



Federal Research and Development Funding: FY2011

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Summary

President Obama requested \$147.696 billion for research and development (R&D) in FY2011, a \$343 million (0.2%) increase from the estimated FY2010 R&D funding level of \$147.353 billion. Congress plays a central role in defining the nation's R&D priorities, especially with respect to two overarching issues: the extent to which the federal R&D investment can grow in the context of increased pressure on discretionary spending and how available funding will be prioritized and allocated. Low or negative growth in the overall R&D investment may require movement of resources across disciplines, programs, or agencies to address priorities.

As of the end of the 111th Congress, no regular appropriations bill had been enacted by Congress. Two of the 12 regular appropriations bills had passed the House (the Transportation, Housing and Urban Development, and Related Agencies Appropriations Act, 2011, and the Military Construction and Veterans Affairs and Related Agencies Appropriations Act, 2011); none had passed the Senate. To provide for continuity of government operations into FY2011, the 111th and 112th Congress passed a series of continuing resolutions that provided funding for all agencies until enactment of the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) on April 15, 2011. Division A of the act provides FY2011 appropriations for the Department of Defense; Division B provides full-year continuing funding for FY2011 for all other agencies at their FY2010 levels unless other provisions in the act specify otherwise.

Under the President's request, six federal agencies would have received 94.8% of total federal R&D spending: the Department of Defense (DOD, 52.5%), Department of Health and Human Services (largely the National Institutes of Health) (21.8%), National Aeronautics and Space Administration (7.4%), Department of Energy (7.6%), National Science Foundation (3.8%), and Department of Agriculture (1.7%). NASA would have received the largest dollar increase for R&D of any agency, \$1.700 billion (18.3%) above its FY2010 funding level; DOD would have received the largest reduction in R&D funding, \$3.542 billion (4.4%) below its FY2010 level.

President Obama requested increases in the R&D budgets of the three agencies that were targeted for doubling in the America COMPETES Act and its reauthorization, and by President Bush under his American Competitiveness Initiative using FY2006 R&D funding as the baseline. The Department of Energy's Office of Science would have received an increase of \$226 million (4.6%), the National Science Foundation an increase of \$551 million (8.0%), and the National Institute of Standards and Technology's core research and facilities an increase of \$48 million (7.3%). P.L. 112-10 provided less than the FY2010 level and less than the President's request for each of these accounts. In aggregate, funding for these accounts under P.L. 112-10 is less than in FY2010 and less than the President's request.

For the past five years, federal R&D funding and execution has been affected by mechanisms used to complete the annual appropriations process—the year-long continuing resolution for FY2007 (P.L. 110-5) and the combining of multiple regular appropriations bills into the Consolidated Appropriations Act, 2008 for FY2008 (P.L. 110-161), the Omnibus Appropriations Act, 2009 (P.L. 111-8), the Consolidated Appropriations Act, 2010 (P.L. 111-117), and P.L. 112-10. Completion of appropriations after the beginning of each fiscal year may cause agencies to delay or cancel some planned R&D and equipment acquisition.

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Overview

The 111th Congress took continuing interest in the health of the U.S. research and development (R&D) enterprise and in providing sustained support for federal R&D activities. However, the 111th Congress was unable to enact any of the regular appropriations bills. Two of the 12 regular appropriations bills passed the House (the Transportation, Housing and Urban Development, and Related Agencies Appropriations Act, 2011, and the Military Construction and Veterans Affairs and Related Agencies Appropriations Act, 2011); none passed the Senate.

To provide for continuity of government operations into FY2011, the 111th and 112th Congress passed a series of continuing resolutions that provided funding for all agencies until enactment of the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) by the 112th Congress on April 15, 2011. Division A of the act provides FY2011 appropriations for the Department of Defense; Division B provides full-year continuing funding for FY2011 for all other agencies at their FY2010 levels unless other provisions in the act specify otherwise.

The U.S. government supports a broad range of scientific and engineering research and development. Its purposes include addressing specific concerns, such as national defense, health, safety, the environment, and energy security; advancing knowledge generally; developing the scientific and engineering workforce; and strengthening U.S. innovation and competitiveness in the global economy. Most of the R&D funded by the federal government is performed in support of the unique missions of the funding agencies. The federal government has played an important role in supporting R&D efforts that have led to scientific breakthroughs and new technologies, from jet aircraft and the Internet to communications satellites and defenses against disease.

On February 1, 2010, President Obama requested \$147.696 billion for R&D in FY2011, a 0.2% increase over the enacted FY2010 R&D funding level of \$147.353 billion.¹ The President's proposed FY2011 R&D funding included an emphasis on increasing funding for the physical sciences and engineering, an effort consistent with the intent of the America COMPETES Act (P.L. 110-69) and President Bush's American Competitiveness Initiative (ACI). President Obama sought to achieve this objective largely through a 6.6% increase in aggregate funding for the Department of Energy Office of Science, the National Science Foundation, and the Department of Commerce National Institute of Standards and Technology's core laboratory research.

More broadly, in a 2009 speech before members of the National Academy of Sciences, President Obama put forth a goal of increasing the national investment in R&D to more than 3% of the U.S. gross domestic product (GDP). President Obama did not provide details on how this goal might be achieved (e.g., how much would be funded through increases in direct federal R&D funding or through indirect mechanisms such as the research and experimentation tax credit²); however doing so likely would require a substantial increase in public and private investment. In 2007, total U.S. R&D expenditures were \$397.629 billion,³ or approximately 2.75% of GDP.⁴ Based on

¹ Funding levels included in this document are in current dollars unless otherwise noted. Inflation diminishes the purchasing power of federal R&D funds, so an increase that does not equal or exceed the inflation rate may reduce real purchasing power.

² The research and experimentation tax credit is referred to frequently as the research and development tax credit or R&D tax credit, through the credit does not apply to development expenditures.

³ Preliminary estimate of 2009 U.S. R&D expenditures, National Science Foundation, *National Patterns of R&D Resources: 2007 Data Update*, NSF 08-318, Arlington, VA, 2008, <http://www.nsf.gov/statistics/nsf08318/>.

2008 figures, reaching President Obama's 3% goal would have required a 8.96% real (above inflation) increase in national R&D funding. Increasing direct federal R&D funding by 8.96% in FY2011 would have required an increase of \$12.9 billion above President Obama's request.

