



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
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MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: JOHN H. MARBURGER, III *JH Marburger*
DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY

MITCHELL E. DANIELS, JR. *MEJ*
DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET

SUBJECT: FY 2005 Interagency Research and Development Priorities

Science and technology contribute significantly to the highest priorities of this Administration: winning the war on terrorism, securing the homeland, and strengthening the economy. The President's FY 2004 Budget sets forth a research and development (R&D) agenda for the forthcoming fiscal year that reflects these priorities and seizes important opportunities for discovery and development while sustaining the basic R&D machinery needed for continued U.S. leadership in science and technology (S&T).

This memorandum provides guidance on R&D priorities for FY 2005, and establishes expectations for program evaluation based on the R&D Investment Criteria.

General R&D Program Guidance

The combination of limited resources and a multitude of opportunities requires careful attention to funding priorities and wise choices by agency managers. New programs must be justified with rigorous analysis demonstrating importance, consistency with national priorities, and likelihood of success. Existing programs also need to be reevaluated, modified, redirected, or terminated, in keeping with national needs and priorities. Agencies should fund new, high-priority activities by reallocating resources from lower-priority or recently completed activities. Requests for funding above guidance levels will require a compelling case that the agency is the best one to conduct the activity, and that funds from lower priority or recently completed programs cannot be substituted within the agency's guidance level.

In general, the Administration will favor investments in federal R&D programs that:

- sustain and nurture America's science and technology enterprise through the pursuit of specific agency missions and stewardship of critical research fields and their enabling infrastructure;
- strengthen science, mathematics, and engineering education by enhancing access and broad availability of excellent educational programs, establishing and encouraging best educational practices, and integrating research and education;
- focus on long-term, potentially high-payoff activities that require a federal presence to attain national goals, including homeland and national security, environmental quality, economic prosperity, human health and well being, and fundamental discovery;

- maximize efficiency and effectiveness of federal R&D investments through means such as competitive, peer-reviewed processes and phase-out of programs that are neither productive nor important to an agency's mission;
- promote collaborations among agencies, industry, academia and states to advance common S&T goals; and
- strengthen international partnerships that foster advancement of scientific frontiers and accelerate the progress of science across borders.

This memo does not set forth every Administration S&T priority. In particular, it does not include all priorities that fall within the purview of a single agency.

Some agencies operate *programs or facilities whose capabilities are important to the missions of other agencies*. Such programs and facilities will be given special consideration in budget preparations. Consistent with the President's Management Agenda, it is imperative that, where appropriate, federal R&D investments be managed as a portfolio of potentially interconnected activities to *optimize scientific discovery through interagency coordination of related research areas*. OSTP informs the budget process regarding the availability of instrumentation and facilities for S&T priorities and the need for coordination of related research programs based on information generated through the National Science and Technology Council (NSTC) and other interagency mechanisms.

The President's Council of Advisors on Science and Technology has urged increased investment in certain areas of physical science, citing opportunities for continued scientific discovery and the fact that such discoveries often drive advances in other areas of science. Budgetary proposals for these or any other area must be specific regarding how the programs will expand scientific frontiers in a manner consistent with stated agency missions and national goals and demonstrate coordination with similar programs in other agencies. The desire to achieve parity in funding levels among disciplines does not by itself suffice to justify funding increases.

Education and workforce development are essential components of all federal R&D activities and continue to be high priorities for this Administration. Effective interagency collaboration will promote the implementation of research-based programs and practices addressing priorities established in the *No Child Left Behind Act of 2002*. In addition to promoting effective educational outreach, a high priority will be given to research addressing math and science learning and achievement, including best practices for improving the quality of math and science education. Federal agencies also are expected to coordinate their ongoing efforts to maintain the adequacy of the supply and capacity of the R&D workforce.

Interagency Priorities for R&D Budgets

The President's R&D agenda includes existing and emerging priorities that require significant levels of interagency coordination and planning. During preparation of the FY 2005 Budget, the priority areas listed below will receive particular attention.

Agencies that receive funding for the following activities are expected to participate in applicable interagency coordination groups to produce: 1) a clear and concise definition of

program activities and priorities within the overall priority title; 2) an inventory of the programs in the baseline budget; and 3) an interagency implementation plan.

1. R&D for Combating Terrorism

Winning the war on terrorism and securing the homeland are national priorities. As articulated in the President's *National Strategy for Homeland Security*, the nation's S&T enterprise provides a key advantage in the war against terrorism when applied to: 1) preventing terrorist attacks within the U.S.; 2) reducing America's vulnerability to terrorism; and 3) minimizing the damage and recovering from attacks that do occur. The aim of this priority is to harness and focus America's substantial R&D capability to achieve these strategic objectives. Agencies are encouraged to promote R&D efforts, with emphasis on applied technologies, to address our nation's ability to detect, prevent, treat, remediate, and attribute acts of terrorism. Research and development, testing, evaluation and validation strategies should be elicited for both medical and non-medical countermeasures to weapons of mass destruction.

