National Science and Technology Council

1998 Annual Report

About the National Science and Technology Council

President Clinton established the National Science and Technology Council (NSTC) by Executive Order on November 23, 1993. This cabinet-level council is the principal means for the President to coordinate science, space and technology policies across the Federal Government. NSTC acts as a "virtual" agency for science and technology (S&T). The President chairs the NSTC. Membership consists of the Vice President, Assistant to the President for Science and Technology, Cabinet Secretaries and Agency Heads with significant S&T responsibilities, and other White House officials.

Through the NSTC, Federal departments and agencies work cooperatively to ensure that Federal S&T investments support national goals. NSTC Committees prepare R&D strategies that are coordinated across the Federal government to form a comprehensive investment package.

Call 202-456-6100 to obtain additional information regarding the NSTC.

About the Office of Science and Technology Policy

The Office of Science and Technology Policy (OSTP) was established by the National Science and Technology Policy, Organization and Priorities Act of 1976. OSTP's responsibilities include advising the President in policy formulation and budget development on all questions in which S&T are important elements; articulating the President's S&T policies and programs; and fostering strong partnerships among Federal, state and local governments, and the scientific communities in industry and academe. The Director of OSTP also serves as Assistant to the President for Science and Technology and manages the NSTC for the President.

Call 202-395-7347 to obtain additional information regarding the OSTP, or see our web site at:

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Dear Colleague:

I am pleased to transmit the *1998 National Science and Technology Council Annual Report*. President Clinton established the National Science and Technology Council (NSTC) in 1993 to coordinate the diverse parts of the Federal research and development enterprise, especially activities requiring resources from more than one Federal agency. In its 5 years of operation, the NSTC has assumed a prominent role in advancing the Clinton Administration's agenda in fundamental science, education and scientific literacy, investment in applied research, and international cooperation.

The Federal government plays a critical investment role in maintaining American leadership in science and technology. The NSTC prepares research and development strategies that are coordinated across Federal agencies to form an investment package aimed at accomplishing multiple national goals. As this report shows, the NSTC encourages cooperation among the public and private sectors, resulting in new research and technology payoffs that far exceed those either party might reasonably expect.

Thomas Jefferson wisely noted that, "As new discoveries are made, new truths discovered, and manners and opinions change with the change of circumstances, institutions must advance also to keep pace with the times." In its dedication to reinvent government, the Clinton Administration has lived up to that sage admonition, and the NSTC is an outstanding example of the benefits that can accrue from changes in institutions. I look forward to many contributions from this outstanding interagency council as we enter the 21st century.

Sincerely,

Neal Lane

Assistant to the President

for Science and Technology

EXECUTIVE SUMMARY

> *Our nation was founded by men and women who firmly believed in the power of science to transform their world for the better. Like them, we're bound together by common dreams and by the values that will drive our own vision for the future*
>
> **-William Jefferson Clinton, January 1998**

Sustaining U.S. leadership in science and technology (S&T) has been a cornerstone of President Clinton's strategy for preparing the Nation for the 21st century. The outputs of S&T have driven economic growth and improvements in the quality of life in America for the last 200 years. They have generated new knowledge and new industries, created new jobs, ensured economic and national security, reduced pollution and increased energy efficiency, provided better and safer transportation, improved medical care, and increased living standards for the American people.

Investments in research and development (R&D) are among the highest payback investments a Nation can make. Over the past 50 years according to a study by the Council of Economic Advisers, technological innovation has been responsible for as much as half of the Nation's growth in productivity.

The President established the National Science and Technology Council (NSTC) in 1993 to ensure that the Nation's investment in S&T is coordinated among the diverse parts of the Federal research and development enterprise. During 1998 the NSTC has worked closely with the Office of Management and Budget (OMB) to develop R&D budget guidance for the Federal departments and agencies so that our S&T investments are integrated into the overall national agenda.

An important objective of the NSTC is to guide individual agency budget priorities for R&D and to orient the S&T spending of each Federal mission agency toward achieving national goals. To meet this objective, the NSTC has established five goal-oriented committees, each of which is chaired jointly by a senior agency official and an OSTP Associate Director. These standing committees, along with ad hoc working groups within the NSTC, provide an effective forum to resolve cross-cutting issues.

National Science and Technology Goals

President Clinton made a commitment to the American people to integrate Federal agency R&D budgets to ensure that the Nation's S&T investments served broad national goals, as well as agency missions. In 1998 the NSTC undertook activities related to the following broadly stated S&T goals:

- Maintaining world leadership in science, mathematics, and engineering
- Promoting long-term economic growth
- Sustaining a healthy, educated citizenry

- Improving environmental quality
- Harnessing information technology
- Enhancing national security and global stability

R&D Budget Guidance

Through the NSTC, Federal departments and agencies have identified a set of 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 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.

President's Committee of Advisors on Science and Technology

President Clinton established the President's Committee of Advisors on Science and Technology (PCAST) at the same time that he established the NSTC to advise the President on matters involving S&T and to assist the NSTC in securing private sector involvement in its activities. The PCAST, which consists of distinguished individuals from industry, education and research institutions, and other non-governmental organizations, serves as the highest level private sector advisory group for the President and the NSTC. 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. Appendix B describes 1998 accomplishments of the PCAST.

NATIONAL SCIENCE AND TECHNOLOGY GOALS

The NSTC focuses Federal R&D activities on the President's goals for S&T. These goals include:

Maintaining World Leadership in Science, Mathematics, and Engineering

The Administration is unequivocally committed to maintaining leadership across the frontiers of scientific knowledge. The nation's prior investment has yielded science and engineering advances without peer, promoted science and engineering education, and contributed 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 and increased the level of investment in key Federal basic science programs.

Promoting Long-Term Economic Growth

Technical progress is the single most important factor in generating sustained economic growth, estimated to account for as much as half of the Nation's long-term growth over the past 50 years. Technology underpins our fastest growing industries and high-wage jobs, provides the tools needed to compete in every business today, and drives growth in every major industrialized nation.

Sustaining 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 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 21st 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.

Improving Environmental Quality

Environmental issues are enormously complex, requiring scientific understanding that is both profound and broad to address them. The dramatic increases in world population and industrial activities during the last century are affecting the environment in profound and potentially irreversible ways. The future of the United States rests on our ability to sustain the bounty of natural resources our environment provides. Improving environmental quality requires supporting a broad and comprehensive research agenda, including observing, documenting, understanding, assessing, and predicting environmental change and its consequences; using natural resources in a sustainable manner; understanding and preserving biodiversity; and developing analytical tools that integrate social, economic, and natural sciences to support policy formulation and decision making that prevents or mitigates adverse effects on public health or ecological systems.

Harnessing 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.

Enhancing National Security and Global Stability

National security and global stability are critical areas where international S&T collaboration and interagency coordination are needed for progress. Collaboration and coordination are needed because the issues faced cannot be solved through the efforts of a single country or a single agency. Threats to human health and safety, such as diseases and natural disasters, do not recognize national borders and require international coordination and effective application of S&T. International S&T relations have become an integral part of the overall U.S. foreign policy and play a vital role in the nonproliferation of weapons of mass destruction, arms control, meeting the challenges of global threats, and strengthening economic security.

