

**Statement of Dr. John H. Marburger, III
to the
United States House of Representatives
Committee on Science**

**Fiscal Year 2004 Federal R&D Budget
February 13, 2003**

Mr. Chairman and members of the committee, it's a pleasure to meet with you today to discuss the President's federal research and development budget for fiscal year 2004.

As I testified last year, I am committed to maintaining a close and productive relationship with this Committee. I applaud your bipartisan and enduring support of our country's research and engineering enterprise, and look forward to continuing our relationship as we make important choices together to optimize the federal R&D investment.

The President's budget focuses on winning the war on terrorism, securing the homeland, and strengthening the economy. Considering the context of an uncertain economic environment and growing federal deficit, any increase in discretionary spending is difficult to justify to the American people. However, the President's budget requests another record high level of funding for R&D: \$123 billion or a 7% increase over the 2003 request. Over \$5.9 billion of the increase is in Department of Defense development activities, reflecting the President's commitment to bolster our national defense and homeland capabilities.

This increase in R&D spending is evidence of the great importance the Administration places on science and technology in addressing our country's present and future challenges. The President's budget also continues to emphasize improved management and performance to maintain excellence and sustain our national leadership in science and technology.

In my statement I will review the broad goals of the President's budget and provide detail on federal research priorities that cut across multiple agencies and research disciplines. I should point out that, in the absence of a final FY2003 budget, the figures reflected in terms of percentage increases for comparison purposes use the President's FY2003 budget as a base.

THE PRESIDENT'S FY2004 R&D BUDGET

Our President has a strong commitment to research and discovery in the national interest. When earlier this month we endured the tragic loss of the space shuttle Columbia, the President was unequivocal in his promise that, despite setbacks, the journey of discovery would go on. He said:

This cause of exploration and discovery is not an option we choose; it is a desire written in the human heart. We are that part of creation which seeks to understand all creation.

The programs in the federal R&D budget represent some extraordinary new vistas of science with the potential to revolutionize our understanding and our capabilities. We cannot fund everything we'd like, but we will fund those exciting and high priority initiatives that keep this dream of discovery alive, and we will set the stage for the next generation scientists and engineers to take up new challenges that we cannot even imagine.

In preparing this budget, the Administration has taken advice from the numerous planning and advisory bodies that exist to guide science priorities. For example, the budget begins to respond to recommendations by the President's Council of Advisors on Science and Technology (PCAST) and others about needs in physical science and engineering. The budget also reflects an extensive process of consultation between the federal agencies, OMB, and OSTP, to thoroughly understand agency programs and priorities, interagency collaborations, and directions for the future. The National Science and Technology Council (NSTC), which I will discuss later in my testimony, provided a valuable mechanism to facilitate this interagency coordination. This process resulted in guidance to agencies issued by OSTP and OMB last May, concerning their program planning, evaluation, and budget preparation, and culminating in the budget you see before you today.

The result is a budget that includes a strong emphasis on basic research across the agencies. Basic research is the source of tomorrow's discoveries and new capabilities, and this long-term research will fuel further gains in economic productivity, quality of life, and national security. Included in the budget, and emphasized in my comments today, is the budget category Federal Science & Technology (FS&T). This category, introduced in response to a recommendation of the National Academy of Sciences, excludes most of the development activities in the federal R&D budget, including Department of Defense development, thereby only highlighting those activities devoted specifically to the creation of new knowledge and technologies.

The budget includes an increase in emphasis on the physical sciences. The physical sciences not only spur understanding of the universe, they are the theoretical foundation for a host of new and promising technologies. Physical science research also offers education and training opportunities vital for a technologically advanced society.

The budget also highlights investments in important research conducted by multiple federal agencies in a coordinated fashion. Increasingly, the cutting edge of research is not cleanly confined to a specific science discipline, but spans a variety of disciplines or applications. Well-managed interagency collaboration takes advantage of the vast pool of capabilities represented across the federal government while minimizing new organizational structures. The high-priority multi-agency R&D initiatives for FY2004 are: combating terrorism R&D, network and information technology, nanotechnology, climate change research and technology and education research.

AGENCY BUDGET HIGHLIGHTS

The Office of Science and Technology Policy (OSTP) has primary responsibility in the White House to coordinate interagency research initiatives, so I will concentrate my testimony on those initiatives and give only brief highlights of the budgets of several agencies within this committee's jurisdiction.

National Science Foundation (NSF):

The proposal would increase the overall NSF budget by \$453 million, or about 9% relative to the FY2003 Presidential request.

