made available under this Act in a manner that does not

1 conform with the discretionary spending caps provided in
2 the most recently adopted concurrent resolution on the
3 budget or threatens the economic stability of the annual
4 budget.

5 (h) **BALANCED RESEARCH PORTFOLIO.**—Because of
6 the interdependent nature of the scientific and engineering
7 disciplines, the aggregate funding levels authorized by the
8 section assume that the Federal research portfolio will be
9 well-balanced among the various scientific and engineering
10 disciplines.

11 **SEC. 6. PRESIDENT'S ANNUAL BUDGET REQUEST.**

12 The President of the United States shall, in coordina-
13 tion with the President's annual budget request, include
14 a report that parallels Congress' commitment to support
15 Federally-funded research and development by provid-
16 ing—

17 (1) a detailed summary of the total level of
18 funding for research and development programs
19 throughout all civilian agencies;

20 (2) a focused strategy that reflects the funding
21 projections of this Act for each future fiscal year
22 until 2010, including specific targets for each agency
23 that funds civilian research and development; and

24 (3) an analysis which details funding levels
25 across Federal agencies by methodology of funding;

1 including grant agreements, procurement contracts,
2 and cooperative agreements (within the meaning
3 given those terms in chapter 63 of title 31, United
4 States Code).

5 **SEC. 7. COMPREHENSIVE ACCOUNTABILITY STUDY FOR**
6 **FEDERALLY-FUNDED RESEARCH**

7 (a) **STUDY.**—The Director of the Office of Science
8 and Technology Policy, in consultation with the Director
9 of the Office of Management and Budget, shall enter into
10 agreement with the National Academy of Sciences for the
11 Academy to conduct a comprehensive study to develop
12 methods for evaluating Federally-funded research and de-
13 velopment programs. This study shall—

14 (1) recommend processes to determine an ac-
15 ceptable level of success for Federally-funded re-
16 search and development programs by—

17 (A) describing the research process in the
18 various scientific and engineering disciplines;

19 (B) describing in the different sciences
20 what measures and what criteria each commu-
21 nity uses to evaluate the success or failure of a
22 program, and on what time scales these meas-
23 ures are considered reliable—both for explor-
24 atory long-range work and for short-range
25 goals; and

1 (C) recommending how these measures
2 may be adapted for use by the Federal govern-
3 ment to evaluate Federally-funded research and
4 development programs;

5 (2) assess the extent to which agencies incor-
6 porate independent merit-based review into the for-
7 mulation of the strategic plans of funding agencies
8 and if the quantity or quality of this type of input
9 is unsatisfactory;

10 (3) recommend mechanisms for identifying Fed-
11 erally-funded research and development programs
12 which are unsuccessful or unproductive;

13 (4) evaluate the extent to which independent,
14 merit-based evaluation of Federally-funded research
15 and development programs and projects achieves the
16 goal of eliminating unsuccessful or unproductive pro-
17 grams and projects; and

18 (5) investigate and report on the validity of
19 using quantitative performance goals for aspects of
20 programs which relate to administrative manage-
21 ment of the program and for which such goals would
22 be appropriate, including aspects related to—

23 (A) administrative burden on contractors
24 and recipients of financial assistance awards;

1 (B) administrative burdens on external
2 participants in independent, merit-based evalua-
3 tions;

4 (C) cost and schedule control for construc-
5 tion projects funded by the program;

6 (D) the ratio of overhead costs of the pro-
7 gram relative to the amounts expended through
8 the program for equipment and direct funding
9 of research; and

10 (E) the timeliness of program responses to
11 requests for funding, participation, or equip-
12 ment use.

13 (b) ALTERNATIVE FORMS FOR PERFORMANCE
14 GOALS.—Not later than 6 months after transmitting the
15 report under subsection (a) to Congress, the Director of
16 the Office of Management and Budget, after public notice,
17 public comment, and approval by the Director of the Of-
18 fice of Science and Technology Policy and in consultation
19 with the National Science and Technology Council shall
20 promulgate one or more alternative forms for performance
21 goals under section 1115(b)(10)(B) of title 31, United
22 States Code, based on the recommendations of the study
23 under subsection (a) of this section. The head of each
24 agency containing a program activity that is a research
25 and development program may apply an alternative form

1 promulgated under this section for a performance goal to
2 such a program activity without further authorization by
3 the Director of the Office of Management and Budget.

