

## ADMINISTRATION HISTORY PROJECT

Office of Science and Technology Policy  
National Science and Technology Council  
President's Committee of Advisors on Science and Technology

The years of the Clinton Administration have been a period of notable growth and accomplishment for the U.S. science and technology (S&T) enterprise. Under the leadership of Dr. John H. Gibbons (1993-1998) and Dr. Neal Lane (1998-2000), the Office of Science and Technology Policy (OSTP), the National Science and Technology Council (NSTC), and President's Committee of Advisors on Science and Technology have advised the President on a wide range of S&T issues and have coordinated development of pathbreaking S&T policies and budgets. The activities of OSTP, NSTC, and PCAST have been captured in numerous publications, which are provided as attachments to document these organizations' achievements. A copy of the OSTP Worldwide Web site as it existed on December 1, 2000, which includes the publications and additional information about OSTP, NSTC, and PCAST, is also attached.

### Attachments

1. Summary of Accomplishments for FY 1993
2. Summary of Accomplishments for FY 1994
3. Summary of Accomplishments for FY 1995
4. Summary of Accomplishments for FY 1996
5. Summary of Accomplishments for FY 1997
6. Summary of Accomplishments for FY 1998
7. Summary of Accomplishments for FY 1999
8. Catalogue of Publications
9. Publications
10. CD Rom Snapshot of the 12/1/00 OSTP Worldwide Web Site

**SUMMARY OF ACCOMPLISHMENTS IN FY 1993**  
**Office of Science and Technology Policy**  
**National Science and Technology Council**  
**President's Committee on Advisors on Science and Technology**

The Clinton Administration treats science and technology as high-leverage investments in America's future. Investments in S&T contribute to: a growing economy with more high-skill, high-wage jobs for American workers; a cleaner environment where energy efficiency, information technology, and advanced chemistry increase profits and reduces pollution; a stronger, more competitive private sector able to maintain U.S. leadership in critical world markets; an educational system where every student is challenged; and an inspired scientific and technological research community focused on ensuring not only our national security but quality of life for ourselves and our children. The most important measure of success will be our ability to make a difference in the lives of the American people, to harness science and technology to improve the quality of life and the economic strength of our nation.

The Office of Science and Technology Policy (OSTP) supports these objectives by: providing authoritative scientific and technological information, analysis, advice, and recommendations for the President, for the Executive Branch, and for Congress; participating in the formulation, coordination, and implementation of national and international policies and programs that involve science and technology; maintaining and promoting the health and vitality of the U.S. science and technology infrastructure; and coordinating research and development efforts of the Federal government to maximize the return on the public's investment in science and technology and to ensure that resources are used efficiently and appropriately.

The Director of OSTP also serves as Assistant to the President for Science and Technology and, in that capacity, supports the activities of the President's National Science and Technology Council (NSTC), created November 23, 1993, by Executive Order. The NSTC has responsibility for:

- coordinating the science and technology policy making process;
- ensuring science and technology policy decisions and programs are consistent with the President's stated goals;
- helping to implement and integrate the President's science and technology policy agenda across the Federal government;
- ensuring science and technology are considered in development and implementation of all Federal policies and programs; and
- furthering international cooperation in science and technology.

OSTP also supports the President's Committee of Advisors on Science and Technology, which advises the President and the NSTC. The following pages summarize the activities of these organizations during Fiscal Year 1993.

## Accomplishments of the Office of Science and Technology Policy

During FY 1993, OSTP reorganized to incorporate President Clinton's mandate to: 1) redirect the Federal effort in science and technology toward national goals; and 2) streamline White House operations. OSTP, still functioning at its FY 1992 staffing level, now fulfills its statutory responsibilities as well as the staff responsibilities of the National Space Council and the National Critical Materials Council. OSTP's new structure reflects this Administration's science and technology priorities.

A Senate-confirmed Associate Director heads each of OSTP's four divisions. The **Technology Division** also includes an Assistant Director for Technology and provides the administrative base for an Assistant Director for Aeronautics and Space who calls on the resources of each Division to fulfill his responsibilities. The **Science Division** includes an Assistant Director for Health and Life Sciences, an Assistant Director for Physical Sciences and Engineering, and an Assistant Director for Social and Behavioral Sciences. The **Environment Division** has an Assistant Director for Environment, and the **National Security and International Affairs Division** has an Assistant Director for International Affairs and an Assistant Director for Science and Security. Each division has a small, multidisciplinary staff, and cross-cutting issues are managed in matrix fashion.

OSTP's Director testified before Congress over twice a month in 1993, including the following statements:

" Technology for America's Economic Growth: A New Direction to Build Economic Strength," before the House Committee on Science, Space, and Technology

" Renewable Energy Resources," before the Senate Subcommittee on Toxic Substances, Research and Development; Committee on Environment and Public Works

" Global Change," before the Senate Committee on Energy and Natural Resources

" Information Infrastructure and the High Performance Computing and High Speed Networking Applications Act of 1993," before the House Committee on Science, Space, and Technology

" The Administration's Technology Policy and Small Business," before the House Committee on Small Business

" The Technology and Industrial Base Needed for National Security," before the Subcommittee on Defense Technology, Acquisition, and Industrial Base of the Senate Committee on Armed Services

" New Environmental Technologies," before the Senate Committee on Environment and Public Works

" Space Station Redesign," before the Subcommittee on Veterans' Administration, HUD, and Independent Agencies of the House Committee on Appropriations

" Administration's Technology Initiatives," before the Joint Economic Committee

" Environmental Technology," before the Subcommittee on Technology, Environment, and Aviation of the House Committee on Science, Space, and Technology

"The Superconducting Supercollider," before the Senate Committee on Energy and Natural Resources

"The Gore-Chernomyrdin Agreements," before the Subcommittee on Space Science and Applications, House committee on Science, Space, and Technology

The Associate Director for Technology also testified, on dual use technologies, before the Subcommittee on Science, House Committee on Science, Space, and Technology.

The Director and staff also played key roles in screening, recruiting, and interviewing candidates for subcabinet posts in Departments and Agencies with responsibilities for science and technology programs.

During its first months in action, the "new" OSTP led White House efforts on several issues of critical national and international concern, including:

#### Implementing the Technology Initiatives

OSTP, working closely with the National Economic Council, produced, for the President and the Vice President, one of the seminal documents of the Clinton Administration: Technology for America's Economic Growth: A New Direction to Build Economic Strength. This document heralds a new era of cooperation between the public and private sectors in achieving national goals and clearly evinces our intention to use the Federal investment in science and technology to further those goals. We have established interagency efforts to address issues of major concern, such as: defense reinvestment and conversion; patient capital and technology financing; Federal support for manufacturing research;

technology for education and training; government infrastructure; space and aeronautics; partnerships between the National Laboratories and industry; and basic sciences.

One early success story in the technology plan is the Information Infrastructure Task Force (IITF), which is charged with forging the Administration's policy on telecommunications and information. The task force developed an integrated federal policy framework to support a plan for a national information infrastructure. This plan will promote private research and investment in a system capable of vastly improving the way information is communicated, stored, and processed in the United States. In 1993, the plan led to improvements in: 1) management of the radio frequency spectrum; 2) the framework for protecting intellectual property; 3) access to government information; and 4) coordination of Federal, State, and local regulatory activities.

OSTP, working closely with the Department of Commerce and other agencies, has spearheaded an effort to establish a new cooperative relationship with the automobile industry. Specifically, a major initiative was undertaken early in the Administration's tenure to develop an understanding with car manufacturers and related businesses that would enable joint pursuit of long-term research and development programs leading to a "clean car" -- one that would provide the amenities we enjoy, such as comfort, safety, and performance, and produce little or no pollution. In September 1993, the President signed an agreement with the CEO's of the Big 3 automakers to jointly pursue a research agenda for a car 3-times as fuel efficient as today's that can help eliminate pollution and dependence on foreign oil imports while capturing markets for environmentally sound technologies here and abroad.

### Defense Conversion

OSTP participated in reorganization of the Advanced Research Projects Agency at the Department of Defense and helped launch the Technology Reinvestment Project (TRP) to stimulate the public and private sector transition from defense to dual use technologies that have both military and civilian applications. The TRP is an integrated effort by 6 government agencies. The Federal Government received TRP proposals from teams representing more than 12,000 companies, universities and local governments. Significantly, proposals totaling over \$8.5 billion in matching private funds were received in competition for a relatively modest federal investment of \$470 million.

### Redesigning the Space Station

Almost immediately upon assuming office, the Administration had to determine the merits of continuing the space station program. OSTP was instrumental in the decisionmaking process leading to the decision to redesign, rather than discontinue, the program, and to reconfigure NASA for more effective and efficient management and operations.

OSTP was the focal point for White House engagement in all phases of the redesign effort. Coordinating closely with the National Security Council, the National Economic Council, the Office of Management and Budget, and the Office of the Vice President, OSTP provided NASA with the broad policy guidance necessary to carry out the internal redesign effort, to incorporate the findings of the independent, blue-ribbon Vest Commission in its final redesign decisions, and, now, to implement those decisions with our international partners.

### Integrating Science and Technology with Environmental Policy

OSTP has made significant scientific and technical inputs to a number of key environmental actions. These include the President's Earth Day speech on the stabilization of greenhouse gas emissions; the development of the U.S. National Action Plan for greenhouse gas emissions; and the Northwest forest action plan. In addition, OSTP is playing a leadership role in the development of the 1994 World Meteorological Organization/United Nations Environment Program (WMO/UNEP) international ozone assessment, the 1994 WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) assessments, and the 1994 UNEP Global Biodiversity assessment.

OSTP has also established a senior-level interagency committee to provide an integrated science-technology-economics-policy interface. The committee is co-chaired by OSTP, the Office of Environmental Policy, and the Council of Economic Advisors and will function as a bridge between science and policy by developing integrated assessments of key environmental issues.

OSTP is committed to providing the leadership needed to revitalize the space programs essential to global climate change research. OSTP established an interface to NASA's Earth Observing System Data Information System (EOSDIS) and also provided support toward organization of a National Academy of Science panel on EOSDIS and assisted in writing the charge to Academy members and suggested that a Blue Ribbon panel be appointed to emphasize the importance of this issue.

The devastating floods along the Mississippi River and its tributaries generated a major effort by OSTP to insert environmental science and technology into post-flood plans to reclaim the flooded lands and reestablish the flood control systems. OSTP worked closely with OMB, the Office of Environmental Policy, and many Executive Branch agencies to ensure the Federal Government's rapid, compassionate responses did not unnecessarily foreclose any long-term options for wise redevelopment of the damaged areas. An interagency Scientific Assessment and Strategy Team was established to examine the scientific issues associated with short- and long-term flood recovery and to develop criteria for policy and funding priorities.

OSTP worked with other federal agencies to establish the Electric and Magnetic Fields Interagency Committee which was mandated by the Comprehensive National Energy Policy Act of 1992. After review of the legislation OSTP worked with the appropriate agencies to assign representatives, outline the committee program and products. Co-chairs from DOE and NIEHS were subsequently selected to carry out the mandated program as charged.

### Enhancing National Security

OSTP has contributed significantly to an examination of policies toward the Former Soviet Union where science and technology play a critical role. It has assessed the technical aspects of dismantlement of nuclear forces and testing of nuclear warheads, reviewed evolving technology transfer policies, assessed nonproliferation goals and strategies, and evaluated the Russian technical brain drain.

The post-Cold War environment has dramatic implications for U.S. intelligence resources. OSTP worked with the intelligence community to redirect resources toward changing requirements, including refocusing economic and S&T analyses and assessing capabilities of collection systems for use in environmental analysis, and to identify unique technologies and capabilities that may have commercial applications.

The Director of OSTP is responsible for managing the nation's telecommunications resources during wartime crises and non-wartime emergencies. OSTP works closely with the National Security Council, OMB, and the National Communications Systems to improve the readiness and effectiveness of the Federal Government response to telecommunications crises.

Military space operations are being shaped by the end of the Cold War and by the need for a closer relationship between defense, civil, and commercial space activities. OSTP is leading White House efforts to define national policy on space launch and excess ballistic missiles and continues to coordinate joint Department of Defense (DOD) and civil aerospace programs.

OSTP assists DOD in reorienting missile defense programs to address post-Cold War dangers. Policies are being implemented with the Ballistic Missile Defense Organization to technically prepare for third world ballistic missile threats.

OSTP established an interagency working group that prepared a U.S. position on space debris and space nuclear power. This position was accepted by the U.N. Committee on the Peaceful Uses of Outer Space.

### Promoting International Cooperation in Science and Technology

OSTP leads the White House effort to coordinate Federal support -- from the Department of State and a cluster of 20 technical agencies -- for international cooperation in science and technology. As part of this effort, OSTP has developed bilateral science and technology agreements. OSTP has actively participated in recent negotiations with Canada, Australia, the European Community and many of its members states, including Germany, France, and Italy. It successfully led the U.S. effort to conclude negotiations with Japan to renew for five years the key U.S.-Japan Science and Technology Agreement. Under OSTP leadership, model annexes on intellectual property rights were developed for S&T agreements, since adequate protection of such rights remain the most visible obstacles to concluding S&T agreements with our major partners.

OSTP led the White House effort to examine the character and magnitude of U.S. - Russian S&T interactions from the perspective of Federal agencies, the private for-profit sector, and academic and professional institutions, and to identify barriers affecting cooperation and propose solutions. It has promoted the use of Nunn-Lugar funds to support a Research and Development Foundation in Russia.

OSTP led successful negotiations for a new Science and Technology Agreement with Russia to promote bilateral S&T cooperation and support Russian reform process. Vice President Gore and Russian Prime Minister Chernomyrdin signed the new US-Russia S&T Agreement during their December meeting in Moscow, providing a new framework for S&T cooperation in the two countries. The agreement defines overall responsibility and procedures under which cooperative S&T activities will be supported, and provides for the full protection of any intellectual property that results from cooperative programs. The final agreement on the treatment of intellectual property represents an important advance in the bilateral relationship between the United States and Russia, and paves the way for cooperative activities not only in the areas of science and technology, but in virtually all fields of cooperation.

During the December meeting with Prime Minister Chernomyrdin, the Vice President proposed a joint study on strategies for shutting down the two remaining Russian military plutonium-production reactors still operating at Tomsk. These two reactors and a third near Krasnoyarsk are still operating -- nominally because they provide heat and electric power to the nearby populations. OSTP is coordinating White House response and providing technical analysis for the study.

In 1993, OSTP led efforts to renew the U.S.-Japan Agreement on Science and Technology. The 1988 U.S.-Japan Agreement on Science and Technology, the primary vehicle for coordinating S&T cooperation between the two countries, was due to expire in June, 1993. The Agreement was formally renewed in June for another five years following a

formal meeting of the U.S.-Japan Joint High Level Committee in May, reestablishing close ties between Japan and the U.S. in science and technology. S&T Cooperation with China was also reestablished in 1993. OSTP agreed to host the first meeting in five years of the Joint Committee under the U.S.-PRC Agreement on Science and Technology, tentatively scheduled to be held in mid-April 1994.

OSTP led U.S. efforts to promote international collaboration in large science programs through the OECD Megascience Forum. The OECD Megascience Forum in 1993 addressed issues in international collaboration, including means of improving coordination among nations, in the areas of astronomy, oceanic and continental deep drilling, global change research and oceanography. The U.S. hosted the experts meeting on global change research, and was a leader in discussions on deep drilling and oceanography. OSTP led the U.S. delegation to each of the Forum meetings.

Also within the OECD, OSTP led U.S. efforts in drafting a report by the Group of National Experts on Biotechnology Safety (GNE) on biofertilizers, plants, and food safety. GNE activities are the primary forum for international harmonization of biotechnology regulations. In the area of trade, OSTP has provided significant input to policy discussions concerning R&D subsidies and GATT negotiations.

OSTP implemented a review of U.S. Policy Toward Fusion Energy and the International Thermonuclear Experimental Reactor (ITER). The review included examination of the status of fusion technology, the site selection process for ITER, and the economic viability of fusion energy. This effort initiated the process of developing a recommendation for the President on the future of U.S. support for international fusion energy research programs.

#### Sustaining World Leadership in the Sciences

OSTP co-sponsored a forum in January 1994 to consider the future of science in the national interest. The purpose of the meeting was to provide background for science policy development and affirmation of the Administration's commitment to science, mathematics, and engineering. This commitment extends to education of a well-trained workforce and of a scientifically literate public. The effort built on the PCAST report "Renewing the Promise: Research-Intensive Universities and the Nation," which concluded that if the U.S. is to maintain its scientific and technological leadership, universities must adapt to the radical changes caused by the end of the Cold War, the emergence of a highly competitive global economy, and limited resources for the foreseeable future. It also incorporated findings of the report, "Trends in the Structure of Federal Science Support," prepared by the working group on the Structure of Science Support of the FCCSET Committee on Physical, Mathematical, and Engineering Science.

During 1993, OSTP worked with the scientific community and the government science agencies on a number of issues of national importance, including the B-factory, support of the Tevatron, the Advanced Nuclear Source, and other physical sciences initiatives. OSTP has also coordinated an interagency approach to merit-based support of research in universities located in states with small per capita federal funding of R&D. This has been predominantly through the Experimental Programs to Stimulate Competitive Research. An OSTP report on the issue has been influential in developing this response to the sense of regional inequity that contributes to the problem of earmarking research funds, which has grown from \$809 million in fiscal year 1991 to \$1.7 billion in fiscal year 1993.

### **The National Science and Technology Council**

On November 23, 1993, the President signed Executive Order 12881 establishing the National Science and Technology Council (NSTC). The President chairs the NSTC, and the membership includes: the Vice President; the Secretaries of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, the Interior, Labor, State, and Transportation; the Directors of the Office of Management and Budget and of the National Science Foundation; the Administrators of the Environmental Protection Agency and of the National Aeronautics and Space Administration; and several senior White House officials. Other departments and agencies participate in NSTC activities as appropriate, and, of course, the President can request any official's participation in full council meetings as needed. The NSTC merges and expands the responsibilities of the Federal Coordinating Council for Science, Engineering, and Technology, the National Space Council, and the National Critical Materials Council.

The Executive Order calls for all agencies to coordinate science and technology policy through the NSTC. In addition, the NSTC is specifically directed to develop recommendations on research and development budgets that reflect national goals and to provide advice to OMB concerning individual agencies' R&D budget submissions. This latter function has been the top priority during NSTC's first weeks. We have established R&D Coordinating Committees designed to enable us to produce, for the first time in the Federal Government's history, an R&D budget request that fully integrates the missions of the agencies and the overarching science and technology requirements of the Nation. NSTC Committees working on the Fiscal Year 1996 R&D budget request include:

- Health, Safety, and Food R&D
- Fundamental Science Research
- Information and Communication R&D

- Environment and Natural Resources Research
- National Security R&D
- Civilian Industrial Technology R&D
- Education and Training R&D
- Transportation R&D
- International Science, Engineering, and Technology R&D

Each committee operates with a Department Chair (or co-chairs), a White House Co-Chair, and a Department Vice-Chair. In the course of developing budget requests, the Committees will assist the NSTC in establishing priorities for research, in generating criteria for evaluating progress toward national goals for science and technology, and in refining those goals as science and technology evolve. NSTC's role in crafting R&D budgets that capitalize on agency strengths and eliminate waste and duplication in these stringent budget years is critical to the success of this Administration and to continued government support for research.

The NSTC's work on the R&D budget builds on the efforts of the FCCSET, which developed six interagency cross-cutting initiatives for the FY 1994 budget. These initiatives are in the following areas: (1) global change research; (2) high performance computing and communications; (3) science, mathematics, engineering, and technology education; (4) advanced materials and processing; (5) biotechnology research; and (6) advanced manufacturing technology. These FCCSET initiatives are an important part of the President's economic program and are an integral part of the President's overall strategy for science and technology.

In addition to coordinating the six R&D Initiatives, FCCSET published a number of reports in FY 1993, including:

An Overview of Federal Food Safety Research, Including Emerging Research Needs for the Future - A report of the Working Group on Food Safety Research of the Committee on Food, Agriculture and Forestry Research (January 1993). This report is the culmination of an intensive, two-year examination of the roles and activities of Federal agencies conducting, funding, or overseeing food safety research.

Federal Research Programs in Superconductivity - A report of the Working Group on Superconductivity of the Committee on Industry and Technology (January 1993). This document, the fifth in a series of reports which began in 1988, provides a comprehensive view of the federally-supported research and development in the areas of superconductivity and superconducting materials.

The Human Immunodeficiency Virus Vaccine Challenge: Issues in Development and International Trials - A report of the Working Group on HIV Vaccine Development and

International Field Trials of the Committee on Life Sciences and Health. The report provides a basis for making decisions about: 1) which candidate HIV vaccines to test; and 2) when and where to begin international field trials.

In the National Interest: The Federal Government and Research Intensive Universities - A report by the Ad Hoc Working Group on Research Intensive Universities and the Federal Government (December 1992). The report presents a joint perspective on the relationship between seventeen research-supporting Federal agencies and the Nation's research-intensive universities. The FCCSET report is a companion to the report of the President's Council of Advisors on Science and Technology (PCAST) titled Renewing the Promise: Research-Intensive Universities and the Nation. The FCCSET report makes a series of recommendations that are generally in consonance with those of the PCAST report.

Machine Translation Technology - A report of the Working Group on Machine Translation of the Committee on Industry and Technology (January 1993). This report highlights the major known translation needs and activities of intelligence, defense, and civilian Federal agencies.

National Atmospheric Sciences Program: Fiscal Years 1987-1990 - A report of the Subcommittee on Atmospheric Research of the Committee on Earth and Environmental Sciences (December 1992). This report describes the atmospheric sciences research programs of the agencies that are members of the Subcommittee on Atmospheric Research of the Committee on Earth and Environmental Sciences.

Pathways to Excellence: A Federal Strategy for Science, Mathematics, Engineering and Technology Education, FY 1994-1998 - A report by the Strategic Plan Working Group of the Committee on Education and Human Resources (January 1993). The report presents clearly identified, measurable milestones and objectives in seven program categories, deliverable between 1994 and 1998.

Title V Report - A central reference document that annually reviews illustrative international science and technology themes and provides a database on U.S. international S&T agreements (January 1993).

Trends in the Structure of Federal Science Support - A report by the Working Group on the Structure of Science Support of the Committee on Physical, Mathematical, and Engineering Sciences (December 1992). This report provides a novel profile of trends in research funding by the seven major research and development agencies of the Federal government. Focusing on selected themes such as support for individual investigators, research teams, centers, and research facilities, the descriptions presented provide an instructive complement to traditional program summaries and budget tables.

### **The President's Committee of Advisors on Science and Technology**

Also on November 23, 1993, the President established the President's Committee of Advisors on Science and Technology (PCAST) to:

- advise the President on matters involving science and technology; and
- assist the National Science and Technology Council in securing private sector involvement in its activities.

The direct link to the activities of the NSTC reflects our intention to incorporate advice from the private sector in developing the science and technology budgets and policies of this Administration and our intention to secure private sector advice on the implementation and evaluation of budgets and policies. PCAST will include the Assistant to the President for Science and Technology and luminaries from the private sector representative of the diverse perspectives and expertise in this Nation's investments in science and technology.

The new advisory committee is a successor organization to the PCAST that served President Bush. The members of the former PCAST met with then President Bush in December 1992 to present the following reports:

Achieving the Promise of the Bioscience Revolution: The Role of the Federal Government, Daniel Nathans, Chairman

High Performance Computing and Communications Panel Report, Solomon Buchsbaum, Chairman

Learning to Meet the Science and Technology Challenge, Peter Likins and Charles Drake, Co-chairmen

Megaprojects in the Sciences, John McTague, Chairman

Renewing the Promise: Research-Intensive Universities and the Nation, David Packard, Chairman, and Harold Shapiro, Vice Chairman

Science, Technology, and National Security, Solomon Buchsbaum and John S. Foster, Co-chairmen

Technology and the American Standard of Living, Ralph Gomory, Chairman

**SUMMARY OF ACCOMPLISHMENTS IN FY 1994**  
**Office of Science and Technology Policy**  
**National Science and Technology Council**

The Clinton Administration treats science and technology as high-leverage investments in America's future. Investments in S&T contribute to: a growing economy with more high-skill, high-wage jobs for American workers; a healthier population; a cleaner environment where energy efficiency, information technology, and advanced chemistry increase profits and reduce pollution; a stronger, more competitive private sector able to maintain U.S. leadership in critical world markets; an educational system where every student is challenged; and an inspired scientific and technological research community focused on ensuring our national security, on improving the quality of life for ourselves and our children, and on successfully meeting global problems through cooperation with other countries. The most important measure of success will be our ability to make a difference in the lives of the American people, to harness science and technology to improve the quality of life and the economic strength of our nation.

The Office of Science and Technology Policy (OSTP) supports these objectives by: providing authoritative scientific and technological information, analysis, advice, and recommendations for the President, for the Executive Branch, and for Congress; participating in the formulation, coordination, and implementation of national and international policies and programs that involve science and technology; maintaining and promoting the health and vitality of the U.S. science and technology infrastructure; and coordinating research and development efforts of the Federal government to maximize the return on the public's investment in science and technology and to ensure that resources are used efficiently and appropriately.

The Director of OSTP also serves as Assistant to the President for Science and Technology and, in that capacity, supports the activities of the President's National Science and Technology Council (NSTC), created November 23, 1993, by Executive Order. The NSTC has responsibility for:

- coordinating the science and technology policy making process;
- ensuring science and technology policy decisions and programs are consistent with the President's stated goals;
- helping to implement and integrate the President's science and technology policy agenda across the Federal government;
- ensuring science and technology are considered in development and implementation of all Federal policies and programs; and
- furthering international cooperation in science and technology.

OSTP also supports the President's Committee of Advisors on Science and Technology, which advises the President and the NSTC. The following pages summarize White House science and technology activities during Fiscal Year 1994.

## **Administration Initiatives**

The Clinton Administration has undertaken to change the nature of Federal science and technology policy and policymaking. Initiatives spearheaded by the White House have redirected our investments in science and technology toward fundamental national goals.

At the beginning of this Administration, President Clinton committed to an integration of agency R&D budgets to ensure the Nation's S&T investments served broad national goals as well as agency missions. This Administration recognizes the contributions that R&D can make to the vitality of this country as we move closer to the 21st century. R&D guidance -- in the form of broad policy principles and goals -- has been issued to guide the individual agencies' budget development. The guidance reflects a significant paradigm shift in the way the Federal R&D enterprise is addressed, both from a budget and a policy standpoint.

The R&D policy principles direct the agencies to:

- emphasize peer review
- invest in human resources
- invest in fundamental science
- integrate civilian and military research programs wherever possible
- integrate environmental objectives into other goals
- encourage cost-shared research partnerships with industry and with States
- invest in anticipatory R&D
- promote international cooperation
- promote equity and diversity

The R&D goals encourage increased focus on:

- a healthy, educated citizenry
- job creation and economic growth
- world leadership in science, mathematics, and engineering
- improved environmental quality
- harnessing information technology
- enhanced national security

Integrated R&D budgets are being prepared in nine principal areas: fundamental science; health, safety, and food; environment and natural resources; information and communications; national security; civilian industrial technology; transportation; education and training; and international science and technology. Strategic implementation plans in each area will be published in parallel with the President's budget request.

One example of this R&D effort is the **Environment and Natural Resources R&D Strategy**. This multidisciplinary strategy will provide the scientific and technical information needed for national and international policy formulation and result in the most efficient use of scarce R&D resources. It is aimed directly at the Administration's goals of: 1) a clean environment; 2) safe and healthy Americans (through greater understanding of the human health implications of environmental changes and the societal vulnerability to natural hazards); 3) a strong economy (through cost-effective pollution prevention technologies and reduction of market and government inefficiencies); 4) national security (by providing information needed to reduce destabilizing environmental degradation); and 5) improved education and training (by strengthening the environmental education curriculum).

The Administration has developed specific initiatives within each of the broad, strategic R&D realms. For example:

**Partnership for a New Generation of Vehicles.** The Federal Government and USCAR (Ford, Chrysler, and GM) have developed a joint R&D program for the development of commercially-viable vehicle technology that, over the long term, can preserve personal mobility while further reducing the impact of cars and light trucks on the environment and reducing dependence on imported petroleum. The partnership includes activities in: 1) manufacturing productivity improvement; 2) near-term improvement in fuel efficiency and emission reduction, including adoption of alternative fuels; and 3) development of a production prototype with three times the fuel efficiency of today's vehicles, with comparable characteristics, in a decade. Key technologies include: advanced light-weight materials; energy conversion (e.g., gas turbines and fuel cells); energy storage devices (e.g., flywheels, ultra capacitors, and advanced batteries); and more efficient electrical systems. The research plan will be peer-reviewed by the National Research Council at the end of August.

**National Earthquake Disaster Reduction Program.** The Federal Government stands to save billions in future earthquake disaster relief if appropriate risk mitigation steps are implemented. Over 25 federal organizations are participating in an OSTP-chaired National Earthquake Strategy Working Group to develop a National Earthquake Disaster Reduction Program. This Program will reinvent the national earthquake strategy embodied in the National Earthquake Hazard Reduction Program (NEHRP, a 4-agency program criticized for lack of interagency and national coordination, insufficient implementation of knowledge gained, and lack of problem-focused research).

**A Post-Cold War National Security Science and Technology Assessment.** Political uncertainty and technology diffusion in many parts of the world call for national security strategy modifications. The NSTC Committee on National Security is undertaking a post-Cold War assessment of the role and potential for science and technology to assist meeting the nation's security needs in a changed global environment. The effort will: 1) assess our S&T base and current applications; and 2) determine how best to maintain a strong national security technology base and to provide defense capabilities for new requirements, including those related to proliferation, regional conflicts, and transnational and global challenges

(particularly narcotics and terrorism). The assessment will include the S&T foundation for intelligence collection, analysis, and dissemination capabilities.

**Climate Change: The State of Knowledge.** In conjunction with the Office of Environmental Policy, the National Economic Council, and the National Security Council, OSTP is chairing a long-term strategy group to examine all budget, technology, R&D, regulatory, and economic policies that could impact greenhouse gas emission levels beyond the year 2000. OSTP is orchestrating the development of a state of knowledge paper in support of this "Post 2000" effort that discusses the science of global change, the impacts/vulnerability of resources to global change, and the economic impacts of global change. Together, these will form the intellectual framework within which to consider post-2000 policies to control greenhouse gases. The papers will highlight the implications of climate change for the United States, but placed within the global context. The research needed to reduce key uncertainties and the timeframes for doing so will be explicitly examined.

**High Performance Computing and Communications.** Many critical applications in industry, national security, and the environment require far greater computing capability than is currently available. The 10-agency HPCC program is designed to:

- extend U.S. technological leadership in high performance computing and computer communications;
- provide wide dissemination and application of the technologies to speed the pace of innovation and to improve the national economic competitiveness, national security, education, health care, and the global environment; and
- provide key enabling technologies for the national information infrastructure (NII) and demonstrate selected NII applications.

**Technology for Education and Learning.** This interagency effort supports development of technology to increase the productivity of learning and teaching. Areas identified as critical by the NSTC include: 1) high quality, affordable software and other learning tools that support learner-centered instruction and are consistent with new standards; 2) effective models for technology use, including attributes such as network configurations, State and local technology plans, professional development, and ongoing operational support; 3) basic research on technology-supported learning, involving fields as diverse as anthropology, computer science, education, linguistics, and psychology; 4) new models of assessing progress in learning, e.g., measurements of productivity gains in the workplace; and 5) technology and networking demonstrations, including connections to the national information infrastructure.

**National Electronics Manufacturing Initiative.** NSTC's Committee on Civilian Industrial Technology is developing this initiative in partnership with industry. The goal is to cooperatively set R&D priorities for manufacturing process technologies and component technologies needed for electronics products that can make use of the national information infrastructure.

**Building and Construction.** This collaboration between Federal agencies and the U.S. construction industry is aimed at a series of 5-year technology goals, such as reducing by 50% the time necessary to design and construct residential and commercial buildings, operation and maintenance costs (including emissions of greenhouse gases), and accidents and deaths associated with construction.

**Research Infrastructure Plan.** The Nation's academic infrastructure -- defined as the physical facilities in which research or training is conducted, the equipment and instrumentation necessary to the research or training activity, and access to information and information technologies -- is in desperate need of renewal and modernization. Estimates of the backlog for renewing and modernizing facilities alone range from \$8 to \$10 billion. An interagency program of competitive awards for renewal of facilities and instrumentation is critical to our future investment in science and technology. The NSTC Committee on Fundamental Science is developing an interagency strategic plan on academic infrastructure.

**Biomass Energy.** The Administration is evaluating the near and long term potential for biomass to serve as a major fuel source for electricity generation. A carefully designed program could result in a new source of income for farmers and farm communities while reducing greenhouse gas emissions. The initiative will involve demonstration of biomass electricity systems by DOE, expansion of fuel-crop research by USDA, and design of prototype fuel-supply contract to help organize relevant markets. The NSTC committees on Environment and Natural Resources and on Civilian Industrial Technology are leading this initiative.

**National Bioethics Advisory Commission.** OSTP has developed a proposal to create a standing body of experts to consider bioethical issues arising from research on human biology and behavior, and the applications of such research. The goal is to establish a panel of non-government experts in the relevant scientific disciplines, law, and ethics, as well as community representatives, to provide advice and recommendations concerning the principles governing the ethical conduct of biological and behavioral research. The proposed charter for this Commission was developed in consultation with the NSTC departments and agencies and with relevant congressional committees, and has been published for public comment in the Federal Register.

**Metrics of Fundamental Science.** The Government Performance and Results Act and the National Performance Review call for improved accountability and management of government-funded research and development. Fundamental research has proven to be more difficult to assess than more applied research, but the development of specific methods of evaluating the government are necessary. This project, undertaken by the NSTC's Committee on Fundamental Science, will review issues and options for the metrics of fundamental science (including program evaluation, aggregate estimates of the returns to research, and development of goals and milestones) based on prior empirical work and feedback from practitioners, stakeholders, and the policy community. Based on the review, recommendations will be made for goals and milestones appropriate for evaluating government programs of fundamental science research.

## **Presidential Directives**

President Clinton evinced his commitment to a "virtual department of science and technology" with four policy directives requiring extensive interagency coordination and cooperation:

**Convergence of U.S. Polar-Orbiting Operational Environmental Satellite Systems.** For the past three decades, the United States operated separate civil and military polar-orbiting environmental satellite systems to collect, process, and distribute remotely-sensed meteorological, oceanographic, and space environmental data. President Clinton approved the convergence of these systems into a single program, with the goal of cutting costs while continuing to satisfy U.S. civil and national security requirements. The converged system will consist of three low earth orbiting satellites, a reduction from the current four satellites (two civilian and two military).

The Departments of Commerce and Defense and NASA are creating an Integrated Program Office (IPO) to manage the converged system. The IPO, scheduled to begin operating by October 1, 1994, will be directed by a System Program Director who will report to a triagency Executive Committee.

The United States will encourage cooperation by foreign governments and international organizations with the converged system, consistent with U.S. requirements. European countries have already been invited to explore incorporating their METOP (meteorological operational mission) polar satellite series into the converged system.

**Landsat Remote Sensing Strategy.** The Landsat program has provided over 20 years of calibrated data to a broad user community including the agricultural community, global change researchers, State and local governments, commercial users, and the military. The Landsat 6 satellite, which failed to reach orbit in 1993, was intended to replace the existing Landsat satellites 4 and 5, which are operating well beyond their 3-year design lives. The advanced age of the Landsat satellites and severe budget constraints led the NSTC to reevaluate the Landsat program, resulting in a new strategy designed to continue the Landsat program and extend the 20-year data set.

The Landsat strategy is composed of the following elements: 1) collecting data from Landsat satellites 4 and 5 as long technically possible; 2) acquiring a Landsat 7 satellite that maintains continuity of data, minimizes development risk, minimizes cost, and achieves the most favorable launch schedule; 3) maintaining an archive within the United States for existing and future Landsat-type data; 4) ensuring availability of unenhanced data from Landsat to all users at the cost to provide; 5) providing data for global change research consistent with the Global Change Research Policy Statements for Data Management; 6) considering alternatives for maintaining continuity of data and fostering development of

## Presidential Policy Statements

The Clinton/Gore Administration released its seminal statement on science and technology policy – Technology for America's Economic Growth: A New Direction to Building Economic Strength – in February 1993. Additional statements illuminating the new policy directions outlined in the early days of the Administration, which will lead to new initiatives in the coming year, include:

**Science in the National Interest.** Through scientific discovery and technological innovation, we enlist the forces of the natural world to solve many of the uniquely human problems we face – feeding and providing energy to a growing population, improving human health, taking responsibility for protecting the environment and the global ecosystem, and ensuring our own nation's security. Scientific discoveries inspire and enrich us, teaching us about the mysteries of life and the nature of the world. In the first formal Presidential statement on science policy since 1979, and the only one addressed to citizens, the Clinton Administration maps out a way to put science to work on behalf of a broadened set of national goals to benefit the American people. Our intent is to:

- Maintain leadership across the frontiers of scientific knowledge;
- Enhance connections between fundamental research and national goals;
- Stimulate government, industry, and academic partnerships that promote investment in fundamental science and engineering and effective use of physical, human, and financial resources;
- Produce the finest scientists and engineers for the 21st century; and
- Raise the scientific and technological literacy of all Americans.

The statement establishes a long term goal of increasing total -- public and private -- spending on R&D to 3 percent of GDP.

The policy statement resulted, in part, from a forum involving 250 scientists and policymakers from around the Nation. It encourages full and equal participation of all Americans, as both contributors to and benefactors of the nation's scientific investment, and recommends a number of actions to increase diversity in the science and technology workforce. The President calls for a new awards program to recognize the importance of role models and mentoring for underrepresented groups in science and technology.

**Technology for a Sustainable Future.** World markets for environmental technologies are growing dramatically and will continue to do so in the years ahead. These technologies offer the United States an exciting opportunity to achieve its economic, environmental, and energy goals simultaneously. A clean environment means a higher quality of life, and technological advancement means economic growth and better jobs for American workers.

Promoting environmental technologies has been a high priority of this Administration. With this broad policy document, we have engaged the Congress, the States, municipalities, industry, academia, nongovernmental organizations, and interested citizens in an effort to

advanced remote sensing technologies at reduced cost and increased performance; and 7) enabling opportunities for commercialization.

**Space Transportation Policy.** Space transportation capability is a fundamental part of pursuing science and technology in the national interest. Mindful of the current budget environment and recent advances in reusable technologies, this policy establishes clear roles and responsibilities for NASA and DOD.

DOD will be the lead agency for modernizing and evolving current expendable launch vehicle systems. NASA will be the lead agency for development and demonstration of next generation reusable launch systems, such as the single-stage-to-orbit concept. The policy requires a decision by December 1996 on whether to proceed with a sub-scale flight test to prove the concept of single-stage-to-orbit.

The policy recognizes the critical role the private sector plays in space transportation. The Departments of Commerce and Transportation are specifically tasked to identify promising areas for government-industry partnerships and with ensuring these opportunities are factored into NASA and DOD efforts. The policy also provides guidance to agencies on the use of foreign launch systems, components, and technologies.

**Federal Laboratory Review.** A central objective of this Administration's science and technology policies is to review all federal support for research and development to ensure programs reflect the Administration's priorities and effectively serve evolving national needs. One part of the government's research enterprise that requires careful attention is its laboratories, which account for over one-third of the Federal Government's R&D budget of about \$70 billion. The three largest Federal laboratory systems -- those of the Department of Defense, the Department of Energy, and the National Aeronautics and Space Administration -- are rich in human talent and facilities and have many responsibilities in common. Since decisions made about the future of these laboratories have major implications for the nation's entire research enterprise, an integrated, interagency review of options is necessary. DOD and DOE are conducting reviews of their major laboratories, and NASA is establishing a review of its R&D centers to complement the recent National Aerospace Facilities Study. The NSTC is conducting an interagency review, providing guidance to, building upon, and integrating the individual agency reviews. The purpose of the review is to evaluate and develop recommendations for ways to improve the efficiency and effectiveness of the Federal R&D investment in the Federal Government's three largest laboratory systems. The review shall define and assess a clear set of options and develop recommendations to achieve this purpose.

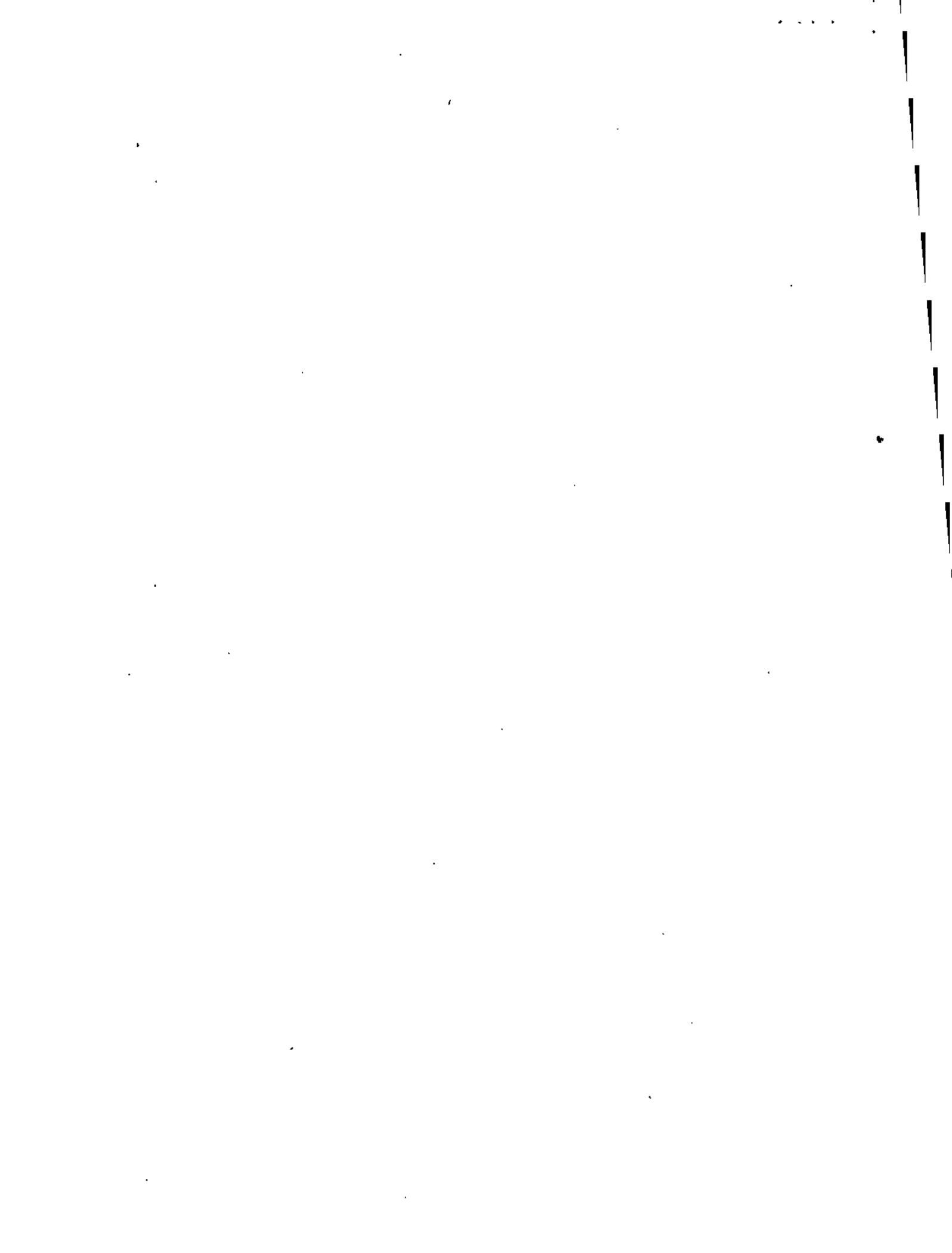
While the DOD, DOE, and NASA laboratory systems are the focus of this review, programs in other Federal laboratory systems that relate to those of the three systems under review shall be considered as necessary and appropriate. Other laboratory systems may be given focused attention in subsequent interagency reviews.

develop a long-term, comprehensive, environmental technology strategy that adheres to the following principles:

- The Federal regulatory and policy-making apparatus will be directed toward facilitating the development of prevention and monitoring technologies critical to achieving sustainable development over the long term and balanced with control and remediation technologies needed in the near term;
- The resource efficiencies of our technological infrastructure will be increased by adopting a systems approach that employs the tenets of industrial ecology;
- We will forge public-private and federal-state partnerships directed to advancing the development, commercialization, and diffusion of environmental technologies;
- We will shorten the cycle time from research and development to commercialization and export of environmental technologies; and
- We will promote the use of environmentally sound and socially appropriate technologies in developing nations throughout the world.

