

Statement of Dr. John H. Marburger, III
to the
Subcommittee on Veterans Affairs and Housing and Urban Development,
and Independent Agencies
Committee on Appropriations
United States Senate
Fiscal Year 2005 Federal R&D and OSTP Budget
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Mr. Chairman and members of the Subcommittee, I welcome the opportunity to present important highlights of the President's Fiscal Year 2005 Federal research and development budget, including the request for the Office of Science and Technology Policy (OSTP).

I have appreciated my close and productive relationship with this Subcommittee and look forward to working with you again this year as you make important choices to optimize the Federal R&D investment. Your continued support of our country's research enterprise is yet another reason why the U.S. Government leads the world in science, engineering, technology, and productivity.

No Federal budget is ever "business as usual" -- the stakes are simply too high. Yet, as we look together at the FY 2005 budget, we should pause to consider the truly unique global forces shaping today's budgetary priorities. In his State of the Union address, the President reminded us that "our greatest responsibility is the active defense of the American people." This includes winning the war on terrorism, and securing our homeland. The President's budget focuses on these important goals and reinforces another critical priority, the economic recovery now underway. The Administration is also determined, without compromising the above priorities, to control and reduce the deficit, as we continue to implement pro-growth policies. The President has proposed a fiscally responsible budget that meets the Nation's expanding national and homeland security needs while limiting all other discretionary spending growth to less than 0.5%. This necessarily leads to smaller increases, and even decreases, for some categories, including some R&D programs. Nevertheless, the overall picture for FY 2005 R&D investment is quite positive, reflecting the Administration's strong support for science and technology.

With the President's FY 2005 budget, total R&D investment during this Administration's first term will be increased 44%, to a record \$132 billion in 2005 as compared to \$91 billion in FY 2001. That equates to increases of nearly 10% each year. Significantly outpacing the FY 2005 overall "non-security" discretionary spending growth of 0.5%, the non-security R&D growth rate is 2.5%. Science and technology drive economic growth. They help improve our health care, enhance our quality of life, and play an important role in securing the homeland and winning the war on terrorism. These increases reflect the Administration's appreciation of the importance of a strong national R&D enterprise for our current and future prosperity. The President's budget, as in years past, also continues to emphasize improved management and performance, to maintain excellence and sustain our national leadership in science and technology.

In my prepared statement I will review the broad goals of the President's budget, provide detail on OSTP's budget, and give an overview of the request for Federal research priorities that cut across multiple agencies and research disciplines.

THE PRESIDENT'S FY 2005 R&D BUDGET

The President's FY 2005 budget request commits 13.5% of total discretionary outlays to R&D, the highest level in 37 years. Not since 1968, during the Apollo program, have we seen an investment in research and development of this magnitude. Of this amount, the budget commits 5.7% of total discretionary outlays to non-defense R&D, the third highest level in 25 years.

Clearly demonstrating the President's commitment to priority investments for the future, Federal R&D spending in the FY 2005 Budget is the greatest share of GDP in over 10 years. In fact, the last time Federal R&D has been over 1% of GDP was in 1993. And even more noteworthy, FY 2005 non-defense R&D is the highest percentage of GDP since 1982.

Not all programs can or should receive equal priority, and this budget reflects choices consistent with recommendations from numerous expert sources. The priority programs in the Federal R&D budget build upon exciting areas of scientific discovery from hydrogen energy and nanotechnology to the basic processes of living organisms, the fundamental properties of matter, and a new vision of sustained space exploration. In particular, this budget responds 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 among the Federal agencies, OMB, and OSTP, to thoroughly evaluate the agency programs and priorities, interagency collaborations, and directions for the future. The National Science and Technology Council (NSTC) continues to provide a valuable mechanism to facilitate this interagency coordination. This process of collaborative review resulted in guidance to agencies issued by OSTP and OMB last June, concerning their program planning, evaluation, and budget preparation, and culminating in the budget you see before you today.

An important component of this budget is an increase in funding for education and workforce development, which are essential components of all Federal R&D activities and continue to be high priorities for the Administration. As President Bush has stated, "America's growing economy is also a changing economy. As technology transforms the way almost every job is done, America becomes more productive, and workers need new skills."

As in previous years, this R&D budget highlights the importance of collaborations among multiple Federal agencies working together on broad themes. I will describe three high-priority R&D initiatives for FY 2005: (1) a cluster of programs fostering innovation, which includes manufacturing R&D, networking and information technology, and the National Nanotechnology Initiative; (2) physical sciences and engineering enhancement, which includes many programs at the National Science Foundation and NASA; and (3) a better understanding of the global environment and climate change.

