

**National Science and Technology Council  
Interagency Working Group on Federal Laboratory Reform**

**Improving Federal Laboratories  
to Meet the Challenges of the 21st Century**

**An Action Plan**

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National Science and Technology Council  
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**EXECUTIVE SUMMARY**

The United States has a large and diverse complex of Federal R&D laboratories and facilities. Each laboratory was created to serve important missions related to national priorities. Over the years, the achievements of these laboratories have been impressive, and their roles continue to be critical in national defense, space, energy, environment and natural resources, health and medicine, agriculture, transportation, information technology, and in the advancement of knowledge. In parallel with these achievements, there have sometimes been inefficient management systems and inadequate environmental stewardship. Moreover, in some cases, the original missions have faded or evolved, making it difficult to maintain the needed mission clarity and for the human and physical infrastructure of the laboratories to keep pace.

Federal laboratories and intramural research continue to fill a key role in the nation's science and technology (S&T) enterprise, complementing the important capabilities and contributions of industry and academia. As we enter the 21st century, the laboratories' mandates are driven by the government's responsibility to:

- Invest and manage Federal R&D resources capably;
- Provide forefront major user facilities to serve the science and engineering enterprise;
- Advance knowledge and technologies required for unique federal government missions;
- Develop an objective, reliable, and credible knowledge base for regulations; and
- Have the capability to respond to the unanticipated.

The Federal laboratory system now needs to serve clear missions deriving from these mandates. To be successful, the system should address the scientific and technological challenges of the twenty-first century; be able to respond and adapt quickly to changing national and global situations and needs;

achieve consistently world-class scientific and technological excellence; foster innovation and breakthroughs; collaborate effectively with industry, academia, other R&D performers, and the international community; and become highly cost effective.

In 1995, the President directed selected agencies to streamline management and oversight of their laboratories, to clarify and focus laboratory missions, and to explore opportunities to coordinate and integrate laboratories resources and facilities on an interagency and intra-agency basis. This report recommends applying these directives to all agencies operating Federal laboratories, and it proposes six specific actions that could improve the scientific and technical quality, cost-effectiveness, responsiveness, and utilization of the laboratory system. The six proposed actions are to:

- Make personnel policies more flexible and conducive to a high-caliber S&T workforce;
- Create incentives to reward agencies and laboratories for divesting unneeded infrastructure;
- Increase productivity by adopting responsible, risk-based, outcome-oriented business practices and environmental, health, safety regulations and procedures;
- Address issues related to stewardship of user facilities when several agencies are involved;
- Increase awareness of laboratory core competencies, facilities, and capabilities and how to obtain access; and
- Improve the management and conduct of certain types of long-term R&D projects and tasks by providing multiyear funding;

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## I. INTRODUCTION

The United States has a large complex of Federal R&D laboratories and facilities, created to serve important missions. These laboratories are owned and operated by or for seventeen Federal agencies. They range in annual budget from less than \$1 million to more than \$1 billion. Over the years, the achievements of these Federal laboratories have been impressive, and their roles continue to be critical in national defense, space, energy, environment and natural resources, health and medicine, agriculture, transportation, information technology, and in the advancement of knowledge. At times, however, accompanying these achievements have been inefficient management systems and inadequate environmental stewardship. In some cases, the original missions have faded or evolved, making it difficult to maintain the needed mission clarity and for the human and physical infrastructure of the laboratories to keep pace.

Today it is clear that Federal laboratories continue to fill compelling national needs. The roles of the laboratories complement those of academia—with its focus on knowledge and education—and of industry—with its emphasis on markets and profits. The laboratories' physical and human infrastructure is rich in capability but not fully matched to the challenges of the early twenty-first century. Improving this match and increasing the cost effectiveness of the Federal laboratories are key components of our strategy to ensure the continuing global competitiveness and leadership of America's science and technology (S&T) enterprise.

Thus, during its first term, the Clinton Administration began a process to review and reform the Federal laboratory systems, with the goal of realizing greater service to the nation at a lower cost. The first focus of this effort was on the agencies operating the government's three largest laboratory systems—the Departments of Defense (DOD) and Energy (DOE) and the National Aeronautics and Space Administration (NASA). In September 1995, at the conclusion of the first review phase, the President directed those three agencies to:

- Streamline management and oversight of their laboratories;
- Clarify and focus lab missions; and
- Improve coordination of laboratory resources and facilities.

In the summer of 1996, the Assistant to the President for Science and Technology inquired about the agencies' responsiveness to the President's direction. Working with the three agencies, the Office of Science and Technology Policy (OSTP) conducted a status assessment. Its report concluded that the agencies and their laboratories were making progress, but that substantially more remained to be done to meet the President's goal of making government work better and cost less. The report made eight recommendations focused on enhancing scientific and technical excellence, streamlining management, and promoting cooperation and optimum utilization of capabilities. A ninth recommendation urged OSTP and the National Science and Technology Council (NSTC) to broaden the reform effort to include all agencies that operate Federal laboratories or conduct substantial intramural research programs. An Interagency Working Group (IWG) was formed in response. The IWG took the Status of Federal Laboratory Reforms as its starting point, and brought together representatives of fifteen agencies plus the Executive Office of the President to share best practices and make proposals for reforms that would enhance productivity, cost effectiveness, and scientific quality. This report presents the conclusions and recommendations of that effort.

The scope of this effort included the management of, conduct of, and infrastructure for federally funded S&T performed intramurally by Federal agencies or at laboratories the government owns. In addition, the IWG addressed the creation, operation, and maintenance of major, shared, federally funded scientific and technical user facilities (such as accelerators, supercomputer systems, telescopes, oceanographic research vessels, and Antarctic research stations). This report recommends specific actions to all agencies operating Federal laboratories in an effort to improve the scientific and technical quality, cost-effectiveness, responsiveness, and utilization of the laboratory system. It does not address security concerns at Department of Energy weapons laboratories or other Federal laboratories as these are being addressed elsewhere.

With the end of the Cold War and the national focus on priorities for the 21st century, it is an opportune time to re-examine the roles, missions, and status of our Federal laboratories. A new vision for these laboratories provides leverage and focus for driving the transition from the current state to a desired future state. The government-wide and agency-specific strategic planning and goal-setting activities required by the Government Performance and Results Act (GPRA) can provide a framework for planning and tracking laboratory reform.

Replacing the Cold War as the overriding mission for many Federal research institutions are major national policy issues whose solution must be informed by science and assisted by advanced technology. These issues include public health, disease, genomics, safe and abundant supplies of food and potable water, energy, climate change, natural disaster reduction, environmental cleanup of the Cold War legacy, and critical infrastructure protection, as well as national defense. To serve these missions, while contributing powerfully to the nation's S&T enterprise, the network of Federal laboratories should be shaped by the needs to provide:

- Capable Management of Federal R&D. The government needs to have scientific and technical expertise available to manage the sizable Federal R&D investment portfolio (about \$80 billion in FY 1999) in the national interest and with uncompromised integrity and excellence.
- Forefront Major S&T User Facilities. Government has an established role to provide major, often unique, scientific and engineering facilities needed to advance the frontiers of knowledge in many fields and serve large, diverse communities of users.
- Objective, Reliable, and Credible Knowledge Base for Regulations. Government needs impartial, objective, reliable, and credible expertise, assessment capability, and research results to resolve controversial issues and inform regulation and national decision making.
- Specialized Knowledge and Technologies Required for Unique Federal Missions. Government has a clear and continuing responsibility for national defense and other public interests that require unique, specialized, and/or sensitive R&D.
- Readiness to Respond to the Unanticipated. Government needs competencies and capacity to anticipate future problems, issues, and opportunities and to be able to mobilize S&T efforts rapidly in response to national “emergencies” or unanticipated opportunities requiring new scientific knowledge or technical capability.

Our vision is for a Federal laboratory system that is configured to serve the roles described above. It must be able to address the scientific and technological challenges of the 21st century; respond and adapt quickly to changing national and global situations and needs; consistently achieve world-class scientific and technological excellence; foster innovation and breakthroughs; and collaborate and partner effectively with other agencies, other laboratories, industry, academia, other R&D performers, and the international community.