4 (c) STRATEGIC PLANS.—Not later than one year
5 after promulgation of the alternative performance goals in
6 subsection (b) of this section, the head of each agency ear-
7 rying out research and development activities, upon updat-
8 ing or revising a strategic plan under subsection 306(b)
9 of title 5, United States Code, shall describe the current
10 and future use of methods for determining an acceptable
11 level of success as recommended by the study under sub-
12 section (a).

13 (d) DEFINITIONS.—In this section:

14 (1) DIRECTOR.—The term “Director” means
15 the Director of the Office of Science and Technology
16 Policy.

17 (2) PROGRAM ACTIVITY.—The term “program
18 activity” has the meaning given that term by section
19 1115(f)(6) of title 31, United States Code.

20 (3) INDEPENDENT MERIT-BASED EVALUA-
21 TION.—The term “independent merit-based evalua-
22 tion” means review of the scientific or technical
23 quality of research or development, conducted by ex-
24 perts who are chosen for their knowledge of sci-

1 entific and technical fields relevant to the evaluation
2 and who—

3 (A) in the case of the review of a program
4 activity, do not derive long-term support from
5 the program activity; or

6 (B) in the case of the review of a project
7 proposal, are not seeking funds in competition
8 with the proposal.

9 (c) **AUTHORIZATION OF APPROPRIATIONS.**—There
10 are authorized to be appropriated to carry out the study
11 required by subsection (a) \$600,000 for the 18-month pe-
12 riod beginning October 1, 1998.

13 **SEC. 8. EFFECTIVE PERFORMANCE ASSESSMENT PROGRAM**
14 **FOR FEDERALLY-FUNDED RESEARCH.**

15 (a) **IN GENERAL.**—Chapter 11 of title 31, United
16 States Code, is amended by adding at the end thereof the
17 following:

18 **“§ 1120. ACCOUNTABILITY FOR RESEARCH AND DEVELOP-**
19 **MENT PROGRAMS**

20 **“(a) IDENTIFICATION OF UNSUCCESSFUL PRO-**
21 **GRAMS.**—Based upon program performance reports for
22 each fiscal year submitted to the President under section
23 1116, the Director of the Office of Management and
24 Budget shall identify the civilian research and develop-
25 ment program activities, or components thereof, which do

1 not meet an acceptable level of success as defined in the
2 study in section 7(a). In carrying out this subsection, the
3 Director and the agency for which the programs are being
4 evaluated may disaggregate program activities to the ex-
5 tent necessary to increase the effectiveness of the assess-
6 ment. Not later than 30 days after the submission of the
7 reports under section 1116, the Director shall furnish a
8 copy of a report listing the program activities or compo-
9 nent identified under this subsection to the President and
10 the Congress.

11 “(b) TERMINATION OF UNSUCCESSFUL PROGRAM IF
12 NO IMPROVEMENT SHOWN.—

13 “(1) IN GENERAL.—Except as provided in para-
14 graph (2), for each program activity or component
15 that is identified by the Director under subsection
16 (a) as being below the acceptable level of success for
17 2 fiscal years in a row, the head of the agency shall
18 no later than 30 days after the Director submits the
19 second report so identifying the program, submit to
20 the appropriate congressional committees of jurisdic-
21 tion a concise statement of the steps needed to ter-
22 minate the program activity or component, together
23 with the legislation needed to put the plan into ef-
24 fect.

1 “(2) EXCEPTION.—A program subject to termi-
2 nation under paragraph (1) shall not be terminated
3 under that paragraph if the Director of the Office
4 of Science and Technology Policy, the Director of
5 the Office of Management and Budget, and the head
6 of the department or agency responsible for the pro-
7 gram determine that the program should be contin-
8 ued. Each time after a program continued under
9 this paragraph is identified in a subsequent annual
10 report, a statement of termination shall be submit-
11 ted under paragraph (1), unless the Directors renew
12 their joint determination under the preceding sen-
13 tence.