Office of Science and Technology Policy (OSTP):

The Office of Science and Technology Policy, which I lead, has primary responsibility in the White House for prioritizing and recommending Federal R&D, as well as for coordinating interagency research initiatives. The FY 2005 request for OSTP is \$7,081,000, which is a 1.4% increase from the FY 2004 enacted level. Some of the changes for this fiscal year include increases for personnel, rental payments to GSA, and supplies, materials, and equipment. The budget request also contains a decrease of \$48,000 in communications due to a realignment in telecommunications infrastructure costs to the Office of Administration.

The estimate for FY 2005 reflects OSTP's commitment to operate more efficiently and cost-effectively without compromising the essential element of a top-caliber science and technology agency--high quality personnel. OSTP continues to freeze or reduce funding in many object classes, such as travel and printing, to meet operating priorities. OSTP will continue to provide high quality support to the President and information to Congress, as well as to fulfill significant national and homeland security and emergency preparedness responsibilities.

AGENCY BUDGET HIGHLIGHTS

National Science Foundation (NSF):

The 2005 Budget provides \$5.75 billion for NSF, a 3% increase over the 2004 enacted level. Since 2001, the NSF budget has increased by 30%.

The budget provides over \$1 billion for NSF awards that emphasize the *mathematical and physical sciences*, including mathematics, physics, chemistry, and astronomy. These programs have increased by 31% since 2001.

NSF participates strongly in this Administration's *cross agency priority programs* in information- and nano-technology, climate science, and education. This budget provides \$761 million for NSF's role in the *National Information Technology R&D* initiative, focusing on long-term computer science research and applications; \$210 million for *climate change science*; and \$305 million for NSF's lead role in the *National Nanotechnology Initiative*, a 20% increase from the 2004 level.

Science and math education is strongly supported in this budget, with funds for 5,500 graduate research fellowships and traineeships, an increase of 1,800 since 2001. Annual stipends in these programs have increased to a projected \$30,000, compared with \$18,000 in 2001.

The redirection of the *Math and Science Partnerships* (MSP) in the Department of Education reflects a desire to focus the program on integrating research-proven practices into classroom settings. The Budget requests \$349 million total for the joint MSP program in 2005, a \$61 million increase over the 2004 level. This increase in the MSP program is a key component of the President's Jobs for the 21st Century Initiative. This initiative will better prepare high school students to enter higher education or the workforce since 80% of the fastest-growing jobs in the

U.S. require higher education and many require math and science skills. \$80 million of the overall program remains in NSF to continue ongoing commitments.

Science infrastructure funding, an investment in the future, is provided to initiate construction for the National Ecological Observation Network (NEON), the Scientific Ocean Drilling Vessel, and a set of experiments in fundamental physics called "Rare Symmetry Violating Processes" (RSVP).

National Aeronautics and Space Administration (NASA):

The President has committed the United States to a *sustainable, affordable program of human and robotic exploration of the solar system*. This vision supports advanced technology development with multiple uses that will accelerate advances in robotics, autonomous and fault tolerant systems, human-machine interface, materials, life support systems, and spur novel applications of nanotechnology and micro-devices. All of these advances, while pushing the frontiers of space, are likely to spur new industries and applications that will improve life on Earth.

To support this and other NASA missions, the Budget requests \$16.2 billion in FY2005 and \$87 billion over five years, an increase of \$1 billion over the FY 2004 five-year plan. NASA will reallocate \$11 billion within this five-year amount toward new exploration activities. Robotic trailblazers to the Moon will begin in 2008, followed by a human return to the Moon no later than 2020. The pace of exploration will be driven by available resources, technology readiness, and our ongoing experience.

The 2005 Budget supports a variety of key research and technology initiatives to enable the space exploration vision. These initiatives include *refocusing U.S. research on the International Space Station* to emphasize understanding and countering the impact of long-duration space flight on human physiology. In addition, the agency will pursue optical communications for increased data rates throughout the solar system, space nuclear power to enable high-power science instruments, advanced in-space propulsion technologies, and systems that enable robots and humans to work together in space.

The Budget continues the growth in *space science* with a request for \$4.1 billion in FY2005, an increase of \$1.5 billion, or over 50%, since 2001. This budget supports the next generation of space observatories that will be used to better understand the origin, structure, and evolution of the universe.

Although exploration will become NASA's primary focus, the agency will not forsake its important work in improving the nation's aviation system, in education, in earth science, and in fundamental physical science.