There are numerous stakeholders in Federal laboratories, and proposed actions must consider their views and interests. To devise an effective path forward, it will be important to encourage significant input from these stakeholders. Especially when improvement requires major change, it will be crucial for the leadership involved to make the change in a manner that preserves the cost effectiveness and the quality of the R&D performed by the affected institution(s). During the transition the national needs must continue to be met effectively, while capacity is created to deliver sustained, world-class levels of excellence and exemplary, cost-effective performance into the future.

Each laboratory is important to its local and regional economy and employs people dedicated to a national priority. Examination and review of infrastructure, capacity, and national needs, however, are leading to conclusions that there may be overcapacity in the system. From time to time the Congress and

others talk about consolidating, privatizing, or closing some facilities, sites, or laboratories. This IWG was not charged to review the Federal laboratory complex for this purpose. However, maintaining obsolete capability can divert funds from more productive and forward-looking purposes. It will be important to follow a fair, open, and well-understood process for determining what course of action is in the national interest. Such a process will be most successful if it allows for input by all stakeholders, some control by the people at the affected institutions, and a reasonable period to carry out the actions.

Agencies and the government as a whole should use existing planning and accountability systems to establish intermediate steps and goals on their roadmaps for improvement, and they should track and report progress against these plans. Continued coordination at the level of the NSTC will be important to help ensure that changes are guided by government-wide priorities and needs. In addition, each agency and laboratory should implement mechanisms to assess the quality, productivity, and efficiency of its R&D programs. These mechanisms should also allow evaluation of the effectiveness of the research portfolio in serving the agency's mission and its balance of high-risk, long-term, and innovative research.

To serve our nation in the 21st century, agencies and laboratories need to be responsible stewards, focusing their institutional assets and core competencies to serve tomorrow's needs, while maintaining high standards of safety and business practices, protecting the environment, and pursuing the R&D programs of today. Regular reassessment of the principles, assumptions, status, practices, and plans is essential to keep them optimized and focused on current and future needs.

Section II of this report describes the action proposals. Section III discusses implementation and monitoring. In Section IV the background and context for Federal laboratory reform are presented. Appendices identify the participating agencies and provide background and reference information, including a glossary of acronyms.

## **II. ACTION PROPOSALS**

### Summary of Action Proposals

Each of the six specific action proposals describes the recommended action and its expected benefits. It identifies the key stakeholders and their likely views and provides examples of best practice from government or the private sector. In addition, each proposal suggests a strategy and approach for implementation and assesses the likelihood of success, how long it will take, and the failure modes and fallback options. Relative or absolute priority to these proposals has not been assigned. They were distilled from among many considered. Each proposal was selected because it both individually and as part of the set would help to make the Federal government's S&T laboratories more cost effective (deliver more per dollar):

Proposal 1. To make personnel policies more flexible and conducive to a high caliber S&T workforce, (1) agencies, in cooperation with the Office of Personnel Management (OPM), should exploit fully the

available flexibility within existing authorities; (2) the Administration should draft legislative proposals and work with Congress to enact legislation that allows proven, successful practices from alternative personnel authorities to be made available to all Federal laboratories; and (3) the Administration should draft legislative proposals and work with Congress to enact legislation to create a permanent alternative personnel system for Federal laboratory organizations.

Proposal 2. To create incentives to reward agencies and laboratories for reducing unneeded infrastructure, Congress should authorize the agencies and their laboratories to retain some of the net proceeds from the sale or transition of infrastructure assets no longer needed.

Proposal 3. To increase productivity in a responsible and accountable manner, agencies should require that their laboratories implement environmental, health, safety and administrative programs and systems that are risk-based, outcome-oriented, and integrated into the conduct of work.

Proposal 4. To address issues related to stewardship of user facilities when several agencies are involved, the NSTC should establish interagency working groups, as needed.

Proposal 5. To increase awareness of the core competencies, facilities, and capabilities of federal laboratories, the NSTC should establish a dependable mechanism to make widely available up-to-date information about the resources, facilities, core competencies, and capabilities of the Federal laboratories, major scientific facilities, and intramural research organizations.

Proposal 6. To improve the management and conduct of multiyear research projects multi-year funding commitments are important. Barring a change in the budget law to appropriate funds for more than one year, agencies should work with OMB to maximize the flexibility they have.

The IWG spent considerable effort working on an additional action proposal related to performance measurement for R&D. However, performance measurement is applicable not only to Federal laboratories, but also to the broader issue of the conduct and management of federally funded R&D, with research at Federal laboratories as only part of the picture. During the period the IWG was working, a study funded by several of the participating agencies was initiated by the National Research Council to look at assessment of research in the context of the GPRA. Therefore, no proposal is presented here on this topic.

Proposal 1: Make Personnel Policies More Flexible and Conducive to a High Caliber S&T Workforce

1.1 Specifics: To make personnel policies more flexible and conducive to a high caliber S&T workforce, (1) agencies, in cooperation with the Office of Personnel Management (OPM), should exploit fully the available flexibility within existing authorities; (2) the Administration should draft legislative proposals and work with Congress to enact legislation that allows proven, successful practices from alternative personnel authorities to be made available to all Federal laboratories; and (3) the Administration should draft legislative proposals and work with Congress to enact legislation to create a permanent alternative

personnel system for Federal laboratory organizations.

Title 5 of the United States Code is the framework for the entire Federal civil service personnel system, with implementation oversight provided by OPM. Greater flexibility is needed by Federal Laboratories (specifically the Government Owned-Government Operated laboratories) to hire, compensate, replace, reward, promote, retain, and shape their science and engineering (S&E) workforce to achieve technical excellence and competitiveness. To attain the level of change truly necessary, a phased approach is appropriate.

In the first phase each agency, in cooperation with OPM, should exploit fully the flexibility currently available within Title 5. In a step toward this direction, OPM, in 1998, developed a framework for Human Resources Management (HRM) initiatives aimed at balancing the needs for both flexibility and consistency across the government. The HRM initiatives strive to equip agencies with the flexibility they need to manage their human resources strategically and to serve the needs of the government as an employer. Federal S&E organizations, with their interest in piloting innovations, could provide a venue for developing and testing some of these initiatives.

The second phase is to prepare a legislative proposal that extends to all Federal laboratories the option to adopt successful practices from the alternative personnel authorities that exist. To date these alternative approaches have provided successful demonstrations of selected personnel-management flexibility. In the past, a few innovations ultimately have been authorized government wide, for example, the use of recruitment and retention bonuses demonstrated at DOD's facilities at China Lake and the Naval Undersea Warfare Center in Newport, Rhode Island. In general, however, successful initiatives have not been institutionalized throughout the government. All Federal laboratories should have the opportunity to implement the best practices of successful demonstration projects that meet their needs.

The third phase would be to develop specific legislation to create an innovative and flexible alternative personnel system for Federal laboratories. The system should provide the needed flexibility for Federal laboratories to fulfill the quality requirements critical to sustaining the technological base and competing in the workplace for the best talent. This legislation should encourage extensions of the best practices from the demonstration projects and would also consider those personnel areas where reform could be beneficial, but is prohibited from testing by current law, e.g., quality-of-life benefit packages. In concert with these changes, specific modifications should be made to government-wide or agency programs such as high-grade/average-grade programs to provide maximum flexibility to recruit, develop, reward and retain a high caliber S&E workforce. Such relief should be provided in a manner that would allow agencies and laboratories to adopt personnel practices conducive to forefront R&D performance, without undermining the purposes driving the government-wide requirement or the need for limits on staffing.

1.2. Expected Benefits: Personnel with state-of-the-art scientific and technical expertise will be attracted to and retained in government S&E positions to manage the Federal R&D investment portfolio in the

national interest and with integrity and excellence. Opportunities to work at the cutting edge, compensation and personnel benefits competitive with those available elsewhere, and a work environment conducive to creativity, innovation, and S&T productivity will allow the required caliber of personnel to be maintained.

