

R&D in the Department of Homeland Security

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HIGHLIGHTS

- **The Department of Homeland Security (DHS) would continue its dramatic expansion of R&D capabilities with an R&D budget of \$1.2 billion, up \$163 million or 15.5 percent after an even larger increase last year (see Table II-20).**

- DHS plans to shift its efforts away from near-term technology development this year to a more balanced portfolio of basic research, applied research, and development in FY 2005. Still, development would dominate the FY 2005 DHS portfolio. DHS plans to more than double its basic and applied research portfolio to \$431 million (up 152 percent).

- In addition to the R&D portfolio, **DHS has already received \$885 million in FY 2004 and \$2.5 billion in FY 2005 for Project BioShield**, a procurement program to purchase biodefense countermeasures that is designed to encourage private-sector biodefense R&D investments.

Last March 1 (2003), the new Department of Homeland Security (DHS) took shape with the transfer of nearly 180,000 federal employees in nearly two dozen federal agencies to the new department. All told, the DHS brought together \$31 billion worth of programs (FY 2003 budget) in the largest reorganization of the federal government since the 1940s. A year later, the DHS is well on its way to integrating its component agencies and is in the process of setting up numerous programs to address gaps in homeland security, including the creation of new science and technology capabilities to provide the knowledge and technology base for the federal government's homeland security efforts.

THE DHS R&D PORTFOLIO

The President's FY 2005 budget request proposes a budget of \$40.2 billion for DHS in FY 2005, an increase of 9.9 percent or \$3.6 billion that reflects the continuing high importance attached to homeland security even in these tough budgetary times. **Included in this total is an R&D portfolio of \$1.2 billion, up from \$1.1 billion in FY 2004 and \$737 million last year (see Table II-20 and Figure 1).** Not only has DHS quickly become the seventh-largest R&D funding agency, overtaking the Department of Commerce, but it would enjoy by far the largest percentage increase in R&D among the R&D funding agencies with an increase of 15.5 percent at a time when other agencies would count themselves lucky to see their R&D budgets keep pace with inflation.

R&D IN THE DIRECTORATE OF SCIENCE AND TECHNOLOGY

Most DHS R&D programs have their home in the Directorate of Science and Technology (S&T), one of five broad directorates in the new department. This Directorate has responsibility for setting homeland-security R&D goals and priorities, coordinating homeland security R&D throughout the federal government, funding homeland security R&D, facilitating the transfer and deployment of technologies for homeland security, and advising the DHS Secretary on all scientific and technical matters.

The S&T Directorate would fund 81 percent of the R&D in DHS (\$987 million out of \$1.2 billion; see Table II-20 and Figure 1). Nearly all of the \$1.0 billion S&T Directorate budget would go toward R&D activities except for \$52 million in administrative costs.

Currently, nearly all the R&D funds in the S&T directorate are for development activities (79 percent of the FY 2004 portfolio), with another 10 percent for the construction of R&D laboratories, leaving just 11 percent for basic and applied research. Unlike many other R&D funding agencies, which are responsible for research but are not responsible for bringing technology-based products all the way to market or deployment, DHS has responsibility for the entire spectrum of science and technology, all the way from basic research to engineering work to development to deployment of new technologies in the hands of DHS employees and state and local responders. Thus, its R&D portfolio is at

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least initially heavily skewed toward development. In this way, the DHS portfolio is very similar to DOD's portfolio rather than the research-oriented models of NIH or NSF.

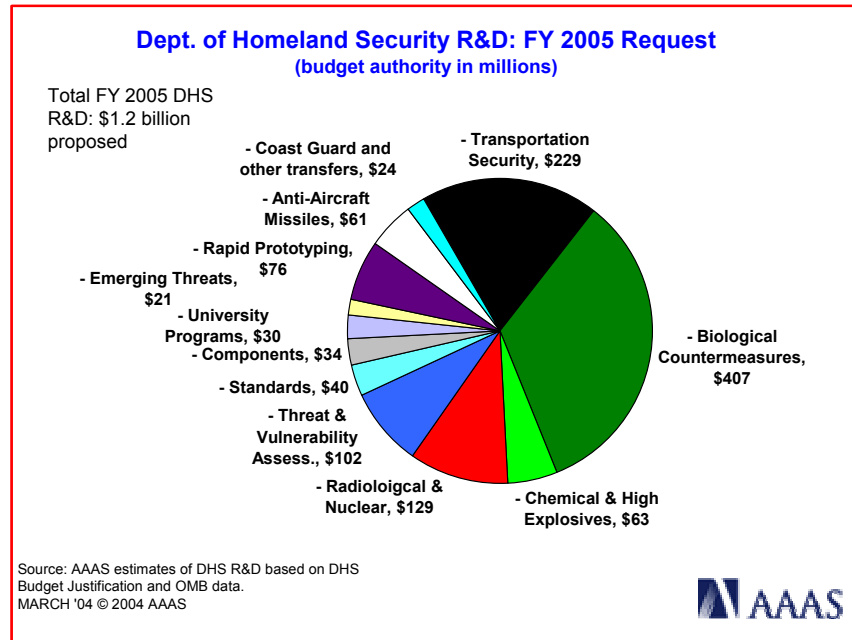


Figure 1.