14 “(3) REPORT.—The Director shall explain the
15 rationale for not terminating any program continued
16 under paragraph (2) in a written report submitted
17 to the President and the Congress within 30 days
18 after making the determination to continue the pro-
19 gram.

20 “(e) TREATMENT OF TERMINATED PROGRAM
21 FUNDS.—A statement of termination under subsection
22 (b)(1) shall recommend a disposition for any funds appro-
23 priated or obligated to a program activity or component
24 terminated under subsection (b) that remain unexpended
25 and unobligated upon its termination. Nothing in this sub-

1 section shall be construed to modify any requirement re-
 2 garding the reprogramming or transfer of funds author-
 3 ized or appropriated for a terminated program activity or
 4 component.

5 “(d) DIRECTOR DEFINED.—For purposes of this sec-
 6 tion, the term ‘Director’ means the Director of the Office
 7 of Management and Budget.”.

8 (b) CONFORMING AMENDMENTS.—

9 (1) The chapter analysis for chapter 11 of title
 10 31, United States Code, is amended by adding at
 11 the end thereof the following:

“1120. Accountability for research and development programs”.

12 (2) Section 1115(f) of title 31, United States
 13 Code, is amended by striking “through 1119,” and
 14 inserting “through 1120”.

15 **SECTION 1. SHORT TITLE.**

16 *This Act may be cited as the “Federal Research Invest-*
 17 *ment Act”.*

18 **SEC. 2. GENERAL FINDINGS REGARDING FEDERAL INVEST-**
 19 **MENT IN RESEARCH.**

20 (a) *VALUE OF RESEARCH AND DEVELOPMENT.—The*
 21 *Congress makes the following findings with respect to the*
 22 *value of research and development to the United States:*

23 (1) *Federal investment in research has resulted*
 24 *in the development of technology that saved lives in*
 25 *the United States and around the world.*

1 (2) *Research and development investment across*
2 *all Federal agencies has been effective in creating*
3 *technology that has enhanced the American quality of*
4 *life.*

5 (3) *The Federal investment in research and de-*
6 *velopment conducted or underwritten by both mili-*
7 *tary and civilian agencies has produced benefits that*
8 *have been felt in both the private and public sector.*

9 (4) *Discoveries across the spectrum of scientific*
10 *inquiry have the potential to raise the standard of*
11 *living and the quality of life for all Americans.*

12 (5) *Science, engineering, and technology play a*
13 *critical role in shaping the modern world.*

14 (6) *Studies show that about half of all United*
15 *States post-World War II economic growth is a direct*
16 *result of technical innovation; and science, engineer-*
17 *ing, and technology contribute to the creation of new*
18 *goods and services, new jobs and new capital.*

19 (7) *Technical innovation is the principal driving*
20 *force behind the long-term economic growth and in-*
21 *creased standards of living of the world's modern in-*
22 *dustrial societies. Other nations are well aware of the*
23 *pivotal role of science, engineering, and technology,*
24 *and they are seeking to exploit it wherever possible to*
25 *advance their own global competitiveness.*

1 (8) *Federal programs for investment in research,*
2 *which lead to technological innovation and result in*
3 *economic growth, should be structured to address cur-*
4 *rent funding disparities and develop enhanced capa-*
5 *bility in States and regions that currently under-*
6 *participate in the national science and technology en-*
7 *terprise.*

8 (b) *STATUS OF THE FEDERAL INVESTMENT.*—*The*
9 *Congress makes the following findings with respect to the*
10 *status of the Federal Investment in research and develop-*
11 *ment activities:*

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18 *steer the Federal government's role in science, engi-*
19 *neering, and technology in a manner that ensures a*
20 *prudent use of limited public resources. There is both*
21 *a long-term problem—addressing the ever-increasing*
22 *level of mandatory spending—and a near-term chal-*
23 *lenge—apportioning a dwindling amount of discre-*
24 *tionary funding to an increasing range of targets in*
25 *science, engineering, and technology. This confluence*

1 of increased national dependency on technology, in-
2 creased targets of opportunity, and decreased fiscal
3 flexibility has created a problem of national urgency.
4 Many indicators show that more funding for science,
5 engineering, and technology is needed but, even with
6 increased funding, priorities must be established
7 among different programs. The United States cannot
8 afford the luxury of fully funding all deserving pro-
9 grams.