1.3. Stakeholders: The civil service committees of Congress and OPM are the key Federal government stakeholders in Title 5. The Office of Management and Budget (OMB) is also a major stakeholder, particularly in areas involving budgetary requirements; e.g., the Federal employees retirement system, the employee health benefits program, and target staffing levels set by the agency. Unions, employee associations, veterans, and the public are also recognized stakeholders.

Based on recent demonstration experience, OPM and OMB are receptive to streamlining and improving the personnel demonstration process within existing authority. The civil service committees and appropriations committees in Congress have indicated that they are willing to support additional demonstrations until they are ready to develop and enact comprehensive civil service reform. Depending on the nature of any proposal, stakeholders, such as the unions, management associations, veterans groups, and others, will express varying degrees of interest. Their position on a proposal would depend on their assessment of its potential impact on their constituents.

1.4. Examples of Best Practice: Best-practice examples are available in recruiting, hiring, position classification, compensation and reward systems for high technology employees, benefit packages, employee development, appraisal, discipline, redress systems, and workforce reshaping. Within the Federal government, these cases have been created through demonstration authority or agency-specific authorizations. In addition, state and local civil service systems, and the private sector (including some Federally Funded Research and Development Centers (FFRDC) and many DOE laboratories, which are Government-Owned, Contractor-Operated (GOCO)) provide examples of effective personnel practices for managing an S&E workforce. Within the Federal government, highly visible “best practices” are in force in the demonstration projects undertaken at the National Institute of Standards and Technology (NIST) and China Lake. Additional best practices are in effect at other Federal R&D organizations such as at NASA, the Naval Research Laboratory, and the Department of Agriculture (USDA).

Demonstration authority within Title 5 allows innovations in personnel systems to be tested and, if proven worthwhile, to be institutionalized in the Federal civil service system. Some personnel demonstration projects, for example those established for NIST, DOD’s S&T laboratories, and DOD’s acquisition workforce, have provided increased flexibility. Example features include extended probationary periods for the S&E work force, improved developmental opportunities, expanded degree programs, pay-for-performance systems, "broadbanding" in lieu of GS salary grades, establishment of a pay range higher than GS-15 for S&E technical managers, and simplified hiring and appointment authorities.

In salary "broadbanding," practiced at NIST and China Lake, a few broad pay bands replace the many discrete government salary levels and pay steps. Another pay innovation is the "contribution-based

compensation system" at the U.S. Air Force Research Laboratory. Modeled on experience from private-sector laboratories, this system bases each person's salary level and raise on his or her contributions to the mission of the organization.

Laboratories of the USDA piloted the use of "quality groups" as a means to identify and hire the best person for a job. In the quality-group approach, any person in a small group of highly qualified applicants can be selected for a particular position, instead of using a strict, civil-service ranking system. Within the highly qualified group, veterans are given preference. NIST has a reduction-in-force system, which is based on business needs, not just seniority.

Congress has directed that China Lake's demonstration be made permanent and has provided special personnel authorities to several agencies to address special personnel-related issues. One example is the establishment of the Senior Biomedical Research Service for the Department of Health and Human Services (HHS) to address the special recruiting and retention problems for this segment of its work force.

For DOD's acquisition workforce demonstration project, Congress modified the process timelines of the Title 5 demonstration authority to expedite the demonstration's establishment. Congress also required the acquisition workforce demonstration to be implemented by a specific date. There is strong OPM and agency support for establishing these demonstrations. Streamlined process timelines should be considered a best practice in the development of any proposal to modify personnel practices affecting the Federal laboratory community.

A more extreme alternative is exemption from Title 5. In FY 1996, the Federal Aviation Administration (FAA) was exempted from significant portions of Title 5. The recent consolidation of several DOD and national intelligence organizations into the National Imagery and Mapping Agency removed the affected personnel from Title 5 coverage. In all these cases, however, the affected organizations have adopted the provisions of Title 5 addressing retirement, health and life insurance, and other benefits. Title 5 requirements should be evaluated to determine if exemptions are required to fully implement an innovative S&E workforce system.

**1.5 Strategy and Steps to Implement:** For the first phase, agencies need to use the full flexibility available to them. To make progress, agency leadership or R&D managers at the working level need to insist that the agency's human resources policies and practices support the effective management of a high-performing S&E workforce. Two OPM handbooks, *The HR Innovator's Tool Kit*, and *Human Resource Flexibilities in the Federal Government*, may be helpful. Waivers, if needed, should be requested and acted upon in the streamlined manner described in President Clinton's April 21, 1998, memorandum on "Streamlining the Granting of Waivers."

Under the second phase, agencies should identify specific proposed demonstrations that need to be undertaken and the S&E organizations that desire to test them. Individual agencies (or laboratories) should propose personnel demonstration projects, identifying features tailored to the requirements of the

agency (or laboratory). The proposal should describe any proven demonstration approaches it includes, along with any newly designed innovations. In concert with OPM, legislation should be drafted to extend to other agencies the availability of successful practices proven under demonstration projects.

For the third phase, an IWG representing the Federal laboratory community should be established to undertake an assessment of state-of-the-art personnel practices for high-performing R&D organizations and develop innovative proposals for an S&E workforce system. This working group should include OPM and OMB representatives. Among the tasks it should undertake are to conduct a literature search; review existing demonstrations and agency-specific personnel authorities for general applicability to Federal laboratories; solicit input from Federal laboratories, GOCOs and FFRDCs; contact personnel consulting organizations; and visit corporate R&D organizations. As a result, a compendium of personnel practices and approaches could be identified including best practices and innovative ideas. For each best practice, the IWG would determine if implementation is within OPM's existing authority, whether the formal rulemaking process must be followed, or whether legislative change is required. For those changes requiring legislation or rule development, the IWG should develop specific proposals and coordinate informally with Congressional staff members, union officials, and agency representatives. Working with OSTP and OPM, the NSTC would submit recommendations to the President and Congress for reforms needed to ensure the alternative personnel system, whether within or separate from Title 5, includes all the flexibility needed to support a high-performing Federal S&E workforce.

1.6. Likelihood of Success: Many agencies could make significant and rapid progress by using existing flexibility to improve their personnel practices and systems. This flexibility and the mandate to use it was emphasized by the President in April 1998 in a memorandum directing the heads of all executive departments and agencies to streamline the granting of waivers. It should be possible, in many cases, to make improvements to personnel systems or practices that enhance S&T management and performance. More widespread agency-by-agency implementation of the flexibility in current authorities could have substantial benefits in a reasonably short time.

Approval for expansion of ongoing demonstration projects to additional laboratories should be attainable based on the common needs of these organizations to attract and retain the most highly qualified technical personnel. The incorporation of these innovations and the subsequent development of a comprehensive, flexible S&E personnel system is likely to take 2 to 3 years to complete. A literature search; review of demonstrations and agency-specific personnel authorities; contacting personnel consulting firms; benchmarking corporate R&D organizations, GOCOs, and FFRDCs; and development of a compendium could take 6 months to a year depending on resources devoted. The length of time to obtain a change to the Federal civil service system would depend on the specifics of each change. Rule changes, in some cases, could take just a few months. Those that are complex could easily take 12-18 months to finalize. Any legislation, particularly legislation to establish a Federal S&E personnel system, could take 2 years or more depending on whether Congress would decide to include the proposals as part of an omnibus civil service reform bill or consider them separately.

Proposal 2: Create Incentives to Reward Agencies and Laboratories for Divesting Unneeded Infrastructure.

2.1. Specifics: To create incentives to reward agencies and laboratories for reducing unneeded infrastructure, Congress should authorize the agencies and their laboratories to retain some of the net proceeds from the sale or transition of infrastructure assets no longer needed.

Permitting laboratories to use a share of net proceeds from asset sales can be an effective incentive for them to find and undertake such actions. These actions could reduce net new costs while maintaining or enhancing programmatic excellence and productivity by focusing on core competencies and de-emphasizing activities outside of core competencies.. The proceeds could be applied—with appropriate review and approval—to higher priority infrastructure needs, scientific equipment, or other approved purposes. Alternatively, laboratories could be authorized to trade assets for in-kind consideration from other public or private entities.

