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Science and Technology Policy: Issues For the 107th Congress, Second Session

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Summary

Science and technology have a pervasive influence over a wide range of issues confronting the nation. Decisions on how much federal funding to invest in basic and applied research and in research and development (R&D), and determining what programs have the highest priority, may have implications for homeland security, new high technology industries, government/private sector cooperation in R&D, and myriad other areas. This report provides an overview of key science and technology policy issues pending before Congress, and identifies other CRS reports that treat them in more depth.

For FY2003, the President is requesting $112.1 billion for R&D, an increase of $8.9 billion over FY2002. Of that amount, defense R&D (for the Department of Defense, and Department of Energy military/nuclear programs) would receive $58.8 billion, while non-defense would receive $53.3 billion. Most of the increase is for the Department of Defense (DOD) and the National Institutes of Health (NIH).

Some of the DOD and NIH funding will be spent on counter terrorism R&D. The White House Office of Science and Technology Policy is playing a major supporting role in coordinating some of the federal counter terrorism R&D activities. OSTP Director John Marburger told Congress in February 2002 that counter terrorism R&D funding is likely to increase from about $1.5 billion in FY2002 to about $3 billion for FY2003. Although total R&D spending is rising, non-NIH, non-defense R&D spending would fall by 0.2%, a pattern which raises concern among some scientists who argue that physical sciences, chemistry, social sciences, computer sciences and related fields are not being given the same attention as health sciences research. They believe such a pattern eventually could undermine the knowledge base needed to sustain growth in biomedical research and across all fields of science.

Apart from R&D funding and priorities, many other science and technology policy issues are pending before Congress. For example, a major debate is ongoing over the deployment of "broadband" technologies to allow high speed access to the Internet. The issue is what, if anything, should be done at the federal level to ensure that broadband deployment is timely, that industry competes on a "level playing field," and that service is provided to all sectors of American society. Other issues include slamming (an unauthorized change in a subscriber's telephone service provider), Internet privacy, electronic government, spectrum management, and voting technologies.

Congress also is debating what role the government should play in drug pricing. Because the federal government funds basic research in the biomedical area, some believe that the public is entitled to commensurate consideration in the prices charged for resulting drugs. Others believe government intervention in setting drug prices would be contrary to long-standing technology development policies. The role of the federal government in technology development is being debated as well.

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Science and Technology Policy: Issues For the 107th Congress, Second Session

Introduction

Science and technology are an underpinning of, and have a pervasive influence over, a wide range of issues confronting the nation. Decisions on how much federal funding to invest in basic and applied research and in research and development (R&D), and determining what programs have the highest priority, could have implications for homeland security, new high technology industries, government/private sector cooperation in R&D, and myriad other areas.

Following are brief discussions of some of the key science and technology issues pending before the 2nd session of the 107th Congress. More in-depth CRS reports and issue briefs on these topics, many of which are frequently updated, are identified at the end of the report. For brevity's sake, the titles of the referenced reports are not included in the text, only their numbers. The list at the end has both titles and product numbers by topic.

This report continues the series of annual CRS reports on science and technology issues for Congress initiated and coordinated by former CRS Senior Specialist Richard E. Rowberg.

Issues

Research and Development Budgets and Policy

FY2003 Research and Development (R&D) Budget. For FY2003, the President is requesting $112.1 billion for R&D, an increase of $8.9 billion over FY2002. (See CRS Issue Brief IB10088). Defense funding includes R&D at the Department of Defense (DOD) and for the Department of Energy's (DOE's) military/nuclear programs. Non-defense R&D is all other R&D agencies. For FY2003, the Administration is requesting $58.8 billion for defense R&D, while $53.3 billion is requested for non-defense R&D. Funding for DOD and the National Institutes of Health (NIH) account for most of the R&D funding increase. (Details on R&D funding by agency, for most of the agencies discussed in this report, can be found in CRS Issue Brief IB10100.) The FY2003 request continues a pattern from the FY2002 budget in which Congress approved a record $11.5 billion increase for federal R&D, raising the federal R&D budget to an estimated $103.2 billion.

As it did last year, the Administration identified a subset of the R&D budget—called the "Federal Science and Technology (FS&T) budget—totaling $57 billion, that focuses on basic and applied research leading to the creation of new knowledge.

It includes some education and training funding, and excludes most development funding. This conceptualization is similar, but not identical, to a proposal made by the National Academy of Sciences in 1995.

Some of the funding increases in the FY2003 budget are for counter terrorism R&D, laboratory security, and basic research. The basic research budget would increase about 9%, to $25 billion, the highest level ever reached. The Administration is seeking funding for three interagency R&D initiatives: nanoscale science, engineering and technology, requested at $710 million, an increase of 17.5% over FY2002; networking and information technology R&D, $1.89 billion, up 2.5% over FY2002; and the U.S. Global Change Research Program, $1.71 billion, an increase of 2.6%.

OMB is proposing deficit spending for FY2003, after four years of budget surpluses. Consequently, congressional debate could focus on discretionary spending priorities for R&D versus other areas, including tax cuts, funding for domestic programs, and homeland defense. Election year politics could increase pressure for more discretionary spending. Debates continue about the balance between health sciences-related funding in NIH, and non-NIH, non-defense funding. Non-NIH, non-defense R&D would fall by 0.2%, a pattern which continues to raise concern among some scientists who argue that physical sciences, chemistry, social sciences, computer sciences and other related fields are not being given the same attention as health sciences research. They believe such a pattern eventually could undermine the knowledge base needed to sustain growth in biomedical research as well as across all fields of science.

In FY2003 budget action so far, in the House, most appropriations bills that deal with R&D have not been reported yet. House-approved defense appropriations would increase DOD R&D funding by 8.1% over the President's requested level. Senate committee action is complete for all 13 appropriations bills and would increase R&D funding by 12.4% over FY2002, which is $4.7 billion more than the President requested. Most of the Senate increase would go to defense R&D and NIH. (See CRS Issue Briefs IB10088, IB10100, and IB10062.)

National Institutes of Health (NIH). The President has requested a total of $27.3 billion for the NIH (part of the Department of Health and Human Services—HHS) for FY2003, enough to complete the planned doubling of the NIH budget over the 5-year period since the FY1998 appropriation of $13.6 billion. The requested amount is an increase of $3.7 billion or 15.7% over the comparable FY2002 appropriation of $23.6 billion. NIH's plans for its FY2003 budget had to be adjusted after the terrorist attacks of September 2001. Of the $3.7 billion increase in the request, $1.5 billion or 40% is devoted to bioterrorism-related activities, which would total $1.75 billion, up from $275 million in FY2002.

Issues facing Congress include the need to weigh its previous commitment to completing the 5-year doubling of NIH against the many new needs for discretionary resources across the federal government. The $3.7 billion increase requested for NIH is larger than the increase ($2.4 billion) requested for total HHS discretionary programs; several other public health and human services agencies are proposed for decreased funding. In addition, there is a continuing disparity between funding for

health research and support of other fields of science, including many areas whose advances are critical for progress in biomedical research. Finally, contentious issues in several areas of research oversight continue to draw attention: research on human stem cells, human embryo research, cloning, human subjects protection, gene therapy, and possible conflicts of interest on the part of researchers.