1998 ACTIVITIES OF NSTC WORKING GROUPS AND COMMITTEES

The diversified Federal research portfolio serves the multiplicity of missions for which our Federal departments and agencies are responsible. This distributed system of research funding provides strong linkages between research and the core agency missions, but also places a premium on coordination of agency programs. The NSTC has coordinated working groups and committees to affect key S&T issues.

Federal Laboratory Reform Working Group

As a result of a 1997 OSTP study on progress in laboratory reform, an NSTC Interagency Working Group 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 final report, scheduled for publication in 1999, contains major proposals to:

- Make personnel policies more flexible and conducive to a high caliber S&T workforce;
- Create incentives rewarding agencies and laboratories for reducing unneeded infrastructure;
- Improve the management and conduct of multiyear research projects;
- 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;

- Increase awareness of the core competencies, facilities, and capabilities of federal laboratories; and
- Promote full utilization of America's forefront scientific and engineering user facilities.

Global Positioning System Working Group

In March 1998 the Vice President announced a decision by the Interagency Global Positioning Satellite (GPS) Executive to add two new signals to meet the growing demands of civil users worldwide. The GPS Executive board was established by Presidential Decision Directive (PDD)/NSTC-6. These new signals will significantly increase the robustness of the system and represent a major step to address concerns over the use of GPS in critical life-saving applications such as civil aviation.

In September 1998 President Clinton and Japanese Prime Minister Obuchi released a Joint Statement of Cooperation in the use of GPS. This statement represents a major step towards fulfilling the goal of PDD/NSTC-6 by establishing GPS as an acceptable international standard. Japan's commitment to work closely with the United States on GPS is particularly significant because the United States. and Japan are the world's two largest producers of civil GPS user equipment.

Aviation Safety and Security Working Group

In April 1998 the Administration announced the Safer Skies initiative in response to recommendations of the White House Commission on Aviation Safety and Security. This initiative, developed by Federal Aviation Administration (FAA) in cooperation with the National Aeronautics and Space Administration (NASA) and industry, embraced the Commission's goal of reducing the fatal aviation accident rate by a factor of five within a decade.

In October 1998 NASA and FAA signed a Memorandum of Understanding (MOU) renewing the agencies commitment to greater cooperation in achieving national goals in aviation safety, air traffic control modernization, and commercial space transportation.

Health Preparedness for Future Troop Deployments Working Group

In response to PDD/NSTC-5, NSTC prepared the report entitled *A National Obligation: Planning for Health Preparedness for and Readjustment of the Military, Veterans, and Their Families after Future Deployment*. The report recommended that a Military and Veterans Health Coodinating Board (MVHCB) undertake coordination of all Federal agency efforts associated with maintaining the health of military members, veterans, and their families. The MVHCB ensures coordination among the Departments of Health and Human Services, Defense, and Veterans Affairs on a broad range of health care and research issues relating to past, present, and future service in the U.S. Armed Forces. Approval for the MVHCB charter is expected in early 1999.

COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

The purpose of the Committee on Environment and Natural Resources (CENR) is to foster and implement a coordinated multi-agency and interdisciplinary focus for Federal environmental R&D. CENR pursues the goals of maintaining biological diversity, maintaining safe water resources, improving air quality, reducing exposure to toxic substances, limiting losses from natural hazards, understanding climate change, providing sustainable use and management of our natural resources, and minimizing ozone depletion.

Global Change Research Program

The U.S. Global Change Research Program (USGCRP) is a national research program conducted under the auspices of the CENR Subcommittee on Global Change Research (SGCR). The USGCRP began as a Presidential Initiative and was codified by the Global Change Research Act of 1990.

The USGCRP seeks to increase understanding of the Earth system and thus provide a sound scientific basis for national and international decision-making on global change issues. The USGCRP focuses on four key areas of Earth system studies: seasonal to interannual climate variability; climate change over decades to centuries; changes in ozone, UV radiation, and atmospheric chemistry; and changes in land cover and terrestrial and aquatic ecosystems.

The USGCRP agencies engaged in a major effort in 1998 to examine and improve their programs in climate, ecological impacts, and carbon cycle research, and in observations and modeling. A new carbon cycle initiative for the FY2000 budget has been defined and a number of revisions completed in USGCRP base program funding. An initial set of self-evaluations has also been developed that will prove useful in the completion of a new long-term research plan for the USGCRP. In 1998 the program held a major retreat that brought together members of the academic community and the federal agencies to discuss problems and opportunities for the USGCRP. This activity contributed both to the focus area analyses and longer-term research planning.

Significant progress was made on the National Assessment of the Consequences of Climate Change for the United States. Production of this assessment is mandated in the United States Global Change Research Act of 1990. The Assessment will define regional and sectoral vulnerabilities to climate change and is expected to contain recommendations for future research activities. Eleven workshops on regional climate change vulnerabilities were completed during 1998.

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. A series of sectoral analyses were initiated, including water resources, human health, agriculture, forests, and coastal areas. The National Assessment Plan was also approved by the NSTC in 1998. In 1999 the final draft of the Synthesis Report will be completed and subjected to comprehensive technical and government review. The final Synthesis Report should be published by the end of 1999. We also expect significant progress on the definition of follow-on regional analyses.

During 1999 strong support for basic research across the broad scope of the Earth sciences will be maintained, with a continued emphasis on interdisciplinary collaborations and participation in international 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.

Research on Toxics and Risk

The Toxics and Risk Subcommittee of CENR maintains two Interagency Working Groups, one on endocrine disruptors, and the other on methylmercury.

Endocrine disruptors are chemicals such as DDT, dioxins, PCBs, and phthalates that may affect the endocrine systems of humans and wildlife when present in the environment as pollutants. What is not clear is whether such effects are likely or even possible at the low concentrations at which these chemicals are typically found in the environment. An Endocrine Disruptors Initiative, begun in late 1995, was completed in 1998. In this initiative, the Interagency Working Group on Endocrine Disruptors assessed the state of science on endocrine disruptors and evaluated 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. The Federal research portfolio contained significant gaps, leaving important questions unaddressed. Identifying these gaps allowed the members of the Working Group to target new areas for research. The CENR report, *Endocrine Disruptors: Research Needs and Priorities--1998*, documents the findings of the working group and the actions taken to address the identified needs.

Now that the formal initiative in this area is complete, the Working Group will continue to facilitate coordination of research across the Federal government. Given that the working group identified substantial needs for modifying the scope and emphasis of the Federal research portfolio on endocrine disruptors, their task is ongoing. The working group will also periodically evaluate the results of the new research to address the identified scientific unknowns and determine whether additional changes in research strategy are warranted.

The Interagency Working Group on Mercury, established in late 1997, is helping to resolve scientific issues related to the Environmental Protection Agency's (EPA) *Mercury Study Report to Congress* and to evaluate new scientific information on the

health effects of mercury. In November 1998 the working group held a workshop that brought key methylmercury health effects investigator teams together with stakeholder Federal agencies to provide in-depth peer review for several important new studies. The workshop evaluated the strengths and weaknesses of the Seychelles and Faeroe Islands data sets on developmental effects in children exposed *in utero* via maternal consumption of fish and marine mammal meat. The workshop results should contribute to resolving differences among risk limit values maintained by several member agencies.

The Interagency Working Group on Mercury plans to continue its coordination activities aimed at harmonizing agency health protection policies. The EPA's Areference dose,≅ the Food and Drug Administration's Aaction level,≅ and the Agency for Toxic Substances and Disease Registry's Aminimal risk level≅ are all evaluated for revision periodically, providing opportunities to incorporate new data. Coordination will help ensure that Federal agencies issue a consistent public health message on the risks and benefits of consuming dietary methylmercury.