**Securing Russia's Nuclear Weapons Materials.** Russia's disintegrating methods of preventing diversion of nuclear-weapons material -- KGB monitoring and control of people -- must be replaced by a system of monitoring and control of materials. Global security depends on this transition, and Russian/U.S. cooperation on a comprehensive strategy is developing. The Clinton Administration will focus its efforts on four key steps that will determine the long-term success of the transition:

- Halting Further Accumulation of Weapons-Useable Materials. The agreement for a verified end to Russian production of plutonium for weapons must be followed by similar agreements to minimize further accumulation of weapons-useable uranium and separated civilian plutonium.
- Strengthening Security Over Nuclear Materials. Some thefts of bomb-grade materials from Russian facilities have been confirmed. The effort to strengthen Russian materials controls depends on their access to U.S. detection and measurement technologies and expertise in systems analysis and computerized data bases.
- Building Confidence Through Openness. To allay Russian suspicions, we will permit visits to a U.S. weapons component storage facility in advance of a U.S. visit to a comparable Russian facility. A "transparency" strategy for nuclear-warhead dismantlement is in preparation. This requires inspection techniques for identification of nuclear warhead components without disclosure of sensitive design information.
- Disposing of Fissile Materials. Two options exist to make plutonium less accessible for weapons: using as reactor fuel; or solidifying a mix of plutonium and high-level, liquid radioactive waste for permanent underground storage. U.S. technical experts are discussing these options with Russian counterparts.



**SUMMARY OF ACCOMPLISHMENTS IN FY 1995**  
**Office of Science and Technology Policy**  
**National Science and Technology Council**  
**President's Committee of Advisors on Science and Technology**

The Clinton Administration treats science and technology (S&T) as high-leverage investments in America's future. Investments in S&T contribute to: a growing economy with more high-skill, high-wage jobs for American workers; a healthier population; a cleaner environment where energy efficiency, information technology, and advanced technology increase profits and reduce pollution; a stronger, more competitive private sector able to maintain U.S. leadership in critical world markets; an educational system where every student is challenged; and an inspired scientific and technological research community focused on ensuring our national security, on improving the quality of life for ourselves and our children, and on successfully meeting global problems through cooperation with other countries. The most important measure of success will be our ability to make a difference in the lives of the American people, to harness science and technology to improve the quality of life and the economic strength of our nation.

The Office of Science and Technology Policy (OSTP) supports these objectives by: providing authoritative scientific and technological information, analysis, advice, and recommendations for the President, for the Executive Branch, and for Congress; participating in the formulation, coordination, and implementation of national and international policies and programs that involve S&T; maintaining and promoting the health and vitality of the U.S. S&T infrastructure; and coordinating research and development efforts of the Federal government to maximize the return on the public's investment in S&T and to ensure that resources are used efficiently and appropriately.

The Director of OSTP also serves as Assistant to the President for Science and Technology and, in that capacity, supports the activities of the President's National Science and Technology Council (NSTC), created November 23, 1993, by Executive Order. The NSTC has responsibility for:

- coordinating the formulation of science and technology policy;
- ensuring science and technology policy decisions and programs are consistent with the President's stated goals;
- helping to implement and integrate the President's science and technology policy agenda across the Federal government;
- ensuring science and technology are considered in the development and implementation of all Federal policies and programs; and
- furthering international cooperation in science and technology.

OSTP also supports the President's Committee of Advisors on Science and Technology (PCAST), which advises the President and the NSTC. The following pages summarize White House science and technology activities during Fiscal Year 1995.

## Administration Initiatives

The Clinton Administration is changing the nature of Federal science and technology policy and policymaking. Initiatives spearheaded by the White House have redirected our investments in science and technology toward fundamental national goals, while streamlining government and saving taxpayers' dollars.

At the beginning of this Administration, President Clinton made a commitment to the American people to integrate agency research and development (R&D) budgets to ensure the Nation's S&T investments served broad national goals, as well as agency missions. This Administration recognizes the contributions that R&D can make to the vitality of this country as we move closer to the 21st century. R&D guidance--in the form of broad policy principles and goals--was issued, for the second year, to guide individual agencies in their budget development. This R&D guidance, built on the previous year's deliberations, was participatively developed by the NSTC Committees, each of which sought input from a wide spectrum of stakeholders, including private industry, academia and the public. Providing this guidance to the R&D agencies last year reinforced the previous year's significant paradigm shift in the way the Federal R&D enterprise is addressed, both from a budget and a policy standpoint. We continue this year to refine and improve this new way of doing business.

In the interest of maintaining excellence, while minimizing Federal costs and maximizing effectiveness, the FY 1997 R&D policy principles direct the agencies to:

- emphasize peer review and select programs through a merit based competitive process
- jointly fund research and education programs through industry, university, or State partnerships
- support multiple goals that provide promise of a high social rate of return, such as improving the environment and helping American businesses compete internationally; ensuring national security while contributing to a strong technical base in civilian businesses; or coupling research, education and training to strengthen the technical literacy of our diverse workforce
- establish and use metrics to measure progress and performance realistically

The six key R&D goals are to:

- Maintain World Leadership in Science, Engineering, and Mathematics
- Promote Long-term Economic Growth that Creates Jobs
- Sustain a Healthy, Educated Citizenry
- Harness Information Technology
- Improve Environmental Quality

- Enhance National Security

In March 1995, each of the nine NSTC committees--fundamental science; health, safety, and food; environment and natural resources; information and communications; national security; civilian industrial technology; transportation; education and training; and international science, engineering and technology--published strategic planning documents that articulate the goals and objectives of their specific science and technology areas. These plans identified the major goals of each Committee, the relevant policy issues and questions confronting the Committee and the scientific/technological goals and research priorities necessary to achieve the goals. This strategic planning activity required the agencies to review major S&T initiatives in terms of appropriate agency roles, milestones, performance measures, resources, private sector input and international issues.

These strategic plans are not an end unto themselves, but rather a means to achieve national goals. Each plan differs in approach and detail, just as each Committee has a different history, composition, and perspective. Each plan is central to the NSTC activities, and all will be refined over time. Although the plans reflect a snapshot of a dynamic, evolving process, these documents reflect our continuing commitment to improve the Federal S&T enterprise.

- Integrated, FY 1997 R&D budgets were prepared for principal areas addressed in the strategic planning documents. In other words, the establishment by each of the NSTC Committees of strategic goals, objectives and research priorities was the first step in improving and integrating the Federal R&D budgets.

The Administration has identified specific initiatives to pursue within each of the six R&D goal areas. For example:

### **I. Maintaining World Leadership in Science, Mathematics, and Engineering**

*Assessing Fundamental Science:* The Government Performance and Results Act (GPRA) and the National Performance Review (NPR) call for better management of Federal programs through a process of setting goals and assessing results. Assessing fundamental science presents a challenge which requires the capture of quantitative, qualitative and institutional dimensions. To assist science agencies, the NSTC has undertaken several activities: A Practitioners' Working Group and the Critical Technologies Institute prepared a background study report based on material from the Office of Management and Budget (OMB), Congressional reports, and other sources to document factual information about the new requirements and existing assessment methods. At a November 1994 workshop,

assessment practitioners examined existing methods and identified issues associated with the adaptation of these methods to fundamental science projects. On May 17, 1995 the NSTC Committee on Fundamental Science sponsored a colloquium on "Assessing the Contribution of Fundamental Science." One purpose of the colloquium was to enable scientists, policymakers, research managers, assessment practitioners and stakeholders to discuss the new emphasis on programmatic accountability and its impact on fundamental science. A second purpose was to develop issues and options for building assessment strategies that will fully represent the contribution of science to the national well being. At this colloquium, members of the public and private scientific enterprise, representing different areas of expertise, probed the complexities of the new assessment environment and explored methods that might be adapted to fundamental science. Key themes from the background studies, workshop and colloquium will be summarized in a series of reports--one was published in 1994, the others to be published in 1996. The NSTC is drafting a paper that identifies a set of principles and other information for use by Federal science agencies in designing and testing methods for improved assessment of fundamental science. This paper is expected to be published in the spring of calendar year 1996.

*U.S. Fusion Energy R&D Program:* It is important that this country develop energy sources adequate to meet the needs of the next century. Fusion energy has been identified as an attractive and possibly essential new future energy source for this country and the world. It is key that the U.S. develop a fusion energy program that is reasonable, desirable, as well as cost realistic, given current budgetary constraints. In July 1995, the PCAST's Fusion Review Panel published a report that provided a thoughtful and technically sound scheme for restructuring the fusion program, at a substantially reduced level of funding. The PCAST also evaluated the consequences of a more dramatically reduced budget proposal, concluding that, if so reduced, the program would lose essential elements and halt progress toward the fusion goal.

*Federal Laboratory Review:* The initial phase of the NSTC-managed Federal Laboratory Review of the Department of Energy (DOE), National Aeronautics and Space Administration (NASA) and the Department of Defense (DoD) was completed. These three laboratory systems account for at least one-fifth of the entire Federal investment in R&D--approximately \$15 billion of an approximate \$70 billion total. The core purpose of this NSTC review was to evaluate the effectiveness of the laboratories in responding to national S&T needs, and to identify ways the laboratories can contribute their best, with maximum efficiency. Prior to the Federal Laboratory Review, all three agencies recognized that their laboratory systems faced downsizing, as missions are more sharply focused and unnecessary duplication is eliminated. As a result of the Federal Laboratory Review, these agencies are expected to identify opportunities for greater efficiency through measures such as integration and consolidation of facilities.

of greater cooperation. The Task Force builds on the work of the State-Federal Technology Partnership and is a joint effort of the Carnegie Commission on Science, Technology and Government, the NGA, the National Conference of State Legislators and the American Society of Mechanical Engineers. The partnership consisted of 20 national leaders, including four governors, state legislators and chief executives from business, academia and non-governmental organizations. Former Governors Richard Celeste of Ohio and Richard Thornburgh of Pennsylvania served as Co-Chairs of the initiative. The report reflects the Task Force's agreement on the following concrete beliefs:

- The S&T relationship between the States and the Federal Government needs to be redefined. This new relationship must be driven by the White House and the governors, and must be responsive to the interests of Congress and State Legislators
- This new relationship must recognize the unique and complementary experiences and resources at the respective levels of government. Strengths at the Federal level include basic research, mission-driven R&D and the capacity to address major national technical issues. Strengths at the State level include close involvement with entrepreneurs, manufacturers, regional industrial coalitions, local boards and councils that support entrepreneurship and technological leadership and concerned individuals
- To achieve a new partnership, the States, Federal Agencies, and the White House must organize themselves to support cooperative activities
- The Governors must ensure representation by an effective organization which communicates the S&T experiences and policies of the 50 states to the Federal government

The Task Force identified a set of overarching and operational principles essential to the development and flourishing of any State-Federal partnership. Their report offers four recommendations, under the following headings:

- Renewing the National Science and Technology System
- Building the Role of the States in the National Science and Technology System
- Catalyzing Private Sector Investments in Technology
- Building National Excellence in Manufacturing

The Task Force's final report was issued on September 5, 1995. An NSTC Working Group, chaired by Dr. Mary Good, Under Secretary for Technology at the Department of Commerce, assessed the report and made recommendations to the NSTC regarding opportunities the U.S. Government can pursue as part of the renewed national effort. In an effort to encourage demonstrable State-Federal partnerships, a broad range of outreach

## II. Promoting Long Term Economic Growth

Partnership for a New Generation of Vehicles. The Federal Government and USCAR (Ford, Chrysler, and General Motors) together with suppliers, other businesses and universities, have developed a joint R&D program for the development of commercially-viable vehicle technology that, over the long term, can preserve personal mobility while further reducing the impact of cars and light trucks on the environment and reducing dependence on imported petroleum. The partnership includes activities in: 1) manufacturing productivity improvement; 2) near-term improvement in fuel efficiency and emission reduction, including adoption of alternative fuels; and 3) development of a production prototype with three times the fuel efficiency of today's vehicles, with comparable characteristics, in a decade. Key technologies include: advanced light-weight materials; energy conversion (e.g., gas turbines and fuel cells); energy storage devices (e.g., flywheels, ultra capacitors and advanced batteries); and more efficient electrical systems. The research plan is annually peer-reviewed by the National Research Council (NRC). The NRC issued its second peer review report in March 1996.

Building and Construction. This collaboration between Federal agencies and the U.S. construction industry is intended to develop better construction technologies to improve the competitive performance of the U.S. industry, raise the life-cycle performance of buildings and protect public safety and the environment. The initiative responds to a high level of industry interest, and combines government and industry goals. Quantitative goals have been established for accomplishment by 2003. They include 50 percent reduction in the time necessary to design and construct residential and commercial buildings; 50 percent reduction in operation, maintenance and energy costs; 50 percent less waste and pollution (including emissions of greenhouse gases); and 50 percent fewer accidents and deaths associated with construction and occupancy. Regulatory issues that present barriers to innovation are also considered. These goals will be achieved with improved housing affordability, and where possible, with a reduction in both initial and lifetime costs. The NSTC Committee on Civilian Industrial Technology developed, with industry participation, a description of the Federal R&D strategy to support the building and construction industry. Their report, *Construction and Building: Federal Research and Development in Support of the U.S. Construction Industry*, was issued in October 1995. To build on this work, and on the 1994 National Construction Goals workshop, the Construction and Building Subcommittee will be holding a workshop in April 1996 to define and develop potential collaborations between industry, academia and Federal, State and Local governments.

State-Federal Technology Partnership Task Force. The Director of OSTP, in conjunction with the Chair of the National Governors' Association (NGA), announced the establishment of a State-Federal Technology Partnership Task Force in January 1995. The Task Force's primary objective was to identify ways to strengthen State-Federal science and technology partnerships to advance the nation's goals and, in particular, the economic benefits

activities have been identified and will be discussed at a summit between sitting governors and senior Federal officials responsible for S&T R&D activities.

*Physical Infrastructure for Transportation.* The NSTC envisions a sustainable and seamless intermodal transportation system that effectively ties America together and links us to the world. Such a transportation system will help citizens and businesses satisfy their needs by providing efficient, safe, secure and environmentally friendly transportation of people and goods. To achieve this result, requires a strengthened partnership between the government and the private sector, focused on effective management and renewal of existing infrastructure, strategic deployment of new technologies and infrastructure and R&D which supports each of these. The NSTC is charged with ensuring that Federal investment in transportation research conducted by all agencies is coordinated to ensure efficient use of Federal funds; focusing on projects identified by users, industry and other stakeholders as critical to achieving success in the agencies' missions; and limiting our scope to areas where it is clear that major public benefits can only be achieved through cost-shared Federal research. Government and industry are working to achieve these goals within a decade.

*Biomass Energy.* The Administration is evaluating the near- and long-term potential for biomass to serve as a major fuel source for electricity generation. A carefully designed program could result in a new source of income for farmers and farm communities while reducing greenhouse gas emissions. The initiative will involve demonstration of biomass electricity systems by the DOE, expansion of fuel-crop research by the Department of Agriculture (USDA) and design of prototype fuel-supply contract to help organize relevant markets. The NSTC committees on Environment and Natural Resources and on Civilian Industrial Technology are leading this initiative.

*National Electronics Manufacturing Initiative.* NSTC's Committee on Civilian Industrial Technology undertook an initiative to develop a new partnership between the public and private sectors to support the nation's electronics manufacturing industry. This effort came to fruition on March 13, 1996, with the announcement of National Electronics Manufacturing Initiative, Inc. (NEMI). NEMI is a consortium created to ensure the sustained growth and competitiveness of electronics manufacturing in the U.S. NEMI is an industry-led, private-public partnership that brings together the largest electronic equipment manufacturers in the U.S., their key suppliers and government agencies to foster development of the world's best electronics manufacturing supply chain. NEMI will improve manufacturing technology by establishing development and implementation projects between users and suppliers. In addition, NEMI has identified key R&D activities which will require the coordination of its members and outside organizations. NEMI is working with government and non-government organizations including the NSTC, OSTP, Defense Advanced Research Projects Agency (DARPA), Semiconductor Industry Association (SIA) and SEMATECH to establish linkages to ensure this coordination.

International Space Station. OSTP continued to be the White House focal point for policy and program oversight related to development of the redesigned International Space Station. Over this past year, OSTP has been integral to maintaining European, Russian, Japanese and Canadian support for the project. OSTP has also worked closely with OMB and NASA to ensure that the program stays within budget and on schedule. When fully assembled, the International Space Station will be a unique, world-class, scientific and technological facility for experimentation and research. It will also be a symbol of the tremendous accomplishments that cooperation in the post Cold-War era can bring.

Global Positioning System. Presidential Review Directive NSTC-3 directed an interagency review of national policy on the future management and use of the Global Positioning System (GPS). OSTP and the National Security Council (NSC) co-chaired an interagency working group to review GPS policy issues. These included current and future military requirements; projected augmentations to GPS for civil and commercial use and their economic implications; the role of international cooperation involving the use of GPS and associated technologies; and the proliferation of civil GPS applications and the potential for their exploitation for hostile purposes. The President approved new guidelines for the management and use of the GPS on March 29, 1996, opening the door for rapid growth in a burgeoning civil and commercial GPS market that could add 100,000 jobs to the U.S. economy and grow from \$2 billion to \$8 billion in annual sales by the year 2000.

Aeronautics and Aviation Research and Technology. The Administration's *Goals for a National Partnership in Aeronautics Research and Technology* was released in September 1995. This report, which was prepared by the NSTC in cooperation with industry and academia, presents the Administration's vision and goals for future Federal investments in aeronautics and aviation research and technology. The research agenda outlined in this report is meant to achieve three fundamental goals--maintain the superiority of U.S. aircraft and engines; improve the safety, efficiency and cost effectiveness of the global air transportation system; and ensure the long-term environmental compatibility of the aviation system. Evidence of our progress in fostering a renewed spirit of cooperation and partnership can be found in a number of recent Memoranda of Understanding between NASA and the Federal Aviation Administration (FAA) in areas ranging from advanced air traffic technologies to general aviation and human factors.

### *III. Sustaining a Healthy, Educated Citizenry*

Emerging and Re-emerging Infectious Diseases. An NSTC interagency working group was convened in December 1994 to consider the global threat of emerging and re-emerging infectious diseases. This group included representatives from more than 17 different government agencies and departments. They reviewed the U.S. role in detection, reporting and response to outbreaks of new and re-emerging infectious diseases and made a number of

recommendations in the report *Infectious Disease--A Global Health Threat*, released in September 1995.

*Health and Food Safety.* The NSTC Health, Safety and Food Committee has developed a research agenda for maintaining and improving America's health and food supply. The goals include creating the fundamental knowledge, promoting prevention, disseminating information broadly and rapidly and improving education in the areas of health, safety and food. In the first phase of implementation, the NSTC will undertake a review of the domestic health, safety and food data systems and will strengthen its integrated, multidisciplinary human nutrition research program. Under the auspices of the NSTC, a policy document *Meeting the Challenge* has been prepared (released in February 1996) which reflects public stakeholder views expressed at a November 1994 forum.

*Technology Learning Challenge (TLC).* The Clinton Administration initiated the Technology Learning Challenge (TLC) grant program to challenge communities to form local partnerships of school systems, colleges, universities and private businesses to develop creative new ways to use technology for learning. Grants focus on integrating innovative learning technologies into school curricula. Federal funds leverage local resources—each Federal dollar is matched by more than three to one by local and private funds. The program is administered by the Interagency Learning Technology Office (ILTO) which coordinated awards in multi-year challenge grants to 19 communities in 16 states in FY95. The 19 recipients and their partners represent a total of 23 states. The President's proposed Technology Literacy Challenge will expand this program from less than \$10 million to \$75 million per year to assure that local innovation keeps U.S. schools on the leading edge of learning technologies.

This interagency effort supports development of tools that make use of technology to increase the productivity of learning in all fields, by all people. These tools may be used in a variety of settings, including school, work and the home. As part of the TLC, the NSTC has identified four priority focus areas: 1) demonstration of how hardware, software and the National Information Infrastructure (NII) can be used for advanced instructional systems; 2) development of new models for evaluating learning and learning productivity; 3) development of high-quality, affordable learning tools and environments; and 4) research that can improve understanding of the learning process and how technology can best support that process. The use of technology to enhance learning will better prepare all Americans for the challenges of the 21st century, while fostering ingenuity, enabling U.S. businesses to more effectively compete in the global economy and enhancing the quality of life by increasing access to information.

*National Bioethics Advisory Commission (NBAC).* OSTP, in consultation with members of the NSTC, developed a proposal to create a standing body of experts to consider bioethical issues arising from research on human biology and behavior, and the applications of

such research. The result was the establishment of the National Bioethics Advisory Commission (NBAC). A public announcement regarding the establishment of NBAC coincided with the release of the *Human Radiation Experiment Report* on October 3, 1995. The NBAC will be appointed by the President from knowledgeable non-government experts and community representatives with special qualifications and competencies to deal effectively with bioethical issues of concern to the participating departments and agencies. As a first priority, the Commission will direct its attention to consideration of issues in the management and use of genetic information and protection of the rights and welfare of research subjects.

#### IV. Improving Environmental Quality

##### *Improved Interagency Coordination of Research Efforts*

*Ecosystem Monitoring and Research.* Building on the analysis and strategies of the NSTC Committee on Environment and Natural Resources (CENR) Ecosystem Working Group and Biodiversity and Ecosystem Dynamics Subcommittee, an interagency team began developing a strategy to better integrate the nation's environmental monitoring and research networks and programs. This strategy will lead to a new capability to assess the status and trends in the conditions of multiple sources and understand the causes of the trends. It will also provide the scientific information base needed to implement ecosystem management and sustainable development policies.

*International and Interagency Assessments.* The Environment Division continued its critical role in leading and coordinating U.S. government participation in scientific and technical assessments of important environmental issues. The peer review and government review process for the second comprehensive assessment of the Intergovernmental Panel on Climate Change (IPCC) is complete, with publication expected in Spring 1996. The review of the Global Biodiversity Assessment has also been completed and the summary document and the full report were published in October 1995.

*Interagency Assessment of Oxygenated Fuels.* The use of oxygenated gasoline was mandated under the Clean Air Act Amendments of 1990 in areas of the country that did not meet the Federal ambient air standard for carbon monoxide. Soon after the oxygenated gasoline program was introduced nationally in the winter of 1992-1993, anecdotal reports of acute health symptoms were received by health authorities in various areas of the country and complaints were voiced of reduced fuel economy and engine performance. To address public concerns and to take full advantage of the extensive expertise across the Federal government, the Environmental Protection Agency (EPA) requested the assistance of OSTP through the NSTC/CENR to coordinate a comprehensive assessment of the winter oxygenated gasoline program. Working groups prepared assessments of effects on public health, air quality, water quality, fuel economy and engine performance. Each of the chapters of the report will

undergo extensive external peer-review prior to the submission of the entire report for review by the National Academy of Sciences (NAS). The findings and comments from the NAS review are expected early summer 1996 and will be incorporated into the final assessment. An NSTC report titled *Interagency Assessment of Potential Health Risks Associated with Oxygenated Gasoline* was released in February 1996.

*Program Guide to Federally Funded Environment and Natural Resources R&D.*

Building on the budget guidance to agencies to include more peer reviewed research, OSTP undertook a study to determine the degree of existing merit review and performance evaluation in Federal research. This information, together with a tabulation of environmental and natural resources research opportunities, will be released as an OSTP report during FY96.

*National Earthquake Disaster Reduction Program.* The Federal government stands to save billions in future earthquake disaster relief if appropriate risk mitigation steps are implemented. Sixteen Federal organizations are participating in an NSTC National Earthquake Strategy Working Group to develop a National Earthquake Disaster Reduction Program. This Program will reinvent the national earthquake strategy embodied in the National Earthquake Hazard Reduction Program (NEHRP), a four-agency program criticized for lack of interagency and national coordination, insufficient implementation of knowledge gained and lack of problem-focused research. The NSTC anticipates publication of a report detailing the proposed strategy in 1996. OSTP also undertook a study of earthquake engineering facilities in the U.S. and released a report to Congress in October 1995.

*Seismic Networks.* On November 14, 1995, key members of Congress received a letter summarizing the results of a year-long NSTC interagency process to improve the coordination of Federal seismic research and monitoring activities. The letter was written to call attention to the importance of U.S. seismic network programs and their relationship to test ban negotiations. These programs provide data to the U.S. in the areas of monitoring of nuclear weapons tests, geoscience research and earthquake hazard monitoring. Each application has different requirements and the Administration examined the appropriate funding and potential for multiple use of such networks.

*Seasonal to Interannual Climate Change.* OSTP hosted a ministerial-level meeting on the El Nino phenomenon in Washington, DC, in early FY96. Participants from 64 different countries and organizations agreed to undertake a collective effort to accelerate improvements in climate prediction, including both improvements in predictive science and improvements in the application of such science to practical problems in affected regions. Early warning of El Nino conditions have already prevented major agricultural losses in tropics, and this forecasting ability is now being expanded to higher latitudes, including the U.S, with long-lead forecasts of seasonal temperature and precipitation issued for the first time during FY95. As the U.S. contribution to this international effort, we have begun a CENR interagency initiative

to improve our forecasting and applications ability by building on existing U.S. operational capabilities and on results from the US Global Change Research Program.

***Endocrine Disruptors.*** Through a new NSTC Committee on Environment and Natural Resources (CENR) interagency working group, OSTP will facilitate the development of a coordinated Federal research program to measure and understand the human and ecological consequences of environmental exposures to chemicals with the potential to disrupt the function of the endocrine system. Such chemicals, which are present in the environment may cause hormone-related problems, such as decreased fertility, certain types of cancer (i.e., breast and prostate) and wildlife population loss. In FY96, the group will evaluate the current state of knowledge, identify data gaps, describe research needs and develop partnerships with nongovernmental organizations to help augment research in this important area.

## V. Harnessing Information Technology

***High Performance Computing and Communications (HPCC).*** The Federal HPCC Program provides essential stimulation and coordination to accelerate progress in crucial areas of computation, information and communications. By accelerating deployment of easy-to-use information technology, this five-year-old program clearly has generated important societal benefits and encouraged the information revolution. The program has described its 1995 accomplishments in three documents: *High Performance Computing and Communications: Foundation for America's Information Future*, *Federal HPCC FY 1996 Implementation Plan*, and a four-page pamphlet that documents HPCC accomplishments over its five-year history.

Moreover, the NSTC Committee on Information and Communication sponsored several HPCC-related events during 1995:

- Second Pasadena Workshop on System Software and Tools for High Performance Computing Environment (January, 1995).
- Virtual Reality in Telemedicine Workshop (January, 1995).
- Digital Libraries Workshop, which produced the report *Interoperability, Scaling, and the Digital Libraries Research Agenda* (May, 1995).
- PetaFLOPS Summer Study on Applications (August, 1995).
- Computing Systems Briefings (October, 1995).
- Electronic Payments Workshop (November, 1995).
- A workshop on "Federal Strategies and Programs in the Age of Information" at Supercomputing '95 (December 1995), the premier U.S. conference on high performance computing.

***Technology for Education and Learning.*** This interagency effort supports development of technology to increase the productivity of learning and teaching. Areas identified as critical

by the NSTC include: 1) high quality, affordable software and other learning tools that support learner-centered instruction and are consistent with new standards; 2) effective models for technology use, including attributes such as network configurations, State and local technology plans, professional development and ongoing operational support; 3) basic research on technology-supported learning, involving fields as diverse as anthropology, computer science, education, linguistics and psychology; 4) new models of assessing progress in learning, e.g., measurements of productivity gains in the workplace; and 5) technology and networking demonstrations, including connections to the national information infrastructure.

## VI. Enhancing National Security

*International Agreements.* OSTP has worked successfully to expand U.S. S&T relationships with important trading partners and economies in transition. To complement the Commerce Department's Big Emerging Markets strategy, OSTP developed strategies for comprehensive S&T cooperation with key countries, including China, Russia, South Africa, India, Argentina and Brazil. The goal of these strategies is to provide guidance to agencies as they engage in international S&T cooperation so that our investments yield benefits for U.S. scientific, economic and national security interests. For example, OSTP helped facilitate a new agreement between the Chinese and the Commerce Department's National Institute of Standards and Technology (NIST) which--by harmonizing standards--will facilitate scientific cooperation and pave the way for expanded economic trade. OSTP also negotiated an umbrella S&T agreement with South African officials in time for the U.S.-South African Binational Commission in South Africa last year. Moreover, two successful Gore-Chernomyrdin Commission meetings this year resulted in new agreements (for cooperation in acoustic thermometry of ocean climate and in establishing a Space Biomedical Center); a broad telecommunications initiative; and establishment of a Civilian Research and Development Foundation to support cooperative projects in all areas of basic and applied sciences in Russia. OSTP is also improving S&T relations with Japan through the Joint High Level Commission.

OSTP has also taken the U.S. Government-lead in several multilateral fora as a way to maximize U.S. S&T investments in a time of shrinking budgets. In Latin America, OSTP is working to expand regional S&T cooperation through the Summit of the Americas process. As follow-up to the December 1994 Summit in Miami, OSTP is working with its counterparts throughout the western hemisphere to organize a meeting of S&T ministers in Colombia in late March 1996. In the Asia Pacific region, OSTP led the U.S. delegation in the first Asia Pacific Economic Council (APEC) Ministerial Conference on Regional Science and Technology cooperation to provide for greater access to technology in these economies.

OSTP has also continued to support international collaboration on large and/or sophisticated science projects as a way to gain new scientific and technological advances while

minimizing the costs to U.S. tax payers. OSTP has led the creation of a follow-on mechanism to the Organization for Economic Cooperation and Development (OECD) Megascience Forum, ensuring that international cooperation on large high-priority S&T programs continue to receive international attention. Moreover, we have worked closely with the technical agencies and OMB to coordinate the U.S. Government's negotiating position on such projects as the Large Hadron Collider, the Human Frontier Science Program and the International Thermonuclear Experimental Reactor.

*Nonproliferation of Nuclear Weapons.* To meet the new challenge of possible erosion of nuclear controls, we have launched a major new effort focused on controlling nuclear weapons and the fissile materials needed to make them. This contrasts with past arms control agreements; such as the START treaties, that limited only missiles and launchers. The Clinton Administration has been implementing a comprehensive four-part plan to secure nuclear material, including building confidence through openness, halting the accumulation of excess materials, and carrying out disposition of excess materials. Working closely with the NSC, OSTP has successfully initiated new policy approaches to securing nuclear materials, provided key support to U.S.-Russian negotiations, and drafted papers and statements for both Presidential summits and Gore-Chernomyrdin meetings. This year's achievements are presented below:

1. Securing Nuclear Materials.

- Initiated the PCAST report on fissile materials, which was briefed to the President and the Vice President in May, and led to a comprehensive Presidential Decision Directive (PDD) guiding this effort, new endorsements of these efforts at the May and September Clinton-Yeltsin summits, and the addition of a full-time Director for Nuclear Materials Security to the NSC staff. In response to a request from NSC, OSTP played a major role in drafting and revising the PDD.
- Working with DOE, proposed and gained interagency and Congressional agreement for more than doubling the budget for nuclear materials security improvements in the former Soviet Union.
- Provided key support for the June Gore-Chernomyrdin meeting, including drafting several major documents on nuclear security cooperation which were discussed by the Vice President and Prime Minister.

2. Building Confidence Through Openness

- Played a central role in U.S.-Russian negotiations on nuclear transparency, which led to agreement on a joint agenda for transparency negotiations agreed to at the May 1995 Clinton-Yeltsin summit.

3. Halting Accumulation of Excess Stocks

- Played an active role in efforts to implement the 1994 Gore-Chernomyrdin agreement to end production of weapons plutonium -- now moving toward a successful conclusion.

#### 4. Long-Term Disposition of Excess Plutonium.

- Continued to lead the interagency working group on plutonium disposition, in cooperation with NSC.
- Played a key role in P-8 (G-7 + Russia) discussions of disposition in preparation for the upcoming Nuclear Safety and Security summit.
- Chaired the first-ever U.S.-Russian joint study of plutonium disposition options, begun in 1995 and scheduled for completion in mid-1996.

Comprehensive Test Ban. The Clinton Administration has led the way toward achieving a Comprehensive Test Ban (CTB), banning all testing of nuclear weapons--a key nonproliferation initiative that has been a goal of Republican and Democratic Presidents dating back to President Eisenhower. Developing the Administration's approach to a CTB has required a careful and detailed assessment of how to maintain confidence in the nation's enduring nuclear weapons stockpile in the absence of nuclear testing--including a robust science-based stockpile stewardship program. OSTP has provided technical analyses and advice for the NSC process that helped lead to President Clinton's historic decision to endorse a CTB banning all nuclear explosions of any kind. In addition, OSTP has led the interagency effort to ensure that existing U.S. seismic networks, both military and civilian, will be fully integrated and exploited in support of CTB verification.

Theater Missile Defense and the Antiballistic Missile Treaty. To respond to threats of missile proliferation while maintaining existing arms agreements and the momentum toward further nuclear arms reductions, the Clinton Administration has sought to clarify the Antiballistic Missile (ABM) Treaty's line between permitted theater missile defenses and strictly limited defenses against strategic ballistic missiles. Working through the NSC process, OSTP has provided input on the technical effectiveness of proposed limitations, to maintain an effective ABM Treaty that will continue to serve as the cornerstone of strategic stability and strategic nuclear arms reductions.

### Presidential Directives

In FY 1995, President Clinton issued Presidential Review Directives and Presidential Decision Directives. The FY 1995 the directives issued include:

- Space Policy Review--The President established an Interagency Working Group, co-chaired by the NSTC and the NSC, to conduct a comprehensive review of national space policy. The intent of this review is to ensure that written policies

reflect the Administration's civilian, national security and commercial space policy. The Interagency Working Group was also tasked with identifying and recommending changes to related national security directives containing guidance on space policies and programs. External advice may be sought from the PCAST and other appropriate representatives of industry, academia, the non-profit sector, as well as state and local governments. Recommendations are expected by April 1996.

- **Global Positioning System (GPS) Policy Review**--The President directed the NSTC and the NSC to lead a comprehensive review of policy issues related to the future management and use of the GPS. GPS uses a constellation of 24 Earth-orbiting satellites that transmit timed radio signals giving their locations. By combining information from any four or more GPS satellites, someone on Earth can compute his/her location very precisely at any time of day or in any weather. While GPS was originally created for national security purposes, from its inception it has been considered a dual-use resource, with civilian as well as military applications. Civilian use of GPS is rising dramatically. A clear statement of national policy is needed to balance commercial and civil uses of GPS with essential national security aspects of the system. The Interagency Working Group reviewed the broad range of GPS-related technology and policy issues affecting national security, economic policy and foreign policy, and made recommendations for a single, coherent national policy for GPS management and funding which was announced by Vice President Gore on March 29, 1996.
- **Federal Laboratory Review**--The President issued a Decision Directive in September 1995 implementing the results of the Federal Laboratory Review of the DOE, NASA and the Department of Defense (DoD). The approach outlined in the Federal Laboratory Review report relies on parent agencies of the laboratories taking numerous actions, quickly and effectively, to make the needed improvements identified by the review. Each agency will report in May 1996 on whether the proposed approach is yielding sufficient progress toward measurable results.

### **Presidential and Vice Presidential Policy Statements**

Through OSTP, the President and Vice President have made several key policy statements during FY 1995, including:

Environmental Technology. The Administration continued strong support for environmental technology, a \$170 billion sector of our economy representing over one million jobs in 60,000 businesses. With the participation of Congress, the States, municipalities, industry, academia, non-governmental organizations and interested citizens, we began implementing the National Environmental Technology Strategy, released during Earth Week of 1995. Recent accomplishments include:

- the development of a CD-ROM containing comprehensive information on all Federal environmental technology programs (over 30,000 copies have been distributed);
- the implementation of the Rapid Commercialization Initiative designed to speed up the entry of near-commercial environmental technologies into the marketplace;
- the implementation of an environmental technology verification program to help developers of environmental technologies verify their technical performance;
- the development of an Environmental Technologies Testing and Demonstration Site Directory to help technology developers find appropriate Federal partners for technology demonstrations;
- the on-going efforts to provide better intelligence on overseas market opportunities for U.S. environmental technology businesses.

Science and Technology Biennial Report: The National Science and Technology Policy, Organization, and Priorities Act of 1976 requires the submission of a biennial report to Congress. In 1995, OSTP prepared, and the President transmitted, a report titled *Science and Technology*. This report details the Administration's commitment to S&T, relating the President's decision to make sound investments in S&T, even as the Federal government cuts other spending, on the basis that 1) technology is the engine of economic growth; 2) scientific knowledge is the key to the future; and 3) responsible government advances S&T. The report articulated the Administration's clear S&T goals, related recent accomplishments, and provided a glimpse into the future of S&T.

Second to None: Preserving America's Military Advantage Through Dual-Use Technology: Along with the National Economic Council (NEC) and the NSC, the NSTC co-authored this report on preserving America's military advantage through dual-use technology. Technology is cited as key to addressing the post-Cold war challenges. To maintain its technological advantage, the report notes that the DoD must break down the barriers created over the last 30 years between defense and civilian sectors. The DoD has become reliant on an increasingly segregated defense industrial base, which, for several reasons, is no longer

appropriate. As a nation we can no longer afford to maintain distinct defense and non-defense, commercial sectors. The report offers a vision of a single, cutting-edge national technology and industrial base that will serve military and commercial needs. This dual-technology approach offers the advantage of exploiting the rapid rate of innovation and market-driven efficiencies of commercial industry to meet defense needs. Strategies are proposed for achieving this goal, one of which is acquisition reform.

*National Critical Technologies Report:* In March 1995, OSTP and the National Critical Technologies Review Group submitted the 1995 Biennial National Critical Technologies Report. The report presents the results of the third biennial National Critical Technologies Review, addressing the state of development of 27 critical technologies, in seven categories, and the U.S. competitive position relative to Europe and Japan. Analysis demonstrated that the U.S. has a very tenuous lead in many technologies critical to our military and economic well being. The principal areas covered by the report are energy, environmental quality, information and communication, living systems, manufacturing, materials and transportation. The U.S. is at parity with, or ahead of, Europe and Japan for all 27 areas. Nevertheless, Japan is outpacing the U.S. in 10 areas and Europe is outpacing the U.S. in four areas. The report designates the technology areas and specific technologies which constitute priorities for the Federal R&D effort. Specifically, it is intended to:

- Identify necessary areas of focus for R&D
- Help leverage limited resources most effectively in times when S&T budgets are not growing as fast as they once did
- Help coordinate government R&D activities by supplying agencies with a common set of priorities and providing Congress with information to support policy decisions
- Serve industry as a guide for possible areas of cooperative R&D

*National Security Science and Technology Strategy.* Using the NSTC process and the March forum, the NSTC has developed the country's first National Security Science and Technology Strategy document that describes the ways in which U.S. investments and international cooperation in S&T support U.S. national security objectives. The document offers a policy context for and a rigorous defense of Clinton Administration initiatives, including the Cooperative Threat Reduction Program (Nunn-Lugar), the Advanced Technology Program, the Technology Reinvestment Program, and economic development programs aimed at mitigating or addressing the problems of endemic poverty, overpopulation, food scarcity, infectious diseases and environmental degradation. The document provides a clear juxtaposition between the Administration's and the Congressional majority's approach to America's role in the world, and focuses on the importance of investments in support of military superiority, verifiable arms control, sustainable development abroad and economic performance at home. The document will be reviewed and updated on an annual basis.

Meeting the Challenge--Health, Safety and Food for America: Early in FY 1995, the NSTC sponsored a forum as a follow-on to *Science in the National Interest*. This forum addressed questions fundamental to the health and well-being of Americans. Advice was sought from a broad range of forum participants from industry, academia, research laboratories, government and professional societies, who represented this Nation's outstanding leaders in S&T. Information obtained at the forum will be invaluable in setting Administration priorities for investment in health, safety and food R&D for the next century. This Administration's policy statement on health, safety and food R&D was released February 1996 and highlights the key themes developed at the this forum, i.e., good health and long life are goals of every American. The report also serves as a blueprint for a coordinated, national effort to reach this goal.

## FORA AND COLLOQUIA

Enhancing Education and Training. In partnership with all levels of government, as well as academia and the private sector, the NSTC helped develop a blueprint for addressing some of the most pressing problems in our science educational system. To help achieve the vision of ensuring all Americans access to quality education and training and achieving science, mathematics and engineering performance in the classroom and workplace that is second to none, the NSTC released its science policy document *Science in the National Interest*. In support of this report, the NSTC also sponsored several fora. The July 1995 forum Making it Happen: First in the World in Science and Mathematics Education was designed to elicit discussion and debate about policy options for producing the finest scientists and engineers for the future and improving science literacy for all Americans. This NSTC sponsored national forum brought together a broad range of stakeholders--over 200 experts from academia, private industry, consumer groups and state and Federal government--to identify the critical issues, discuss the current status of their collective efforts, and to address the country's short- and long-term objectives.

The Role of Science and Technology in Promoting National Security and Global Stability. The NSTC Committee for National Security (CNS) co-sponsored with the Council on Foreign Relations (CFR) and American Association for the Advancement of Science (AAAS) a leadership forum on The Role of Science and Technology in Promoting National Security and Global Stability. Participants included members of the National Academy of Sciences (NAS), AAAS, and CFR interested in the contributions of S&T to broader international policy goals. Also present were science diplomats and governmental policy makers from the executive and legislative branches. The forum served to launch a debate that led to an examination of the role of S&T in fostering post-Cold War stability. The forum launched an ongoing dialogue among government agencies and the private sector and

represented the first step in developing the country's first National Security Science and Technology Strategy.

*Emerging and Re-emerging Infectious Diseases*. Among the issues identified at the forum on The Role of Science and Technology in Promoting National Security and Global Stability was the threat to regional stability posed by the emergence and re-emergence of infectious diseases. The NSTC Committee for International Science, Engineering and Technology (CISSET), has developed an important study which analyzes U.S. and international capabilities to monitor and respond to emerging infectious diseases. Recent experiences with the Ebola virus and HIV/AIDS have demonstrated the need for consistent and coordinated monitoring and response. The document *Infectious Disease--A Global Health Threat* provides a list of recommendations to strengthen national and international surveillance and response. An interagency approved action plan outlining the steps needed to act on the report recommendations and a response to an NSC "tasker" on the matter were developed. An Implementation Group on Emerging Infectious Disease has been formed to carry out the recommendations. OSTP is drafting a Presidential Decision Directive in anticipation of a June 1996 release.

*Human Health and Climate Change*. In October 1994, Vice President Gore asked OSTP and the Council on Environmental Quality (CEQ) to organize a conference on the potential human health risks posed by climate change. The result was a two-day conference cosponsored by the Institute of Medicine, and held at the National Academy of Science (NAS) on September 11-12, 1995. The purpose of the conference was two-fold:

- To bring together a diverse group of experts from government, academia, industry and nongovernmental organizations to address the potential effects of climate change and ozone depletion on the current and future incidence of disease, heat stress, food and water supplies, and air pollution.
- To discuss initial recommendations for improving R&D, global health surveillance systems, health care and disease prevention, medical and public health community education, international cooperation and public outreach.

Over three hundred people attended the conference and Vice President Gore delivered the keynote address. A Summary of the Proceedings of the conference is expected to be published in early 1996.

## REPORTS

*A National Strategy for Environment and Natural Resources R&D. Preparing for the Future Through Science and Technology, An Agenda for Environmental and Natural Resources*

*Research*, completed and published during 1995, is a multidisciplinary strategy written by 13 executive branch, administrative and independent agencies which sets coordinated priorities to assure the most efficient use of scarce R&D resources. The strategy was developed by the NSTC, with the assistance of all relevant Federal agencies and other stakeholders from academia, industry and state and local government. It is aimed directly at the Administration's primary S&T goals:

- a clean environment (through support of the research that supplies the objective information necessary to support informed decision making);
- safe and healthy Americans (through greater understanding of human health implications of environmental changes and societal vulnerability to natural hazards);
- a strong economy (through cost-effective pollution prevention technologies and reduction of market and government inefficiencies);
- national security (by providing the information needed to reduce destabilizing environmental degradation); and
- improved education and training (by strengthening the environmental education curriculum).