10 (3) Current projections of Federal research fund-
11 ing show a downward trend.

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15 The Congress makes the following findings:

16 (1) *FLOW OF SCIENCE, ENGINEERING, AND TECH-*
17 *NOLOGY.*—The process of science, engineering, and
18 technology involves many steps. The present Federal
19 science, engineering, and technology structure rein-
20 forces the increasingly artificial distinctions between
21 basic and applied activities. The result too often is a
22 set of discrete programs that each support a narrow
23 phase of research or development and are not coordi-
24 nated with one another. The government should maxi-
25 mize its investment by encouraging the progression of

1 science, engineering, and technology from the earliest
2 stages of research up to a pre-commercialization
3 stage, through funding agencies and vehicles appro-
4 priate for each stage. This creates a flow of tech-
5 nology, subject to merit review at each stage, so that
6 promising technology is not lost in a bureaucratic
7 maze.

8 (2) *EXCELLENCE IN THE AMERICAN RESEARCH*
9 *INFRASTRUCTURE.*—Federal investment in science,
10 engineering, and technology programs must foster a
11 close relationship between research and education. In-
12 vestment in research at the university level creates
13 more than simply world-class research. It creates
14 world-class researchers as well. The Federal strategy
15 must continue to reflect this commitment to a strong
16 geographically-diverse research infrastructure. Fur-
17 thermore, the United States must find ways to extend
18 the excellence of its university system to primary and
19 secondary educational institutions and to better uti-
20 lize the community college system to prepare many
21 students for vocational opportunities in an increas-
22 ingly technical workplace.

23 (3) *COMMITMENT TO A BROAD RANGE OF RE-*
24 *SEARCH INITIATIVES.*—An increasingly common
25 theme in many recent technical breakthroughs has

1 *been the importance of revolutionary innovations that*
2 *were sparked by overlapping of research disciplines.*
3 *The United States must continue to encourage this*
4 *trend by providing and encouraging opportunities for*
5 *interdisciplinary projects that foster collaboration*
6 *among fields of research.*

7 (4) *PARTNERSHIPS AMONG INDUSTRY, UNIVER-*
8 *SITIES, AND FEDERAL LABORATORIES.—Each of these*
9 *contributors to the national science and technology*
10 *delivery system has special talents and abilities that*
11 *complement the others. In addition, each has a cen-*
12 *tral mission that must provide their focus and each*
13 *has limited resources. The nation’s investment in*
14 *science, engineering, and technology can be optimized*
15 *by seeking opportunities for leveraging the resources*
16 *and talents of these three major players through part-*
17 *nerships that do not distort the missions of each part-*
18 *ner. For that reason, Federal dollars are wisely spent*
19 *forming such partnerships.*

20 **SEC. 4. MAINTENANCE OF FEDERAL RESEARCH EFFORT;**
21 **GUIDING PRINCIPLES.**

22 (a) *MAINTAINING UNITED STATES LEADERSHIP IN*
23 *SCIENCE, ENGINEERING, AND TECHNOLOGY.—It is impera-*
24 *tive for the United States to nurture its superb resources*

1 *in science, engineering, and technology carefully in order*
2 *to maintain its own globally competitive position.*

3 (b) *GUIDING PRINCIPLES.*—*Federal research and de-*
4 *velopment programs should be conducted in accordance*
5 *with the following guiding principles:*

6 (1) *GOOD SCIENCE.*—*Federal science, engineer-*
7 *ing, and technology programs include both knowledge-*
8 *driven science together with its applications, and mis-*
9 *sion-driven, science-based requirements. In general,*
10 *both types of programs must be focused, peer- and*
11 *merit-reviewed, and not unnecessarily duplicative, al-*
12 *though the details of these attributes must vary with*
13 *different program objectives.*