Natural Disaster Research

The NSTC is working to reduce the cost of natural disasters to the U.S. economy through support of a multidisciplinary, multi-agency research program coordinated by the CENR Subcommittee on Natural Disaster Reduction (SNDR). Key aspects of this program include focusing R&D efforts on improving future risk assessment and risk management capabilities, and improvement of analytical, modeling, forecasting, and information dissemination tools.

The SNDR and the Institute for Business and Home Safety recently established the Public Private Partnership 2000 (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. PPP 2000 is holding a series of forums to foster novel partnerships among government and private sector organizations to address natural disaster reduction issues. Their purposes are to increase national/international dialog on ways to reduce escalating losses, increase our understanding of the many complex issues, and raise the visibility of these issues in the Legislative and Executive branches and the board rooms of the private sector. Summary reports from forums held to date can be found on the Internet at the URL *http://www.usgs.gov/ppp2000/index.html.*

Due to the efforts of the SNDR, the FY 1999 budget included $100 M for new activities aimed at reducing losses from natural disasters through coordinated activities. SNDR members also worked closely with the Vice President's National Partnership for Reinventing Government on a FY 2000 initiative ASaving Lives with an All-Hazards Warning Network≅ that would place NOAA weather radios in public buildings in areas at risk from natural hazards.

Interagency efforts to gain support from Congress for a Global Disaster Information Network (GDIN) initiative in FY 1999 failed, but key agencies (United States Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), Central

Intelligence Agency, Department of Defense (DOD), National Aeronautics and Space Administration (NASA), Federal Emergency Management Administration (FEMA) and others) provided funding for work on interoperability issues. Their work proved useful when the devastation left by Hurricane Mitch in Central America produced an urgent need for comprehensive spatial information. These agencies, along with private sector partners and the government of Honduras, produced a GIS Atlas, risk maps, and CD ROM to support response and recovery efforts.

In December 1998 the Open GIS Consortium, a non-profit group devoted to promoting the development and use of advanced open systems standards and techniques in the area of geoprocessing and related information technologies, voted to create a GDIN special interest group with broad support from private sector high tech companies. The special interest group will help develop a comprehensive suite of open interface specifications that enable software

developers to write interoperating components providing capabilities in the area of disaster information and warnings. A proposed testbed will evaluate three disasters.

SNDR's Working Group on Natural Disaster Information Systems produced the draft report *Effective Disaster Warnings* that 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 report is now in NSTC review and completion is anticipated in spring 1999.

Increasing losses in FY 1999 raised the visibility of natural disaster reduction issues and accelerated demand for presentations on federal mitigation activities by SNDR members. In addition, reports from the PPP2000 Forums will contribute to the U.S. National Report to the United Nations for the close of the International Decade for National Disaster Reduction (IDNDR), and SNDR will play an active role in planning for a ADisaster Summit≅ to be held in Washington, DC, in 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. CENR will continue to encourage emerging public-private partnerships to develop an interoperable disaster information and warning system.

Air Quality Research

The CENR supports an array of research activities aimed at improving our understanding of atmospheric processes and the effect of human activities on the atmosphere. While the Nation's commitment to better air quality is clear and unequivocal, the best means for attaining it are far from clear. The overall aim of the Air Quality Research Subcommittee (AQRS) is to enhance the effectiveness and productivity of air quality research to provide a better scientific basis for decision-making to improve air quality.

The National Acid Precipitation Assessment Program (NAPAP) completed its 1998 biennial report to Congress on the effectiveness of the first 2 years of the SO_2 and NO_x reductions required by Title IV of the Clean Air Act. The findings of this assessment were that the Acid Rain Program achieved significant emission reductions at a much lower cost than was originally estimated. Utility emissions of SO_2 were below projected and allowable levels, and these reductions, in turn, did contribute to decreased acid deposition. However, the data from the Program's first 2 years are not yet sufficient to allow definitive statements on whether these deposition reductions will be adequate to reverse the adverse effects of acid precipitation on sensitive receptors.

In 1999 the AQRS plans to focus on (1) Particulate Matter (PM) - The AQRS is actively developing a series of multi-agency measurement programs to address the information gaps for PM. It will also initiate discussions with the North American Research Strategy for Tropospheric (NARSTO) on the development of a joint state-of-science assessment for fine particles. (2) Outreach to the health research community - The subcommittee will build on the collaborations established to date to develop programs for fine particle research among the atmospheric sciences, exposure and health effects research communities. Continued collaboration is essential to craft effective management strategies in the face of uncertainty regarding PM's adverse health impacts. (3) Ground-level ozone - The completion of the NARSTO state-of-science assessment for ground level ozone will be a high priority for the subcommittee. (4) Air Quality Monitoring Networks – The AQRS is actively working to preserve and enhance the Nation's air quality monitoring networks through better, less costly designs, promotion of improved data accessibility, and leveraged investments through the deployment of multi-purpose monitors. (5) One Atmosphere – Air pollutants may act in common, as multiple stressors, with serious consequences for the environment and public health. They are formed by common chemistry and transported together in the atmosphere. They have common sources, and need common solutions. The subcommittee will look at ways to integrate research results, providing a "heads-up" for policy makers on how emission reductions targeted for one issue may beneficially or adversely affect another. In particular, the AQRS hopes to begin to explore connections between air quality and climate through a series of joint programs with the CENR Global Change Research Subcommittee of the CENR. The subcommittee will help develop integrated programs designed to understand how future climate change may affect pollution control efforts.

Ecological Systems

The Subcommittee on Ecological Systems works to help build the foundation for conservation and sustainable use and management of ecological systems. An understanding of the relationship between environmental stresses and changes in ecosystem structure and function is essential to this effort and to meet societal needs in agriculture, forestry, fisheries, recreation, medicine, and quality of life. The focus of the subcommittee is to coordinate research efforts to document change, synthesize and assess information, understand processes and the effect of scale, predict change, and provide for management and restoration.

In 1998 the subcommittee led a CENR-wide effort 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

research, technology development, monitoring, modeling, assessment, and information management.

During 1999 the subcommittee plans to refine and develop a long-term ISEC strategy and an FY 2001 budget initiative involving a wider technical review by academia, states, non government organizations, and others. Recommendations of the President's Committee of Advisors on Science and Technology (PCAST) will also be incorporated into the strategy. Potential areas of additional coordination or of greater focus include environmental monitoring and assessment, species discovery, socioeconomic analysis, extreme natural events, and global change.

Important progress was also made by the subcommittee's associated task teams in 1998. The Bioinformatics Task Team proposed a framework strategy for the Next Generation National Biological Information Infrastructure, as recommended by PCAST. It also sponsored a major conference entitled AMetadiversity: Metadata Implications for Networking of Biodiversity Information." The Invasive Species Task Team made steady progress on developing a strategy to integrate both management and science needs relating to invasive species. A government Task Force on Amphibian Decline and Deformities (TADD) has been established with working groups in science, conservation, international affairs, and education. The TADD/Science Working Group has begun to coordinate surveys and research on amphibian decline.