‡ *Securing Russia's Nuclear Weapons Materials*. The Clinton Administration has assigned top priority to responding to the global nuclear proliferation threat posed by theft and smuggling of weapons-usable nuclear materials. OSTP has led the way in this critical effort, developing and outlining the Administration's comprehensive four-part plan to respond to the threat, and commissioning an in-depth report from the PCAST with recommendations on additional steps to strengthen the program. The PCAST report quickly led to a Presidential Decision Directive outlining a far-reaching plan of action to cooperate with the states of the former Soviet Union in improving security and accounting for nuclear materials.

## TESTIMONY

Director John H. Gibbons and his OSTP colleagues testified frequently before Congress during FY 1995, including the following statements:

- "The Future in Science and Technology" before the House Committee on Science;
- "H.R. 9, The Job Creation and Wage Enhancement Act, Title III on Risk Assessment and Cost-Benefit Analysis for New Regulations" before the House Committee on Science;
- "OSTP's Budget Request for Fiscal Year 1996" before the Senate Committee on Appropriations, Subcommittee on Veterans' Affairs, HUD, and Independent Agencies;

- "Clinton Administration Science and Technology Strategy" before the Senate Committee on Commerce, Science, and Transportation Subcommittee on Science, Space, and Technology

Robert T. Watson, Associate Director for Environment:

- "Federal Environment and Natural Resources R&D", before House Committee on Science, Space and Technology, May 1995.
- "Science of Climate Change", before the House Committee on Energy and Natural Resources, May 1995.
- "Convergence of the U.S. Military and Civilian Polar-Orbiting Environmental Satellite Program", before the Senate Committee on Commerce, Science and Transportation, June 1995.
- "Stratospheric Ozone Depletion", before the House Committee on Commerce August 1995.
- "Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates", before the House Committee on Science, September 1995
- "National Earthquake Loss Reduction Strategy", before the House Science Committee, October 1995.
- "Climate Models and Projections of Potential Impacts of Global Climate Change", before House Committee on Science, November 1995.

#### **Accomplishments of the President's Committee of Advisors on Science and Technology**

The President established the President's Committee of Advisors on Science and Technology (PCAST) to:

- advise the President on matters involving S&T; and
- assist the National Science and Technology Council in securing private sector involvement in its activities.

The direct link to the activities of the NSTC reflects our intention to incorporate advice from the private sector in developing the S&T budgets and policies of this Administration and

our intention to secure private sector advice on the implementation and evaluation of budgets and policies. PCAST is co-chaired by the Assistant to the President for Science and Technology and John Young, former President and CEO of Hewlett-Packard Co. The membership includes:

- Norman Augustine, President and CEO, Lockheed Martin Corporation
- Francisco Ayala, Professor, University of California, Irvine
- Murray Gell-Mann, Professor, Santa Fe Institute and California Institute of Technology
- David Hamburg, President, Carnegie Corporation of New York
- John Holdren, Professor, University of California, Berkeley
- Diana MacArthur, Chair and CEO, Dynamac Corporation
- Shirley Malcom, Directorate Head, American Association for the Advancement of Science
- Mario Molina, Professor, Massachusetts Institute of Technology
- Peter Raven, Director, Missouri Botanical Garden
- Sally Ride, Director, California Space Institute
- Judith Rodin, President, University of Pennsylvania
- Charles A. Sanders, Former Chairman and CEO, Glaxo-Wellcome, Inc.
- Phillip Sharp, Professor, Massachusetts Institute of Technology
- David Shaw, CEO, D.E. Shaw and Co.
- Charles Vest, President, Massachusetts Institute of Technology
- Virginia Weldon, Senior Vice President, Monsanto Company
- Lilian Shiao-Yen Wu, Research Staff, Thomas J. Watson Research Center, IBM

The Committee's second and third plenary meetings were held March 27-28 and July 11-12, 1995. At the March meeting, the PCAST discussed the relationship between S&T and economic growth. At the conclusion of the meeting, the Committee urged that in the face of mounting financial pressure to cut S&T investments, the U.S. should continue to provide strong support for a robust Federal R&D portfolio. The PCAST also received the findings and recommendations of the PCAST Panel on U.S.-Russian Cooperation to Control and Account for Fissile Materials. The Committee unanimously authorized the transmittal of this report to the President. The President was briefed personally on May 1, 1995, and immediately initiated actions to implement essentially all of the panel's recommendations. The President directed the development of language for use at the U.S.-Russian summit. After negotiations with the Russians, a joint statement was issued by Presidents Clinton and Yeltsin calling for accelerated and expanded cooperation to secure and account for nuclear materials. The joint statement also directed the Gore-Chernomyrdin Commission to prepare a joint report on additional steps that should be taken.

At the July meeting, the PCAST addressed issues related to the U.S. S&T enterprise and its ability to create new knowledge that is essential for achieving national goals. These

issues included the long-term health of the U.S. research university system and strategic considerations for improving Federal S&T capabilities in a time of government downsizing. Further, the PCAST Fusion Review Panel presented its findings and recommendations to the full Committee. OSTP asked PCAST to undertake this review in response to a Congressional request, in the FY 1995 Energy and Water Appropriations Act, for an assessment of DOE's magnetic fusion energy program. The panel provided a thoughtful and technically sound scheme for restructuring the fusion program, at a substantially reduced level of funding, noting that the program would lose essential elements and halt progress toward the fusion goal if funding were reduced to less than \$320 million per year through the next decade. The PCAST report supports the President's policy of treating R&D as a key long-term investment. The large scale of fusion experimental technology, the long lead time to commercialization and recent extraordinary achievements argue for continued strong Federal support within DOE. Further, the report indicates that international collaboration is necessary for demonstrating practical fusion energy.

**SUMMARY OF ACCOMPLISHMENTS IN FY 1996**  
**Office of Science and Technology Policy**  
**National Science and Technology Council**  
**President's Committee of Advisors on Science and Technology**

The Clinton Administration considers science and technology (S&T) one of the best investments we can make in America's future. Investments in S&T contribute to: a growing economy with more high-skill, high-wage jobs for American workers; a healthier population; a cleaner environment where energy efficiency, information technology, and advanced technology increase profits and reduce pollution; a stronger, more competitive private sector able to maintain U.S. leadership in critical world markets; an educational system where every student is challenged; and an inspired scientific and technological research community focused on ensuring our national security, on improving the quality of life for ourselves and our children, and on successfully meeting global problems through cooperation with other countries. The most important measure of success will be our ability to make a difference in the lives of the American people, to harness S&T to improve the quality of life and the economic strength of our nation.

The Office of Science and Technology Policy (OSTP) supports these objectives by: providing authoritative scientific and technological information, analysis, advice, and recommendations for the President, for the Executive Branch, and for Congress; participating in the formulation, coordination, and implementation of national and international policies and programs that involve S&T; maintaining and promoting the health and vitality of the U.S. S&T infrastructure; and coordinating research and development efforts of the Federal government to maximize the return on the public's investment in S&T and to ensure that resources are used efficiently and appropriately.

The Director of OSTP also serves as Assistant to the President for Science and Technology. In that capacity, he supports the activities of the President's National Science and Technology Council (NSTC), created November 23, 1993, by Executive Order and the OSTP staff serve as the technical staff of the NSTC. The NSTC has responsibility for:

- coordinating the formulation of S&T policy;
- ensuring S&T policy decisions and programs are consistent with the President's stated goals;
- helping to implement and integrate the President's S&T policy agenda across the Federal government;
- ensuring S&T are considered in the development and implementation of all Federal policies and programs; and
- furthering international cooperation in S&T.

OSTP also supports the President's Committee of Advisors on Science and Technology (PCAST), which advises the President and the NSTC. The following pages summarize White House S&T activities during Fiscal Year (FY) 1996.

### **Administration Initiatives**

The Clinton Administration is changing the nature of Federal S&T policy and policymaking. Initiatives spearheaded by the White House have redirected our investments in S&T toward fundamental national goals, while streamlining government and saving taxpayers' dollars.

At the beginning of this Administration, President Clinton made a commitment to the American people to integrate agency research and development (R&D) budgets to ensure the Nation's S&T investments served broad national goals, as well as agency missions. This Administration recognizes the contributions that R&D can make to the vitality of this country as we move closer to the 21st century. R&D guidance--in the form of broad policy principles and goals--was issued, for the third year, to guide individual agencies in their budget development. This R&D guidance, built on the previous year's deliberations, was participatively developed by the NSTC Committees, each of which sought input from a wide spectrum of stakeholders, including private industry, academia, and the public. Providing this guidance to the R&D agencies for another year reinforced the significant paradigm shift in the way the Federal R&D enterprise is addressed, both from a budget and a policy standpoint. We continue this year to refine and improve this new way of doing business.

In the interest of maintaining excellence, while minimizing Federal costs and maximizing effectiveness, the FY 1998 R&D policy principles direct the agencies to:

- emphasize peer review and select programs through a merit based competitive process
- jointly fund research and education programs through industry, university, or State partnerships
- support multiple goals that provide promise of a high social rate of return, such as improving the environment and helping American businesses compete internationally; ensuring national security while contributing to a strong technical base in civilian businesses; or coupling research, education, and training to strengthen the technical literacy of our diverse workforce
- establish and use metrics to measure progress and performance realistically

The six key R&D goals are to:

- Maintain World Leadership in Science, Engineering, and Mathematics
- Promote Long-term Economic Growth that Creates Jobs
- Sustain a Healthy, Educated Citizenry

- Harness Information Technology
- Improve Environmental Quality
- Enhance National Security and Global Stability

During FY 1996, each of the nine NSTC committees--fundamental science; health, safety, and food; environment and natural resources; information and communications; national security; civilian industrial technology; transportation; education and training; and international science, engineering, and technology--made progress towards addressing the S&T goals and policy issues identified in their strategic plans. The Administration, through the efforts of the NSTC and OSTP, achieved significant accomplishments in pursuit of specific initiatives within each of the six R&D goal areas. For example:

### *1. Maintaining World Leadership in Science, Mathematics, and Engineering*

Assessing Fundamental Science: The Government Performance and Results Act (GPRA) and the National Performance Review (NPR) call for better management of Federal programs through a process of setting goals and assessing results. Assessing fundamental science presents a challenge that requires the capture of quantitative, qualitative, and institutional dimensions. Building on previous activities conducted in FY 1995, the NSTC released *Assessing Fundamental Science*, in July 1996, that distills public and private experience to date with the assessment of fundamental science, offers basic assessment principles, and provides information about performance measures. The report provides Federal agencies and departments with a consistent set of general principles and high-level goals for the assessment process in fundamental science:

Federal Laboratory Review: The Department of Defense (DOD), Department of Energy (DOE) and National Aeronautics and Space Administration (NASA) laboratory systems account for at least one-fifth of the entire Federal investment in R&D--approximately \$15 billion of an approximate \$70 billion total. Last year the NSTC reviewed these laboratory systems to evaluate their effectiveness in responding to national S&T needs, and to identify ways the laboratories could contribute their best with maximum efficiency. This review resulted in the September 1995 Presidential Decision Directive (PDD) directing the agencies to better focus laboratory missions, reduce excessive agency oversight, and streamline agency and laboratory administrative processes. Input to the NSTC Report was obtained and formulated before the priority placed on balancing the Federal budget heightened. This has only increased the need to reduce Federal expenditures while at the same time meeting the nation's S&T needs. During the summer of 1996, OSTP coordinated an EOP follow-up study to assess agency responses to the PDD. The review confirmed that the agencies have made substantial progress in meeting the PDD goals, though work remains. Several recommendations emerged, including the need for better productivity measures, improved coordination between the agencies and the laboratories, greater flexibility in Federal personnel rules and regulations, and removal of barriers to interagency use of national laboratories.

National Bioethics Advisory Commission. On October 3, 1995, the President established the National Bioethics Advisory Commission (NBAC) to ensure the ethical conduct of human biological and behavioral research. Eighteen experts and community representatives have been appointed to the Commission. The first meeting was held October 4, 1996. As its first priority, the Commission will address the adequacy of government human subject protections measures and the use and management of genetic information. OSTP played a leading role in establishing the Commission and provides the Designated Federal Official to oversee its activities.

U.S. Antarctic Program. In the Fall of 1995 the Congress requested that the NSTC examine the U.S. presence in Antarctica in light of new Federal budget realities and post Cold War geopolitics. Under the auspices of the NSTC Committee on Fundamental Science, a working group with representatives from all Federal agencies with Antarctic interests, prepared a report on the United States Antarctic Program. The report, released in April 1996, reviewed the National Science Foundation's (NSF) management of U.S. Antarctic operations as well as the program's scientific research. NSTC found the science to be of high quality and high interest and it recommended that an external, blue-ribbon panel be formed to suggest how to maintain the science within funding constraints. The report has been very well received by Congress and the scientific community. The Blue-Ribbon panel has been assembled, is chaired by Norman Augustine (Chief Executive Officer (CEO), Lockheed-Martin), and is meeting to study detailed questions about U.S. Antarctic operations, including the major task of rebuilding the South Pole Station.

Immigration. During the 103<sup>rd</sup> Congress, the Clinton Administration engaged in deliberations regarding legislative and administrative reforms of immigration policy. OSTP coordinated the input of the research agencies concerning the important role of non-U.S. scientists and engineers in support of our National research and education capabilities. Because legislation was not enacted, an issue of the method for determining the appropriate level of compensation for non-U.S. scientists remained unresolved at the conclusion of the legislative calendar. OSTP has worked with the Office of Management and Budget (OMB) and relevant Executive Branch agencies to reach a conclusion that will allow the continued participation of exceptional individuals from around the world in our scientific endeavors, in a manner that is consistent with our National goals.

## *II. Promoting Long Term Economic Growth*

Partnership for a New Generation of Vehicles. The Federal Government and USCAR (Ford, Chrysler, and General Motors) together with suppliers, other businesses and universities, have developed a joint R&D program for the research on commercially-viable vehicle technology that, over the long term, can preserve personal mobility while further reducing the impact of cars and light trucks on the environment and reducing dependence on imported petroleum. The partnership includes research on: 1) manufacturing productivity improvement; 2) near-term improvement in fuel efficiency and emission reduction; and 3) development of a production prototype with three times the fuel efficiency of today's vehicles, with comparable cost and performance by the year 2010. Key technologies include: advanced light-weight materials; energy conversion (e.g., gas turbines and fuel cells); energy

storage devices (e.g., flywheels, ultra capacitors and advanced batteries); and more efficient electrical systems. The research plan is annually peer-reviewed by the National Research Council (NRC). The NRC issued its second peer review report in March 1996 and is currently concluding its third review. Many recommendations from the 1996 review have been incorporated into the FY97 program.

Construction and Building. This collaboration between Federal agencies and the U.S. construction industry develops better construction technologies to improve the competitive performance of the U.S. industry, raise the life-cycle performance and economy of constructed facilities, and protect public safety and the environment. The initiative responds to a high level of industry interest, and combines government and industry goals.

Quantitative goals have been established for accomplishment by the year 2003. They include 50 percent reduction in the time necessary to obtain regulatory clearance, design and construct residential and commercial buildings; 50 percent reduction in operation, maintenance and energy costs; 50 percent less waste and pollution (including emissions of greenhouse gases); and 50 percent fewer accidents and illnesses associated with construction and occupancy. Regulatory issues that present barriers to innovation are also considered. These goals will be achieved with improved housing affordability, and where possible, with a reduction in both initial and lifetime costs. The NSTC Committee on Civilian Industrial Technology developed, with industry participation, the Federal R&D strategy to support the building and construction industry and issued the report, *Construction and Building: Federal Research and Development in Support of the U.S. Construction Industry*, in October 1995. Building on this work, and on the 1994 National Construction Goals workshop, the Construction and Building Subcommittee held a workshop in April 1996 to define potential collaborations between industry, academia, and Federal, State, and local governments.

In September 1996, with the NSTC State-Federal Technology Partnership, the Subcommittee initiated a project to be performed by the National Council of States Building Codes and Standards (NCSBCS) to streamline and coordinate the regulatory permitting of construction projects by developing model regulations and standards. Permitting involves compliance with land use, zoning, environmental, and health and safety regulations of local, State, and Federal agencies. These model regulations and procedures will be developed in consultation with industry and State and local governments to be recommended for use by local, State & Federal agencies.

State-Federal Technology Partnership. This initiative was undertaken at the request of the Director of OSTP, in recognition of the fact that State governments were increasingly active and interested in S&T as part of their economic development plans. At the same time, it is recognized that states have better knowledge of industry needs in their jurisdiction and have knowledge of financing and venture capital availability to commercialize innovations derived from the investment in S&T to support their economic development goals. A position was established within OSTP to coordinate the federal participation and interface with the states on this initiative.

A task force co-chaired by former Governors Celeste and Thornburgh was commissioned to recommend actions to be undertaken to create a State-Federal Technology Partnership to combine the talents and infrastructure of State and Federal governments in planning and executing S&T programs. The report of the task force was published on September 5, 1995. In an effort to implement the recommendations contained in that report, the Director of OSTP appointed Dr. Mary Good, Under Secretary for Technology at the Department of Commerce, to chair a working group to organize Federal agency activities supporting this initiative.

In March, 1996, the Director of OSTP invited Governor Tommy Thompson, then chair of National Governors Association (NGA), to a White House conference where Governors expressing interest in the SFTP and Federal Officials, with major responsibilities for S&T programs, would convene to establish an organization under which the partnership would operate. In preparation for the conference, task groups were appointed, consisting of both State and Federal members, to prepare issue papers showing potential areas of technology partnerships.

These issue papers will be presented at regional meetings to solicit input from a wide audience. These meetings will take place before the meeting of the principals now scheduled for February 1997. While working to formalize a partnership organization, an on-line information network is being built for partnership participants. One component of this network is a compilation of all State and Federal manufacturing development and outreach activities active at this time.

*Biomass Energy.* The Administration is evaluating the near- and long-term potential for biomass to serve as a major fuel source for electricity generation, and for converting biomass fuels for transportation. A carefully designed program could result in a new source of income for farmers and farm communities while reducing greenhouse gas emission and oil imports. The initiative involves continued research into feedstock development and conversion of biomass to electricity and fuels. A major element of this initiative has been the cooperative agreement between DOE and the Department of Agriculture in the Biomass for Rural Development program. This program is in the form of a solicitation whose goal is to develop and ultimately commercialize biomass energy systems. Three projects were signed to begin this initiative. The first was with the Salix Corporation in New York with the objective to achieve delivered cost of willow feedstocks at less than \$2/mmBtu by the year 2001, attempting to use 6,000 acres producing up to 47MW directly and through cofiring in existing plants.

The second project was with the Minnesota Valley Alfalfa Producers to develop an integrated alfalfa processing and biomass power system using integrated gasification combined-cycle technology to proceed 75MW of baseload power, and process 700,000 tons of alfalfa per year into a variety of products by the year 2001. Finally, the last project just signed in October was with the Iowa-Charlton Valley Partnership to use 30,000-40,000 acres of underutilized marginal conservation reserve program cropland to grow switchgrass to be used to generate 35MW through cofiring at an existing coal-fired facility. Each of these projects will take us a long way in demonstrating the feasibility of these technologies and will help to understand problems. Research efforts from this can help bring the costs down.

The NSTC Committees on Environment and Natural Resources and on Civilian Industrial Technology are leading this initiative.

*National Electronics Manufacturing Initiative.* NSTC's Electronics Subcommittee of the Committee on Civilian Industrial Technology undertook an initiative with the American Electronics Association (AEA) to develop a partnership to support the nation's electronics manufacturing industry. This effort came to fruition on March 13, 1996, with the announcement of National Electronics Manufacturing Initiative, Inc. (NEMI). NEMI is a consortium created to ensure the sustained growth and competitiveness of electronics manufacturing in the U.S. NEMI is an industry-funded, industry-led, private-public partnership that brings together the largest electronic equipment manufacturers in the U.S., their key suppliers and government agencies to foster development of the world's best electronics manufacturing supply chain. NEMI will improve manufacturing technology by establishing development and implementation projects between users and suppliers. In addition, NEMI has identified key R&D activities which will require the coordination of its members and outside organizations. NEMI is working with government and non-government organizations including the NSTC, OSTP, Defense Advanced Research Projects Agency (DARPA), Semiconductor Industry Association (SIA) and SEMATECH to establish linkages to ensure this coordination.

*International Space Station.* OSTP continued to be the White House focal point for policy and program oversight related to development of the redesigned International Space Station. Over this past year, OSTP has been integral to maintaining European, Russian, Japanese and Canadian support for the project. OSTP has also worked closely with the OMB and NASA to ensure that the program stays within budget and on schedule. When fully assembled, the International Space Station will be a unique, world-class, scientific and technological facility for experimentation and research. It will also be a symbol of the tremendous accomplishments that cooperation in the post Cold-War era can bring.

*Global Positioning System (GPS).* On March 29, 1996, the President approved a new national policy on the future management and use of the GPS, Presidential Decision Directive NSTC-6. The President's policy will open the door for rapid growth in a burgeoning civil and commercial GPS market that could add 100,000 jobs to the U.S. economy and grow from \$2 billion to \$8 billion in annual sales by the year 2000. OSTP, working with the National Security Council (NSC) and other Executive Branch Agencies, was the principle architect of the policy.

*Aeronautics and Aviation Research and Technology.* The Administration's *Goals for a National Partnership in Aeronautics Research and Technology* was released in September 1995. This report, which was prepared by the NSTC in cooperation with industry and academia, presents the Administration's vision and goals for future Federal investments in aeronautics and aviation research and technology. The research agenda outlined in this report is meant to achieve three fundamental goals--maintain the superiority of U.S. aircraft and engines; improve the safety, efficiency, and cost effectiveness of the global air transportation system; and ensure the long-term environmental compatibility of the aviation system.

Evidence of our progress in fostering a renewed spirit of cooperation and partnership can be found in a number of recent Memoranda of Understanding, between NASA and the Federal Aviation Administration (FAA), in areas ranging from advanced air traffic technologies to general aviation and human factors.

### *III. Sustaining a Healthy, Educated Citizenry*

*Emerging and Re-emerging Infectious Diseases.* OSTP led the development of a Presidential Decision Directive (NSTC-7) which called for strengthening our ability to respond to the growing global threat of emerging and re-emerging infectious diseases. This policy is based on the recommendations of the report, "Infectious Disease--A Global Health Threat," of the Committee on International Science, Engineering, and Technology (CISSET) of the NSTC. The priorities of this policy initiative include: 1) strengthening domestic infectious disease surveillance and response, both at the Federal, State, and local levels and at ports of entry into the United States; 2) working with other nations and international organizations to establish a global infectious disease surveillance and response system; 3) strengthening research activities to improve diagnostics, treatment, and prevention, and to improve the understanding of the biology of infectious agents; 4) ensuring the availability of the drugs, vaccines, and diagnostic tests needed to combat infectious diseases and infectious disease emergencies through public and private sector cooperation; 5) expanding missions and establishing the authority of relevant U.S. Government agencies to contribute to a worldwide infectious disease surveillance, prevention, and response network; and 6) promoting public awareness of emerging infectious diseases through cooperation with non-governmental organizations and the private sector.

*Health, Safety and Food.* The NSTC Health, Safety and Food Committee has developed a research agenda for maintaining and improving America's health and food supply. The goals include creating the fundamental knowledge, promoting prevention, disseminating information broadly and rapidly and improving education in the areas of health, safety and food. Under the auspices of the NSTC, the policy document *Meeting the Challenge* was prepared (released in February 1996), which reflects public stakeholder views expressed at a November 1994 forum. This policy document lays out the following five initiatives: 1) establish the Presidential Early Career Scientist Award; 2) strengthen domestic health, safety, and food data systems; 3) strengthen the integrated, multidisciplinary human nutrition research initiative; 4) develop an integrated research agenda to develop technologies to assure the safety and quality of food for consumers; and 5) develop methods for assessing exposures and other factors influencing health.

*Excellence in Science, Mathematics, and Engineering Mentoring.* This program was established in 1996 to recognize outstanding mentoring efforts and programs that have served to encourage minorities, women, and persons with disabilities to succeed in science, mathematics, and engineering. Ten individual and five institutional awards were recognized on September 25, 1996. These winners were selected from 131 nominees, which included 90 individuals and 40 institutions, by leaders in the community using NSF peer review procedures. OSTP was responsible for implementation of this new Presidential award.

Presidential Early Career Awards for Scientists and Engineers. This new awards program for early investigators across government agencies was approved by President Clinton on February 1, 1996. Maintaining leadership across the frontiers of scientific knowledge and producing the finest scientists and engineers for the 21st century, two of the five goals enunciated in the NSTC's Science in the National Interest, are both significantly served by this award. This year, nine departments and agencies selected their nominees and the President selected 60 individuals to receive their awards at a ceremony in Washington, D.C. later this year. OSTP was responsible for implementation of this new Presidential award.

The Children's Initiative. The NSTC Committees on Health, Safety, and Food and on Fundamental Science co-sponsored a Children's Initiative to examine the research agenda on the biological, cognitive, and social development of America's children and adolescents. With OSTP leadership, this work was undertaken by a subcommittee with representation from all Federal stakeholders in research on children. The size and scope of the Federal research portfolio on children and adolescents has been assessed and gaps in the current knowledge base and in research funding have been identified. Research priorities of the agencies were reviewed and recommendations formulated for sustainable collaborations and communications within the Federal government and appropriate partnerships with public and private sector parties. Recommendations were also made regarding the use of research findings to improve the quality of services and the formulation of policies regarding children.

Technology Learning Challenge (TLC). OSTP has helped lead the Clinton Administration initiated the Technology Learning Challenge (TLC) grant program to challenge communities to form local partnerships of school systems, colleges, universities, and private businesses to develop creative new ways to use technology for learning in FY 1995. Grants focus on integrating innovative learning technologies into school curricula. Federal funds leverage local resources, each Federal dollar is matched by more than three to one by local and private funds. The program is administered by the Interagency Learning Technology Office (ILTO) which coordinated awards in multi-year challenge grants to 19 communities in 16 states in FY 1995. The 19 recipients and their partners represent a total of 23 states. The President's proposed Technology Literacy Challenge will expand this program from less than \$10 million to \$75 million per year to assure that local innovation keeps U.S. schools on the leading edge of learning technologies. In FY 1996, 24 finalists have been identified for grants to communities in 16 states. If all finalists are awarded grants, the result would be a total of 43 active grants in 26 states.

An NSTC-led interagency effort supports R&D to increase the productivity of learning and teaching. Areas identified as critical by the NSTC include: 1) high quality, affordable software and other learning tools that support learner-centered instruction and are consistent with new standards; 2) effective models for technology use, including attributes such as network configurations, State and local technology plans, professional development, and ongoing operational support; 3) basic research on technology-supported learning, involving fields as diverse as anthropology, computer science, education, linguistics, and psychology; 4) new models of assessing progress in learning, e.g., measurements of productivity gains in the workplace; and 5) technology and networking demonstrations, including connections to the national information infrastructure. The work of the NSTC in this area has supported the

President's Educational Technology Initiative, launched in February 1996, and has included public/private partnership activities such as NetDays, Tech Corps, Technology Literacy Challenge and Cyber Ed.

#### *IV. Improving Environmental Quality*

*Environmental Technology.* Following a series of workshops held across the country with more than 1000 key stakeholders, OSTP hosted a White House Conference with 200 high-level representatives from industry, non-governmental organizations, and state and local governments, to discuss ways to implement the *National Environmental Technology Strategy* that will: 1) facilitate the development and deployment of environmental technologies; 2) provide better access to Federal environmental technology programs; 3) support technology verification and demonstration; 4) enhance export promotion for U.S. technology; and 5) identify and reduce regulatory barriers impeding the use and financing of innovative environmental technologies. A *Federal Directory of Environmental Technology Test and Demonstration Sites* was also developed and released that lists over 100 sites at Federal facilities around the country where the private sector can partner with the government to demonstrate new approaches to remediation, monitoring, pollution control, or prevention.

*National Environmental Monitoring and Research.* Through leadership of the NSTC Committee on Environment and Natural Resources (CENR), OSTP has fostered an interagency effort to integrate the Nation's environmental monitoring and related research. Coordination of the 15,000 Federal environmental monitoring sites and the approximately \$650 million annual expenditures will allow us to better understand the causes and effects of environmental change and the ability to predict how an action will affect the health of ecosystems in the future. A framework for this integration has been completed and will be published in the Spring of 1997. A Mid-Atlantic Regional Workshop was held in April 1996 to lay the basis for a pilot demonstration project. A national workshop was held in September 1996, involving representatives from state and local governments, industry, non-governmental organizations, and academic experts to build the broadest possible foundation for integrating national monitoring efforts.

*Natural Disaster Reduction.* In FY 1996, announced NSTC's *Strategy for National Earthquake Loss Reduction*, that focuses scarce research and development dollars on the most effective means for saving lives and property and limiting the social disruptions from earthquakes. Economic losses from natural disasters such as hurricanes, floods, earthquakes, landslides, geomagnetic storms, and volcanic eruptions will be reduced in the future because of the Federal Emergency Management Agency's (FEMA) new *National Mitigation Strategy* that utilizes the combined talents and concerted efforts of all levels of government, academia, professional and voluntary organizations, the corporate sector, and all Americans. A strategic plan for the National Space Weather Program was announced and \$1.2 million in research grants was awarded to improve predictions of solar storms. The U.S. Weather Research Program awarded \$1.4 million in new funding for research grants to improve predictions of hurricane landfall and flash floods, and to enhance the use of offshore observations for tracking winter storms. In November 1995, CENR Subcommittees on Natural Disaster Reduction and Risk Assessment sponsored a conference on "Risk Assessment and Decision-

making on Natural Hazards," that provided a wide range of new ideas on strategies for a comprehensive and integrated national risk assessment with respect to natural hazards, and represented a first step in the implementation of the Subcommittees' strategic plans.

Recognizing that natural disasters cause the loss of thousands of lives and hundreds of billions of dollars in damage annually worldwide, OSTP led the formation of an interagency working group, under the NSTC, to consider ways in which international cooperation and advances in S&T can be more fully exploited to reduce the cost to life and property from natural disasters.

*Interagency Assessment of Oxygenated Fuels.* To address public concerns and to take full advantage of the extensive expertise across the Federal government, the Environmental Protection Agency (EPA) requested the assistance of OSTP through the NSTC/CENR to coordinate a comprehensive assessment of the winter oxygenated gasoline program. The use of oxygenated gasoline was mandated under the Clean Air Act Amendments of 1990 in areas of the country that did not meet the Federal ambient air standard for carbon monoxide. Soon after the oxygenated gasoline program was introduced nationally in the winter of 1992-1993, anecdotal reports of acute health symptoms were received by health authorities in various areas of the country and complaints were voiced of reduced fuel economy and engine performance. The NSTC report titled *Interagency Assessment of Potential Health Risks Associated with Oxygenated Gasoline* was released in February 1996. In addition to assessing the effects on public health, working groups also prepared evaluations of the effects on air quality, water quality, fuel economy, and engine performance. Each of the chapters in the comprehensive *Interagency Assessment of Oxygenated Fuels* underwent extensive external peer-review prior to the submission of the entire report for review by the National Research Council (NRC) of the National Academy of Sciences. The NRC review was completed in June 1996 and, for the most part, it agreed with the information in the Interagency report. The Interagency Assessment is being revised, taking into consideration the findings and comments from the NRC review, and will be released to the public after review by the NSTC.

*International and Interagency Assessments.* The Environment Division of OSTP continued its critical role in leading and coordinating U.S. government participation in scientific and technical assessments of important environmental issues. We produced a short summary of climate change science, based on the *Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*, that included information about both the physical climate system and potential impacts of climate on the U.S. This summary was distributed by the U.S. delegation at the Second Conference of Parties of the Framework Convention on Climate Change, and to Administration officials and all members of Congress to assist in their deliberations on climate change policy. OSTP continues to be closely involved in discussions on the work plan for the next round of IPCC assessment and review of the current round of IPCC technical papers drawn for the recently published *Second Assessment Report*.

*Program Guide to Federally Funded Research.* A *Program Guide to Federally Funded Environment and Natural Resources R&D* was published and made available on the OSTP Home Page. It provides information to colleges, universities, and other research institutions on programs within Federal agencies that fund R&D in environment and natural resources areas. It describes the general competitive process of merit review and evaluation

for the types of environment and natural resources research that is supported by Federal agencies. It provides researchers with an understanding of the scope of Federally-funded environment and natural resources research, and potential funding opportunities.

Endocrine Disruptor Research. An interagency work group was established by the CENR and has developed a planning framework for Federal research related to the human health and ecological effect of endocrine disrupting chemicals and has conducted an inventory of on-going Federal research programs. The framework, which reviews the current state of the science and major uncertainties related to endocrine disrupting chemicals and identifies research areas in need of attention, was released at a work group meeting with international participation, on November 22, 1996. It, in conjunction with the inventory, will be used to identify research gaps and to develop a coordinated interagency plan by the end of the year. This effort responds quickly to evidence that domestic animals and wildlife have suffered adverse consequences from exposure to environmental chemicals that interact with the endocrine system. These problems have primarily been identified in species exposed to relatively high levels of organochlorine compounds, including DDT and its metabolites, PCBs and dioxins, although other chemicals may be involved. Whether similar effects are occurring in the general human or wildlife populations from ambient environmental levels or whether there are synergistic effects is currently unknown.

Education for Sustainability. OSTP contributed to the creation of *An Agenda for Action*, a unique report written in collaboration among hundreds of individuals across the nation from government, business, nongovernmental organizations, and the educational community. This document, available for distribution December 1996, is designed to serve as a model for projects, programs, and opportunities that will encourage education for sustainability as a critical part of a lifelong learning process. The development of *An Agenda for Action* occurred in consort with the work of the President's Council on Sustainable Development and the National Environmental Technology Strategy. The Agenda lays out a number of overarching policy recommendations to steer our nation toward a more sustainable future.

Seismic Networks. On November 14, 1995, the Director of OSTP sent key members of Congress a letter summarizing the results of a year-long NSTC interagency process to improve the coordination of Federal seismic research and monitoring activities. The letter was written to call attention to the importance of U.S. seismic network programs and their relationship to test ban negotiations. These programs provide data to the U.S. in the areas of monitoring of nuclear weapons tests, geoscience research, and earthquake hazard monitoring. Each application has different requirements and the Administration examined the appropriate funding and potential for multiple use of such networks.

## V. *Harnessing Information Technology*

High Performance Computing and Communications (HPCC). The Federal HPCC Program coordinates Federal efforts to accelerate progress in the crucial areas of computation, information, and communications. By facilitating deployment of easy-to-use information technology, this program has clearly generated important societal benefits and encouraged the information revolution. The recent accomplishments of the program, which celebrated its

fifth anniversary in October 1996, are described in the supplement to the Presidents 1997 Budget: *Advancing the Frontiers of Information Technology*. The program plans and goals for the coming year are outlined in the *HPCC 1997 Implementation Plan*.

Additionally, the NSTC Committee on Computing, Information, and Communications sponsored several HPCC-related events during FY 1996:

- PetaFlops Architecture WorkShop (PAWS) (April 1996).
- PetaSoft Systems Software Summer Study (PetaSoft '96) (June 1996).
- Workshop on Software Tools for High Performance Computing Systems co-sponsored by the High End Computing and Computation Working Group of the Computing, Information, and Communications R&D Subcommittee of the CCIC (October 1996).
- A research exhibit at Supercomputing '96, the premier U.S. conference on high performance computing (November 1996).

*National Information Infrastructure (NII) Initiative.* Since the start of the Administration, staff members from the Technology Division of OSTP have been involved in almost every facet of the Administration's NII Initiative to spur the development and use of the information highway. Through the many inter-agency working groups of the Information Infrastructure Task Force (IITF), OSTP staff have provided advice on new technological developments and helped ensure that Administration telecommunications and information technology policies promote, not hinder, the development and deployment of new technologies and applications. For instance, OSTP staff have been deeply involved in the efforts of the IITF Committee on Applications and Technology to promote a wide spectrum of applications of information technology. OSTP staff have also contributed to the work of the Privacy Working Group and the Security Issues Forum, which are examining ways to protect the privacy and security of electronic information.

*Encryption Policy.* For the first three and a half years of the Administration, OSTP and NSC co-chaired an interagency working group on Encryption and Telecommunications, which has developed policy recommendations on how best to promote global encryption solutions that provide strong protection for electronic data without endangering public safety or national security. An OSTP staff member chaired an international meeting at the Organization for Economic Cooperation and Development (OECD) in Paris in December 1995, in which over 80 representatives of over 20 nations discussed ways to address this difficult and controversial problem. OSTP has been involved in subsequent OECD negotiations on international cryptography policy guidelines.

*Global Information Infrastructure (GII) Initiative.* OSTP staff have been deeply involved in promoting and implementing the Administration's GII Initiative, which was launched in February 1995. OSTP staff have participated in various multilateral and bilateral international meetings on the GII, including the Asia Pacific Economic Council (APEC)

meeting of telecommunications ministers held in Seoul, Korea in 1995, the U.S.-Italy Bilateral Dialogue on the Information Society in October 1996, and several U.S.-European Union ministerial-level meetings on the GII.

In addition, OSTP staff have done dozens of briefings for foreign officials and business representatives on the NII and the GII initiatives in order to promote competitive, open markets in the telecommunications, computer, and content industries. In the past year, OSTP staff have made presentations at dozens of major conferences, both here and abroad, including at the World Economic Forum Annual Meeting in Davos, Switzerland in February 1996; a conference on the information highway in Paris sponsored by the French Ministry of Post and Telecommunications in February 1996; a high-level conference on information technology in China in April 1996 sponsored by the Chinese Ministry of Post and Telecommunications; a World Bank-sponsored conference on information technology in Indonesia in April 1996; and the Agenda '96 conference (an annual conference of computer industry CEOs in October 1995). In addition, OSTP staff serve on an advisory committee set up by the Director-General of UNESCO to advise him on information technology issues.

Electronic Commerce. OSTP staff have played an important role in an interagency working group convened by Ira Magaziner to develop a comprehensive Administration strategy for promoting international electronic commerce on the GII. OSTP contributed chapters on encryption and security and has helped review and shape the soon-to-be-released paper outlining the strategy.

## VI. *Enhancing National Security and Global Stability*

International Agreements. OSTP has worked successfully to expand U.S. S&T relationships with important trading partners and economies in transition. To complement the Commerce Department's Big Emerging Markets strategy, OSTP developed strategies for comprehensive S&T cooperation with key countries, including China, Russia, South Africa, India, Argentina, and Brazil. The goal of these strategies is to provide guidance to agencies as they engage in international S&T cooperation so that our investments yield benefits for U.S. scientific, economic, and national security interests. For example, OSTP participated in the Vice President's Sustainable Development Forum with China to ensure that the S&T capabilities of the two nations could be fully harnessed for a healthy global environment. On behalf of the President, OSTP also hosted the second meeting of the S&T Committee of the U.S.-South African Binational Commission and encouraged U.S. technical agencies to join South Africa in projects to combat infectious diseases, ensure food security through weather prediction and agriculture technology projects, and rebuild South Africa's S&T capacity among the disenfranchised. Through the Gore-Chernomyrdin Commission, OSTP oversaw the initiation of new projects in high-energy physics and a new program in biomedical and behavioral research under the Civilian Research and Development Foundation. OSTP is also enhancing the value of S&T engagement with Japan through the review and promotion of opportunities for improving the relationship, such as the creation of the Earthquake Disaster Mitigation Partnership this year.

OSTP has also taken the U.S. Government lead in several multilateral fora as a way to maximize U.S. S&T investments in a time of shrinking budgets. In Latin America, OSTP worked with its counterparts in the hemisphere to organize the first-ever meeting of S&T Ministers. The Ministers adopted 50 recommendations to promote S&T cooperation and support the broad goals of the Summit of Americas process. In the Asia Pacific region, OSTP led the U.S. delegation in the first APEC Ministerial Conference on Regional Science and Technology Cooperation in November 1995, to mitigate stresses on the environment and natural resources brought about by economic growth in this region and to provide for greater access to markets and technology in these economies.

OSTP has also continued to support international collaboration on large and/or sophisticated science projects as a way to gain new scientific and technological advances while minimizing the costs to U.S. tax payers. OSTP promoted the creation of a follow-on mechanism to the OECD Megascience Forum, ensuring that international cooperation on large high-priority S&T programs continues to receive international attention. Moreover, OSTP worked closely with the technical agencies and OMB to coordinate the U.S. Government's negotiating position on such projects as the Large Hadron Collider, the Human Frontier Science Program, and the International Thermonuclear Experimental Reactor.

*Nonproliferation of Nuclear Weapons.* OSTP has been working with the NSC to coordinate U.S. efforts to control nuclear weapons and the fissile materials needed to make them. This is a broader scope than past arms control agreements, such as the START treaties, that were limited to missiles and launchers. The Clinton Administration has been implementing a comprehensive four-part strategy to secure nuclear material, build confidence through openness, halt the accumulation of excess materials, and carry out disposition of excess materials. Working closely with the NSC, OSTP has successfully initiated new policy approaches to securing nuclear materials, provided key support to U.S.-Russian negotiations, and drafted papers and statements for both Presidential summits and Gore-Chernomyrdin meetings. This year's achievements are presented below:

- **Securing Nuclear Materials.**
  - Working with DOE, proposed and gained interagency and Congressional agreement for continued substantial funding for nuclear materials security improvements in the former Soviet Union.
  - Provided key support for the July Gore-Chernomyrdin meeting, including drafting several major documents on nuclear security cooperation and related issues which were discussed by the Vice President and Prime Minister.
  
- **Building Confidence Through Openness**
  - Continued to play a central role in support of U.S.-Russian negotiations on nuclear transparency, in anticipation of a resumption of transparency negotiations agreed to at the May 1995 Clinton-Yeltsin summit.

- Halting Accumulation of Excess Stocks
  - Continued to play an active role in efforts to implement the 1994 Gore-Chernomyrdin agreement to end production of weapons plutonium--now moving toward a successful conclusion.
  
- Long-Term Disposition of Excess Plutonium.
  - Continued to lead the interagency working group on plutonium disposition, in cooperation with the NSC.
  - Played a key role in both interagency preparations and P-8 (G-7 + Russia) discussions of disposition in preparation for the April 1996 Nuclear Safety and Security Summit.
  - Chaired the first-ever U.S.-Russian joint study of plutonium disposition options, begun in 1995 and completed in August 1996, with follow-on technical analyses and small scale demonstrations in cooperation with Russia, scheduled to begin in late 1996.
  - Worked with DOE in preparing and reviewing its nonproliferation assessment of alternative U.S. excess plutonium disposition options.
  - In cooperation with the NSC, coordinated interagency preparations for and participated in the U.S. delegation to the October 1996 meeting of disposition experts in France called for by the P-8 nations at the April 1996 Moscow Nuclear Summit.

Comprehensive Test Ban. The Clinton Administration has led the way toward achieving a Comprehensive Test Ban Treaty (CTBT), banning all testing of nuclear weapons--a key nonproliferation initiative that has been a goal of Republican and Democratic Presidents dating back to President Eisenhower. Developing the Administration's approach to a CTBT has required a careful and detailed assessment of how to maintain confidence in the nation's enduring nuclear weapons stockpile in the absence of nuclear testing--including a robust science-based stockpile stewardship program. OSTP has provided technical analyses and advice for the NSC process that helped lead to President Clinton's historic decision to endorse a CTBT banning all nuclear explosions of any kind. OSTP has also been an active participant in interagency working group meetings that directed U.S. negotiation efforts and strategies for concluding the text of the CTBT and for achieving UN approval resulting in the successful completion of a CTBT in 1996. In addition, OSTP has led the interagency effort to ensure that existing U.S.-operated global seismic networks, both military and civilian, will be fully integrated and exploited in support of CTB verification.

