The National Institute of Standards and Technology: An Appropriations Overview

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March 23, 2011

Congressional Research Service
7-5700
www.crs.gov
95-30

CRS Report for Congress
Prepared for Members and Committees of Congress

Summary

The National Institute of Standards and Technology (NIST), a laboratory of the Department of Commerce, is mandated to provide technical services to facilitate the competitiveness of U.S. industry. NIST is directed to offer support to the private sector for the development of pre-competitive generic technologies and the diffusion of government-developed innovation to users in all segments of the American economy. Laboratory research is to provide measurement, calibration, and quality assurance techniques that underpin U.S. commerce, technological progress, improved product reliability, manufacturing processes, and public safety.

Continued funding for NIST extramural programs directed toward increased private sector commercialization has been a major issue. Some Members of Congress have expressed skepticism over a "technology policy" based on providing federal funds to industry for development of pre-competitive generic technologies. This approach, coupled with pressures to balance the federal budget, led to significant reductions in funding for NIST. The Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP), which accounted for over 50% of the FY1995 NIST budget, were proposed for elimination. In 2007, ATP was terminated and replaced by the Technology Innovation Program (TIP).

While much of the legislative debate has focused on ATP and MEP, increases in spending for the NIST laboratories that perform the research essential to the mission responsibilities of the agency have tended to remain small. As part of the American Competitiveness Initiative, announced by former President Bush in the 2006 State of the Union, the Administration stated its intention to double over 10 years funding for "innovation-enabling research" done at NIST through its "core" programs (defined as internal research in the STRS account and the construction budget). In April 2009, the current President stated his decision to double the budget of key science agencies, including NIST, over the next 10 years. While additional funding has been forthcoming, it remains to be seen how support for internal R&D at NIST will evolve and how this might affect financing of extramural efforts such as TIP and MEP. The dispensation of funding for NIST programs may influence the way by which the federal government supports technology development for commercial application.

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Mission and Background

The National Institute of Standards and Technology, formerly the National Bureau of Standards (NBS), was established by the NBS Organic Act of 1901 (P.L. 56-177) as a laboratory of the Department of Commerce. Unlike most federal laboratories, NIST has a mission specified by statute (15 U.S.C. 271-282a), has a separate authorization and appropriation, and is headed by a Senate-confirmed presidential appointee.

Prior to 1988, the mission of NBS was to develop and maintain standards and measurement support for scientific investigations, engineering, manufacturing, commerce and educational institutions, as well as to provide technical and advisory services to other government agencies on scientific and engineering problems. The Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418) changed the name of NBS to the National Institute of Standards and Technology and mandated that the agency provide technical services to facilitate the competitiveness of U.S. industry. NIST is directed to offer support to the private sector for the development of pre-competitive generic technologies and the diffusion of government-developed innovation to users in all segments of the American economy. Laboratory research is to provide measurement, calibration, and quality assurance techniques that underpin U.S. commerce, technological progress, improved product reliability, manufacturing processes, and public safety.

A dual approach is used to accomplish this mission. Research and development is performed within the NIST laboratory facilities while two extramural initiatives, the Technology Innovation Program (TIP) and the Manufacturing Extension Partnership (MEP), are administered by the organization.

The NIST in-house R&D effort, involving approximately 2,800 scientists, engineers, technicians, and support personnel (plus some 1,800 visiting scientists from industry, academia, and other government agencies and "1,400 affiliated field agents"), is conducted at laboratories in Maryland and Colorado. Research is focused on measurement, evaluated data, standards, and test methods; basic "infrastructural technologies" that enable development of advanced technologies, and which industry can use to characterize new materials, monitor production processes, and ensure the quality of new product lines. Cooperative research with industry to overcome technical barriers to commercialization of emerging technologies is a major component of the work at NIST; the laboratory participates with U.S. companies in collaborative R&D programs in numerous research areas.[1] After an October 2010 realignment, there are six internal research laboratories at NIST, including the Materials Measurement Laboratory; the Physical Measurement Laboratory; the Engineering Laboratory; the Information Technology Laboratory; the Center for Nanoscale Science and Technology; and the Center for Neutron Research.

