II

105TH CONGRESS
2D SESSION

S. 2217

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, and Mr. BREAUX) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

---

A BILL

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

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Federal Research Investment Act''.

SEC. 2. GENERAL FINDINGS REGARDING FEDERAL INVESTMENT IN RESEARCH.

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

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

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

(3) The Federal investment in research and development conducted or underwritten by both military and civilian agencies has produced benefits that have been felt in both the private and public sector.

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

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

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

(7) Technical innovation is the principal driving force behind the long-term economic growth and increased standards of living of the world's modern industrial societies. Other nations are well aware of the pivotal role of science, engineering, and technology, and they are seeking to exploit it wherever possible to advance their own global competitiveness.

(b) STATUS OF THE FEDERAL INVESTMENT.—The Congress makes the following findings with respect to the status of the Federal Investment in research and development 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, engineering, and technology in a manner that ensures a prudent use of limited public resources. There is both a long-term problem—addressing the ever-increasing level of mandatory spending—and a near-term challenge—apportioning a dwindling amount of discretionary funding to an increasing range of targets in science, engineering, and technology. This

confluence of increased national dependency on technology, increased targets of opportunity, and decreased fiscal flexibility has created a problem of national urgency. Many indicators show that more funding for science, engineering, and technology is needed but, even with increased funding, priorities must be established among different programs. The United States cannot afford the luxury of fully funding all deserving programs.

(3) Current projections of Federal research funding show a downward trend.

SEC. 3. ADDITIONAL FINDINGS REGARDING THE LINK BETWEEN THE RESEARCH PROCESS AND USEFUL TECHNOLOGY.

The Congress makes the following findings:

(1) FLOW OF SCIENCE, ENGINEERING, AND TECHNOLOGY.—The process of science, engineering, and technology involves many steps. The present Federal science, engineering, and technology structure reinforces the increasingly artificial distinctions between basic and applied activities. The result too often is a set of discrete programs that each support a narrow phase of research or development and are not coordinated with one another. The government should maximize its investment by encouraging the

progression of science, engineering, and technology from the earliest stages of research up to a pre-commercialization stage, through funding agencies and vehicles appropriate for each stage. This creates a flow of technology, subject to merit review at each stage, so that promising technology is not lost in a 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 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 technology delivery system has special talents and abilities that complement the others. In addition, each 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 optimized by seeking opportunities for leveraging the resources and talents of these three major players through partnerships that do not distort the missions of each partner. For that reason, Federal dollars are wisely spent forming such partnerships.

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

(a) MAINTAINING UNITED STATES LEADERSHIP IN SCIENCE, ENGINEERING, AND TECHNOLOGY.—It is imperative for the United States to nurture its superb re-

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

(b) GUIDING PRINCIPLES.—Federal research and development programs should be conducted in accordance with the following guiding principles:

(1) GOOD SCIENCE.—Federal science, engineering, and technology programs include both knowledge-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 measuring 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 require a long-term horizon, with specific relevance to a Federal mission requirement, or with broad knowledge-based goals. 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 pre-competitive activities, leaving

competitive activities solely for the private sector. As a rule, the government should not invest in commercial technology that is in the product development stage, very close to the broad commercial marketplace, except to meet a specific agency goal. When the government provides funding for any science, engineering, and technology investment program, it must take reasonable steps to ensure that the potential benefits derived from the program will accrue broadly.

SEC. 5. POLICY STATEMENT.

(a) POLICY.—This Act is intended—

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

(2) to set a minimum level of investment in order to maintain the high priority that science, engineering, and technology had previously been afforded in the Federal budget;

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

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

(5) to guarantee the leadership of the United States in science, engineering, medicine, and technology.

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

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

(2) the National Science Foundation;

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

(4) the National Aeronautics and Space Administration;

(5) the National Oceanic and Atmospheric Administration, within the Department of Commerce;

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

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

(8) the Department of Agriculture;

(9) the Department of Transportation;

(10) the Department of the Interior;

(11) the Department of Veterans Affairs;

(12) the Smithsonian Institution;

(13) the Department of Education; and

(14) the Environmental Protection Agency (to the extent that it is engaged in science, engineering, and technology activities for basic scientific, medical, or pre-competitive engineering research).

(c) HISTORICAL INVESTMENT TREND.—

(1) Over the past 20 years, the percentage of the civilian discretionary budget allocated to research and development efforts has increased steadily from approximately 10 percent in 1980 to approximately 14 percent for fiscal year 1998. The increase in Federal investment in civilian research and development from fiscal years 1988 through 1998 resulted in an overall doubling of funding across the major federal research and development agencies.

(2) The investment in civilian research and development efforts for fiscal year 1998 is 2.11876 percent of the overall Federal budget.

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

(e) INCREASE FUNDING.—In order to maintain and enhance the economic strength of the United States in the world market, funding levels for fundamental, scientific, and pre-competitive engineering research should be increased to equal approximately 2.6 percent of the total annual budget.

(f) FUTURE FISCAL YEAR ALLOCATIONS.—

(1) GOALS.—

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

(B) There is a minimum threshold below which long-term harm to both the research infrastructure and economic strength of the United States would be caused, therefore it shall be the goal of the President and Congress to prevent the total amount of Federally-funded research and development from falling below 2.1 percent of the overall Federal budget at any point in the budget process.