- **Sale of Surplus or High-Value Property.** An example would be to allow agencies to retain a share of the net proceeds from the sale of surplus real property or from exchanging high-value property for equally functional but less-costly property elsewhere. Some agencies own land and facilities in downtown areas of major cities. The value of such property has, in many cases, grown dramatically in commercial value; yet the functions performed at these sites do not necessarily need to be performed at the high-value locations. Sale of the property and relocation could yield significant net proceeds and be done in a manner that does not create or aggravate urban sprawl. At present, any proceeds from such a transaction, by law revert in total to the U.S. treasury. By allowing agencies to retain a share of these net proceeds, a strong incentive is created for agencies and laboratories to assess their holdings of real estate and facilities in light of current and future needs, and to manage them in a manner that is optimized for the nation's benefit.

- **Facility Trade-offs.** An example would be to eliminate one obsolescent S&T facility, and use the funds saved to modernize and equip a second S&T facility, which is more important for future programs. Where proposed trade-offs would have policy-level magnitude or importance, appropriate levels of review and approval should be obtained.

As a means of controlling and disbursing proceeds, agencies and labs should be permitted to deposit resulting funds and specifically-designated appropriated funds in multi-year revolving Working Capital Funds (WCF) accounts. Funds deposited in or appropriated to these accounts would remain available until expended and could be used for replacement or upgrade of facilities. At the present time there is no uniform approval process for the creation, funding, and use of WCFs or depreciation accounts. However, in some cases WCFs are used to cover depreciation and upkeep/replacement expenses.

2.2. Expected benefits: Timely investment in technical maintenance and facility upgrades contributes directly to S&T program excellence. Optimization of infrastructure and capabilities allows the present and future programs to be accomplished most effectively, efficiently, and productively. The sale of underutilized and unneeded assets would reduce future infrastructure maintenance costs. Without incentives, the responsible agencies and laboratories are less likely to choose to divest infrastructure.

Some sharing of the income generated between the owning agency and the treasury will encourage sales, and result in more revenues for both the Treasury and the cognizant agency.

2.3. Stakeholders: Congress, OSTP, OMB, the General Services Administration (GSA), agencies, laboratories, and their local communities are all stakeholders, and many would welcome improvements to the Federal government's management of real property. In a May 1998 oversight hearing by the House Subcommittee on Government Management, Information and Technology, Congress requested GSA's advice regarding changes to the Federal Property and Administrative Services Act of 1949, as amended (Property Act), which governs the management of Federal real property. In response, OMB requested that GSA prepare a comprehensive package of legislative proposals to improve the Property Act. The reengineering recommended by GSA includes, among many reforms, the use of incentives like those proposed in this report. This development suggests considerable stakeholder support for the ideas in this action proposal.

Given the pressures and complexities of day-to-day program management, and the knowledge that nothing will be gained by their programs as a result of the near-term sacrifices and inconvenience involved, the people familiar with the infrastructure rarely question its necessity or take the initiative to liquidate or exchange it. Hence, incentives are needed and desirable to motivate the leadership and management of agencies and laboratories to pursue such opportunities continuously and aggressively.

2.4. Examples of Best Practice. No best practice was found in the government, though the private sector often empowers managers to use the full range of resources and assets available to optimize profits and/or future prospects. An attempt was made recently to implement the proposed concept in DOE and, although it failed to gain congressional approval, the attempt identified some obstacles that must be overcome.

In FY 1997 DOE proposed legislation, with Administration approval, for a pilot program that would permit DOE to retain 50% of the net receipts from certain specified sales of its national laboratory property. DOE's appropriation subcommittees rejected this proposal after the Congressional Budget Office (CBO) determined that the Budget Enforcement Act (BEA) required it to count any resources retained from such asset sales against the statutory spending cap on appropriated funds. CBO determined that since DOE already has legal authority to sell the assets, the BEA prohibits the receipts from augmenting spending authority.

However, a WCF may provide a mechanism for managing the funds that would be available, if it were permissible for some revenue from asset sales or exchanges to be used by the cognizant agency or laboratory. The Department of Transportation (DOT) and USDA (Forest Service) have used WCFs for many years. The DOT's WCF is used for supporting common service needs, and the Forest Service's WCF emphasizes facilities replacement and maintenance. These WCFs provide effective mechanisms for distributing costs, managing funds, and investing in equipment and inventories that must be replaced over time to prevent obsolescence.

2.5. **Strategy and Steps to Implement:** The NSTC and OMB, in consultation with GSA should guide the implementation of this proposal. Given the GSA's progress on a legislative proposal for Property Act Reform, it would be timely to provide S&T agency review of the GSA proposal, with the specific interests of the laboratories in mind. A five- to six-person team could probably produce the required information and recommendations in 4 to 6 months. Another 2 to 3 months would be required for agency and OMB approval. The proposed legislation should be coordinated with the Senate Government Affairs Committee, the House Government Operations Committee, and the House and Senate Budget Committees. It is important that this proposal be handled centrally by the Administration and be advocated strongly as a government-wide reform.

2.6. **Likelihood of Success:** The GSA's proposal for improvements to the Property Act are very encouraging. Given DOE's experience in trying to get authority to use some of the funds that would be received by selling some of its national-laboratory property, it is likely that the BEA would have to be amended for this proposal to have a realistic chance of success. The IWG did not discuss with the cognizant congressional committees their assessment of the chances for a suitable amendment to the BEA. If the GSA's legislative proposals are put forward by the Administration, one could anticipate about 1 year for congressional action. If the proposal fails, no incentive is created, and only exhortations (as is currently the case) can be used to find potential asset sales possibilities. Agencies can individually seek the necessary legislative authority as DOE is now trying to do, but prospects would not be as favorable as a generic initiative advocated by the Administration.

### Proposal 3: Increase Productivity By Adopting Responsible, Risk-Based, Outcome-Oriented Business Practices and Environment, Health, Safety Regulations and Procedures

3.1. **Specifics:** To increase productivity in a responsible and accountable manner, agencies should require that their laboratories implement environmental, health, safety and administrative programs and systems that are risk-based, outcome-oriented, and integrated into the conduct of work. Risk should be determined on the basis of an assessment that neither minimizes nor exaggerates the nature and the magnitude of the risks.

Some agencies, in well intentioned efforts to prevent potential problems, impose on themselves and their laboratories environmental, health, safety and administrative requirements that are overly burdensome, duplicative of other applicable standards and regulations, and go beyond what is necessary to ensure the success desired. In some cases, procedures and requirements are established and remain in effect beyond their period of usefulness and even after conditions change and new requirements are added. Comparison of requirements with acknowledged "best practice" from other agencies and the private sector can point the way to recognition of, and relief from, overly stringent regulations and procedures. Ideally agencies should impose requirements that are risk-based and performance-oriented and allow the laboratories maximum flexibility to achieve the desired outcomes in the most straightforward and effective manner. Compliance with applicable environment, health, and safety regulations and procedures, federally mandated research protections, and reporting and administrative requirements is important and carries a cost. In cases where the regulations or procedures are followed but are duplicative, outdated, or not applicable to the specific activities, the costs are incurred, but they

do not contribute to benefits. Beyond the direct cost of implementation, the effort invested in these unnecessary activities diverts attention from R&D, which results in fewer opportunities being pursued.

Agencies should adopt and implement nationally recognized standards and best practices from the private sector, whenever available and appropriate. Rather than creating overly prescriptive regulations and directives for their laboratories, agencies should use the national standards promulgated by the Occupational Safety and Health Administration (OSHA), EPA, Nuclear Regulatory Commission (NRC), DOT, HHS, and others. Section 19 of the Occupational Safety and Health Act, Executive Order 12196, and 29CFR1960 establish the legal framework for all Federal agencies to comply with OSHA standards, while allowing the imposition of alternate standards where deemed necessary. Regulatory agencies should impose the same standards and practices on Federal laboratories and intramural research organizations that they apply to comparable private-sector entities.

One mechanism that can help agencies expedite the adoption of nationally recognized standards and "best practices," in lieu of their normal requirements and procedures, is the process of streamlining the granting of waivers, as directed in President Clinton's recent memorandum. Examples of best practice cited in the President's memorandum include:

- Acting upon waiver requests within 30 days or less. After 30 days, the originating entity within the agency can assume approval and implement the requested waiver.
- Allowing officials having authority to grant or change internal agency rules to approve waiver requests, but only the head of an agency to deny them.
- Encouraging officials who have the authority to grant waivers to identify and pursue potential waiver opportunities.

