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## R&D in the FY 2006 Department of Defense Budget

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### HIGHLIGHTS

- The Department of Defense (DOD), the largest federal sponsor of R&D, would see its R&D budget grow only slightly by 0.1 percent to \$71.0 billion in FY 2006, an increase of just \$80 million compared to multi-billion dollar increases the past five years (see Table II-2).
- **DOD “Science and Technology” (S&T)**, which includes research, medical research, and early technology development, **would plummet 21.3 percent down to \$10.7 billion** (see Table II-5); at 2.54 percent of the regular DOD budget, this would fall far short of the Pentagon-endorsed target of 3 percent and the 3.39 percent ratio in 2005.
- Within S&T, **DOD funding for basic and applied research would both decline steeply**. Basic research (“6.1”) would fall 12.9 percent to \$1.3 billion, while applied research (“6.2”) would fall 14.7 percent in FY 2006, after large increases for both in this year’s budget (see Table II-2).
- DOD weapons development would see a modest increase overall, but there would be some steep cuts. Missile Defense Agency (MDA) funding for the development, testing, and evaluation of missile defenses would fall \$1 billion to \$7.8 billion (see Table II-3).
- The Defense Advanced Research Projects Agency (DARPA) would be a winner among research-oriented programs, with a request of \$3.1 billion in FY 2006, a 3.6 percent increase (see Table II-3).

### DEFENSE R&D: AN OVERVIEW

The Department of Defense (DOD) is by far the largest supporter of R&D in the federal government, accounting for more than half the total

federal R&D portfolio. In the 1980s, DOD supported nearly two-thirds of total federal R&D. Because of defense cutbacks following the end of the Cold War, however, DOD's support for R&D declined by a third after FY 1987, bottoming out in the mid-1990s, but has increased dramatically in the past few years to new highs. Defense-related R&D is also funded by the Department of Energy (DOE), which is responsible for maintaining the U.S. nuclear weapons stockpile, and the Department of Homeland Security (DHS), whose primary mission is homeland defense but also performs military security R&D (see Figure 1).

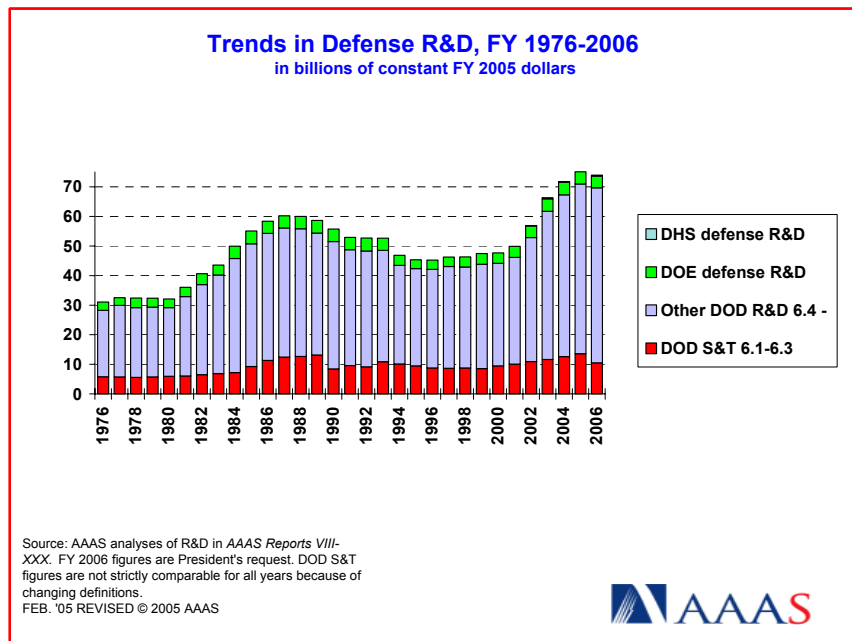


Figure 1.

While most agencies break out R&D into the three categories of basic research, applied research, and development, DOD divides its RDT&E (Research, Development, Test, and Evaluation) account into seven categories, each with a numerical code: Basic Research (known as “6.1”), Applied Research (“6.2”), Advanced Technology Development (“6.3”), Advanced Component Development and Prototyping (“6.4”), Systems Development and Demonstration (“6.5”), Management Support (“6.6”), and Operational Systems Development (“6.7”). DOD also funds some R&D and personnel support costs in non-RDT&E accounts, and funds applied research on medical topics in the Defense Health Program.