National Security/Emergency Preparedness. By Executive Order, the OSTP Director is assigned responsibility for directing the exercise of the President's wartime authorities over domestic telecommunications derived from the Communications Act of 1934. In emergencies or crises in which the exercise of the President's war power functions is not required or permitted by law, the OSTP Director is charged with the responsibility to advise and assist the President and Federal departments and agencies with the provision, management, or allocation of telecommunications resources. The National Communications System (NCS), a formal interagency organization, assists the President, the OSTP Director, the National Security Advisor, and the Director of OMB in the exercise of national security and emergency

preparedness of telecommunications functions. OSTP works closely with the NCS in providing telecommunications support to Federal, State, and local response efforts following a Presidentially-declared emergency, major disaster, extraordinary situation, or other emergency. OSTP is also a key participant in classified continuity of government programs which relate to the domestic infrastructure. In 1996, an OSTP member was appointed Deputy Director of the National Emergency Management Team (NEMT), which is part of a program to ensure continuity of government at the Federal, State, and local levels, in any national security emergency that might confront the nation, including an attack with nuclear weapons. OSTP, along with the NSC staff, is a focal point within the Executive Office of the President for the National Security Telecommunications Advisory Committee (NSTAC), a Presidentially-appointed private sector advisory group which advises the President on telecommunications matters related to national security/emergency preparedness. OSTP assists the NSTAC in setting priorities, developing a policy agenda, and conducting their analyses.

*Theater Missile Defense and the Antiballistic Missile Treaty.* To respond to threats of missile proliferation while maintaining existing arms agreements and the momentum toward further nuclear arms reductions, the Clinton Administration has sought to clarify the Antiballistic Missile (ABM) Treaty's line between permitted theater missile defenses and strictly limited defenses against strategic ballistic missiles. Working through the NSC process, OSTP has provided input on the technical effectiveness of proposed limitations, to maintain an effective ABM Treaty that will continue to serve as the cornerstone of strategic stability and strategic nuclear arms reductions. OSTP has also worked with the Intelligence Community (IC) to ensure that IC assessments of projected theater ballistic missile threats accurately reflect technologically realistic future developments.

*Counter-Terrorism and Aviation Security.* OSTP staff are contributing actively to the White House Commission on Aviation Safety and Security, helping to coordinate technical assessments of technologies and procedures that can help defeat terrorist threats to our airways. OSTP also actively participates in the Technical Support Working Group, which coordinates and funds interagency efforts to develop technologies that are useful in defeating terrorist threats. OSTP is also involved with the Interagency Security Committee's Technology Working Group which evaluates technologies to improve the security of Federal facilities.

*Humanitarian Demining.* In support of the President's May 16 Anti-Personnel Landmine (APL) policy, OSTP participates in the Interagency Working Group on Demining and helps oversee Administration programs to develop technologies specific to humanitarian demining (to be distinguished from military countermine warfare.)

*Presidential Advisory Committee on Gulf War Veterans' Illnesses.* OSTP provided staff support for the Presidential Advisory Committee on Gulf War Veterans' Illnesses. OSTP staff coordinated all interagency activities (DOD, CIA, VA, and HHS) and was the primary interface between the Advisory Committee and the agencies and the White House. OSTP provided leadership in producing an action plan that addressed the Advisory Committee's recommendations contained in their interim report. The Committee's final report will be released in December.

## Presidential Directives

In FY 1996, President Clinton issued Presidential Review Directives and Presidential Decision Directives. The FY 1996 the directives issued include:

- Global Positioning System (GPS) Policy—The President issued a Presidential Decision Directive (PDD NSTC-6) on the future management and use of the GPS. The President's policy will open the door for rapid growth in a burgeoning civil and commercial GPS market that could add 100,000 jobs to the U.S. economy and grow from \$2 billion to \$8 billion in annual sales by the year 2000.
- Emerging Infectious Diseases—The President issued a Presidential Decision Directive (PDD NSTC-7) that established a Task Force on Emerging Infectious Diseases (EIDs), co-chaired by OSTP and the Centers for Disease Control, to implement policies for strengthening our domestic and international capabilities for EID surveillance, preparedness, and response.
- Space Policy—The President issued a Presidential Decision Directive (PDD NSTC-8) to update the National space policy to be consistent with the Administration's civilian, National security, and commercial space programs and policies.
- University-Government Partnership—The President directed that a review, Presidential Review Directive (PRD NSTC-4), be conducted by a multiagency task force under the auspices of NSTC, to form the input for revisiting Federal policies concerning the capacity of universities to meet the Nation's research and educational requirements in the next century.

## Presidential and Vice Presidential Policy Statements

With OSTP support, the President and Vice President have made several key policy statements during FY 1996, including:

- Emerging and Re-emerging Infectious Diseases. Vice President Gore announced the Administration's initiative to strengthen the fight against emerging and re-emerging infectious disease at Annual Conference of the National Council for International Health on June 12, 1996. Reflecting the Presidential Decision Directive (PDD NSTC-7) and the report of the Committee on International Science, Engineering, and Technology *Infectious Disease--A Global Health Threat*, the Vice President detailed the Administration's strategy for strengthening disease surveillance and response, research and training, public-private partnership, and global cooperation.
- Meeting the Challenge: A Research Agenda for America's Health, Safety, and Food. Under the auspices of the NSTC, a policy document *Meeting the Challenge* has been prepared (released in February 1996), which reflects public stakeholder views expressed at a November 1994 forum. This policy document lays out the

following five initiatives: establish the Presidential Early Career Scientist Award; strengthen domestic health, safety, and food data systems; strengthen the integrated, multidisciplinary human nutrition research initiative; develop an integrated research agenda to develop technologies to assure the safety and quality of food for consumers; and develop methods for assessing exposures and other factors influencing health.

### Fora, Conferences and Workshops

*The National Environmental Monitoring Mid-Atlantic Regional Workshop:* In April 1996 the CENR sponsored a Mid-Atlantic Regional Workshop that included Federal and non-Federal stakeholders. Approximately 110 individuals, including representatives of state environment and natural resource agencies and regional commissions, university scientists, representatives of non-governmental organizations and corporations, and Federal agency program managers, met on April 10-12, 1996 to determine whether and how best to implement a Regional Pilot in the Mid-Atlantic area under this Framework. Workshop participants were charged to identify: 1) the key resource management issues in the region around which to integrate environmental monitoring and research; 2) monitoring and supporting research needed to provide information relevant to resolving these issues; and 3) next steps for implementing an integrated regional framework by using, modifying, and building on existing Federal and non-Federal programs.

*Risk Assessment and Decision-Making on Natural Hazards:* The first NSTC Conference on Risk Assessment and Decision-making on Natural Hazards was held on November 2, 1995. It was designed to provide a wide range of new ideas on strategies for a national risk assessment that will provide opportunities for some 30,000 local jurisdictions of the Nation to reduce potential losses from natural and technological hazards. The objective is to improve decision-making on natural hazards which can strike with little or no warning, adversely impacting the buildings and infrastructure of communities, natural resources, and the environment over broad geographic areas, and inflicting devastating socioeconomic consequences, morbidity, and mortality. The conference was attended by 80 people from throughout the Nation, representing academia, professional organizations, the financial sector, staff members of the Executive and Legislative Branches, and state and Federal government agencies.

*National Environmental Monitoring Workshop:* A National Environmental Monitoring and Research Workshop was convened by the NSTC/CENR and the Smithsonian Institution in Washington, DC, September 25-27, 1996. It involved more than 170 stakeholders, representing the public and private sector. The overall charge to the workshop participants was: "How can we improve our current environmental monitoring and research programs and the synthesis of that information to address policy issues related to the health of our Nation's ecosystems?" This charge was expanded by the Vice President's challenge for Federal agencies to work with the scientific community and other interested parties to produce a "report card" on the health of the Nation's ecosystems.

Discussions were carried out in four groups representing four major environmental sectors: forests, coastal/marine, rangelands/croplands, and freshwater/rivers. The discussion

topics included identification of policy-relevant scientific questions, variables related to ecological goods and services, and design of a national environmental monitoring and research framework. A panel of distinguished speakers from the Federal and non-Federal sectors explored the challenges of synthesis and prediction in the field of ecosystem health. The participants suggested three major follow-on actions to the workshop: 1) begin the process of producing a Report Card for the Year 2001 by using existing monitoring and research capabilities to complete a draft national assessment within 18 months; 2) initiate a series of regional pilot projects, starting in the Mid-Atlantic Region, to examine monitoring and assessment needs at a more detailed level and address institutional issues; and 3) develop a pilot study to explore the capability of a national network of index sites.

### Reports and Publications

*Natural Disaster Reduction: A Plan for the Nation* (in press). The strategy recommends three major policy shifts: 1) to anticipate and assess risk, not simply react to disasters; 2) to focus on mitigation that builds resilience at the earliest planning stages; and 3) to implement warning and information dissemination systems to allow society to bring its resilience into play. The Nation must focus its efforts on: 1) a National risk assessment; 2) an integrated natural disaster mitigation information network; and 3) augmentation of comprehensive, hazard-specific programs, including the National Earthquake Loss Reduction Program, the National Space Weather Program, and the U.S. Weather Research Program. The Nation's goal must be expanded beyond saving lives to ensuring continued, uninterrupted functionality and viability of communities, regions, and their associated managed and natural ecosystems.

*Federal Directory of Environmental Technology Test and Demonstration Sites*. This directory lists over 100 sites at Federal facilities around the country where the private sector can partner with the Government to demonstrate new approaches to remediation, monitoring, pollution control or prevention.

*Program Guide to Federally Funded Environment and Natural Resources R&D*. This guide provides information to colleges, universities, and other research institutions on programs within Federal agencies that fund R&D in environment and natural resources areas. It describes the general competitive process of merit review and evaluation for the types of environment and natural resources research that is supported by Federal agencies. It provides researchers with an understanding of the scope of Federally funded environment and natural resources research and potential funding opportunities.

### Testimony

OSTP staff testified frequently before Congress during FY 1996, including the following statements:

Lionel S. Johns, Associate Director for Technology

- July 1996, on Partnership for a New Generation of Vehicles, before the House Committee on Science, Subcommittee on Energy and Environment

- July 1996, on National Space Policy, before House Committee on Science, Subcommittee on Space and Aeronautics

Robert T. Watson, Associate Director for Environment

- October 1995, on the National Earthquake Loss Reduction Strategy, before the House Committee on Science
- November 1995, on Climate Models and Projections of Potential Impacts of Global Climate Change, before House Committee on Science
- March 1996, on U.S. Global Change Research programs: Data Collection and Scientific Priorities, before the House Committee on Science

Ernest J. Moniz, Associate Director for Science

- July 1996, on Civilian Science Agencies implementation of the government Performance and Results Act before the House Committee on Science
- July 1996, on The Future of Antarctic Research before the House Committee on Science's Subcommittee on Basic Research
- September 1996, on Evidence for Early Life on Mars before the Senate Subcommittee on Commerce, Science and Transportation's Subcommittee on Science, Technology and Space

#### **Accomplishments of the President's Committee of Advisors on Science and Technology**

The President established the President's Committee of Advisors on Science and Technology (PCAST) to:

- Advise the President on matters involving S&T; and
- Assist the NSTC in securing private sector involvement in its activities.

The direct link to the activities of the NSTC reflects the Administration's intention to incorporate advice from the private sector in developing the S&T budgets and policies of this Administration and to secure private sector advice on the implementation and evaluation of budgets and policies. PCAST is co-chaired by the Assistant to the President for Science and Technology and John Young, former President and CEO of Hewlett-Packard Co. The membership includes:

- Norman Augustine, Vice Chairman of the Board and Chief Executive Officer, Lockheed Martin Corporation

- Francisco Ayala, Professor, University of California, Irvine
- Murray Gell-Mann, Professor, Santa Fe Institute and California Institute of Technology
- David Hamburg, President, Carnegie Corporation of New York
- John Holdren, Professor, Harvard University
- Diana MacArthur, Chair and CEO, Dynamac Corporation
- Shirley Malcom, Directorate Head, American Association for the Advancement of Science
- Mario Molina, Professor, Massachusetts Institute of Technology
- Peter Raven, Director, Missouri Botanical Garden
- Sally Ride, Director, California Space Institute, and Professor, University of California - San Diego
- Judith Rodin, President, University of Pennsylvania
- Charles A. Sanders, Former Chairman and CEO, Glaxo-Wellcome, Inc.
- Phillip Sharp, Professor, Massachusetts Institute of Technology
- David Shaw, CEO, D.E. Shaw and Co.
- Charles Vest, President, Massachusetts Institute of Technology
- Virginia Weldon, Senior Vice President, Monsanto Company
- Lilian Shiao-Yen Wu, Research Staff, Thomas J. Watson Research Center, IBM

The Committee's fourth, fifth, and sixth plenary sessions were held October 23-24, 1995, April 18-19, 1996, and September 16-17, 1996. At the October meeting, PCAST focused on: 1) strategies for protecting the R&D enterprise in this period of financial stringency, and 2) key themes emerging as the PCAST working groups on health, research universities, sustainable development, R&D partnerships, and educational technology. In addition, PCAST discussed the status of several major NSTC initiatives. At the April 1996 meeting, PCAST returned to the issue of reviewing the Federal R&D budget priorities, but, focused more narrowly during this meeting on how various Federal government agencies support research universities in their budgets. In addition, they reviewed drafts from several of the PCAST working groups, reviewed progress on NSTC initiatives, and received briefings by the OSTP Associate Directors on new NSTC initiatives. At the September 1996 meeting, PCAST sponsored a "round-table" with invited university presidents, corporate executives, and Nobel Prize winners to discuss key issues to be incorporated in the NSTC PRD on the University-Government Partnership. PCAST also discussed S&T issues related to improving international cooperation and completed several draft reports.

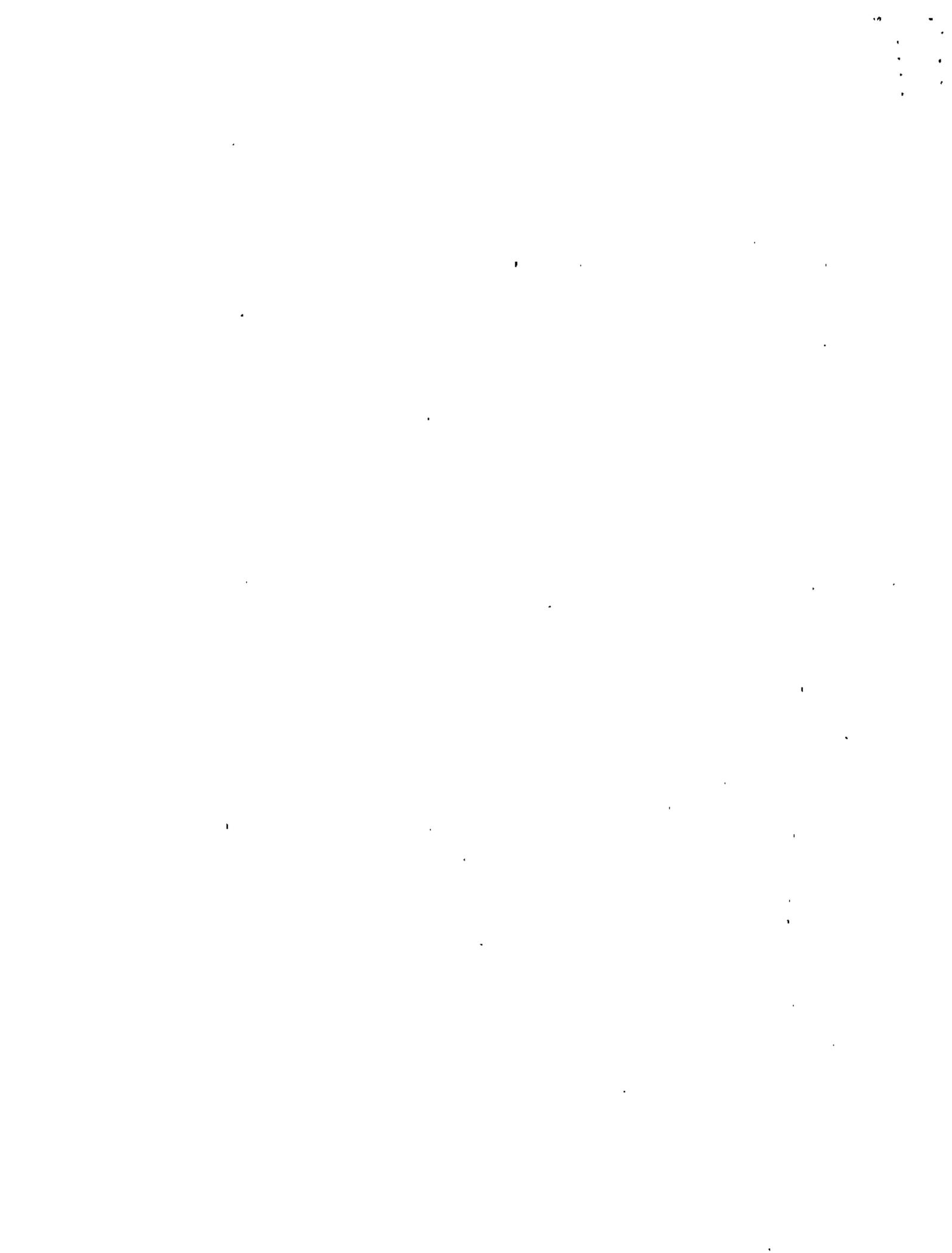
During FY 1996, in addition to providing informal advice to the President and several Federal agencies, writing Op-Eds and letters, and working with Congress to help its members understand the importance of the S&T enterprise to the Nation's security and economic growth, PCAST issued the following three reports to the President:

- *Letter Report on Academic Health Centers*, released in November 1995. This letter report, prepared by its Health Panel, outlined PCAST's concerns about threats posed to Academic Health Centers (AHCs) by health care reform proposals, including the sharp cuts proposed for Medicare and Medicaid, coupled with the erosion of clinical revenues associated with the emergence of managed care. In

urging the President to keep these centers as a priority while making the needed changes to enhance medical efficacy and cost effectiveness of our system, PCAST recommended that the President: 1) establish an expert commission to address the preservation of the research and educational capacity of AHCs and the future of the health care work force; 2) take action to protect the funds in the Graduate Medical Education (GME) accounts by resisting disproportionate decreases and directing the funds to those engaged in graduate medical education; and 3) provide government support to those institutions like AHCs that provide a disproportionate share of care for the indigent and uninsured populations.

- *Principles on the U.S. Government's Investment Role in Technology*, released in July 1996, provides criteria to be used by policymakers in identifying essential investments in technology, as well as targets of opportunity for support. The transmittal letter underscores the importance of these investments for the Nation's economic security. Copies of the Principles were also forwarded to members of Congress with a special interest in or responsibility for science and technology issues.
- *Letter Report on Research Universities*, released in September 1996, concluded that the stresses on these institutions threaten their two fundamental missions: discovery of new knowledge and preparation of the next generation. PCAST recommended that the Federal government initiate a full policy and administrative review, including its current policies, programs, and regulations affecting the university-government partnership, and that the results of this review be reported to the President. In response to this Letter Report on Research Universities, as well as to similar letters from corporate leaders and Nobel Prize winners, NSTC has issued a Presidential Review Directive on the University-Government Partnership calling for a report to be completed in FY 1997. Actions recommended by the report could be incorporated into agency budget planning for FY 1998.

PCAST also approved final drafts of reports on the role of S&T in preventing deadly conflict, sustainable development, and education technology at their September 26-27, 1996, meeting. These reports are expected to be delivered to the President during FY 1997.



**SUMMARY OF ACCOMPLISHMENTS IN FY 1997**  
**Office of Science and Technology Policy**  
**National Science and Technology Council**  
**President's Committee of Advisors on Science and Technology**

The Clinton Administration considers science and technology (S&T) one of the best investments we can make in America's future. Investments in S&T contribute to: a growing economy with more high-skill, high-wage jobs for American workers; a healthier population; a cleaner environment where energy efficiency, information technology, and advanced technology increase profits and reduce pollution; a stronger, more competitive private sector able to maintain U.S. leadership in critical world markets; an educational system where every student is challenged; and an inspired scientific and technological research community focused on ensuring our national security, on improving the quality of life for ourselves and our children, and on successfully meeting global problems through cooperation with other countries. The most important measure of success will be our ability to make a difference in the lives of the American people, to harness S&T to improve the quality of life and the economic strength of our Nation.

The Office of Science and Technology Policy (OSTP) supports these objectives by: providing authoritative scientific and technological information, analysis, advice, and recommendations for the President, for the Executive Branch, and for Congress; participating in the formulation, coordination, and implementation of national and international policies and programs that involve S&T; maintaining and promoting the health and vitality of the U.S. S&T infrastructure; and coordinating research and development efforts of the Federal Government to maximize the return on the public's investment in S&T and to ensure that resources are used efficiently and appropriately.

The Director of OSTP also serves as Assistant to the President for Science and Technology. In this capacity, he supports the activities of the President's National Science and Technology Council (NSTC), created November 23, 1993, by Executive Order, and the OSTP staff serves as the technical staff of the NSTC. The NSTC has responsibility for:

- coordinating the formulation of S&T policy;
- ensuring S&T policy decisions and programs are consistent with the President's stated goals;
- helping to implement and integrate the President's S&T policy agenda across the Federal government;
- ensuring S&T are considered in the development and implementation of all Federal policies and programs; and
- furthering international cooperation in S&T.

OSTP also supports the President's Committee of Advisors on Science and Technology (PCAST), which advises the President and the NSTC. The following pages summarize White House S&T activities during Fiscal Year (FY) 1997.

### Administration Initiatives

Participation in the front ranks of research and innovation continues to be essential for our national capacity to capture the gains of scientific and technological advances. Recognizing this, the Clinton Administration identified five imperatives that drive the Administration's strong commitment to an integrated investment agenda in scientific research, technological innovation, business environment, and education:

- America's world-leading S&T enterprise must be sustained and nurtured.
- We must strengthen our science, math, and engineering education and ensure their broad availability.
- The fiscal and regulatory environment for research must be sound and responsive to rapidly changing societal and business conditions.
- We must retain a long-term commitment to research, education, and innovation even in this period of budgetary constraint.
- The Federal Government has an important role in each of these areas, but must be viewed only as one partner in the Nation's effort.

Through the NSTC process, investment principles responsive to these imperatives resulted in FY 1999 R&D guidance for Federal research and education programs that places a high priority on efforts that:

- Are peer reviewed and selected through a merit based competitive process;
- Are planned and funded jointly through industry, university, or State partnerships;
- Are designed to establish and use quantitative and qualitative indicators, as appropriate, to provide realistic and objective measures of progress and performance; are designed to improve interactions with State and local governments to enable technology development;
- Build professional capacity for the workforce; and
- Promote international cooperation in S&T.

In addition to coordinating R&D initiatives through the NSTC, OSTP, in partnership with the Office of Management and Budget (OMB), worked actively to ensure that the FY 1999 budget process will conform with the Government Performance and Results Act (GPRA).

Guidelines were established and have been communicated to agencies calling for the development of strategic plans that describe how and why R&D are part of the agency's portfolio. OSTP's and OMB's oversight of GPRA implementation for S&T focuses on six areas to ensure that documents and systems:

- Satisfy the requirements of the law;
- Treat S&T appropriately and visibly and in a manner that promotes leadership in S&T through quality and innovation;
- Are useful for guiding the priorities and actions of the agency managers and staff;
- Communicate the agency's S&T goals and objectives in a way non-experts can appreciate;
- Have the potential to result in clear and understandable performance reports that fairly and legitimately reflect the agency's S&T accomplishments and value; and,
- Describe the agency's coordination of S&T programs with other agencies and stakeholders.

As a result of its investment and management strategies, the Administration achieved significant progress toward six R&D goals. The six key R&D goals are to:

- **Maintain World Leadership in Science, Engineering, and Mathematics**
- **Promote Long-term Economic Growth that Creates Jobs**
- **Sustain a Healthy, Educated Citizenry**
- **Harness Information Technology**
- **Improve Environmental Quality**
- **Enhance National Security and Global Stability**

#### **I. Maintain World Leadership in Science, Engineering, and Mathematics**

The Administration is unequivocally committed to maintaining leadership across the frontiers of scientific knowledge. The nation's prior investment has yielded a scientific and engineering enterprise without peer, awards and prizes, advanced education, and contributions to technological innovation. This scientific strength is a treasure that we must continue to build on. Thus, even as the Federal budget deficit is eliminated, the Administration has protected the level of investment in key Federal basic science programs. In FY 1997, the Administration focused on improved management of the federal investment as well as enhancing the quality of the scientific research with initiatives such as the following.

The Biennial Science and Technology Report to Congress, Science and Technology: Shaping the Twenty-first Century. The S&T Biennial report to Congress was published in April 1997 and distributed to 5,000 stakeholders in government, academia, industry, the scientific community, and the press. It has been made available on the World Wide Web, with "hot links" to facilitate public access to additional information about cited agencies, programs, projects, and Federal S&T facilities.

Review of the University/Federal Government Partnership. The longstanding partnership between the Federal Government and universities aimed at advancing S&T in the national interest is a core element of America's world-leading R&D enterprise. Federal commitment to the partnership remains strong and Federal support for university-based research has increased. However, both parties report growing stresses in the partnership and concerns about the best ways to sustain the relationship into the future. Therefore, the Assistant to the President for Science and Technology initiated a review of this partnership to (1) determine what might be the major stresses in the areas of research, education, and administrative regulations; and (2) determine the best ways to address the issues raised in this examination. The products of the review will assist both parties in developing strategies that promote cost-effective university-based research, allocate research costs fairly, strengthen the research-education linkage, and maintain appropriate accountability for expenditure of public funds in an environment of highly constrained budgets, expected to remain level for the next several years. The NSTC task force will complete its work in early 1998.

Research Misconduct. The NSTC continued its efforts to develop a common definition of research misconduct and a set of guiding principles to shape agency efforts to ensure the integrity of the research record. Research agencies were given an opportunity to respond to the NSTC Committee on Fundamental Science (CFS) approved definition and principles. OSTP is working with the CFS to modify the proposed definition based on agency input. A final definition will be sent for full NSTC approval by February 1998.

Plant Genome. An NSTC interagency working group (IWG) was established under the auspices of the CFS to develop a plan to map and sequence genomes of agriculturally important plants. The IWG presented a status report in June 1997 that was used by Congress to help shape FY 1998 appropriations decisions for the National Science Foundation (NSF) and the U.S. Department of Agriculture (USDA). The IWG will produce a final report by the end of calendar year 1997.

Cloning/National Bioethics Advisory Commission (NBAC). OSTP staff facilitated the development of the NBAC report "Cloning Human Beings." The President requested this report after the announcement in February 1997 of the successful cloning of a sheep from fully differentiated cells. In response to recommendations in the report, OSTP, in collaboration with the Domestic Policy Council (DPC), developed legislation prohibiting the use of this technology to clone human beings that was transmitted by the President to Congress.

Federal Laboratory Reform. OSTP coordinated a study, published in March 1997, that assessed the progress of the Department of Defense (DOD), the Department of Energy (DOE),

and the National Aeronautics and Space Administration (NASA) in implementing the Presidential Decision Directive (PDD) of September 1995 to focus laboratory missions, reduce excessive agency oversight, and streamline administrative processes. The study confirmed that the agencies are making progress, but much work remains. As a result, an NSTC IWG was established during the summer of 1997 to implement the recommendations and improve information flow among all S&T agencies with intramural research programs.

## **II. Promote Long-term Economic Growth that Creates Jobs**

Sustained prosperity for Americans requires a continuous stream of technological innovation. The Administration has acted in a variety of roles – funder, partner, facilitator – to stimulate new enabling technologies of importance both to Federal missions and to economic growth. Specific priorities pursued during FY 1997 are described below.

Partnership for a New Generation of Vehicles (PNGV). The Federal government and USCAR (Ford, Chrysler, and General Motors), together with suppliers, other businesses, and universities, have developed a joint R&D program for research on commercially-viable vehicle technology that, over the long run, can preserve personal mobility while further reducing the impact of cars and light trucks on the environment and dependence on imported petroleum. The program is preparing for the period known as “technology select,” when promising technologies are selected from the portfolio of research work that is ongoing. The technology select will occur at the end of calendar year 1997. The selected technologies will be used to produce the first generation prototype PNGV vehicles, and will be used to prepare for the production prototype planned for 2004.

Global Positioning System (GPS). OSTP continued to provide guidance on implementation of the Administration’s GPS policy (PDD NSTC-6), for which it was the principal architect. The Secretaries of Defense and Transportation chartered an Interagency GPS Executive Board to manage GPS and its U.S. Government augmentations and to provide policy guidance for U.S. efforts to assure global acceptance of GPS. DOD and the Department of Transportation (DOT) reached an agreement assuring the availability of a second frequency to civilian GPS users, a major step towards acceptance of GPS as an international standard. In response to the President’s policy, the Department of State (DOS) initiated formal consultations with Japan, the European Union (EU), and Russia on development of bilateral agreements on GPS cooperation. A draft agreement was submitted to the Government of Japan for consideration, and additional consultations with Japan and the EU are scheduled for late-1997.

Inmarsat Restructuring. OSTP coordinated the U.S. position for restructuring the International Mobile Satellite Organization (Inmarsat), an intergovernmental treaty organization, into a private entity. The U.S. continues to be committed to a restructuring of Inmarsat that allows the new entity to thrive while ensuring the guaranteed provision of the Global Maritime Distress and Safety System (GMDSS) and enhancing fair competition. OSTP, the U.S. instructional agencies (DOS, the Federal Communications Commission (FCC), and the Department of Commerce (DOC)) and the U.S. Signatory, COMSAT, are working together with other Inmarsat Parties and Signatories to forge a consensus on a successful restructuring of Inmarsat.

Partnership for Advancing Technologies in Housing (PATH). OSTP has worked with a number of cabinet agencies to formulate and develop a potential public-private partnership to advance the development and market acceptance of new technologies and designs that can substantially improve the quality and reduce the environmental impact of housing while also lowering the monthly cost of homeownership. This core team of agencies (HUD, DOE, EPA, DOC, DOD, DOL and FEMA) met with potential sector partners in December 1997.

The United States Innovation Partnership (USIP). This initiative (originally undertaken as the State-Federal Technology Partnership) is an agreement between this Administration and the National Governors Association. It was announced in February 1997. USIP has the following activities underway:

- Promoting Electronic Commerce,
- Shaping the Next Generation of the Manufacturing Extension Program (MEP),
- Building Partnerships to Leverage Federal Investment in the Small Business Innovative Research (SBIR) Program,
- Designing a New Experimental Program to Stimulate Technology (EPSCoT),
- Finding Investors Online with ACE-Net,\*\*\*
- Providing Technology Information for Entrepreneurs,
- Building a Competitive Information Infrastructure,
- Exploring the Potential for Reciprocal Environmental Technology Validation
- Streamlining the Nation's Building Regulatory Process.

Framework for Global Electronic Commerce. OSTP staff has played an important role in the interagency working group on electronic commerce. OSTP contributed to chapters on encryption and security and helped review and shape the document, which was released in July 1997 as *A Framework for Global Electronic Commerce*. OSTP will continue to have an active role in implementation of the Framework, particularly in working with DOC to achieve ratification of the World Intellectual Property Organization (WIPO) Copyright Treaty and the WIPO Performances and Phonograms Treaty.

### **III. Sustain a Healthy, Educated Citizenry**

Improving the health of our nation's citizens continues to be a major goal of our Federal investment in S&T. Starting in 1862 with the financial support for our Land Grant institutions and State Agricultural Experiment Stations, and through the establishment in 1887 of the laboratory that became the National Institutes of Health (NIH), the United States has developed a system of intra- and extramural support for health-related research. We have more recently

committed ourselves to similar efforts in science, engineering, and mathematics education. The degree to which our nation prospers in the 21<sup>st</sup> century will depend on our abilities to develop scientific and technical talent in our youth, to provide lifelong learning to a well-educated workforce able to embrace the rapid pace of technological change, and to raise the level of public scientific and technological literacy. Specific FY 1997 initiatives included the following.

Health Preparedness for Future Troop Deployments. The Presidential Advisory Committee on Gulf War Veterans' Illnesses (PAC) issued their final report on December 31, 1996. The PAC recommended a "Presidential Review Directive be issued to instruct the NSTC to develop an interagency plan to address health preparedness for and readjustment of veterans and families after future conflicts and peacekeeping missions." The PAC highlighted seven broad categories to be addressed by this review, which have been grouped into the following areas: deployment health, record keeping, research, and risk communications. An NSTC IWG was established to oversee the progress of the review, which should be complete by spring 1998.

Emerging and Re-emerging Infectious Diseases. The NSTC Task Force on Emerging Infectious Diseases, co-chaired by OSTP and the Centers for Disease Control (CDC), led the implementation of the June 1996 Presidential Decision Directive (PDD) on Emerging Infectious Diseases (NSTC-7). Accomplishments include:

- Agreements with 22 states and localities to cooperate in strengthening national notifiable disease systems, conduct disease surveillance, diagnose diseases, and investigate outbreaks.
- Expansion of research on emerging infectious diseases and disease vaccines, both domestically and internationally.
- Cooperation with medical associations and medical schools to increase the attention given to emerging infectious diseases in curricula.
- Development of a work plan for more effective quarantine and containment.
- Consultations with the International Society of Travel Medicine to improve communications and establishment of the surveillance network of travel medical clinics.
- Support for U.S. leadership on this issue in bilateral and multilateral fora.
- Support for U.S. participation in the WHO-proposed revision of the International Health Regulations for improved screening and quarantine capabilities.
- Creation of a DOD Surveillance and Response System for Infectious Diseases.

Children's Initiative. The multi-agency "Children's Initiative" study was conducted by the NSTC, with collaboration from the DPC. It assessed the current scope of research on child and adolescent development, identified significant gaps in the research agenda, and

developed recommendations for needed efforts not only in the research area but also in linking research and policy development. The Children's Initiative report was published in April 1997.

Improving Math and Science Education. A March 1997 Presidential Directive instructed the Secretary of Education and the Director of NSF to create an IWG to develop an action strategy in support of a voluntary national test for individual eighth-grade students. The strategy would ensure that Federal programs, research, and human resources are effectively used--in partnership with nongovernmental, professional, business, and community organizations--to help improve teaching and learning based on widely accepted, challenging national standards in mathematics. OSTP and DPC coordinated the IWG. Its report is planned for release in December 1997. It focuses on the components of standards-based mathematics education in the middle grades (4-8)--improved teaching, enhanced access to and implementation of curriculum and instructional materials, technology integrated into the classroom, and community involvement in motivating students to understand how math concepts are applied in the real world. The action strategy addresses how improved coordination of Federal agency resources will support local efforts to raise the visibility, teaching, and learning of standards-based mathematics and science.

Excellence in Mathematics and Science Teaching. The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) is the Nation's highest commendation for K-12 math and science teachers. Candidates are chosen on the basis of their teaching performance, background, and experience. PAEMST is administered through NSF, and coordinated by OSTP. One science and one math teacher at each level are ultimately recommended as Presidential Awardees. They must be U.S. citizens who teach in one of the 50 states, the District of Columbia, the Department of Defense Dependent Schools, or the U.S. territories. In 1997, there were 107 elementary and 107 secondary recipients. The Vice President addressed the elementary school recipients and the First Lady the secondary school recipients. All (over 1,000) teacher awardees since 1983 are now linked electronically and have been used as a comparison group in a national study of math and science teachers.

Excellence in Science, Mathematics, and Engineering Mentoring. The second annual presentation of the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM) occurred on September 11, 1997. This award demonstrates the Administration's support for access to education and diversity in the S&T workforce by recognizing the efforts of individuals and institutions that have mentored underrepresented groups (women, minorities, and persons with disabilities).

Technology for Training and Lifelong Learning. OSTP has led an interagency effort to improve the delivery of and stimulate a national market for computer-based training. Working closely with the Department of Labor (DOL) and DOD, OSTP has provided advice on new technological developments in training technology and brought in key industry participants. The priorities of this initiative include: 1) creating an Internet-based training network which serves as a public broker for information about and access to training resources; 2) partnering with industry and academia in government procurements of training to stimulate a national market in computer-based training; 3) determining how accreditation, certification, and licensing of

training products can be expanded and accomplished over the Internet; and 4) demonstrating the feasibility and efficacy of porting learning/training technologies developed by the military to the civilian/public sector.

Learning Technologies R&D Review. Effective use of learning technologies for education and training is essential to the well being and economic success of our Nation. Federally-sponsored research on learning technologies ranges across the Government from basic work on cognition and pedagogy to the development of component-based software for military training. Recognizing that this national priority should be addressed in a cost-effective manner, OSTP created an interagency working group consisting of OSTP, DOD, the Department of Education (DoED), and NSF to review the learning technology R&D programs of those agencies. The review will ensure that these significant investments are at the state-of-the-art, effective, and synergistic, and that existing R&D efforts are well-managed and sensibly cost-shared with private sector partners. Based on the review and OSTP sponsored workshops, the working group will produce a report including a clear set of priorities and strategies for coordinating and managing Federal learning technology R&D.

E-Rate and Universal Service. As a member of the interagency Education Technology (EdTech) group, OSTP helped design and secure support for the use of the education provisions of the Telecommunications Act of 1996. The Administration maintained strong support for an expansive interpretation of this provision. The FCC's May 1997 decision on implementing universal service provisions of the Act establishes discounted rates, known as E-rates or education rates, for connecting eligible schools, libraries, and rural health care providers to the global telecommunications network. The discounts, financed through the universal service funding system, are vitally important to ensure that all students, particularly those in rural areas, have access to the benefits of the Internet and other services available through telecommunications.

#### **IV. Harness Information Technology**

No technology promises to affect our world more profoundly than the rapid sweep of digital technology. Every sector of our economy – manufacturing and services, transportation, health care, education, and government – is being transformed by the power of information technologies to create new products and services and new ways to communicate, resulting in significant improvements in productivity and knowledge sharing. The Clinton Administration has actively addressed the research and policy issues raised by the challenges of the information age through initiatives such as the following.

Computing, Information, and Communications (CIC). The Federal Computing, Information, and Communications (CIC) programs invest in long-term R&D to advance computing, information, and communications. These programs are an outgrowth of the highly successful, Congressionally-chartered High Performance Computing and Communications (HPCC) initiative that was responsible for catapulting the U.S. into the era of teraflop computers, gigabyte networks, and computation-intensive science and engineering applications. The NSTC's Committee on Computing, Information, and Communications (CCIC) oversees the interagency CIC R&D programs, which are organized into five Program Component Areas: High

End Computing and Computation (HEC); Large Scale Networking (LSN); High Confidence Systems (HCS); Human Centered Systems (HuCS); and Education, Training, and Human Resources (ETHR). Program accomplishments in FY 1997 are documented in several publications (described below).

Next Generation Internet (NGI). On October 10, 1996, President Clinton and Vice President Gore announced the NGI initiative, a \$100 million per year, 3-year project that will invest in R&D for new networking technologies, such as the ability to handle real-time, multimedia traffic; connect more than 100 research institutions at speeds that are 100 to 1,000 times faster than today's Internet; and demonstrate new applications in areas such as distance education, telemedicine, national security, and "collaboratories" (laboratories without walls). Built on the base of Federal agency programs currently underway as part of the NSTC CCIC's Large-Scale Networking (LSN) working group, the initiative will call for partnerships and collaboration with the private sector and the academic community. LSN released both a concept paper and a draft implementation plan in late July 1997. The plan will be finalized after final Congressional approval of the FY 1998 budget.

Advisory Committee on High-Performance Computing and Communications, Information Technology, and the Next Generation Internet. In February 1997, President Clinton established an Advisory Committee to provide the NSTC, through the Director of OSTP, with guidance and advice on all areas of high performance computing, communications and information technologies. The members bring a broad range of expertise and interests from business and universities. The Advisory Committee reviewed the implementation plans for the Administration's NGI initiative, and reported enthusiastic support for the NGI.

Domain Name Governance. The enormous growth and commercialization of the Internet has burdened current domain name registration systems and raised numerous issues, including questions about the interrelationship of domain name registrations and registered trademarks, governance of domain name registration systems, conflicts among domain name systems, processes for dispute resolution, and the international implications of all of these issues. Despite the growth and commercialization of the Internet, major components of the domain name system are still under the supervision of the U.S. Government. OSTP co-chaired with OMB the interagency working group established to resolve issues arising as the transition of domain name governance to private sector control continues. Various private sector groups have proposed systems for allocating and managing generic top-level domains (GTLDs). The interagency working group is studying the proposals and the underlying issues to determine what role, if any, the U.S. Government should play. The U.S. Government is seeking the views of the public regarding these proposals and broader policy issues as well.

Global Information Infrastructure (GII). In FY 1997, OSTP staff represented the Administration's interests in GII and related information infrastructure issues in international fora. OSTP staff have participated in various multilateral and bilateral international meetings on the GII, including the Carnegie Expert Group on Misuse of the Internet (Paris, June 1997) and the U.S.-European Union Bilateral Dialogue on Information Society (Washington, July 1997). OSTP also contributed to U.S. Government activities in the telecommunications and information

policy subgroups of the APEC and Organization for Economic Cooperation and Development (OECD).

"Family Friendly" Internet. In July 1997, President Clinton and Vice President Gore announced a strategy for making the Internet "family friendly." OSTP staff was a key member of the team that crafted the strategy. This strategy is based in large part on using technology solutions to empower parents and educators and give them the tools they need to prevent children from getting access to inappropriate material on the Internet, and to guide them towards high-quality educational resources. The strategy was developed in the wake of the Supreme Court decision that found that parts of the Communications Decency Act, written to protect children from inappropriate material, abridged the free speech rights of adults.

## V. Improve Environmental Quality

Advances in environmental science and technology hold tremendous promise for creation of a sustainable future, a future where environmental health, economic prosperity, and quality of life are mutually reinforcing. We need to apply science and technology in order to assess, anticipate, and avoid the negative consequences of environmental change. OSTP concentrated its efforts in the following areas during FY 1997.

Global Change Research. Global change activities have been revitalized through the development of a regional focus on climate change impacts. OSTP co-sponsored regional workshops in 1997 (with several more planned for 1998). The purpose of these workshops is to examine the vulnerabilities of various regions of the United States to climate variability and climate change and to aggregate information across regions to support nation-scale scientific assessment as called for in the Global Change Research Act. OSTP staff led the effort to prepare for a national workshop on Climate Change Impacts that was held November 12-13 in Washington, D.C. to relate regional to national-scale impacts in support of the assessment process.

Ecological Systems. A national workshop was held in September 1996, bringing together a wide range of interested parties to plan a course of action for the Environmental Monitoring and Research Initiative. The Vice President challenged the workshop participants to "work with the scientific community and other interested parties to produce a "report card" on the health of the Nation's ecosystems by 2001." By consensus, the national workshop recommended three actions that have been the focus of OSTP's efforts. They are:

- Report Card – The report card on the health of the Nation's ecosystems will be based on the broad perspective of goods and services that society desires.
- Mid-Atlantic Regional Pilot Project – A working group was established to assemble a blueprint for work that will demonstrate the practicality and utility of integrating monitoring in the mid-Atlantic.

- **Index Sites** -- An interagency working group has been asked to pick a few, relatively broad science questions and examine the role of index sites in dealing with these questions.

One new agenda item recently identified for additional focus is Hypoxia in the Gulf of Mexico. The hypoxia threatens the ecological integrity and economic productivity of the affected waters. A Federal IWG on Hypoxia has been formed to develop recommendations to address this problem.

**Air Quality.** OSTP staff is working with EPA to develop a framework for planning and coordination of research to address the scientific uncertainties associated with particulate matter. In addition, the National Acid Precitation Assessment Program (NAPAP) was reorganized and operationally subsumed under the NSTC CENR in consultation with EPA, other NAPAP member agencies, and OSTP supervision to ensure the future of the Program. The NAPAP FY 1996 report to Congress is in final review.

**Natural Disaster Reduction.** Reducing losses from natural disasters is one of the Administration's top priorities for S&T. The NSTC's "Natural Disaster Reduction: A Plan for the Nation," was published in April 1997. It provides an interagency approach for the strategic coordination and advancement of programs, strategies, and research to reduce the social, environmental, and economic costs of natural hazards and lays the groundwork for a comprehensive set of Federal R&D policies to address this critical issue. Through activities of the CENR's Subcommittee on Natural Disaster Reduction (SNDR), progress has been made in expanding national capabilities for hazard identification and risk assessment, advancing understanding of the causes of hazards, and laying the foundations for more timely and reliable forecasts of dangerous events.

**Toxics and Risk.** Under OSTP's direction, a multi-year interagency evaluation of oxygenated fuels was completed and published in June 1997. The report presents current understanding of critical scientific issues related to the winter oxygenated gasoline program.