14 (2) *FISCAL ACCOUNTABILITY.*—*The Congress*
15 *must exercise oversight to ensure that programs fund-*
16 *ed with scarce Federal dollars are well managed. The*
17 *United States cannot tolerate waste of money through*
18 *inefficient management techniques, whether by gov-*
19 *ernment agencies, by contractors, or by Congress*
20 *itself. Fiscal resources would be better utilized if pro-*
21 *gram and project funding levels were predictable*
22 *across several years to enable better project planning;*
23 *a benefit of such predictability would be that agencies*
24 *and Congress can better exercise oversight responsibil-*

1 *ities through comparisons of a project's and pro-*
2 *gram's progress against carefully planned milestones.*

3 (3) *PROGRAM EFFECTIVENESS.—The United*
4 *States needs to make sure that government programs*
5 *achieve their goals. As the Congress crafts science, en-*
6 *gineering, and technology legislation, it must include*
7 *a process for gauging program effectiveness, selecting*
8 *criteria based on sound scientific judgment and*
9 *avoiding unnecessary bureaucracy. The Congress*
10 *should also avoid the trap of measuring the effective-*
11 *ness of a broad science, engineering, and technology*
12 *program by passing judgment on individual projects.*
13 *Lastly, the Congress must recognize that a negative*
14 *result in a well-conceived and executed project or pro-*
15 *gram may still be critically important to the funding*
16 *agency.*

17 (4) *CRITERIA FOR GOVERNMENT FUNDING.—Pro-*
18 *gram selection for Federal funding should continue to*
19 *reflect the nation's 2 traditional research and develop-*
20 *ment priorities: (A) basic, scientific, and technological*
21 *research that represents investments in the nation's*
22 *long-term future scientific and technological capacity,*
23 *for which government has traditionally served as the*
24 *principle resource; and (B) mission research invest-*
25 *ments, that is, investments in research that derive*

1 *from necessary public functions, such as defense,*
2 *health, education, environmental protection, and rais-*
3 *ing the standard of living, which may include pre-*
4 *commercial, pre-competitive engineering research and*
5 *technology development. Additionally, government*
6 *funding should not compete with or displace the*
7 *short-term, market-driven, and typically more specific*
8 *nature of private-sector funding. Government funding*
9 *should be restricted to pre-competitive activities, leav-*
10 *ing competitive activities solely for the private sector.*
11 *As a rule, the government should not invest in com-*
12 *mmercial technology that is in the product development*
13 *stage, very close to the broad commercial marketplace,*
14 *except to meet a specific agency goal. When the gov-*
15 *ernment provides funding for any science, engineer-*
16 *ing, and technology investment program, it must take*
17 *reasonable steps to ensure that the potential benefits*
18 *derived from the program will accrue broadly.*

19 **SEC. 5. POLICY STATEMENT.**

20 *(a) POLICY.—This Act is intended—*

21 *(1) to encourage, as an overall goal, the doubling*
22 *of the annual authorized amount of Federal funding*
23 *for basic scientific, medical, and pre-competitive engi-*
24 *neering research over the 12-year period following the*
25 *date of enactment of this Act;*

1 (2) *to invest in the future of the United States*
2 *and the people of the United States by expanding the*
3 *research activities referred to in paragraph (1);*

4 (3) *to enhance the quality of life for all people*
5 *of the United States;*

6 (4) *to guarantee the leadership of the United*
7 *States in science, engineering, medicine, and tech-*
8 *nology; and*

9 (5) *to ensure that the opportunity and the sup-*
10 *port for undertaking good science is widely available*
11 *throughout the States by supporting a geographically-*
12 *diverse research and development enterprise.*

13 (b) *AGENCIES COVERED.—The agencies intended to be*
14 *covered to the extent that they are engaged in science, engi-*
15 *neering, and technology activities for basic scientific, medi-*
16 *cal, or pre-competitive engineering research by this Act*
17 *are—*

18 (1) *the National Institutes of Health, within the*
19 *Department of Health and Human Services;*

20 (2) *the National Science Foundation;*

21 (3) *the National Institute for Standards and*
22 *Technology, within the Department of Commerce;*

23 (4) *the National Aeronautics and Space Admin-*
24 *istration;*

1 (5) *the National Oceanic and Atmospheric Ad-*
2 *ministration, within the Department of Commerce;*