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DOD is responsible for only 13 percent of all federal support of basic and applied research (“6.1” and “6.2”), but is a key sponsor for several science and engineering (S&E) disciplines. DOD supports 36 percent of all federal research in the computer sciences and 37 percent of all engineering research, as well as significant shares of research in mathematics and oceanography. DOD’s impact is even greater in several engineering sub-disciplines such as electrical engineering and mechanical engineering. DOD funds research in these disciplines for their contributions to national defense, but this research is also a key source for major innovations in the civilian economy. DOD is also a key supporter of social sciences research.

The “6.1,” “6.2,” and “6.3” categories are often grouped together as **“Science and Technology”** (S&T; see Figure 1 and Figure 2). This category includes basic research, applied research, and advanced technology development. These programs contribute to a broad knowledge base with potential applications to a wide variety of military as well as civilian uses. S&T is separate from the “6.4” and higher categories, which are focused on the development and testing of specific weapons systems. Nearly all DOD support for R&D at colleges and universities comes from the S&T accounts. AAAS estimates of DOD S&T (see Table II-5) also include applied medical research in the Defense Health Program, which was formerly funded in Army accounts.

A majority of DOD’s R&D (and nearly all the work in categories “6.4” and higher) is performed by industrial firms such as the large defense contractors Lockheed Martin and Boeing. FFRDCs (federally funded research and development centers), defense laboratories, and colleges and universities also perform R&D. If one excludes DOD development, which is nearly exclusively performed by industry, DOD basic and applied research (“6.1” and “6.2”) is performed by a diverse group of institutions. 40 percent of DOD research is performed by DOD laboratories, while 35 percent is performed by industry. A fifth of DOD basic and applied research is performed by universities and colleges.

### **PRIORITIES IN DOD R&D**

Tables II-2 and II-3 show DOD’s R&D in detail. Table II-2 shows DOD R&D by “6.x” category, and Table II-3 by agency and department. Table

II-4 provides details of the DOD basic research (“6.1”) portfolio. Finally, Table II-5 shows details of the “S&T” portion of the R&D portfolio.

This year, the Pentagon is presiding over a record-breaking budget of \$476 billion, including a recently proposed FY 2005 supplemental, up from \$468 billion last year. DOD’s budget is at record levels, of course, because of the continuing deployment of U.S. forces during the occupation and reconstruction of Iraq and Afghanistan. The FY 2006 budget appears to be a sharp drop to \$419 billion (see the second half of Table II-3), but the FY 2006 budget leaves out entirely the future costs of the U.S. presence in Iraq. Even the Pentagon itself acknowledges that U.S. troops will be in Iraq at current strengths at least through the end of 2006, but President Bush has refused to include Iraq costs in his last few budgets. These additional funds will have to be provided in emergency supplemental appropriations bills outside the regular DOD budget process, as is the case with the \$75 billion FY 2005 supplemental for DOD which was released in mid-February, after the release of the FY 2006 budget.

**DOD R&D would barely rise 0.1 percent to \$71.0 billion in FY 2006** (see Table II-2). In inflation-adjusted dollars, the FY 2006 R&D total would be the first real cut in DOD’s R&D since 1996, coming after three years of record-setting R&D investments that exceed previous Cold War highs (see Figure 1).

But **DOD support of basic and applied research would fall steeply in FY 2006**. DOD’s “6.1” (basic research) and “6.2” (applied research) activities combined would fall 14.2 percent to \$5.5 billion in FY 2006 (see Table II-2). In real terms, the proposed cut would undo six years of increases and leave DOD research support at 2000 funding levels.

**Basic research funding (the “6.1” category) would fall 12.9 percent to \$1.3 billion**, reversing an 11 percent increase last year (see Table II-4); Congress provided an increase after the Pentagon had requested a cut. Table II-4 shows that basic research in the Army, Navy, Air Force and Defense Agencies would all decline. Many of the cuts would be due to the proposed elimination of congressional earmarks inserted into the FY 2005 budget, but there would also be cuts in core DOD “6.1” funding. Funding for the University Research Initiatives program would fall 15.7 percent down to \$248 million. URI competitively awards basic research grants to university performers and is funded by the three services. The

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Defense Research Sciences program, which primarily funds in-house research but also awards external grants, would receive a combined \$849 million in FY 2006, a cut of 12.1 percent. One area proposed for increased funding is the new National Defense Education Program (NDEP), started this year in the Office of the Secretary of Defense (OSD) with \$3 million and proposed to increase to \$10 million next year.