In response to what was perceived as the necessity of maintaining a strong manufacturing base, Title V of the Omnibus Trade and Competitiveness Act (P.L. 100-418) "significantly expand[ed] the role of NIST as the Government's lead laboratory in support of U.S. industrial quality and competitiveness." To this end, NIST was given specific technology transfer functions as several programs were created including the now terminated Advanced Technology Program (ATP), Regional Centers for the Transfer of Manufacturing Technology, and State Technology Extension.

[1] Available at the National Institute of Standards and Technology website: http://www.nist.gov/.

These efforts were designed to facilitate industrial activities to utilize advanced process technology; to promote cooperative ventures among industry, universities, and government laboratories; and to encourage shared risks, accelerated development, and increased skills.

Prior to its elimination in 2007, the Advanced Technology Program provided seed funding, matched by private sector investment (generally 50% or more of costs), to companies or consortia of universities, businesses, and government laboratories for development of generic technologies that have broad application across industries.[2] Awards, based on technical and business merit, were made for high-risk work past the basic research stage but not yet ready for commercialization. The first awards were made in 1991; 824 projects were funded.

The Technology Innovation Program[3] was authorized to replace ATP in the America COMPETES Act (P.L. 110-69) and funded in the FY2008 appropriations legislation. While similar to ATP in the intent to promote high risk R&D that would be of broad economic benefit to the nation, under TIP large firms are not eligible to receive grants. In addition, TIP permits universities to qualify for grants if they are partnered with a small or medium-sized firm, whereas in the ATP program universities participating in a joint venture could not be the direct recipient of an ATP award.

The original Regional Centers for the Transfer of Manufacturing Technology were expanded in 1994 to include the State Technology Extension Program and are now known as the Hollings Manufacturing Extension Partnership.[4] NIST also assumed support of the 36 centers originally funded by the Department of Defense through its Technology Reinvestment Project when funding for this program was terminated in FY1994. This activity is designed to transfer expertise and technologies developed under NIST programs to small and mid-sized U.S.-based manufacturing firms. Funded through cooperative agreements with non-profit or state and local organizations, competitive awards were originally made for up to six years (now extended). Non-federal sources are required to provide 50% or more of each Center's capital and costs during this time period. P.L. 105-309 permits the federal government to support centers after the six years if a positive, independent evaluation is made every two years. Federal funding is limited to one-third of the capital and annual operating and maintenance costs of the center. Manufacturers are offered expertise, needs evaluation, application demonstrations for new production technologies, training, and information dissemination. Centers are located in all 50 states and Puerto Rico with approximately 400 regional offices.

The America COMPETES Act authorized the creation of (but did not fund) several new manufacturing programs to be administered by NIST including collaborative manufacturing research pilot grants for partnerships between industry and other educational or research institutions to develop new manufacturing processes, techniques, or materials; a manufacturing fellowship program with stipends available for post-doctoral work at NIST; and a manufacturing research database.

In October 2010, NIST announced $9.1 million in cooperative agreements for 22 projects "designed to enhance the productivity, technological performance and global competitiveness of

[2] For more information on ATP see CRS Report 95-36, *The Advanced Technology Program*, by Wendy H. Schacht.

[3] See CRS Report RS22815, *The Technology Innovation Program*, by Wendy H. Schacht

[4] For more information on the MEP see CRS Report 97-104, *Manufacturing Extension Partnership Program: An Overview*, by Wendy H. Schacht.

U.S. manufacturers."[5] The funding was granted on a competitive basis to non-profit organizations that will work with the MEP centers and address one or more of the areas that have been identified by NIST as critical to U.S. manufacturing. These activities differ from the established MEP effort in which no new manufacturing research is conducted and funded as existing manufacturing technology is applied to the needs of small and medium-sized firms.

NIST Appropriations

Beginning in FY1991, the NIST budget experienced marked growth as Congress funded external grant programs—the Advanced Technology Program and the Manufacturing Extension Partnership—authorized by P.L. 100-418. However, the 104th Congress curtailed the expansion of support for NIST and overall funding levels decreased 18% between FY1995 and FY1997. In FY1998, the NIST budget again increased as P.L. 105-119 appropriated $677.9 million. Under P.L. 105-277, NIST received $641.1 million in FY1999 funding, approximately 5% less than the previous year. For FY2000, P.L. 106-113 provided NIST with $635.8 million after a mandated rescission. P.L. 106-553 funded NIST at $598.3 million in FY2001. The following year, P.L. 107-77 financed NIST at $674.5 million, an increase of 13% over the earlier figure.