3 (6) *the Centers for Disease Control, within the*
4 *Department of Health and Human Services;*

5 (7) *the Department of Energy (to the extent that*
6 *it is not engaged in defense-related activities);*

7 (8) *the Department of Agriculture;*

8 (9) *the Department of Transportation;*

9 (10) *the Department of the Interior;*

10 (11) *the Department of Veterans Affairs;*

11 (12) *the Smithsonian Institution;*

12 (13) *the Department of Education; and*

13 (14) *the Environmental Protection Agency.*

14 (c) *CURRENT INVESTMENT.*—*The investment in civil-*
15 *ian research and development efforts for fiscal year 1998*
16 *is 2.1 percent of the overall Federal budget.*

17 (d) *DAMAGE TO RESEARCH INFRASTRUCTURE.*—*A*
18 *continued trend of funding appropriations equal to or lower*
19 *than current budgetary levels will lead to permanent dam-*
20 *age to the United States research infrastructure. This could*
21 *threaten American dominance of high-technology industrial*
22 *leadership.*

23 (e) *INCREASE FUNDING.*—*In order to maintain and*
24 *enhance the economic strength of the United States in the*
25 *world market, funding levels for fundamental, scientific,*

1 *and pre-competitive engineering research should be in-*
 2 *creased to equal approximately 2.6 percent of the total an-*
 3 *nual budget.*

4 *(f) FUTURE FISCAL YEAR ALLOCATIONS.—*

5 *(1) GOALS.—The long-term strategy for research*
 6 *and development funding under this section would be*
 7 *achieved by a steady 2.5 percent annual increase*
 8 *above the rate of inflation throughout a 12-year pe-*
 9 *riod.*

10 *(2) INFLATION ASSUMPTION.—The authorizations*
 11 *contained in paragraph (3) assume that the rate of*
 12 *inflation for each year will be 3 percent.*

13 *(3) AUTHORIZATION.—There are authorized to be*
 14 *appropriated for civilian research and development in*
 15 *the agencies listed in subsection (b)—*

16 *(A) \$37,720,000,000 for fiscal year 1999;*

17 *(B) \$39,790,000,000 for fiscal year 2000;*

18 *(C) \$41,980,000,000 for fiscal year 2001;*

19 *(D) \$42,290,000,000 for fiscal year 2002;*

20 *(E) \$46,720,000,000 for fiscal year 2003;*

21 *(F) \$49,290,000,000 for fiscal year 2004;*

22 *(G) \$52,000,000,000 for fiscal year 2005;*

23 *(H) \$54,870,000,000 for fiscal year 2006;*

24 *(I) \$57,880,000,000 for fiscal year 2007;*

25 *(J) \$61,070,000,000 for fiscal year 2008;*

1 (K) \$64,420,000,000 for fiscal year 2009;

2 and

3 (L) \$67,970,000,000 for fiscal year 2010.

4 (g) *CONFORMANCE WITH BUDGETARY CAPS.*—Not-
5 *withstanding any other provision of law, no funds may be*
6 *made available under this Act in a manner that does not*
7 *conform with the discretionary spending caps provided in*
8 *the most recently adopted concurrent resolution on the*
9 *budget or threatens the economic stability of the annual*
10 *budget.*

11 (h) *BALANCED RESEARCH PORTFOLIO.*—*Because of*
12 *the interdependent nature of the scientific and engineering*
13 *disciplines, the aggregate funding levels authorized by the*
14 *section assume that the Federal research portfolio will be*
15 *well-balanced among the various scientific and engineering*
16 *disciplines, and geographically dispersed throughout the*
17 *States.*

18 **SEC. 6. PRESIDENT'S ANNUAL BUDGET REQUEST.**

19 *The President of the United States shall, in coordina-*
20 *tion with the President's annual budget request, include a*
21 *report that parallels Congress' commitment to support Fed-*
22 *erally-funded research and development by providing—*

23 (1) *a detailed summary of the total level of fund-*
24 *ing for research and development programs through-*
25 *out all civilian agencies;*