3.2. Expected Benefits. Scientific and technical excellence will benefit when high standards of safety, health, environmental protection and business practices are achieved without cumbersome constraints, requirements, procedures, and reporting burdens. Relevance will be improved when regulations, standards, practices, and procedures are appropriate to each situation, focused on mitigating the risks and hazards present, and adapted to achieving the desired outcomes. Risk-based environment, health, safety requirements along with "best practice" business systems could result in substantial savings. The savings come from achieving better safety, environmental and business performance and by eliminating the effort invested in compliance with non-value-added requirements. The amount that can be saved will vary from agency to agency and from lab to lab.

3.3. Stakeholders: Congress and the taxpayer want agencies and their laboratories to be responsible stewards, accountable managers, and to accomplish their missions cost effectively and safely. The agencies and laboratories want to maximize the quality and quantity of R&D performed and maintain acceptable records in safety, worker health and environmental protection. In cases where the high costs are due to the large number of staff involved, the affected staff would be likely to oppose any changes that could result in the elimination of their jobs.

3.4. Examples (Best Practices): OSHA's Voluntary Protection Program (VPP) is a cost-effective

approach, proven to improve workplace health and safety performance and lower injury and illness rates in the private sector. The VPP is a cooperative effort between OSHA and individual companies, in which the company takes full responsibility for a comprehensive health and safety program that involves its workers and is tailored to its specific workplace.

OSHA's draft Performance Evaluation Profile (PEP) is available and provides a guide for an organization to examine its health and safety program. It is a good model to help organizations identify the strengths and weaknesses of their programs. Insight gained can help the organization to minimize unnecessary and excessive requirements and procedures.

In another area, the Centers for Disease Control and Prevention (CDC) of HHS promulgates regulations for handling infectious agents. These regulations are followed by other agencies within HHS and also by the Department of Veterans Affairs (VA). Many examples like this could be cited.

The DOE has started pursuing a graded approach to environment, health and safety requirements at its national laboratories, which are mostly managed and operated by contractors. The approach is to identify for each laboratory and on-site facility the "Work-Smart Standards" that are necessary and sufficient to mitigate the specific hazards and risks involved. In so far as possible, the standards imposed are nationally accepted. This approach substitutes for a more onerous one in which an entire site (or even all DOE facilities) would be required to implement the requirements and procedures needed to mitigate every hazard present anywhere in the DOE system.

3.5. Strategy and Steps to Implement. Each agency should review the environmental, health, safety administrative, and reporting requirements and procedures it imposes on its laboratories and other R&D performers to ensure that all are appropriate and commensurate with the hazards and risks involved. Those requirements that are duplicative or unnecessarily more onerous than required by law or nationally accepted standards should be rescinded. Those that specify prescriptive procedures should be rescinded or converted to specify desired outcomes. If waivers are needed, they should be requested and acted upon in a timely and responsive manner, consistent with the President's memorandum to agency heads on April 21, 1998.

Each R&D agency should review and evaluate its approach to management, oversight, and enforcement of environment, health, safety and business requirements on its laboratories and intramural research organizations to ensure that they are effective, efficient, and achieve the desired outcomes. The agencies may determine that the best way to fulfill these responsibilities is through partnerships to obtain regulatory, oversight, or enforcement services from Federal or state regulators with expertise in the applicable disciplines. In this case, legislation, transfer of funds, or Memoranda of Agreement between the cognizant agency and the regulator(s) may be needed.

Each laboratory should review and benchmark its management systems and procedures to ensure they are configured to achieve the desired outcomes in a straightforward and cost-effective manner that represents proven best practice.

3.6. Likelihood of Success: It should take 3 to 6 months for agencies and laboratories to complete their reviews and an additional 6 to 12 months to reinvent the requirements and procedures, craft needed legislation and Memoranda of Agreement, and begin the few-year process to convert to risk-based, outcome-oriented management systems for environmental protection, workplace safety and health and business practices. The incentive is the considerable savings that should be available. Those benefiting from the current system, however, will work to prevent change. A fallback option is to avoid imposing additional, overly prescriptive requirements that are not risk-based and outcome-oriented.

#### Proposal 4. Enhance Interagency Coordination of Scientific and Engineering User Facilities

4.1. Specifics: The NSTC should establish interagency working groups, as needed, to address issues related to stewardship of user facilities when several agencies are involved.

Through Federal government support, major scientific and engineering user facilities that could not be afforded or justified by individual investigators or research institutions are created and operated because they provide unique capability often serving a range of disciplines or applications. The United States today has several major scientific facilities that in many fields define the cutting edge.

Many of these facilities are located at Federal laboratories, and the creation, operation, and management of the facilities are part of the mission for these laboratories. Qualified investigators and their students are provided access, based on the scientific and technical quality and priority of their proposed use, and also on the extent to which that research requires the unique capabilities of the facility. Increasingly, the users and uses of these facilities represent a broader scientific and engineering frontier (and set of sponsors) than is encompassed by the mission(s) of the Federal agency funding facility operations. As budgets and priorities within the sponsoring agency change, however, they may affect the availability of a user facility in a manner that is not well coupled with its broader value. This issue becomes particularly acute when the owning agency has major budget pressures or loses user share and cannot justify the continuing costs, even though the greater national good might be served. One example is the increasing use of synchrotron radiation and neutron sources for biomedical research, where funding and usage are growing for NIH-supported investigators, yet the facility sponsors (DOE, NSF, and NIST, in this case) have tight and sometimes declining budgets and different primary missions. The proposed working groups should consider such mechanisms as involving all the affected agencies in decision making and priority setting, seeking international and/or state, local, or private-sector partnerships, and/or using Memoranda of Understanding (MOU) to define cost-sharing approaches,

Proposed working groups could address the following issues:

- Obtaining adequate resources for the upgrade and operation of existing facilities, to serve a growing or evolving user community;
- Creating, maintaining, and upgrading user stations and instrumentation, and providing high-quality support to users;

· Justifying and obtaining resources to create a new facility that serves several agencies and missions, but isn't the top priority for any one or is too costly to justify the investment by one agency.

4.2. Expected Benefits: The development of useful principles for cost sharing, sponsorship and ownership of instrumentation and facilities that takes into account interests and needs beyond the purview of the sponsoring agency should result. The efforts of the proposed IWGs should also lead to increased awareness of the scientific and engineering user facilities, their capabilities, and how to gain access. The composite effect should improve S&T excellence, utilization of capabilities, productivity, and cost effectiveness.

4.3. Stakeholders: Users of facilities want convenient timely access, high availability, good support, and maximum operations. Sponsoring agencies facing budget pressures have problems balancing facilities' support with other program priorities, such as research. Facility operators want adequate and predictable budgets, simple administrative interfaces with their users and sponsors, and prompt publication by users of their results. Agencies sponsoring users want reliable operations and capabilities that allow the research they are sponsoring to be completed in a timely manner with the lowest possible overheads and administrative burdens.

4.4. Examples of Best Practice: NASA and DOD recently entered into an agreement to manage their aeronautical test facilities jointly. DOE and NSF have for many years used one shared advisory committee for their nuclear physics programs and facilities. In 1998 OSTP convened an NIH-led working group involving DOE, NIH, NSF, and NIST program managers to coordinate priorities to support structural biology uses of existing synchrotron light sources.

4.5. Strategy and Steps to Implement: The Associate Director for Science of OSTP should establish interagency working groups, as needed, to develop frameworks for creating, maintaining, upgrading, managing, accessing, and funding scientific and engineering user facilities serving needs broader than those of the sponsoring agency. Agencies sponsoring facilities, those sponsoring users, and OMB should be represented.

4.6. Likelihood of Success: Focused interagency discussion could yield an agreement on viable principles and mechanisms for improving access to and optimizing management of the considerable collection of scientific user facilities, most of which are located at and managed by Federal laboratories. It is possible that other scientific infrastructure assets, not currently managed and made available as user facilities, may be more effectively utilized in this mode. Likelihood of success is high, and a framework should be able to be developed within less than a year.