Defense Science and Technology. Last year, DOD conducted two major reviews—the congressionally mandated Quadrennial Defense Review, and the Administration's own internal strategic military review. During the election, the Bush campaign suggested that the U.S. military was still too wedded to Cold War structures, tactics and equipment, and too slow in addressing more unconventional threats. The September 11 terrorist attacks appear to have underscored that concern, and the war in Afghanistan is proving to be a laboratory for new technologies and tactics.

Last year's reviews and the subsequent war on terrorism, however, have not resulted in any tectonic shift in the allocation of science and technology resources. While more funds have been allocated to areas such as unmanned aerial vehicles (including increasing their capabilities beyond surveillance), networking of sensors and communications, and technologies for the warfighter (i.e. technologies that an individual combatant would carry with him), many traditional Cold War era systems (F-22, Comanche helicopter, e.g.) are also continuing to be developed. The Administration has fulfilled its promise to increase defense research and development. Its FY2003 Research, Development, Test and Evaluation (RDT&E) budget request is higher than the previous historic peak in FY1987, in both current and constant dollars. Its Science and Technology (S&T) request (for basic and applied research), however, is slightly below last year's appropriation.

The Administration is also committed to increasing funding for missile defense development and has restructured that program to pursue a layered global defense system that could engage a limited number of ballistic missiles at any point along their flight path. The Administration is pushing a concept called "evolutionary acquisition." Evolutionary acquisition has existed in various forms for many years as "block" developments and preplanned product improvements. The Administration has also floated a concept called "capabilities-based management" of systems development, as opposed to the current practice of "requirements-based management." The Administration, however, is still in the process of articulating the differences. It is not yet clear what the implications of these conceptual changes may be for the allocation of research and development resources and the development and insertion of new technologies. (See CRS Issue Brief IB10062.)

Public Access to Federal R&D Data. The FY1999 omnibus appropriations bill (P.L. 105-277) required OMB to establish procedures for the public to obtain access to data from federally funded research, through provisions of the Freedom of Information Act (FOIA). This was a major change from traditional practice. While permitted, federal agencies typically have not required grantees to submit research data, and pursuant to a 1980 Supreme Court decision, agencies, under FOIA, did not have to give the public access to research data not part of agency records.

There was considerable debate in Congress and the scientific community about this legislation. Opponents said that FOIA was an inappropriate vehicle to allow wider public access. They argued that using it would harm the traditional process of scientific research because human subjects will refuse to participate in experiments, believing that the federal government might obtain access to confidential information; researchers would have to spend additional time and money preparing data for submission to the government, thereby interfering within ongoing research; and government/university/industry partnerships would be jeopardized, because data funded jointly would be made available under FOIA. Proponents of the amendment said that "accountability" and "transparency" were paramount; the public should have a right to review scientific data underlying research funded by government taxpayers and used in making policy or setting regulations. OMB released its final guidelines (as revisions to OMB Circular A-110), as directed by law, on September 30, 1999. After considerable public comment, OMB limited access under FOIA to selected research data that the federal government cites or uses in actions having the force and effect of law.

Legislation was introduced in the 106th Congress to repeal the law and hearings were held, but the bill did not pass. It had been anticipated that court challenges would be raised to the OMB guidelines, to the extent they represent a narrow interpretation of the law. Reportedly, William L. Kovacs, vice president of environmental and regulatory affairs for the U.S. Chamber of Commerce and a major supporter of the legislation, predicted that the OMB regulations, which some see as being too narrow in allowing access to research data, could be revisited by the new Bush administration. This has not yet occurred.

Quality of Federal R&D Data. Final guidelines implementing the "Data Quality Act," Section 515 of P.L. 106-554 (the FY2001 Treasury and General Government Appropriations Act), were published in the *Federal Register* on January 2, 2002. This section required OMB to issue government-wide guidelines to ensure the "quality, objectivity, utility and integrity" of information disseminated by the government. Some say the law strengthens the position of industrial opponents to some federal health and environmental policies, who would be able to challenge the scientific quality of data and reports used to develop regulations. During the rule writing stage for the new law, scientific groups sought to have the rules written in a way to prevent "harassment" of scientists working on controversial research and to avoid imposing new obstacles to the publication of research rules. The final guidelines addressed some of these issues, but still allow challenges to research results underlying official agency policies. The guidelines allow peer reviewed findings to be challenged on a case-by-case basis. According to the *New York Times* (March 21, 2002), agencies are to promulgate their own implementing regulations by October 1, 2002, and the National Academy of Sciences and other groups are holding meetings to discuss agency implementation procedures.

Government Performance and Results Act (GPRA) and the President's Management Agenda. The Government Performance and Results Act of 1993 (GPRA), P.L. 103-62, is intended to produce greater efficiency, effectiveness, and accountability in federal spending and to ensure that an agency's programs and priorities meet its goals. It also requires agencies to use performance measures for management and, ultimately, for budgeting. Agencies are required to

provide Congress with annual performance plans and performance reports. All major R&D funding agencies have developed performance measures to assess the results of their R&D programs. Commentators have pointed out that it is particularly difficult to define priorities for most research and to measure the results quantitatively, since research outcomes cannot be defined well in advance and often take a long time to demonstrate.

Recent actions could force agencies to identify more precisely goals for research and measures of research outcomes. The Bush Administration has emphasized the importance of performance measurement, including for R&D, as announced in *The President's Management Agenda, FY2002* and in the FY2003 budget request. However, most observers say that more analytical work and refinement of measures is needed before performance measures can be used to recommend budget levels for research. In the FY2003 budget request, OMB used performance measures for management processes, and issued a color coded chart indicating how departments and agencies were performing in five different areas: human capital, competitive sourcing, improved financial management, electronic government (e-government), and integrating budget and performance. Green signified success, yellow indicated mixed results, and red meant unsatisfactory. Only one green rating was awarded—to the National Science Foundation for financial management. Most departments and agencies received red ratings in all five categories, although a few yellows were issued.

In addition, as part of a pilot test, six performance criteria were used to evaluate the Department of Energy's applied R&D programs. Although OMB reported that not enough data were available for a valid assessment, the measures used indicated areas possibly meriting increased funding, including research to control greenhouse gases, and areas where funding might be decreased, including oil drilling technology and high wind-speed power research (*FY2003 Budget, Analytical Perspectives,* Sec. 8). OMB also identified seven "fundamental [performance] principles" that will motivate the development of FY2004 R&D budgets.

OMB cosponsored a conference with the National Academy of Sciences (NAS) to develop performance criteria for assessing basic research, which it says it wants agencies to use eventually in their budget requests. The NAS has issued two reports to assist agencies in developing performance measures for research. The most recent is entitled *Implementing the Government Performance and Results Act for Research: A Status Report, 2001*. The House Science Committee's science policy report, *Unlocking Our Future*, 1998, commonly called the Ehlers report, recommended that a "portfolio" approach be used when applying GPRA to basic research. P.L. 106-531 mandated that an agency head assess the completeness and reliability of performance data used in reports to Congress and the House adopted a rule with the passage of H. Res. 5 requiring all "committee reports [to] include a statement of general performance goals and objectives, including outcome-related goals and objectives for which the measure authorizes funding." (See CRS Report RL30905 and CRS Report RS20257.)

