

## R&D in the Department of Homeland Security

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### HIGHLIGHTS

- **Recent growth in Department of Homeland Security (DHS) R&D funding would slow in FY 2006, but would still gain ground in an era of tight budgets.** DHS R&D would increase \$44 million or 3.6 percent to \$1.3 billion (see Table II-6), after increases of more than \$200 million in each of the past three years.
- The top priorities in the DHS R&D portfolio would be \$246 million for radiological and nuclear countermeasures (double this year's investment) to establish a Domestic Nuclear Detection Office (DNDO), \$102 million for chemical countermeasures (up 93 percent) and \$110 million for R&D to counter portable anti-aircraft missiles (up 80 percent).
- Large increases for the top priorities would be offset by cuts in other areas of the DHS R&D portfolio, including explosives countermeasures (down a quarter to \$15 million), threat and vulnerability assessments (down 29 percent to \$47 million), standards development (down 11 percent to \$36 million), rapid prototyping (down two-thirds to \$21 million), cybersecurity, and transportation security.
- The largest part of the DHS R&D portfolio would continue to be biological countermeasures with an investment of \$362 million in FY 2006, down slightly from this year.
- The FY 2006 budget proposes to finish the process of consolidating all DHS R&D into the Directorate of Science and Technology (S&T). In FY 2006, R&D programs that transferred into DHS with the Transportation Security Administration (TSA) and the Coast Guard (CG) in 2003 would be moved out of those units into S&T, though at reduced funding levels.

Two years ago, the Department of Homeland Security (DHS) took shape with the transfer of nearly two dozen federal agencies into a new cabinet-level department, in the largest reorganization of the federal government since the 1940s. Two years later, DHS has mostly integrated its component agencies and is poised to finish building and consolidating its new science and technology capabilities to provide the knowledge and technology base for the federal government's homeland security efforts. In FY 2006, DHS hopes to consolidate all R&D programs into one unit.

### THE DHS R&D PORTFOLIO

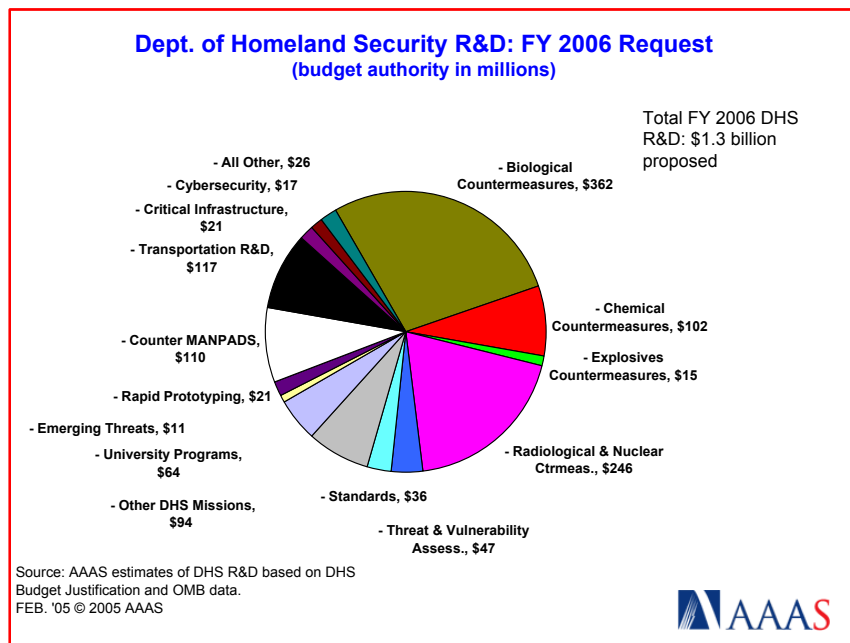


Figure 1.

The President's FY 2006 budget request proposes a budget of \$29.3 billion in discretionary funding for DHS in FY 2006, a slight increase of 1.2 percent (excluding FY 2005 disaster relief supplementals and Bioshield funding) that represents a maturation of the homeland-security effort after the frenzied start-up phase of the last several years. Although still a high priority in these uncertain times, the tighter FY 2006 DHS budget would require some tough choices in spending priorities, as well as a controversial increase in user fees to pay for airport security programs. The DHS R&D portfolio mirrors the trends in the overall DHS

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budget: after annual increases greater than 20 percent in the first few years of its existence, **growth in the DHS R&D portfolio would level off with an FY 2006 request of \$1.3 billion, up \$44 million or 3.6 percent** (see Table II-6 and Figure 1). Although the increase compares favorably with other R&D funding agencies facing flat budgets or cuts in the tight FY 2006 budget proposal, increases in some parts of the DHS R&D portfolio would require offsetting cuts in other areas that have previously enjoyed large increases. Unlike other DHS activities, DHS inherited few R&D programs from other agencies at its birth in 2003; therefore, the large increases in R&D funding for the past few years were devoted to building R&D capabilities from scratch to meet the urgent need for science and technology to address homeland security concerns. Now that the start-up phase of DHS R&D is mostly complete, R&D programs should see more stable funding profiles with trade-offs between different areas based on changing assessments of DHS' science and technology needs.