## Proposal 5. Increase Awareness of the Core Competencies, Facilities, and Capabilities of Federal Laboratories

5.1. Specifics: To increase awareness of the core competencies, facilities, and capabilities of federal

laboratories, the NSTC should establish a dependable mechanism to make widely available up-to-date information about the resources, facilities, core competencies, and capabilities of the Federal laboratories, major scientific facilities, and intramural research organizations. Agencies and laboratories should take the initiative to make information about their assets widely available in a useful and accessible form.

5.2. **Expected Benefits:** Awareness of and access to information is a prerequisite to effective coordination and optimized utilization of such a large and complex resource as Federal R&D infrastructure. Improved and broad awareness can also support priority setting and decision-making that crosses agency lines.

5.3. **Stakeholders:** Stakeholders include all agencies with R&D assets or needs, Congress, OMB, OSTP, the university community, industry, international partners, educators, and Federal laboratory and facility management and staff. All stakeholders would generally support having access to such information. Those providing and maintaining it, however, will do so only if they believe the benefits will exceed the effort and costs involved.

5.4. **Examples Of Best Practice:** Virtually every agency and laboratory now maintains information about itself on the World Wide Web. Much of the information envisaged in this proposal is accessible through the Web, but those who need specific information may have difficulty finding it. In addition, some interagency groups maintain web pages with links to laboratory information. Examples are the "Major Facilities Inventory" (<http://facility.hq.nasa.gov/>) operated by NASA, DOD, DOE, NOAA, and the FAA, for those seeking aerospace R&D facilities; and the Web site of the Federal Laboratory Consortium (<http://www.fedlabs.org/index.html>), for those seeking technology partnerships with the Federal laboratories. Accessible through the White House Web page, the President's biannual report to Congress on S&T is available at (<http://www.whitehouse.gov/WH/EOP/OSTP/SNT/>). This report links in a natural way to many other websites containing more detailed and updated information about science and technology accomplishments and programs sponsored by the Federal government.

5.5. **Strategy And Steps To Implement:** The NSTC should establish as a goal, that agency, laboratory and facility web pages provide current information about their resources, facilities, core competencies and capabilities. The Web pages should be upgraded to provide specific types of information in a form readily locatable using the standard commercial Web search engines and browsers. Certain standard types of information useful for arranging R&D partnerships and access should be available through Web pages. Mutual hyperlinking should be implemented among the Web pages of related sites and facilities. A user-friendly mechanism for collecting customer feedback and using it to guide continuous improvement of the Web resource should be implemented.

Agencies should propose, in their GPRA performance plans, measures of how well their Web pages inform potential users about the R&D capabilities they provide and the R&D facilities they manage. The NSTC should provide entry points to the Web network of Federal laboratory information through its own Web page.

In addition, an annual or biannual Federal laboratory "expo" could provide a forum in which agencies and their laboratories can interact, share ideas and solutions to problems, focus on specific, timely, high-profile topics, and learn about each others' capabilities. Organization and sponsorship of the "expo" could rotate among agencies, assisted by a small, multiagency program committee.

Major national professional societies, such as the American Association for the Advancement of Science, could be encouraged to include sessions at their annual meetings that highlight Federal laboratories and promote greater integration and awareness among the labs, academia, industry, and other stakeholders.

5.6. Likelihood of Success: In the past the government has created specialized systems or databases that haven't managed to achieve uniformly high-quality or self-sustainability. To avoid this problem, it is preferable to use or adapt existing systems and mechanisms and to educate the information providers on what the customers need and how providing this information in a convenient way is of value to them. No laws need to be changed; no major policies need to be developed. With a minimum of guidance, grass-roots implementation could occur at low cost over several months. Alternatively, the President could proclaim an annual government-wide Web Day where every government-provided Web page is reviewed and updated. Academic and industrial organizations could be exhorted to participate, as well. It will be important to establish feedback loops that keep customers and providers in tune with each other, promote the implementation of appropriate hyperlinks, and keep the information current and accurate.

#### Proposal 6: Provide Multiyear Funding to Improve the Management and Conduct of Multiyear Research Projects and Large Equipment Purchases

6.1. Specifics: Multi-year funding commitments are important to improve the management and conduct of multi-year research projects. Barring a change in the budget law to appropriate funds for more than one year, agencies should work with OMB to maximize the flexibility they have.

For many years the advantages of multiyear funding for management and conduct of research have been stated, recently in a bill introduced to the Senate. Most intramural R&D projects, programs and large-equipment purchases cannot be accomplished within the 12 months of one fiscal year. Yet for most intramural and Federal laboratory research programs, funds are provided only in 1-year allotments, and must be obligated in the year in which they are appropriated. Grants are often made by agencies to academic researchers to cover several years. In some cases the full grant is given in the first year. In most cases the actual amount of the grant in any specific year is dependent upon the budget actually passed by Congress. This situation in research contrasts with building and facilities (B & F) appropriations, which are typically multiyear.

Multi year funding for research would encourage efficient and effective management by allowing researchers to plan the full duration of the work, not just each year's phase. It would avoid end-of-fiscal-year adjustments in activity level and priorities, purely driven by near-term cash-flow issues (both cutbacks and extra spending). Furthermore, multiyear funding would provide a strong incentive to

increase the efficiency of investments, since funds could be utilized in future fiscal years to support continuing task-related work. The proposal would allow individual agencies to carry over funding for specific intramural research programs, projects, and large equipment purchases. A reasonable limit on the amount of carry-over authority could be specified (e.g. 20 percent of the appropriation), along with the maximum duration of any commitment (e.g. up to 5 years).

6.2. Expected benefits: Multiyear funding could allow more deliberate management and staffing, optimized for the duration of the multiyear R&D effort, rather than focused on each 12-month time interval. Money saved by avoiding annual (or more frequent) replanning and budget justification could be invested in people and equipment needed to achieve scientific excellence. Funds would continue to be available for the projects, programs and purchases for which they were designated, rather than lapsing or being reprogrammed every October. Delays in inaugurating projects, sometimes essential because of changes in technology, would not result in wasted effort or default termination of projects. Multiyear funding would also discourage last minute end-of-year expenditures, which might not be thoroughly thought out, and would reward efficiencies by allowing the Federal laboratory to utilize funds for its approved research programs that would otherwise lapse.

6.3. Stakeholders: Federal intramural scientists and managers, OMB, OSTP, congressional authorizing and appropriations committees are stakeholders. The scientists and managers are eager to obtain the few-year budget stability this proposal would allow and to reduce their workload associated with writing and reviewing proposals and with replanning work to accommodate changes in funding. Most agencies would view this proposal as a powerful tool to enhance management of research activities at their laboratories. The desirability of budget stability and of reducing the overhead associated with the entire budgeting and appropriations process has stimulated calls to convert to a biennial Federal appropriations cycle, which would provide more budget stability for all government functions. This change has been hard to achieve politically, and, even after many tries, has not yet happened. In this context, it may be hard to convince OMB and Congress to allocate and manage funding for Federal R&D programs differently from other programs, unless they can be convinced of the special factors that would justify such treatment.

6.4. Examples of Best Practice: The appropriation for the National Oceanographic and Atmospheric Administration (NOAA) is "no-year" money, making it available until it is obligated, without time limit. However, in practice, the agency spends its appropriations within a few years. Practical concerns include that its parent agency, the Department of Commerce (DOC), may reallocate unobligated funds to other programs, that OMB may reapportion carryover funds to other priorities, and that Congress tends to use unobligated balances as an offset against future appropriations.

DOD and NASA also have authority contained within their appropriations budgets for multiyear funding of large projects, but not for operations and maintenance (which includes in-house personnel costs). In practice, in DOD 80 percent of R&D funds are spent within the year in which they are appropriated. DOD also has some "revolving funds" which are funds without fiscal year or "color," i.e., they are undesignated and can be used for intramural R&D for an indefinite period of time.

