



Executive Office of the President  
Office of Management and Budget



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Office of Science and Technology Policy

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MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

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SUBJECT: FY 2008 Administration Research and Development Budget Priorities

This memo highlights the Administration's research and development (R&D) priorities and emphasizes improving management and performance to maintain excellence and leadership in science and technology. The memo highlights the President's American Competitiveness Initiative, provides general guidance for setting priorities among R&D programs, identifies interagency R&D efforts that should receive special focus in agency budget requests, and reiterates the R&D Investment Criteria that agencies should use to improve investment decisions for and management of their R&D programs. These updated R&D budget priorities reflect an extensive, continuous process of consultation with the President's Council of Advisors on Science and Technology (PCAST) and collaboration within the interagency National Science and Technology Council (NSTC).

**Presidential Priority: The American Competitiveness Initiative**

To build on America's unparalleled economic success and to remain a leader in science and technology, President Bush has proposed the American Competitiveness Initiative. The centerpiece of the American Competitiveness Initiative is the President's strong commitment to double investment over ten years in key Federal agencies that support basic research in the physical sciences and engineering that has potentially high impact on economic competitiveness. President Bush plans to double investment by the National Science Foundation, the Department of Energy's Office of Science, and the Department of Commerce's National Institute of Standards and Technology core activities. To achieve this doubling within ten years, overall annual increases for these three agencies will average roughly seven percent. Specific allocations will be based on research priorities and opportunities. In addition to the doubling effort at these three agencies, similarly high-impact basic and applied research of the Department of Defense should be a significant priority.

## General R&D Program Guidance

The combination of finite resources, the commitment to the American Competitiveness Initiative, and a multitude of new research opportunities requires careful attention to funding priorities and wise choices by agency managers. As has been reiterated previously in these annual memos, agencies must rigorously evaluate existing programs and, wherever possible, consider them for modification, redirection, reduction or termination, in keeping with national needs and priorities. They must justify new programs with rigorous analysis demonstrating their merit, quality, importance and consistency with national priorities. Agencies may propose new, high-priority activities, but these requests should identify potential offsets by elimination or reductions in less effective or lower priority programs or programs where Federal involvement is no longer needed or appropriate.

In general, the Administration favors Federal R&D investments that:

- advance fundamental scientific discovery to improve future quality of life;
- support high-leverage basic research to spur technological innovation, economic competitiveness and new job growth;
- align with the efforts of the Academic Competitiveness Council and the National Math Panel to enable superior performance in science, mathematics and engineering education;
- enable potentially high-payoff activities that require a Federal presence to attain long-term national goals, including national security, energy security, and a next generation air transportation system;
- sustain specifically authorized agency missions and support the missions of other agencies through stewardship of user facilities;
- enhance the health of our Nation's people to reduce the burden of illness and increase productivity;
- ensure a scientifically literate population and a supply of qualified technical personnel commensurate with national need;
- strengthen our ability to understand and respond to global environmental issues and natural disasters through better observation, data, analysis, models, and basic and social science research;
- maximize the efficiency and effectiveness of the science and technology (S&T) enterprise through expansion of competitive, merit-based peer-review processes and phase-out of programs that are only marginally productive or are not important to an agency's mission; and
- encourage interdisciplinary research efforts that foster advancement, collaboration and innovation on complex scientific frontiers and strengthen international partnerships that accelerate the progress of science across borders.

Agencies are expected to conduct programs in accordance with the highest standards of ethical and scientific integrity, and to have clear guidelines on issues such as scientific misconduct, conflict of interest, protection of privacy, and the treatment of human subjects. Agency participation in coordination of relevant standards through NSTC is expected, following the example of the U.S. Federal Policy for the Protection of Human Subjects, known as the Common Rule.

This Administration values science as a basis for effective action in its service to the public, and regards the timely, complete and accurate communication of scientific information an important part of that service. It is also essential for agencies to be aware of and coordinate within their organizations, and with other appropriate offices, the disclosure of information likely to have

high public interest or impact on markets, regulatory affairs, or public health and safety. Accordingly, agencies have already been asked to develop, revise or re-emphasize policies related to scientific openness and to ensure that employees and management understand their rights and obligations under these policies. All federal employees, including scientists, are obliged to distinguish their personal views from the official positions of their agencies, and procedures should be in place to ensure that such distinctions are clearly drawn.

Agencies should maximize the coordination and planning of their R&D programs through the NSTC. Two areas requiring special agency attention and focus through the NSTC are Federal scientific collections and R&D assessment.