The Hypoxia Task Team convened six science teams to develop background papers on topics relevant to dynamics and impacts of Gulf of Mexico hypoxia, sources and transport of watershed nutrients, and technical and economic aspects of available nutrient management strategies. The resulting six reports are currently undergoing independent peer review and will be synthesized into an integrated assessment and delivered to the President and Congress this spring, as mandated in the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998.

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

The third *Program Guide to Federally Funded Environment and Natural Resources R&D* was published in 1998. This popular document serves as a reference for use by colleges, universities, and other research institutions on opportunities for funding environmental

research provided by the CENR member agencies. 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 agency programs. Preparation of the fourth (1999) edition of the *Program Guide* is now underway.

COMMITTEE ON INTERNATIONAL SCIENCE, ENGINEERING, AND TECHNOLOGY

The Committee on International Science, Engineering, and Technology (CISET) addresses international scientific cooperation as it relates to foreign policy and the Nation's R&D agenda. CISET's mandate is not defined within any particular area of S&T. Rather, CISET's role is to review the wide range of bilateral and multilateral international scientific programs carried out by the technical agencies in the U.S. Government, and to identify opportunities for international cooperation and interagency coordination in response to new needs and opportunities. CISET's activities are directed toward three broad, complementary goals to:

- Identify, and coordinate international cooperation that can strengthen the domestic S&T enterprise and promote U.S. economic competitiveness and national security;

- Utilize American leadership in S&T to address global issues and to support the post-Cold War tenets of U.S. foreign policy -- promoting democracy, maintaining peace, and fostering economic growth and sustainable development;

- Coordinate the international aspects of Federal R&D funding across federal agencies.

CISET supported the following five working groups during 1998: the Emerging Infectious Diseases Task Force; the Interagency Working Group on Russia; the Interagency Working Group on the Organization for Economic Cooperation and Development (OECD); the Interagency Working Group on Japan; and the Interagency Working Group on China. CISET also operates a number of *ad hoc* working groups to address issues as they arise, such as APEC and the Summit of the Americas.

Emerging Infectious Diseases Task Force

The goal of the Emerging Infectious Disease (EID) Task Force is to coordinate U.S. government activities on infectious diseases and to implement PDD/NSTC-7. Five groups were created to achieve this goal: 1) Surveillance and Response; 2) Research and Training; 3) Capacity Development; 4) Legislation and Agency Mandates; and 5) Outreach. Through these five sub-working groups, working in cooperation with the private sector and public health and medical communities, the EID Task Force seeks 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. The EID Task Force also sought to expand this surveillance and response network onto the global scale. It strengthened the Nation's research activities in the fields of diagnostics, treatment, and prevention, and to expand the Nation's understanding of the biology of infectious disease agents.

The EID task force has made major strides in the implementation of PDD/NSTC-7. Internationally, the task force helped place EIDs on the international agenda of the G-8 Summit in Birmingham, the Asia Pacific Economic Cooperation (APEC) Leaders Summit in Kuala Lumpur, and other major multinational forums. 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 World Health Organization to develop a Stop Tuberculosis Project.

Domestically, task force members have increased budgets for surveillance, response, research and outreach. The Centers for Disease Control and Prevention (CDC) have expanded its programs to strengthen its epidemiology and laboratory capacity, including a new electronic network to track deadly strains of the bacterium *E. coli*. In response to the increasing problem of antibiotic resistance, CDC has launched two major prevention programs in 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. The EID Task Force released their annual report, wherein were listed their important accomplishments.

The EID Task Force has set the following calendar for itself for 1999:

January 1999 Transmission of Second Annual Progress Report to the President

on PDD/NSTC-7 March 1999 Hong Kong B Asia Pacific Economic Cooperation (APEC) S&T Working Group meeting; side meeting on EIDs

March 1999 Bangkok B U.S.-Japan Cooperative Medical Sciences Symposium on EIDs in Asia.

April 1999 World Health Day

June 1999 Cologne, Germany B G-8 Summit, EIDs to be discussed

Key Countries

Key countries are defined as those countries with economic, scientific, and technical achievements requiring United States cooperation to garner important advances for the people of the United States. Currently, key countries consist of Russia, Japan, and China.

Russia

The goals of the Interagency Working Group on Russia are to develop and articulate a strategy for S&T cooperation with Russia and to coordinate U.S. government cooperation across the technical agencies to:

- Promote bilateral cooperation for mutual scientific and technological benefit;
- Facilitate the reduction of barriers to cooperation; and
- Support the Administration's strategic goals of non-proliferation and sustainable development.

The CISET Russia Interagency Working Group continues to develop a cohesive U.S. strategy for S&T cooperation with Russia and supports the U.S.-Russia Commission on Economic and Technological Cooperation.

The U.S.-Russian Binational Commission, now called the Gore-Primakov Commission, has been the driving force behind the Interagency Working Group on Russia this year. The General Problems Working Group (GPWG) has been re-established under the Science and Technology Committee and held a working-level meeting in Moscow this December to discuss problems related to customs, taxes, and intellectual property rights. A government-wide strategy on Arctic Research for the United States is underway, and a final version of a MOU between Russia and the USGS on observational seismology will be released soon.

Another key area of activity is the cooperation in the commercialization of technology. The United States hosted a roundtable on technology commercialization in September 1998, attended by numerous Russian and American agency representatives. Also in September, the Russian Science Ministry and the Civilian Research and Development Foundation (CRDF) signed an MOU on technology commercialization, resulting in the creation of CRDF's Next Steps to Market Program.

Finally, progress has been made in expanding cooperation with the Russians in telecommunications. Examples include the University of California at Santa Barbara and

St. Petersburg University sharing their digital libraries and geographic information systems, the establishment of a direct internet link between scientists in the United States and Russia, and the creation of a Russian supercomputing center.

The CISET working group on Russia has set the following calendar of events for 1999:

March 1999 Meeting of Working Group on General Problems of S&T

Cooperation

March 1999 Meeting of Gore-Primakov Commission S&T Committee
April 1999 Moscow B NSF-sponsored workshop on high-speed computer; opening of

supercomputing center in Moscow.
September 1999 Moscow (tentative) B meeting of Gore-Primakov Commission S&T

Committee

Japan

The purpose of the Interagency Working Group on Japan is to develop a coordinated strategy toward U.S. relations with Japan, which maximizes the value of S&T cooperation, strengthens our relations in trade and security, and builds upon our contributions to international issues of common concern. A coordinated strategy was recommended by the National Research Council in their report, *Maximizing U.S. Interests in Science and Technology Relations with Japan.* Areas assessed by the Working Group include identification of priority areas of cooperative activity, support for Administration priorities and bilateral agreements in S&T (such as the Joint High Level Committee on Science and Technology and the U.S.-Japan Common Agenda) and support for the re-negotiation/renewal of the umbrella S&T agreement.

The CISET Working Group on Japan completed an interagency strategy document submitted to the NSTC in June 1998. Congress was briefed on the contents of this document, and this influenced the content of Senate Resolution 262 on U.S.-Japan cooperation in S&T submitted by Senators Roth and Bingaman. The discussions leading to the formation of this document also informed U.S. government positions in a range of bilateral S&T agreements, including the umbrella agreement, which is due to be renewed this year. Finally, the Interagency Working Group considered the report of the U.S.-Japan Joint High Level Advisory Panel (JHLAP), which addressed the following issues: enhancing the participation of youth in science and technology; increasing the sharing of information on the means of gaining public awareness of S&T; increasing the priority on cooperation in environmental issues; increasing the priority on cooperation in health related research and development; addressing continuing problems in access to scientific information; strengthening efforts to recruit American individuals to participate in S&T bilateral exchange programs; working to exploit more fully the internet to advance collaboration; and examining the means of facilitating the DOD to participate in basic research collaborations.