In addition, advocates for increased federal R&D funding—including President Obama's science advisor, John Holdren—have raised concerns about the potential harm of a “boom-bust” approach to federal R&D funding (i.e., rapid growth in federal R&D funding followed by much slower growth, flat funding, or even decline).⁵ The biomedical research community experienced a variety of challenges resulting from such a circumstance following the five-year doubling of the NIH budget that was completed in FY2003. With the NIH doubling came a rapid expansion of the nation's biomedical research infrastructure (e.g., buildings, laboratories, equipment), as well as rapid growth in university faculty hiring, students pursuing biomedical degrees, and grant applications to NIH. After the doubling, however, the agency's budget fell each year in real terms from FY2004 to FY2009. Critics assert a variety of damages of this boom-bust cycle, including interruptions and cancellations of promising research, declining share in the number of NIH grant proposals funded, decreased student interest in pursuing graduate studies, and reduced employment prospects for the large number of biomedical researchers with advanced degrees. According to then-NIH Director Elias Zerhouni, the damages have been particularly acute for early- and mid-career scientists seeking a first or second grant.⁶

Analysis of federal R&D funding is complicated by several factors, including the Obama Administration's omission of congressionally directed spending from the FY2011 budget request and inconsistency among agencies in the reporting of R&D. Another complicating factor for FY2009 and FY2010 is the inclusion of funding for R&D, facilities, and equipment, and related activities in the American Recovery and Reinvestment Act of 2009 (ARRA, P.L. 111-5). ARRA funds supplement funding provided to agencies in P.L. 110-329 and P.L. 111-8. Some ARRA funding was spent in FY2009 and in FY2010, and the balance of these funds will be spent in subsequent years. For purposes of this report, unless otherwise noted, comparisons of FY2009 and FY2010 R&D funding do not incorporate funding provided under P.L. 111-5. As a result of these and other factors, the R&D agency figures reported by the White House Office of Management and Budget (OMB) and White House Office of Science and Technology Policy (OSTP), and shown in **Table 1**, may differ somewhat from the agency budget analyses that appear later in this report.

(...continued)

⁴ Based on 2008 U.S. GDP of \$14,441.4 billion as reported by the U.S. Department of Commerce Bureau of Economic Analysis, *National Income and Product Accounts Table*, Table 1.1.5, <http://www.bea.gov/national/nipaweb/TableView.asp?SelectedTable=5&Freq=Qtr&FirstYear=2007&LastYear=2009>.

⁵ Jennifer Couzin and Greg Miller, “NIH Budget: Boom and Bust,” *Science*, vol. 316, no. 5823 (April 2007), pp. 356-361, at <http://www.scienceline.org/cgi/content/full/316/5823/356>.

⁶ Ibid. For additional information on NIH R&D funding issues, see CRS Report R41705, *The National Institutes of Health (NIH): Organization, Funding, and Congressional Issues*, by (name redacted) and (name redacted).

Federal R&D Funding Perspectives

Federal R&D funding can be analyzed from a variety of perspectives that provide unique insights.

Agency Perspective

The authorization and appropriations process views federal R&D funding primarily from agency and program perspectives. **Table 1** provides data on R&D by agency for FY2009 (actual), FY2010 (estimate), ARRA, and FY2011 (request) as reported by OMB. Under President Obama's FY2011 budget request, six federal agencies would have received 94.8% of total federal R&D funding: the Department of Defense (DOD), 52.5%; the Department of Health and Human Services (HHS) (primarily the National Institutes of Health (NIH)), 21.8%; the National Aeronautics and Space Administration (NASA), 7.4%; the Department of Energy (DOE), 7.6%; the National Science Foundation (NSF), 3.8%; and the Department of Agriculture (USDA), 1.7%. This report provides an analysis of the R&D budget requests for these agencies, as well as for the Departments of Commerce (DOC), Homeland Security (DHS), the Interior (DOI), and Transportation (DOT), as well as the Environmental Protection Agency (EPA). In total, these departments and agencies accounted for more than 98% of FY2010 federal R&D funding.

In his FY2011 budget request, President Obama reiterated his intention to double the federal investment in three key science agencies over a decade from their FY2006 levels: DOE's Office of Science (up 4.6% above the estimated FY2010 level), NSF (up 8.0%), and DOC's National Institute of Standards and Technology (NIST) laboratories and construction funds (up 6.9%).⁷ This request essentially continued the American Competitiveness Initiative (ACI) initiated by President Bush to double physical sciences and engineering research in these agencies over 10 years (FY2007-FY2016). In 2007, Congress authorized substantial R&D increases for these agencies under the America COMPETES Act (P.L. 110-69), setting a more aggressive seven-year doubling course.⁸

The largest agency R&D increases in the President's FY2011 request were for NASA, \$1.700 billion; the Department of Health and Human Services, \$979 million (due primarily to a \$956 million increase in R&D funding for NIH); the Department of Energy, \$526 million; and the National Science Foundation, \$479 million. Under President Obama's FY2011 budget request, DOD R&D funding would have been reduced by \$3.542 billion, USDA R&D funding would have been cut by \$143 million, and DHS R&D would have fallen by \$104 million.⁹

⁷ Executive Office of the President, Office of Science and Technology Policy, *The President's Plan for Science and Innovation: Doubling Funding for Key Science Agencies in the FY2011 Budget*, February 1, 2010, <http://www.whitehouse.gov/sites/default/files/doubling%2011%20final.pdf>.

⁸ For additional information, see CRS Report RL34328, *America COMPETES Act: Programs, Funding, and Selected Issues*, by (name redacted).

⁹ *A Renewed Commitment to Science and Technology: Federal R&D, Technology, and STEM Education in the 2010 Budget*, Office of Science and Technology Policy, The White House, May 7, 2009, available at <http://www.ostp.gov/galleries/budget/FY2010RD.pdf>.

Table 1. Federal Research and Development Funding by Agency, FY2009-FY2011

(Budget authority, dollar amounts in millions)

Department/Agency	FY2009 Actual	FY2009 ARRA	FY2010 Estimate	FY2011 Request	Dollar Change, 2010 to 2011	Percent Change, 2010 to 2011
Agriculture	2,437	176	2,591	2,448	-143	-5.5
Commerce	1,393	576	1,516	1,727	211	13.9
Defense	80,821	300	81,090	77,548	-3,542	-4.4
Energy	10,301	2,967	10,693	11,219	526	4.9
Environmental Protection Agency	559	0	622	651	29	4.7
Health and Human Services	30,595	11,063	31,177	32,156	979	3.1
Homeland Security	1,096	0	1,150	1,046	-104	-9.0
Interior	701	74	755	772	17	2.3
NASA	10,887	790	9,286	10,986	1,700	18.3
National Science Foundation	5,379	2,197	5,092	5,571	479	9.4
Transportation	976	0	1,012	1,018	6	0.6
Veterans Affairs	1,020	0	1,162	1,180	18	1.5
Other	1,153	10	1,207	1,374	167	16.7
Total^a	147,318	18,153	147,353	147,696	343	0.2

Sources: Executive Office of the President, Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2011*, Table 21-1; Executive Office of the President, Office of Science and Technology Policy, *Investing in the Building Blocks of American Innovation: Federal R&D, Technology, and STEM Education in the 2011 Budget*, Table 1, February 1, 2010.

a. Totals may differ from the sum of the components due to rounding.