The Bush Administration first offered a significant cut in support for MEP in the FY2003 budget. The proposed 89% decline in MEP funding was due to the President's recommendation that centers in operation for more than six years do so without federal financing. However, P.L. 108-7 provided NIST with $707.5 million in FY2003 funds and maintained support for manufacturing extension.

FY2004 appropriations of $610.7 million for NIST were included in P.L. 108-199. In-house R&D under the Scientific and Technical Research and Services (STRS) account was funded at $337.2 million. Financing for the Manufacturing Extension Partnership program decreased significantly to $38.7 million. ATP received $170.5 million and construction totaled $64.2 million. The following year, P.L. 108-447 provided NIST with funding of $695.3 million with MEP support increased to pre-FY2004 levels at $107.5 million. The STRS account received $378.8 million, ATP was financed at $136.5 million, and the construction budget totaled $72.5 million.

NIST appropriations totaled $752 million in FY2006. Support for the STRS account increased to $394.8 million. MEP was funded at $104.6 million, while financing for ATP declined to $79 million. Construction more than doubled to $173.6 million. No final FY2007 appropriations legislation was enacted until the 110th Congress passed P.L. 110-5, providing $676.9 million for NIST. The STRS account increased to $434.4 million, construction support decreased to $58.7 million, while ATP was financed at $79.1 million and MEP received $104.7 million.

The Administration's FY2008 budget request included $640.7 million for NIST, 5.3% below FY2007, due primarily to the absence of financing for ATP and reduced support for MEP. The STRS account would have received $500.5 million (including the Baldrige National Quality Program) while funding for MEP would be reduced to $46.3 million. The construction budget would have totaled $93.9 million.

[5] National Institute of Standards and Technology, NIST Manufacturing Extension Partnership Awards $9.1 Million for 22 Projects to Enhance U.S. Manufacturers' Global Competitiveness, Press Release, October 5, 2010, available at http://www.nist.gov/mep/upload/100410-MEP-Competition-press-release-FINAL.pdf.

The FY2008 Consolidated Appropriations Act, provided NIST with $755.8 million, an increase of 11.7% over FY2007. Support for the STRS account increased 1.4% to $440.5 million (including the Quality Program). The Technology Innovation Program, which replaced ATP, was appropriated $65.2 million (with an additional $5 million from FY2007 ATP unobligated balances), 17.6% below the previous fiscal year. Funding for MEP totaled $89.6 million, 14.4% less than FY2007. Support for construction almost tripled to $160.5 million.

The Bush Administration's original FY2009 budget request proposed $638 million in funding for NIST. On June 6, 2008, the former President submitted a series of amendments to his budget including a reduction of $2 million in the amount requested for NIST (from the MEP program). The new request of $636 million was 15.9% below the earlier fiscal year due to an absence of support for TIP and a significant decrease in financing MEP. Funding for the STRS account (including the Quality Program) was to increase 21.5% to $535 million, while MEP would be provided $2 million to close out the federally financed portion of the program. Construction support would decline 38.3% to $99 million.

During the 110th Congress, H.R. 7322, as reported from House Committee on Appropriations, would have funded NIST at $816.9 million, 8.1% above FY2008. The STRS account would have increased 13.7% to $500.7 million while support for TIP at $65.2 million would remain constant and MEP funding would increase 36.2% to $122.0 million. Construction spending was to decrease 19.6% to $129.0 million. S. 3182, as reported by the Senate Committee on Appropriations, would have provided $813.5 million for NIST, an increase of 7.6% over FY2008. Included was $489.5 million for the STRS account (an 11.1% increase), $65.0 million for TIP, and $110.0 million for MEP (a 22.8% increase). The construction budget would have declined 7.2% to $149.0 million.

No final FY2009 appropriations legislation was enacted by the close of the 110th Congress. P.L. 110-329, the Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009, provided, in part, funding for NIST at FY2008 levels through March 6, 2009. In the current Congress, P.L. 111-8, the FY2009 Omnibus Appropriations Act, provided NIST with $819.0 million. The STRS account received a 7.2% increase to $472.0 million while support for MEP totaled $110.0 million (a 22.8% increase) and financing for TIP remained constant at $65.0 million. The $172.0 million for construction reflected a 7.2% increase in funding.