1 (2) *a focused strategy that reflects the funding*
 2 *projections of this Act for each future fiscal year until*
 3 *2010, including specific targets for each agency that*
 4 *funds civilian research and development;*

5 (3) *an analysis which details funding levels*
 6 *across Federal agencies by methodology of funding,*
 7 *including grant agreements, procurement contracts,*
 8 *and cooperative agreements (within the meaning*
 9 *given those terms in chapter 63 of title 31, United*
 10 *States Code); and*

11 (4) *specific proposals for infrastructure develop-*
 12 *ment and research and development capacity building*
 13 *in States with less concentrated research and develop-*
 14 *ment resources in order to create a nationwide re-*
 15 *search and development community.*

16 **SEC. 7. COMPREHENSIVE ACCOUNTABILITY STUDY FOR**
 17 **FEDERALLY-FUNDED RESEARCH.**

18 (a) *STUDY.*—*The Director of the Office of Science and*
 19 *Technology Policy, in consultation with the Director of the*
 20 *Office of Management and Budget, shall enter into agree-*
 21 *ment with the National Academy of Sciences for the Acad-*
 22 *emy to conduct a comprehensive study to develop methods*
 23 *for evaluating Federally-funded research and development*
 24 *programs. This study shall—*

1 (1) *recommend processes to determine an accept-*
2 *able level of success for Federally-funded research and*
3 *development programs by—*

4 (A) *describing the research process in the*
5 *various scientific and engineering disciplines;*

6 (B) *describing in the different sciences what*
7 *measures and what criteria each community uses*
8 *to evaluate the success or failure of a program,*
9 *and on what time scales these measures are con-*
10 *sidered reliable—both for exploratory long-range*
11 *work and for short-range goals; and*

12 (C) *recommending how these measures may*
13 *be adapted for use by the Federal government to*
14 *evaluate Federally-funded research and develop-*
15 *ment programs;*

16 (2) *assess the extent to which agencies incor-*
17 *porate independent merit-based review into the for-*
18 *mulation of the strategic plans of funding agencies*
19 *and if the quantity or quality of this type of input*
20 *is unsatisfactory;*

21 (3) *recommend mechanisms for identifying Fed-*
22 *erally-funded research and development programs*
23 *which are unsuccessful or unproductive;*

24 (4) *evaluate the extent to which independent,*
25 *merit-based evaluation of Federally-funded research*

1 *and development programs and projects achieves the*
2 *goal of eliminating unsuccessful or unproductive pro-*
3 *grams and projects; and*

4 *(5) investigate and report on the validity of*
5 *using quantitative performance goals for aspects of*
6 *programs which relate to administrative management*
7 *of the program and for which such goals would be ap-*
8 *propriate, including aspects related to—*

9 *(A) administrative burden on contractors*
10 *and recipients of financial assistance awards;*

11 *(B) administrative burdens on external par-*
12 *ticipants in independent, merit-based evalua-*
13 *tions;*

14 *(C) cost and schedule control for construc-*
15 *tion projects funded by the program;*

16 *(D) the ratio of overhead costs of the pro-*
17 *gram relative to the amounts expended through*
18 *the program for equipment and direct funding of*
19 *research; and*

20 *(E) the timeliness of program responses to*
21 *requests for funding, participation, or equipment*
22 *use.*

23 *(6) examine the extent to which program selec-*
24 *tion for Federal funding across all agencies exempli-*

1 *fies our nation's historical research and development*
2 *priorities—*

3 *(A) basic, scientific, and technological re-*
4 *search in the long-term future scientific and*
5 *technological capacity of the nation; and*

6 *(B) mission research derived from a high-*
7 *priority public function.*

8 *(b) ALTERNATIVE FORMS FOR PERFORMANCE*
9 *GOALS.—Not later than 6 months after transmitting the re-*
10 *port under subsection (a) to Congress, the Director of the*
11 *Office of Management and Budget, after public notice, pub-*
12 *lic comment, and approval by the Director of the Office of*
13 *Science and Technology Policy and in consultation with the*
14 *National Science and Technology Council shall promulgate*
15 *one or more alternative forms for performance goals under*
16 *section 1115(b)(10)(B) of title 31, United States Code, based*
17 *on the recommendations of the study under subsection (a)*
18 *of this section. The head of each agency containing a pro-*
19 *gram activity that is a research and development program*
20 *may apply an alternative form promulgated under this sec-*
21 *tion for a performance goal to such a program activity*
22 *without further authorization by the Director of the Office*
23 *of Management and Budget.*