### **R&D IN THE DIRECTORATE OF SCIENCE AND TECHNOLOGY**

Currently, most DHS R&D programs have their home in the Directorate of Science and Technology (S&T). 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.

In FY 2006, DHS proposes to finish consolidating all R&D activities within the S&T Directorate. Up to this year, the Transportation Security Administration (TSA) and Coast Guard (CG), which transferred to DHS from the Department of Transportation (DOT) in 2003, have retained their own R&D programs, but in **FY 2006 the S&T Directorate would take over their R&D portfolios and become responsible for 100 percent of the department's \$1.3 billion in R&D funding**. Nearly all of the \$1.4 billion total S&T Directorate budget would go toward R&D activities except for \$81 million in management expenses.

The majority of R&D funds in the S&T directorate would be for development activities (56 percent of the FY 2005 portfolio), with another 3 percent for the construction of R&D laboratories, leaving 40 percent for basic and applied research. The ratios would be similar in the

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proposed FY 2006 budget. 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 was at least initially heavily skewed toward development based on the urgent technology needs of front-line homeland security personnel. In this way, the DHS portfolio is similar to DOD's portfolio rather than the research-oriented models of NIH or NSF. Over its young life, DHS has gradually boosted its proportion of research within the R&D portfolio to achieve a more-balanced mix between research and development, even as it retains its missions of delivering working technologies into the hands of DHS personnel and other first responders. This move toward a more research-oriented portfolio would continue in the FY 2006 budget, although DHS would remain outside the top 10 federal agency sponsors of (basic and applied) research at #11. DHS is already the seventh-largest federal sponsor of R&D.

In an era of record-breaking federal budget deficits and tightening restraints on discretionary spending, even defense and homeland security spending are not immune from tough choices in the FY 2006 budget, requiring careful balancing of priorities. The FY 2006 DHS R&D portfolio, with a 3.6 percent increase far smaller than past increases allowing every program area to receive more funding, would set clear priorities among DHS' R&D program areas (see Figure 1 and Table II-6). **The top priorities in the DHS R&D portfolio would be radiological and nuclear countermeasures (doubling to \$246 million in FY 2006), including the establishment of a Domestic Nuclear Detection Office (DNDO); chemical countermeasures (almost doubling to \$102 million); and R&D to counter portable anti-aircraft missiles (up 80 percent to \$110 million).**

The FY 2006 budget would provide \$227 million in FY 2006 for a new Domestic Nuclear Detection Office (DNDO), which would make up most of the \$246 million DHS investment in radiological and nuclear countermeasures, double the \$123 million FY 2005 investment. The DNDO would develop, acquire, and support a domestic system to detect and report terrorist attempts to transport or use radiological or nuclear materials. DNDO will be staffed with a multi-agency team and will

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coordinate its efforts with the intelligence community, and hopes to fund R&D, develop new technologies, and transition these technologies to field use. Within this portfolio, there would also be \$9 million to finish construction of a Radiological / Nuclear Countermeasures Test and Evaluation Complex (Rad/Nuc CTEC) at the Nevada Test Site to provide laboratory facilities for this work.

The Counter MANPADS portfolio would nearly double to \$110 million (up 80.3 percent). Man Portable Air Defense Systems (MANPADS) are shoulder-mounted portable air missiles that have been used (unsuccessfully so far) against passenger aircraft. Fears of a successful MANPADS attack against commercial aircraft have jump-started DHS' Counter MANPADS effort. The increased FY 2006 investment would allow DHS to develop, prototype, and test promising technologies in aircraft to give policymakers a range of options on how to most effectively protect commercial aviation.

A large part of the 93 percent increase for R&D on chemical countermeasures to \$102 million would be for \$20 million in new funds for a Low Volatility Agent (LVA) Warning System. This development effort would attempt to develop technologies that could detect and warn against chemical threats with low vapor pressures that elude current detectors, with a vision of deployable detectors that can detect and identify low-vapor threats in time to respond effectively.

Another area proposed for a large increase is R&D for Support of DHS Components, up 71 percent to \$94 million. This R&D portfolio represents S&T Directorate R&D programs that directly support the missions and capabilities of other DHS units, such as the Border Patrol, the Secret Service, the Emergency Preparedness and Response directorate, and the Coast Guard. Key technologies explored in this portfolio are border surveillance technologies, container shipping security, disaster modeling and simulation capabilities, and protective equipment.