Also during FY 1997, the CENR Working Group on Endocrine Disruptors completed two of the three objectives established for an integrated research strategy across Federal agencies. First, a planning framework, *The Health and Ecological Effects of Endocrine Disrupting Chemicals: A Framework for Planning*, was published in November 1996. In addition, a research inventory ([www.epa.gov/endocrine](http://www.epa.gov/endocrine)) describing nearly 400 projects supported by the Federal Government was completed. OSTP has provided international leadership by working with the United Nations Environment Program (UNEP), OECD, WHO, and other international organizations to begin an international assessment of the science for endocrine disruptors.

## **VI. Enhance National Security and Global Stability**

The technological superiority in war fighting equipment on which the military depends is the product of a strategic commitment to science and technology, through research investments in defense laboratories, industry, and universities. We also recognize that our national security depends on global stability and building global partnerships for cooperation in science and

technology is an important part of our security strategy. FY 1997 achievements in the area of enhancing national security and global stability include the following.

International Agreements. OSTP has worked successfully to expand U.S. S&T relationships with important trading partners and economies in transition. OSTP has developed strategic approaches for comprehensive S&T cooperation with key countries, including China, Russia, South Africa, the Ukraine, and Japan. OSTP has also led U.S. participation in multilateral fora in support of the Administration's goals in the Asia-Pacific and the Americas. OSTP's goal is to provide guidance to agencies as they engage in international S&T cooperation so that our investments yield benefits for U.S. scientific, economic, and national security interests.

OSTP has also continued to support international collaboration on large and/or sophisticated science projects as a way to gain new scientific and technological advances while minimizing the costs to U.S. taxpayers. For example, OSTP worked closely with the technical agencies and OMB to coordinate the U.S. Government's negotiating position on such projects as the Large Hadron Collider and the International Thermonuclear Experimental Reactor.

International Space Station. OSTP continued to be the White House focal point for policy and program oversight related to the development of the redesigned International Space Station. OSTP has worked closely with the Office of the Vice President (OVP), the National Security Council (NSC), OMB, and NASA to develop and implement U.S. contingency plans, which include a new baseline assembly schedule and modifications to the program budget. When fully assembled, the International Space Station will be a unique, world-class, scientific and technological facility for experimentation and research. It will also be a symbol of the tremendous accomplishments that cooperation in the post-Cold War era can bring.

Nonproliferation of Nuclear Weapons. OSTP has been working with the NSC to coordinate U.S. efforts to control nuclear weapons and the fissile materials needed to make them. These efforts have a broader scope than those associated with existing arms control agreements, such as the START treaties, that were limited to missiles and launchers. The Clinton Administration has been implementing a comprehensive four-part strategy to secure nuclear material, build confidence through openness, halt the accumulation of excess materials, and carry out disposition of excess materials.

Comprehensive Test Ban. The Clinton Administration has led the way toward achieving a Comprehensive Test Ban Treaty (CTBT), banning all testing of nuclear weapons—a key nonproliferation initiative that has been a goal of Republican and Democratic Presidents dating back to President Eisenhower. Developing the Administration's approach to a CTBT has required a careful and detailed assessment of how to maintain confidence in the nation's enduring nuclear weapons stockpile in the absence of nuclear testing—an assessment that has given rise to a robust science-based stockpile stewardship program. OSTP provided technical analyses and advice prior to submission of the CTBT for Senate advice and consent.

National Security/Emergency Preparedness. By Executive Order, the OSTP Director is assigned responsibility for directing the exercise of the President's wartime authorities over

domestic telecommunications derived from the Communications Act of 1934. In emergencies or crises in which the exercise of the President's war power functions is not required or permitted by law, the OSTP Director is charged with the responsibility to advise and assist the President and Federal departments and agencies with the provision, management, or allocation of telecommunications resources. In 1997, an OSTP staff member served as Deputy Director of the National Emergency Management Team (NEMT). It is part of a program to ensure continuity of government at the Federal, State, and local levels, in any national security emergency that might confront the nation, including an attack with nuclear weapons. OSTP, along with the NSC staff, is a focal point within the Executive Office of the President for the National Security Telecommunications Advisory Committee (NSTAC), a Presidentially-appointed private sector advisory group which advises the President on telecommunications matters related to national security/emergency preparedness. OSTP assisted the NSTAC in setting priorities, developing a policy agenda, and conducting their analyses.

Counter-Terrorism. OSTP actively participated in the Technical Support Working Group, which coordinates and funds interagency efforts to develop technologies that are useful in defeating terrorist threats. OSTP is also involved with the Interagency Security Committee's Technology Working Group that evaluates technologies to improve the security of Federal facilities. In cooperation with the NSC, OSTP coordinated a survey of U.S. Government investments in counter-terrorism R&D. OSTP worked with the President's Commission on Critical Infrastructure Protection and assisted in the formulation of the study agenda, definition of priorities, and supported development of government infrastructure R&D by making available the RADIUS database of the Critical Technologies Institute. OSTP drafted a technical primer, *Cybernation*, which examines current trends that raise concerns about the reliability of the automated infrastructure. The primer was released early in FY 1998.

Humanitarian Demining. To support the President's commitment to "develop improved mine detection and clearing technology and to share this improved technology with the broader international community," OSTP helped oversee the management and execution of humanitarian demining R&D in the Department of Defense and other Federal agencies. In 1997, OSTP actively participated in the interagency review of U.S. antipersonnel landmine policy and negotiating strategy. OSTP worked to ensure that relevant R&D is budgeted at appropriate levels, is coordinated across the government, and reflected appropriate balance between near-term and longer-term projects.

Aviation Security. OSTP staff contributed actively to the White House Commission on Aviation Safety and Security, helping to develop interagency plans for implementing the Commission's recommendations on aviation safety, security, and air traffic control modernization. OSTP requested that NASA, the Federal Aviation Administration (FAA), and DOD prepare a joint S&T implementation plan for submission with their FY 1999 budgets that details agency roles and responsibilities, partnership opportunities, and five-year budgets.

Theater Missile Defense and the Antiballistic Missile Treaty. To respond to threats of missile proliferation while maintaining existing arms agreements and the momentum toward further nuclear arms reductions, the Clinton Administration has sought to clarify the Antiballistic

Missile (ABM) Treaty's line between permitted theater missile defenses and strictly limited defenses against strategic ballistic missiles. OSTP has also worked with the Intelligence Community (IC) to ensure that IC assessments of projected intercontinental theater ballistic missile threats accurately reflect technologically realistic future developments.

### NSTC PRESIDENTIAL REVIEW DIRECTIVES (PRD's)

Presidential review directives and decision directives may be issued under the auspices of the NSTC. Work (also described above) started on two NSTC PRD's in fiscal year 1997.

Review of the Development of Interagency Plans to Address Health Preparedness for and Readjustment of Veterans and Their Families after Future Deployments (issued 4/21/97).

Responds to recommendation from the Presidential Advisory Committee on Gulf War Veterans' Illnesses for the NSTC to develop an interagency plan to address health preparedness for and readjustment of veterans and their families after future conflicts and peacekeeping missions. The review is expected to be complete in April 1998.

Review of the University-Government Partnership (issued 9/26/96). A Government-wide policy and administration review of the U.S. universities research system. The NSTC has formed a task force to conduct a review to determine what might be the major stresses in the areas of research, education, and administrative regulations, and to determine what the Federal Government's role should be in addressing any issues raised by this examination. Final report planned for Spring 1998.

### NSTC REPORTS AND PUBLICATIONS

Coordination of multiagency reports is an important role of the NSTC. In FY 1997, several reports were published, including:

*Advancing the Frontiers of Information Technology*, November 1996. This book presents FY 1997 plans, describes the new organization for the NSTC CCIC programs (for which the HPCC Program forms the core), summarizes the goals and objectives of these new CCIC R&D programs, and includes a comprehensive list of government personnel who are involved in the HPCC and CCIC programs.

*Natural Disaster Reduction: A plan for the Nation*, December 1996. This report highlights ongoing Federal research efforts in natural disaster reduction and identifies new and promising areas for additional Federal support.

*Federal HPCC FY 1997 Implementation Plan*, December 1996. This document presents in detail the FY 1997 Implementation Plan for the Federal HPCC Program reflected in the President's FY 1997 budget request.

*NSTC Calendar Year 1996 Accomplishments Report*, February 1997. This document describes accomplishments over the course of 1996. The report reflects the considerable

progress made by the NSTC in helping Federal R&D organizations move from an autonomous, fiscally expansive environment to a collaborative, fiscally constrained one.

*Computing, Information and Communications Technologies for the 21<sup>st</sup> Century*, March 1997 (a brochure). This publication highlights representative accomplishments, key R&D areas, and the HPCC budget crosscuts, demonstrating their contribution to the new CIC strategy.

*Status of Federal Laboratory Reforms*, March 1997. This status report provides a snapshot of an ongoing, dynamic reform process in the agencies – DOD, DOE, NASA, and their laboratories – charged with implementing PDD NSTC-5, Guidelines for Federal Laboratory Reform. It summarizes how the agencies have responded to the PDD and includes recommendations for how to build on the reforms accomplished to date, along with suggestions for next steps.

*Integrating the Nation's Environmental Monitoring and Research Networks and Programs: A Proposed Framework*, March 1997. This report proposes a national framework for integrating environmental monitoring and related research on the Nation's ecological systems and resources. The framework links systematic observations and monitoring of ecological systems and resources with predictive modeling and process research.

*Science and Technology: Shaping the Twenty-First Century*, April 1997. This biennial report to the Congress on S&T addresses the President's policy for maintaining the Nation's international leadership in S&T, developments and Federal actions of national significance in S&T, currently important national issues that are affected by S&T, and associated human resources to achieve Federal program objectives and national goals.

*Investing in Our Future*, April 1997. The report, produced by a multi-agency working group under the direction of the NSTC Committees on Fundamental Science, and Health, Safety, and Food, assesses the current scope of Federal research on child and adolescent development, identifies significant needed research, and makes recommendations. The report also includes a linking between research and policy development.

*Manufacturing Infrastructure: Enabling the Nation's Manufacturing Capacity*, April 1997. The report describes ongoing Federally-sponsored programs that contribute to improving the Nation's manufacturing performance.

*National Environmental Technology Strategy: Status & Action*, April 1997. This report reflects the proceedings from the Private Enterprise Government Interaction (PEGI) Third Annual Round Table Conference. The purpose of the conference was to evaluate the status of the Clinton-Goze Administration's environmental technology initiatives proposed in the National Environmental Technology Strategy released in April 1995.

*Our Changing Planet: The FY 1998 U.S. Global Change Research Program*, June 1997. This report to Congress supplements the President's FY 1998 budget, pursuant to the Global Change Research Act of 1990. The report describes the USGCRP, reviews progress in global change research over the past decade, presents highlights of recent and current research on key

global change environmental science issues, outlines integrative activities and perspectives supported by the USGCRP, discusses new global change research challenges in the coming decade, and provides a detailed view of the FY98 USGCRP budget, including FY 1998 program components and program highlights by agency.

*Interagency Assessment of Oxygenated Fuels*, June 1997. This report provides reviews the scientific literature on oxygenated fuels and assesses effects of the winter oxygenated fuels program on air quality, water quality, fuel economy and engine performance, and public health.

*Transportation Science and Technology Strategy*, September 1997. This document provides a framework to guide Federal transportation R&D toward meeting our national transportation goals. It proposes institutionalized of a collaborative R&D strategic planning process within the Government; recommends strategic transportation partnerships among government, industry, and academia; and endorses specific advanced, high-risk enabling research, education, and training efforts.

### **Fora, Conferences, and Workshops**

OSTP often uses its convening power to draw together experts and stakeholders in various fields to advance the state of knowledge and cooperation in various fields. In FY 1997, we sponsored the following meetings.

Space Science Symposium. On December 11, 1996, OSTP organized a roundtable discussion for the Vice President involving twenty prominent scientists, theologians, and other thinkers on the subject of space science and the ongoing search for life in the universe. The discussion delved into a wide range of subjects, including the implications of the 1996 discovery of possible microfossils in a meteorite from Mars.

PNGV Symposium on Internal Combustion Engines. The sixth Vice Presidential PNGV symposium was hosted by the Vice President on July 22-23 at the White House Conference Center. The event was designed to fully investigate the internal combustion engines that could potentially be selected for use in the PNGV vehicle. The event generated high interest and drew speakers and participants from the Senate, Federal agencies, public interest groups, and industry. The discussion related to the practical use of alternate fuels, the efficiency limits of the technology, and the roadblocks related to implementation of the new technologies.

Public Private Partnership 2000: Natural Disaster Reduction. In September 1997, the 19 member agencies comprising SDR, in partnership with the Institute for Business and Home Safety, held the first in a series of fora. These fora are to seek new and innovative opportunities for government and nonprofit, private sector organizations to work together to foster the reduction of loss of life, injuries, vulnerability, property damage, and negative health and environmental consequences from natural hazards such as floods, severe storms, earthquakes, landslides, volcanic eruptions, wildfires, droughts, tsunamis, and technological hazards in communities throughout the Nation. The series, entitled Public Private Partnership 2000, will include 14 fora, each focusing on a different public policy issue related to natural disaster

reduction. The first forum, held on September 10 at the White House Conference Center, focused on "Natural Disaster Reduction Initiatives of the Insurance Sector."

**Accomplishments of the  
President's Committee of Advisors on Science and Technology (PCAST)**

PCAST was established by Executive Order in 1993. The President established PCAST to:

- Advise the President on matters involving S&T; and
- Assist the NSTC in securing private sector involvement in its activities.

The direct link to the activities of the NSTC reflects the Administration's intention to incorporate advice from the private sector in developing the S&T budgets and policies of this Administration and to secure private sector advice on the implementation and evaluation of budgets and policies. PCAST is co-chaired by John H. Gibbons, the Assistant to the President for Science and Technology and John Young, former President and CEO of Hewlett-Packard Co. The membership includes:

- Norman R. Augustine, Vice Chairman of the Board and CEO, Lockheed Martin Corporation
- Francisco J. Ayala, Donald Bren Professor of Biological Sciences, Professor of Philosophy, University of California, Irvine
- Murray Gell-Mann, Professor, Santa Fe Institute, R. A. Millikan Professor Emeritus of Theoretical Physics, California Institute of Technology
- David A. Hamburg, President Emeritus, Carnegie Foundation of New York
- John P. Holdren, Teresa and John Heinz Professor of Environmental Policy, John F. Kennedy School of Government, Harvard University
- Diana MacArthur, Chair and CEO, Dynamac Corporation
- Shirley M. Malcom, Head, Directorate for Education and Human Resources Programs, American Association for the Advancement of Science
- Mario J. Molina, Lee and Geraldine Martin Professor of Environmental Science, Massachusetts Institute of Technology
- Peter H. Raven, Director, Missouri Botanical Garden, Engelmann Professor of Botany, Washington University in St. Louis

- Sally K. Ride, Director, California Space Institute, Professor of Physics, University of California, San Diego
- Judith Rodin, President, University of Pennsylvania
- Charles A. Sanders, Former Chairman, Glaxo-Wellcome Inc.
- Phillip A. Sharp, Professor of Biology, Head, Department of Biology, Massachusetts Institute of Technology
- David E. Shaw, CEO, D.E. Shaw and Co.
- Charles M. Vest, President, Massachusetts Institute of Technology
- Virginia V. Weldon, Senior Vice President for Public Policy, Monsanto Company
- Lilian Shiao-Yen Wu, Member, Research Staff, Thomas J. Watson Research Center, IBM.

The committee's seventh, eighth, ninth, and tenth plenary sessions were held January 15, 1997; March 6, 1997; June 9, 1997; and September 29, 1997. During FY 1997 PCAST issued the following reports to the President:

- *Preventing Deadly Conflict: What Can the Community Do?*, released in November 1996, recommends enhanced activity areas for the Administration in order to preclude outbreaks of violence, expulsion, and slaughter on a massive scale targeted against specific populations. The panel concluded that: 1) scientific research can clarify causes of deadly conflict at the individual, group, and international levels; 2) R&D can sharpen the concepts and techniques of conflict resolution and violence prevention; 3) such research can help diminish the development of prejudice and ethnocentrism during childhood and adolescence; and 4) international cooperation among scientists can play a valuable role in contributing to the prevention of deadly conflict.
- *Letter Report on Second Term Initiatives for the Clinton Administration in Science and Technology*, released on December 6, 1996. This letter report outlined S&T challenges facing the U.S. in the next five years: 1) a national strategy for energy R&D; 2) an improved understanding and management of biological resources; 3) research and technology to improve education and training; 4) industry-government-university partnerships; and 5) improved protection, management, and disposition of nuclear materials.
- *R&D Priorities for Sustainable Development*, released in January 1997, reports that the rapid growth in the world's population and its rates of consumption of natural resources has led to a deterioration of environmental conditions which threaten global stability and limit future human prospects. Five interrelated areas—climate change,

biodiversity, energy, ecosystems, and food supplies are recommended as S&T investments that would have substantial returns for the health, economic prosperity, security, and well being of all Americans.

- *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States*, released in March 1997. The panel's findings and recommendations are: 1) focus on learning with technology, not about technology; 2) emphasize content and pedagogy, and not just hardware; 3) give special attention to professional development; 4) engage in realistic budgeting; 5) ensure equitable, universal access; and 6) initiate a major program of experimental research.
- *Letter Report on Cloning Technology*, released April 11, 1997. The report endorsed the Administration's prohibition on Federal funding for cloning of human beings and the request that the private-sector adopt a self-imposed moratorium on cloning human beings. PCAST also supports the important and continuing contributions of biotechnology to agriculture and biomedical science and the request of the NBAC for advice on legal and ethical implications of extending the animal experiments to human studies. PCAST recommended that the National Academy of Sciences, Institutes of Medicine ensure that the public understands the complexities surrounding cloning.

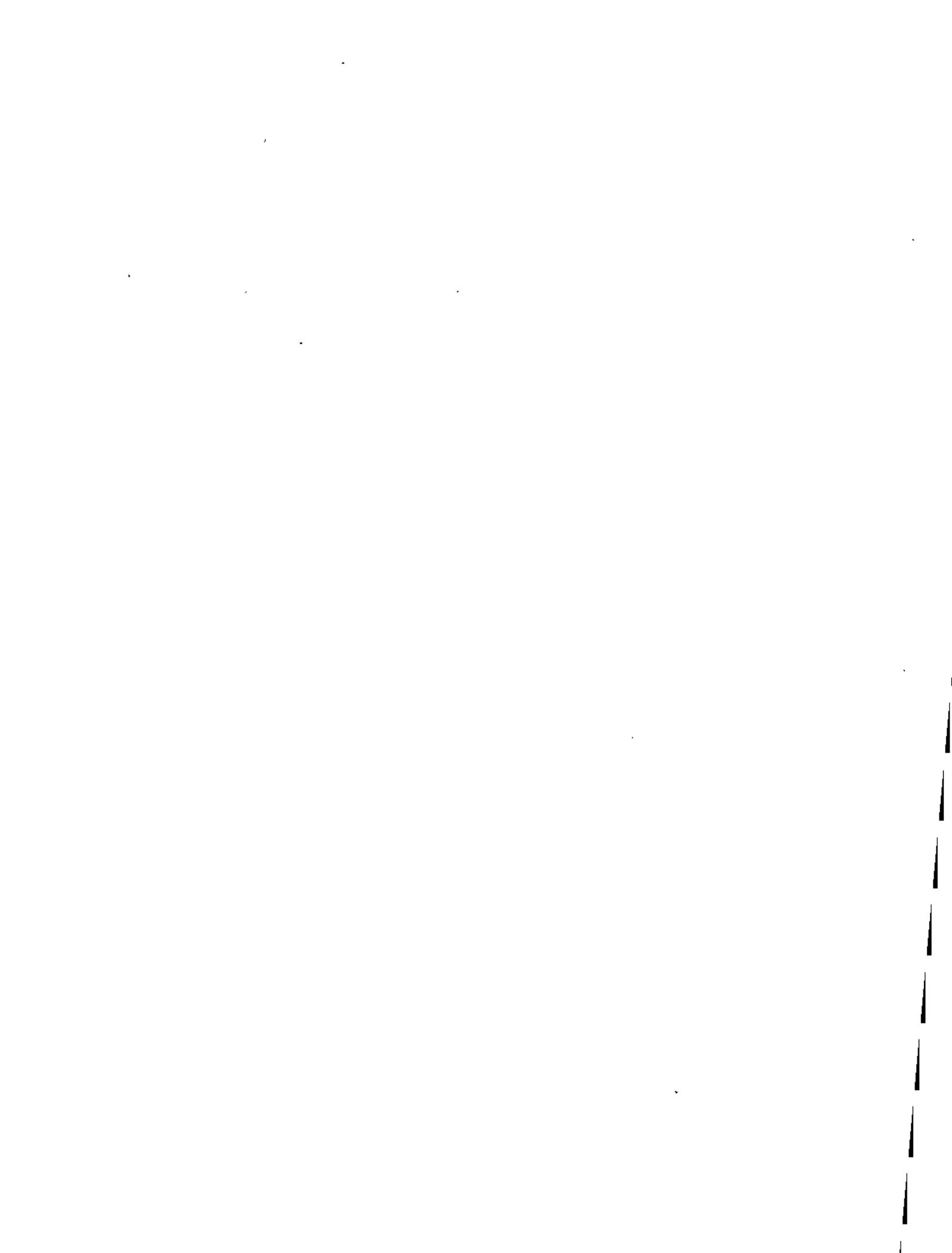
PCAST also studied energy R&D, biodiversity and ecosystems, and education issues in FY 1997:

Energy Research and Development. A panel of independent experts, to review the Nation's energy R&D program, was formed in March under the auspices of PCAST. OSTP and DOE are working with this panel to prepare a review and make recommendations on Federal support for energy R&D, incentives for private-sector investments in energy R&D, and U.S. commitments to international cooperation in energy R&D. Sub-panels are considering efficiency, renewables, advanced fossil-fuel technologies, and nuclear fission and fusion. The panel reported its findings to the President in October 1997.

Biodiversity and Ecosystem Management. This panel was constituted to: review significant Federal efforts in education related to biodiversity with recommendations on adjustments to improve the Nation's ability to manage its biological resources; review the major elements that comprise the information systems on the Nation's biological heritage, identifying priorities and resource changes, as well as new strategies for dealing with the information to enable more complete knowledge of the status and trends in distribution and abundance of species, relationship among species, and understanding of the ecological processes on which they depend; summarize the nation's basic strategy for conservation of biological resources, project its likely success through the mid-21<sup>st</sup> century and recommend actions for improvements in the context of sustainable development; describe the biological elements of the National Environmental Monitoring and Research Network with recommendations for reallocation of effort to improve its effectiveness; recommend the appropriate role for integrated assessments of the multiple stresses affecting biodiversity and ecosystems in the management of the Nation's biological resources and the mechanisms to ensure that assessments are solidly based

on the best scientific and socio-economic understanding. The report is in progress and will be finalized in January 1998.

The Education Panel. The Education Panel was formed under the auspices of PCAST to: 1) review the Federal government's major education-related initiatives (Children's Initiative, White House Conference on Early Learning, Department of Education—National Science Foundation Working Group on Improving Math and Science Education, IWG on Learning Technology) to determine potential linkages to recommendations in the earlier PCAST document, *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States*; 2) describe how these initiatives would benefit from partnership arrangements both within and outside the Federal government, and taken together, how they can be translated into a strategic plan for investing in research on education; and 3) recommend specific actions to be pursued as a result of the DoED-NSF report, especially the integration of technology into classroom practice. The Education Panel will make a series of recommendations between Fall 1997 and Spring 1998, primarily through reports at PCAST meetings and letter reports.



**SUMMARY OF ACCOMPLISHMENTS IN FY 1998**  
**Office of Science and Technology Policy**  
**National Science and Technology Council**  
**President's Committee of Advisors on Science and Technology**

The Clinton Administration considers science and technology (S&T) one of the best investments we can make in America's future. Investments in S&T contribute to: a growing economy with more high-skill, high-wage jobs for American workers; a healthier population; a cleaner environment where energy efficiency, information technology, and advanced technology increase profits and reduce pollution; a stronger, more competitive private sector able to maintain U.S. leadership in critical world markets; an educational system where every student is challenged; and an inspired scientific and technological research community focused on ensuring our national security, on improving the quality of life for ourselves and our children, and on successfully meeting global problems through cooperation with other countries. The most important measure of success will be our ability to make a difference in the lives of the American people, to harness S&T to improve the quality of life and the economic strength of our Nation.

The Office of Science and Technology Policy (OSTP) supports these objectives by: providing authoritative scientific and technological information, analysis, advice, and recommendations for the President, for the Executive Branch, and for Congress; participating in the formulation, coordination, and implementation of national and international policies and programs that involve S&T; maintaining and promoting the health and vitality of the U.S. S&T infrastructure; and coordinating research and development efforts of the Federal government to maximize the return on the public's investment in S&T and to ensure that resources are used efficiently and appropriately.

The Director of OSTP also serves as Assistant to the President for Science and Technology. In this capacity, he supports the activities of the President's National Science and Technology Council (NSTC), created November 23, 1993, by Executive Order, and the OSTP staff serves as the technical staff of the NSTC. The NSTC has responsibility for:

- coordinating the formulation of S&T policy;
- ensuring S&T policy decisions and programs are consistent with the President's stated goals;
- helping to implement and integrate the President's S&T policy agenda across the Federal government;
- ensuring S&T are considered in the development and implementation of all Federal policies and programs; and
- furthering international cooperation in S&T.

OSTP also supports the President's Committee of Advisors on Science and Technology (PCAST), which advises the President and the NSTC. The following pages summarize White House S&T activities during Fiscal Year (FY) 1998.

## **Administration Initiatives**

Participation in the front ranks of research and innovation continues to be essential for our national capacity to capture the gains of scientific and technological advances. Recognizing this, the Clinton Administration identified five imperatives that drive the Administration's strong commitment to an integrated investment agenda in scientific research, technological innovation, business environment, and education:

- America's world-leading S&T enterprise must be sustained and nurtured.
- We must strengthen our science, math, and engineering education and ensure their broad availability.
- The fiscal and regulatory environment for research must be sound and responsive to rapidly changing societal and business conditions.
- We must retain a long-term commitment to research, education, and innovation even in this period of budgetary constraint.
- The Federal government has an important role in each of these areas, but must be viewed only as one partner in the Nation's effort.

## **R&D Budget Guidance**

OSTP and the Office of Management and Budget, coordinating through the NSTC, provide Federal departments and agencies guidance on identifying a set of important national R&D areas that require coordinated investments across several agencies (refer to attached memo dated June 16, 1998). As with all R&D investments, these interagency priority areas should reflect our objectives of maintaining excellence, maximizing effectiveness, and minimizing costs. This budget guidance, rather than providing an exhaustive list of all Administration R&D priorities, focuses on those activities that require a significant level of interagency coordination.

The Administration's approach to S&T investments is guided by several fundamental principles. In general, Federal R&D investments should: a) sustain and nurture America's world-leading S&T enterprise, through pursuit of specific agency missions and through stewardship of critical research fields and scientific facilities; b) strengthen science, math, and engineering education, ensure their broad availability, and contribute to preparing the next generation of scientists and engineers; c) focus on activities that require a Federal presence to attain national goals, including national security, environmental quality, economic growth and prosperity, and human health and well being; and d) promote international cooperation in S&T.

As a result of its investment and management strategies, the Administration achieved significant progress toward six R&D goals. The six key R&D goals are to:

- Maintain World Leadership in Science, Engineering, and Mathematics
- Promote Long-term Economic Growth that Creates Jobs
- Sustain a Healthy, Educated Citizenry
- Harness Information Technology
- Improve Environmental Quality
- Enhance National Security and Global Stability

## I. Maintain World Leadership in Science, Engineering, and Mathematics

Since the beginning of President Clinton's first term, his Administration has been unequivocally committed to maintaining leadership across the frontiers of scientific knowledge. The Nation's prior investment has yielded a scientific and engineering enterprise without peer, as measured through awards and prizes, advanced education, and contributions to technological innovation. This scientific strength is a treasure on which we must continue to build. Thus, even as the Federal budget deficit is eliminated, the Administration has protected the level of investments in key Federal basic science programs. In FY 1998, the Administration continued to focus on improved management of the federal investment as well as enhancing the quality of the scientific research. Progress was made in the following areas:

Review of the University/Federal Government Partnership. The longstanding partnership between the Federal government and universities aimed at advancing S&T in the national interest is a core element of America's world-leading R&D enterprise. Federal commitment to the partnership remains strong and Federal support for university-based research has increased. Both parties, however, report growing stresses in the partnership and concerns about the best ways to sustain the relationship into the future. Therefore, the Assistant to the President for Science and Technology initiated a review of this partnership to (1) determine what might be the major stresses in the areas of research, education, and administrative regulations; and (2) determine the best ways to address the issues raised in this examination. The products of the review will assist both parties in developing strategies that promote cost-effective university-based research, allocate research costs fairly, strengthen the research-education linkage, and maintain appropriate accountability for expenditure of public funds in an environment of highly constrained budgets.

The NSTC task force has sent its report to the NSTC Committee on Science (CS) for approval. In addition to articulating the principles that should govern the partnership and reiterating the need for close linkage between education and research, the report recommends actions on research integrity, grants administration, regulations, and cost sharing. Over the next year, OSTP will engage the university community in a dialogue to develop the principles of the partnership further.

Research Misconduct. The NSTC continued its efforts to develop a common definition of research misconduct and a set of guiding principles to shape agency efforts to ensure the integrity of the research record. Research agencies were given an opportunity to respond to the CS approved definition and principles. OSTP is working with the CS to modify the proposed definition based on agency input. A final definition has been sent to the CS for approval and full NSTC approval is expected in early 1999. Pending full NSTC approval, the proposed research misconduct policy will be available for public comment in early 1999. Once approved, Federal agencies will have twelve months to put the policy in place. Universities will be expected to comply with the new policy.

NASA Cassini Launch. OSTP managed the process for Presidential approval of the launch of NASA's Cassini spacecraft, including the Interagency Nuclear Safety Review Panel, the Final Safety Assessment Report, and the Safety Evaluation Report. The Cassini mission was launched on November 15, 1997, and the spacecraft will reach Saturn in July 2004 to carry out a

four-year exploration of the planet, its rings and its moons. As the best-instrumented interplanetary spacecraft ever launched, Cassini will provide the most complete information about another planet system ever obtained. This \$3.5B mission represents one of NASA's most significant international space science missions, and involves hardware from Europe and over 120 scientists from 16 European countries.

Plant Genome. An NSTC interagency working group (IWG) was established under the auspices of the CS to develop a plan to map and sequence genomes of agriculturally important plants. The IWG presented a status report in June 1997 that was used by Congress to help shape FY 1998 appropriations decisions for the National Science Foundation (NSF) and the U.S. Department of Agriculture (USDA). The IWG published their final report in January 1998. Since then, the agencies that comprise the IWG have been working on implementing the plan through joint grant solicitations on rice, *Arabidopsis*, and other plant species of economic importance.

Cloning/National Bioethics Advisory Commission. OSTP staff continues to facilitate the work of the National Bioethics Advisory Commission (NBAC). After the publication of its 1997 report to the President, "Cloning Human Beings," NBAC continued to address issues related to the use of somatic cell nuclear transfer and stem cells. Responding to a request from the President, NBAC issued a letter report in November 1998 dealing with the ethical considerations of generating animal/human hybrid cells using cloning techniques. A more comprehensive examination of the ethical, medical and legal issues associated with stem cell research is expected from the Commission in June 1999. In addition, NBAC finalized its report on experimentation on humans with diminished decision making capacity. A report entitled "*The Use of Human Biological Materials in Research*" will be completed this year.

Federal Laboratory Reform. As a result of a 1997 OSTP study on progress in laboratory reform, an NSTC IWG was established during the summer of 1997 to implement the study's recommendations and improve information flow among all S&T agencies with intramural research programs. The IWG's report is going through full NSTC clearance with publication anticipated early in 1999. The report contains major proposals:

- To make personnel policies more flexible and conducive to a high-caliber S&T workforce;
- To create incentives to reward agencies and laboratories for reducing unneeded infrastructure;
- To improve the management and conduct of multiyear research projects;
- To increase productivity in a responsible and accountable manner, laboratories should implement environmental, health, safety, security, and administrative programs and systems that are risk-based, outcome-oriented, and integrated into the conduct of work;
- To increase awareness of the core competencies, facilities, and capabilities of Federal laboratories; and
- To promote full utilization of America's forefront scientific and engineering user facilities.

## II. Promote Long-term Economic Growth that Creates Jobs

Sustained prosperity for Americans requires a continuous stream of technological innovation. The Administration has acted in a variety of roles – funder, partner, facilitator – to stimulate new enabling technologies of importance both to Federal missions and to economic growth. Specific priorities pursued during FY 1998 are described below.

The United States Innovation Partnership. This initiative (originally undertaken as the State-Federal Technology Partnership) is an agreement between this Administration and the National Governors Association to support technology-based economic development. The United States Innovation Partnership (USIP) facilitates partnerships between state and local governments and Federal agencies working on mutually beneficial goals. These partnerships leverage the traditional roles of the States and the Federal government to maximize the Nation's investment in research and development. USIP accomplished the following activities in FY1998:

- Initiated the first set of grants under the Experimental Program to Stimulate Technology (EPSCoT) supporting high-technology development in EPSCoR states.
- Issued a report designing the next generation of the Manufacturing Extension Partnership (MEP) prepared by a State-Federal working group.
- Designed and initiated a pilot program to leverage state dollars with the Federal investment in the Small Business Innovation Research (SBIR) program in Federal agencies.
- Maintained the Angel Capitol Electronic Network (ACE-Net) which matches venture capital with entrepreneurs.

USIP will focus its continuing work on workforce development, leadership development in the states, and increasing regional and local efforts.

Partnership for a New Generation of Vehicles. The Federal government and USCAR (Ford, Chrysler (DaimlerChrysler after 11/17/98), and General Motors), in conjunction with suppliers, other businesses, and universities, have developed a joint R&D program for research on commercially-viable and safe vehicle technology that, over the long run, can preserve personal mobility while further reducing the impact of cars and light trucks on the environment and dependence on imported petroleum. In January 1998, the Partnership for a New Generation of Vehicles (PNGV) program completed a major milestone, its selection of technologies, and will now focus its research and technology development efforts in four key system areas: hybrid-electric vehicle drive, direct-injection engines, fuel cells, and lightweight materials. The selected technologies considered to be the most promising for achieving the ambitious goals of the Partnership will be used to produce the first generation concept PNGV vehicles in 2000, and will be used to prepare for the production prototype planned for 2004.

Technology for Training and Lifelong Learning. In response to the January 30, 1998 memorandum from the President, OSTP led the President's Training Technology Task Force — an interagency effort to promote the effective use of technology in Federal training and to stimulate a national market for computer-based training. The Internet, inexpensive home and office computers, and other new technologies make it possible for us to deliver timely,

individualized instruction to people at their desks and homes at a very affordable price. OSTP has provided advice on these emerging technologies for training and expanding these types of training opportunities for Federal employees. The priorities of the Task Force include: (1) creating an Internet based training network to serve as a collaborative site for multi agency development and/or procurement of training technology and to broker for information about and access to training resources; (2) demonstrating the effective and cost-effective use of training technology in Federal agency training programs; and (3) partnering with industry and academia in Federal procurements of training to stimulate a national market in computer-based training.

Future S&T Workforce. On September 10, 1998, the President directed the NSTC to develop recommendations within 180 days on how to achieve greater diversity throughout our scientific and technical work force. The NSTC recommendations will detail ways for the Federal government to bolster mentoring in S&T fields and to work with the private sector and academia to strengthen mentoring in higher education. Therefore, OSTP, along with the CS, established a new IWG that will provide recommendations on how to increase the participation of minorities, women, and persons with disabilities in the S&T workforce. Specifically, this IWG is concerned with defining and recommending the Federal role in developing the U.S. S&T workforce of the future. The S&T workforce is assumed to extend from the technician (typically less than 4-year college preparation) to the Ph.D. level. While the IWG is focusing on programs and policies affecting persons above high school to keep the scope of the study within bounds, it is recognized that relevant educational pipeline issues are also critical to developing the S&T workforce of the future.

Global Positioning System. OSTP continued to provide guidance on implementation of the Administration's Global Positioning System (GPS) policy (PDD NSTC-6), for which it was the principal architect. OSTP was instrumental in the Administration's successful efforts to protect the GPS spectrum by coordinating actions (including intervention by the Secretaries of State, Defense, and Transportation, as well as the President's National Security Advisor) to defeat proposals at the 1998 World Radiocommunications Conference for use of the GPS spectrum by the Mobile Satellite community. OSTP also negotiated a compromise between DoD and FAA enabling the Vice President to announce the addition of two new civil signals for the GPS that will spur future economic growth and improvements in aviation safety. Finally, OSTP was instrumental in concluding a Joint Statement between the President and the Japanese Prime Minister on U.S.-Japan cooperation using the GPS.

National Critical Technologies. OSTP commissioned the Science & Technology Policy Institute (formerly the Critical Technologies Institute) at RAND to capture an industrial perspective on technologies industrial leaders consider critical in maintaining technological leadership both today and in the coming decades. This report, "*New Forces at Work: Industry Views Critical Technologies*", the fourth in a series of reports requested by Congress to review the technologies critical for furthering the long-term economic growth and national security of the Nation, was delivered to Senator Bingaman in December 1998.

This report builds upon earlier analysis of national critical technologies by focusing on the challenges facing the most important custodian and user of the U.S. technology base—private industry. Unlike earlier critical technology assessments, this work was based on an extensive

series of personal interviews with technology leaders in business representing a wide range of business areas and a range of company sizes. It's encouraging to see that in comparison with earlier assessments, the business leaders interviewed are much more optimistic about the ability of U.S. businesses to maintain global leadership in key technologies. The interviews with industrial leaders revealed the following most often cited critical technologies: software, microelectronics and telecommunications technologies, new materials, advanced manufacturing, and sensor and imaging technologies.

¶ Evolved Expendable launch Vehicle. OSTP supported the DoD's revised acquisition strategy and contract award for two competing families of Evolved Expendable Launch Vehicles (EELV), to implement direction in the President's 1994 National Space Transportation Policy to evolve the current fleet of expendable launch systems for improved efficiency and lower cost. The goal of this program is to lower the cost of space transportation by 25% to 50% for national security payloads, while improving the international competitiveness of the U.S. commercial space launch industry.

Reusable Launch Vehicle Technology. OSTP supported continuing development of the X-33 and X-34 reusable launch vehicle (RLV) technology demonstration vehicles by NASA and their industry partners, Lockheed Martin and Orbital Sciences Corporation, implementing the President's 1994 National Space Transportation Policy. These technology demonstrations will provide information on the technologies required to support a decision whether to develop an operational next-generation reusable launch vehicle.

Commercial Space Launch Activities. OSTP sustained a stable space policy environment that enabled the U.S. commercial space sector to make record gains with record launch rates that outpace both DoD and NASA combined. In 1998, the U.S. captured 47% of the world market for internationally competed commercial space launches, more than any other Nation, and up from 40% in 1997. The U.S. commercial launch rate has doubled since 1996, and more than quadrupled since 1994. Revenues from U.S. commercial space launch activities have grown rapidly from \$635 million in 1996, to \$940 million in 1997, and will top \$1 billion in 1998.

Commercial Remote Sensing. In cooperation with the NSC, OSTP created a State Department-led Interagency Working Group on Remote Sensing which serves as a focal point for industry/government interactions on foreign policy and national security issues related to commercial remote sensing activities. This group facilitates business planning for potential U.S. commercial remote sensing system providers and implements direction in the President's 1994 policy on the operation and sale of commercial remote sensing systems.

Commercial Space Act of 1998. OSTP led the interagency review and formation of the Administration's policy with regard to space-related legislation proposed by the Congress in 1998, including the Commercial Space Act, which was passed and signed into law by the President. Among other things, this Act amends the Commercial Space Launch Act of 1984 to extend the authority of the FAA to regulate reusable launch vehicles currently under development by several private U.S. entrepreneurial firms.

### III. Sustain a Healthy, Educated Citizenry

Improving the health of our Nation's citizens continues to be a major goal of our Federal investment in S&T. Starting in 1862 with the financial support for our Land Grant institutions and State Agricultural Experiment Stations, and through the establishment in 1887 of the laboratory that became the National Institutes of Health (NIH), the United States has developed a system of intra- and extramural support for health-related research. We have more recently committed ourselves to similar efforts in science, engineering, and mathematics education. The degree to which our Nation prospers in the 21<sup>st</sup> century will depend on our abilities to develop scientific and technical talent in our youth, to provide lifelong learning to a well-educated workforce able to embrace the rapid pace of technological change, and to raise the level of public scientific and technological literacy. Specific FY 1998 initiatives included the following.

Health Preparedness for Future Troop Deployments. The Presidential Advisory Committee (PAC) on Gulf War Veterans' Illnesses issued its final report on December 31, 1996. The PAC recommended that a "Presidential Review Directive be issued to instruct the NSTC to develop an interagency plan to address health preparedness for and readjustment of veterans and families after future conflicts and peacekeeping missions." The PAC highlighted seven broad categories to be addressed by this review, which have been grouped into the following areas: deployment health, record keeping, research, and risk communications. An NSTC IWG was established to oversee the progress of the review and they issued their plan on Veteran's Day, November 11, 1998. The President ordered the formation of a Military and Veterans Health Coordinating Board to improve health protection for our armed forces, veterans and families. This Board will oversee the implementation of a new interagency plan requiring better medical record keeping, improved health surveillance, advanced research, and enhanced communications about health risks.

Food Safety. Over the past year, the CS IWG on Food Safety Research conducted an in-depth assessment of the Federal food safety research portfolio. A report is being drafted that reflects the breadth and diversity of this portfolio as well as input received at a public meeting held on June 30, 1998. The IWG's work will be central to the functioning of the Joint Institute for Food Safety Research, which was mandated by the President on July 3, 1998. On August 25, 1998, the Joint Institute was brought under the auspices of the President's Council on Food Safety. Upon publication of its report, the IWG will disband, and the Joint Institute will assume the food safety research planning and coordination activities.

The President's Science Advisor, Neal Lane, was also made co-chair of the President's Council on Food Safety. OSTP played a major role in establishing this Council and getting it up and running. Neal Lane chaired the first council meeting, which was held on December 16, 1998. In addition, over the past year, the Council held four public meetings to obtain input on the future of the Federal food safety system.

Children's Initiative. In April 1997, the NSTC report of the multi-agency "Children's Initiative" was published. It assessed the current scope of research on child and adolescent development, identified significant gaps in the research agenda, and developed recommendations for needed efforts not only in the research area but also in linking research and policy

development. Since then, a new NSTC IWG has been established to act on the earlier report's recommendations. To guide agencies' fiscal year 2001 budget preparations, the IWG will:

- Identify key research investment opportunities related to children and youth within the priority areas that emphasize multi-agency collaborations and research-policy linkages.
- Work with OSTP and OMB to develop a research strategy, including budgetary issues.
- Identify mechanisms to strengthen research-policy linkages among NSTC, Domestic Policy Council (DPC), Federal agencies and state and local governments, as well as non-governmental organizations and other public and private sector parties at the national, regional, and community levels.
- Involve the scientific community outside the Federal government in the development and assessment of the research investment opportunities, partnerships, and research-policy linkages.

Excellence in Mathematics and Science Teaching. The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) is the Nation's highest commendation for K-12 math and science teachers. Candidates are chosen on the basis of their teaching performance, background, and experience. PAEMST is administered through NSF, and coordinated by OSTP. One science and one math teacher at each level are ultimately recommended as Presidential Awardees. They must be U.S. citizens who teach in one of the 50 states, the District of Columbia, the DoD Dependent Schools, or the U.S. territories. In 1998, there were 107 elementary and 107 secondary recipients. The First Lady addressed both the elementary school recipients and the secondary school recipients. All (over 1,000) teacher awardees since 1983 are now linked electronically and have been used as a comparison group in a national study of math and science teachers.

Excellence in Science, Mathematics, and Engineering Mentoring. The second annual presentation of the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM) occurred on September 10, 1998. This award demonstrates the Administration's support for access to education and diversity in the S&T workforce by recognizing the efforts of individuals and institutions that have mentored underrepresented groups (women, minorities, and persons with disabilities). The President addressed the winners in the Roosevelt Room and issued a directive to the NSTC to recommend ways to improve the participation of minorities, women and persons with disabilities in the S&T workforce.