Cooperative R&D. As R&D becomes more expensive, collaborative efforts among government, industry, and academia continue to expand. While there are various laws that encourage such efforts, additional issues have developed as a

consequence of the implementation of those laws. Congress has addressed cooperative R&D within the context of patent reform, federal R&D funding, the future of the research and experimentation tax credit, and amendments to the Stevenson-Wydler Technology Innovation Act concerning cooperative research and development agreements (CRADAs). Recently, changes were made in the patent laws, the research and experimentation tax credit was extended, and the Small Business Technology Transfer Program was reauthorized. It is expected that during the second session of 107th Congress, some Members of Congress may consider a review of collaborative R&D, particularly in relation to facilitating expansion of high-tech industries, including pharmaceuticals, biotechnology, telecommunications, and computers. Critics, however, believe the government should not fund research that supports development of commercial products. (See CRS Issue Brief IB89056 and CRS Report 98-862).

Science and Technology Education. An important aspect of U.S. efforts to maintain and improve economic competitiveness is the existence of a capable scientific and technological workforce. Global competition and rapid advances in science and technology require a workforce that is increasingly more scientifically and technically proficient. A September 2000 report of the National Commission on Mathematics and Science Teaching for the 21st Century, *Before It's Too Late*, states that jobs in the computer industries and health sciences requiring science and mathematics skills will increase by 5.6 million by the year 2008. Also, 60% of all new jobs in the early 21st century will requite skills held by just 20% of the current workforce. An important education focus of the 107th Congress may be on the ability of the U.S. to educate the workforce needed to generate the technological advances deemed necessary for continued economic growth.

Hearings were held during the second session of the 107th Congress to address the reported needs in science and mathematics education. On March 7, 2002, the House Subcommittee on Research held a hearing to examine the current state of undergraduate mathematics, science, and engineering education. The hearing examined the variety of responses by colleges and universities, discussed the types of programs that address the relevant problems in science and mathematics education, and discussed federal programs that could be developed to stimulate additional change. On April 22, the House Subcommittee on Research held field hearings on strengthening and improving K-12 and undergraduate science, mathematics, and engineering education. In addition, the hearing discussed industry needs for a diverse and scientific literate workforce for the 21st century.

Several pieces of legislation have been introduced that focus on improving certain aspects of science and mathematics education. H. R. 3130, the Technology Talent Act of 2001, passed the House on July 9, 2002. H.R. 3130 authorizes the awarding of grants, on a competitive basis, to colleges and universities with science, mathematics, engineering, or technology programs for the purpose of increasing the number of students earning degrees in established or emerging fields within the disciplines. Not fewer than 10 grants are to be awarded each year. The awards are for a 3 year period, with the third year of funding contingent on the progress made during the first 2 years of the grant period. H.R 1858, the National Mathematics and Science Partnerships Act, passed the House on July 30, 2002. One of the purposes of this bill is to make improvements in science and mathematics education by

awarding competitive grants to institutions of higher education to evaluate and enhance the effectiveness of information technologies in elementary and secondary science and mathematics education. An added purpose is to make awards for outreach grants (for partnerships between community colleges and secondary schools) that give priority to proposals involving secondary schools with a significant number of students from groups that are underrepresented in the scientific and technical fields.

On January 8, 2002, President Bush signed into law the Elementary and Secondary Education Act, P.L. 107-110 (H.R. 1, No Child Left Behind Act of 2001). The legislation provides $12.5 million for math and science partnerships between schools and colleges. Funding is targeted for use by schools to recruit and train science and mathematics teachers. Also, colleges and universities will receive support for assisting in the training and advising of teachers in the scientific disciplines.

Foreign Science and Engineering Presence in U.S. Institutions and the Labor Force. The increased presence of foreign students in U.S. graduate science and engineering programs continues to be of concern to many in the scientific community. Enrollment of U.S. citizens in graduate science and engineering programs has not kept pace with that of foreign students in those programs. In addition to the number of foreign students in graduate science and engineering programs, a significant number of university faculty in the scientific disciplines are foreign, and foreign doctorates are employed in large numbers by industry.

National Science Foundation data reveal that in 2000, the foreign student population earned approximately 30.3% of the doctorate degrees in the sciences and approximately 52.4% of the doctorate degrees in engineering. Trend data for science and engineering degrees for the years 1991-2000 reveal that of the non-U.S. citizen population, temporary resident status students consistently have earned the majority of the doctorate degrees.

Industry leaders contend that because of the lack of U.S. workers with skills in scientific and technical fields, high technology companies have to rely more heavily on foreign workers on H-1B visas. The American Competitiveness in the Twenty-First Century Act of 2000 (P.L. 106-313) raised the number of H-1B visas by 297,500 over a period of three years. While a portion of the fees collected from these visas would be to provide technical training for U.S. workers and to establish a K-12 science, mathematics, and technology education grant program, many in the scientific and engineering communities believe that the legislation lessens the pressure to encourage more U.S. students, especially minorities, to pursue scientific and technical careers. In addition, they contend that U.S. workers can be retrained to do these new jobs, but the high technology companies prefer foreign workers because they will work for less money. Company officials contend that the technologies are evolving too rapidly to permit retraining and that they must hire workers who have the skills now or risk losing market share to companies who do have the necessary workforce (See CRS Report RL30498).

Homeland Security

Counter Terrorism R&D. The White House Office of Science and Technology Policy (OSTP), the Office of Management and Budget, and the Office of Homeland Security have played major role in coordinating federal counter terrorism R&D budgets and major activities. The National Science and Technology Council (NSTC) has established an Anti-terrorism Task Force, which has four subgroups, each of which is developing R&D priorities for specific subject areas. The $3 billion FY2003 budget request for counter terrorism R&D is about double the amount appropriated for FY2002. According to the Office of Management and Budget's (OMB) *Annual Report to Congress on Combating Terrorism, FY2002*, $44.802 billion was requested for combating terrorism for FY2003. Of this, about $2.905 billion - or 5.5% of the total - was requested for R&D to develop technologies to deter, prevent or mitigate terrorist acts. This is an increase over FY2002, when appropriated funds, combined with the Emergency Response Fund, totaled $36.468 billion, with R&D funding at $1.162 billion, or 3.2% of the total. OSTP has also identified some examples of the Administration's science and technology-related antiterrorism priorities for FY2003 (see the following Web site: [http://www.ostp.gov/html/AntiTerrorismS&T.pdf]). According to OMB, the three largest funding increases in the FY2003 request are for the Department of Health and Human Services (DHHS), the Environmental Protection Agency (EPA), and the National Science Foundation (NSF). The largest increase was for bioterrorism-related R&D at the National Institutes of Health (part of DHHS). (See CRS Report RS21270 and CRS Report RL31202.)

It is estimated that the Department of Homeland Security that would be created in H.R. 5005, which passed the House in August 2002, would be responsible for counter terrorism R&D totaling about about $300 to $500 million. The Department of National Homeland Security that is proposed in S. 2452 would be responsible for a larger amount of R&D which would be transferred to the new department. Among the issues Congress may consider are: coordination among agency programs to avoid duplication and overlap; coordination between existing interagency counterterrorism R&D mechanisms and those included in the proposed departments; and possible negative effects on scientific information exchange and scientific inquiry of placing security controls on scientific and technical information. (See CRS Report RL31354.)