Character of Work, Facilities, and Equipment Perspective

Federal R&D funding can also be examined by the character of work it supports—basic research, applied research, and development—and funding provided for facilities and acquisition of major R&D equipment. (See **Table 2**.) President Obama's FY2011 request included \$31.341 billion for basic research, up \$1.339 billion (4.5%) from FY2010; \$30.276 billion for applied research, up \$1.949 billion (6.9%); \$81.455 billion for development, down \$2.918 billion (3.5%); and \$4.624 billion for facilities and equipment, down \$27 million (0.6%).

Table 2. Federal Research and Development Funding by Character of Work, Facilities, and Equipment, FY2009-FY2011

(Budget authority, dollar amounts in millions)

	FY2009 Actual	FY2009 ARRA	FY2010 Estimate	FY2011 Request	Dollar Change, 2010 to 2011	Percent Change, 2010 to 2011
Basic research	29,583	7,794	30,002	31,341	1,339	4.5
Applied research	29,054	5,385	28,327	30,276	1,949	6.9
Development	83,866	1,482	84,373	81,455	-2,918	-3.5
Facilities & equipment	4,815	3,492	4,651	4,624	-27	-0.6
Total^a	147,318	18,153	147,353	147,696	343	0.2

Source: Executive Office of the President, Office of Science and Technology Policy, *Investing in the Building Blocks of American Innovation: Federal R&D, Technology, and STEM Education in the 2011 Budget*, Table 1, February 1, 2010.

a. Totals may differ from the sum of the components due to rounding.

Combined Perspective

Combining these perspectives, federal R&D funding can be viewed in terms of each agency's contribution to basic research, applied research, development, and facilities and equipment. (See **Table 3**.) The federal government is the nation's largest supporter of basic research, funding an estimated 57% of U.S. basic research in 2008,¹⁰ primarily because the private sector asserts it cannot capture an adequate return on long-term fundamental research investments. In contrast, industry funded only 17.7% of U.S. basic research in 2008. In FY2010, the Department of Health and Human Services, primarily the National Institutes of Health (NIH), accounts for more than half of all federal funding for basic research.¹¹

In contrast to basic research, industry is the primary funder of applied research in the United States, accounting for an estimated 60.8% in 2008, while the federal government accounted for an estimated 32.4%.¹² Among federal agencies, HHS is the largest funder of applied research, accounting for nearly half of all federally funded applied research in FY2010.¹³

Industry also provides the vast majority of funding for development, accounting for an estimated 84.1% in 2008, while the federal government provided an estimated 14.9%.¹⁴ DOD is the primary federal agency funder of development, accounting for 88.5% of total federal development funding in FY2010.¹⁵

¹⁰ National Science Foundation, *New NSF Estimates Indicate that U.S. R&D Spending Continued to Grow in 2008*, NSF 10-312, January 2010, <http://www.nsf.gov/statistics/infbrief/nsf10312/#fn>. <http://www.nsf.gov/statistics/nsf08318/>.

¹¹ Executive Office of the President, Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2010*, Table 5-1, May 2009.

¹² National Science Foundation, *National Patterns of R&D Resources: 2007 Data Update*, NSF 08-318, 2008, <http://www.nsf.gov/statistics/nsf08318/>.

¹³ Executive Office of the President, Office of Management and Budget, *Analytical Perspectives*, Table 5-1, May 2009.

¹⁴ National Science Foundation, *National Patterns of R&D Resources*, 2008, <http://www.nsf.gov/statistics/nsf08318/>.

¹⁵ Executive Office of the President, Office of Management and Budget, *Analytical Perspectives*, Table 5-1, May 2009.

Table 3. Top R&D Funding Agencies by Character of Work, Facilities and Equipment, FY2008-FY2010

(Budget authority, dollar amounts in millions)

	FY2009 Actual^a	FY2010 Estimate	FY2011 Request
Basic Research			
Health and Human Services	21,140	16,981	17,502
National Science Foundation	6,107	4,291	4,684
Energy	4,505	3,862	4,003
Applied Research			
Health and Human Services	18,836	14,051	14,479
Defense	5,066	4,500	4,479
Energy	3,686	3,131	3,728
Defense	74,100	74,676	70,974
NASA	6,677	5,452	6,126
Energy	3,050	2,612	2,560
Facilities and Equipment			
NASA	2,180	2,267	2,547
Energy	2,027	1,088	928
National Science Foundation	998	458	452

Source: *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2011*, Office of Management and Budget, The White House, February 2010.

Note: Top funding agencies based on FY2011 request.

- a. The amounts for FY2009 include funding from P.L. 111-5, the American Recovery and Reinvestment Act of 2009.

Multiagency R&D Initiatives Perspective

Federal R&D funding can also be viewed in terms of multiagency efforts, such as the National Nanotechnology Initiative (see “Multiagency R&D Initiatives” below), and presidential initiatives.

In FY2010 supporting budget documents, President Obama stated that he would seek to double funding for basic research over 10 years (FY2006-FY2016) at the the NSF, NIST laboratories and construction accounts, and the DOE Office of Science (collectively, the “target accounts”)—continuing the goal of President George W. Bush’s American Competitiveness Initiative (ACI).¹⁶ In 2007 Congress established authorization levels for FY2008-FY2010 in the America COMPETES Act (P.L. 110-69) that would put funding for research at these agencies on track to double in approximately seven years. Three years later, with enacted funding levels for FY2008-

¹⁶ Executive Office of the President, Office of Science and Technology Policy, *The President’s Plan for Science and Innovation: Doubling Funding for Key Basic Research Agencies in the 2010 Budget*, May 7, 2009, <http://www.whitehouse.gov/files/documents/ostp/budget/doubling.pdf>.

FY2010 below those authorized in P.L. 110-69, Congress passed the America COMPETES Reauthorization Act of 2010 establishing authorization levels for FY2011-FY2013 for the target accounts at a growth rate consistent with a 10-year doubling path. In FY2011 supporting budget documents, President Obama extended his target for doubling to 11 years (FY2006-FY2017).¹⁷ However, FY2011 enacted funding for the target accounts was below both authorized and requested levels, setting a pace for a 15-year doubling—more than twice the length of time originally envisioned in the America COMPETES Act and about a third longer than the pace set by the 2010 reauthorization.