- The budget invests heavily in the physical sciences: NSF physical science investments would increase by \$100 million, or 13%. Fundamental discoveries in the physical sciences are needed to spur progress in other areas, such as health research, energy, agriculture and the environment.
- The 2004 budget continues a multi-year effort to improve attraction and retention of U.S. students into science and engineering careers by increasing annual graduate student fellowship and training stipends from \$25,000 to \$30,000 and increasing the number of awards. Reducing the financial burden graduate students face can have a significant impact on their choice of science or engineering as a career.
- The Major Research Equipment and Facility Construction program will receive a 60% increase to a total of \$202 million in 2004. Simultaneously, NSF is taking a close look at their investments and priorities in research infrastructure, and has, for the first time, provided the Congress with a rank ordering of its approved large facility construction projects and a discussion of how these projects were selected, approved and prioritized.

Department of Energy (DOE):

The budget provides \$5.2 billion for federal science and technology at the DOE, a 3% increase from the 2003 request. The FY2004 budget for DOE reflects the phasing down of construction funding for the Spallation Neutron Source, enabling additional funding to be redirected toward research.

- The recently announced \$1.2 billion Hydrogen Fuel Initiative includes \$720 million in new funding proposed over the next five years to develop the technologies and infrastructure needed to produce, store and distribute hydrogen fuel for use in fuel cell vehicles and electricity generation.

- The budget includes \$12 million to support the President's recently announced commitment for the U.S. to enter into negotiations with international parties to participate in building ITER, the next milestone on the path towards developing fusion as a commercially viable energy source.
- The budget proposes \$3.3 billion for DOE's science programs, an increase of \$55 million over 2003. This includes increased emphasis on support for physical sciences research, including nearly tripling the investment in new centers for nanoscale science research.

National Aeronautics and Space Administration (NASA):

The President's request for NASA represents a total funding increase of 9% for R&D and nearly \$9.2 billion for FS&T programs, a 5% increase.

- The President's commitment to space exploration is evident in this budget, which was conceived before the tragic loss of the Columbia astronauts. Total funding for NASA is proposed to increase 3.1% overall. The Shuttle budget, after taking into account the transition to full cost accounting, receives nearly a 5% increase over 2003.
- Included in the \$4 billion in space science programs are several initiatives to increase the scientific and educational outcomes of future planetary missions, such as a new \$31 million investment in optical communications technology and a \$279 million investment in Project Prometheus, to include the development of propulsion systems that will enable exploration of our solar system's most distant planets.

Department of Commerce:

The budget provides \$851 million for FS&T programs, an increase of 1%.

- The budget provides increased funding for National Institute of Standards and Technology (NIST) laboratories' upgrades, maintenance and repairs, and an increase of over \$10 million for homeland security standards development related to biometric identification, threat detection, and high-rise safety.
- The Advanced Technology Program (ATP) is terminated consistent with the Administration's emphasis on shifting resources to reflect changing needs. Funding is provided for administrative costs and close-out. Additionally, the budget maintains the 2003 policy of limiting federal funding for the Manufacturing Extension Partnership (MEP).

- The budget provides \$57 million for NOAA's Sea Grant College Program, which is working to move increasingly towards merit-based funding of research.

Environmental Protection Agency (EPA):

The budget provides \$776 million in the FS&T budget for EPA, essentially maintaining funding at the level requested in the FY2003 Budget.

- The EPA budget supports significant efforts to continue to improve the scientific base in support of policy and regulations through: improvement of the use of science by the regional offices; ongoing efforts to attract and maintain a high-quality, diverse scientific workforce; and assessments to ensure the quality and consistency of science.
- Responding to concerns about the adequacy of its science, EPA has appointed an agency Science Advisor to improve environmental science integration and coordination at EPA.
- The President's Budget provides nearly a four-fold increase in funding to improve the Integrated Risk Information System (IRIS), a database which contains toxicity information of chemicals. IRIS is used by other federal agencies, states, and international officials to help assess the potential health risks of chemicals and to develop regulations.

Department of Transportation (DOT):

The budget provides \$606 million for FS&T at the DOT, an increase of 11%.

- The National Highway Traffic Safety Administration is provided an increase of \$14 million for R&D in crash worthiness, crash avoidance, and data analysis to help reduce highway fatalities and injuries.
- The budget provides \$100 million for the Federal Aviation Administration to maintain its focus on safety and environmental research.

Department of Homeland Security (DHS):

Finally, because it is a new department with significant federal R&D responsibility, it is important to mention that the Department of Homeland Security will house a science and technology directorate that will support the conduct of R&D for developing countermeasures to chemical, biological and radiological and nuclear weapons and other terrorist threats. The 2004 request for direct activities of the S&T Directorate is \$803 million.