Environmental Protection Agency (EPA):

The FY 2005 budget provides nearly three quarters of a billion dollars for EPA science and technology. The EPA is enhancing its overall scientific program to ensure that its efforts to

safeguard human health and the environment are based on the best scientific and technical information.

One example of this enhancement was announced February 18 by Administrator Leavitt when he signed a Memorandum of Understanding with Energy Secretary Abraham. The purpose of the MOU is to expand the research collaboration of both agencies in the conduct of basic and applied research related to: (1) environmental protection, environment and energy technology, sustainable energy use, ecological monitoring, material flows, and environmental and facilities clean-up; (2) high-performance computing and modeling; and (3) emerging scientific opportunities in genomics, nanotechnology, remote sensing, bioinformatics, land restoration, material sciences, molecular profiling, and information technology, as well as other areas providing promising opportunities for future joint efforts by EPA's and DOE's research communities.

Two particular areas of note in the EPA request are homeland security research and water quality monitoring. EPA's homeland security research program will result in more efficient and effective threat detection and response for water systems. Additionally, EPA will develop practices and procedures that provide elected officials, decision makers, the public, and first responders with rapid risk assessment protocols for chemical and biological threats. On water quality, EPA will address the integration of different scales and types of monitoring to target effective water quality management actions and document effectiveness of water quality management programs.

Department of Veterans Affairs (VA):

The FY 2005 Budget provides approximately three quarters of a billion dollars (\$770 million) for science and technology at the VA, a 9% increase since FY 2001. After taking into consideration the significant funding the Department receives from other government agencies and private entities to support VA-conducted research. Total VA R&D program resources are \$1.7 billion.

The proposed budget provides for clinical, epidemiological, and behavioral studies across a broad spectrum of medical research disciplines. Some of the Department's top research priorities include improving the translation of research results into patient care, special populations (those afflicted with spinal cord injury, visual and hearing impairments, and serious mental illness), geriatrics, diseases of the brain (e.g. Alzheimer's and Parkinson's), treatment of chronic progressive multiple sclerosis, and chronic disease management.

VA will soon begin to use increased funding from private companies for the indirect administration costs of conducting research in VA facilities. The 2005 Budget also reflects a restructuring of total resources in the Research Business Line as first shown in the 2004 Budget.

PRIORITY INITIATIVES

The 2005 budget highlights high-priority interagency initiatives described briefly below. These initiatives are coordinated through the National Science and Technology Council (NSTC) for which my office has responsibility for day-to-day operations. The Council prepares research

and development strategies that cross agency boundaries to form a consolidated and coordinated investment package.

Innovation – The FY 2005 Budget calls for research and development investments to promote technological innovation in high-priority areas including manufacturing technology; information technology, and nanotechnology; the creation of incentives for increased private sector R&D funding; and stronger intellectual property protections. These investments will stimulate innovation and enhance U.S. competitiveness.

- *Manufacturing Technology.* The President's Budget requests increased funding for a number of programs that strengthen manufacturing innovation, including those within the National Science Foundation's Design, Manufacture and Industrial Innovation Division—up 27 percent since 2001 to \$66 million—and the Manufacturing Engineering Laboratory at the National Institute of Standards and Technology (NIST)—up 50 percent since 2001 to \$30 million. The FY 2005 Budget sustains funding for the Manufacturing Extension Partnership at the Department of Commerce at the 2004 level and proposes to implement reforms to improve the efficiency and effectiveness of the program.
- *Networking and Information Technology.* Since 2001, funding for Networking and Information Technology R&D (NITRD) has increased by 14 percent to over \$2 billion, and the R&D funded by this effort has laid the foundation for many of the technological innovations that have driven the computer sector forward. The President's FY 2005 Budget sustains this significant investment. One half of the NITRD budget is controlled by this Subcommittee and you have increased the funding of that part of the program by 26% since FY 2001.
- *Nanotechnology.* The President's Budget includes \$1 billion in funding to increase understanding, and develop applications based upon, the unique properties of matter at the nanoscale – that is, at the level of clusters of atoms and molecules. Funding for nanotechnology R&D has more than doubled since 2001. Nearly 35% of the President's request for funding of the National Nanotechnology Initiative is within this Subcommittee's purview. I want to thank this Subcommittee for its recognition of the importance of the nanotechnology R&D under your jurisdiction, which has increased by 67% since FY 2001.

Physical Sciences and Engineering – Research in the physical sciences and engineering is an essential component of space exploration, nanotechnology, networking and information technologies, biomedical applications, and defense technologies. Physical science research leads to a better understanding of nature and, indeed, our universe. Research in this area also complements a number of critical investments in other areas such as those being made in the life sciences. The 2005 Budget strengthens our nation's commitment to the physical sciences and engineering, devoting significant resources to this priority area. The policy priority regarding the physical sciences responds to input and recommendations from PCAST.