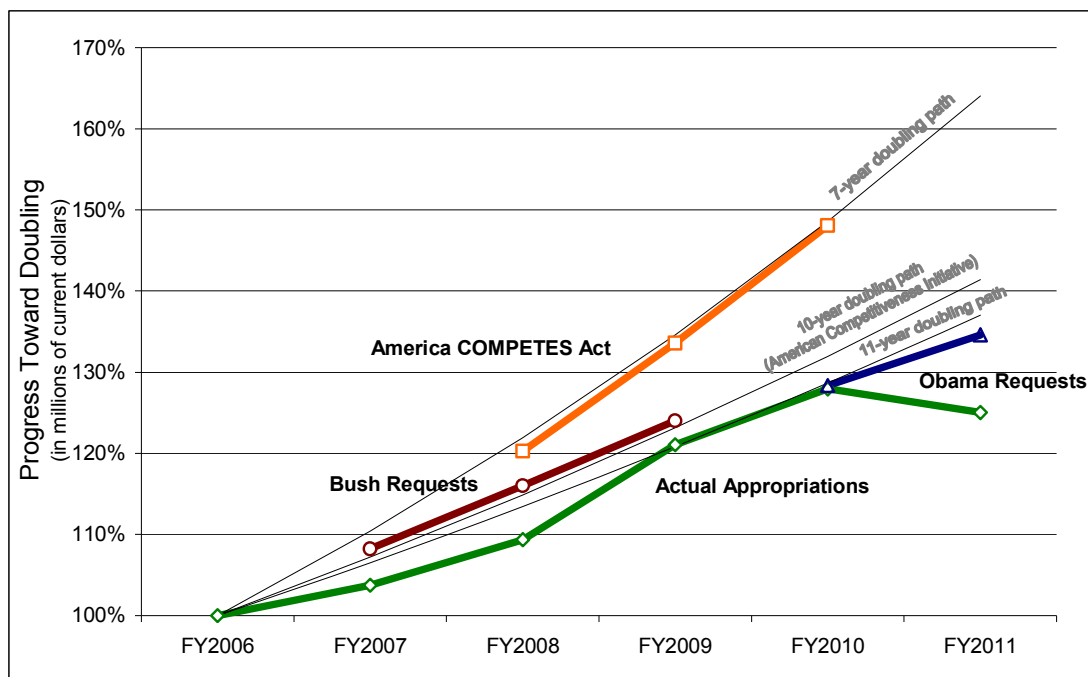
Further, it is unclear whether the Obama Administration still intends to support doubling of the target accounts. Following enactment of the 2011 budget, White House Communications Director Dan Pfeiffer stated on The White House Blog,

Even though we will no longer double the funding of key research and development agencies, you will still see strong investments in National Institute of Standards and Technology, National Science Foundation and the [DOE] Office of Science.

Figure 1 illustrates how requested, actual, and enacted appropriations (for FY2006 through FY2011) for the target accounts, in aggregate, compare to 7- and 10-year doubling rates.

For FY2011, President Obama proposed \$13.255 billion in funding for NSF, DOE's Office of Science, and NIST's core research and facilities, an increase of \$824 million (6.6%) above the FY2010 estimated funding level of \$12.598 billion; Congress appropriated \$12.311 billion for FY2011. The American Recovery and Reinvestment Act of 2009 (P.L. 111-5) also provided funding for each of the three ACI agencies totaling approximately \$5.202 billion (in addition to the enacted levels in P.L. 110-329). (See **Table 4**.)

¹⁷ Executive Office of the President, Office of Science and Technology Policy, *The President's Plan for Science and Innovation: Doubling Funding for Key Basic Research Agencies in the 2011 Budget*, February 1, 2010, <http://www.whitehouse.gov/sites/default/files/doubling%2011%20final.pdf>.

Figure 1. Doubling of Research Funding Effort: Appropriations versus Selected Rates

Source: Prepared by the Congressional Research Service (CRS) using data from the sources cited in **Table 4**; appropriations data does not include funding providing by the American Recovery and Reinvestment Act of 2009.

Notes: The 10-year doubling pace assumes annual increases of 7.2% each year for 10 years. The seven-year double pace assumes annual increases of 10.4% each year for seven years. Through compounding, these rates achieve the doubling of funding in the desired time period. The line passing through the aggregate agency appropriations data points is for illustration purposes only.

Table 4. Agencies Targeted for Research Doubling by President Obama, the America COMPETES Act, and the American Competitiveness Initiative

(dollar amounts in millions)

Agency	FY2006 Actual	FY2007 Actual	FY2008 Actual	FY2009 Actual	FY2009 ARRA	FY2010 Estimate	FY2011 Request	FY2011 Enacted
National Science Foundation	5,646	5,884	6,084	6,469	2,402	6,972	7,424	6,860
Department of Energy/Office of Science	3,632	3,837	4,083	4,807	1,633	4,964	5,121	4,874
National Institute of Standards and Technology/core research ^a	395	434	441	472	220	515	585	507
National Institute of Standards and Technology/facilities	174	59	161	172	360	147	125	70
Total^b	9,846	10,214	10,768	11,920	4,615	12,598	13,255	12,311

Sources: National Institute of Standards and Technology, budget requests for fiscal years 2008, 2009, 2010, and 2011, available at http://www.nist.gov/public_affairs/budget/index.cfm; Department of Energy, budget requests for fiscal years 2008, 2009, 2010, and 2011, available at <http://www.cfo.doe.gov/croorg/cf30.htm>; National Science Foundation, budget requests for fiscal years 2008, 2009, 2010, and 2011, available at <http://www.nsf.gov/about/budget/>. FY2011 enacted funding levels based on CRS analysis of P.L. 112-10.

- a. NIST core research activities are those performed under its Scientific and Technical Research and Services account.
- b. Totals may differ from the sum of the components due to rounding.

FY2010 Supplemental Funding for Research and Development

On February 12, President Obama submitted to Congress a request for FY2010 supplemental funding for disaster relief related to Hurricane Katrina and the Midwest floods, as well as for funds to implement settlement of certain legal cases. The request did not appear to contain any funding for R&D or related activities.

On March 21, 2010, the Disaster Relief and Summer Jobs Act of 2010 (H.R. 4899), a FY2010 supplemental funding bill, was introduced in the House and was subsequently passed. The House-passed version of H.R. 4899 did not appear to contain any funding for R&D or related activities. On May 14, 2010, the Senate Committee on Appropriations adopted an amendment in the form of a substitute and reported the bill, accompanied by S.Rept. 111-188. On May 27, 2010, the Senate passed H.R. 4899, as amended. The Senate version of H.R. 4899 was named the Supplemental Appropriations Act, 2010, and includes funding for a variety of agencies and purposes, including funding for R&D and related activities. On July 1, 2010, the House passed an amended version of the bill that would, among other things, rescind funds for research and development accounts at the Departments of Commerce, Defense, Energy, Homeland Security, and Interior. Subsequently, the Senate considered the House-amended version of the bill. A cloture vote failed and the amended bill was sent back to the House. On July 27, 2010, the House passed the Senate's May 27 version of the bill; President Obama signed the bill (P.L. 111-212) into law on July 29, 2010.