**Applied research funding (the “6.2” category) would plummet by 14.7 percent** or \$711 million to \$4.1 billion in FY 2006, after a 12 percent congressional increase last year in response to a requested cut. There would be steep cuts to applied research programs in the three services, including drops of 40 percent in the Army, 27 percent in the Navy, and 10 percent in the Air Force. Applied research in the Defense Agencies would increase 2.8 percent because of proposed boosts in DARPA funding (see DARPA, below).

Beginning in the early 1990s, Congress has appropriated funds for **congressionally designated medical research** programs in the DOD budget. In the last decade, nearly all of these funds were appropriated in the Army, but in FY 2000 Congress began to appropriate the majority of them outside the RDT&E accounts in the Defense Health Program (see Table II-2). The current-year total of \$507 million for medical research includes \$150 million for breast cancer research and \$85 million for prostate cancer research in peer-reviewed, competitively awarded grants. There is also \$50 million for peer-reviewed research on other medical topics. These programs award grants on a peer-reviewed basis and are managed by the Army. Additional congressionally designated performer-specific medical research programs are funded in Army “6.2” and “6.3” accounts. DOD’s policy is not to request continuing funds for most congressionally designated projects; the FY 2006 request is only \$169 million for information technology development to support military medical readiness, but Congress is sure to add on funds.

**DOD funding of “S&T”** (the “6.1” through “6.3” categories plus medical research) **would fall to \$10.7 billion, down 21.3 percent from this year** (see Table II-5 and Figure 3). For the past several years, Congress has tended to be more supportive of S&T funding than the Pentagon; in last year’s budget, DOD also requested a cut in S&T funding, but Congress ended up appropriating a \$1.2 billion increase. Advocates of DOD S&T in the science and engineering community argue that DOD S&T funding is essential for building the knowledge and

technology base for future DOD needs, and have successfully argued that post-Cold War cutbacks over the past decade eroded this base. In the past few years, there has been growing support inside and outside the Pentagon for setting 3 percent of the DOD budget as a goal for the proper level of S&T investment, and in September 2001 the Quadrennial Defense Review endorsed the goal of investing 3 percent of the DOD budget in S&T. The last four budgets, including this year's, have met that goal after taking out Iraq and Afghanistan war spending, hitting 3.39 percent in 2005. The FY 2006 request, however, would cut S&T funding steeply, lowering the S&T/budget ratio to 2.54 percent and reversing the past four years of gains (see Figure 2) that brought DOD S&T funding to an all-time high in inflation-adjusted dollars in FY 2005 after six years of steady increases.

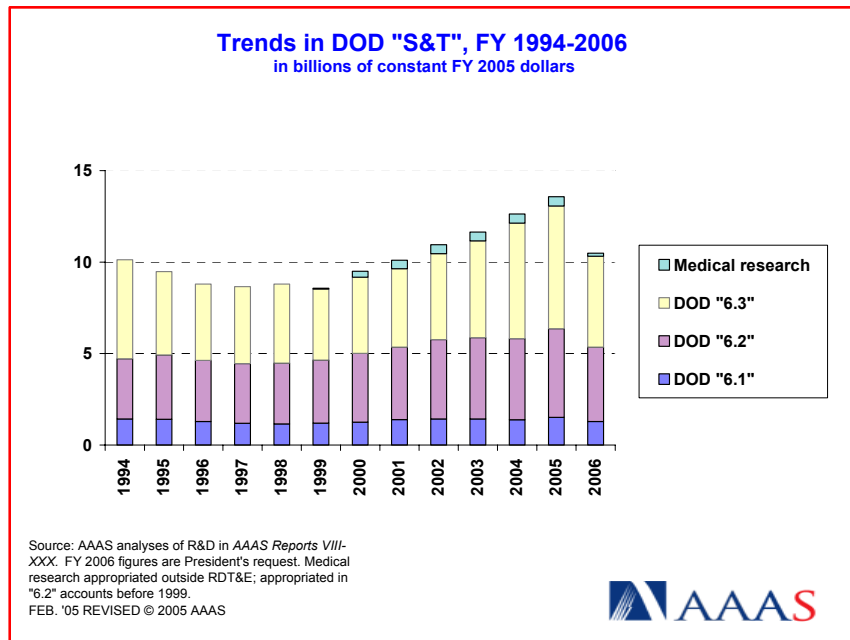


Figure 2.