The Working Group on Japan will participate in the re-negotiation of the U.S.-Japan Science and Technology Agreement, which is due to expire in March 1999. The Interagency Working Group will conduct a 1-year assessment of the changes that have occurred since the submission of the strategy to the NSTC. The Interagency Working Group will also participate in planning the Joint High Level Committee meeting and will work with the Joint High Level Advisory Panel in moving forward the recommendations of that panel.

China

The goals of the Interagency Working Group on China are to develop and articulate a strategy for cooperation with China, and to coordinate U.S. government cooperation across the technical agencies. The goals are to:

- Promote bilateral cooperation for mutual scientific and technological benefit;
- Develop new market opportunities for U.S. firms; and
- Support the Administration's goals of engagement with China, particularly in the areas of energy, environment, water, and sustainable development.

The Interagency Working Group on China continues to develop U.S. strategy for S&T cooperation with China, and, among other activities, supports the Joint Commission on Scientific and Technological Exchange, the Forum on Sustainable Development, and the Clean Energy and Environment Initiative.

The Working Group on China concentrated its 1998 efforts in three areas. First, the Interagency Working Group worked to implement the Clean Energy and Environmental Initiative. Second, the Interagency Working Group prepared and gained an enthusiastic approval from the Chinese government on a proposal to hold a workshop on water. The Chinese Ministry of Water Resources will be the lead agency for China. The workshop, postponed due to the extensive flooding in China has been rescheduled for April 1999.

Third, the Working Group has begun to develop a strategy for cooperation in S&T with China in the 21st century. This strategy will bring together priority activities of the President and Vice President and the interests of various agencies, while balancing our national security concerns regarding close engagement with the Chinese.

The Interagency Working Group on China is planning three major events for April 1999:

- Participate in a forum on China/U.S. S&T relationships
- Hosting the U.S.-China Joint Commission on Scientific and Technological Exchange; and
- Sponsor the water workshop in Phoenix, AZ.

In addition, the working group will complete a strategy paper on China.

Organization for Economic Cooperation Development

The goals of the Interagency Working Group on the Organization for Economic Cooperation and Development (OECD) are to develop and articulate a strategy for S&T cooperation with OECD and to coordinate U.S. government cooperation across the technical agencies. Goals include:

- Promoting ongoing streamlining and priority-setting activities that encourage activities and working mechanisms to support U.S. S&T interests;
- Developing a new program and approach for engaging OECD member states in S&T at the beginning of the 21st century; and

- Supporting the Administration's interest in fostering new mechanisms for international cooperation through participation in the OECD Megascience Forum.

In light of on going trends to streamline the OECD, the working group is looking at ways to make the U.S. experience and investment in OECD activities more productive and effective. A proposal for restructuring and redistributing resources in the Committee on Scientific and Technological Policy was submitted and discussed at the Paris OECD meeting in October. Other member states are currently considering the proposal.

The United States also conducted an evaluation of the Megascience Forum based on the reports from its working groups on Biological Informatics, Radioastronomy, Nuclear Physics, Neutron Sources, and Removing Obstacles, with recommendations for the future. The United States government is pleased with its experiences in the Megascience Forum and the Forum's positive contributions to our science policy decision-making process. The conclusions of the Neutron Scources Working Group, for example, influenced our own investment decisions. The Biological Informatics Group's recommendation for a Global Bioinformatics Facility is also being seriously considered for domestic investment.

In 1999 the interagency working group will continue its work with OECD to streamline activities and develop a budget commensurate with our interests. The interagency working group will also be responsible for developing the U.S. positions for the June 1999 Ministerial and the specifics of the next phase of the MegaScience Forum.

Other CISET Accomplishments

Outside of the five established international working groups, other international activities included work on APEC, South Africa, the European Union, and Egypt.

An *ad hoc* Working Group on S&T in APEC (Asia Pacific Economic Cooperation) continues to meet periodically to assess means of best advancing issues of interest to the U.S. government in this forum. This *ad hoc* interagency working group supported U.S. Government participation at this year's APEC Science and Technology Ministerial in Mexico City. Central themes that emerged from the U.S. government were the importance of identifying areas of broad common S&T interest in the region and the value of catalyzing the work of international S&T initiatives that occur outside of the formal APEC structure. Key U.S. initiatives advanced were in the areas of emerging infectious diseases and health, and cleaner production.

In the realm of U.S.-South Africa relations, two major accomplishments this year were the co-sponsorship by the United States of the Northwest Province for the South African Year of Science and Technology, and the creation of the Manufacturing Advisory Center, a major step forward in our technology commercialization efforts.

The year 1998 also saw implementation of the U.S.-European Union S&T agreement and a public event to bring together United States. and European Union government officials responsible for funding research. An Interagency Working Group on Egypt was also

established to reinvigorate the Technology Subcommittee of the Gore-Mubarak Commission with Egypt.

COMMITTEE ON NATIONAL SECURITY

The Committee on National Security (CNS) facilitates coordination of Federal efforts in R&D in the area of national security. CNS identifies relevant priorities, programs, and plans across Federal agencies with a view toward advising the NSTC about the vigor and appropriateness of Federal investments in R&D that underpin a sound national security posture. In 1998 CNS focused on nonproliferation, initiated a new working group on technology transfer, and investigated infrastructure protection research.

Three working groups executed Committee actions: the Nonproliferation and Arms Control Technology Working Group, the International Technology Transfer Issues and Policy Interagency Working Group, and the Critical Infrastructure Protection Research and Development Interagency Working Group.

Nonproliferation and Arms Control Technology

Since its formation in 1994 as the result of a PDD, the Nonproliferation and Arms Control (NPAC) Technical Working Group has evolved into a highly credible and respected vehicle for coordinating key elements of our national security S&T strategy. The working group is composed of 13 interagency, subject-specific focus groups and a Technology Needs subcommittee. The working group reports to the President through both the CNS and the National Security Council (NSC). The working group is chartered to exchange information and coordinate NPAC R&D activities; review NPAC R&D programs, identifying gaps and unnecessary overlaps; advise agencies on NPAC R&D priorities; frame interagency issues and differences for decisions by adjudicating bodies; and make recommendations to the CNS on the coordination of all nonproliferation and arms control-related R&D programs in the President's budget submission to Congress.

During 1998 approximately 100 R&D program managers representing 60 organizations conducted numerous program reviews. The working group coordinated nearly 300 R&D programs and projects representing an approximately federal investment of $700 million. The key thrust in working group 1998 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. To this end, the group conducted formal meetings with the Community Management Staff, the Nonproliferation Center, the Arms Control Intelligence Staff, the Defense Special Weapons Agency (now the Defense Threat Reduction Agency), the National Security Council Counterterrorism Office, and the Critical Infrastructure Protection R&D Working Group. Furthermore, the group expanded cooperation with the Counterproliferation Program Review Committee through joint working group meetings.

These meetings reviewed the status of hazard prediction models, unattended ground sensors and hyper/ultraspectral sensors for chemical and biological warfare agent and activities detection.