The National Institutes of Health (NIH) have authority in their appropriations bill for 2-year funds to support activities at the Clinical Center. This authority is part of a re-invention authority to help re-invigorate clinical research at the NIH and improve efficiency of operation of the Clinical Center. This authority was used successfully in FY 1998 to invest funds saved from improved operations of the Clinical Center in new clinical research activities, consistent with congressionally approved missions.

In addition, DOE has some no-year monies, the Biological Resources Division of the U.S. Geological Survey (USGS) in the Department of the Interior (DOI) has 2-year monies, and the Environmental Protection Agency (EPA) has 2-year monies for S&T.

6.5. Strategy and Steps to Implement: The NSTC should advocate the desirability of multiyear funding for R&D tasks at Federal laboratories. The OMB would have to determine what the current statutory flexibility is, and develop the management framework specifying the procedures, applicability, limits, and controls within which agencies could make multiyear commitments to R&D projects at their laboratories. In so far as presently permitted by law, agencies should adopt a working capital fund approach to allow multiyear funding where necessary. Individual congressional committees for different agencies will need to include within the authorization and appropriations bills, provisions to enable this proposal. Alternatively, the Administration could draft legislative proposals and work with Congress to enact government-wide changes to the appropriations process and/or the fiscal controls on appropriated funds.

6.6. Likelihood of Success: The likelihood of success is substantial for individual R&D projects, since related authority has already been granted to several Federal agencies. Working with OMB, each agency would need to define the management framework and controls and to identify criteria for eligibility. Implementation could be accomplished either government wide or on a case-by-case basis by OMB and the congressional appropriations committees as part of the normal budget process and cycle. In the event that Congress decides to convert from an annual to a biennial appropriations cycle, there would be considerable benefits for the management and conduct of R&D at Federal laboratories.

### **III. IMPLEMENTATION AND TRACKING**

The NSTC recommends that the President issue a Decision Directive or Executive Order on Federal laboratories that would apply to all S&T agencies. In parallel, NSTC should publicize these recommendations throughout the participating agencies, with agencies asked to identify a champion for each applicable action proposal. Depending on the proposal, the champions would either work as agents for change within the agency or collectively across the government. In any case, NSTC should provide an interagency forum for these champions to exchange information on progress, frustrations, and lessons learned.

In addition, each agency should consider the missions, roles, and effective management of its laboratories in its agency-wide strategic planning and goal setting . To establish specific goals and

measures associated with improving the scientific quality, productivity, and management of the Federal laboratories agencies could elect to use the mechanisms provided by the GPRA. Appropriate action should be taken, if needed, to re-energize or reinforce continuous improvement.

#### **IV. BACKGROUND AND CONTEXT FOR FEDERAL LABORATORY REFORM**

Federal investments in forefront S&T are central to the capacity of the United States to continue to improve our economic prosperity, health, quality of life, and national defense. Thus, the Federal government spends nearly \$80 billion per year on R&D of all types. Over half of this amount (about \$45 billion) represents what the National Research Council has proposed calling the Federal Science and Technology (FS&T) budget, a bona fide investment in increasing knowledge and catalyzing innovation of broad applicability. The major R&D performers of Federal S&T include academic institutions, Federal agencies and laboratories, nonprofit research institutions, and industry. Together academic institutions, Federal agencies, and Federally Funded Research and Development Centers (FFRDC) receive about 70 percent of FS&T funds. Since these are public funds, the government is responsible to maximize the research progress per Federal S&T dollar.

Although R&D fared well in the President's budget request and in the appropriations bills for FY 1999, the outyear funding prospects remain constrained by the historic bipartisan Balanced Budget Agreement of August 1997. Whatever the Federal funding outlook for S&T might be, one important challenge is to increase the cost effectiveness of these Federal investments as a component of our strategy to ensure the global competitiveness and leadership of the nation's S&T enterprise, along with R&D's continuing benefits to the economy.

During its first term, the Clinton/Gore Administration began to review and reform the Federal S&T system with the goal of realizing greater service to the nation at a lower cost. One focus is on improving the government's partnership with universities, which receive about 30 percent of FS&T funds, while simultaneously educating the next generation of scientists and engineers. This IWG on Federal Laboratories was charged to conduct a parallel effort focused on improving the cost-effectiveness, productivity and scientific quality of the Federal laboratory system. This scope includes agency intramural research, research performed at national laboratories or other FFRDCs, and the provision and operation of major, shared federally funded scientific user facilities. Together these performers receive about 40% of the FS&T investment.

One premise underlying the work of this IWG is that the "diversity of Federal sources of research funding and the rich variety of institutions and organizations conducting the research are two of the strengths contributing to U.S. leadership across the scientific frontiers." The Federal laboratories, intramural research organizations, and federally funded scientific user facilities are thoroughly integrated into America's science enterprise in their mission areas. Rich in human talent and science and engineering capability, these research organizations are internationally renowned in their own right or for unique, state-of-the-art scientific instruments, operated for and made available to the scientific community. Although created several decades ago to serve national needs at that time, these

organizations must continue to play important roles serving evolving national needs in the years ahead. Each agency's progress and ability to serve the taxpayer will continue to depend on advancing the knowledge base required to support increasingly complex and technology-based mission needs.

## Recent History of Federal Laboratory Reform

The Presidential Review Directive (PRD/NSTC-1) of May 5, 1994, established the Interagency Federal Laboratory Review focusing upon the government's three largest laboratory systems—those operated by DOD, DOE, and NASA. These agencies each had major separate reviews of their laboratory systems already underway. In September 1995, based on the results of these reviews and the Interagency Federal Laboratory Review conducted by NSTC, the President issued a Presidential Decision Directive (PDD/NSTC-5), Guidelines for Federal Laboratory Reform. This Directive instructed the affected agencies to streamline management and oversight of their laboratories, focus laboratory missions, and coordinate laboratory resources and facilities. The overarching goals were to improve the productivity and cost effectiveness of the Federal laboratories, while maintaining or enhancing scientific leadership and excellence.

In the summer of 1996, the Assistant to the President for Science and Technology asked the staff of the OSTP to work with DOD, DOE, NASA and the OMB to assess the status of the reform effort. The study was completed in spring 1997, and the resulting report concluded that these agencies and their laboratories were making progress. Nonetheless, substantially more remained to be done to meet the President's goal of making government work better and cost less.

The Status report made eight recommendations focused on enhancing scientific and technical excellence; streamlining management and improving productivity; and reducing barriers to interagency cooperation and optimum utilization of laboratory capabilities to address national needs. The ninth recommendation urged OSTP and NSTC to broaden the reforms to include all agencies that operate Federal laboratories and/or conduct substantial intramural research programs. This recommendation set the stage for this IWG. Despite differences in mission and structure, Federal S&T agencies face common challenges, particularly relating to personnel, regulatory, and management issues.

In the summer of 1997, the Assistant to the President for Science and Technology established the NSTC IWG on Federal Laboratories to address the recommendations of the Status report, to review barriers to reform, to share lessons learned across government, and to develop and implement an action plan to move the reform process forward in all science and technology agencies. Appendix A lists the participating agencies and their designated representatives. Appendix B presents in summary form the recommendations from the Status report. Appendix C provides a glossary of acronyms used in this report.

The IWG met monthly and formed task groups, which worked between meetings to identify the issues and develop action proposals. During the process, IWG members from the participating agencies shared their agency's experiences, problems, solutions, and successful practices. Indeed, each representative

brought special insight to the task group and to the IWG as a whole. One real-time benefit was the opportunity to learn from each other how rich and varied the agencies and laboratories are, and to see how some agencies or laboratories, within existing law, had implemented practices that support R&D excellence and cost-effectiveness. By combining these experiences and perspectives, the IWG identified the six proposals presented here, as ones that are both important and achievable. When implemented, they will help the Federal laboratories save costs, increase productivity, maintain or enhance research quality, achieve agency missions, and contribute to the national goal of maintaining leadership across the frontiers of knowledge.