Multiagency R&D Initiatives

National Nanotechnology Initiative

President Obama's FY2011 budget request sought funding for three multiagency R&D initiatives. Funding for the National Nanotechnology Initiative (NNI) was requested in the amount of \$1.776 billion for FY2011, \$5 million (0.3%) below the estimated FY2010 level of \$1.781 billion. The overall decrease in the FY2011 NNI funding request was due primarily to reductions of \$87 million (20.0%) in funding for DOD nanotechnology R&D compared to its estimated FY2010 funding level, a decrease of \$17 million (4.1%) in funding for NSF, and a decrease of \$6 million (5.3%) in funding for NIST. These decreases were offset, in part, by requested increases in funding for other agencies, primarily DOE (up \$65 million, 17.4%) and HHS¹⁸ (up \$36 million, 9.5%).¹⁹

¹⁸ HHS NNI R&D funding includes funding for NIH, the Food and Drug Administration, and the Centers for Disease Control and Prevention.

¹⁹ Executive Office of the President, Office of Science and Technology Policy, *Investing in the Building Blocks of* (continued...)

Networking and Information Technology Research and Development Program

President Obama requested \$4.281 billion in FY2011 funding for the Networking and Information Technology Research and Development (NITRD) program, \$9 million (0.2%) below the estimated FY2010 level of \$4.290 billion. The NITRD request included a reduction of \$171 million (13.4%) in DOD funding, and increases of \$80 million (7.3%) for NSF, \$38 million (3.1%) for HHS, \$29 million (5.9%) for DOE, and \$15 million (14.4%) for DOC.²⁰

U.S. Global Change Research Program

President Obama proposed \$2.561 billion for the U.S. Global Change Research Program (USGCRP) in FY2010, \$439 million (20.7%) above the estimated FY2010 level of \$2.122 billion. Four agencies were to receive the bulk of the FY2010 USGCRP funding increase: NASA (up \$214 million, 20.0%); DOC, including the National Oceanic and Atmospheric Administration and NIST (up \$77 million, 21.4%); NSF (up \$51 million, 16.0%); and USDA (up \$48 million, 44.0%).²¹

FY2011 Appropriations Status

As of the end of the 111th Congress, no regular appropriations bill had been enacted. Two of the 12 regular appropriations bills had passed the House (the Transportation, Housing and Urban Development, and Related Agencies Appropriations Act, 2011, and the Military Construction and Veterans Affairs and Related Agencies Appropriations Act, 2011); none had passed the Senate.

To provide for continuity of government operations into FY2011, the 111th and 112th Congress passed a series of continuing resolutions that provided funding for all agencies until enactment of the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) by the 112th Congress on April 15, 2011. Division A of the act provides FY2011 appropriations for the Department of Defense; Division B provides full-year continuing funding for FY2011 for all other agencies at their FY2010 levels unless other provisions in the act specify otherwise.

The remainder of this report provides a more in-depth analysis of research and development in 12 federal departments and agencies that receive more than 98% of federal R&D funding. Annual appropriations for these agencies are provided through 8 of the 12 regular appropriations bills.

(...continued)

American Innovation: Federal R&D, Technology, and STEM Education in the 2011 Budget, Table 1, February 1, 2010. For additional information on the NNI, see CRS Report RL34401, *The National Nanotechnology Initiative: Overview, Reauthorization, and Appropriations Issues*, by (name redacted)

²⁰ Executive Office of the President, Office of Science and Technology Policy, *Investing in the Building Blocks of American Innovation*, February 1, 2010.

²¹ Executive Office of the President, Office of Science and Technology Policy, *Investing in the Building Blocks of American Innovation: Federal R&D, Technology, and STEM Education in the 2011 Budget*, Table 1, February 1, 2010. The USGCRP figures do not include Climate Change International Assistance programs in the U.S. Agency for International Development (U.S. AID), \$43 million requested for FY2011. For additional information on the USGCRP, see CRS Report RL33817, *Climate Change: Federal Program Funding and Tax Incentives*, by (name redacted).

For each agency covered below, **Table 5** shows the corresponding regular appropriations bill that provides funding for the agency, including its R&D activities.

Table 5. Alignment of Agency R&D Funding and Regular Appropriations Bills

Department/Agency	Regular Appropriations Bill
Department of Defense	Department of Defense Appropriations Act
Department of Homeland Security	Department of Homeland Security Appropriations Act
National Institutes of Health	Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act
Department of Energy	Energy and Water Development and Related Agencies Appropriations Act
National Science Foundation	Commerce, Justice, Science, and Related Agencies Appropriations Act
Department of Commerce National Institute of Standards and Technology National Oceanic and Atmospheric Administration	Commerce, Justice, Science, and Related Agencies Appropriations Act
National Aeronautics and Space Administration	Commerce, Justice, Science, and Related Agencies Appropriations Act
Department of Agriculture	Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act
Department of the Interior	Department of the Interior, Environment, and Related Agencies Appropriations Act
Environmental Protection Agency	Department of the Interior, Environment, and Related Agencies Appropriations Act
Department of Transportation	Transportation, Housing and Urban Development, and Related Agencies Appropriations Act

Source: CRS website, FY2011 Status Table of Appropriations, available at <http://www.crs.gov/Pages/appover.aspx>.

Department of Defense²²

Congress supports research and development in the Department of Defense (DOD) through its Research, Development, Test, and Evaluation (RDT&E) appropriation. The appropriation primarily supports the development of the nation's future military hardware and software and the technology base upon which those products rely.

Nearly all of what DOD spends on RDT&E is appropriated in Title IV of the defense appropriation bill. (See **Table 6**.) However, RDT&E funds are also appropriated in other parts of the bill. For example, RDT&E funds are appropriated as part of the Defense Health Program and the Chemical Agents and Munitions Destruction Program. The Defense Health Program supports the delivery of health care to DOD personnel and their families. Program funds are requested through the Operations and Maintenance appropriation. The program's RDT&E funds support

²² This section was written by John Moteff, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

congressionally directed research in such areas as breast, prostate, and ovarian cancer and other medical conditions. The Chemical Agents and Munitions Destruction Program supports activities to destroy the U.S. inventory of lethal chemical agents and munitions to avoid future risks and costs associated with storage. Funds for this program have been requested through the Procurement appropriation. The Joint Improvised Explosive Device Defeat Fund (JIEDDF) also contains RDT&E monies. However, the fund does not contain an RDT&E line item as do the two programs mentioned above. The Joint Improvised Explosive Device Defeat Office, which now administers the fund, tracks (but does not report) the amount of funding allocated to RDT&E. The JIEDDF funding is not included in the table below. Typically, Congress has funded each of these programs in Title VI (Other Department of Defense Programs) of the defense appropriations bill.

RDT&E funds also have been requested and appropriated as part of DOD's separate funding to support efforts in what the Bush Administration had termed the Global War on Terror (GWOT), and what the Obama Administration refers to as Overseas Contingency Operations (OCO). Typically, the RDT&E funds appropriated for GWOT/OCO activities go to specified Program Elements (PEs) in Title IV. However, they are requested and accounted for separately. The Bush Administration requested these funds in separate GWOT emergency supplemental requests. The Obama Administration, while continuing to identify these funds uniquely as OCO requests, has included these funds as part of the regular budget, not in emergency supplementals. However, the Obama Administration will ask for additional OCO funds in supplemental requests, if the initial OCO funding is not enough to get through the fiscal year.