- Agencies should assess the priorities for and stewardship of Federal scientific collections, which play an important role in public health and safety, homeland security, trade and economic development, medical research, and environmental monitoring. Agencies should develop a coordinated strategic plan to identify, maintain and use Federal collections and to further collections research.
- Determining the effectiveness of Federal science policy requires an understanding of the complex linkages between R&D investments and economic and other variables that lead to innovation, competitiveness, and societal benefits. An interagency process has been established and is now encouraged to promote and coordinate individual agency and collaborative actions needed to develop “new science of science policy” for better assessing the impact of R&D investments, defining appropriate metrics for measuring this impact, understanding the effect of the globalization of science and technology, and improving the basis for national science policy decisions.

### **Interagency R&D Priorities**

While some priority R&D areas fall mainly within the purview of a single agency, such as the President’s space exploration vision at the National Aeronautics and Space Administration, other areas require strong interagency coordination. The following interagency R&D priorities should receive special focus in agency budget requests. Agencies that receive funding for these activities should be prepared to participate in applicable interagency coordination groups to produce: 1) a clear and concise definition of program activities and priorities within the overall priority area; 2) an inventory of the programs in the baseline budget; 3) agency trade-offs that will provide the resources to help produce a coordinated, cross-agency program with greater impact than that of the individual activities; and 4) an interagency implementation plan.

### **Homeland Security**

Almost four years have passed since the publication of the President’s *National Strategy for Homeland Security* which identified the Nation’s S&T enterprise as a key asset in our efforts to secure the homeland. All parts of that S&T enterprise, both public and private, have answered the call for the development of “new technologies for analysis, information sharing, detection of attacks, and countering chemical, biological, radiological, and nuclear weapons.” Despite the significant achievements over the past four years, many challenges remain to mitigate vulnerabilities.

Agencies should place increased emphasis on R&D efforts that support:

- quick and cost-effective sampling and decontamination methodologies and tools for remediation of biological and chemical incidents;
- the development of integrated predictive modeling capability for emerging and/or intentionally released infectious diseases of plants, animals and humans, as well as for chemical, radiological or nuclear incidents, and the collection of data to support these models;
- the exploitation of recent advances in biotechnology to develop novel detection systems and broad spectrum treatments to counter the threat of engineered biological weapons;
- the development of novel countermeasures against the natural or intentional introduction of agricultural threats, including R&D on new methods for detection, prevention, and characterization of high-consequence agents in the food and water supply;
- transformational capabilities for stand-off detection of special nuclear material and conventional explosives;
- biometric recognition of individuals for border security, homeland security, and law enforcement purposes in a rapid, interoperable, and privacy-protective manner; and
- recognizing and expediting safe cargo entering the country legally, while securing the borders against other entries.

### Energy Security

In his 2006 State of the Union address, President Bush launched the Advanced Energy Initiative (AEI) to take new, bold steps toward the goal of reliable, affordable and clean energy for all Americans. Agencies should seek ways to support the AEI through fundamental research targeting scientific and technical breakthroughs in two vital areas: diversifying energy sources for American homes and businesses; and increased vehicle efficiency and acceleration of the development of domestic, renewable alternatives to gasoline and diesel fuels. Power diversification possibilities include advanced clean coal and carbon sequestration processes, new semiconducting materials that more efficiently convert sunlight directly to electricity, wind energy dynamics, and clean and safe nuclear energy. Numerous opportunities for alternative fuels range from bio-based transportation fuels such as ethanol, to advanced battery technologies to extend the range of hybrid vehicles and make possible “plug-in” hybrids and electric cars, to hydrogen as promoted through the President’s Hydrogen Fuel Initiative.

### Advanced Networking and High-End Computing

Under the Networking and Information Technology R&D (NITRD) program, agencies should continue to emphasize their investments in high-end computing. In addition, agencies should give priority to R&D in advanced networking technologies and cyber security. Advanced networking activities should target research on hardware, software, and tools (including large-scale testbeds) for the design of secure, reliable, and scalable data communication networks for high-speed transmission of extremely large data sets. Advanced networking research conducted by agencies with large investments in high-end computing facilities should emphasize enhancing the utility and the scientific impact of such facilities. In the area of cyber security, agency plans must be consistent with the 2006 *Federal Plan for Cyber Security and Information Assurance R&D*; should address any mission-relevant gaps identified in the Federal Plan; and should emphasize coordination, leveraging the efforts of all agencies and, where appropriate, use of coordinated multi-agency investments. Agencies supporting R&D in these and other on-going components of the NITRD program are expected to participate in interagency planning through the NSTC to help prioritize future investments.