Aviation Security Technologies. The September 11 terrorist attacks heightened congressional interest in technologies for aviation security (CRS Report RL31151). In February 2002, the newly formed Transportation Security Administration took over a long-established aviation security R&D program previously conducted by the Federal Aviation Administration. The main emphasis of this program in recent years has been the development of explosives-detection equipment for screening airline passenger checked baggage. Other technologies under development include equipment for passenger screening, biometrics and other technologies for airport access control, and aircraft hardening. The Aviation and Transportation Security Act (ATSA, P.L. 107-71) requires that explosives-detection equipment be used to screen all checked baggage by December 31, 2002. Until then, the severe challenge of procuring and deploying enough equipment to meet the deadline, and the debate over whether to extend it, may overshadow efforts to

develop improved equipment types. In particular, funding for aviation security R&D may not increase significantly in FY2003, despite the September 11 attacks, because of the pressure of ATSA's near-term operational deadlines and the focus on immediate needs as the Transportation Security Administration takes over security responsibility from the private sector.

Critical Infrastructure. Following the September 11 terrorist attacks, the Bush Administration articulated its approach to protecting the nation's information systems and the critical infrastructure that depends on it. Executive Order 13228, signed October 8, 2001, established the Office of Homeland Security. Executive Order 13231, signed October 16, 2001, established the President's Critical Infrastructure Protection Board. The Office of Homeland Security has overall authority for coordinating activities to protect the nation, including the nation's critical infrastructures, from terrorist attacks. The President's Critical Infrastructure Protection Board focuses primarily on the information infrastructure upon which much of the nation's critical physical infrastructure relies. The Executive Orders leave in place many of the activities initiated under the Clinton Administration's Presidential Decision Directive 63 (PDD-63).

In June 2002, the Administration proposed establishing a new Department of Homeland Security. The new Department would bring together numerous agencies from other departments in an effort to better coordinate the nation's counter-terrorism response. In the area of critical infrastructure protection, a number of entities established by, or in support of, PDD-63 would be transferred, including the Critical Infrastructure Assurance Office, the Federal Computer Incident Response Center, and parts of the National Infrastructure Protection Center. The proposal for the new Department leaves in place the entities established by the earlier Executive Orders. While the reorganization is meant to increase coordination of these groups, the question remains how well their activities are being implemented and coordinated.

Meanwhile, Version 2 of the National Infrastructure Plan, previously due in 2001, is still being developed This is supposed to contain the private sector's plan for protecting the infrastructure they own and operate. It is not entirely clear if it will address cyber security primarily or will also include strategies for protecting assets from physical attacks as well. Bills have been introduced to help facilitate the exchange of information between the private sector and the federal government by exempting the shared information from the Freedom of Information Act. The Administration's proposal to establish the new Department (see above), and the two congressional bills being debated, would include such an exemption. The exemption proposals, however, have raised issues within those groups concerned with open access to government information. (See CRS Report RL30153.)

Technology Development

Intellectual Property/Patent Reform. Interest in protection of intellectual property has grown as its ownership becomes more complex because of increasing joint public and private support of research. A particular focus of that concern is cooperative R&D among the federal government, industry, and academia. Issues continue to be raised in Congress about the right of drug companies to set prices on drugs that were developed in part with federal funding or in conjunction with federal

agencies. Conflicts have also surfaced in Congress over federal laboratories patenting inventions that each collaborating party believes to be its own. For some federal agencies, delays continue in negotiating cooperative research and development agreements (CRADAs), because of disagreements over the ownership and control of any intellectual property. Problems have been encountered by NIH in obtaining, for use in its research, new experimental compounds that have been developed and patented by drug companies. The companies are concerned that their intellectual property rights could be eroded if new applications are discovered by NIH. These and other issues are expected to be explored as Congress addresses technology transfer, drug pricing, and/or the implications of patent reform legislation passed last session (CRS Report 98-862, CRS Report RL30451, and CRS Report RL30572).

Advanced Technology Program. The Advanced Technology Program (ATP), a key element in the former Clinton Administration's efforts to promote economic growth through technology development, has been targeted for elimination since the start of the 104th Congress. Critics argue that R&D aimed at the commercial marketplace should be funded by the private sector, not by the federal government. This controversy was evident in the activities of the 106th Congress when the original House-passed appropriations legislation contained no funding for ATP. While FY2000 funding for ATP was 28% below the previous year, a small increase was provided for FY2001. Funding for the program increased 27% in FY2002. During the upcoming authorization and/or appropriation debates, similar questions may arise as to the appropriateness of federal government support for the Advanced Technology Program. The broader issues associated with a determination of the proper role of the federal government in technology development may also be explored. (See CRS Issue Brief IB91132, CRS Report 95-36, and CRS Report 95-50).

Technology Transfer. As technology transfer activities between federal laboratories and the private sector become more widespread, additional issues are surfacing including, among others, fairness of opportunity, dispensation of intellectual property, and participation of foreign firms. Congressional concerns about competing claims on rights to patents arising from federally-funded research and development may generate oversight of the policies and practices of various federal research establishments. Congressional interest in health-related R&D has also led to questions about what role the transfer of government-supported research plays in the creation of pharmaceuticals and biotechnology products. The implications of the laws associated with technology transfer in these and other industrial sectors are expected to be of continuing concern during the 107th Congress. (See CRS Issue Brief IB85031 and CRS Report RL30585 and CRS Report RL30320).

Federal R&D, Drug Costs, and Availability. Congressional interest in methods to provide drugs at lower cost, particularly through Medicare for the elderly, has rekindled discussion over the role the federal government plays in facilitating the creation of new pharmaceuticals for the marketplace. In the current debate, some argue that the government's financial, scientific, and/or clinical support of biomedical research and development (R&D) entitles the public to commensurate considerations in the prices charged for any resulting drugs. Others view government

intervention in price decisions based upon initial federal R&D funding as contrary to a long-term trend of government promotion of innovation, technological advancement, and the commercialization of technology by the business community leading to new products and processes for the marketplace.

Various federal laws facilitate commercialization of federally-funded R&D through technology transfer, cooperative R&D, and intellectual property rights. These laws are intended to encourage additional private sector investments often necessary to further develop marketable products. The current approach to technology development policy attempts to balance the public sector's interest in new and improved technologies with concerns over providing companies valuable benefits without adequate accountability or compensation. However, questions have been raised in Congress about whether this balance is appropriate, particularly with respect to drug discovery. Critics maintain that the need for technology development incentives in the pharmaceutical and/or biotechnology sectors is mitigated by industry access to government-supported work at no cost, monopoly power through patent protection, and additional regulatory and tax advantages such as those conveyed through the Hatch-Waxman Act (P.L. 98-417) and the Orphan Drug Act (P.L. 97-414). Supporters of the existing approach argue that these incentives are precisely what are required and have given rise to robust pharmaceutical and biotechnology industries. It remains to be seen whether or not Congress will change the nature of the current approach to government-industry-university cooperation through an attempt to legislate costs associated with prescription drugs. (See CRS Report RL31379, CRS Report RL30756, CRS Report RL30585, CRS Report RS21129, and CRS Issue Brief IB10105).