The FY 2005 budget would retain DHS' development focus, but would begin to expand the S&T directorate's basic and applied research funding to look at longer-term research to build on the homeland security knowledge base necessary for the future. In FY 2005, DHS plans to more than double its basic and applied research portfolio to \$431 million (up 152 percent), with all of the increase in S&T directorate programs. Basic and applied research would grow from just 11 percent of the R&D portfolio to close to 40 percent if these plans are carried through, and would go a long way toward fulfilling the DHS vision of an integrated portfolio of long-term research and short-term technology development.

Whether these plans will actually bear fruit is still uncertain. In the FY 2004 DHS appropriation, Congress provided **\$69 million for University Programs and Fellowship Programs**. This program funds several university-based centers of excellence and is a funding source dedicated

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exclusively to funding university-based research. The Department expects to designate at least three university-based centers for homeland security in FY 2004; the first such center, oriented toward threat assessments using the social sciences, has been awarded to the University of Southern California. This spring, DHS will establish two centers focused on agro-terrorism. This program will also fund fellowships that will bring scientists and engineers from academia and private industry to work within DHS for a year or two. In FY 2005, funding would decline to \$30 million.

In FY 2005, DHS would spend \$61 million for R&D on antimissile devices for commercial aircraft, in the hopes of developing and prototyping of antimissile devices that can be fitted on airplanes (up from \$60 million). Congress also provided \$73 million for rapid prototyping activities, up to \$76 million next year. This program will assist private industry in rapidly developing and prototyping new homeland security technologies to speed the deployment of new technologies by first responders and DHS employees. DHS also has \$39 million for standards R&D in FY 2004 and \$40 million next year.

DHS is also making significant R&D investments in other areas: \$129 million for the development of radiological / nuclear countermeasures (up from \$126 million in FY 2004); \$63 million for chemical and high explosives countermeasures to protect U.S. civilians against chemical or explosives attacks; \$102 million next year for threat and vulnerability assessments to develop technologies to analyze and evaluate threats, especially in information technologies; and \$21 million for R&D on emerging threats.

Biological countermeasures would be a high priority in FY 2005, increasing from \$285 million this year to \$407 million in FY 2005. In FY 2005, \$65 million in new funds would go to the new BioSurveillance initiative program to develop an integrated, real-time, human-animal-plant surveillance system for a total DHS investment of \$118 million. These new funds would go to the BioWatch program, which has been developing and testing biological detection technologies in major U.S. cities through a network of automated sample collectors. This year and next year, the program will focus on improving these environmental monitoring systems for better accuracy, faster data processing, and adapting these systems for monitoring the U.S. food supply. The Bio-Surveillance initiative in FY 2005 would be a multi-agency effort, with

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\$130 million for the Centers for Disease Control and Prevention (CDC), smaller contributions from the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA), and small contributions from other DHS units for a government-wide total of \$274 million in FY 2005. The biological countermeasures program includes \$87 million this year and \$35 million in FY 2005 for construction of a new laboratory named the National Biodefense Analysis and Countermeasures Center in Fort Detrick, Maryland.

Most of the above S&T directorate funds will be spent in federal laboratories or federally funded R&D centers (FFRDCs; government-owned, contractor-operated laboratories). DHS has an Office for National Laboratories that coordinates DHS interactions with DOE national laboratories possessing expertise in homeland security. So far, DHS has relied the most on five DOE laboratories (Los Alamos, Lawrence Livermore, Sandia, Pacific Northwest, and Oak Ridge National Laboratories), which have set up lab-within-a-lab structures to allow a core of laboratory employees to work primarily for DHS with DHS funds while still drawing on the resources of their DOE-funded colleagues. This year, DHS will set up its own FFRDC, a new Homeland Security Institute (HSI).

The extramural R&D portfolio in the S&T directorate is managed by **the Homeland Security Advanced Research Projects Agency (HSARPA)**, modeled on the Defense Advanced Research Projects Agency (DARPA) in the Department of Defense (DOD). HSARPA awards extramural grants for basic and applied research to promote revolutionary changes in homeland security technologies; develops and tests potential homeland security technologies; and accelerates or prototypes the development of homeland security technologies to get them ready for deployment. Because HSARPA is not a budget line item, its funding will vary throughout the year but the latest estimate is that it will award \$210 million of external R&D funds in FY 2004 across most of the DHS' mission areas. These funds will go to industry contractors, research institutions, and universities; universities also have a separate \$69 million pool of funds in University Programs (see above). Last fall, HSARPA conducted its first solicitation of proposals for detection technologies for biological and chemical countermeasures, followed by a solicitation for detection technologies for radiological and nuclear countermeasures in February, with a possible solicitation of proposals for low vapor pressure chemicals detection later this year.