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## APPENDIX A

### LIST OF PARTICIPATING AGENCIES, REPRESENTATIVES, AND WEB SITES

Arms Control & Disarmament Agency (ACDA) <http://www.acda.gov>

Sallie Mullen (effective 1/98; Ambassador James Sweeney through 12/97)

<http://www.dtic.mil/npac> to access the Nonproliferation and Arms Control Technology Working Group (NPAC TWG)

Central Intelligence Agency (CIA) <http://www.odci.gov/cia>

John Corkill  
Office of Deputy Director for Science & Technology

Department of Agriculture (USDA) <http://www.usda.gov>

Mitch Geasler  
Office of the Under Secretary for Research, Education and Economics

Department of Commerce (DOC) <http://www.doc.gov>

Alan R. Thomas  
Deputy Assistant Administrator for Oceanic and Atmospheric Research  
National Oceanic and Atmospheric Administration (NOAA)

Eugene S. Fritz, Alternate

Director of Programs, Oceanic and Atmospheric Research, NOAA

<http://www.oar.noaa.gov> to access NOAA's Environmental Research Laboratories

<http://www.nmfs.gov> to access NOAA's National Marine Fisheries Service Laboratories

<http://www.nist.gov> to access NIST Laboratories

Department of Defense (DOD) <http://www.defenselink.mil/>

Lance A. Davis

Deputy Director, Defense Research & Engineering

Mark Paulson, Alternate

James F. Donnelly, Alternate

<http://www.htic.mil/labman> to access information about DOD's laboratories.

Department of Education (DOE) <http://www.ed.gov/>

Robert Stonehill

Director, State & Local Support

[http://www.ed.gov/prog\\_info/Labs/](http://www.ed.gov/prog_info/Labs/)

Department of Energy (DOE) <http://www.doe.gov>

Michael Knotek (from 2/98; Skila Harris from 11/97 to 2/98; David Cheney through 10/97)  
Special Assistant to the Under Secretary

David Goldman, Alternate (through 1/98)

Skila Harris, Alternate (from 2/98)

Department of Health & Human Services (HHS) <http://www.dhhs.gov/>

Michael Gottesman

Deputy Director for Intramural Research, National Institutes of Health (NIH)

Richard G. Wyatt, Alternate

Executive Director, Office of Intramural Research, NIH

<http://www.nih.gov> to access information about NIH.

Department of Interior (DOI) <http://www.doi.gov/>

Marguerite Kingston

Special Assistant to the Chief Geologist, United States Geological Survey (USGS)

<http://www.usgs.gov> to access information about the USGS

Department of Labor (DOL) <http://www.dol.gov/>

Emily Sheketoff

Deputy Assistant Secretary

Alphonse Abadir, Alternate

Office of Science and Technology Assessment, Occupational Safety & Health Administration (OSHA)

<http://www.osha.gov> to access OSHA

Department of Transportation (DOT) <http://www.dot.gov/>

Fenton Carey

Associate Administrator for Research, Technology, and Analysis

John Hohl, Alternate

Technology Sharing Officer, Research, Technology, and Analysis

<http://scitech.dot.gov/> to access information about DOT's science and technology programs

Department of Veteran Affairs (VA) <http://www.va.gov/>

David Wolff

Associate Director, Medical Research Services

William Pare, Alternate

Maryland HCS, Perry Point

<http://www.va.gov./resdev/>

Environmental Protection Agency (EPA) <http://www.epa.gov/>

Henry L. Longest

Acting Assistant Administrator for R&D

Sidney Draggan, Alternate

<http://www.epa.gov/ORD/offices.htm> to access information about EPA's R&D programs

National Aeronautics & Space Admin. (NASA) <http://www.nasa.gov>

H. Lee Beach, Jr. (Through 7/98; Ed Gabris starting 8/98)  
Deputy Director, Langley Research Center

Raymond L. Walters, Alternate (Through 4/98)  
Langley Research Center

National Science Foundation (NSF) <http://www.nsf.gov>

David Berley  
Program Manager for Laser Interferometer Gravity Wave Observatory (LIGO)  
Directorate for Mathematics and Physical Sciences

National Partnership for Reinventing Government (NPR) <http://www.npr.gov/>

Tina Sung  
Federal Quality Consulting Group (FQCG)

John Gaff, Alternate

<http://www.fqcg.gov/> to access the FQCG

Office of Management & Budget (OMB) <http://www.whitehouse.gov/WH/EOP/OMB/html/ombhome.html>

Robert Civiak  
Policy Analyst, Energy Branch

Office of Science & Technology Policy (OSTP) <http://www.whitehouse.gov/OSTP>

Beverly Hartline  
Assistant Director for Physical Science & Engineering

National Science & Technology Council (NSTC)

Joan Porter (Angela Phillips Diaz through 1/98)  
Executive Secretary

Miriam A. Forman (through 6/98)  
NSTC Agency Representative

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## **APPENDIX B**

### Summary of Recommendations of the Working Group on Federal Laboratory Reform

To enhance scientific and technical excellence:

1. Existing laws, regulations, and executive guidance must be reviewed and modified to enable agencies and their laboratories to implement personnel practices that promote scientific competence and renewal in the workforce, especially at the government-operated laboratories.
2. Performance measures (quantitative, qualitative, and peer review) tailored to the unique character of R&D should be developed and implemented to assess research quality, importance, and laboratory productivity. (Reference: Assessing Fundamental Science and the Government Performance and Results Act.)
3. Incentives should be developed to reward agencies and laboratories for initiatives that preserve or enhance programmatic excellence and productivity while reducing costs.

To streamline management and improve productivity:

4. Intensified agency leadership at the highest levels is needed to ensure that the intentions of the reform process are reflected in day-to-day operations and in requirements on the laboratories.
5. Laws and regulations on any subject that impede laboratory reform should be reviewed to identify candidates for repeal or modification.
6. The number and length of agency-specific regulations, directives, and procedures should be reduced to the absolute minimum necessary for safe, effective, and efficient operations. They should describe desired outcomes, and set standards, but not mandate specific approaches.
7. The Administration and Congress should conduct a pilot project to fund R&D tasks at the laboratories on a multi year basis, to eliminate inefficiencies built into annual funding.

To improve utilization of laboratory capabilities to address national needs:

8. The NSTC should examine further and propose ways to reduce the legal, financial, institutional, and cultural barriers to optimum utilization of laboratory capabilities to promote greater cooperation among all federal agencies and laboratories and with the industrial and academic sectors.

Next Step

9. The NSTC should establish an interagency working group on federal laboratories to address these recommendations, review barriers to laboratory reform, share lessons learned across government, and develop and implement an action plan to continue the reform process.

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## APPENDIX C

### Glossary of Acronyms

BEA Budget Enforcement Act  
B&F Buildings and Facilities  
CBO Congressional Budget Office  
CDC Center for Disease Control and Prevention  
DOC Department of Commerce  
DOD Department of Defense  
DOE Department of Energy  
DOI Department of Interior  
DOT Department of Transportation  
ED Department of Education  
EPA Environmental Protection Agency  
FAA Federal Aviation Administration  
FFRDC Federally Funded Research and Development Center  
FQCG Federal Quality Consulting Group  
FS&T Federal Science and Technology  
GOCO Government Owned, Contractor Operated  
GPRA Government Performance and Results Act  
GSA General Services Administration  
HHS Department of Health and Human Services  
IWG Interagency Working Group  
NASA National Aeronautics and Space Administration  
NIH National Institutes of Health  
NIST National Institute of Standards and Technology  
NOAA National Oceanographic and Atmospheric Administration

NPR National Partnership for Reinventing Government  
NRC Nuclear Regulatory Commission  
NSF National Science Foundation  
NSTC National Science and Technology Council  
OMB Office of Management and Budget  
OPM Office of Personnel Management  
OSHA Occupational Safety and Health Administration  
OSTP Office of Science and Technology Policy  
PDD Presidential Decision Directive  
PEP Performance Evaluation Profile  
PRD Presidential Review Directive  
R&D Research and Development  
S&E Scientists and Engineers; scientific and engineering  
S&T Science and Technology  
US United States  
USDA Department of Agriculture  
USGS US Geological Survey  
VA Department of Veterans Affairs  
VPP Voluntary Protection Program  
WCF Working Capital Fund  
WWW World Wide Web