Educational Research. In response to the recommendations of PCAST's Education Panel, OSTP has worked with NSF, the Department of Education (ED), and the National Institute for Child Health and Human Development to develop an interagency education research agenda that will provide needed knowledge of how to enable all students to learn to high academic standards. The initial research will focus on understanding how young children learn to read and develop basic mathematical skills. The research will focus on different aspects of learning as well as methods of preparing teachers to teach early reading and mathematics more effectively. The first research awards will be made in FY 1999.

#### IV. Harness Information Technology

No technology promises to affect our world more profoundly than the rapid sweep of digital technology. Every sector of our economy – manufacturing and services, transportation, health care, education, and government – is being transformed by the power of information technologies to create new products and services and new ways to communicate, resulting in significant improvements in productivity and knowledge sharing. The Clinton Administration has actively addressed the research and policy issues raised by the challenges of the information age through initiatives such as the following.

Presidents Information Technology Advisory Committee. In February 1997 President Clinton established the President's Information Technology Advisory Committee (PITAC) to provide the NSTC, through the Director of OSTP, guidance and advice on all areas of high performance computing, communications, and information technologies. The members bring a broad range of expertise and interest from business and universities.

In June 1998, PITAC sent the President a letter urging that public investments in computing, communication, and other information technology research be significantly expanded to ensure an ever-increasing standard of living and quality of life for all Americans. The President then requested that the Assistant to the President for Science and Technology prepare an ambitious new research program in computation, communication, and other areas of information technology. The PITAC elaborated on its findings in an Interim Report to the President submitted in August 1998. The Interim Report has provided valuable guidance to the Assistant to the President for Science and Technology for developing an R&D investment initiative that was presented in the President's budget for FY2000.

Computing, Information, and Communications. The Federal Computing, Information, and Communications Research and Development (CIC R&D) programs invest in long-term R&D to advance computing, information, and communications. These programs are an outgrowth of the highly successful, Congressionally-chartered High Performance Computing and Communications (HPCC) Program and were reauthorized by Congress last year in the Next Generation Internet Act of 1998.

In 1998, OSTP staff, working with the NSTC, oversaw work in five program component areas: 1) High End Computing and Computation; 2) Large Scale Networking; High Confidence Systems; 3) Human Centered Systems; 4) Education, Training, and Human Resources, and 5) the Federal Information Services and Applications Council.

Accomplishments of the Federal CIC R&D Program in 1998 are described in *Computing, Information and Communications: Networked Computing for the 21st Century Supplement to the President's 1999 Budget* and in the FY 1998 Implementation Plan.

Next Generation Internet. Announced by the President in October 1996, the Next Generation Internet (NGI) initiative is a multi-agency Federal R&D program that is developing advanced networking technologies and revolutionary applications requiring advanced networking. The program will demonstrate these capabilities on testbeds that are 100 to 1,000

times faster end-to-end than today's Internet. The NGI initiative is a key component of the Large Scale Networking research, with participation from the Defense Advanced Research Projects Agency (DARPA), DOE, NASA, NIH, the National Institute of Standards and Technology, and NSF.

The NGI Implementation Plan was published in January 1998. In March 1998 Congressional representatives, Administration officials, and the general public had an opportunity to view firsthand the technologies and applications being developed under the NGI initiative at an event coined "Netamorphosis." Seventeen NGI demonstrations from seven Federal agencies, academia, and industry showed how further development of Internet technologies will lead to advancements in healthcare, the environment, manufacturing, defense, and education. At SC98, a national high performance networking and computing conference held in November 1998, eleven NGI demonstrations were exhibited as part of the CIC R&D research exhibit and an NGI panel described the NGI programs across the agencies, their purposes, accomplishments to date, current status, future schedules, milestones, and expected achievements.

In FY1998 several agencies granted NGI awards. The NGI Supernet Program, which creates a transcontinental testbed 1000 times faster than current Internet connection speeds linking 20 institutions, was established via a DARPA award to two consortia. In addition to Supernet, DARPA awarded 27 other NGI awards totaling approximately \$50M. The National Library of Medicine announced 24 contract awards totaling \$2.3M to medical institutions and companies that will develop innovative medical projects benefiting from NGI capabilities. The NSF awarded grants to 36 universities for links to the NSF's high performance Backbone Network Service or to other approved high performance networks.

The Digital Economy. With support from DPC, OSTP initiated an interagency working group on the digital economy to advance data collection, methodologies, and research for better understanding the implications of the digital economy. The group began planning a public conference with commissioned papers to be held in May 1999 with support from NSF and the Department of Commerce (DoC). The President announced the working group as a new initiative of the Electronic Commerce Working Group in November 1998.

Database Protection. OSTP represented the concerns of the science agencies in response to proposed new legislation to protect databases. During the summer of 1998, OSTP worked closely with the DoC to develop an Administration position on the legislation, which passed in the House of Representatives. OSTP and DoC subsequently worked on informal comments to the Senate Judiciary Committee while the database legislation was debated in conference committee as part of the Digital Millennium Copyright Act. The database protection title was ultimately stripped from the Act.

## V. Improve Environmental Quality

Advances in environmental science and technology hold tremendous promise for creation of a sustainable future, a future where environmental health, economic prosperity, and quality of life are mutually reinforcing. We need to apply S&T in order to assess, anticipate, and avoid the negative consequences of environmental change. OSTP concentrated its efforts in the following areas during FY 1998.

Integrated Science for Ecosystem Challenges. OSTP worked through the NSTC Committee on Environment and Natural Resources (CENR) to develop a research initiative known as Integrated Science for Ecosystem Challenges (ISEC) to address environmental stresses to ecosystems by using new technologies and approaches to ecological research. For FY 2000, the initiative focuses on four critical areas: (1) invasive species, biodiversity, and species decline; (2) harmful algal blooms, hypoxia, and eutrophication; (3) habitat conservation and ecosystem productivity; and (4) information management, monitoring and integrated assessment. ISEC efforts are to be integrated into a flexible multi-disciplinary framework for coordinating S&T activities. They will also be integrated across Federal, state, and local agencies to share capabilities, facilities, and resources, and coordinated across activities, such as research, technology development, monitoring, modeling, assessment, and information management.

This long-range strategy will take advantage of new technologies and approaches to address challenges to ecosystem function and resiliency, and increase both ecosystem understanding and the utility of research findings. These challenges fall generally into five categories of stressors -- invasive species, pollution, land and resource use, extreme natural events, and atmospheric and climate change. The interagency strategy provides a plan for programs at the Department of Interior (DOI), Environmental Protection Agency (EPA), NSF, USDA, and the National Oceanic and Atmospheric Administration (NOAA), and has been reviewed by the academic community and endorsed by the PCAST Environmental Panel.

The National Assessment of the Consequences of Climate Change. Significant progress was made on the National Assessment of the Consequences of Climate Change for the United States. The Assessment, which will be completed in late 1999, will define regional and sectoral vulnerabilities to climate change and is expected to contain recommendations for future research activities. Production of such an assessment is mandated in the authorizing legislation of the U.S. Global Change Research Program (the Global Change Research Act of 1990). The National Assessment Plan was completed and approved by the NSTC during 1998, and a wide variety of assessment activities were undertaken:

- Eleven regional workshops were completed during 1998: Rocky Mountains and Great Basin, Gulf Coast, Southwest - Rio Grande River Basin, Hawaii and Pacific Islands, California, Metropolitan East Coast, Great Lakes, Appalachians, Eastern Midwest, South Atlantic Coast and Caribbean, Native Peoples/Native Homelands.
- A National Assessment Synthesis Team was chartered under FACA to provide leadership and oversight of the assessment process, and to author the National Assessment Synthesis Report. The team includes Federal agency, academic, and private sector participants.

- Sectoral analyses of Water Resources, Human Health, Agriculture, Forests, and Coastal Areas were initiated.

Environmental Monitoring and Research Initiative. OSTP continued working closely with the relevant Federal agencies, the academic community, and the private sector on the "Report Card on the Status of the Nation's Ecosystems." Several workshops hosted by the Heinz Center led to substantial progress on defining the elements of the first report card and agreement on a set of indicators to be used in describing the status of ecosystems. A concise prototype report card, covering agriculture, coastal areas, and forests is expected to be completed in the summer of 1999.

Endocrine Disruptor Research Initiative. OSTP completed the initial phase of the initiative, which was to assess the state of science on endocrine disruptors and evaluate the adequacy of on-going Federal research to resolve the scientific unknowns. The effort found that the available scientific knowledge did not provide an adequate basis to inform public policy and that the Federal research portfolio contained significant gaps that would leave important questions unaddressed. During 1998, the comprehensive database of agency program was updated, and an international assessment effort was initiated. A report, *Endocrine Disruptors: Research Needs and Priorities--1998*, documenting the findings of the Working Group and the actions taken to address the identified needs, was finalized and published as a CENR document.

Global Change Research. OSTP led a major effort to examine and improve the U.S. Global Change Research Program (USGCRP) programs in climate, ecological impacts, carbon cycle research, and in observations and modeling. This effort led to definition of a carbon cycle initiative for the FY2000 budget and a number of revisions in USGCRP base programs. It also has provided an initial set of self-evaluations in these areas that will prove very useful in the completion of a new long-term research plan for the USGCRP.

Air Quality Research. OSTP played an important role in expanding the Federal air quality research agenda to include a new emphasis on particulate matter (PM) to support the design of improved sampling strategies required to implement the new PM standards established by the Administration. NSTC Subcommittee member agencies compiled an inventory of their efforts in PM atmospheric research to provide a picture of on-going Federal work directed toward improving our understanding of emissions, chemical and physical transformations, atmospheric transport, and deposition. The North American Research Strategy on Tropospheric Ozone (NARSTO), many of whose members serve on the Subcommittee, also voted to expand from an exclusive focus on ozone to include PM.

Natural Disaster Reduction. OSTP assisted with the final definition of new program activities to be supported by the \$100 million in the FY 1999 budget for new activities aimed at reducing losses from natural disasters. Working closely with other NSTC members and the Vice President's National Partnership for Reinventing Government, OSTP developed an FY 2000 initiative "Saving Lives with an All-Hazards Warning Network" that would place NOAA Weather Radios in public buildings in areas at risk from single or multiple natural hazards.

Global Disaster Information Network. OSTP continued participating in the interagency Global Disaster Information Network (GDIN) effort. The United States Geological Survey (USGS), the Central Intelligence Agency (CIA), DoD, NASA, NOAA/NESDIS, and the Federal Emergency Management Agency (FEMA), along with private sector partners and the government of Honduras, produced a GIS Atlas, risk maps and CD ROM to support Hurricane Mitch response and recovery efforts in Central America.

Construction and Building. On May 4, 1998, the President announced the formation of the Partnership for Advancing Technologies in Housing (PATH) to develop, demonstrate, and deploy housing technologies, designs and practices that can significantly improve the quality of housing without raising costs. Under guidance from OSTP, Federal government agencies, led by the Department of Housing and Urban Development (HUD) and DOE with support from the DoC and the Department of Labor, FEMA and EPA, have partnered with builders, developers, product suppliers, insurers and financiers. Over 100 innovative technologies and 12 best practices are now described on the PATH web site ([www.pathnet.org](http://www.pathnet.org)). The site also provides a forum for builders to describe their experiences using the new technologies.

A similar Partnership for Advancing the Infrastructure and its Renewal (PAIR) is being formed to provide the technology to rebuild and revitalize the Nation's civil infrastructure, including transportation, telecommunications, energy, water supply and sewage, and institutional facilities.

Federal agencies are also supporting an effort by the National Conference of States on Building Codes and Standards, along with 55 other concerned private sector organizations, to streamline the building regulatory process by developing model processes. The model processes will be based on case studies of system improvements achieved in various parts of the country.

## **VI. Enhance National Security and Global Stability**

The technological superiority in war fighting equipment on which the military depends is the product of a strategic commitment to science and technology, through research investments in defense laboratories, industry, and universities. We also recognize that our national security depends on global stability. Building global partnerships for cooperation in S&T is an important part of our security strategy. Achievements in the area of enhancing national security and global stability during FY 1998 include the following areas.

Counter-Terrorism and Critical Infrastructure Protection. In May 1998, the President issued Presidential Decision Directives (PDD) 62 and 63 to strengthen the Nation's defenses against emerging unconventional threats to the U.S.: terrorist acts, use of weapons of mass destruction, and assaults on or failures of the Nation's critical infrastructures. Among other things, these directives establish new interagency groups to develop policy and coordinate agency activities to counter weapons of mass destruction and to protect critical infrastructures. OSTP chairs two R&D subgroups which support both of these interagency groups. In this capacity, OSTP chaired an interagency process that produced a range of R&D proposals for

critical infrastructure protection. OSTP also initiated reviews of medical R&D, nonmedical R&D, and modeling, simulation, and operations research needed to counter chemical and biological terrorism. In addition, OSTP participated in the Justice Department's year-long process to prepare a Five-year Interagency Counterterrorism and Technology Crime Plan, submitting material for and carefully reviewing that plan's discussion of R&D.

National Security/Emergency Preparedness. By Executive Order, the OSTP Director is assigned responsibility for directing the exercise of the President's wartime authorities over domestic telecommunications derived from the Communications Act of 1934. In emergencies or crises, in which the exercise of the President's war power functions is not required or permitted by law, the OSTP Director is charged with the responsibility to advise and assist the President and Federal departments and agencies with the provision, management, or allocation of telecommunications resources. OSTP, along with National Security Telecommunication Advisory Committee (NSTAC) and Purdue University, co-sponsored an R&D Exchange Meeting in October that addressed R&D policy issues related to national security/emergency preparedness telecommunications and critical infrastructure protection. OSTP also took steps to reactivate the Joint Telecommunications Resources Board to address possible Y2K-related telecommunications outages.

Nuclear Weapon Stockpile Stewardship. OSTP continues to provide detailed technical review of DOE's annual revisions of the Stockpile Stewardship Plan, which describes the Department's program for maintaining a safe and reliable nuclear deterrent without nuclear testing. As part of this effort, OSTP serves on DOE's Executive Review Group, established to provide advice to DOE on the Stockpile Stewardship program.

Nonproliferation of Nuclear Weapons and Missile Technology. OSTP continues its work with the NSC to coordinate U.S. efforts to control nuclear weapons and the fissile materials needed to make them. These efforts have a broader scope than those associated with existing arms control agreements, such as the START treaties, that in the past were limited to missiles and launchers. The Clinton Administration has been implementing a comprehensive four-part strategy to build confidence through openness to secure nuclear materials, halt the accumulation of excess materials, and carry out disposition of these excess materials. OSTP has also been working with the NSC and the Office of the Vice President to assess strategies to curb the proliferation of missile technology.

Comprehensive Test Ban Treaty. OSTP has worked with key scientific and technical societies to provide information about the Comprehensive Test Ban Treaty. Within the Administration, OSTP successfully worked to develop U.S. policies that, consistent with U.S. security requirements, would maximize the international scientific community's access to data collected by the Comprehensive Test Ban Treaty's International Monitoring System. Such access will improve monitoring of the treaty as well as make new sources of data available for scientific use.

Humanitarian Demining. To support the President's commitment to "develop improved mine detection and clearing technology and to share this improved technology with the broader international community," OSTP helped oversee the management and execution of humanitarian

demining R&D in the DoD and other Federal agencies. In 1998, OSTP initiated a process to prepare a report on humanitarian demining R&D. Such a report will be useful for public outreach and diplomacy, and its preparation will help guide the evolution of the demining R&D program itself.

Biological Weapons Arms Control. In his State of the Union address on January 27, 1998, the President called for measures to strengthen the 25-year-old Biological Weapons Convention (BWC) by adding an international inspection system to help detect and deter cheating. OSTP has worked with the NSC and with agencies to develop policy positions regarding ongoing negotiation of a Monitoring and Compliance Protocol to the BWC.

Aviation Security. OSTP coordinated the Administration's appeal (via a letter from the Vice President) to the House and Senate conferees on the security supplemental to the Federal budget. This appeal resulted in an additional \$100M for deployment of explosive detection systems at the Nation's airports.

International Agreements. OSTP has worked successfully to expand U.S. S&T relationships with important trading partners and economies in transition. OSTP has led S&T cooperation with key countries, including China, Russia, Japan, South Africa and Egypt. OSTP worked with the State Department to realize the signing of the first S&T agreement with the European Union, and OSTP, through the NSTC, also developed a comprehensive strategy for S&T engagement with Japan. OSTP has also led U.S. participation in multilateral S&T fora in support of the Administration's goals in the Asia-Pacific and the Americas, as well as among Organization for Economic Cooperation and Development (OECD) countries. OSTP's goal is to provide guidance to agencies as they engage in international S&T cooperation so that our investments yield benefits for U.S. scientific, economic, and national security interests. For example, OSTP is working with State Department and technical agencies to ensure continued, but appropriate, S&T relations with India and Pakistan in the aftermath of nuclear testing and the imposition of sanctions.

Emerging and Re-emerging Infectious Diseases. The NSTC Task Force on Emerging Infectious Diseases (EIDs), co-chaired by OSTP and the Centers for Disease Control and Prevention (CDC), led the implementation of the June 1996 PDD on Emerging Infectious Diseases (NSTC-7).

Internationally, the Task Force helped place EIDs on the agenda of the G-8 Summit in Birmingham, and other major multinational fora. An EID experts meeting was also held under the G-8 auspices to begin development of a global strategy for surveillance and response, particularly in developing countries. To follow up on G-8 commitments to reduce the death rate from malaria, Task Force members achieved significant budget increases for prevention, control and research on malaria. In response to the increasing threat of multi-drug resistant tuberculosis, Task Force members are working closely with the World Health Organization (WHO) to develop a Stop TB project. An agenda for action has also been developed in the Asia Pacific Economic Cooperation (APEC) forum, as a result of Task Force leadership.

Domestically, Task Force members have increased budgets for surveillance, response, research and outreach. CDC has expanded its programs to strengthen its epidemiology and laboratory capacity, including a new electronic network to track deadly strains of E. coli. In response to the increasing problem of antibiotic resistance, CDC has launched two major prevention programs in the community and hospital settings. CDC and other Task Force members conducted a major outreach effort by holding the first international conference on EIDs in Atlanta in March 1998.

International Space Station. OSTP continued to be the White House focal point for policy and program oversight related to the development of the redesigned International Space Station (ISS). OSTP has worked closely with the Office of the Vice President, the NSC, OMB, and NASA to develop and implement U.S. contingency plans, which include the development of U.S. capabilities to protect against potential future Russian shortfalls in their ability to meet their commitments. The first two elements of the ISS were launched and joined in orbit in November and December of 1998. When fully assembled, the ISS will be a unique, world-class, scientific and technological facility for experimentation and research. It will also be a symbol of the tremendous accomplishments that cooperation in the post-Cold War era can bring.

Shuttle-Mir Program. OSTP supported the successful conclusion of NASA's Shuttle-Mir program, which constitutes Phase I of the International Space Station program. In many ways, the Shuttle-Mir program has been a rehearsal for the complex tasks of assembling, supplying, maintaining, and conducting research on the International Space Station. Since its initiation in 1993, through the entire series of nine Shuttle missions to Mir, including seven long-duration stays on-orbit by U.S. astronauts, and nine Russian Cosmonaut flights on the Shuttle, the Shuttle-Mir collaboration has proved a resounding success.

## **NSTC PRESIDENTIAL REVIEW DIRECTIVES (PRD's)**

Presidential review directives (PRD's) and decision directives (PDD's) may be issued under the auspices of the NSTC. Work started on three NSTC PRD's in fiscal year 1998.

Presidential Directive on Achieving Greater Diversity Throughout the U.S. Scientific and Technical Work Force. The President directed the NSTC to develop recommendations within 180 days on how to achieve greater diversity throughout our scientific and technical work force. The NSTC recommendations will detail ways for the Federal government to bolster mentoring in S&T fields and to work with the private sector and academia to strengthen mentoring in higher education.

Review of the Development of Interagency Plans to Address Health Preparedness for and Readjustment of Veterans and Their Families after Future Deployments (issued 4/21/97). Responds to recommendation from the Presidential Advisory Committee on Gulf War Veterans' Illnesses for the NSTC to develop an interagency plan to address health preparedness for and readjustment of veterans and their families after future conflicts and peacekeeping missions. The review was released on Veteran's Day, November 11, 1998.

Review of the University-Government Partnership (issued 9/26/96). A government-wide policy and administration review of the U.S. universities research system. The NSTC has formed a task force to conduct a review to determine what might be the major stresses in the areas of research, education, and administrative regulations, and to determine what the Federal government's role should be in addressing any issues raised by this examination. The final report is planned for release in the spring of 1999.

## NSTC REPORTS AND PUBLICATIONS

Coordination of multiagency reports is an important role of the NSTC. In FY 1998, several reports were published, including:

*National Plant Genome Initiative*, January 1998.

*Program Guide to Federally Funded Environment and Natural Resources R&D, Third Edition*, February 1998.

*Our Changing Planet: The FY 1999 U.S. Global Change Research Program, An Investment in Science for the Nation's Future*, March 1998.

*National Science and Technology Council 1997 Annual Report*, April 1998.

*A National Obligation: Planning for Health Preparedness for and Readjustment of the Military, Veterans, and their Families after Future Deployments*, November 1998.

*Networked Computing for the 21<sup>st</sup> Century/Supplement to the President's FY 99 Budget*, August 1998.

*Transportation Technology Plan*, November 1998.

*Endocrine Disruptors: Research Needs and Priorities*, December 1998.

*U.S. National Assessment: The Potential Consequences of Climate Variability and Change. A Plan by the National Assessment Synthesis Team*, 1998.

*Air Quality Research Strategic Plan*, November 1998.

*Public/Private Partnerships: Implications for Innovation in Transportation*, December 1998.

## Fora, Conferences, and Workshops

OSTP often uses its convening power to draw together experts and stakeholders in various fields to advance the state of knowledge and cooperation in various fields. In FY 1998, we sponsored the following meetings.

*Public Private Partnership 2000 (PPP 2000): Natural Disaster Reduction.* OSTP working with the NSTC CENR and the Institute for Business and Home Safety (IBHS), established PPP 2000 to seek opportunities for government and nonprofit, private-sector organizations to work together to reduce vulnerability to natural hazards in U.S. communities. The series will include 14 fora, each focusing on a different public policy issue related to natural disaster reduction. These fora are to seek new and innovative opportunities for government and nonprofit, private sector organizations to work together to foster the reduction of loss of life, injuries, vulnerability, property damage, and negative health and environmental consequences from natural hazards such as floods, severe storms, earthquakes, landslides, volcanic eruptions, wildfires, droughts, tsunamis, and technological hazards in communities throughout the Nation. To date, 10 of the fora have been completed. Summary reports from Forums held to date can be found on the Internet at: <http://www.usgs.gov/ppp2000/index.html>

*The National Assessment of the Consequences of Climate Change.* A November 1998 National Climate Forum, in Washington DC, brought together nearly 500 government, academic, and private sector participants from around the country to discuss findings from the initial set of regional workshops, means of assessing sectoral impacts, and alternatives for structuring the National Assessment activity.

*The U.S. S, E & T Workforce of the Future: National Strategy, National Portfolio, National Resource Base.* On July 29-30, 1998, under the auspices of the NSTC Committee on Science, numerous Federal agencies sponsored a workshop to explore the status of and options for diversifying our future science, engineering and technology workforce. Over one hundred participants and speakers attended the workshop. The workshop was designed to provide input into the work of the IWG on the Future of the S&T workforce.

*Bioinformatics Workshop.* On February 3-4, 1998, the Committee on Science's Subcommittee on Biotechnology conducted a workshop with 20 bioinformatics experts to provide advice on future Federal programs in information technology as it relates to development, use, and maintenance of biological databases.

*OSTP-AAAS One America Conversation.* On February 13, 1998, OSTP and the American Association for the Advancement of Science (AAAS) co-sponsored a conversation entitled "Meeting America's Needs for the Scientific and Technological Challenges for the Twenty-First Century." This conversation was part of the President's Race Initiative. Twenty participants added their views on how the Federal government can improve the participation of minorities in the future S&T workforce.

*Netamorphosis, NGI Demonstrations, March 11-13, 1998.* OSTP sponsored a series of technical showcases coined "Netamorphosis," which provided Congressional representatives, Administration officials, and the general public with an opportunity to view firsthand the technologies and applications being developed under the NGI initiative. Seventeen NGI demonstrations from seven Federal agencies, academia, and industry showed how further development of Internet technologies will lead to advancements in healthcare, the environment, manufacturing, defense, and education.

SC98: *CIC R&D Research Exhibit and Next Generation Internet Demos*, November 1998. At SC98, a national high performance computing and networking conference, eleven NGI demonstrations were exhibited as part of the CIC R&D research exhibit and an NGI panel described the NGI programs across the agencies, their purposes, accomplishments to date, current status, future schedules, milestones, and expected achievements.

### **Accomplishments of the President's Committee of Advisors on Science and Technology (PCAST)**

PCAST was established by Executive Order in 1993. The President established PCAST to:

- Advise the President on matters involving S&T; and
- Assist the NSTC in securing private sector involvement in its activities.

The direct link to the activities of the NSTC reflects the Administration's intention to incorporate advice from the private sector in developing the S&T budgets and policies of this Administration and to secure private sector advice on the implementation and evaluation of budgets and policies. PCAST is co-chaired by Neal Lane, the Assistant to the President for Science and Technology and John Young, former President and CEO of Hewlett-Packard Co. The membership includes:

- *Norman R. Augustine - Chairman and CEO, Lockheed Martin Corporation*
- *Francisco J. Ayala - Donald Bren Professor of Biological Sciences, Professor of Philosophy, University of California-Irvine*
- *John M. Deutch - Institute Professor, Dept. of Chemistry, Massachusetts Institute of Technology*
- *Murray Gell-Mann - Professor, Santa Fe Institute; R.A. Millikan Professor Emeritus of Theoretical Physics, California Institute of Technology*
- *David A. Hamburg - President Emeritus, Carnegie Foundation of New York*
- *John P. Holdren - Teresa and John Heinz Professor of Environmental Policy, John F. Kennedy School of Government, Harvard University*
- *Diana MacArthur - Chair and CEO, Dynamac Corporation*
- *Shirley M. Malcom - Head, Directorate for Education and Human Resources Programs, American Association for the Advancement of Science*
- *Mario J. Molina - Institute Professor, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology*
- *Peter H. Raven - Director, Missouri Botanical Garden; Engelmann Professor of Botany, Washington University in St. Louis*
- *Sally K. Ride - Professor of Physics, University of California-San Diego*
- *Judith Rodin - President, University of Pennsylvania*
- *Charles A. Sanders - Former Chairman, Glaxo-Wellcome Inc.*
- *David E. Shaw - Chairman, D.E. Shaw and Co. and Juno Online Services*
- *Charles M. Vest - President, Massachusetts Institute of Technology*

- *Virginia V. Weldon – Director, Center for the Study of American Business, Washington University in St. Louis*
- *Lillian Shiao-Yen Wu - Member, Research Staff, Thomas J. Watson Research Center, IBM*

The committee's 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, and 15<sup>th</sup> plenary sessions were held in 1998 on: January 26; March 5-6; June 9; September 17; and November 19. During FY 1998 PCAST issued the following reports to the President:

*Federal Energy Research and Development for the Challenges of the Twenty-First Century*, released November 1998. The final report of the PCAST's Energy Research and Development Panel recommended focusing the government's energy R&D on projects where high potential payoffs for society as a whole justify larger investments than industry would be likely to make on the basis of expected private returns and where modest government investments can effectively complement, leverage, or catalyze work in the private sector. The inadequacy of current energy R&D is especially acute in relation to the challenge of responding responsibly and cost-effectively to the risk of global climatic change. The report's recommendations helped shape the Administration's proposals for applied energy-technology R&D in the Climate Change Technology Initiative.

*Teaming With Life: Investing in Science to Understand and Use America's Living Capital*, released June, 1998. Over the last few decades, a new paradigm has emerged: Improving and protecting our environment is compatible with growing the Nation's economy. As part of this paradigm, we have come to recognize the essential linkage between the economy and the environment. We now understand that the sustained bounty of our Nation's lands and waters and of its native plant and animal communities is the natural capital on which our economy is founded. We also realize that a sound forward-looking economic strategy requires that we protect this natural capital, rather than damage it and then spend millions or billions of dollars attempting to recreate what Nature has already given us. To protect our natural capital, our Nation's biodiversity and the ecosystems within which it thrives, we need to have an extensive and frequently updated environmental knowledge base. This knowledge base is required to evaluate alternative plans for managing biodiversity and ecosystems as we work to optimize the union between the environment and the economy. The report offers strategies as to how to amplify our knowledge that will allow us to accomplish these goals.

*Letter Report on R&D Partnerships*, released March 6, 1998, reviewed the effectiveness of Federal technology partnership programs based on three studies and noted areas for improving programmatic effectiveness and efficiency.

*Letter Report on Global Cooperation to Develop and Commercialize Energy Technologies to Meet the Global Challenge of Climate Change*, released May 15, 1998. The report advised that the issues of climate change presents the U.S. and the world with one of the greatest challenges of the 21<sup>st</sup> century. The report recommended development of a plan to address the challenge of global impact of human activities through technology and development of a global collaborative framework in greenhouse-gas reductions.

*Letter Report on the Education Research Initiative*, released June 8, 1998. The report advised that the quantity, quality, and organization of education research in this country need renewed attention. The report recommended that the FY 1999 spending constitute an initial investment in building the methodological human, and institutional resources that will move the U.S. to a \$1.5 billion annual program of peer reviewed, politically independent, reliable, and cumulative research in education that draws on a broad base of expertise.

*Letter Report on the FY 2000 Budget*, released November 4, 1998. The report urges the President to support strongly a broad science and technology portfolio in the FY 2000 budget. PCAST advised the President to continue to focus Federal resources on strengthening the U.S. research capacity through an approach such as the 21<sup>st</sup> Century Research Fund and to broaden this concept to encompass the basic research programs of the Department of Defense.

*Letter Report on the Need for Increased Investment in Educational Research*, released June 8, 1998. This letter report placed the need for increased investment in large-scale educational research within the context of U.S. performance on the Third International Mathematics, and Science Study (TIMSS) and identified the following three key investment areas: methodological development, human development, and institutional development.

PCAST also studied environmental R&D, and education issues in FY 1998.

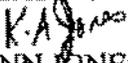
PCAST Environment Panel. The PCAST Environment Panel has provided valuable review, advice on a number of key Administration environmental R&D initiatives, including the National Assessment of Climate Change, the Report Card on the State of the Nation's Ecosystems, and the Integrated Science for Ecosystem Challenges effort. We also began a major new study of International Energy R&D under the auspices of the Panel, in response to a request from the President.

The Education Panel. The Education Panel was formed under the auspices of PCAST to: 1) review the Federal government's major education-related initiatives (Children's Initiative, White House Conference on Early Learning, Department of Education—NSF Working Group on Improving Math and Science Education, IWG on Learning Technology) to determine potential linkages to recommendations in the earlier PCAST document, *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States*; 2) describe how these initiatives would benefit from partnership arrangements both within and outside the Federal government, and taken together, how they can be translated into a strategic plan for investing in research on education; and 3) recommend specific actions to be pursued as a result of the ED-NSF report, especially the integration of technology into classroom practice. The Education Panel will continue to make recommendations primarily through reports at PCAST meetings and letter reports.

THE WHITE HOUSE  
WASHINGTON

June 16, 1998

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM:  KERRI-ANN JONES AND  JACOB L. LEW

SUBJECT: FY 2000 Interagency Research and Development Priorities

Through the National Science and Technology Council (NSTC), Federal agencies and departments have identified a set of research and development (R&D) areas that are important national efforts requiring coordinated investments across several agencies. As with all R&D investments, these interagency priority areas should reflect our objectives of maintaining excellence, maximizing effectiveness, and minimizing costs. This memorandum, rather than providing an exhaustive list of all Administration R&D priorities, focuses on those activities that require a significant level of interagency coordination.

Investment Principles

The Administration's approach to science and technology investments is guided by several fundamental principles. In general, Federal R&D investments should: a) Sustain and nurture America's world-leading science and technology enterprise, through pursuit of specific agency missions and through stewardship of critical research fields and scientific facilities; b) Strengthen science, math, and engineering education, ensure their broad availability, and contribute to preparing the next generation of scientists and engineers; c) Focus on activities that require a Federal presence to attain national goals, including national security, environmental quality, economic growth and prosperity, and human health and well being; and/or d) Promote international cooperation in science and technology.

More specifically, in making investment decisions on Federal R&D, the Administration will:

- Favor investments that focus on long-term, potentially high-payoff activities and outcomes that would not occur in the absence of a Federal presence, such as activities in the 21st Century Research Fund.
- Favor activities that employ competitive, peer-reviewed processes.

- Encourage collaborative arrangements with other agencies, industry, academia, the States, and appropriate overseas/foreign counterparts.
- Encourage agencies to fund program proposals within FY 2000 budget guidance, rather than requesting additional funding, in keeping with our continuing effort to maintain a balanced Federal budget. The Administration encourages agencies to fund new, high-priority activities by substituting them for lower-priority or recently-completed activities.

### R&D Performance Measures

We encourage agencies to include the following R&D goals and measures in their agency performance plans. The Government Wide Performance Plan that accompanied the President's FY 1999 budget included similar measures for Function 250 activities.

- **Federally funded research will be of high quality**
  - We encourage each agency to establish a goal for the percent (by amount of funds) of its research project portfolio that will be allocated on the basis of a merit-based competitive process. (In the President's FY 1999 budget, the goal is 80 percent or greater for Function 250 activities.)
  - We encourage agencies to ensure that independent assessments of their research programs evaluate both the quality and the progress of the agencies' research toward stated goals. The goal will be to achieve a "satisfactory" rating from such assessments, consistent with the format provided in the Government Performance and Results Act. Existing advisory committees, groups within the National Academy of Sciences, or other outside groups could conduct the assessment.
- **Major scientific facilities will be built and operated efficiently**
  - As established by law in the Federal Acquisition Streamlining Act, agencies will keep the development and upgrade of facilities on schedule and within budget, not to exceed 110 percent of estimates. In operating R&D user facilities, agencies will establish a goal for unscheduled down time as a percent of total scheduled possible operating time. (In the President's FY 1999 budget, the goal is less than 10 percent unscheduled down time.)

### Research and Development Budgets for Interagency Priorities

NSTC coordinates selected interagency science and technology investment priorities. Interagency priorities that require high-level attention in the President's budget submission to Congress are managed as interagency crosscuts. The NSTC has also identified a number of special emphasis areas that require budget oversight within the Executive branch but that do not require formal

budget crosscuts. These special emphasis areas do not constitute a comprehensive list of all NSTC priorities. The NSTC is actively involved in a number of interagency R&D issues that, unlike the issues outlined below, do not require near-term Administration policy or budget decisions, but are nevertheless important, ongoing activities.

### NSTC Crosscuts

The FY 2000 budget will include four interagency R&D crosscuts. Agencies and departments should be prepared to demonstrate their commitment to these priorities, if relevant to their missions, as part of their budget discussions with, and FY 2000 budget requests to, the Office of Management and Budget (OMB), as well as in their responses to the Government Performance and Results Act (GPRA). OMB's Circular A-11, a revised version of which will be available in the early summer, outlines the definitions of these crosscuts and how agencies must submit data to OMB. The four cross-cutting R&D areas are:

1. Climate Change Technology Initiative
2. U.S. Global Change Research Program
3. Partnership for a New Generation of Vehicles
4. High Performance Computing and Communications (including Next Generation Internet)
  - The President has called for a significant funding increase in long-term information and communications R&D within agency budget allocations. Agency budget submissions should reflect the President's directive by including proposals for new and expanded activities within the High Performance Computing and Communications crosscut.

To promote more uniform management and accounting, each interagency program must include the following:

1. Concise program performance goals and measures, finalized in time to be sent to OMB as part of the FY 2000 Budget submission. Goals and measures should be quantitative if possible, but may be qualitative where appropriate.
2. A program implementation plan for the FY 2000 budget outlining specific agency activities and budgets, and the linkages between them. Agency activities contributing to the crosscut should be tied clearly to overall crosscut goals and performance measures. Agency budget information should include estimates for FY 1999-2004. Funding for the crosscut activities should be within OMB budget guidance. Activities whose funding cannot be accommodated with the budget guidance should be clearly delineated. Agencies should provide such information in a timely fashion if they plan to participate in the interagency program; late submittals may not be accepted. Implementation plans should be finalized no later than September, 1998.

3. Written assurance, incorporated in the crosscut implementation plan, by each participating agency that all agencies involved in the crosscut have reviewed each other's projects, and that these projects directly contribute to the goals and objectives of the crosscut and are well coordinated.
4. Budget hearing with OSTP and OMB staff in September, 1998.
5. Supplement to the President's budget, to be released to the public no later than end of March, 1999.

This schedule emphasizes the requirement for agencies to coordinate and share information on development of the FY 2000 budget as part of each interagency program.

We will work with you in the coming months through the NSTC to ensure that each interagency program achieves these results.

#### Areas of Special Emphasis

In addition to the crosscutting programs listed above, the NSTC is also coordinating activities in a variety of other fields. In the following areas of special emphasis, the NSTC will be working to understand and compare ongoing programs across agencies and to identify gaps and overlap in these programs. Departments and agencies participating in NSTC activities in these special emphasis areas will be asked to report on their participation in the NSTC working group during their budget hearings this fall. OMB and OSTP staff who have also participated in the working groups will attend these hearings and engage the presenters in a dialogue on how the department or agency is supporting the President's policies in these areas. In the coming months, the Administration may make significant policy and budget decisions in the following areas of special emphasis:

1. **Learning and Teaching:** Support research to better understand the learning process and to apply that understanding to the development and evaluation -- particularly through large scale, long-term, and experimental studies -- of educational systems, technologies, and other approaches aimed at improving educational and training outcomes. Upcoming FY 2000 budget decisions will be based on a coordinated interagency plan that addresses priorities identified by an NSTC Interagency Working Group on the Education Research Initiative. The plan should reflect recommendations contained in the report from the President's Committee of Advisors on Science and Technology on the *Use of Technology to Strengthen K-12 Education in the United States*.
2. **Critical Infrastructure Protection:** Promote and coordinate research to reduce vulnerabilities in our Nation's critical infrastructures; promote the research and development of technologies that will detect, contain, and mitigate attacks against or other failures in

these infrastructures. Upcoming decisions will focus on assessment of progress and responsiveness to a forthcoming Presidential Decision Directive, and on whether to transition this effort into a formal crosscut.

3. **Aviation Safety and Security:** Support research and development aimed at: (a) Reducing the aviation fatal accident rate by a factor of five within ten years; (b) Modernizing our aging air traffic control system using advanced information, communication, and navigation technologies; and (c) Enhancing the security of air travel. These activities are in response to the recommendations of the White House Commission on Aviation Safety and Security. Upcoming decisions include whether to adjust investments and responsibilities based on issues raised in the interagency coordination plan, and whether to transition this effort into a formal crosscut.

4. **Emerging Infectious Diseases:** Continue to implement the activities called for in the President's policy - Presidential Decision Directive NSTC-7. Upcoming decisions will focus on assessment of agency investments in priority activities and whether to develop this effort into a formal crosscut that captures the breadth of the policy for Emerging Infectious Diseases - technologies and methodologies for surveillance and response, research, and training.

5. **Science for Sustainable Ecosystems:** Develop the knowledge base, information infrastructure, and modeling framework to help resource managers predict/assess environmental and economic impacts of stress on vulnerable ecosystems, with particular focus on invasive species, water and air pollution, changes in weather and climate, and land and resource use. Upcoming FY 2000 budget decisions will be based on analysis of the existing research portfolio and coordinated interagency plans reflecting priorities recommended by the President's Committee of Advisors on Science and Technology and the National Research Council.

6. **Plant Genome:** Promote the coordinated development of plant genomic information, new technologies, and resources that will improve our understanding of plant biology and be applied to the enhancement of economically important plants. Upcoming FY 2000 budget decisions will be based on coordinated interagency plans that address the program priorities contained in the 1998 NSTC report *National Plant Genome Initiative*. In addition, agencies will be expected to provide plans on engaging the private sector and international partners.

7. **Food Safety:** Promote food safety research that provides a scientific foundation for sound food safety policy, innovations in food production to increase safety, consumer education to improve food safety practices, and global monitoring (surveillance) and response to outbreaks of food-borne illnesses. Upcoming FY 2000 budget decisions will be based on coordinated interagency plans that address the program priorities established by NSTC Interagency Working Group on Food Safety Research. Specifically, priorities

must reflect the President's Food Safety Initiative and be based on an assessment of the existing research portfolio.

**SUMMARY OF ACCOMPLISHMENTS IN FY 1999**  
**Office of Science and Technology Policy**  
**National Science and Technology Council**  
**President's Committee of Advisors on Science and Technology**

The Clinton Administration considers science and technology (S&T) one of the best investments we can make in America's future. Investments in S&T contribute to: a growing economy with more high-skill, high-wage jobs for American workers; a healthier population; a cleaner environment where energy efficiency, information technology, and advanced technology increase profits and reduce pollution; a stronger, more competitive private sector able to maintain U.S. leadership in critical world markets; an educational system where every student is challenged; and an inspired scientific and technological research community focused on ensuring our national security, on improving the quality of life for ourselves and our children, and on successfully meeting global problems through cooperation with other countries. The most important measure of success will be our ability to make a difference in the lives of the American people, to harness S&T to improve the quality of life and the economic strength of our Nation.

The Office of Science and Technology Policy (OSTP) supports these objectives by: providing authoritative scientific and technological information, analysis, advice, and recommendations for the President, for the Executive Branch, and for Congress; participating in the formulation, coordination, and implementation of national and international policies and programs that involve S&T; maintaining and promoting the health and vitality of the U.S. S&T infrastructure; and coordinating research and development efforts of the Federal government to maximize the return on the public's investment in S&T and to ensure that resources are used efficiently and appropriately.

The Director of OSTP also serves as Assistant to the President for Science and Technology. In this capacity, he supports the activities of the President's National Science and Technology Council (NSTC), created November 23, 1993, by Executive Order, and the OSTP staff serves as the technical staff of the NSTC. The NSTC has responsibility for:

- coordinating the formulation of S&T policy;
- ensuring S&T policy decisions and programs are consistent with the President's stated goals;
- helping to implement and integrate the President's S&T policy agenda across the Federal government;
- ensuring S&T are considered in the development and implementation of all Federal policies and programs; and
- furthering international cooperation in S&T.

OSTP also supports the President's Committee of Advisors on Science and Technology (PCAST), which advises the President and the NSTC. The following pages summarize White House S&T activities during Fiscal Year (FY) 1999.

## **Administration Initiatives**

Participation in the front ranks of research and innovation continues to be essential for our national capacity to capture the gains of scientific and technological advances. Recognizing this, the Clinton Administration identified five imperatives that drive the Administration's strong commitment to an integrated investment agenda in scientific research, technological innovation, business environment, and education:

- America's world-leading S&T enterprise must be sustained and nurtured.
- We must strengthen our science, math, and engineering education and ensure their broad availability.
- The fiscal and regulatory environment for research must be sound and responsive to rapidly changing societal and business conditions.
- We must retain a long-term commitment to research, education, and innovation even in this period of budgetary constraint.
- The Federal government has an important role in each of these areas, but must be viewed only as one partner in the Nation's effort.

### **Research and Development (R&D) Budget Guidance**

OSTP and the Office of Management and Budget (OMB), coordinating through the NSTC, provide Federal departments and agencies guidance on identifying a set of important national R&D areas that require coordinated investments across several agencies (refer to attached memorandum dated April 22, 1999). As with all R&D investments, these interagency priority areas should reflect our objectives of maintaining excellence, maximizing effectiveness, and minimizing costs. This budget guidance, rather than providing an exhaustive list of all Administration R&D priorities, focuses on those activities that require a significant level of interagency coordination.

The Administration's approach to S&T investments is guided by several fundamental principles. In general, Federal R&D investments should: a) sustain and nurture America's world-leading S&T enterprise, through pursuit of specific agency missions and through stewardship of critical research fields and scientific facilities; b) strengthen science, math, and engineering education, ensure their broad availability, and contribute to preparing the next generation of scientists and engineers; c) focus on activities that require a Federal presence to attain national goals, including national security, environmental quality, economic growth and prosperity, and human health and well being; and d) promote international cooperation in S&T.