As a result of the expanded dialog with the above organizations, the working group Fourth Annual Symposium on Coordination of Federal NPAC R&D included substantial new participation by policy makers and technology users. Three hundred policy makers, program managers, and contractors attended the symposium.

The working group, in conjunction with the Office of Management and Budget (OMB) and OSTP, has begun outlining an informal budget review process. This process will provide better information to participating agencies on NPAC R&D priorities and shortfalls while improving the timing of working group reports and recommendations with respect to agency and Federal budget cycles.

In 1999 the working group will continue formalizing the processes for identifying and validating needs and translating them into adjudicable technology options for existing interagency working groups and agency resource managers. Approaches to be considered include a forum for agencies to review R&D issues developed by the Technology Needs Subcommittee. Such a forum will facilitate the proposal of programmatic options for resolving technology-needs issues and establishing system requirements for applicable technologies. It might also include investment strategies and mechanisms to pursue responsive R&D programs. The working group will continue to integrate R&D more fully into the budget process by highlighting successful interagency approaches for assigning resources to national needs, encouraging stable and supportive leadership in the R&D community, and ensuring existing and planned efforts have coordinated policy-level justification. A summary report on the results of the case-study reviews is expected by the middle of 1999.

International Technology Transfer

The International Technology Transfer Working Group was established in December 1996 to identify ways to improve national policy procedures governing international technology interactions and execution mechanisms for technology transfer and control. The working group includes representation from the Departments of Commerce, Defense, Energy, and State; the Arms Control and Disarmament Agency; and NASA. The working group tasks are to: review mechanisms and legislation; review ABuy American≅ legislation as a barrier to exports; refine definitions of critical technology and related export policies; review the practices of other governments; consult with U.S. industry; identifiy interagency differences; and consider improvements for interagency cooperation and risk assessment; and the relationship of export policies on the import of technology. The CNS principals directed the group to conduct case studies of international technology transfer with a focus on lessons learned and best practices that might be used to improve management processes.

In 1998 the Working Group focused on the study of specific cases. The CNS considered 12 case-study topics and voted to study first the international technology transfer associated with federal laboratories. This case study examined policies and procedures for managing international technology transfer at the Federal laboratories and identified best practices through a comparison of laboratory approaches. The assessment initially focused on international participation in R&D partnerships and licensing and included both domestic programs and international agreements. Management processes for assessing international participation were reviewed, along with the assessment criteria. Approaches to evaluating key issues, such as reciprocity of access, partner country intellectual property protection, and export control review were also reviewed. Several CNS principals raised the question of interagency review as a wise precaution on key projects. During the course of the study, legislation in both the House and Senate called for similar review of cooperative R&D agreements (House Resolution 2544 and Senate Resolution 2120). The House version of the legislation passed, but the Senate did not act on its version prior to the end of the Congressional session. At the CNS October 27, 1998, meeting, the principals asked the group to extend its study to the handling of foreign visitors and personnel at federal laboratories. Also, the Department of Commerce has provided study drafts on international participation in SEMATECH and rocket motor casing export controls to the group for assessment.

The working group will focus its 1999 efforts on technology transfer process improvements. In particular, the group will concentrate on identifying mechanisms by which individual technology transfer cases would be considered as they develop. These mechanisms will be tested on at least six technology transfer cases to provide validity. In addition, the working group will attempt to more fully understand interagency issues and differences on international technology transfer and equipment export. The working group will also examine the technology transfer implications of foreign personnel working in U.S. facilities and the export license issues associated with foreign scientists and engineers.

Critical Infrastructure Protection Research and Development

The Critical Infrastructure Protection Research and Development Interagency Working Group is the newest CNS working group. It was formed in March 1998 in anticipation of PDD/NSC 63, signed May 22, 1998, and emphasizes the need to protect and develop new options for the protection of the national infrastructure from terrorist and other threats. The group is chaired by OSTP and co-chaired by the Departments of Commerce and Defense. It is charged with developing the federal R&D agenda and strategy necessary to protect our critical infrastructure and reports to both the Committee on National Security and Technology and to the NSC.

The Critical Infrastructure Protection R&D Interagency Working Group organized its activities into eight subgroups: Banking and Finance, Information and Communications, Energy, Transportation, Vital Human Services, Interdependencies, Outreach, and Budget. During 1998 the working group developed a comprehensive draft R&D. The first activity of the working group was the establishment of a budget baseline, through a review of the

OMB data call initiated in December 1997. An informal working group survey begun in June 1998 was also completed. The working group completed a comprehensive review of infrastructural vulnerabilities and a determination of where gaps and shortfalls existed. R&D efforts effective in reducing vulnerability were also identified. Finally, R&D priorities were established. The working group efforts for 1998 culminated in a Presidential report that included a restatement of R&D vision and objectives, R&D options for FY 2000, a draft R&D plan, and recommendations for interagency processes for budget, outreach, and technology monitoring.

During 1999 the working group will focus on outreach to the private sector, academia, and the international community; the development of plans and recommendations for the fiscal year 2001 budget; continuing review of current technology efforts and issues; and coordination with the security panel established under PCAST. The Critical Infrastructure Protection Working Group also expects to conduct an R&D conference during 1999 as part of its outreach and coordination activities.

Other CNS Accomplishments

Other activities by the Committee included: monitoring and coordination with the Weapons of Mass Destruction R&D Interagency Working Group; communicating with involved agencies in R&D efforts related to humanitarian demining; and discussion of the OSTP fiscal year 2000 research and development priorities.

COMMITTEE ON SCIENCE

The purpose of the Committee on Science (CS) is to advise and assist the NSTC, with emphasis on those federally supported efforts that develop new knowledge in the sciences, mathematics, and engineering, including issues related to health and safety. The CS also addresses significant national policy matters that cut across agency boundaries and provides a formal mechanism for interagency science policy development, coordination, and information exchange.

Operation and Instrumentation of User Facilities

The neutron scattering and synchrotron radiation facilities funded by the Departments of Commerce, Energy and the National Science Foundation (NSF), are now being used extensively by researchers whose funding comes from other agencies, including the National Institutes of Health. CS members formed an informal working group to examine the relative roles of agencies in funding the operations and instrumentation of these facilities.

Research Integrity

The CS has taken the lead in developing a government-wide approach to ensuring the integrity of the research record. The CS is working to develop a common definition of

research misconduct for federally sponsored research (both intramural and extramural) and a set of guiding principles for responding to specific allegations. The CS anticipates that the draft guidelines will be ready for publication in the Federal Register early in 1999.

Review of the Government/University Partnership

The long-standing S&T 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. 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 will 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 dealing with this review is now completing its work. The draft report recommends: (1) articulating principles for the government/university partnership through on-going dialogue between agencies and the academic sector; (2) recognizing the importance of the research/education interaction to the strength of the U.S. research enterprise; and (3) taking action to modify selected business practices of Federal agencies that have an unintended adverse impact on the partnership. The final report will be available early in 1999.

Plant Genome Research

The Working Group on Plant Genome Research has developed a strategy on how the federal government can contribute to a comprehensive effort on expanding our knowledge of plant genomes, especially those plants that contribute to our Nation's agricultural sector. The working group's strategy was published in early 1998. The strategy builds on an interagency and international project to sequence the genome of *Arabidopsis thaliana*, a relatively simple mustard plant that has been used as a model. The working group is now focusing on implementing the plan through the programs of several participating agencies.