The American Recovery and Reinvestment Act of 2009, P.L. 111-5, provided an extra $220.0 million for the STRS account to be used (in FY2009 and FY2010) for "research, competitive grants, additional research fellowships and advanced research and measurement equipment and supplies," as noted in the Joint Explanatory Statement of the Committee on Conference. An additional $360.0 million was included for construction, of which $180.0 million "shall be for the competitive construction grant program for research science buildings." The law also directed the transfer of $20.0 million from the Health Information Technology initiative to NIST to "create and test standards related to health security and interoperability in conjunction with partners at the Department of Health and Human Services," according to the Joint Statement.

The President's FY2010 budget requested $846.1 million in funding for NIST, an increase of 3.3% over the FY2009 appropriation. Support for in-house research and development under the STRS account would have increased by 13.3% to $534.6 million. The Manufacturing Extension Program would have received $124.7 million, 13.4% more than FY2009, while financing for the Technology Innovation Program was budgeted at $69.9 million, an increase of 7.5% over the FY2009 appropriation. Construction funding would decline 32.0% to $116.9 million.

The original FY2010 Commerce, Justice, Science, and Related Agencies appropriations bill, H.R. 2847, as passed by the House, would have provided $781.1 million for NIST, 4.6% below FY2009 funding (due primarily to decreased funding for construction). Included in this figure was $510.0 million for the STRS account, 8.1% more than FY2009. The $124.7 million in support for MEP represented a 13.4% increase while funding for TIP would increase 7.5% to $69.9 million. Construction spending would have amounted to $76.5 million, a 55.5% decrease from FY2009.

The version of H.R. 2847 passed by the Senate would have funded NIST at $878.8 million, 7.3% above FY2009. Support for the STRS account totaled $520.3 million, an increase of 10.2% over FY2009. Funding for MEP would increase 13.4% to $124.7 million and financing for TIP would increase 7.5% to 69.9 million. The $163.9 million for construction represented a 4.7% decrease from FY2009.

The final legislation, P.L. 111-117, the Consolidated Appropriations Act, 2010, provided $856.6 million in funding for NIST, an increase of 4.6% over the FY2009 appropriation, 1.2% below the Administration's request, 9.7% above the original House-passed bill, and 2.5% below the version of H.R. 2847 passed by the Senate. Support for in-house research and development under the STRS account increased 9.1% from FY2009 to $515.0 million. The MEP program received $124.7 million, 13.4% more than the previous fiscal year, while financing for TIP was budgeted at $69.9 million, an increase of 7.5% over the FY2009 appropriation. Support for construction totaled $147.0 million, 14.5% below the FY2009 figure.

The Administration's FY2011 budget proposed $918.9 million in funding NIST, a 7.3% increase over the FY2010 appropriation. The STRS account (including the Baldrige National Quality Program) would increase 13.5% to $584.5 million. The Manufacturing Extension Partnership program would be funded at $129.7 million, 4.0% more than the FY2010 figure, while financing for the Technology Innovation Program increased 14.3% over the current appropriation. The construction budget would decline 15.1% to $124.8 million.

In the 111th Congress, the FY2011 Commerce, Justice, Science appropriations bill reported from the Senate Committee on Appropriations, S. 3636, would have provided NIST with $940.8 million for FY2011, a 9.8% increase over FY2010 and 2.4% more than the amount contained in the Administration's budget. The $584.5 million proposed for the STRS account and the $129.7 million for MEP were identical to the President's request and respectively reflected a 13.5% and a 4.0% increase from FY2010. Funding for TIP would have remained at the FY2010 level of $69.9 million, which was 12.5% below the Administration's proposal. Support for construction would total $156.7 million, 6.6% more than the FY2010 figure and 25.6% more than the figure contained in the President's budget.

During the 111th Congress, no FY2011 Commerce, Justice, Science appropriations bill was reported from the House Appropriations Committee.

Currently, NIST is operating under several Continuing Resolutions. Under the latest CR, P.L. 112-6, in effect through April 8, 2011, funding for NIST is $799.1 million, $57.5 million less than the FY2010 appropriation. Support for the STRS account is decreased by $10.5 million to $504.5 million from the FY2010 figure of $515.0 million, while support for construction decreases $47.0 million from $147.0 million in FY2010 to $100.0 million under the "three week" CR.