24 *(c) STRATEGIC PLANS.—Not later than one year after*
25 *promulgation of the alternative performance goals in sub-*

1 *section (b) of this section, the head of each agency carrying*
2 *out research and development activities, upon updating or*
3 *revising a strategic plan under subsection 306(b) of title*
4 *5, United States Code, shall describe the current and future*
5 *use of methods for determining an acceptable level of success*
6 *as recommended by the study under subsection (a).*

7 *(d) DEFINITIONS.—In this section:*

8 *(1) DIRECTOR.—The term “Director” means the*
9 *Director of the Office of Science and Technology Pol-*
10 *icy.*

11 *(2) PROGRAM ACTIVITY.— The term “program*
12 *activity” has the meaning given that term by section*
13 *1115(f)(6) of title 31, United States Code.*

14 *(3) INDEPENDENT MERIT-BASED EVALUATION.—*
15 *The term “independent merit-based evaluation”*
16 *means review of the scientific or technical quality of*
17 *research or development, conducted by experts who are*
18 *chosen for their knowledge of scientific and technical*
19 *fields relevant to the evaluation and who—*

20 *(A) in the case of the review of a program*
21 *activity, do not derive long-term support from*
22 *the program activity; or*

23 *(B) in the case of the review of a project*
24 *proposal, are not seeking funds in competition*
25 *with the proposal.*

1 (e) *AUTHORIZATION OF APPROPRIATIONS.*—*There are*
 2 *authorized to be appropriated to carry out the study re-*
 3 *quired by subsection (a) \$600,000 for the 18-month period*
 4 *beginning October 1, 1998.*

5 **SEC. 8. EFFECTIVE PERFORMANCE ASSESSMENT PROGRAM**
 6 **FOR FEDERALLY-FUNDED RESEARCH.**

7 (a) *IN GENERAL.*—*Chapter 11 of title 31, United*
 8 *States Code, is amended by adding at the end thereof the*
 9 *following:*

10 **“§ 1120. Accountability for research and development programs**

11 **“(a) IDENTIFICATION OF UNSUCCESSFUL PRO-**
 12 *GRAMS.*—*Based upon program performance reports for each*
 13 *fiscal year submitted to the President under section 1116,*
 14 *the Director of the Office of Management and Budget shall*
 15 *identify the civilian research and development program ac-*
 16 *tivities, or components thereof, which do not meet an accept-*
 17 *able level of success as defined in section 1115(b)(1)(B). Not*
 18 *later than 30 days after the submission of the reports under*
 19 *section 1116, the Director shall furnish a copy of a report*
 20 *listing the program activities or component identified under*
 21 *this subsection to the President and the Congress.*

22 **“(b) ACCOUNTABILITY IF NO IMPROVEMENT SHOWN.**—
 23 *For each program activity or component that is identified*
 24 *by the Director under subsection (a) as being below the ac-*
 25 *ceptable level of success for 2 fiscal years in a row, the head*

1 *of the agency shall no later than 30 days after the Director*
2 *submits the second report so identifying the program, sub-*
3 *mit to the appropriate congressional committees of jurisdic-*
4 *tion:*

5 “(1) *a concise statement of the steps that will be*
6 *taken—*

7 “(A) *to bring such program into compliance*
8 *with performance goals; or*

9 “(B) *to terminate such program should*
10 *compliance efforts have failed; and*

11 “(2) *any legislative changes needed to put the*
12 *steps contained in such statement into effect.”.*

13 *(b) CONFORMING AMENDMENTS.—*

14 (1) *The chapter analysis for chapter 11 of title*
15 *31, United States Code, is amended by adding at the*
16 *end thereof the following:*

“1120. Accountability for research and development programs”.

17 (2) *Section 1115(f) of title 31, United States*
18 *Code, is amended by striking “through 1119,” and in-*
19 *serting “through 1120”.*