Food Safety Research

Over the past year, the Working Group 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. This work will be central to the functioning of the Joint Institute for Food Safety Research, created 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 Working Group will disband, and the Joint Institute will assume the food safety research planning and coordination activities.

Research on Children and Youth

Preparing America's children for the 21st century is among our most important national priorities. Today's children face the promise of a new century of unparalleled opportunity. Yet, too many of them face obstacles that obscure that bright future - obstacles including poverty, violence, child abuse, limited educational opportunity, and unhealthy behaviors. We must develop new knowledge and use it in a way that provides policies and programs that are likely to succeed in appropriately addressing these obstacles and provide a productive future for children at risk.

The multi-agency AChildren's Initiative≅ study was released in 1997, and one area identified for additional research was children's health and behavior. The CS formed the interagency working group on the Children's Initiative in 1998 to focus on issues related to children's health and behavior. The working group will identify key research opportunities; understand the influence of families on the development of children and adolescents; consider longitudinal studies of children and youth; and develop a research strategy for the future. The working group is focusing on activities that require a coordinated, multi-agency approach.

S&T Workforce of the Future

One of the abiding concerns of the CS is ensuring an appropriate workforce for the S&T enterprise of the future. In 1998 the CS created an international working group to address issues related to workforce development. The working group is to look at the effect of demographic and socioeconomic changes on workforce development; the potential contributions that could be lost when elements of the population do not participate fully in the S&T enterprise; and the current policies and programs of federal agencies that might influence participation rates, particularly of women and minorities. A workshop was held in the summer of 1998. The working group is currently examining the legal, demographic and programmatic circumstances influencing participation in the workshop. An interim report is expected early in 1999, with a final report about 6 months later.

Biotechnology

Biotechnology is one of the most active areas for R&D in science and engineering. The CS Subcommittee on Biotechnology addresses research opportunities in aspects of biotechnology, resources and infrastructure needed for biotechnology research, and international aspects of biotechnology. In 1998 research activities focused on bioremediation and metabolic engineering. Planned activities for 1999 include marine biotechnology and aquaculture. A

report on accomplishments from the Federal investment in biotechnology research will be completed in 1999, as will a report on critical issues in bioinformatics.

COMMITTEE ON TECHNOLOGY

The Committee on Technology (CT) was created in 1998 to advise and assist the NSTC to increase the overall effectiveness and productivity of Federal R&D efforts. The Committee addresses significant national policy matters that cut across agency boundaries and provides a formal mechanism for interagency policy coordination and development of Federal technology activities. This includes developing balanced and comprehensive R&D programs, establishing structures that improve the way the Federal government plans and coordinates R&D, and advising the Directors, OSTP and OMB, on R&D budget crosscuts and priorities.

Partnership for a New Generation of Vehicles

On September 29, 1993, the Federal government and the U.S. automobile industry have joined in an unprecedented alliance established by the Vice President. It includes seven Federal agencies, 19 national laboratories, universities, suppliers and the United States Council of Automobile Research (USCAR). USCAR is an organization formed by the Big Three U.S. auto makers (Ford, Daimler-Chrysler, and General Motors) to coordinate pre-competitive research.

The Partnership for a New Generation of Vehicles (PNGV) includes research on:

1) manufacturing productivity improvement; 2) near-term improvements in fuel efficiency and emission reduction; and, 3) development of advanced technologies that will enable light-duty vehicle design with up to three-fold better fuel economy while meeting future safety and emission requirements and achieving cost and performance similar to today's vehicles. The deliveries are concept cars in 2000 and pre-production prototype cars in 2004. The research plan is annually peer-reviewed by the National Research Council.

During 1998 the PNGV completed and announced the results of the Technology Selection decisions. It focused its R&D activities on fuel cell advanced direct injection internal combustion engines; advanced emission control and new fuels for very low emissions lithium and nickel-metal-hydride high power batteries; advanced electric drive systems with a particular focus on hybrid-electric-drive systems; and lightweight structural materials. The number of automotive suppliers and other companies participating in PNGV has continued to grow to over 300 and the number of advanced automotive technology commercial announcements increased significantly as the American automotive industry plans for the future.

United States Innovation Partnership

United States Innovation Partnership (USIP) was officially established in June 1997 through a MOU between the Federal government and the National Governors' Association. Its goal is to promote economic growth. USIP focuses its efforts on eliminating barriers to technological innovation and job creation by making Federal tools

more Astate friendly,≅ achieving state and Federal public-policy objectives through state-Federal collaboration, engaging in pilot state-based projects, and assimilating state "best practices" into Federal departments and agencies. Through the implementation of these strategies, USIP has accomplished the following:

- The Department of Commerce (DOC) has modified the Advanced Technology Program to allow states to participate in consortia applying for funding.

- A Small Business Innovation Research (SBIR) Task Force, chaired jointly by the Small Business Administration and President of the Kansas Technology Enterprise Corporation, is bench-marking best practices of state-Federal technology partnerships for small businesses using SBIR funds.

- Senior state organization technology advisors and provided recommendations on the future of Manufacturing Extension Partnership program to the nation's governors and the National Institute of Standards and Technology (NIST).

- The American Society of Mechanical Engineers and USIP co-hosted the "Accessing Technology Symposium" in Albuquerque, NM, in September. The symposium addressed the opportunities and challenges facing technology-based economic development in New Mexico.

- The DOC and the states formed the Experimental Program to Stimulate Competitive Technology (EPSCoT). EPSCoT, a matching grants program, supports technology development, deployment, and diffusion in eligible jurisdictions by promoting partnerships among state and local governments, universities, community colleges, non-profit organizations and the private sector.

- USIP and the Science and Technology Council of the States are sponsoring a series of roundtable discussions to address the issue of state-Federal partnerships in the area of technology-based economic development. This provides a forum for the states to discuss their individual successes and experiences with the Federal government in strengthening the linkage between S&T and economic development.

Information Technology

In 1998 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.

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 this year in the Next Generation Internet Act of 1998.

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, August 1998,* and in the FY 1998 Implementation Plan. Additionally, the NSTC sponsored the following events during 1998:

- Netamorphosis, NGI Demonstrations, March 1998
- Interagency High Confidence System Workshop, March 1998
- Differentiated Services Workshop, June 1998
- Petaflops Systems Operations Working Review, August 1998
- Workshop on Quality of Service, August 1998
- High End Computing Systems Vendor Briefings, August 1998
- SC98: CIC R&D Research Exhibit and NGI Demos, November 1998

Next Generation Internet Initiative

Announced by the President in October 1996, the Next Generation Internet initiative (NGI) 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), Department of Energy (DOE), NASA, NIH, NIST, and NSF.

The NGI Implementation Plan was published in January 1998. In March 1998 Congressional representatives, Administration officials, and the public had an opportunity to view firsthand the technologies and applications being developed under the NGI initiative at an event, coined ANetamorphosis.≅ 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 award 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.

President's Information Technology Advisory Committee

In February 1997 President Clinton established the President's Information Technology Advisory Committee (PITAC) to provide the NSTC, through the Assistant to the President for Science and Technology, 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 the R&D investment initiative, Information Technology for the Twenty First Century (IT^2) that was announced by the Vice President 1999.

In September 1998 PITAC convened six panels, comprised of PITAC members and other non-governmental experts, to elaborate upon the Interim Report's recommendations and to provide input for PITAC's final report, which will be presented to the President in February 1999.