Research priority areas include:

- (1) enhancing detection, treatment, and remediation of chemical, biological, and radiological threats;
- (2) developing and transitioning technology to support first responders;
- (3) exploiting the significant advances in human and microbial genetic sequencing to promote the development of novel or next-generation vaccines, therapeutics and diagnostics to counter biological threat agents;
- (4) converting the vast amount of intelligence data into actionable knowledge;
- (5) assessing the social and behavioral aspects of terrorism to help anticipate, counter, and diffuse threats to our homeland security;
- (6) facilitating inspection of cargo and people at ports-of-entry; and
- (7) securing critical infrastructure including information infrastructure.

The NSTC is actively shaping more specific R&D priorities within each of these categories. This is an ongoing process requiring intensive interagency planning and coordination.

2. Nanotechnology

The National Nanotechnology Initiative (NNI) continues to offer great promise broadly across many scientific fields and most sectors of the economy, and remains an Administration priority. The NNI supports both fundamental and applied R&D in nanotechnology and nanoscience across a broad range of areas, development of nanoscale instrumentation and metrology, and the dissemination of new technical capabilities to industry. Nanoscale R&D priority areas continue to include material science and research relevant to medical care and homeland security. Though 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, as well as support for interdisciplinary activities at centers and user facilities, are encouraged.

3. Networking and Information Technology R&D

The interagency Networking and Information Technology R&D (NITRD) Program continues to be an Administration priority. Efforts that contribute to other interagency R&D priorities (research related to critical infrastructure protection and cybersecurity, for example) are

especially important, and may also require broader coordination with other NSTC entities. Research on networking is another high priority area. In addition, while the overall importance of each of the NITRD Program Component Areas remains undiminished, high-end computing is the subject of increased attention through coordinated multi-agency planning activities that are underway. These activities are focused on developing coordinated, multi-agency investment plans for R&D for core high-end computing technology, and will also address high-end computing capability, capacity and accessibility issues. Because of the emphasis on leveraging efforts and providing benefit to multiple agencies through these planning activities, agency plans and requests should reflect full consideration of the results of this planning activity.

4. Molecular-level Understanding of Life Processes

Methods for characterizing plants, animals and microorganisms have evolved from observation at the level of the whole organism, to deconstruction and manipulation at the cellular and molecular levels. New computer algorithms permit the synthesis of sequence data with experimental evidence of function across species to enable greater understanding of normal development and processes associated with disease, including the role of individual proteins and their interactions (proteomics). The NSTC coordination process (including efforts on Plant Genomes, Domestic Animal Genomes, and the Microbe Project) will assist in identifying R&D opportunities and needs to most effectively utilize federal resources and take better advantage of current biological, computational and bioinformatics technologies.

5. Environment and Energy

The Administration's environment and energy research initiatives are critical for achieving sustained economic growth while ensuring national energy security and a healthy environment.

- **Climate Change:** The Administration's R&D investments responding to the challenge of global climate change will increase our understanding of climate change science to provide sound climate policy decision-making. Agencies should implement strategic plans being developed for the Climate Change Science Program and the National Climate Change Technology Initiative, and should then move forward in prioritizing areas identified in the strategic plans and in establishing program-wide performance metrics.
- **Environmental Observations:** A key goal of the Administration's R&D investments is to enhance capabilities to assess and predict key environmental systems. Assessment and prediction are important in improving our understanding of and ability to model climate change, but they also affect many other aspects of society, such as health, resource management, weather prediction, sustainable development, and economic prosperity. To this end, integrated, comprehensive, global observation systems are required for understanding, monitoring, and predicting changes to the Earth system (atmosphere, land, fresh water, ocean, and ecosystems). Through the NSTC, the responsible agencies will develop and implement a coordinated, multi-year plan to enhance data time series, minimize data gaps, and maximize the quality, integrity, and utility of the data for short-term and long-term applications.
- **Hydrogen Fuel R&D:** President Bush's Hydrogen Fuel Initiative will work through partnerships with industry to develop the technologies and infrastructure needed to produce, store, and distribute hydrogen, and to use it in stationary, portable, and vehicular applications. Agency research efforts should address key technology barriers such as lowering the cost of hydrogen production, creating effective hydrogen storage, and developing affordable hydrogen fuel cells. OSTP will coordinate agency efforts, which