## National Nanotechnology Initiative

Continued Federal investment in the agency programs that make up the National Nanotechnology Initiative (NNI) facilitates breakthroughs and maintains U.S. competitiveness in this field. The NNI should support both basic and applied research in nanoscience, develop instrumentation and methods for nanoscale characterization and metrology, and disseminate new technical capabilities, including those to help industry advance nanofabrication and nanomanufacturing. Because research at the nanoscale offers natural bridges to interdisciplinary collaboration, especially at the intersection of the life and physical sciences, the Administration encourages novel approaches to accelerating interdisciplinary and interagency collaborations. Activities such as joint programs utilizing shared resources or leveraging complementary assets, as well as support for interdisciplinary activities at centers and user facilities should receive higher relative priority. To ensure that nanoscience research leads to the responsible development of beneficial applications, high priority should be given to research on societal implications, human health, and environmental issues related to nanotechnology and agencies should develop, where applicable, cross-agency approaches to the funding and execution of this research.

## Understanding Complex Biological Systems

Agencies should target investments toward the development of a deeper understanding of complex biological systems, which will require collaborations among physical, computational, behavioral, social, and biological scientists and engineers who will, among other things, need to develop the data management tools and platforms necessary to facilitate this research. Access to new biotechnological tools and increasing amounts of genetic sequence data will open new avenues for research into the functional implications of gene expression. At the same time, rapidly developing methods and capabilities within the behavioral and social sciences are enhancing our knowledge of organisms and larger systems and providing greater insight into the relationship between biological, physiological and cultural influences on human behavior and decision-making. Continued research at both the cellular/sub-cellular and the organism/community levels has the potential to have significant impact on national security and homeland security, health, environmental management, and education. In particular, this research is relevant to the prevention and treatment of infectious disease, and to inherently complex issues such as obesity, which should remain a priority area for interagency research coordination.

## Environment

The Administration's environmental research initiatives are critical for achieving sustained economic growth while ensuring a healthy environment.

Global earth observations support research in a wide range of sciences important for society. The *U.S. Strategic Plan for an Integrated Earth Observations System* provides guidance for agencies contributing to these efforts and establishes six Near Term Opportunities that serve as the focal point of U.S. R&D activities. Agencies are encouraged to align their R&D programs in this area with the recommendations in the U.S Group on Earth Observations' annual report, *Development of the U.S. Integrated Earth Observations System: Progress and Recommendations for the Way Forward*.

Investments in global climate change science and technology continue to improve our understanding of climate variability and change, provide the basis for sound long-term climate policy decision-making by helping to reduce uncertainty in climate projections, and enable the development of new technologies. Agencies should continue to support the goals of the 2003 *Strategic Plan for the U.S. Climate Change Science Program* and continue to work together to develop the Synthesis and Assessment Reports called for in that report.

Agencies are encouraged to continue implementing activities outlined in the Administration's 2004 U.S. Ocean Action Plan, to continue to participate in the development of an Ocean Research Priorities Plan and Implementation Strategy and to begin aligning their budgets to match the emerging priorities that will be finalized this year, and to integrate U.S. ocean observing efforts into the Global Earth Observation System of Systems.

U.S. and global supplies of fresh water continue to be critical to human health and economic prosperity. Agencies, through the NSTC process, are developing a coordinated, multi-year plan to improve research aimed at understanding the processes that control water availability and quality, and to improve collection and availability of the data needed to ensure an adequate water supply for the future. Agencies should participate in the finalization of this plan and in its subsequent implementation.

## **Research and Development Investment Criteria**

The President's Management Agenda directs agencies to use the R&D investment criteria to improve investment decisions for and management of their R&D programs. Under this initiative, three primary criteria apply to all R&D programs: relevance; quality; and performance.

Industry-relevant applied R&D must meet additional criteria. The specific activities that programs should undertake to demonstrate fulfillment of the R&D investment criteria are described in a previous year's memorandum, which is available at:

<http://www.whitehouse.gov/omb/memoranda/m03-15.pdf>

Many of these specific activities have been incorporated into the Program Assessment Rating Tool (PART) that has been tailored for R&D programs. Agencies should use the criteria as broad guidelines that apply at all levels of Federally funded R&D efforts, and they should use the PART as the instrument to periodically evaluate fulfillment of the criteria at the program level.

The R&D criteria have benefited from years of working with agencies, other stakeholders, and experts in assessment, to build on the best of existing R&D planning and assessment practices. The R&D investment criteria continue to:

- Provide tools for programs, agencies, and policy makers to select, plan, and manage R&D programs effectively, to increase the productivity of the Federal R&D portfolio and the return on taxpayer investment;
- Help convey the Administration's expectations for proper program management;
- Set standards for information to be monitored and provided in program plans and budget justifications; and
- Ultimately improve public understanding of the potential benefits and effectiveness of the Federal investment in R&D.