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 and the DOE with support from the Departments of Commerce and Labor, the Federal Emergency Management Agency (FEMA) and the 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. 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.

Materials Technology

Even though the United States has led the world in the science and development of advanced materials and processing, international competitors are rapidly gaining ground on U.S. firms. If the nation is to maintain its leadership in materials R&D and the many technologies that depend on it, we must address this problem. Materials science and engineering are cross-cutting fields that impact applications as varied as medical implants, communications, transportation, and aerospace. Therefore, communication between materials scientists and engineers is crucial to effective implementation of research results in advanced materials and processing methods.

In FY 1998 the Federal R&D investment in materials S&T was estimated at $1695.8 M and the FY 1999 investment is estimated at $1871.3 M. This investment includes the ongoing R&D base that supports the missions of nine Federal departments and agencies including the Department of Commerce, Defense, Energy, Agriculture, Transportation, Health and Human Services, NASA, NSF, and EPA. Strategic investment will overcome obstacles in the production and use of advanced materials technologies. Ideas such as cost-shared research with industrial and academic partners in critical precompetitive technology areas and international cooperation on selected topics with assured benefits for the United States will help maintain our R&D base.

In 1998 the Subcommittee focused its efforts on developing a report entitled, *The Federal Program in Materials Science and Technology*, that describes the Federal materials S&T program and recommends new efforts that can address the needs of key economic sectors, such as basic materials industries, transportation, communications, health, national security, environment, and energy. The report addresses virtually every aspect of the materials cycle for the majority of materials classes. Various aspects of the materials cycle are addressed by Materials Technology Working Groups, focused on metals, structural ceramics, non destructive evaluation, composites, electronic materials, and environmentally benign materials technology.

Transportation Research and Development

The purpose of the Transportation R&D Subcommittee is to conduct strategic planning for Federal transportation R&D to ensure fast, safe, secure, efficient, accessible and global transport of people, goods and freight which meet the vital interests of the United States and enhances the quality of life of the American people.

In FY 1998 the subcommittee focused on expanding the report *Federal Transportation Science and Technology Strategy* into a national strategy and implementing the major public-

private partnerships identified in the *Strategy* through an NSTC Transportation Technology Plan and extensive outreach.

The partnerships being developed include the following initiatives:

- Intelligent Vehicle Initiative
- National Intelligent Transportation Infrastructure
- Next-Generation Global Air Transportation
- Enhanced Transportation Weather Services
- Enhanced Goods/Freight Movement at Domestic and International Gateways
- Accessibility for Aging and Transportation-Disadvantaged Populations
- Transportation and Sustainable Communities
- Next-Generation Motor Vehicles and Ships
- Aviation Safety Research Alliance
- Total Terminal Security
- Monitoring, Maintenance, and Rapid Renewal of the Physical Infrastructure

Those involved include 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. This included a national workshop in Chicago, Illinois, in July on, ADeveloping a National Science and Technology Strategy.≅

The subcommittee sponsored a National Council/Transportation Research Board Committee on the Federal Transportation R&D Strategic Planning Process that reviewed the goals, plans and status of each of the partnerships; identified the appropriate Federal role in each; and suggested supporting strategies the government might adopt.

The subcommittee also released a report, *AMoving Forward: Federal Transportation Research for the 21st Century*,≅ which provides an overview of Federal transportation enabling research identified in the *Strategy*. This includes: human performance and behavior; advanced materials; computers, information and communication systems; energy and environment; sensing and measurement; and tools for transportation modeling, design and construction.

The subcommittee was also active internationally, supporting the development of the AInitial Five-Year Plan for Increased Cooperation in the Field of North America Transportation Technology,≅ which was signed by the United States, Canada, and Mexico in June 1998. Members also participated in a National Research Council Board conference between the European Union and the United States entitled ANew Vistas in Transatlantic Science and Technology Cooperation,≅ which included a special session on

Transportation Challenges for the 21st Century. This conference will provide the framework for implementing the S&T agreement signed by the European Union and the United States in 1998.

Additional information concerning these activities can be obtained by accessing the new National Transportation Science and Technology Homepage at http://scitech.dot.gov. The Homepage also provides an online capability for those individuals or organization who wish to participate in the transportation R&D strategic planning process.

Nano Science, Engineering, and Technology

The new Nano Science, Engineering, and Technology working group strives, with other national stakeholders such as state and local governments, industry and academe, to develop a vision for the evolution of nano technology. The working group identifies scientific and technological challenges relating to the implementation of nano technology, encourages industry-led efforts to set priorities for long-term R&D in nano technology, develops a framework for establishing Federal nano technology R&D priorities, and provides mechanisms for Federal cooperation with industry, national laboratories and academe. The working group defines nano technology as technology that exploits the novel and significantly improved properties, phenomena and processes of systems that are intermediate in size between isolated molecules and bulk materials. According to this definition, nano technology must also capitalize upon our ability to manufacture and utilize such structures, components and devices through the controlled tailoring of physical, chemical and biological properties by control at the atomic and molecular levels.

APPENDICES

Appendix A - FY 2000 Interagency Research and Development Priorities

Through the NSTC, Federal agencies and departments have identified a set of 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 S&T 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 S&T.

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

The NSTC coordinates selected interagency S&T 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 Cross-cuts

The FY 2000 budget includes 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 1999, outlines the definitions of these crosscuts and how agencies must submit data to OMB. The four cross-cutting R&D areas are:

- Climate Change Technology Initiative
- U.S. Global Change Research Program
- Partnership for a New Generation of Vehicles
- 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 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 includes the following:

- 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.
- 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.

- Written assurance, incorporated in the cross-cut 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.
- Budget hearing with OSTP and OMB staff in September 1998.
- 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.

Areas of Special Emphasis

In addition to the cross-cutting 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 PCAST 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 PDD, 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 5 within 10 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 - PDD/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 PCAST 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.

Appendix B - Activities of the President's Committee of Advisors on Science and Technology

President Clinton established the PCAST at the same time as NSTC to advise the President on matters involving S&T and to assist the NSTC in securing private sector involvement in its activities. PCAST, composed of distinguished individuals forum 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 1998 PCAST provided the following reports:

Teaming With Life: Investing in Science to Understand and Use America's Living Capital (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.

PCAST issued the following letter reports:

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 United States and the world with one of the greatest challenges of the 21st 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 United States 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 be bold in the FY 2000 budget and to support strongly a broad S&T portfolio. PCAST advised the President to continue to focus Federal resources on strengthening the U.S. research capacity through an approach such as the 21st Century Research Fund and to broaden this concept to encompass the basic research programs of the DOD.

Appendix C - Presidential Directives

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.

Appendix D - Reports

National Plant Genome Initiative, January 1998

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

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

FY 2000 Interagency Research and Development Priorities (Jones-Lew Memorandum), June 1998

Networked Computing for the 21st Century/Supplement to the President's FY 99 Budget,

August 1998

Transportation Technology Plan, November 1998

Air Quality Research Strategic Plan, November 1998

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

Endocrine Disruptors: Research Needs and Priorities, December 1998

Reports and further information may be obtained by calling: 202-456-6100 (phone) or 202-456-6026 (fax).

Reports are also available on the NSTC Home Page via links from the OSTP home page at:
http://www.ostp.gov/nstc/

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