INTERAGENCY INITIATIVES

Beyond the individual agency initiatives, the President's budget outlines priority areas of research involving multiple agency participation. Last May, OMB Director Mitch Daniels and I sent out an FY2004 budget-planning memo to agencies to provide guidance and focus for these budget priorities. National R&D priorities set forth in the guidance memo include: R&D for Combating Terrorism, Networking and Information Technology, Nanotechnology, Climate Change, Molecular Life Processes and Education.

A mechanism for coordinating interagency initiatives lies within the President's National Science and Technology Council (NSTC), and my office has responsibility for the day-to-day operations of the NSTC. This Cabinet-level Council is the principal means for the President to coordinate science, space, and technology, bringing together the diverse parts of the Federal research and development enterprise. The Council prepares research and development strategies that are coordinated across Federal agencies to form an investment package aimed at accomplishing multiple national goals. The following describe high priority interagency initiatives the NSTC helps to coordinate:

Combating Terrorism -- Last month the Department of Homeland Security opened its doors for business. Standing up the new Department is a massive undertaking and one of the highest priorities of this Administration. The President has proposed \$3.2 billion in research and development funding for homeland security and combating terrorism across the Federal government. Over \$900 million is requested for combating terrorism research and development in the new department, including \$803 million in the S&T directorate. This investment will be focused on robust research, development, testing, evaluation and systems procurement to ensure both evolutionary and revolutionary capabilities.

The National Science and Technology Council's Committee on Homeland and National Security will work with the Homeland Security Council, the National Security Council, the Office of Management and Budget, the Department of Homeland Security and other relevant departments and agencies to identify priorities for and facilitate planning of homeland and national security R&D. The coordinated federal effort will emphasize:

- Strategies to combat weapons of mass destruction, including radiological and nuclear countermeasures and biological agent detection, diagnostics, therapeutics, and forensics;
- Information analysis;
- Social, behavioral, and educational aspects of combating terrorism;
- Border entry/exit technologies; and
- Developing standards relevant to both homeland and national security.

Networking and Information Technology -- The President's 2004 budget provides \$2.2 billion for the Networking and Information Technology R&D Program (NITRD). This is a 6% increase over last year's budget. The largest increase above 2003 NITRD funding levels is proposed for the Department of Health and Human Services, which would

increase by \$67 million, or 18%. The increased life sciences budget reflects the growing importance of bioinformatics R&D – efforts at the intersection between biology and information technology – in furthering biomedical research. NSF maintains the largest share of NITRD program funding and the budget proposes a \$45 million, or 7%, increase.

Agencies involved in developing or using high end computing are engaged in planning activities coordinated through the National Science and Technology Council's Committee on Technology. In 2004, NITRD research emphases include:

- Network “trust” (security, reliability, and privacy);
- High-assurance software and systems;
- Micro- and embedded-sensor technologies;
- Revolutionary architectures to reduce the cost, size, and power requirement of high end computing platforms; and
- Social and economic impacts of information technology.

National Nanotechnology Initiative -- The President's 2004 budget provides \$849 million for the multi-agency National Nanotechnology Initiative (NNI). This is a 9.8% increase over 2003 levels. The Office of Science at the Department of Energy almost triples its investment in new nanoscale science research centers, with a proposed increase of \$63 million to begin design and construction on four new nano-science research centers, bringing the total number of funded nano-centers to five. NSF continues to have the largest share of federal nanotechnology funding, reflecting the broad mission of NSF in supporting fundamental research across disciplines, and the budget for NIH nanotechnology activities is increased by almost 8%. Altogether, 10 federal agencies cooperate in the nanotechnology initiative with activities coordinated through the National Science and Technology Council's Committee on Technology. The NNI strategy for 2004 involves further investment in fundamental research across the range of scientific and engineering disciplines through investments in investigator-led activities at colleges and universities, centers of excellence, and supporting infrastructure.

Responding to a recent National Research Council recommendation, next month the President's Council of Advisors for Science and Technology (PCAST) will begin conducting an ongoing, external review of the NNI aimed at strengthening the program and helping to identify and measure progress toward strategic goals.

Climate Change -- Last year, to advance climate change science objectives, President Bush created the Climate Change Research Initiative (CCRI). The CCRI was combined with the existing US Global Change Research Program (USGCRP) to create the Climate Change Science Program (CCSP), an interagency research effort involving 12 federal agencies. While funding for the combined CCSP remains level with 2003, the funds identified for CCRI is increased to \$182 million as compared with \$40 million in FY2003. The CCRI investment will develop resources to support policy making, provide computer resources for climate modeling for decision support studies, and enhance observations and data management for a climate observing system. The increase for CCRI is the result of a process that has focused on managing GCRP funding more

effectively and refocusing some research toward CCRI goals. A draft strategic plan for the CCSP has been produced and vetted through the science community using a multi-day public workshop held in December 2002 and in an open comment period. The response was overwhelmingly in support of the new management approach to the federal program on climate change. A final strategic plan, relying on the extensive analysis and commentary resulting from the workshop, will be produced this spring and will guide the future activities of the program.