Telecommunications and Information Technology

Bell Entry into Long Distance. Present laws and regulatory policies applied to the Bell operating companies (BOCs) restrict them from offering long distance (interLATA) services within their service regions until certain conditions are met. The BOCs seeking to provide such services must file an application with the Federal Communications Commission (FCC) and the appropriate state regulatory authority that demonstrates compliance with a 14-point check list. The FCC, after consultation with the Justice Department and the relevant state regulatory authority will determine whether the BOC is in compliance and can be authorized to provide in region, interLATA services. To date, three BOCs, Verizon, SBC Communications, and BellSouth, have been authorized to provide such services in 15 states. Concerns have been raised about whether such restrictions are overly burdensome and discourage needed investment in and deployment of broadband services. Proponents of these measures feel that the lifting of such restrictions will accelerate the deployment of and access to broadband services, particularly in rural and under served areas. Opponents argue that such restrictions are necessary to ensure the growth of competition in the provision of telecommunications services and that the lifting of such restrictions will have an adverse effect on the broadband marketplace. Legislation (H.R. 1542) seeking to ease these regulatory restrictions, as applied to high speed data services, passed (273-157) the House, as amended, on February 27, 2002. Two measures (S. 2430, and S. 2863) addressing broadband deregulation, but not containing provisions specific to BOC interLATA service entry, have been

introduced in the Senate. (See CRS Issue Brief IB10045, CRS Report RL30018).

Slamming. Slamming is the unauthorized change in a subscriber's telephone service provider. Measures (S. 58 and S.1084) to strengthen slamming regulations issued by the FCC were introduced in the 106th Congress, but were not enacted. During that period, the FCC promulgated additional regulations to further strengthen its slamming rules. Whether FCC-adopted slamming rules will be a sufficient deterrent to stop the practice of slamming and negate congressional interest to enact legislation remains to be seen. To date no legislation to modify slamming regulations has been introduced in the 107th Congress. (See CRS Issue Brief IB98027).

Broadband Internet Access. Broadband Internet access gives users the ability to send and receive data at speeds far greater than conventional "dial up" Internet access over existing telephone lines. New broadband technologies—primarily cable modem and digital subscriber line (DSL), as well as satellite, and fixed wireless Internet—are currently being deployed nationwide by the private sector. Many observers believe that ubiquitous broadband deployment is an important factor in the nation's future economic growth. At issue is what, if anything, should be done at the federal level to ensure that broadband deployment is timely, that industry competes on a "level playing field," and that service is provided to all sectors of American society. Currently, legislation in Congress centers on two approaches. Those are: easing certain legal restrictions and requirements (imposed by the Telecommunications Act of 1996) on incumbent telephone companies that provide high-speed data (broadband) access (H.R. 1542, passed by the House on February 27, 2002, S. 2430, S. 2863), and providing federal financial assistance—such as grants, loans, or tax credits (H.R.267, S. 88, S.1731, S. 2448)—for broadband deployment in rural and economically disadvantaged areas. (See CRS Issue Brief IB10045 and CRS Report RL30719).

Spectrum Management and Wireless Technologies. Managing utilization of the radio spectrum to maximize the efficiency and effectiveness of meeting increased spectrum demands during an era of rapidly growing wireless telecommunications has become a major challenge for government and industry. Interested parties want to ensure that competition is maximized and that all consumer, industry, and government groups are treated fairly.

The radio spectrum, a limited and valuable resource, is used for all forms of terrestrial and satellite wireless communications including radio and television broadcast, mobile telephone services, paging, radio relay, and aeronautical and maritime navigation. The spectrum is used by federal, state, and local governments and the commercial sector. A vast array of commercial wireless services and new technologies are being developed to provide voice, data, and video transmissions in analog and digital format for broadcast and interactive communications. Spurred by the growth of electronic commerce, many wireless service providers are developing wireless Internet access services. Spectrum used for public safety, similarly, needs to support data and video transmissions as well as voice communications to respond effectively to emergency situations. As a result, competition for spectrum is increasing.

Due mainly to the combination of different technology standards operating on different radio frequencies, communications between—and even within— local, state and federal agencies is not always assured. Achieving interoperability—the ability to communicate among public safety telecommunications networks—is an important goal of the public safety community. In the last decade, significant advances in technology and in funding to purchase communications equipment have eased — but not eliminated — problems of incompatible systems, inadequate technology in the hands of first responders, insufficient funding, and limited spectrum.

President Bush's FY2003 budget request for Homeland Security includes $1.4 billion to enhance communications infrastructure to support interoperability. This sum is part of $3.5 billion that would go to the Federal Emergency Management Agency (FEMA) and the Department of Justice to be used in "first responder" grants to states. As currently planned, the Department of Homeland Security would absorb FEMA and on-going Office of Justice Programs that include interoperability among federal, state and local public safety agencies.

Title III of the Balanced Budget Act of 1997 (P.L. 105-33) is intended to promote the transition from analog to digital television broadcasting. In that Act, Congress directed the FCC to designate spectrum for public safety agencies in the channels to be cleared (channels 60-69). The FCC is working with the broadcasting industry and wireless carriers on a market-driven approach for voluntary clearing of spectrum assigned for future use by public safety agencies. When it allocated this spectrum, the FCC specified that part would be used to assure interoperability for wideband networks used by public agencies.

Congress is preparing to review national policies for managing spectrum including spectrum allocation, the promotion of efficient spectral technology, and the availability of sufficient spectrum for public safety operations. Additional legislation has been proposed to assure that public safety receives designated spectrum in the Upper 700 MHZ range in a "timely manner." H.R. 3397 addresses this matter. The roles of the FCC (which manages spectrum for commercial, and state and local government uses) and the National Telecommunications and Information Administration (which manages spectrum for the federal government) may also be revisited in the 2nd Session of the 107th Congress. (See CRS Report RL31375 and CRS Report RS 20993.)

Internet Privacy. Internet privacy issues encompass concerns about the collection of personally identifiable information (PII) from visitors to Web sites, as well as debate over law enforcement or employer monitoring of electronic mail and Web usage. In the wake of the September 11 terrorist attacks, debate over the issue of law enforcement monitoring has intensified, with some advocating increased tools for law enforcement to track down terrorists, and others cautioning that fundamental tenets of democracy, such as privacy, not be endangered in that pursuit. The Department of Justice authorization bill (H.R. 2215), as passed by the House and Senate, requires the Justice Department to report to Congress on its use of Internet monitoring software such as Carnivore/DCS 1000. But Congress also passed the USA PATRIOT Act (P.L. 107-56) that, *inter alia*, makes it easier for law enforcement to monitor Internet activities. Congress and public interest groups are

expected to monitor how law enforcement officials implement that Act. (See CRS Report RL31289 and CRS Report RL31408.)

The parallel debate over Web site information policies concerns whether industry self regulation or legislation is the best route to assure consumer privacy protection on commercial sites, and whether amendments to 1974 Privacy Act are needed to protect visitors to government Web sites. The issue is how to balance consumers' desire for privacy with needs of companies and the government to collect certain information on visitors to their Web sites. Although many in Congress and the Clinton Administration preferred industry self regulation for commercial Web sites, slow industry response led the 105th Congress to pass legislation to protect the privacy of children under 13 (the Children's Online Privacy Protection Act, P.L. 105-277) as they use commercial Web sites. Many bills have been introduced since that time to protect those not covered by COPPA, but the only legislation that has passed addresses information collection practices by federal, not commercial, Web sites. Many Internet privacy bills are pending and hearings have been held (see CRS Report RL31408 for legislative status).