On the development side, there would be mixed news for DOD's big-ticket weapons development programs. The largest single development project in DOD, and indeed the entire federal budget, would once again be the Joint Strike Fighter (JSF), funded by the Navy and Air Force together at a development cost of \$4.9 billion, up from \$4.3 billion this year as the fighter plane nears production. In a sign of how expensive

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weapons development can be, the JSF project alone would be more than the entire R&D portfolio of the National Science Foundation (NSF). Although the overall Army R&D budget would fall by 7.5 percent in the request, development in the Armored Systems Modernization project would climb from \$2.3 billion to \$3.1 billion in FY 2006. But there would be steep cuts in development funding for several projects making up the national missile defense system in the Missile Defense Agency (MDA; see below). And some programs would see their development funding fall as projects move into procurement: the Navy's DD(X) Destroyer would receive \$1.1 billion in FY 2006 for development, down from \$1.2 billion, in preparation for delivering the first ship in 2007.

After several years of large increases, R&D in the Defense Agencies would fall \$1.7 billion or 8.2 percent to \$18.8 billion, primarily because of a \$1.0 billion or 11.5 percent cut to \$7.8 billion for development in the Missile Defense Agency (MDA; see Table II-3). **Although missile defense systems have begun to be deployed in Alaska, the development effort would slow in FY 2006.** The MDA (formerly the Ballistic Missile Defense Organization) no longer funds research; there would be some funds for technology development (\$136 million in FY 2006), but now nearly all missile defense funds go to advanced development, testing, manufacturing development, and evaluation of missile defense systems with an additional \$567 million elsewhere in the DOD budget for procurement of completed systems and some R&D in other DOD accounts, for a grand total of \$8.8 billion next year for missile defense (down from \$9.9 billion).

The **Defense Advanced Research Projects Agency (DARPA) would see its R&D funding increase to \$3.1 billion** in FY 2006, an increase of \$107 million or 3.6 percent (see Table II-3), after similar increases in the last three years. DARPA is research-oriented (51 percent of its budget is for research, with the remainder devoted to "6.3" technology development), and its broad research portfolio is aimed at expanding the frontiers of knowledge and military technology to provide future solutions to DOD's technology needs. DARPA's efforts in areas such as tactical technology, materials, aerospace systems, network-centric warfare, information and communications technology, and cognitive computing would all receive increases, while there would be cuts in DARPA support of electronics technology, biological warfare defense, sensors, and guidance technology.

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Among the other Defense Agencies, the big winner would be the Chemical and Biological Defense Program (CBDP), with a proposed 26 percent increase for its R&D to \$898 million. CBDP funds chemical and biological defense R&D at all stages from basic research through testing and evaluation of new technologies; most categories would receive large increases in FY 2006, including basic and applied research. But R&D in the Office of the Secretary of Defense (OSD) would fall by nearly a third down to \$1.6 billion, primarily from steep cuts in the “6.3” and higher categories. The Defense Threat Reduction Agency (DTRA), after a large increase in 2005, would see its R&D funding fall 10 percent down to \$409 million. Most of the proposed cuts would come from DTRA’s applied research programs oriented toward weapons of mass destruction (see Table II-3).

#### **OUTLOOK FOR DEFENSE R&D**

The FY 2006 DOD budget is unusual in that total defense spending (excluding Iraq costs) in FY 2006 would increase only modestly, compared to enormous gains in each of the past several years. The overall FY 2006 budget continues the austerity in domestic spending that hit many R&D funding agencies in 2005, but would extend it to defense spending as well. Partly, the apparent flattening of defense spending is due to the Pentagon’s decision to load more and more of what normally would be regular defense spending into emergency supplemental requests, taking these costs out of the budget request. But there are real cuts in several development, procurement, and research programs in the budget that have already attracted considerable criticism on Capitol Hill. Congress, as usual, is likely to weigh the balance between short-term operational needs and longer-term R&D horizons carefully, and will come up with different answers than the Pentagon. In past years, this has meant adding billions of dollars to the S&T accounts and saving some weapons programs from cancellation. But with the willingness to increase the defense budget year after year apparently waning on both ends of Pennsylvania Avenue, Congress may be forced to make tough choices on the defense side of the budget as it has already done on the domestic side.