As a result of its investment and management strategies, the Administration achieved significant progress toward six R&D goals. The six key R&D goals are to:

- Maintain World Leadership in Science, Engineering, and Mathematics
- Promote Long-term Economic Growth that Creates Jobs
- Sustain a Healthy, Educated Citizenry
- Harness Information Technology
- Improve Environmental Quality
- Enhance National Security and Global Stability

## I. Maintain World Leadership in Science, Engineering, and Mathematics

Since the beginning of President Clinton's first term, his Administration has been unequivocally committed to maintaining leadership across the frontiers of scientific knowledge. The Nation's prior investment has yielded a scientific and engineering enterprise without peer, as measured through awards and prizes, advanced education, and contributions to technological innovation. This scientific strength is a treasure on which we must continue to build. Thus, even as the Federal budget deficit is eliminated, the Administration has protected the level of investments in key Federal basic science programs. In FY 1999, the Administration continued to focus on improved management of the Federal investment as well as enhancing the quality of the scientific research. Progress was made in the following areas:

Reviewing and Renewing the Government/University Partnership. The long-standing S&T partnership between the Federal government and universities aimed at advancing science and technology in the national interest, is a core element of America's world-leading R&D enterprise. Stresses in the evolving partnership require attention. The Assistant to the President for Science and Technology initiated a review to (1) determine what might be the major stresses in the areas of research, education and administrative regulations; and (2) determine the best ways to address the issues raised in this examination. The products of the review were intended to assist in developing strategies that promote cost-effective, university-based research, allocate research costs fairly, strengthen the research-education linkage and maintain appropriate accountability for the expenditure of public funds.

The interagency task force charged with reviewing the government/university partnership produced a *Report on Renewing the Federal Government-University Research Partnership for the 21<sup>st</sup> Century*, which was released by the President in April 1999 at an East Room event honoring the Medal of Science and Medal of Technology winners. On that same day, a Presidential Memorandum was released directing the NSTC to implement the recommendations of the report. It called upon the NSTC to: issue a statement of principles based on the draft statement contained in the NSTC report and revised on the basis of public input; to develop and implement recommendations to more firmly tie government policies and practices to the integration of research and education; and, to implement a set of recommendations that will help make the partnership more effective and efficient. The NSTC has one year from the date of the release of the report to implement all these recommendations. The NSTC will also establish a standing committee to provide for continual review of the government-university research partnership.

As part of the public input process, the task force and the working group that supports it have arranged a series of regional hearings. The first such hearing was held in May 1999 in Washington, D.C. and was convened by the PCAST. Three more hearings were held in 1999, one in Atlanta in October, a second in Indianapolis in November, and third in San Francisco on December 1. Another hearing was held on January 27, 2000 in New York. Information about the hearings, the report, and background materials can be found at: <http://www.whitehouse.gov/WH/EOP/OSTP/html/rand/index.htm>.

Research Misconduct. A proposal to develop a common definition of research misconduct for Federally sponsored research was first developed by the Committee on Science's (CS) Research Integrity Panel in summer 1996. A policy has since been developed and after undergoing extensive revisions at all levels of the NSTC and its agencies; the proposed Federal Policy for Research Misconduct was published in the Federal Register on October 14, 1999. Interested parties have been provided with a 60-day comment period to respond to the proposed policy. The policy can be accessed at:  
<http://www.whitehouse.gov/WH/EOP/OSTP/html/misconduct.html>.

The report proposes a definition of research misconduct applicable to all research funded by the Federal government, universities and Federal facilities alike. It also provides guidelines for the conduct of fair and timely investigations. The proposed policy will be revised, as necessary, on the basis of public comment after which agencies will be directed to implement it. In 2000, an NSTC implementation working group will be established, and agencies will have up to one year to implement the new policy.

Bioremediation. Under the leadership of the *Bioremediation Task Group*, a subgroup of the Subcommittee on Biotechnology (CS), three interagency competitions focussing upon the bioavailability of chemicals for bioremediation processes in complex situations under field situations have been held in the last four years, resulting in interagency investments of over \$12M. A second awardee conference is scheduled for early 2000, to continue assessment of the contributions enabled by these investments. The task group is currently planning a new interagency competition focussing upon the use of plants in bioremediation.

Plant Genomes. An NSTC interagency working group (IWG) was established under the auspices of the CS to develop a plan to map and sequence genomes of agriculturally important plants. The goal of the CS IWG on Plant Genomes is to develop a comprehensive Federal effort aimed at expanding our knowledge of plant genomes, specifically focussing upon those plants which contribute significantly to the nation's agricultural sector. In early 1998, the working group published a six-goal strategy designed to enable the National Plant Genome Initiative (NPGI). The NPGI can be viewed at:  
<http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/npgireport.html>.

Working group efforts in 1998 and 1999 have resulted in progress toward realizing the goals discussed in the document noted above. The working group published a progress report on the NPGI in 1999. The NPGI has supported the sequencing of the genomes of model organisms. *Arabidopsis thaliana*, a small mustard-like plant, will be the first flowering plant genome to be completely sequenced. It is expected that the *Arabidopsis* genome will be completely sequenced by the end of the year 2000. The working group has also participated in an international effort to fully sequence the rice genome. Since most grasses have common sets of genes, what is learned from the study of the rice genome will be immediately applicable to other grasses such as barley, corn, sorghum, sugarcane and wheat. Conservative estimates indicate that the rice sequence will be complete by 2008, however rapid advances in sequencing technologies may in fact enable complete sequencing of the rice genome by 2004.

As a result of working group coordination, biological research resources have been developed to enable the elucidation of the structure and organization of complex plant genomes.

Collaborative structural genomics research projects have provided the research community with genetic maps, physical maps, expressed sequence tags, DNA clone libraries and mutant populations with specific genes tagged for many widely grown plants such as barley, corn, cotton and rice. These resources have changed the way individual laboratories conduct research, allowing them to pursue biology-based research in a cost-efficient manner.

Functional genomics activities will become the increasing focus of working group activities in the future. Functional genomics activities target genes important to plant production and productivity, such as those coding for disease and stress resistance, seed development, grain-quality traits, carbon allocation, flowering time, biomass production and synthesis of valuable fuels and chemicals.

Technologies and methods specifically designed to advance plant genomics are also being developed as a result of the NPGI. The working group will continue to encourage the community to develop new technologies and methods to push the frontier of plant genomics further.

All sequence data from the NPGI are deposited rapidly in GenBank, the international repository for sequence data, and in turn, are made widely available to the scientific research community. In 2000 and beyond, the NPGI will support community-driven development of standardized nomenclature, the development of minimum common principles for database design, and the development of software tools designed to facilitate query across multiple databases.

Bioinformatics. In 1999, the CS Subcommittee on Biotechnology issued a report entitled, *Bioinformatics in the 21<sup>st</sup> Century*. The report indicates that achievements in biology and medicine in the 21<sup>st</sup> century will require a substantial investment in bioinformatics; that bioinformatics projects must be driven by user needs; that alternative funding and review mechanisms are needed for support of bioinformatics infrastructure and enabling technologies; and that mechanisms are needed for interfacing funding agencies with professional societies to help set priorities for supporting bioinformatics research and infrastructure. Three broad areas worthy of support were identified: basic research into bioinformatics and its applications; bioinformatics infrastructure (e.g. databases) and other user resources; and education and training in bioinformatics. The report can be viewed at: <http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/bioinformaticsreport.html>.

Marine Biotechnology. The *Marine Biotechnology Task Group* was recently formed under the CS and developed a 5-year working plan. The work plan highlights interagency communication and coordination of ongoing efforts, and indicates intent to explore research topics for possible joint funding activities.

Aquaculture. The CS Subcommittee on Aquaculture serves as a Federal interagency coordinating group to increase the overall effectiveness and productivity of Federal aquaculture research, technology transfer, and assistance programs. Information regarding the subcommittee, activities undertaken by it and output generated as a result of interagency coordination can be accessed at: <http://ag.ansc.purdue.edu/aquanic/jsa/index.htm>.

Great strides were made in 1999 toward revising the National Aquaculture Development Plan, which identifies high-priority Federal government actions necessary to support a sustainable, internationally competitive U.S. aquaculture industry in the next 3-5 years, and to lay out a realistic, achievable strategy for undertaking these actions. The final version of the revised plan will be released during 2000.

In 1999, the subcommittee completed development of an interagency strategy to address exotic shrimp virus issues in wild and farm-raised shrimp. Reports discussing peer review and risk management of non-indigenous pathogenic shrimp viruses have been released and a workshop on risk management of shrimp viruses was held. A report from this workshop will be released in early 2000.

The subcommittee recently established the "Aquaculture Effluents Study Task Force" to provide a national forum to address issues associated with effluents and diverse aquaculture facilities in the U.S. The task force will prepare an expert peer-reviewed report with contributions by different technical subgroups for use by government agencies, trade associations, academia, non-government organizations and the public. The task force will meet in February 2000.

The publication *Guide to Federal Aquaculture Programs and Services* was updated and published in electronic format as an informational resource on aquaculture programs and services within the Federal government. The document can be accessed directly at:  
[http://ag.ansc.purdue.edu/aquanic/sa/federal\\_guide/index.htm](http://ag.ansc.purdue.edu/aquanic/sa/federal_guide/index.htm)

Microbial Genomics. The CS *Microbial Genomics Task Group* recently completed the *Interagency Report on the Federal Investment in Microbial Genomics*, which will be released in 2000. The report indicates that although past research investments have focussed on sequencing the genomes of human pathogens and on microbes related to energy production or environmental cleanup, major gaps in knowledge of microbes that make up much of the biosphere remain. The report notes that in microbial genomics, there are many emerging areas in which agencies can work together to build a knowledge base for new applications.

Review of Space Launch Failures. Between August 1998 and May 1999, the U.S. experienced six launch failures. In May 1999, the President requested the Secretary of Defense, in coordination with the Director of Central Intelligence and the NASA Administrator, to provide a report on the causes of these failures and the corrective actions needed to ensure our future access to space. OSTP coordinated White House oversight of the Department of Defense (DOD) review, with interim and final briefings to White House staff, and delivered the final report to the President in November, including the President's reply to the Secretary of Defense.

Aviation Safety, Security, Environment, and Efficiency. In November 1999, the NSTC published the "National Research and Development Plan for Aviation Safety, Security, Efficiency, and Environmental Compatibility." This plan describes coordinated long-term research initiatives to bring about advances in aviation that will be required in the opening decades of the next century. It is in direct response to the White House Commission on Aviation Safety and Security and was developed by Federal Aviation Administration (FAA), NASA and DOD. The plan defines the national civil aviation goals and shows the roles and programs

Federal agencies are accomplishing to achieve the goals. The plan lays out twenty-five year roadmaps showing the relationship between research and operational actions to improve civil aviation. It is a visionary plan presenting cooperative government research and operational solutions in the four key areas that otherwise would limit our nation's ability to meet the growing demand for air transportation. It is also a baseline for government and industry to build a consensus toward an integrated aviation system of the future. Of the many technologies now under development, two may have profound impacts on aviation safety: (1) Synthetic Vision, which will turn every flight into a clear daylight flight and alert the crew to any safety hazard, and (2) Flight Data Analysis Tools, which will be used by airlines and government to identify and fix problems before they cause incidents or accidents.

National Bioethics Advisory Commission. OSTP staff continues to facilitate the work of the National Bioethics Advisory Commission (NBAC). After the publication of its June 1997 report to the President, "Cloning Human Beings," NBAC continued to address issues related to the use of somatic cell nuclear transfer technology. Responding to a request from the President, NBAC issued a comprehensive examination of the ethical, medical and legal issues associated with stem cell research, which was delivered to the President in September 1999. This report informed development of a plan to establish guidelines and an oversight system for Federally funded stem cell research. In December 1998, NBAC finalized its report on experimentation on humans with diminished decision making capacity. In July 1999, the NSTC Human Subject Research Subcommittee was tasked to review the report and develop a common set of core principles for relevant agencies. An NBAC report entitled "The Use of Human Biological Materials in Research" was completed in August 1999, and has been useful in providing advice to several funding agencies.

Federal Laboratory Reform. In July 1999, the NSTC released its report titled "Improving Federal Laboratories to Meet the Challenges of the 21st Century". This report, a result of a 1997 NSTC IWG, contains six major action proposals to enhance the productivity, cost effectiveness, and scientific quality of the federal laboratories and any agency that conducts substantial intramural research programs:

- To make personnel policies more flexible and conducive to a high-caliber S&T workforce;
- To create incentives to reward agencies and laboratories for reducing unneeded infrastructure;
- To improve the management and conduct of multiyear research projects;
- To increase the productivity in a responsible and accountable manner, laboratories should implement environmental, health, safety, security, and administrative programs and systems that are risk-based, outcome-oriented, and integrated into the conduct of work;
- To increase awareness of the core competencies, facilities, and capabilities of Federal laboratories; and
- To promote full utilization of America's forefront science and engineering user facilities.

Many of these action items are now actively being implemented by the agencies, either alone or in coordination with the NSTC and OMB. For example, OSTP is presently working with OPM to develop an agency "self assessment" survey. These survey results could then be used as a tool by the agencies to develop personnel management reform with OPM under the existing Title 5 authority for demonstration projects. Similarly, to promote full utilization of America's forefront science and engineering user facilities, an IWG on Synchrotron Radiation for

Macromolecular Crystallography is actively addressing interagency issues that relate to synchrotron facilities use by the fast growing, bimolecular crystallography community.

## II. Promote Long-term Economic Growth that Creates Jobs

Sustained prosperity for Americans requires a continuous stream of technological innovation. The Administration has acted in a variety of roles – investor, partner, facilitator – to stimulate new enabling technologies of importance both to Federal missions and to economic growth. Specific priorities pursued during FY 1999 are described below.

Partnership for a New Generation of Vehicles. On September 29, 1993, the Federal government and the U.S. automobile industry forged an unprecedented alliance under the leadership of President Clinton and Vice President Gore. The partnership includes seven Federal agencies, 19 Federal laboratories, and more than 300 automotive suppliers and universities and the United States Council for Automotive Research, the pre-competitive research arm of Ford, DaimlerChrysler, and General Motors. The Partnership for a New Generation of Vehicles' (PNGV) supports research and development of technologies to achieve the program's three research goals: 1) to significantly improve national competitiveness in automotive manufacturing by upgrading manufacturing technology; 2) to apply commercially viable innovations resulting from ongoing research to conventional vehicles, especially technologies that improve fuel efficiency and reduce emissions; and 3) to develop advanced technologies for mid-sized vehicles that deliver up to triple the fuel efficiency of today's cars (equivalent to 80 miles per gallon), without sacrificing affordability, performance, or safety. The research plan and the programs progress is peer-reviewed annually by the National Research Council. During the past six years, PNGV has made extraordinary progress towards achieving its aggressive technical goals. In 1999, PNGV continued its robust research and development work and moved closer to achieving its second key milestone: the unveiling of 2000 Concept Cars. Selecting from the technologies developed under this historic partnership, each of the U.S. automakers – Ford, DaimlerChrysler, and General Motors – is developing a unique concept car. The PNGV research program will achieve its final milestone in 2004 as the participating automakers complete the development of pre-production prototype cars.

National Summit on Innovation. On November 30 and December 1, 1999, the NSTC Committee on Technology (CT), in association with several key national stakeholder organizations, convened over 230 public- and private-sector leaders at the George Washington University for the *Summit on Innovation: Federal Policy for the New Millennium*. The findings of the Summit will instruct the NSTC on developing and implementing a Federal role for the next millennium that creates opportunities, not barriers, within our National Innovation System. C-SPAN covered the morning keynote addresses by PCAST co-chair John Young, Council of Economic Advisors Chairman Martin Baily, and Procter & Gamble's CTO, Gordon Brunner. The national and international business-leaders, policy makers, and technical experts in attendance generated many useful recommendations concerning issues affecting innovation, including globalization; capital markets; trade policy; priority setting in support of R&D; talent pool for innovation; and using the Internet to foster innovation. The NSTC will draw on these suggestions to develop a short-term, non-budgetary innovation policy action, suitable for announcement early in 2000. The NSTC will also develop a longer range "agenda for action"

that could provide the framework for a more broadly defined innovation initiative that the President could announce in September 2000.

Future S&T Workforce. On September 10, 1998, the President directed the NSTC to develop recommendations on how to achieve greater diversity throughout our scientific and technical work-force. The NSTC recommendations will detail ways for the Federal government to bolster mentoring in S&T fields and to work with the private sector and academia to strengthen mentoring in higher education. Therefore, OSTP, in conjunction with the CS, established a new IWG that will provide recommendations on how to increase the participation of minorities, women, and persons with disabilities in the S&T workforce. Specifically, this IWG is concerned with defining and recommending the Federal role in developing the U.S. S&T workforce of the future. The S&T workforce is assumed to extend from the technician (typically less than 4-year college preparation) to the Ph.D. level. In 1999, the working group released the proceedings of a 1998 workshop on the "U.S. Science, Engineering and Technology Workforce of the Future: National Strategy, National Portfolio, National Resource Base." The working group will release a new report in 2000 entitled *Ensuring the 21<sup>st</sup> Century U.S. Scientific, Technical and Engineering Workforce* which discusses important human resource development strategies that will help prepare a 21<sup>st</sup> century workforce equipped to meet the demands of an increasingly technological society.

Nanotechnology. The CT Interagency Working Group on Nano Science, Engineering and Technology (IWGN) was established on September 23, 1998. The IWGN set goals to develop a comprehensive overarching framework for Federal support of nanoscale science and engineering with input from key experts from governments, industry and academia and to identify challenges and provide an infrastructure for establishing Federal R&D priorities and budget guidance. The participating agencies are the Department of Commerce (DOC), DOD, the Department of Energy (DOE), the Department of Transportation (DOT), NASA, the National Institutes of Health (NIH) and NSF. The main 1999 activities included: developing a strong interagency coordination and information sharing on nanoscale R&D activities within the Federal government, prioritizing R&D themes, planning for a balanced R&D infrastructure with external input, developing a recommendation for FY 2001 budget, and proposing an investment strategy.

The IWGN's most significant accomplishment has been the development of a National Nanotechnology Initiative (NNI), incorporating input from industry, academe and government experts. This new funding initiative identifies major research priorities, outstanding needs for research infrastructure as well as societal implications and education and training, and an interagency collaborative research and development plan. Funding for FY 2001 highlights five themes: fundamental research, grand challenges, centers and networks of excellence, research infrastructure, as well as societal implications and education and training. More information can be found at ([www.nano.gov](http://www.nano.gov)). In 1999, the IWGN published four reports:

- *National Nanotechnology Initiative – Leading to the Next Industrial Revolution*, an internal government document that outlined the funding mechanisms and R&D activities for a proposed nanoscale S&T initiative. The PCAST Nanotechnology Panel reviewed the technical and budgetary aspects of the proposed National Nanotechnology Initiative in this draft report in the Fall 1999 and sent the President a letter of endorsement in support of the establishment of a National Nanotechnology Initiative;

- *Nanostructure Science and Technology – A Worldwide Study*, published in August 1999, reviews the status of R&D in nanoparticles, nanostructured materials, and nanodevices, including innovative approaches to synthesis and characterization. The report highlights applications in dispersions, high-surface area materials, electronic and magnetic devices, nanostructured materials, and biological systems. It includes a comparative review of research programs around the world – the United States, Japan, Western Europe, and other countries – to help provide a global picture of the field.  
(<http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/iwgn/IWGN.Worldwide.Study/toc.htm>);
- *IWGN Workshop Report: Nanotechnology Research Directions*, published in September 1999, builds upon *Nanostructure Science and Technology: A Worldwide Study*, and incorporates a vision for how the nanotechnology community – Federal agencies, industries, universities, and professional societies – can more effectively coordinate efforts to develop a wide range of revolutionary commercial applications. *Nanotechnology Research Directions* identifies challenges and opportunities in the nanotechnology field and begins to make recommendations on how to develop a balanced R&D nanotechnology infrastructure, advance critical research areas, and nurture the scientific and technical workforce of the next century. It incorporates perspectives developed at a January 1999 IWGN-sponsored workshop by 150 leading nanotechnology experts from universities, industry, and the Federal government.  
(<http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/iwgn/IWGN.Research.Directions/toc.htm>);
- *Nanotechnology - Shaping the World Atom by Atom*, published in September 1999. This glossy publication sets the stage for increasing the public's understanding of what nanotechnology is, how nanotechnology came to be, and its potential impact on society. "The emerging fields of nanoscience and nanoengineering are leading to unprecedented understanding and control over the fundamental building blocks of all physical things. This is likely to change the way almost everything – from vaccines to computers to automobile tires to objects not yet imagined – is designed and made."  
(<http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/iwgn/IWGN.Public.Brochure/welcome.htm>).

On May 12, 1999, the IWGN coordinated a Congressional hearing called by the Senate Subcommittee on Science, Technology, and Space, on Emerging Technologies of the Third Millennium. On June 22, 1999, IWGN assisted with preparation of a second hearing hosted by the House Subcommittee on Basic Research of the Committee on Science.

Transportation Technology. The Transportation R&D Subcommittee under the CT has moved forward aggressively to implement the public-private partnerships identified in the strategy through the NSTC Transportation Technology Plan and extensive outreach. These partnerships include Federal, state, local and tribal governments, academia, industry, state departments of transportation, transportation users and operators and others representing the diverse constituencies in the transportation community and aim to address the nation's transportation challenges of the 21st century, such as improving transportation safety and security while reducing vehicle energy consumption and environmental emissions.

In FY 1999, the subcommittee released the following four documents: *Transportation Technology Plan*, December 1998; *National Transportation S&T Strategy*, May 1999; *Transportation Strategic Research Plan*, May 1999; and *Public/Private Partnerships: Implications for Innovation in Transportation*, January 1999. These documents aim to focus Federal R&D on national transportation goals; forge technology-based private-public partnerships to achieve the goals; foster strategic Federal transportation research; and, accelerate the process of moving technology into the marketplace. In addition, the subcommittee published focused assessments and planning documents, including: *Total Terminal Security: Intermodal Cargo Transportation Industry Best Security Practices*, May 1999; *Surface Transportation R&D Assessment*, June 1999; *National Research Agenda for Transportation and Sustainable Communities*, September 1999; and *Comparison of International Transportation R&D Expenditures and Priorities*, September 1999. These documents have influenced the Federal and national transportation R&D agenda. The *Total Terminal Security* document, for example, has already been distributed by the National Cargo Security Council to the entire cargo industry to improve security across the nation.

Global Positioning System. OSTP continued to provide guidance on implementation of the Administration's Global Positioning System (GPS) policy (PDD NSTC-6), for which it was the principal architect. OSTP was instrumental in the Administration's successful efforts to protect the GPS spectrum by coordinating Agency actions.

Evolved Expendable Launch Vehicle. OSTP supported the DOD-industry partnership to develop two competing families of Evolved Expendable Launch Vehicles (EELV), to implement direction in the President's 1994 National Space Transportation Policy to evolve the current fleet of expendable launch systems for improved efficiency and lower cost. The goal of this program is to lower the cost of space transportation by 25% to 50% for national security payloads, while improving the international competitiveness of the U.S. commercial space launch industry.

Reusable Launch Vehicle Technology. OSTP supported continuing development of the X-33 and X-34 reusable launch vehicle (RLV) technology demonstration vehicles by NASA and their industry partners, Lockheed Martin and Orbital Sciences Corporation, implementing the President's 1994 National Space Transportation Policy. These technology demonstrations will provide information on the technologies required to support a decision whether to develop an operational next-generation single stage to orbit reusable launch vehicle. In addition, OSTP worked closely with OMB, NASA, and industry to develop an integrated space transportation plan to define how best to proceed toward a decision whether to develop operational next-generation RLVs to take advantage of civil and commercial sector synergies.

Commerical Space Launch Activities. OSTP chaired an interagency group consisting of NASA, DOD, Air Force (AF), NTIA, DOC, DOT and State to reexamine the Federal policy for U.S., nongovernmental access to NASA's Tracking, Data, Relay Satellite System (TDRSS) to provide launch communications and telemetry. As a result, the USG policy was changed from one disallowing non-USG use to one permitting it on a case-by-case basis. Specifically, the Secretary of Defense issued a letter to the Secretary of Commerce permitting use of the frequency band 2200 to 2290 MHz by U.S. commercial entities for space launch on a non-interference basis, consistent with national security, foreign policy and arms control interests. OSTP sustained a stable space policy environment that enabled the U.S. commercial space sector to

make record gains with record launch rates that outpace both DOD and NASA combined. In 1999, the U.S. captured 36% of the world market for internationally competed commercial space launches, more than any other Nation. The U.S. commercial launch rate has tripled since the first half of the 1990s. Revenues from U.S. commercial space launch activities have grown rapidly from \$635 million in 1996, to \$940 million in 1997, and topping \$1 billion in 1998.

Promotion of Commercial Opportunities for International Space Station. OSTP led the interagency review and formation of the Administration's policy with regard to legislation setting up a demonstration program promoting on-orbit use of the International Space Station, transportation services and related ground facilities which was passed into law as part of NASA's FY 2000 Appropriations. It provides the Administrator the authority to set a price structure for use of ISS, based on marginal costs, and to retain receipts in excess of any direct and indirect costs incurred by NASA in support of such U.S. commercial activity.

Commercial Remote Sensing. In cooperation with the National Security Council (NSC), OSTP continued to oversee the operation of the State Department-led Interagency Working Group on Remote Sensing created by OSTP and NSC in 1998. This group serves as a focal point for industry/government interactions on foreign policy and national security issues related to commercial remote sensing activities. Requests by foreign governments for access to U.S. turnkey systems, technology and components, and data are considered on a case-by-case basis. It facilitates business planning for potential U.S. commercial remote sensing system providers and implements direction in the President's 1994 policy on the operation and sale of commercial remote sensing systems. In addition, interagency workshops were set up to more broadly look at how to facilitate fair treatment and efficiency in the review process as well as issues that have emerged with the implementation of U.S. policy, PDD-23. Also of note, OSTP worked with NSC, DOD, State, and DOC to finalize a Memorandum of Understanding (MOU) between the DOC, State, DOD, DOI and the Intelligence Community regarding interagency procedures on commercial remote sensing systems and consultation regarding interruption of normal commercial operations. This MOU will include decisions to limit collection and/or dissemination of data, consistent with the President's policy on remote sensing.

Interagency Review on Future Management and Use of the U.S. Space Launch Bases and Ranges. Between March 1999 and February 2000, OSTP and NSC co-chaired an interagency review on the future management and use of the U.S. space launch bases and ranges. The report of the interagency working group describes how DOD, DOT, DOC, NASA, and the Central Intelligence Agency (CIA) agree we should deal with the three-fold increase in commercial space launch rates since the President's National Space Transportation Policy was finalized in 1994. It describes a national strategy and recommendations that will enhance and expand the government-state-industry partnership, but it does not recommend radical changes—the bases and ranges should continue to be owned and operated by DOD.

Technology for Training and Lifelong Learning. In January, 1999, Executive Order 1311, *Using Technology to Improve Training Opportunities for Federal Government Employee*, established the President's Task Force on Federal Training Technology and the President's Advisory Committee for Expanding Training Opportunities. This Executive Order is part of the Administration's strategy to promote life-long learning and to ensure that new technologies are used to allow workers to acquire new skills "anytime, anywhere." OSTP has provided guidance

and advice on these emerging technologies for training and expanding these types of training opportunities for Federal employees. The Task Force is charged with providing leadership regarding the effective use of technology in training and education; making training opportunities an integral part of continuing Federal employment; and facilitating the ongoing coordination of Federal training technology activities. The Task Force completed its first report on Individual Training Accounts (ITAs) for the Federal Government. In response, the President has requested that Federal agencies establish ITA demonstration projects. The final report of the Task Force was delivered to the President in July 1999.

The United States Innovation Partnership. This initiative (originally undertaken as the State-Federal Technology Partnership) is an agreement between this Administration and the National Governors Association to support technology-based economic development. The United States Innovation Partnership (USIP) facilitates partnerships between state and local governments and Federal agencies working on mutually beneficial goals. These partnerships leverage the traditional roles of the states and the Federal government to maximize the Nation's investment in research and development. USIP accomplished the following activities in FY 1999:

- Initiated the Community Alliance for Math, Science and Technology Literacy (CASTL) in cooperation with the National Institute of Standards and Technology. CASTL is a pilot program partnering local school boards and businesses to foster high quality K-12 education through enhanced professional development of K-12 math, science and technology teachers.
- Initiated the State/Federal Virtual Laboratories Research Project (VLRP) in cooperation with five states, the Department of Energy and with additional support from six other federal agencies. The objective of the VLRP is to enhance the competitiveness of U.S. universities, federal laboratories and industry by linking researchers in multidisciplinary collaborations through the use of advanced networking technologies to accelerate the pace of scientific discovery and the commercialization of new products.
- Performed a key role in planning and holding the Federal "Summit on Innovation". The Summit was part of a multiphase effort designed to identify priorities for reforming federal support of innovation, with emphasis on how federal policies and regulations could be shaped to foster opportunities for innovation. Highly useful data from the Summit are now available to federal planners for synthesis and implementation.
- Participated in bringing together federal, state and industry partners, in policy discussions at various "Accessing Technology" symposia in several states. These symposia were invaluable opportunities for harmonization of state and federal programs related to new technologies, with the objective of nurturing the growth of those technologies at the state and local level.

USIP will continue to focus its work on workforce development, leadership development in the states, and increasing regional and local efforts.

### **III. Sustain a Healthy, Educated Citizenry**

Improving the health of our Nation's citizens continues to be a major goal of our Federal investment in S&T. Starting in 1862 with the financial support for our Land Grant institutions and State Agricultural Experiment Stations, and through the establishment in 1887 of the laboratory that became the National Institutes of Health (NIH), the United States has developed a

system of intra- and extramural support for health-related research. We have more recently committed ourselves to similar efforts in science, engineering, and mathematics education. The degree to which our Nation prospers in the 21<sup>st</sup> century will depend on our abilities to develop scientific and technical talent in our youth, to provide lifelong learning to a well-educated workforce able to embrace the rapid pace of technological change, and to raise the level of public scientific and technological literacy. Specific FY 1999 activities included the following.

Food Safety. The CS IWG on Food Safety Research was founded to conduct an in-depth review of Federal research related to microbiological aspects of food safety as well as research investments in food-associated toxins and antibiotic resistance. During the 1990s, the safety of the food supply for the American people has become an increasingly visible public health issue and a national priority for the Federal government. The President's Science Advisor, Neal Lane, was a co-chair of the President's Council on Food Safety. OSTP played a major role in establishing this Council and getting it up and running. Neal Lane chaired the first council meeting, which was held on December 16, 1998. The IWG on Food Safety Research recently completed its review and in July 1999, published a report entitled *Federal Food Safety Research: Current Programs and Future Priorities*. The report can be viewed at: <http://www.whitehouse.gov/WH/EOP/OSTP/html/foodsaf.html>.

The Joint Institute for Food Safety Research created under the auspices of the President's Council on Food Safety will use this report as a basis upon which to coordinate food safety research among U.S. Department of Agriculture (USDA), Department of Health and Human Services (HHS), the Environmental Protection Agency (EPA) and other Federal agencies. Its work done, the IWG on Food Safety Research was discharged in late 1999.

Children's Initiative. The CS IWG on the Children's Initiative was established to address recommendations articulated in a 1997 report entitled *Investing In Our Future: A National Research Initiative for America's Children for the 21<sup>st</sup> Century*. This report described recommendations to advance research opportunities on children and adolescents and to develop mechanisms to enhance linkages between research and policy and between government entities, researchers, private organizations and communities. The working group is particularly focussed on developing multi-agency priorities aimed at understanding relationships between children's health and behavior, to determine how serious and chronic health problems that emerge later in life can be better prevented.

In 1999, the working group has focussed on developing a comprehensive, interdisciplinary research portfolio focussed on policy research in child health behaviors. This effort is aimed at furthering the science base and its connection to policymaking, on how positive and negative behaviors develop with respect to the physical and mental health of children and youth.

Human Subject Research. The Human Subjects Research Subcommittee under the CS coordinates the implementation of the "Federal Policy for the Protection of Human Subjects," otherwise known as the Common Rule. In 1999, the subcommittee continued its efforts to coordinate implementation of the President's memorandum dated March 27, 1997, concerning strengthened protection for human subjects involved in classified research. The subcommittee completed an Interim Final Rule in 1999, and is pursuing agency clearances for this document.

The subcommittee has continued to work closely with the National Bioethics Advisory Commission (NBAC) in 1999. In response to the NBAC Report, *Research Involving Persons with Mental Disorders that May Affect Decisionmaking Capacity* (<http://bioethics.gov/capacity/TOC.htm>), the subcommittee is currently developing a set of core principles common to member agencies, and will formulate a set of possible policy options. In addition, the subcommittee will continue to provide assistance to NBAC in its review of Federal agency implementation of the Common Rule. In June 1999, in collaboration with the DOE, the subcommittee sponsored a two-day symposium on "Workers as Research Subjects: A Vulnerable Population."

Excellence in Mathematics and Science Teaching. The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) is the Nation's highest commendation for K-12 math and science teachers. Candidates are chosen on the basis of their teaching performance, background, and experience. PAEMST is administered through NSF, and coordinated by OSTP. One science and one math teacher at each level are ultimately recommended as Presidential Awardees. They must be U.S. citizens who teach in one of the 50 states, the District of Columbia, the DOD Dependent Schools, or the U.S. territories. In 1999, there were 108 elementary and 108 secondary recipients. All (over 1,000) teacher awardees since 1983 are now linked electronically and have been used as a comparison group in a national study of math and science teachers.

Excellence in Science, Mathematics, and Engineering Mentoring. The second annual presentation of the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM) occurred on December 5, 1999. This award demonstrates the Administration's support for access to education and diversity in the S&T workforce by recognizing the efforts of individuals and institutions that have mentored underrepresented groups (women, minorities, and persons with disabilities). Neal Lane, the President's Science Advisor, and Rita Colwell, the Director of NSF, addressed the awardees in Presidential Hall.

Educational Research. In response to the recommendations of PCAST's Education Panel, OSTP has worked with NSF, the Department of Education (ED), and the National Institute for Child Health and Human Development to develop an interagency education research program that will accelerate the application of research-based knowledge to improving K-12 teaching and learning. This group is jointly supporting a fundamentally new character of research in education that features interdisciplinary collaborations across a range of learning-related disciplines, a strong focus on current issues and problems in education, and studies on a scale large enough to understand what educational interventions work and under what conditions. With nearly \$30 million in FY 1999 funds, this interagency group made its first round of competitive, peer-reviewed grants, funding 14 awards averaging \$2 million. A grant announcement will soon be released for \$38 million in new FY 2000 funds to build on this strong initial portfolio.

Health Preparedness for Future Troop Deployments. The Presidential Advisory Committee (PAC) on Gulf War Veterans' Illnesses issued its final report on December 31, 1996. The PAC recommended that a "Presidential Review Directive be issued to instruct the NSTC to develop an interagency plan to address health preparedness for and readjustment of veterans and families after future conflicts and peacekeeping missions." The PAC highlighted seven broad

categories to be addressed by this review, which have been grouped into the following areas: deployment health, record keeping, research, and risk communications. An NSTC IWG was established to oversee the progress of the review and they issued their plan on Veteran's Day, November 11, 1998. The President ordered the formation of a Military and Veterans' Health Coordinating Board to improve health protection for our armed forces, veterans and families. This Board will oversee the implementation of a new interagency plan requiring better medical record keeping, improved health surveillance, advanced research, and enhanced communications about health risks.

#### **IV. Harness Information Technology**

No technology promises to affect our world more profoundly than the rapid sweep of digital technology. Every sector of our economy – manufacturing and services, transportation, health care, education, and government – is being transformed by the power of information technologies to create new products and services and new ways to communicate, resulting in significant improvements in productivity and knowledge sharing. The Clinton Administration has actively addressed the research and policy issues raised by the challenges of the information age through initiatives such as the following.

Presidents Information Technology Advisory Committee. The President's Information Technology Advisory Committee (PITAC) was established via Executive Order 13035 in February 1997 to provide the NSTC with guidance and advice on all areas of high performance computing, communications, and information technologies. A February 1999 amendment to Executive Order 13035 extended the PITAC's term to February 2001.

In February 1999, the PITAC issued a landmark report, *Information Technology Research: Investing in Our Future*, which proposed a bold agenda for ensuring America's leadership in the Information Age by expanding government investments in long-term R&D for information technology (IT). The PITAC highlighted the critical role that Federal research has played in developing modern computing, the Internet, and other Information Age technologies. Citing inadequate levels of current R&D investments by both government and industry, the PITAC argued for sharply increased support for basic research, giving highest priority to research on computer software. They also stressed the importance of social and economic research on the impacts of information technology to inform key policy decisions.

In accordance with the Next Generation Internet Research Act of 1998, the PITAC conducted a review of the Next Generation Internet (NGI) program and transmitted their findings to the President and the Congress on April 28, 1999. The PITAC recommended continued funding at the proposed level, and endorsed funding and implementation of follow-on activities proposed as part of the Administration's IT<sup>2</sup> initiative. In preparation for its FY2000 review of the NGI Program, due to the Congress in April 2000, the NGI Review Subcommittee met with representatives of the six NGI agencies in October 1999 for a briefing on the status of the agencies' NGI programs.

The PITAC also reviewed the Administration's proposed Information Technology for the 21<sup>st</sup> Century Initiative (IT<sup>2</sup>) initiative and its Implementation Plan. The PITAC found that the research agenda and agencies' plans proposed for the IT<sup>2</sup> initiative responded directly to the findings and recommendations of the PITAC as stated in their February report. Consequently they expressed their strong support for the initiative in a letter sent to the President on September 8, 1999.

Computing, Information, and Communications. The Federal Computing, Information, and Communications Research and Development (CIC R&D) programs invest in long-term R&D to advance computing, information, and communications. These programs are an outgrowth of the highly successful, Congressionally-chartered High Performance Computing and Communications (HPCC) Program and were reauthorized by Congress in the Next Generation Internet Act of 1998.

In 1999, OSTP staff, working with the NSTC, coordinated the Federal government's information technology (IT) R&D investments through the Computing, Information, and Communications (CIC) R&D programs. CIC R&D work was organized into five areas: High End Computing and Computation (HECC); Large Scale Networking (LSN); High Confidence Systems (HCS); Human Centered Systems (HuCS); and Education, Training, and Human Resources (ETHR), plus the Federal Information Services and Applications Council (FISAC).

Accomplishments of the CIC R&D programs in 1999 are described in *Information Technology Frontiers for a New Millennium*, a Supplement to the President's FY 2000 Budget (<http://www.ccic.gov/pubs/bluc99/>). Additionally, the NSTC sponsored the following CIC-related events during 1999:

- PetaFLOPS II Conference, February 1999
- Global Observation Information Network Workshop, March 1999
- Large Scale Networking Workshop, June 1999
- "Bridging the Gap," a High Performance Networking Applications Team/Networking Research Team Workshop, August 1999
- SC99 CIC R&D Research Exhibit and Information Technology/Next Generation Internet Demonstrations, November 1999

Next Generation Internet. Announced by the President in October 1996, the Next Generation Internet (NGI) initiative is a multi-agency Federal R&D program that is developing advanced networking technologies and revolutionary applications requiring advanced networking. The NGI initiative is a key component of the Large Scale Networking research, with participation from the Defense Advanced Research Projects Agency (DARPA), DOE, NASA, NIH, the National Institute of Standards and Technology (NIST), and NSF. The multi-agency NGI initiative is a key component of the CIC R&D's LSN research. The initiative, which entered its third year in October 1999, is developing advanced networking technologies and revolutionary applications and demonstrating these capabilities on testbeds that are 100 to 1,000 times faster end-to-end than today's Internet.

In 1999, more than 300 organizations in the Internet research and product development community adopted, developed, and released the NIST Quality of Service (QOS) testing tools.

In addition, DARPA contributed R&D in multi-gigabit broadband access technologies, assured service mechanisms, integrated network management, and QOS to the NGI.

Several agencies granted NGI awards in FY1999. Networking research testbeds and applications were funded by DARPA and NSF, including 150 awards for high performance connections to vBNS and other high performance networking testbeds made through NSF's Connections Program. During 1999, Federal agencies completed deployment of multicasting in the backbone links of the 100x testbed. Other agencies, such as NASA and NIH, concentrated their funding in research for advanced applications.

Information Technology for the Twenty-First Century (IT<sup>2</sup>) Initiative. During his June 1998 commencement address at the Massachusetts Institute of Technology, the President asked Dr. Neal Lane, his Assistant for Science and Technology, to prepare a detailed plan on computing and communications research. Dr. Lane drew upon CIC R&D expertise to establish an NSTC interagency working group that was charged with carrying out the President's request, drawing heavily on findings outlined in the PITAC's interim report, released in August 1998.

The resulting budget proposal, a new \$366 million, multi-agency initiative known as Information Technology for the Twenty-First Century, or IT<sup>2</sup>, was announced by the Vice President in January 1999. The first publication outlining the objectives of the initiative, *Information Technology for the Twenty-First Century: A Bold Investment in America's Future*, was published on January 24, 1999 as a working draft. IT<sup>2</sup> extended the existing CIC R&D programs, with special emphasis on increased support for fundamental computing research. The subsequent release of the final PITAC report in February 1999 underscored the importance of the initiative as a vital first step in increasing support for long-term information technology R&D.

The IT<sup>2</sup> Working Group worked closely with the Subcommittee on CIC R&D and the PITAC during FY1999 to develop its implementation plans and build congressional support. The Subcommittee met jointly with the IT<sup>2</sup> Working Group throughout 1999 to assure a smooth transition to integrated coordination of all multi-agency IT programs in FY2000. Integration of the management structures of the CIC R&D and IT<sup>2</sup> programs was completed in November 1999. Beginning in 2000, all CIC R&D and IT<sup>2</sup> activities will be coordinated through a separate Interagency Working Group for Information Technology R&D which has emerged from the combined management structures. The IWG will report directly to the Assistant to the President for Science and Technology and a special group of NSTC agency principals. In 2000, the IWG will continue programmatic objectives established under CIC R&D and IT<sup>2</sup>, while seeking a second year of increased Federal investment for the interagency IT R&D programs, as recommended by the PITAC.

## V. Improve Environmental Quality

Advances in environmental science and technology hold tremendous promise for creation of a sustainable future, a future where environmental health, economic prosperity, and quality of life are mutually reinforcing. We need to apply S&T in order to assess, anticipate, and avoid the negative consequences of environmental change. OSTP concentrated its efforts in the following areas during FY 1999.

Integrated Science for Ecosystem Challenges. OSTP continued to work through the NSTC Committee on Environment and Natural Resources (CENR) to lead the development of a CENR-wide research initiative known as Integrated Science for Ecosystem Challenges (ISEC) to address environmental stresses to ecosystems with new technologies and approaches to ecological research. The Subcommittee developed an ISEC Implementation Plan for FY 2000 based upon the coordinated budget requests of eight Federal agencies. The FY 2000 plan focuses on four critical areas: (1) invasive species, biodiversity, and species decline; (2) harmful algal blooms, hypoxia, and eutrophication; (3) habitat conservation and ecosystem productivity; and (4) information management, monitoring and integrated assessment.

This long-range strategy will take advantage of new technologies and approaches to address challenges to ecosystem function and resiliency, and increase both ecosystem understanding and the utility of research findings. These challenges fall generally into five categories of stressors – invasive species, pollution, land and resource use, extreme natural events, and atmospheric and climate change. The interagency strategy provides a plan for programs at the DOI, EPA, NSF, USDA, and the National Oceanic and Atmospheric Administration (NOAA), and has been reviewed by the academic community and endorsed by the PCAST Environmental Panel.

International Clean Energy Initiative. On Sept. 14, 1999, the President directed the Director of OSTP to form a working group on international energy research, development, demonstration, and deployment under the NSTC. The group will help advance the Administration's goals for addressing energy-linked economic, environmental, and security challenges. The new working group will work on such issues as higher consumer costs, greater regional pollution, more pronounced climate disruption, and increasing risks to energy security. By November 1999, the NSTC held its first meeting of the working group, which culminated in the rollout of a \$100 million budget initiative in the President's FY 2001 budget request.