E-Government. Electronic government (e-government) is an evolving concept, meaning different things to different people. However, it has significant relevance to four important areas of governance: (1) delivery of services (government-to-citizen, or G2C); (2) providing information (also G2C); (3) facilitating the procurement of goods and services (government-to-business, or G2B, and business-to-government, or B2G); and (4) facilitating efficient exchanges within and between agencies (government-to-government, or G2G). For policymakers concerned about e-government, a central issue is developing a comprehensive but flexible strategy to coordinate the disparate e-government initiatives across the federal government. Just as the private sector is undergoing significant change due, in part, to the convergence of technology, these same forces are transforming the public sector as well. E-government initiatives vary significantly in their breadth and depth from state to state and agency to agency.

So far, states such as California, Minnesota, and Utah have taken the lead in developing e-government initiatives. However, there is rapidly increasing interest and activity at the federal level as well. Perhaps the most well-known federal example is the September 2000 launch of the FirstGov web site [http://www.firstgov.gov/]. FirstGov, which underwent a significant redesign in March 2002, is a web portal designed to serve as a single locus point for finding federal government information on the Internet. The FirstGov site also provides access to a variety of state and local government resources.

The movement to expand the presence of government online raises as many issues as it provides new opportunities. Some of these issues concern: security, privacy, management of governmental technology resources, accessibility of government services (including "digital divide" concerns as a result of a lack of skills or access to computers, or disabilities), and preservation of public information (maintaining comparable freedom of information procedures for digital documents as exist for paper documents). Although these issues are neither new nor unique to e-government, they do present the challenge of performing governance functions

online without sacrificing the accountability of or public access to government that citizens have grown to expect. (See CRS Report RL31057).

Federal Chief Information Officer (CIO). A growing interest in better managing government technology resources, combined with recent piecemeal efforts to move governmental functions and services online, has led some observers to call for an "e-government czar," or a federal Chief Information Officer (CIO), to coordinate these efforts. In the private sector, a CIO usually serves as the senior decisionmaker providing leadership and direction for information resource development, procurement, and management with a focus on improving efficiency and the quality of services delivered.

During the 106th Congress, two bills were introduced in the House calling for the establishment of a federal CIO position, but neither passed. The issues are being revisited in the 107th Congress. On May 1, 2001, Senator Lieberman introduced S. 803, the E-Government Act of 2001. Among its many provisions, S. 803 originally called for the establishment of a federal CIO, to be appointed by the President and confirmed by the Senate. The federal CIO would be in charge of a proposed Office of Information Policy and would report to the Director of OMB. S. 803 would also establish the CIO Council by law with the federal CIO as Chair. This bill was referred to the Senate Governmental Affairs Committee, which held a hearing on the bill on July 11, 2001. Also on July 11, 2001, Representative Turner introduced an identical companion bill, H.R. 2458, the E-Government Act of 2001. That bill has been referred to the House Committee on Government Reform.

On March 21, 2002, the Senate Governmental Affairs Committee reported S. 803 (now renamed the E-Government Act of 2002) with an amendment. As amended, S. 803 now calls for the establishment of an office of Electronic Government within OMB. The new office is to be headed by a Senate-confirmed administrator, who in turn, is to assist OMB's Director, and Deputy Director of Management, and work with the Administrator of the Office of Information and Regulatory Affairs (OIRA) "in setting strategic direction for implementing electronic Government...." The amended version of S. 803 was passed unanimously by the Senate on June 27, 2002. At this time, no additional action has been taken on the House companion bill, H.R. 2458. (See CRS Report RL30914.)

On June 14, 2001, OMB announced the appointment of Mark Forman to a newly created position, the Associate Director for Information Technology and E-Government. According to the OMB announcement, as "the leading federal e-government executive," the new Associate Director will be responsible for the e-government fund, direct the activities of the CIO Council, and advise on the appointments of agency CIOs. The Associate Director will also "lead the development and implementation of federal information technology policy." The new position will report to the Deputy Director of Management at OMB, who in turn will be the federal CIO.

Information Technology R&D. For FY2002, almost all of the funding for federal information science and technology and Internet development is part of a single government-wide initiative. This is called the Information Technology Research and Development (IT R&D) initiative, and is the successor to the federal

High Performance Computing and Communications Initiative begun in FY1991. The IT R&D initiative continues the effort begun in FY1991 by providing support for federal high-performance computing science and technology, information technology software and hardware, networks and Internet-driven applications, and education and training for personnel. In the current fiscal year, seven federal agencies will receive a total of $1.84 billion under the IT R&D initiative, with the NSF receiving about a third of that total. The Bush Administration is proposing that for FY2003, the IT R&D initiative receive $1.89 billion. The 107th Congress has so far supported this initiative, and H.R. 3400, which amends the High Performance Computing Act of 1991 to authorize appropriations for fiscal years 2003 through 2007, was reported favorably out of the House Committee on Science and placed on the House Calendar on June 18, 2002.

Voting Technologies. The 2000 Presidential election raised the question of whether changes are needed in the voting systems used in the United States (see CRS Reports RL30773 and RS20898). Elections in the United States are administered at the state and local level, and the federal government does not currently set mandatory standards for voting technologies. Five different kinds of technologies are now used: paper ballots, lever machines, punchcards, marksense forms, and electronic systems. Most states use more than one kind. For some of these technologies, in particular, punchcard ballots, concerns have been raised about ballot design, voter errors, and counting accuracy. Questions have also been raised about voter registration systems and the impacts of remote voting, including absentee and mail-in balloting. One form of remote voting currently in development is Internet voting (see CRS Report RS20639), which so far has been used only on an experimental basis.

The House and Senate have both passed election reform legislation (H.R. 3295), which is now in conference. Issues currently being debated include the degree to which the federal government should set mandatory as opposed to voluntary national standards (CRS Report RS21156); whether punchcard and lever voting systems should be eliminated; whether precincts should be required to have voting machines that are fully accessible to blind and other disabled voters; whether states should adopt computerized statewide voter registration systems; what kinds of identification should be required of first-time voters; and what federal funding should be made available for upgrading voting systems and for administering federal elections. (See the CRS Election Reform Electronic Briefing Book for details.)

Biotechnology: Privacy, Patents, and Ethics

Much debate currently focuses on how genetic privacy and discrimination, gene patenting, and ethical issues will affect the application of advances in biotechnology. Those advances hold great promise for providing extraordinary benefits through agricultural, medical, industrial, and other applications, but they have also raised concerns. The advances are based mostly on research in molecular biology and genetics. The genetic basis of biotechnology is the source not only of much of its promise, but also of many of the concerns. That is because the genetic code contains the basic information used to produce the chemical building blocks of life, and it is inherited. Biotechnology provides methods to identify and manipulate that code, including the transfer of genes between species.

One major issue is how individual privacy can best be protected and discrimination prevented in the face of major advances in genetic testing that are increasingly revealing predisposition to disease as well as other genetic traits. The application of existing privacy statutes to genetic information appears limited (CRS Report RL30006). One of the issues being debated is whether genetics should be included in broader medical privacy legislation or whether legislation specific to genetic privacy is more appropriate. The potential for genetic discrimination both in employment and insurance has led to the introduction of numerous bills, as well as hearings. Issues include whether such discrimination currently exists and whether it would be covered by the Americans with Disabilities Act (ADA).