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

(3) AUTHORIZATION.—Therea reautjorized to be appropriated for civilian research and development in the agencies listed in subsection (b)—

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

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

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

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

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

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

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

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

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

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

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

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

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

(h) BALANCED RESEARCH PORTFOLIO.—Because of the interdependent nature of the scientific and engineering

disciplines, the aggregate funding levels authorized by the section assume that the Federal research portfolio will be well-balanced among the various scientific and engineering disciplines.

SEC. 6. PRESIDENT'S ANNUAL BUDGET REQUEST.

The President of the United States shall, in coordination with the President's annual budget request, include a report that parallels Congress' commitment to support Federally-funded research and development by providing—

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

(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; and

(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 States Code).

SEC. 7. COMPREHENSIVE ACCOUNTABILITY STUDY FOR FEDERALLY-FUNDED RESEARCH

(a) STUDY.—The Director of the Office of Science and Technology Policy, in consultation with the Director of the Office of Management and Budget, shall enter into agreement with the National Academy of Sciences for the Academy to conduct a comprehensive study to develop methods for evaluating Federally-funded research and development programs. This study shall—

(1) recommend processes to determine an acceptable level of success for Federally-funded research and development programs by—

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

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

(C) recommending how these measures may be adapted for use by the Federal government to evaluate Federally-funded research and development programs;

(2) assess the extent to which agencies incorporate independent merit-based review into the formulation of the strategic plans of funding agencies and if the quantity or quality of this type of input is unsatisfactory;

(3) recommend mechanisms for identifying Federally-funded research and development programs which are unsuccessful or unproductive;

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

(5) investigate and report on the validity of using quantitative performance goals for aspects of programs which relate to administrative management of the program and for which such goals would be appropriate, including aspects related to—

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

(B) administrative burdens on external participants in independent, merit-based evaluations;

(C) cost and schedule control for construction projects funded by the program;

(D) the ratio of overhead costs of the program relative to the amounts expended through the program for equipment and direct funding of research; and

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

(b) ALTERNATIVE FORMS FOR PERFORMANCE GOALS.—Not later than 6 months after transmitting the report under subsection (a) to Congress, the Director of the Office of Management and Budget, after public notice, public comment, and approval by the Director of the Office of Science and Technology Policy and in consultation with the National Science and Technology Council shall promulgate one or more alternative forms for performance goals under section 1115(b)(10)(B) of title 31, United States Code, based on the recommendations of the study under subsection (a) of this section. The head of each agency containing a program activity that is a research and development program may apply an alternative form promulgated under this section for a performance goal to such a program activity without further authorization by the Director of the Office of Management and Budget.

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

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

(d) DEFINITIONS.—In this section:

(1) DIRECTOR.—The term ''Director'' means the Director of the Office of Science and Technology Policy.

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

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

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

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

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

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

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

"§ 1120. Accountability for research and development programs

''(a) IDENTIFICATION OF UNSUCCESSFUL PROGRAMS.—Based upon program performance reports for each fiscal year submitted to the President under section 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 the study in section 7(a). In carrying out this subsection, the Director and the agency for which the programs are being evaluated may disaggregate program activities to the extent necessary to increase the effectiveness of the assess-

ment. 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 activities or component identified under this subsection to the President and the Congress.

''(b) TERMINATION OF UNSUCCESSFUL PROGRAM IF NO IMPROVEMENT SHOWN.—

''(1) IN GENERAL.—Except as provided in paragraph (2), for each program activity or component that is identified by the Director under subsection (a) as being below the acceptable level of success for 2 fiscal years in a row, the head of the agency shall no later than 30 days after the Director submits the second report so identifying the program, submit to the appropriate congressional committees of jurisdiction a concise statement of the steps needed to terminate the program activity or component, together with the legislation needed to put the plan into effect.

''(2) EXCEPTION.—A program subject to termination under paragraph (1) shall not be terminated under that paragraph if the Director of the Office of Science and Technology Policy, the Director of the Office of Management and Budget, and the head of the department or agency responsible for the pro-

gram determine that the program should be continued. Each time after a program continued under this paragraph is identified in a subsequent annual report, a statement of termination shall be submitted under paragraph (1), unless the Directors renew their joint determination under the preceding sentence.

''(3) REPORT.—The Director shall explain the rationale for not terminating any program continued under paragraph (2) in a written report submitted to the President and the Congress within 30 days after making the determination to continue the program.

''(c) TREATMENT OF TERMINATED PROGRAM FUNDS.—A statement of termination under subsection (b)(1) shall recommend a disposition for any funds appropriated or obligated to a program activity or component terminated under subsection (b) that remain unexpended and unobligated upon its termination. Nothing in this subsection shall be construed to modify any requirement regarding the reprogramming or transfer of funds authorized or appropriated for a terminated program activity or component.

''(d) DIRECTOR DEFINED.—For purposes of this section, the term 'Director' means the Director of the Office of Management and Budget.''.

(b) CONFORMING AMENDMENTS.—

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

''1120. Accountability for research and development programs''.

(2) Section 1115(f) of title 31, United States Code, is amended by striking ''through 1119,'' and inserting ''through 1120''.

○