The National Assessment of the Consequences of Climate Change. Progress continues on the U.S. National Assessment of the Potential Consequences of Climate Variability and Change. A National Assessment Synthesis Team, chartered under the Federal Advisory Committee Act, provides leadership and oversight of the assessment process, and will author the National Assessment Synthesis Report. The team includes Federal agency, academic, and private sector participants. The report will define regional and sectoral vulnerabilities to climate change and will identify research and information needs for future assessments. More than 40 summary reports, technical reports, and journal articles and four books are currently planned to result from the assessment, including 16 regional assessments and assessments of the water resources, human health, agriculture, forests, and coastal and marine sectors. The first regional assessment report, covering the Pacific Northwest, was completed and published in November 1999. Additional regional reports, the five sectoral reports, and the National Assessment Synthesis Report are expected to be completed during 2000.

Endocrine Disruptor Research Initiative. The CENR Toxics and Risk subcommittee IWG on Endocrine Disruptors continues to lead national and international efforts to define the scope of the endocrine disruptor problem, identify areas of scientific uncertainty, and conduct research. In 1999, the group's focus centered on two main activities: coordination of a multi-agency research

solicitation in the form of a Request for Applications (RFA); and discussion and outreach on the international level to develop research partnerships with other governments.

The IWG decided to pursue international activities by offering to develop joint research solicitations between U.S. funding agencies and the European Union (EU). The RFA effort was particularly successful in strengthening the portfolio of studies examining effects in wildlife populations exposed to endocrine disrupting chemicals, but additional efforts will be needed to encourage researchers to submit proposals to determine the nature and extent of effects in humans. Efforts are underway between National Institute of Occupational Safety and Health and EPA to construct a FY 2000 RFA to address this need. It is hoped that other agencies will eventually join as partners for this effort.

The Endocrine Disruptor IWG also evaluated the National Research Council (NRC) report entitled *Hormonally Active Agents in the Environment*, which was released in August 1999. The consensus of the IWG was that the report did not raise additional issues or present research recommendations that required an update of the U.S. Federal framework for research developed by the IWG in 1996, nor did it require revising the recommended research priorities identified in 1998.

Aviation Environmental Compatibility. Under the 1999 NSTC National R& D Plan for Aviation Safety, Security, Efficiency and Environmental Compatibility, NASA provides the basis for aircraft improvements that reduce environmental impacts. In partnership with the FAA, EPA, and DOD, NASA is addressing noise and emissions issues, which could become significant barriers to the anticipated three-fold growth in the nation's aviation system over the next 20 years. This research involves both engine and airframe design and retrofit to reduce environmental impacts. The FY 2001 Budget requests a \$75 million increase over five years for NASA's noise and emissions research.

Hypoxia. OSTP led the Hypoxia Task Team under the auspices of the CENR Subcommittee on Ecological Systems, and continued to work on its assessment activities for hypoxia science, documenting the state of knowledge of the extent, characteristics, causes, and effects (both ecological and economic) of hypoxia in the northern Gulf of Mexico. The team compiled existing information on nutrient sources, identified alternatives for reducing nutrient inputs, and examined the costs and benefits associated with reducing the nutrient loads to surface waters. The team wrote six interrelated technical reports examining key aspects of Gulf hypoxia and released the reports for public comment. A draft Integrated Assessment that draws upon these reports submitted for public review and is expected to be finalized in early 2000.

Global Change Research. In 1999, the U.S. Global Change Research Plan (USGCRP) agencies strengthened coordination of research efforts and took steps to address issues of the adequacy of climate observing systems and of the capacity of U.S. climate modeling that were raised by National Research Council (NRC) reports commissioned by the USGCRP. A series of augmentations to surface based observations capabilities were defined. Improvements to ocean buoy networks were begun in 1999 and further improvements to ocean, temperature, precipitation, and soil moisture measurements are continuing in 2000 and strongly supported in the Administration's FY 2001 budget request. Important enhancements were made to USGCRP space-based observing capabilities with the launch of NASA's Landsat, ACRIMSAT, QuikScat,

and EOS TERRA satellites. A greatly improved predictive understanding of the climate system across time scales is being advanced through an unprecedented combination of modeling, observations, and process studies conducted within a coordinated international scientific framework.

A major new USGCRP Carbon Cycle Science initiative is underway, guided by a comprehensive U.S. Carbon Cycle Science Plan produced by academic and government scientists. As part of this effort, new measurements the ratio of oxygen to nitrogen have helped reveal significant interannual variability in the magnitude of the terrestrial carbon sink and air-sea CO<sub>2</sub> flux was measured directly for the first time. USGCRP research projects resulted in numerous advances in our understanding of other aspects of global change as well. Scientists extended the long-term climate and trace gas record back to 400,000 years before the present through studies of Antarctic ice cores and demonstrated that the last 10 years have been the warmest decade (and 1998 appears to have been the warmest year) in the last 1000 years through study of tree rings, corals, glaciers, and lake sediments. They showed that there are cycles of climate variability associated with Atlantic Ocean temperature changes that are independent from the El Niño-Southern Oscillation phenomenon in the Pacific and that CO<sub>2</sub> levels affect the growth of invasive species and the effectiveness of some herbicides. They also documented, for the first time, the chemical and physical properties of natural and human-produced aerosols and trace gases over the Indian Ocean and achieved an initial quantification of the role of NO<sub>2</sub> in the Earth's radiation budget.

During FY 2000, strong support for basic global change research across the broad scope of the Earth system sciences will be maintained, with a continued emphasis on interdisciplinary collaborations and an increasing emphasis on understanding the potential consequences of global change for people and managed and unmanaged ecosystems. Participation in international scientific projects and the globally-coordinated research efforts proceeding under the auspices of the International Geosphere-Biosphere Program, the World Climate Research Program, and the International Human Dimensions of Global Change Program will continue to be a priority, as will participation in and support for the global-scale assessment efforts of the Intergovernmental Panel on Climate Change. The web site for USGCRP is: <http://www.usgcrp.gov/>.

Air Quality Research. In 1999, the members of the Air Quality Research Subcommittee of the CENR prepared an inventory of research activities, current programs, and plans in each of its five focus areas (ozone, particulate matter, acid rain, air toxics, and indoor air quality) as an informal publication, *Federal Air Quality Research 1998-2000*. This document is an important resource for creating and maintaining a balanced, collaborative research program to address the information needs of sound policy formulation. The subcommittee also held a series of meetings with representatives of Federal agencies engaged in health-related particulate matter (PM) research to explore the establishment of a PM Research Working Group that would integrate health effects and atmospheric science research. A decision to establish this new working group was finalized in November 1999.

Natural Disaster Reduction. In 1999, the Subcommittee on Natural Disaster Reduction (SNDR) sponsored the first two in a new series of interagency research reviews. The purpose of these reviews is to bring Federal researchers, managers, and policy-makers together to review the state-of-knowledge in specific areas related to SNDR activities, discuss ongoing research

programs and management needs, and make recommendations for improved coordination and changes in research focus. The first review, organized by the NIST and the Forest Service, focused on "Fire in Natural and Built Environments." It brought together researchers and managers from the science, natural resource and defense agencies to discuss knowledge needs for fire management and protection in the wild land-urban interface and ways to better coordinate research on structural and wild land fires. The second review, organized by NASA and NOAA, focused on "Remote Sensing Applications for Risk and Vulnerability Assessment."

Disaster Information Systems. SNDR's Working Group on Natural Disaster Information Systems produced the draft report *Effective Disaster Warnings*, which evaluates and recommends ways to integrate public and private resources with infrastructure. This ensures that the most accurate and timely technical information regarding natural disasters is instantly available to everyone who can take action to save lives, reduce damage, and speed response and recovery. The working group completed the report in spring 1999.

SNDR will continue to work with agencies across the Federal government to improve coordination of loss reduction activities, especially in the areas of real-time monitoring and warning systems. SNDR will also continue to encourage emerging public-private partnerships to develop an interoperable disaster information and warning system.

Construction and Building. On May 4, 1998, the President announced the formation of the Partnership for Advancing Technologies in Housing (PATH) to develop, demonstrate, and deploy housing technologies, designs and practices that can significantly improve the quality of housing without raising costs. Under guidance from OSTP, the public-private PATH is managed by HUD and was funded at \$10 million for FY 99 and FY 2000, with the President requesting \$12 million for FY 2001. PATH has 10 Federal agency partners. Private sector partners include homebuilders, developers, remodelers, product manufacturers, code organizations, financial institutions, academic institutions, realtors and product retailers. PATH goals are to lower construction costs; reduce energy use and environmental impact; improve durability; reduce loss of life, injury, and property destruction from natural hazards; and reduce construction illness and injury. In 1999, PATH established a web site ([www.pathnet.org](http://www.pathnet.org)) that described more than 150 technologies. Research programs on durability and home fire safety have been started, and a NSF housing research program has been announced. A government/industry cooperative R&D program has been initiated. Five National Pilot community projects and 10 demonstration developments are underway.

A similar Partnership for Advancing the Infrastructure and its Renewal (PAIR) is being formed to provide the technology to rebuild and revitalize the Nation's civil infrastructure, including transportation, telecommunications, energy, water supply and sewage, and institutional facilities. The concept of a PAIR has been well received by the Construction Industry Round Table.

Program Guide to Federally Funded Environment and Natural Resources R&D. In 1999, the CENR released the fourth edition of the *Program Guide to Federally Funded Environment and Natural Resources R&D*. This document serves as a reference for colleges, universities, and other research institutions. The program guide describes the competitive processes for merit

review and evaluation, describes potential funding sources, and provides points of contact and web site information for all extramural agency funding programs.

Invasive Species. The CENR Subcommittee on Ecological Systems developed a research strategy to support and accompany the implementation of the new Executive Order 13112 on Invasive Species (February 3, 1999). The team is also assisting in the identification of research needs and opportunities associated with a National Invasive Species Management Plan.

Endocrine Research. The Endocrine Disrupter IWG, under the auspices of the Subcommittee on Toxics and Risk evaluated the NRC report entitled *Hormonally Active Agents in the Environment*, which was released in August 1999. The consensus of the IWG was that the report did not raise additional issues or present research recommendations that required an update of the U.S. Federal framework for research developed by the IWG in 1996, nor did it require revising the recommended research priorities identified in 1998.

Mercury. OSTP helped establish the IWG on Mercury in late 1997 under the auspices of the Subcommittee on Toxics and Risk, which is helping to resolve scientific issues related to the assessment of human health effects of mercury, especially methylmercury. The results of a workshop that evaluated the strengths and weaknesses of the current studies on developmental effects in children exposed *in utero* via maternal consumption of fish and marine mammal meat, *Scientific Issues Relevant to Assessment of Health Effects from Exposure to Methylmercury*, was issued in June 1999. The report should help harmonize health guidance levels used by the three U.S. agencies (Agency for Toxic Substances and Disease Registry, the FDA, and EPA) and the World Health Organization.

Environmental Monitoring and Research Initiative. OSTP continued working closely with the relevant Federal agencies, the academic community, and the private sector on the "Report Card on the Status of the Nation's Ecosystems." The first prototype report card, covering agriculture, coastal areas, and forests, was completed and distributed to stakeholders for comment in 1991. Work is underway on the next edition of the report card, which should be completed in 2001. It will add aquatic systems, arid and rangelands, and urban and suburban environments to the three ecosystems described in the 1999 draft.

## **VI. Enhance National Security and Global Stability**

The technological superiority in war fighting equipment on which the military depends is the product of a strategic commitment to science and technology, through research investments in defense laboratories, industry, and universities. We also recognize that our national security depends on global stability. Building global partnerships for cooperation in S&T is an important part of our security strategy. Achievements in the area of enhancing national security and global stability during FY 1999 include the following areas.

R&D to Counter Twenty-First Century Threats. OSTP continues to chair interagency working groups on Weapons of Mass Destruction (WMD) Preparedness R&D and Critical Infrastructure Protection (CIP) R&D. These groups report to senior Interagency groups, chaired

by the National Security Council's (NSC) National Coordinator for Security, Infrastructure Protection, and Counter-terrorism, that were established under Presidential Decision Directives 62 and 63, respectively. The R&D subgroups chaired by OSTP have identified vulnerabilities and shortfalls in the federal government's ability to deal with weapons of mass destruction incidents, or with threats to our critical infrastructures; they have identified research and development objectives that will address these vulnerabilities and shortfalls; and they have identified ongoing and proposed federal R&D programs to address these R&D objectives. During the development and review of the President's Fiscal Year 2001 budget, OSTP worked closely with agencies, with NSC, and with OMB to coordinate agency WMDP and CIP R&D programs and to review agency budget requests.

Biological Weapons Arms Control/Nonproliferation/Consequence Management. OSTP has continued to work with the NSC and with agencies to develop policy positions regarding ongoing negotiation of a Monitoring and Compliance Protocol to the BWC. OSTP also remained active in interagency efforts to review proposed scientific collaboration programs with former Soviet biological weapons institutes. These programs seek to provide legitimate research opportunities for former weapons scientists who might otherwise be tempted to lend their expertise to proliferant states. OSTP also played a significant role in the Administration review of whether or not to destroy the last remaining stocks of live smallpox virus, and in the development of a research agenda to accomplish with the stocks once the President decided to temporarily retain them. This research is important to prepare for possible use of smallpox as a biological weapon.

Nuclear Weapon Stockpile Stewardship. OSTP continues to provide detailed technical review of DOE's annual revisions of the Stockpile Stewardship Plan, which describes the Department's program for maintaining a safe and reliable nuclear deterrent without nuclear testing. As part of this effort, the OSTP Director serves on DOE's Executive Review Group, established to provide advice to DOE on the Stockpile Stewardship program.

Department of Energy Reorganization. OSTP participated in Legislative and Executive branch actions to restructure the Department of Energy by creating of a National Nuclear Security Administration (NNSA). OSTP has worked to ensure that the creation of the NNSA preserves the ability of the nuclear weapons laboratories to keep fully abreast of worldwide advances in unclassified areas of science and engineering – including those activities conducted in unclassified DOE facilities that will remain outside the NNSA. Such interactions are essential for the nuclear weapons labs to fulfill their national defense mission. Similarly, OSTP has worked to ensure that unique scientific capabilities at the national defense labs remain available for scientific use.

Comprehensive Test Ban Treaty. OSTP has worked with key scientific and technical societies to provide information about the Comprehensive Test Ban Treaty. Within the Administration, OSTP successfully worked to develop U.S. policies that, consistent with U.S. security requirements, would maximize the international scientific community's access to data collected by the Comprehensive Test Ban Treaty's International Monitoring System. OSTP is now working to help ensure that the international community adopts these U.S. policies. Such access will improve monitoring of the treaty as well as make new sources of data available for scientific use.

Nonproliferation of Nuclear Weapons and Missile Technology. OSTP continues its work with the NSC to coordinate U.S. efforts to control nuclear weapons and the fissile materials needed to make them. These efforts have a broader scope than those associated with existing arms control agreements, such as the START treaties, that in the past were limited to missiles and launchers. The Clinton Administration has been implementing a comprehensive four-part strategy to build confidence through openness to secure nuclear materials, halt the accumulation of excess materials, and carry out disposition of these excess materials. During 1999, the Nonproliferation and Arms Control Technology Working Group, which reports to OSTP and to the NSC, helped coordinate nearly 300 R&D programs and projects in nonproliferation and arms control technology that represent approximately \$700 million in Federal investments. The key thrust of these activities was to promote a shared interagency understanding of the evolving dynamics of effective R&D coordination in an era of constrained resources and expanding needs for national security technologies.

National Security/Emergency Preparedness. By Executive Order, the OSTP Director is assigned responsibility for directing the exercise of the President's wartime authorities over domestic telecommunications derived from the Communications Act of 1934. In emergencies or crises, in which the exercise of the President's war power functions is not required or permitted by law, the OSTP Director is charged with the responsibility to advise and assist the President and Federal departments and agencies with the provision, management, or allocation of telecommunications resources. OSTP reactivated the Joint Telecommunications Resources Board in time to address any possible Y2K-related telecommunications outages, and it is working to study whether – and how – its national security/emergency preparedness telecommunications authorities should be modified as information technology and communication technology continue to evolve.

International Agreements. OSTP has worked successfully to expand U.S. S&T relationships with important trading partners and economies in transition. OSTP has led S&T cooperation with key countries, including China, Russia, Japan, South Africa and Egypt. OSTP worked with the State Department to realize the signing of the first S&T agreement with the European Union, and OSTP, through the NSTC, also developed a comprehensive strategy for S&T engagement with Japan. OSTP has also led U.S. participation in multilateral S&T fora in support of the Administration's goals in the Asia-Pacific and the Americas, as well as among Organization for Economic Cooperation and Development (OECD) countries. This year saw the implementation of the U.S.-EU S&T agreement and a public event to bring together U.S.- and EU-government officials responsible for funding research; and an ad hoc IWG on Egypt was established to reinvigorate the Technology Subcommittee of the Gore-Mubarak Commission with Egypt; and an ad hoc IWG on India was established to consider possibilities for expanded collaboration as well as the imposition of sanctions.

OSTP's goal is to provide guidance to agencies as they engage in international S&T cooperation so that our investments yield benefits for U.S. scientific, economic, and national security interests. For example, OSTP is working with State Department and technical agencies to ensure continued, but appropriate, S&T relations with India and Pakistan in the aftermath of nuclear testing and the imposition of sanctions.

Emerging and Re-emerging Infectious Diseases. The NSTC Task Force on Emerging Infectious Diseases (EIDs), co-chaired by OSTP and the Centers for Disease Control and Prevention (CDC), led the implementation of the June 1996 PDD on Emerging Infectious Diseases (NSTC-7). The EID Task Force, in cooperation with the private sector and public health and medical communities, works to strengthen the domestic infectious disease surveillance and response system, both at the Federal, State and local levels and at ports of entry into the United States. Task force members have increased budgets for surveillance, response, research and outreach. The Center for Disease Control has expanded its Epidemiology and Laboratory Capacity (ELC) program to over 40 states and six major cities and counties. ELC accomplishments include a new electronic network to track deadly strains of E. coli and other infectious agents. In response to the increasing problem of antibiotic resistance, a special IWG on Antimicrobial Resistance is developing a national action plan, to be released in early 2000. The EID Task Force seeks to expand disease surveillance and response network onto the global scale. It strengthened the nation's research activities in the fields of diagnostics, treatment and prevention, and has expanded the nation's understanding of the biology of infectious disease agents. Additional information can be found at:  
[http://www.state.gov/www/global/oes/health/task\\_force/](http://www.state.gov/www/global/oes/health/task_force/)

Internationally, the task force helped place EIDs on the agenda of the G-8 Summit in Cologne, the Asian Pacific Economic Cooperation Leaders Summit in New Zealand, and other major multi-national fora. To follow up on G-8 commitments to reduce the death rate from malaria and tuberculosis, task force members achieved significant budget increases for disease prevention, control and research.

International Space Station. OSTP continued to be the White House focal point for policy and program oversight related to the development, launch, and assembly in orbit of the redesigned International Space Station (ISS). OSTP has worked closely with the Office of the Vice President, the NSC, OMB, and NASA to develop and implement U.S. contingency plans, which include the development of U.S. capabilities to protect against potential future Russian shortfalls in its ability to meet its commitments. The first two elements of the ISS were launched and joined in orbit in November and December of 1998. When fully assembled, the ISS will be a unique, world-class, scientific and technological facility for experimentation and research. It will also be a symbol of the tremendous accomplishments that cooperation in the post-Cold War era can bring.

UNISPACE III UN Conference. OSTP participated in UNISPACE III as a U.S. delegate. The UNSPACE III conference resulted in (1) broader participation in activities related to the monitoring and understanding of the Earth and its environment; (2) identification of new areas conducive to international cooperation; (3) endorsement of and increased support for existing mechanisms utilized by the U.S. for international cooperation; (3) dissemination of information on space research areas and strategies for developing countries; (4) strengthened regional space cooperation, and (5) promotion of civil and commercial applications and use of outer space. OSTP oversaw the drafting of the US National Paper on accomplishments in space and aeronautics. In addition, OSTP sought and received industry input into conference agenda items and coordinated a presentation to industry on the results of the UNISPACE III conference. This is significant because international space activities are being conducted by both public and private sector organizations as a result of globalization and commercial space activities. In fact,

since 1996, commercial space revenues outpaced government space expenditures and the gap continues to widen. The United States seeks to foster international commercial space by supporting international regulations that encourage commercial practices that are predictable, transparent and effective. Commercial space activities promise to improve the world's standard of living not only by creating jobs, but also by providing information and products that make life more productive and convenient.

Committee for the Peaceful Uses of Outerspace (COPUOS). As a result of the UN COPUOS meeting and OSTP support of that meeting, the U.S. is pleased with the progress made on restructuring the agendas and new approaches to considering agenda items in the Scientific and Technical Subcommittee and Legal Subcommittee. A particular concern is that the LSC has been considering topics of only limited interest to many members of the COPUOS.

UN Second Ministerial Conference of the Economic and Social Commission for Asia and the Pacific (ESCAP) on Space Applications for Sustainable Development in Asia and the Pacific. OSTP coordinated interagency participation and attended as a U.S. delegate the successful ESCAP ministerial, held in India. The conference reviewed the status of the implementation of the regional space applications program (REDSAP) initiated in 1994 as an outcome of the first ministerial. A minimum common program was adopted having 8 core elements: environmental and natural resource management; food security and agricultural systems; capacity building; human resource development and education; poverty alleviation; natural disaster reduction; health care and hygiene; and sustainable development planning.

#### **NSTC PRESIDENTIAL REVIEW DIRECTIVES (PRD's)**

Presidential review directives (PRD's) and decision directives (PDD's) may be issued under the auspices of the NSTC. Work was finalized on one NSTC PRD's in fiscal year 1999.

Review of the University-Government Partnership (issued 9/26/96). A government-wide policy and Administration review of the U.S. universities research system was continued in 1999. The NSTC has formed a task force to conduct a review to determine what might be the major stresses in the areas of research, education, and administrative regulations, and to determine what the Federal government's role should be in addressing any issues raised by this examination. The final report was released in 1999.

#### **NSTC REPORTS AND PUBLICATIONS**

Coordination of multiagency reports is an important role of the NSTC. In FY 1999, several reports were published, including:

*Bioinformatics in the 21st Century* (January 99)

*Research Involving Persons with Mental Disorders That May Affect Decisionmaking Capacity*  
(March 99)

*The Role of Monitoring Networks in the Management of the Nation's Air Quality* (March 99)

*The Role of Monitoring Networks in the Management of the Nation's Air Quality* (March 99)

*Renewing the Federal Government-University Research Partnership for the 21st Century*  
(April 99)

*Transportation Strategic Research Plan* (May 99)

*Transportation Science and Technology Strategy* (May 99)

*National Transportation Science and Technology Strategy* (May 99)

*Program Guide to Federally Funded Environment and Natural Resources R&D* (May 99)

*Our Changing Planet* (June 99)

*Improving Federal Laboratories to Meet the Challenges of the 21<sup>st</sup> Century* (July 99)

*Federal Food Safety Research: Current Programs and Future Priorities* (July 99)

*Nanostructure Science and Technology, A Worldwide Study* (August 99)

*Comparison of International Transportation R&D Expenditures and Priorities* (September 99)

*Accessibility for Aging and Transportation-Disadvantaged Populations* (September 99)

*Nanotechnology Research Directions: IWGN Workshop Report* (September 99)

*Nanotechnology: Shaping the World Atom by Atom* (September 99)

*National R&D Plan for Aviation Safety, Security, Efficiency, and Environmental Compatibility*  
(November 99)

These documents can be viewed at the NSTC Publications and Testimony Web page:  
[http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/nstc\\_pubs.html](http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/nstc_pubs.html)

### **Fora, Conferences, and Workshops**

OSTP often uses its convening power to draw together experts and stakeholders in various fields to advance the state of knowledge and cooperation in various fields. In FY 1999, we sponsored the following meetings.

*Reviewing and Renewing the Government/University Partnership.* As part of the public input process, OSTP, along with the task force and the working group that supports it held a series of regional hearings. The first such hearing was held in May 1999 in Washington, D.C. and was convened by the PCAST. Three more hearings were held in 1999, one in Atlanta in October, a second in Indianapolis in November, and third in San Francisco on December 1. Another

hearing was held on January 27, 2000 in New York. Information about the hearings can be obtained at: <http://www.whitehouse.gov/WH/EOP/OSTP/html/rand/index.htm>.

*National Summit on Innovation.* On November 30 and December 1, 1999, the NSTC Committee on Technology (CT) in association with several key national stakeholder organizations convened over 230 public- and private-sector leaders at the George Washington University for the *Summit on Innovation: Federal Policy for the New Millennium*. The findings of the Summit will instruct the NSTC on developing and implementing a Federal role for the next millennium that creates opportunities, not barriers, within our National Innovation System. C-SPAN covered the morning keynote addresses by PCAST co-chair John Young, Council of Economic Advisors Chairman Martin Baily, and Procter & Gamble's CTO, Gordon Brunner. The national and international business-leaders, policy makers, and technical experts in attendance generated many useful recommendations concerning issues affecting innovation, including globalization; capital markets; trade policy; priority setting in support of R&D; talent pool for innovation; and using the Internet to foster innovation.

*Workers as Research Subjects: A Vulnerable Population.* In June 1999, in collaboration with the DOE, the subcommittee sponsored a two-day symposium on "Workers as Research Subjects: A Vulnerable Population".

*Resolving the Digital Divide.* On October 19, 1999, the Joint Center for Political and Economic Studies in association with the PITAC and the Woodrow Wilson International Center for Scholars co-sponsored "Resolving the Digital Divide: Information, Access, and Opportunity." This was a public policy forum to develop a national action plan to ensure that all Americans have access to information technology and the Internet.

*IT<sup>2</sup> Expo.* On May 19, 1999, an IT<sup>2</sup> Expo was held in Washington, DC. IT<sup>2</sup> demonstrations were presented by the proposed participating agencies — DARPA, DOE, NASA, NIST, NOAA, and NSF—to members of Congress and their staff.

*SC99: CIC R&D Research Exhibit and Next Generation Internet Demos,* November 1999. At SC98, a national high performance computing and networking conference, ten NGI demonstrations were exhibited as part of the CIC R&D research exhibit and a PITAC panel described their report, Congressional reaction to it, future plans for the committee, and expected achievements.

*Integrated Science for Ecosystem Challenges.* OSTP, with the NSTC Committee on Environment and Natural Resources held a workshop in 1999 to refine a long-term ISEC strategy. Topics identified for focus over the long term include social science, environmental monitoring and assessment, non-native invasive species and other introduced threats, ecological restoration, biological information, species discovery, landscapes and watersheds, hypoxia and harmful algal blooms, refugia science, extreme environmental events, and coral reef ecosystems.

*The Public Private Partnership 2000 (PPP 2000).* The SNDR and the Institute for Business and Home Safety established the Public Private Partnership 2000 (PPP 2000) in 1998 to seek opportunities for government and nonprofit, private-sector organizations to work together to reduce vulnerability to natural hazards in U.S. communities. PPP 2000 held a series of forums to

foster novel partnerships among government and private sector organizations to address natural disaster reduction issues, which was completed in 1999. Reports from the PPP 2000 Forums have contributed to the U.S. National Report to the UN for the close of the International Decade for National Disaster Reduction. Summary reports from the partnership can be found on the Internet at: <http://www.usgs.gov/ppp2000/index.html>.

### **Accomplishments of the President's Committee of Advisors on Science and Technology (PCAST)**

PCAST was established by Executive Order in 1993. The President established PCAST to:

- Advise the President on matters involving S&T; and
- Assist the NSTC in securing private sector involvement in its activities.

The direct link to the activities of the NSTC reflects the Administration's intention to incorporate advice from the private sector in developing the S&T budgets and policies of this Administration and to secure private sector advice on the implementation and evaluation of budgets and policies. PCAST is co-chaired by Neal Lane, the Assistant to the President for Science and Technology and John Young, former President and CEO of Hewlett-Packard Co. The membership includes:

- *Norman R. Augustine - Chairman and CEO, Lockheed Martin Corporation*
- *Francisco J. Ayala - Donald Bren Professor of Biological Sciences, Professor of Philosophy, University of California-Irvine*
- *John M. Deutch - Institute Professor, Dept. of Chemistry, Massachusetts Institute of Technology*
- *Murray Gell-Mann - Professor, Santa Fe Institute; R.A. Millikan Professor Emeritus of Theoretical Physics, California Institute of Technology*
- *David A. Hamburg - President Emeritus, Carnegie Foundation of New York*
- *John P. Holdren - Teresa and John Heinz Professor of Environmental Policy, John F. Kennedy School of Government, Harvard University*
- *Diana MacArthur - Chair and CEO, Dynamac Corporation*
- *Shirley M. Malcom - Head, Directorate for Education and Human Resources Programs, American Association for the Advancement of Science*
- *Mario J. Molina - Institute Professor, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology*
- *Peter H. Raven - Director, Missouri Botanical Garden; Engelmann Professor of Botany, Washington University in St. Louis*
- *Sally K. Ride - Professor of Physics, University of California-San Diego*
- *Judith Rodin - President, University of Pennsylvania*
- *Charles A. Sanders - Former Chairman, Glaxo-Wellcome Inc.*
- *David E. Shaw - Chairman, D.E. Shaw and Co. and Juno Online Services*

- *Charles M. Vest – President, Massachusetts Institute of Technology*
- *Virginia V. Weldon – Director, Center for the Study of American Business, Washington University in St. Louis*
- *Lillian Shiao-Yen Wu - Member, Research Staff, Thomas J. Watson Research Center, IBM*

The committee's 16<sup>th</sup>, 17<sup>th</sup>, and 18<sup>th</sup> plenary sessions were held in 1999 on: February 22-23; May 24-25; and December 9-10. During FY 1999 PCAST issued the following reports to the President:

#### **Activities of the President's Committee of Advisors on Science and Technology**

PCAST, composed of distinguished individuals from industry, education, and research institutions, and other non-governmental organizations, serves as the high-level private sector advisory group for the President and the NSTC. In 1999 PCAST issued the following report:

*Powerful Partnerships: The Federal Role in International Cooperation on Energy Innovation* (June 1999). It is in our fundamental national interest to greatly strengthen international cooperation in energy innovation. The PCAST concluded that continuing our current energy trajectory would be "problem plagued and potentially disastrous." Unless innovation to increase energy end-use efficiency and to improve energy supply technologies is both rapid and global, world energy demand is likely to soar in the next century to four times today's level, entailing higher consumer costs for energy, greater oil import dependence, worse local and regional air pollution, more pronounced climate disruption from greenhouse gases, and bigger nuclear energy risks than today. And if the U.S. abdicates leadership in international cooperation on energy technology while others forge ahead, it will cost U.S. firms dearly in their share of the multi-hundred-billion-dollar per-year global market in energy-supply technologies, most of which is and will remain overseas. As the world heads into the next millennium, however, there is a window of opportunity – open now, but closing fast – to move the world off this troublesome path. The choices the U.S. makes today will influence the evolution of the global energy system for many decades to come. The United States has strong stakes in the future economic, national security, and environmental course of world energy development.

PCAST also advised the President on the following topics:

*Establishment of a Laboratory for National Information Infrastructure Protection.*  
(December 98)

*Review of Proposed National Nanotechnology Initiative* (November 99)

*Review of the NSB Report on Environmental Science and Engineering for the 21st Century* (December 99)

*Letter to the President regarding FY2001 Budget Priorities* (December 99)

*Letter to the President to Endorse the Proposed National Nanotechnology Initiative* (December 99)

## NSTC PUBLICATIONS LIST

ADMIN	ORIGIN	COMMITTEE	TITLE	DATE
Clinton	NSTC	CIC	High Performance Computing & Communications: Technology for the National Information Infrastructure, Supplement to FY1995 Budget	01/01/94
Clinton	NSTC	CENR	Our Changing Planet: The FY1995 U.S. Global Change Research Program	03/01/94
Clinton	NSTC	NCO HPCC	High Performance Computing & Communications, FY1995 Implementation Plan	04/08/94
Clinton	NSTC		Technology for Sustainable Future - A Framework for Action	07/01/94
Clinton	NSTC		Technology for Sustainable Future - A Framework for Action - Executive Summary	07/01/94
Clinton	NSTC	CIT	Construction and Building: Federal Research & Development in Support of the U.S. Construction Industry	01/01/95
Clinton	NSTC	NCO HPCC	Technology for the National Information Infrastructure FY 1995	01/01/95
Clinton	NSTC	CENR	Our Changing Planet: The FY1996 U.S. Global Change Research Program	03/01/95
Clinton	NSTC		Forum on Future Directions in Transportation R&D	03/06/95
Clinton	NSTC	CENR	Preparing for the Future through Science and Technology - An Agenda for Environmental and Natural Resource Research	03/10/95
Clinton	NSTC	CIC	Strategic Implementation Plan - America in the Age of Information	03/10/95
Clinton	NSTC	CCIT	Strategic Planning Document 1995, Committee on Civilian Industrial Technology	03/10/95
Clinton	NSTC	CET	Strategic Planning Document 1995, Committee on Education & Training	03/10/95
Clinton	NSTC	CENR	Strategic Planning Document 1995, Committee on Environment & Natural Resources	03/10/95
Clinton	NSTC	CFS	Strategic Planning Document 1995, Committee on Fundamental Science	03/10/95
Clinton	NSTC	CHSF	Strategic Planning Document 1995, Committee on Health, Safety & Food	03/10/95
Clinton	NSTC	CIC	Strategic Planning Document 1995, Committee on Information & Communication	03/10/95
Clinton	NSTC	CISET	Strategic Planning Document 1995, Committee on International Science, Engineering, & Technology	03/10/95
Clinton	NSTC	CENR	Bridge to a Sustainable Future, National Environmental Technology Strategy	04/01/95
Clinton	NSTC	NCO HPCC	High Performance Computing & Communications, FY1996 Implementation Plan	05/14/95
Clinton	NSTC	CFS	Biotechnology for the 21st Century: New Horizons	07/01/95
Clinton	NSTC	CENR	Setting a New Course for U.S. Coastal Ocean Science, Phase I & Phase II	07/01/95
Clinton	NSTC		Goals for a National Partnership in Aeronautics Research and Technology	08/08/95
Clinton	NSTC	CENR	A National R&D Strategy for Toxic Substances and Hazardous and Solid Waste	09/01/95
Clinton	NSTC	CISET	Infectious Disease - A Global Health Threat	09/01/95
Clinton	NSTC	CTRD	Interagency Report on Orbital Debris 1995	11/01/95
Clinton	NSTC	CENR	Building a Scientific Basis to Ensure the Vitality and Productivity of the U.S. Ecosystems	12/01/95
Clinton	NSTC	CIT	The Federal Research & Development Program on Materials Science & Technology 1995	12/01/95
Clinton	NSTC	GCIC	Advancing the Frontiers of Information Technology, Supplement to the President's FY1997 Budget	01/01/96
Clinton	NSTC	NCO HPCC	HPCC Foundation for America's Information Future FY 1996 Budget	01/01/96
Clinton	NSTC	CENR	Interagency Assessment of Potential Health Risks Associated with Oxygenated Gasoline	02/01/96
Clinton	NSTC	CHSF	Meeting the Challenge - A Research Agenda for America's Health, Safety, and Food	02/01/96
Clinton	NSTC	CHSF	Meeting the Challenge Health, Safety, Food - Executive Summary	02/01/96
Clinton	NSTC	CENR	Our Changing Planet: The FY1997 U.S. Global Change Research Program	03/01/96
Clinton	NSTC		Strategy for National Earthquake Loss Reduction, April 1996	04/16/96
Clinton	NSTC		Human-Centered Transportation Systems	05/01/96
Clinton	NSTC	CFS	Assessing Fundamental Science	07/01/96
Clinton	NSTC	CENR	Program Guide to Federally Funded Environment and Natural Resources R&D	07/17/96
Clinton	NSTC	CENR	Environmental Technologies Testing and Demonstration Sites, A Federal Directory	09/01/96
Clinton	NSTC	CENR	Integrating Environmental Monitoring and Research in the Mid-Atlantic Region, Proceedings of a Workshop April 10-12, 1996	10/01/96

## NSTC PUBLICATIONS LIST

ADMIN	ORIGIN	COMMITTEE	TITLE	DATE
Clinton	NSTC	CENR	The Health and Ecological Effects of Endocrine Disrupting Chemicals, A Framework for Planning	11/22/96
Clinton	NSTC		Accomplishments of the National Science and Technology Council (NSTC) 1996	12/01/96
Clinton	NSTC	CENR	Natural Disaster Reduction A Plan for the Nation	12/01/96
Clinton	NSTC	CENR	Program Guide to Federally Funded Environment and Natural Resources R&D	02/01/97
Clinton	NSTC	CENR	Our Changing Planet: The FY1998 U.S. Global Change Research Program	03/01/97
Clinton	NSTC		Status of Federal Laboratory Reforms, Working Group on the Implementation of Presidential Decision Directive PDD/NSTC-5	03/01/97
Clinton	NSTC	CENR	Integrating the Nation's Environmental Monitoring & Research Networks & Programs: A Proposed Framework	03/19/97
Clinton	NSTC		Infrastructure Enabling the Nation's Manufacturing Capacity	04/01/97
Clinton	NSTC	CFS	Investing in Our Future - A National Research Initiative for America's Children for the 21st Century	04/17/97
Clinton	NSTC	CENR	National Environmental Technology Strategy: Status and Action - 3rd Annual PEGI Private Sector Roundtable Conference 11/7/95	04/21/97
Clinton	NSTC	GTI	Manufacturing Infrastructure: Enabling the Nation's Manufacturing Capacity	04/30/97
Clinton	NSTC	CCIC	Computing, Information and Communications -- Technology for the 21st Century, Supplement to the President's FY1998 Budget	05/01/97
Clinton	NSTC	CENR	Interagency Assessment of Oxygenated Fuels	06/01/97
Clinton	NSTC	CTRD	Transportation Science and Technology Strategy	09/01/97
Clinton	NSTC	CS	National Plant Genome Initiative	01/01/98
Clinton	NSTC		National Science and Technology Council 1997 Annual Report	02/01/98
Clinton	NSTC	CENR	Program Guide to Federally Funded Environment and Natural Resources R&D	02/01/98
Clinton	NSTC	CENR	Our Changing Planet: The FY1999 U.S. Global Change Research Program	03/01/98
Clinton	NSTC	CENR	NAPAP Biennial Report to Congress: An Integrated Assessment	05/01/98
Clinton	NSTC	CS	The U.S. Science, Engineering and Technology Workforce of the Future, National Strategy, National Portfolio, National Resource Base	07/30/98
Clinton	NSTC		A National Obligation - Presidential Review Directive 5 - Planning for Health Preparedness for and Readjustment of Military, . . .	08/01/98
Clinton	NSTC	CT	Networked Computing for the 21st Century - Supplemental to President's FY1999 Budget	08/03/98
Clinton	NSTC	CENR	Air Quality Research Subcommittee Strategic Plan	11/01/98
Clinton	NSTC	CT	Transportation Technology Plan	11/01/98
Clinton	NSTC	CENR	Endocrine Disruptors: Research Needs and Priorities 1998	12/01/98
Clinton	NSTC	CT	Public/Private Partnership - Implications for Innovation in Transportation	12/01/98
Clinton	NSTC	CFS	Bioinformatics in the 21st Century	01/01/99
Clinton	NSTC		National Science and Technology Council 1998 Annual Report	02/01/99
Clinton	NSTC	CENR	Our Changing Planet: The FY2000 U.S. Global Change Research Program	03/01/99
Clinton	NSTC	CENR	The Role of Monitoring Networks in the Mgmt of the Nation's Air Quality	03/01/99
Clinton	NSTC	CT	Information Technology Frontiers for a New Millennium, Supplement to the President's FY2000 Budget	04/01/99
Clinton	NSTC	CT	National Transportation Science and Technology Strategy	04/01/99
Clinton	NSTC		Renewing the Federal Government-University Research Partnership for the 21st Century - NSTC Presidential Review Directive 4	04/01/99
Clinton	NSTC		Intermodal Cargo Transportation - Industry Best Security Practices	05/01/99
Clinton	NSTC	CENR	Program Guide to Federally Funded Environment and Natural Resources R&D	05/01/99
Clinton	NSTC	CT	Transportation Strategic Research Plan	05/01/99
Clinton	NSTC		Improving Federal Laboratories to Meet the Challenges of the 21st Century - An Action Plan	07/07/99
Clinton	NSTC	CS	Federal Food Safety Research: Current Programs and Future Priorities	07/23/99
Clinton	NSTC	CT	Nanostructure Science and Technology - A Worldwide Study	08/31/99
Clinton	NSTC	CT	Nanotechnology Research Directions: IWGN Workshop Report, Vision for Nanotechnology R&D in the Next Decade	09/27/99

## NSTC PUBLICATIONS LIST

ADMIN	ORIGIN	COMMITTEE	TITLE	DATE
Clinton	NSTC	CT	National Research and Development Plan for Aviation Safety, Security, Efficiency and Environmental Compatibility	11/02/99
Clinton	NSTC	CS	National Plant Genome Initiative - Progress Report October 1999	12/02/99
Clinton	NSTC		National Science and Technology Council 1999 Annual Report	02/04/00
Clinton	NSTC	CT	Nanotechnology - Shaping the World Atom by Atom	02/07/00
Clinton	NSTC	CT	Nanotechnology Initiative - Leading to the Next Industrial Revolution, Supplement to the President's FY2001 Budget	02/07/00
Clinton	NSTC		The Future Management and Use of the U.S. Space Launch Bases and Ranges - Report of the Interagency Working Group	02/08/00
Clinton	NSTC	CIS	Ensuring A Strong U.S. Scientific Tech. & Engineering Workforce in the 21st Century	04/11/00
Clinton	NSTC	CISSET	Interagency Report on the Federal Investment in Microbial Genomics	05/01/00
Clinton	NSTC	CENR	Atmospheric Ammonia: Sources and Fate - A Review of Ongoing Federal Research and Future Needs	06/01/00
Clinton	NSTC		Discovery, Education & Innovation, An Overview of the Federal Investment in Science and Technology	07/01/00
Clinton	NSTC	CT	National Nanotechnology Initiative - The Initiative and Its Implementation Plan	07/11/00
Clinton	NSTC	CT	Review of Federal Programs for Wire System Safety, Final Report	11/15/00

OSTP PUBLICATIONS LIST

ADMIN	ORIGIN	COMMITTEE	TITLE	DATE
Clinton	OSTP		Technology for America's Economic Growth: A New Direction to Build Economic Strength	02/22/93
Clinton	OSTP		Technology for America's Economic Growth	11/01/93
Clinton	OSTP		Science in the National Interest: President William J. Clinton, Vice President Albert Gore, Jr.	03/01/94
Clinton	OSTP		Science and Technology: A Report of the President, Transmitted to the Congress 1995	01/01/95
Clinton	OSTP		Second to None: Preserving America's Military Advantage Through Dual-Use Technology (Document with NEONSCO/OSTP)	02/01/95
Clinton	OSTP		Cybernation: The American Infrastructure in the Information Age, A Technical Paper for Risks and Reliability	04/01/97
Clinton	OSTP		Science & Technology: Shaping the 21st Century, A Report to the Congress	04/01/97
Clinton	OSTP		Climate Change - State of Knowledge	10/01/97
Clinton	OSTP		Synchrotron Radiation for Macromolecular Crystallography: Report of the OSTP Working Group on Structural Biology	01/1/98
Clinton	OSTP		Meeting America's Needs for the Scientific and Technological Challenges of the Twenty-First Century: A WH Roundtable Initiative on Race	05/14/98

PCAST PUBLICATIONS LIST

ADMIN	ORIGIN	COMMITTEE	TITLE	DATE
Clinton	PCAST		<i>The U.S. Program of Fusion Energy Research and Development - Report of the Fusion Review Panel</i>	07/11/95
Clinton	PCAST	EdTec	<i>Report to the President on the Use of Technology to Strengthen K-12 Education in the United States</i>	03/01/97
Clinton	PCAST		<i>Federal Energy Research and Development for the Challenges of the Twenty-First Century</i>	11/01/97
Clinton	PCAST	Biodiversity	<i>Teaming with Life: Investing in Science to Understand and Use America's Living Capital</i>	03/06/98
Clinton	PCAST		<i>Powerful Partnerships: The Federal Role in International Cooperation on Energy Innovation, June 1999</i>	05/24/99
Clinton	PCAST		<i>Powerful Partnerships: A Synthesis of a Report by PCAST</i>	08/01/99
Clinton	PCAST		<i>Wellspring of Prosperity - Science and Technology in the U.S. Economy - How Investments in Discovery Are Making Our Lives Better</i>	03/01/00