Another important issue concerns the public policy implications of gene patenting and other forms of intellectual property protection in biotechnology. While patents have long been granted in the biotechnology industry, several issues are currently being debated (CRS Reports RL30648 and RL30585). They include ethical concerns, environmental impacts, and questions about the impacts of current patent practice. Some observers question whether patents should be granted at all for living things, genetic materials, and other biotechnologies. Supporters counter that trade secret protection is a less attractive alternative; and in a broader sense, they question whether patent law is the appropriate vehicle to address the social consequences of biotechnology. Internationally, a major issue is how intellectual property protection can affect equity in the distribution of biotechnology applications. Some nations are increasingly fearful that the use of agricultural biotechnology could leave their food production at the mercy of a few corporations; others demand, equally forcefully, that developed nations must commit to ensuring equal access to the benefits of biotechnology.

A third set of issues concern identification of the ethical issues raised by research in biotechnology and ways to address them. Some of the thorniest ethical issues faced by Congress are associated with biomedical research, especially genetic testing, gene therapy, stem cell research (CRS Report RL31015, CRS Report RL31142, and CRS Report RS21044), the development of controversial crop technologies such as the "Terminator" gene (CRS Report RL30278), and cloning (CRS Report RL31358). Debate centers on the limits that should be placed on such research and the applications deriving from it, regulation of those activities, and to what extent the federal government should fund them.

Global Climate Change

Congress has maintained an active and continuing interest in the implications of, and the issues associated with, possible global climate change for the United States. In December 1997, the parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to the Kyoto Protocol to establish binding commitments for reductions in greenhouse gases for the 38 developed countries of the world, including the United States, and the economies in transition (former Communist nations). However, the Kyoto Protocol has not yet received the required number of ratifications to enter into force. If the Protocol were to enter into force, and if the United States were ever to ratify the Protocol, the nation would be committed to reducing its net average annual emissions of six greenhouse gases to

7% below baseline levels (1990 for carbon dioxide) during the period covering the years 2008 to 2012. At present, U.S. emissions are above baseline levels.

The United States signed the protocol, but President Clinton did not submit it to the Senate for advice and consent to ratification because the Senate passed a resolution stating that the United States should not agree to a protocol that did not impose similarly binding requirements on developing countries or that would "result in serious harm to the U.S. economy or possibly produce little environmental benefit."

Work continued under United Nations' auspices on many of the methodologies and procedures needed to implement the Convention and to ensure that the Protocol will be fully operational at such time as it might enter into force. Seven "conference of parties" (COP) meetings have been held to resolve outstanding issues. COP-6 negotiations collapsed in November 2000, however, and the meeting was suspended without agreement. It was anticipated that talks would resume in 2001.

In March 2001, however, the Bush Administration indicated its opposition to the Kyoto Protocol, declared it a failed effort, and essentially rejected it, citing possible harm to the U.S. economy and lack of developing country participation. COP-6 negotiations resumed in July 2001. The United States attended, but, for the most part, did not participate in discussions related to the Protocol. The United States continued to act as an observer at COP-7 later in 2001, declining to participate in negotiations. At COP-7, most major issues were resolved, and a goal emerged of bringing the Kyoto Protocol into force, without the United States if necessary, by the August 26 - September 4, 2002, meeting of the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa. Although Protocol proponents fell short of that goal, the drive continues internationally, spearheaded mainly by the European Union, to acquire the requisite number of ratifications so that the Kyoto Protocol might enter into force at some future date.

On February 14, 2002, President Bush announced a U.S. policy framework for climate change, the so-called "Clear Skies Initiative" – a new approach for meeting the long-term challenge of climate change. The centerpiece of this announcement was a plan to reduce greenhouse gas intensity of the U.S. economy by 18% over the next 10 years. Greenhouse gas intensity measures the ratio of greenhouse gas emissions to economic output, and has been declining in the United States over the past several years. The Administration stated that the goal, to be met through voluntary action, was to achieve efficiency improvements that would reduce the 183 metric tons of emissions per million dollars of gross domestic product (GDP) to 151 in 2012. The plan noted that "if, in 2012, we find that we are not on track toward meeting our goal, and sound science justifies further policy action, the United States will respond with additional measures that may include a broad, market-based program" and other incentives and voluntary measures to accelerate technology development. President Bush also outlined a U.S. Climate Change Research Initiative and a National Climate Change Technology Initiative, along with a new Cabinet-level management structure to oversee their implementation. For a full description of this announcement, visit the following Web site: [http://www.whitehouse.gov/news/releases/2002/02/climatechange.html].

Discourse in Congress over the prospect of global warming, the extent to which it might occur, and what the United States could or should do about it, has yielded a range of legislative proposals from both sides of the issue. Moreover, several committees in the House and the Senate have held hearings to review the details of those proposals. In that milieu, arguments were presented that policy actions to reduce emissions of carbon dioxide and other greenhouse gases should be taken now, in line with the intent of the Kyoto Protocol. Alternative arguments called for delay, citing challenging issues that were regionally complex, politically delicate, and scientifically uncertain; the need to expand technological options for mitigating or adapting to the effects of any climate change; and the associated high cost of certain mitigation schemes that would prematurely replace existing capital stock before the end of its economic life.

Interest in the 107th Congress has focused on the scientific evidence for global warming and the uncertainties associated with future climate projections; performance and results of federal spending on climate change technology programs and, more broadly, on global change research programs; the implications for the U.S. economy of various options for complying with emissions reductions in the Protocol, if it were ever to be ratified; the extent to which carbon dioxide is considered a "pollutant" and whether the government has the authority to regulate it; the pros and cons of granting American companies credit for early action to reduce their emissions of greenhouse gases; and long-term research and development programs to develop new technologies to help stabilize greenhouse gas emissions. For more information, see "CRS Products" in the CRS Electronic Briefing Book on Global Climate Change [http://www.congress.gov/brbk/html/ebgcc1.shtml]), and CRS Report RL30452.

Aeronautics R&D

In February 2002, the National Aeronautics and Space Administration (NASA) presented its technology vision for aviation in a report entitled *The NASA Aeronautics Blueprint* [www.aerospace.nasa.gov/aero_blueprint/]. Noting that aviation accounts for about 6% of the U.S. gross domestic product, the report highlights the role of new technologies in increasing air traffic capacity, reducing the impact of aircraft noise and emissions, improving aviation safety and security, and meeting other needs such as national defense and commercial competitiveness. Unlike a similar document issued by the European Union in January 2001, *European Aeronautics: A Vision for 2020* (available at the following Web site: [europa.eu.int/comm/research/growth/aeronautics2020/en/]), the *Blueprint* does not call specifically for increases in government funding. Despite a modest increase in FY2002, the NASA budget for aeronautics R&D is down by about half from its FY1998 peak. The overall funding level, as well as funding for certain activities of particular congressional interest, continues to receive close attention in the 2nd session of the 107th Congress. A related issue may be the coordination of NASA's aeronautics R&D activities with those of the Federal Aviation Administration, which has a smaller program, focused primarily on support of its regulatory activities. See CRS Report RL31347.