Under H.R. 1, as passed by the House (the "full-year" CR), NIST would receive an appropriation of $697.1 million, 18.6% below the FY2010-enacted figure of $856.6 million. This proposed amount is 24.1% less than the Administration's FY2011 request and 25.9% less than the amount in the bill reported from the Senate Committee on Appropriations during the 111th Congress. Included in the full-year CR is $469.5 million for the STRS account, $124.7 million for the MEP program, $44.9 million for TIP, and $58.0 million for construction.

The Administration's FY2012 budget proposes $1.001 billion in funding for NIST, a 16.9% increase over the FY2010 appropriation of $856.6 million (comparisons are made to FY2010 because there is no definitive FY2011 appropriation as of this time). Support for research and development under the STRS account would increase 34.3% to $678.9 million (excluding the Baldrige National Quality Program which has been transferred out of STRS).The MEP program would receive $142.6 million, 14.4% more than the amount appropriated in FY2010, while financing for TIP increases to $75.0 million, 7.3% over the FY2010 figure. Now budgeted under ITS, support for the Baldrige National Quality Program would decrease 19.8% to $7.7 million. A new program, the Advanced Manufacturing Technology Consortia (AMTech) would be created and funded at $12.3 million. The construction budget declines 42.4% to $84.6 million.

Issues for Congress

Continued funding for the extramural programs at NIST has been a major issue. Beginning with the 104th Congress, many Members expressed skepticism over a "technology policy" based on providing federal funds to industry for development of pre-competitive generic technologies. This philosophical shift from previous Congresses, coupled with pressures to balance the federal budget, led to significant reductions in funding for NIST. The Advanced Technology Program and the Manufacturing Extension Partnership, which accounted for over 50% of the FY1995 NIST budget, were proposed for elimination. While, in the past, strong support by the Senate led to their continued financing, funding for ATP remained controversial. Beginning in FY2000, the original appropriations bills as passed by the House did not contain funding for ATP and many of the budget proposals submitted by former President Bush called for abolishing the program. In the 110th Congress, legislation replaced ATP with the TIP initiative and provided financing for the new program. In the FY2003 budget proposal, the Bush Administration also recommended suspension of federal support for those manufacturing extension centers in operation for more than six years and the following year funding for the MEP program was significantly reduced. However, the FY2005 Omnibus Appropriations Act brought support for MEP back up to the level necessary to fully fund the existing centers.

While much of the legislative debate has focused on the extramural programs (e.g., ATP and MEP), increases in spending for the NIST laboratories that perform the research essential to the mission responsibilities of the agency have tended to remain small: a 3.7% increase between FY1995 and FY1996, a 3.5% increase in FY1997, no increase for FY1998, and 3.1% for FY1999. During FY2000, there was less than a 1% increase in support. However, FY2001 appropriations were 11% above the previous year while the figure for FY2002 included a 2.7% increase in funding. Support for in-house R&D in FY2003 was 12% more than the previous fiscal year; although the FY2004 figure decreased by 5.5%, funding for FY2005 included a 12% increase. In FY2006, financing of these in-house activities once again increased. As part of the American Competitiveness Initiative, announced by former President Bush in the 2006 State of the Union, the Administration stated its intention to double over 10 years funding for "innovation-enabling research" done at NIST through its "core" programs (defined as internal research in the

STRS account and the construction budget). To this end, the then President's FY2007 budget requested an increase of 18.3% for intramural R&D at NIST; the final FY2007 appropriations legislation included a 10% increase for the STRS account.

For FY2008, the increase in support for internal research and development was 1.4%, below the 15.2% and 15.6% increases in the initial House and Senate FY2008 appropriations bills and the President's FY2008 budget proposal. While the former Administration's FY2009 budget contained a 21.5% increase in funding for the STRS account, the amount in P.L. 110-5 reflected a 7.2% increase for these activities. Support for the STRS account expanded 9.1% in FY2010, less than the President's request but more than the amount included in the original House and Senate appropriation bills. President Obama stated his decision to double the budget of key science agencies, including NIST, over the next 10 years and proposed in his FY2011 budget a 13.5% increase in funding for the STRS account as well as another large increase in the FY2012 request. It remains to be seen how support for internal R&D at NIST will evolve and how this might affect financing of extramural efforts such as TIP and MEP. As the Congress continues to debate appropriation issues, the resulting dispensation of funding for NIST programs may influence the way by which the federal government supports technology development for commercial application.

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