**Large increases for the priorities above would be offset by cuts in other areas of the DHS R&D portfolio,** including explosives countermeasures (down a quarter to \$15 million), threat and vulnerability assessments (down 29 percent to \$47 million), standards development (down 11 percent to \$36 million), rapid prototyping (down two-thirds to \$21 million), critical infrastructure, cybersecurity, and transportation

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security. TSA and Coast Guard R&D programs, mostly in transportation security, funded at a combined \$196 million in FY 2005 would be consolidated within the S&T Directorate at \$117 million in FY 2006, a dramatic reduction.

**Funding would also decline slightly to \$64 million for University Programs and Fellowship Programs**, down from \$70 million in FY 2005 but still well above \$22 million last year. This program funds several university-based centers of excellence and is a funding source dedicated exclusively to funding university-based research. DHS has already designated four university-based centers for homeland security; the latest, awarded to the University of Maryland and its partners, will focus on behavioral and social aspects of terrorism. Another focuses on threat assessments and two focus on agro-terrorism. The fifth center, to be awarded this year, will focus on preparations and responses to terrorist attacks, and will be followed by three other centers to be awarded by the end of FY 2006. The program also funds cooperative centers awarded in collaboration with other federal agencies for research areas of mutual interest: there will soon be a joint DHS-EPA award for a center on microbial risk assessment, followed by two more cooperative centers by the end of FY 2006. This program also funds fellowships and scholarships that fund graduate education and research opportunities for scientists and engineers in areas related to homeland security. By FY 2006, a rotating group of 300 students will be funded by DHS as well as numerous postdocs and researchers.

**The largest part of the portfolio would continue to be biological countermeasures** with an investment of \$362 million in FY 2006, down slightly from this year. Although no money would be requested, construction of the National Biodefense Analysis and Countermeasures Center (NBACC) at Fort Detrick, Maryland would continue in FY 2006 with previously appropriated funds toward a target completion date of 2008. There would also be \$23 million in new funds to start construction of a National Bio and Agrodefense Facility (NBAF), a \$450 million total project with a scheduled completion of 2010 to enhance DHS capabilities to respond to food or animal-borne terrorist threats. The remaining biodefense countermeasures portfolio would continue R&D activities in areas such as the BioWatch program, which has been developing and testing biological detection technologies in major U.S. cities through a network of automated sample collectors.

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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. Over the past year, DHS has set up its own FFRDC, a new Homeland Security Institute (HSI), and has also consolidated R&D activities at laboratories it inherited from other departments, such as the Plum Island Animal Disease Center in New York, the Coast Guard Research and Development Center in Connecticut, and the Transportation Security Laboratory in New Jersey. 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. As part of its work, HSARPA also runs DHS' Small Business Innovation Research (SBIR) program of competitive R&D awards to small and medium-sized businesses.

### **R&D IN OTHER DHS DIRECTORATES AND PROGRAMS**

With the proposed consolidation of DHS R&D into the S&T Directorate, other DHS units will rely on S&T for their science and technology needs, as envisioned in the authorizing legislation that created DHS.

Within the Emergency Preparedness and Response (EPR) directorate, there is \$5.6 billion over 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 provided \$885 million in FY 2004 and \$2.5 billion in FY 2005 for the program named Project BioShield. Although responsibility for management of the program now rests with the Department of Health and Human Services (HHS), specifically its Office of Public Health and Emergency Preparedness (OPHEP), funding for the program comes from the DHS budget. Last November, HHS awarded the first BioShield contract, a \$878 million contract to VaxGen for 75 million doses of an anthrax vaccine, with more awards scheduled to be announced this year

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and next 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. Stockpiles of purchased countermeasures will go to the Strategic National Stockpile (SNS), formerly housed in DHS but now back in HHS.

#### **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 \$4.4 billion in FY 2006, a boost of 4.9 percent, of which the DHS R&D portfolio makes up less than one third. (For more on the total homeland security-related R&D portfolio, see Chapter 1 and Table I-6).

#### **NEXT STEPS AND POSSIBLE IMPACTS**

The rapid start-up phase of the DHS R&D portfolio appears to be ending, and with it the double-digit percentage increases of the past few years. As the DHS R&D infrastructure emerges in more or less its mature shape, DHS now has to make tough choices among competing R&D priorities just as other agencies do, and also make tough choices in balancing its research needs with development and facilities needs. Within an overall homeland security R&D effort and a total homeland security effort that are also leveling off from rapid post-September 2001 increases, the next phase of homeland security funding in which budget pressures that affect other domestic programs also affect homeland security programs begins with the FY 2006 budget.