Key activities in the physical sciences may be seen in selected programs in NSF, NASA's Space Science Enterprise, DOE's Office of Science, and the National Institute of Standards and Technology and National Oceanic and Atmospheric Administration in the Department of Commerce. Using these activities as a barometer of the health of physical science funding, the 2005 Budget requests \$11.4 billion, \$2.6 billion more than the FY 2001 funding level. That's a

29% increase under this Administration. Within this total, Space Science grows 56%, from \$2.6 billion to \$4.1 billion over the last four years. And within NSF, the Mathematical and Physical Sciences, Geosciences, Computer and Information Science and Engineering, and Engineering Directorates rise 31%, from \$2.3 billion to over \$3 billion.

Climate Change and Global Observations – For Fiscal Year 2005, the Administration is proposing to maintain funding at approximately \$2 billion for the Climate Change Science Program to increase our understanding of the causes, effects, and relative impacts of climate change phenomena. Nearly three-quarters of this climate change research money is allocated to NASA, NSF, and EPA, which are all agencies within this Subcommittee’s jurisdiction. The Administration considers the development of an integrated, comprehensive, coordinated, and sustained global Earth observation system to be of high importance for numerous activities such as improved weather forecasts, improved land and ecosystem management, and improved forecasts of natural disasters such as landslides, floods, and drought; which all have high impact on national economic security and public health. Accurate and sustained global observations are critical for understanding our climate and how climate changes on various time scales. Environmental observations are also a critical component in an effective national response strategy for natural and terrorist incident management.

The Administration’s 2005 Budget has accelerated by \$56.5 million the research on aerosols, oceans, and carbon cycle to contribute to filling knowledge gaps identified in the U.S. Climate Change Science Program Strategic Plan, which last week received high marks after a 6-month review from an independent committee convened by the National Research Council. Global observations of vertical distributions of size, composition, physical and optical properties of aerosols will help determine whether and by how much the overall effect of aerosols enhances heating or cooling of the atmosphere. With new observations from satellite, ships and land stations, the uncertainty about the role of aerosols in climate science is expected to be halved in ten years.

Knowledge of regional sources and sinks of the global carbon cycle, essential for long term predictions of climate, require innovative new observations. Measurements of vertical profile of carbon dioxide in North America will be enhanced from land-based towers and aircraft. Additionally, the vast expanse of the world ocean is highly under sampled. The Administration will accelerate deployment of moored and free-drifting buoys to measure ocean temperature, salinity and other variables to observe the unsteady characteristics of ocean circulation. These measurements and the Administration’s other observational assets contribute to the global Earth observation system.

MANAGING THE FEDERAL RESEARCH BUDGET

Research and development are critically important for keeping our Nation economically competitive, and will help solve the challenges we face in health, defense, energy, and the environment. Recognizing this, the Administration is investing in R&D at a rate of growth significantly greater than most other domestic discretionary spending. We all share the responsibility for ensuring the American people that these funds are invested wisely. Therefore,

consistent with the Government Performance and Results Act, every Federal R&D dollar must be evaluated according to the appropriate investment criteria.

As directed by the President's Management Agenda, the R&D Investment Criteria were first applied in 2001 to selected R&D programs at DOE. Through the lessons learned from that DOE pilot program, the criteria were subsequently broadened in scope to cover other types of R&D programs at DOE and other agencies. To accommodate the wide range of R&D activities, a new framework was developed for the criteria to address three fundamental aspects of R&D:

- *Relevance* – Programs must be able to articulate why they are important, relevant, and appropriate for Federal investment;
- *Quality* – Programs must justify how funds will be allocated to ensure quality; and
- *Performance* – Programs must be able to monitor and document how well the investments are performing.

In addition, R&D projects and programs relevant to industry are expected to meet criteria to determine the appropriateness of the public investment, enable comparisons of proposed and demonstrated benefits, and provide meaningful decision points for completing or transitioning the activity to the private sector.

OSTP and OMB are continuing to assess the strengths and weaknesses of R&D programs across the Federal government in order to identify and apply good R&D management practices throughout the government.

CONCLUSION

Mr. Chairman and members of the Subcommittee, I believe this is a good budget for science and technology. It is based on well-defined, well-planned, collaboratively-selected priorities. In a difficult budget year, this Administration remains committed to strong, sound research and development as the foundation for national security and economic growth and jobs. I would be pleased to respond to questions.