In addition, GWOT/OCO-related requests/appropriations often include money for a number of transfer funds. These include the Iraqi Freedom Fund (IFF), the Iraqi Security Forces Fund, the Afghanistan Security Forces Fund, the Mine Resistant and Ambush Protected Vehicle Fund (MRAPVF), and, beginning in FY2010, the Pakistan Counterinsurgency Capability Fund. Congress typically makes a single appropriation into each of these funds, and authorizes the Secretary to make transfers to other accounts, including RDT&E, at his discretion.

For FY2011, the Obama Administration requested \$76.131 billion for DOD's baseline Title IV RDT&E, roughly \$4.5 billion (between 5% and 6%) less than the funding available for baseline Title IV RDT&E in FY2010. The FY2011 requests for RDT&E in the Defense Health Program and the Chemical Agents and Munitions Destruction program were \$500 million and \$401 million, respectively. In addition, the Obama Administration requested \$635 million in FY2011 OCO-related RDT&E. It also submitted a supplemental request for additional FY2010 OCO funding, which included \$277 million for RDT&E.

In the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10), Congress provided \$74.957 billion in Title IV RDT&E funding. This was \$1.174 billion below the request and \$5.698 billion below what was available in FY2010. A large share of the reductions were taken from the Systems Development and Demonstration activities of the departments, including reductions due to program adjustments in the Army's manned ground vehicle program, the Navy's Joint Strike Fighter program, terminations of the Air Forces HH-60 search and rescue helicopter program and the Marines Expeditionary Fighting Vehicle, and reductions in the Chemical/Biological Defense Program due in part to schedule delays. Congress also provided \$1.176 billion in RDT&E through the Defense Health Program and \$393 million in RDT&E through the Chemical Agents and Munitions Destruction Program. Congress also provided \$979 billion in OCO RDT&E funding, including \$24 billion for the Defense Health Program.

RDT&E funding can be broken out in a couple of ways. Each of the military departments request and receive their own RDT&E funding. So, too, do various DOD agencies (e.g., the Missile Defense Agency and the Defense Advanced Research Projects Agency), collectively aggregated within the Defensewide account. RDT&E funding also can be characterized by budget activity (i.e., the type of RDT&E supported). Those budget activities designated as 6.1, 6.2, and 6.3 (basic research, applied research, and advanced technology development, respectively) constitute what is called DOD's Science and Technology Program (S&T) and represent the more research-oriented part of the RDT&E program. Budget activities 6.4 and 6.5 focus on the development of specific weapon systems or components (e.g., the Joint Strike Fighter or missile defense systems), for which an operational need has been determined and an acquisition program established. Budget activity 6.7 supports system improvements in existing operational systems. Budget activity 6.6 provides management support, including support for test and evaluation facilities.

Congress is particularly interested in S&T funding since these funds support the development of new technologies and the underlying science. Ensuring adequate support for S&T activities is seen by some in the defense community as imperative to maintaining U.S. military superiority. This was of particular concern at a time when defense budgets and RDT&E funding were falling at the end of the Cold War. As part of its 2001 Quadrennial Review, DOD established a goal of stabilizing its baseline S&T funding (i.e., Title IV) at 3% of DOD's overall funding. Congress has embraced this goal.

The FY2011 baseline S&T funding request in Title IV is \$11.819 billion, about \$1.928 billion (14%) less than the funding available for baseline S&T in Title IV in FY2010. Furthermore, the S&T request for baseline Title IV is approximately 2.2% of the overall baseline DOD budget request (\$549 billion, not counting funds for the Overseas Contingency Operations), short of the 3% goal. The S&T funding provided in the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) totaled \$11.982 billion, \$163 million more than requested. Basic research was less than requested, but more than what was available in FY2010.

Within the S&T program, basic research (6.1) receives special attention, particularly by the nation's universities. DOD is not a large supporter of basic research, when compared to NIH or NSF. However, over half of DOD's basic research budget is spent at universities and represents the major contribution of funds in some areas of science and technology (such as electrical engineering and material science). The FY2011 request for basic research (\$1.999 billion) is roughly \$166 million (8%) less than what was available for Title IV basic research in FY2010.

While the FY2011 request for RDT&E is below the funding provided in FY2010, Congress provided more funding than requested in FY2010, as it has for a number of years. Even so, the FY2011 request is roughly \$2.5 billion below the Administration's FY2010 request. The Administration requested more in FY2011 than FY2010 for basic research and applied research.

Table 6. Department of Defense RDT&E

(in millions of dollars)

Budget Account	FY2010 Actual	FY2011 Request		FY2011 Enacted	
	Base + OCO	Base	OCO	Base	OCO
Army	11,711	10,333	151	9,711	143
Navy	19,948	17,693	60	17,736	105
Air Force	27917 ^c	27,247	266	26,517	484
Defensewide	20,890	20,662	157	20,797	223
Dir. Test & Eval.	188	195		195	
Total Title IV - By Account^d	80,655	76,131	635	74,957	955
Budget Activity					
6.1 Basic Research	1,815	1,999		1,947	
6.2 Applied Research	4,984	4,476		4,497	
6.3 Advanced Dev.	6,507	5,344	14	5,539	130
6.4 Advanced Component Dev. and Prototypes	14,469	13,877	75	14,391	52
6.5 Systems Dev. and Demo	16,779	16,453	44	14,486	92
6.6 Management Support ^e	6,098	4,484	5	4,569	
6.7 Op. Systems Dev. ^f	30,003	29,498	497	29,527	682
Total Title IV - by Budget Activity^d	80,655	76,131	635	74,957	955
Title VI - Other Defense Programs					
Defense Health Program	1,444	500		1,176	24
Chemical Agents and Munitions Destruction	351	401		393	
Grand Total	82,036	77,032	635	76,525	979

Source: FY010 actual figures taken from the Department of Defense Budget, Fiscal Year 2012, RDT&E Programs (R-1), February 2011. FY2011 request figures taken from the Department of Defense Budget, fiscal Year 2011, RDT&E Programs (R-1), February 2010. The FY2011 enacted figures taken from H.R. 1473, P.L. 112-10, and from the Explanatory Summary in Congressional Record, April 14, 2011, H2768-H2787.

- a. FY2009 figures do not include \$300 million for Title IV RDT&E provided in the American Recovery and Reinvestment Act (P.L. 111-5).
- b. See **Table 7** below for Congressional action on the FY2010 Supplemental.
- c. Includes \$292 million for Tanker Replacement Transfer Fund.
- d. Total Budget Authority for Account and Budget Activity may not agree due to rounding.
- e. Includes funds for Developmental and Operational Test and Evaluation.
- f. Includes funding for classified programs.