Space Programs: Civil, Military, and Commercial

NASA's Long-Term Goals. On December 20, 2001, the Senate confirmed Mr. Sean O'Keefe as the new Administrator of NASA. Mr. O'Keefe's background is in public administration and financial management. He has made clear in testimony to Congress that his top priority at NASA is improving management, particularly in the space station program, which has experienced significant cost growth (see below). Responding to criticism that he lacked "vision" for the agency, Mr. O'Keefe gave a speech at Syracuse University on April 12, 2002 outlining that vision. Unlike many previous NASA administrators and space program advocates, he declined to identify human missions back to the Moon or to Mars as NASA goals, insisting that NASA's program should be driven by science, not destination. Mr. O'Keefe's more "nuts and bolts" focus makes some space advocates wonder what the future holds for NASA under his leadership.

Some NASA supporters believe that the Bush Administration's budget for NASA suggests that bold goals are not envisioned. The FY2003 request is $15 billion (see CRS Report RL31347), less than one percent higher than FY2002. The "out-year" budget projections show an agency that is either level-funded or declining (depending on the rate of inflation). Others, however, are relieved that in this tight fiscal environment, the NASA budget has not fared worse.

Mr. O'Keefe also has stated that he wants to focus on NASA's role as part of the national security community. To some, that comment is worrisome because NASA, by statute, is a civilian space agency. While NASA and DOD routinely cooperate on technology activities, particularly in aeronautics and space transportation, NASA's identity as an open, civilian agency has remained unchanged since it was created in 1958. Some wonder to what extent NASA's mandate may change under the Bush Administration.

Space Station. One NASA program that continues to generate controversy is the International Space Station (ISS) program. (See CRS Issue Brief IB93017.) When ISS was approved in 1993 (replacing the earlier "Freedom" program begun in 1984), NASA said it would cost $17.4 billion to build, and the result would be a laboratory in space for "world class" scientific research, housing seven astronauts. By 2000, that cost had grown to $24.1-$26.4 billion. In response, Congress imposed a $25 billion cap on building the space station (not including the cost of space shuttle launches to take the various segments and crews into orbit). In 2001, however, NASA revealed another $5 billion in cost growth. Following a study by an independent task force (see CRS Report RL31216), the Bush Administration put the program on "probation" and gave the space station program office two years to demonstrate credibility in its cost estimating and program management practices. Until then, NASA has been instructed to truncate construction of the space station at a stage the Administration calls "core complete." At that point, the space station could support only three crew members, instead of the seven planned. The crew size limitation would significantly reduce the amount of research that could be conducted, and would affect all the international partners in the program (the United States, Europe, Canada, Japan, and Russia). All of the partners have expressed deep concern.

The non-U.S. partners are seeking a commitment from the Administration that the seven-person configuration ultimately will be built, even if there is no deadline for completing it. The Administration has not been willing to make that commitment, however. How Mr. O'Keefe will tame ISS costs, or whether he will find himself in the same quandary as his predecessor—attempting to build a useful space station that meets international commitments, while staying within the congressionally mandated cap and protecting other NASA programs—remains to be seen.

The Space Shuttle and the Space Launch Initiative. The United States government and private sector companies need space launch vehicles to place satellites of varying sizes into different orbits or interplanetary trajectories. In the case of NASA, humans also must be launched. NASA's space shuttle is the only U.S. launch vehicle capable of placing humans in space, and the only operational reusable launch vehicle (RLV) in the world. All others are expendable launch vehicles (ELVs) that can only be used once. Several U.S. companies compete in the world market to provide ELV launch services to government and commercial customers. (See CRS Issue Brief IB93062.)

The U.S. government and the private sector want to develop launch vehicles with lower operational costs. In the 1990s, the government and the private sector embarked on joint efforts to create less costly ELVs, but many observers believe that to reduce costs significantly, a new RLV design is needed. Government, private sector, and joint government-private sector efforts to do so have failed so far. NASA began its most recent attempt, the Space Launch Initiative (SLI), in FY2001. SLI is funding technology development activities that are expected to allow a decision in 2006 as to what design to choose for a "2nd generation" RLV. Because of the earlier program failures, and SLI's goals and timeline (which many consider optimistic), the program is under considerable scrutiny.

The availability of a 2nd generation RLV is intertwined with decisions on how long the space shuttle will be needed and therefore how much to spend on safety and supportability upgrades to it. NASA asserts that the new vehicle will achieve initial operational capability in 2012, but many argue that is too optimistic, particularly since the choice of design will not be made until 2006. That would leave only 6 years to develop and test the new vehicle. Cost estimates for the new vehicle are notional at this time, but NASA suggests it will be on the order of $10 billion, raising issues about whether expected budgets can support such an investment. If the new vehicle will not be ready until after 2012, additional shuttle upgrades may be needed. In the nearer term, an independent advisory group that oversees safety in NASA's human spaceflight programs (the Aerospace Safety Advisory Panel) said in its March 2002 annual report that "current and proposed budgets are not sufficient to improve or even maintain the safety risk levels of operating the Space Shuttle or the ISS." The report is at: [http://www.hq.nasa.gov/office/codeq/codeq-1.htm].

National Security Space Programs. DOD and the intelligence community conduct a space program roughly equal in size to that of NASA, although for FY2003 DOD is requesting more than NASA: $18.5 billion, compared with $15 billion for NASA. This "national security space program," often referred to simply as the military space program, involves building and launching satellites for

communications, navigation, weather, intelligence collection, and other purposes. (See CRS Issue Brief IB92011.)

One program that is especially controversial is the Space Based InfraRed System (SBIRS) program of early warning satellites (see CRS Report RS21148). SBIRS consists of two separate but related programs, SBIRS-High and SBIRS-Low. SBIRS-High, using satellites in geostationary orbit (22,500 miles above the equator) and in highly elliptical orbits, would replace the existing series of early warning satellites that alert the National Command Authority to foreign missile launches. SBIRS-Low, consisting of 20-30 satellites in low Earth orbit, would be dedicated to missile defense, tracking the missile from launch, though its "mid-course" phase when warheads are released, to its terminal phase when warheads reenter the atmosphere. Technical and cost issues on both programs have made them very controversial.

Commercial Satellite Exports. Commercial communications satellites are used by countries and companies around the world for data, voice, and broadcast services. U.S. companies are the major manufacturers of such satellites and want to continue their market dominance. Many of the satellites are not launched by U.S. launch vehicles, however, but are exported to Europe, Russia, China, or elsewhere for launch. Export licenses are required to ship the satellites to the launch site, as well as for technical discussions among the companies, their customers, and insurers.

The State Department had responsibility for issuing export licenses for commercial communications satellites until 1992. Between 1992 and 1996, that responsibility was transferred to the Commerce Department. In the late 1990s, Congress became concerned that U.S. satellite manufacturers were transferring technology to China in the course of investigating launch failures that involved their satellites. The resulting controversy led Congress to transfer export responsibility for these satellites back to the State Department as of March 15, 1999. U.S. space industry representatives and others claim that the State Department takes much longer to decide on export licenses, causing customers to buy from foreign companies instead. They are trying to convince Congress to return jurisdiction to the Commerce Department. Supporters of keeping State Department in control argue that the Commerce Department is not sufficiently strict in ensuring that technology is not transferred to other countries, and shifting responsibility again would add another element of uncertainty to U.S. policy, which could adversely affect a customer's willingness to buy from a U.S. company. This issue is being debated as part of the Export Administration Authorization Act, H.R. 2581. (See CRS Issue Brief IB93062.)

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