\$40 million is identified for the National Climate Change Technology Initiative (NCCTI) Competitive Solicitation program – an innovative approach for funding technology research and development to reduce, avoid or sequester greenhouse gases. In 2004, government-wide spending on climate change technologies will be reviewed, and priority programs for emphasis in the NCCTI will be identified.

Math and Science Education – No Child Left Behind – The improvement of preK-12 math and science education remains a major Administration priority, with special emphasis on the successful development and implementation of evidence-based educational programs and practices, as called for in the No Child Left Behind Act of 2002. The President’s 2004 budget request includes support for two such programs involving the federal research agencies: the Math and Science Partnership (MSP) Program and the Interagency Education Research Initiative (IERI). The MSP request for NSF is \$200 million, and for the Department of Education is \$12.5 million. The program funds new and ongoing partnerships between institutions of higher education and local school districts. This program also will fund teacher training summer institutes for more intense immersion into mathematics and science content areas.

The funding request for the IERI remains level with the President’s 2003 budget request. The goal of the IERI is to improve preK-12 student learning and achievement in reading, math and science by conducting research on the scaling of educational practices that have already demonstrated their effectiveness in studies conducted with a limited number of students or classrooms. Currently the NSF, the Department of Education, and the National Institute of Child Health and Human Development (NICHD) participate in IERI.

Additionally, the 2004 budget includes a \$10 million increase in research, development, and dissemination funding for the Department of Education’s new “Institute of Education Sciences” – from \$175 to \$185 million.

Recognizing the need for better coordination of educational activities between the federal research agencies, the National Science and Technology Council’s Committee on Science has formed a Subcommittee on Education. This subcommittee will advise on best practices and will develop strategies to move agency programs away from fragmentation and duplication of effort towards a coordinated, complimentary set of individual agency and interagency programs.

MANAGING THE FEDERAL RESEARCH BUDGET

Equal in importance to the spending on the federal research budget is the management of this investment. In addition to providing funding coordination, the NSTC will also be reviewing management aspects of research including:

- Analysis and recommendations concerning the requirements for federal investment in major research facilities and infrastructure, and the best management practices to determine priorities and allocate funding; and
- An investigation of the changing business model for research, and recommendations for modernizing the management and funding of federal research programs in response to this changing research environment.

The FY2004 budget emphasizes increased return on investment by improvements in management, performance and results of the research programs. Working together and with the federal research agencies, OMB and OSTP are developing, implementing, and continuing to improve investment criteria for research programs across the government. Explicit R&D investment criteria have been developed to improve R&D program management, better inform R&D program funding decisions, and ultimately increase public understanding of the possible benefits and effectiveness of the federal investment in R&D. In 2004, all R&D program managers must demonstrate the extent to which their programs meet the following three tests:

- **Relevance:** R&D programs must be able to articulate *why* the investment is important, relevant, and appropriate. This must include complete planning with clear goals and priorities, clearly articulated societal benefits, and the mechanisms used for reviewing and determining the relevance of proposed and existing programs.
- **Quality:** R&D programs must justify *how* funds will be allocated to ensure quality. Agencies must maximize quality through clearly stated, defensible methods for awarding a significant majority of their funding. Programs must assess and report on the quality of current and past R&D.
- **Performance:** R&D programs must be able to monitor and document *how well* the investments are performing. This includes tracking and reporting annually on objectives and milestones for relevant programs, and defining appropriate measures of performance, output, and outcome.

As a result of implementing these criteria, and consistent with the Government Performance and Results Act, the Administration strives to ensure that every dollar is invested as effectively as possible. Based on lessons learned and other feedback, the Administration will continue to improve the R&D investment criteria and their implementation towards more effective management of the federal R&D portfolio.

CONCLUSION

Mr. Chairman and members of the committee, I believe this is a good budget for science and technology. I hope I have conveyed to you the extent of this Administration's commitment to advancing science and technology in the nation's interest. I look forward to our work together as we move towards implementing a national science and technology strategy that will draw from the best in industry, academia, the non-profit sector, and all levels of government. The programs that we discuss today will help us protect our citizens and our national interests, advance knowledge, promote education, and preserve the dream of exploration and discovery. I would be pleased to respond to questions about this budget.