The Senate Appropriations Committee added the Obama Administration's FY2010 OCO Supplemental request to H.R. 4899; see **Table 7**. The Administration requested \$277 million in supplemental RDT&E. The committee recommended \$274 million, eliminating funds for the Army request, reducing funds for classified programs, providing a net decrease in funds for the Air Force, and providing a net increase in funds for the Navy and Defensewide accounts. The House resolved to concur with the Senate's action on RDT&E.

Table 7. FY2010 OCO Supplemental
(in millions of dollars)

Budget Account	Request	House ^a	Senate	Enacted
Army	62	0	0	0
Navy	5	45	45	45
Air Force	188	164	164	164
Defensewide	22	65	65	65
Dir. Test & Eval.				
Total Title IV-By Account^b	277	274	274	274
Budget Activity				
6.1 Basic Research				
6.2 Applied Research				
6.3 Advanced Dev.		16	16	16
6.4 Adv. Component Dev. and Prototypes				
6.5 Sys. Dev. and Demo	66	44	44	44
6.6 Management Support ^c	11	5	5	5
6.7 Op. Systems Dev. ^d	200	209	209	209
<i>Classified programs</i>	<i>200</i>	<i>139</i>	<i>139</i>	<i>139</i>
Total Title IV - by Budget Activity^b	277	274	274	274
Title VI - Other Defense Programs				
Defense Health Program				
Chemical Agents and Munitions Destruction				
Grand Total	277	274	274	274

Source: Senate Rpt. 111-188, accompanying H.R. 4899. P.L. 111-212.

- The House resolved to concur with the Senate amendments to H.R. 4899 related to DOD's RDT&E funding.
- Total Budget Authority for Account and Budget Activity may not agree due to rounding.
- Includes funds for Developmental and Operational Test and Evaluation.
- Includes funding for classified programs. Funding for classified programs in italics below.

Department of Homeland Security²³

The Department of Homeland Security (DHS) requested \$1.344 billion for R&D and related programs in FY2011, a 4% decrease from \$1.407 billion in FY2010.²⁴ This total included \$1.018 billion for the Directorate of Science and Technology (S&T), \$306 million for the Domestic Nuclear Detection Office (DNDO), and \$20 million for Research, Development, Test, and Evaluation (RDT&E) in the U.S. Coast Guard. The final appropriation for these activities was \$1.122 billion, including \$767 million for S&T, \$331 million for DNDO, and \$24 million for Coast Guard RDT&E. (See **Table 8**.)

The S&T Directorate is the primary DHS R&D organization.²⁵ Headed by the Under Secretary for Science and Technology, it performs R&D in several laboratories of its own and funds R&D performed by the DOE national laboratories, industry, universities, and others. The Administration requested a total of \$1.018 billion for the S&T Directorate for FY2011. This was 2% more than the FY2010 appropriation, but it included \$109 million for radiological and nuclear countermeasures R&D, an activity formerly funded in DNDO. The request proposed reducing funding for the directorate's other activities by 9%. A proposed reduction of \$39 million for the Infrastructure and Geophysical Division included the termination of local and regional initiatives previously established or funded at congressional direction. The request for Laboratory Facilities included no funds for the planned National Bio and Agro-Defense Facility (NBAF), which received \$32 million in FY2010, but DHS stated that it planned to request a reprogramming of unobligated prior-year funds to support construction of a utility plant at the NBAF site.²⁶ The final appropriation was \$767 million: \$828 million in new funds and a rescission of \$60 million remaining unobligated from prior years. For the most part, Congress did not specify how the final appropriation should be allocated to particular programs.

The construction of NBAF will likely require significant increases in Laboratory Facilities funding over the next several years. It may also result in increased congressional oversight. For construction of NBAF and decommissioning of the Plum Island Animal Disease Center (PIADC), which NBAF is intended to replace, DHS expects to need further appropriations of \$691 million between FY2012 and FY2017. The estimated total federal cost of the NBAF project increased from \$451 million in December 2006 to \$615 million in May 2009. Additional site-specific infrastructure and utility upgrade costs of \$110 million are to be contributed in-kind by Kansas State University and its partners. Decommissioning PIADC is expected to cost another \$190 million. These estimated costs have not changed since May 2009, but the completion schedule has been extended by one year because the process of selling Plum Island is taking longer than

²³ This section was written by (name redacted), Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

²⁴ If the DNDO Systems Acquisition account, which funds little or no R&D, was excluded, then the FY2011 request was \$1.283 billion, a decrease of 7% from FY2010.

²⁵ For more information, see CRS Report RL34356, *The DHS Directorate of Science and Technology: Key Issues for Congress*, by (name redacted) and (name redacted).

²⁶ DHS is prohibited from obligating funds for NBAF construction until 90 days after it completes a safety and security assessment, has it evaluated by the National Academy of Sciences, and provides the Academy's report and certain other reports to the House and Senate appropriations committees. (Department of Homeland Security Appropriations Act, 2010, P.L. 111-83, §560) According to the DHS congressional budget justification for FY2011, DHS expects to conduct site preparation at the NBAF site during FY2010 and FY2011, and to begin construction of a utility plant in FY2011, but does not plan to commence construction of the laboratory facility until FY2012.

DHS had planned. In the Department of Homeland Security Appropriations Act, 2009 (P.L. 110-329, Div. D, §540) and the Department of Homeland Security Appropriations Act, 2010 (P.L. 111-83, §540), Congress authorized DHS to use receipts from the sale of Plum Island, subject to appropriation, to offset NBAF construction and PIADC decommissioning costs.²⁷ The final FY2011 appropriation continued this authorization from the FY2010 act.

Congress has been interested for several years in DHS policies and procedures for testing and evaluation (T&E) of large acquisition projects. This interest has especially focused on the T&E role of the S&T Directorate in acquisitions by other DHS components. The Homeland Security Act of 2002 (P.L. 107-296, §306) authorizes the Secretary of Homeland Security, acting through the Under Secretary for Science and Technology, to “issue necessary regulations with respect to ... testing and evaluation activities of the Department.” Under current DHS policy, in establishing T&E policies and procedures for DHS acquisitions, the Under Secretary acts through the Director of the S&T Directorate’s Test and Evaluation and Standards Division (TSD) and a special assistant in the TSD known as the Director of Operational Testing and Evaluation (DOT&E).²⁸ Congressional oversight of DHS acquisition and T&E may therefore focus attention on the S&T Directorate’s funding for Test and Evaluation and Standards.