R&D IN OTHER DHS DIRECTORATES AND PROGRAMS

\$229 million, or a fifth, of the FY 2005 DHS R&D portfolio would remain outside the S&T Directorate (see Table II-20 and Figure 1).

- **Directorate of Border and Transportation Security:** This division is by far the largest of the four in terms of budget and personnel, integrating the former Immigration and Naturalization Service, the Customs Service, and the Transportation Security Administration (TSA) within DOT. This directorate inherited TSA's R&D programs on aviation security, with an appropriation of \$170 million in FY 2004 that would rise to \$229 million in FY 2005. Congress provided \$45 million this year for R&D on next-generation explosive detection technologies in commercial aviation, and \$55 million for air cargo security R&D (rising to \$85 million in FY 2005).

- **Directorate of Emergency Preparedness and Response:** This directorate coordinates all federal assistance in response to disasters (including natural disasters) and domestic attacks, and folds in the former Federal Emergency Management Agency (FEMA). There are no R&D programs within its \$7.4 billion budget in FY 2005, though the S&T Directorate could fund R&D to improve this directorate's ability to respond to disasters.

Within this directorate, there is \$5.6 billion over the next 10 years to procure biodefense countermeasures from the private sector, which could provide strong incentives for private-sector investments in biodefense R&D. The FY 2004 DHS budget provides \$885 million in FY 2004 and an additional \$4.7 billion between 2005 and 2013 for the program named Project BioShield in the President's State of the Union address. \$2.5 billion of this money will become available in FY 2005 without any further action by Congress, of which DHS plans to sign contracts for \$890 million in FY 2005 to follow on \$885 million in contracts this year. Although not an R&D program, the program is designed to encourage private-sector R&D investments in biodefense vaccines, therapeutics, and other countermeasures by providing a guaranteed government market for future products. The directorate will purchase and stockpile these countermeasures using the \$5.6 billion total appropriation, but the management of the program, including the

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selection of eligible countermeasures, will be handled by the Department of Health and Human Services (HHS).

- **Directorate of Information Analysis and Infrastructure Protection (IAIP):** There would be no R&D funding in the \$864 million budget for this directorate, but IAIP would collaborate with the S&T directorate in the Bio-Surveillance initiative (see above). IAIP would use \$11 million in FY 2005 to collect and analyze data from these biosurveillance sensors and integrate these data with data from other sources.

- **Coast Guard:** The Coast Guard, formerly in the Department of Transportation, is now housed in DHS. Its R&D portfolio totals \$14 million in FY 2004, but beginning in FY 2005 its R&D needs will be handled by the S&T Directorate with a transfer of \$14 million.

OTHER HOMELAND SECURITY R&D PROGRAMS

Although DHS is now the focal point for homeland security-related R&D in the federal government, the majority of federal homeland security-related R&D remains outside the department. Bioterrorism R&D programs at the National Institutes of Health (NIH) make up the largest part of federal homeland security R&D. Total federal homeland security R&D would be \$4.2 billion in FY 2005, a boost of 15.9 percent over FY 2004, of which the DHS R&D portfolio makes up less than one third. The NIH bioterrorism R&D portfolio for FY 2005 would be \$1.8 billion, mostly in the National Institute of Allergy and Infectious Diseases (NIAID), dwarfing the DHS R&D portfolio. The DHS legislation signed into law in November 2002 gives the DHS Secretary joint authority with the HHS Secretary to set priorities and strategy for human health-related research on terrorist threats; research grants continue to flow from NIH out of the NIH budget, but research priorities are decided in consultation with DHS, and many of the results of NIH biodefense R&D in the form of vaccines and other countermeasures will go to DHS first responders and also to the Strategic National Stockpile, which the FY 2005 budget would transfer back to HHS control after two years under DHS control. (For more on the NIH R&D portfolio, see Chapter 8).

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NEXT STEPS AND POSSIBLE IMPACTS

It will take years before the DHS reorganization is complete. In particular, the S&T infrastructure is still its formative stages. For example, only in February did HSARPA begin its Small Business Innovation Research (SBIR) program (competitively awarded R&D grants to small and medium-sized businesses) with Phase I exploratory grants, and is still gearing up to award its first Phase II (larger, R&D toward prototype) grants. March brought the first meeting of the Homeland Security S&T Advisory Committee, created by the DHS organizing law as a mechanism to bring external S&T advice to the DHS S&T directorate, and later this year DHS will select its FFRDC, the Homeland Security Institute (HSI), as well as select more university-based Centers of Excellence.