Statutory authority for the Homeland Security Institute (HSI) expired in April 2009. Under its general authority to establish federally funded R&D centers, the S&T Directorate has replaced HSI with the Homeland Security Studies and Analysis Institute (HSSAI). It has also established a new Homeland Security Systems Engineering and Development Institute (HSSEDI). Both institutes are funded mostly on a cost-reimbursement basis by other S&T programs and other DHS and non-DHS agencies. The institutes attracted outside users in FY2009 at only about one-third the level that DHS had anticipated. Nevertheless, DHS expects them to grow rapidly in FY2010 and continue growing in FY2011. The FY2011 budget justification projected reimbursable obligations of \$187 million in FY2011, more than four times the FY2009 level of \$42 million.

The Domestic Nuclear Detection Office (DNDO) is the primary DHS organization for combating the threat of nuclear attack. It is responsible for all DHS nuclear detection development, testing, evaluation, acquisition, and operational support. Under the Administration’s FY2011 budget, DNDO’s research role was to be transferred to the S&T Directorate. The Administration requested a total of \$306 million for DNDO for FY2011. This was a 20% decrease from the FY2010 appropriation. Excluding the proposed transfer of the Transformational R&D program, the request for the remaining DNDO activities was a 12% increase. In some cases, however, the request proposed substantial shifts in emphasis. The request for Systems Acquisition included \$53 million for human-portable radiation detection systems, versus none in FY2010. The request for Systems Development was reduced by \$31 million. The final appropriation provided \$331 million for DNDO: \$342 million in new funds and a rescission of \$11 million remaining unobligated from prior years. Congress did not specify how the final appropriation should be allocated to programs below the account level.

²⁷ For more information on NBAF, see CRS Report RL34160, *The National Bio- and Agro-Defense Facility: Issues for Congress*, by (name redacted), (name redacted), and (name redacted).

²⁸ DHS, *Acquisition Management Directive*, DHS Directive 102-01, revision 01, authorized by the Under Secretary for Management on January 20, 2010.

Congressional attention has focused in recent years on the testing and analysis DNDO has conducted to support its planned purchase and deployment of Advanced Spectroscopic Portals (ASPs), a type of next-generation radiation portal monitor.²⁹ Congress has included a requirement for secretarial certification before full-scale ASP procurement in each homeland security appropriations act from FY2007 through FY2010. The expected date for certification has been postponed several times. In February 2010, DHS decided that it would no longer pursue the use of ASPs for primary screening, although it will continue developing and testing them for use in secondary screening.³⁰ The final FY2011 appropriation continued the certification requirement from the FY2010 act.

The global nuclear detection architecture overseen by DNDO remains an issue of congressional interest.³¹ According to the FY2011 budget justification, the proposed reduction in funding for Systems Development reflected “a shift in DNDO priorities to developing a wider range of potential solutions to enduring vulnerabilities in the global nuclear detection architecture” and would result in increased funding for “systems studies, as well as testing and piloting existing technologies in new operational environments.” Congress may wish to consider the basis for and implications of these changes in priorities, including how they may affect other elements of the global architecture. Other agencies with a role in the architecture, in addition to DHS, include the DOD, DOE, Department of Justice, Department of State, and the intelligence community.

The mission of DNDO, as established by Congress in the SAFE Port Act (P.L. 109-347, Title V), includes serving as the primary federal entity “to further develop, acquire, and support the deployment of an enhanced domestic system” for detection of nuclear and radiological devices and material (6 U.S.C. 592). The act also eliminated any explicit mention of radiological and nuclear countermeasures from the statutory duties and responsibilities of the Under Secretary for S&T. Congress may consider whether the proposed transfer of DNDO’s research activities to the S&T Directorate is consistent with congressional intent in the SAFE Port Act. Congress may also choose to consider the acquisition portion of DNDO’s mission. Most of DNDO’s funding for Systems Acquisition was eliminated in FY2010, and that year’s budget stated that “funding requests for radiation detection equipment will now be sought by the end users that will operate them.”³² In contrast, the FY2011 request for Systems Acquisition included more funding than ever before for DNDO’s procurement of human-portable radiation detectors on behalf of the Coast Guard, Customs and Border Protection, and the Transportation Security Administration. The reasons for this apparent reversal of policy were not explained in the FY2011 budget justification for DNDO.

²⁹ For more information, see CRS Report RL34750, *The Advanced Spectroscopic Portal Program: Background and Issues for Congress*, by (name redacted), (name redacted), and (name redacted).

³⁰ Letter from Dr. William K. Hagan, Acting Director, DNDO, to Senator Lieberman, February 24, 2010, http://hsgac.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=11f7d1f0-c4fe-4105-94e6-bb4a0213f048.

³¹ For more information, see CRS Report RL34574, *The Global Nuclear Detection Architecture: Issues for Congress*, by (name redacted).

³² Executive Office of the President, FY2010 Budget, Appendix, p. 560.

Table 8. Department of Homeland Security R&D and Related Programs
(in millions of dollars)

	FY2010 Enacted	FY2011 Request	FY2011 Enacted
Directorate of Science and Technology	\$1,000	\$1,018	\$767
Management and Administration	143	152	141
R&D, Acquisition, and Operations	856	866	626
<i>Border and Maritime</i>	44	40	n/a
<i>Chemical and Biological</i>	207	201	n/a
<i>Command, Control, and Interoperability</i>	82	75	n/a
<i>Explosives</i>	121	121	n/a
<i>Human Factors / Behavioral Sciences</i>	16	13	n/a
<i>Infrastructure and Geophysical</i>	75	36	n/a
<i>Radiological and Nuclear</i>	—	109	n/a
<i>Innovation</i>	44	44	n/a
<i>Laboratory Facilities</i>	150	122	n/a
<i>Test and Evaluation, Standards</i>	29	23	n/a
<i>Transition</i>	46	42	n/a
<i>University Programs</i>	49	40	n/a ^a
<i>Homeland Security Institute</i>	—	—	n/a
<i>Rescission of Prior-Year Unobligated Balances</i>	(7)	—	(60)
Domestic Nuclear Detection Office	383	306	331
Management and Administration	38	37	37
Research, Development, and Operations	325	208	264
<i>Systems Engineering and Architecture</i>	25	39	n/a
<i>Systems Development</i>	100	69	n/a
<i>Transformational R&D</i>	109	—	n/a
<i>Assessments</i>	32	43	n/a
<i>Operations</i>	38	34	n/a
<i>Forensics</i>	20	23	n/a
<i>Rescission of Prior-Year Unobligated Balances</i>	—	—	(11)
Systems Acquisition	20	61	30
<i>Radiation Portal Monitors Program</i>	—	8	n/a
<i>Securing the Cities</i>	20	—	n/a
<i>Human Portable Radiation Detection Systems</i>	—	53	n/a
U.S. Coast Guard RDT&E	25	20	24
TOTAL	1,407	1,344	1,122

Source: DHS FY2011 budget justification, online at <http://www.dhs.gov/xabout/budget/>, and P.L. 112-10.

Notes: Totals may not add because of rounding.

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