

R&D in the FY 2005 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 to yet another all-time high of \$69.9 billion in FY 2005**, an increase of \$4.0 billion or 6.0 percent after similar multibillion-dollar increases the past four years, with all of the increase going to the development of new weapons systems (see Table II-2).
- **The big winner in DOD, again, would be the missile defense program.** Funding for the Missile Defense Agency would jump 20 percent to \$9.1 billion in FY 2005 in preparation for deployment of missile defenses beginning this year. Including procurement funds and R&D in other DOD agencies, the total missile defense investment would be \$10.2 billion, up from \$9.0 billion this year.
- By contrast, **DOD funding for basic and applied research would both decline steeply.** Basic research (“6.1”) would fall 5.3 percent to \$1.3 billion, while applied research (“6.2”) would fall 12.3 percent to \$3.9 billion in FY 2005.
- **DOD “Science and Technology” (S&T)**, which includes research, medical research, and early technology development, **would fall 15.5 percent to \$10.6 billion, and at 2.64 percent of the total DOD budget would be well below the 3 percent target endorsed publicly by DOD** (see Table II-6).

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 new Department of Homeland Security (DHS), whose primary mission is homeland defense but also performs R&D related to military security (see Figure 1).

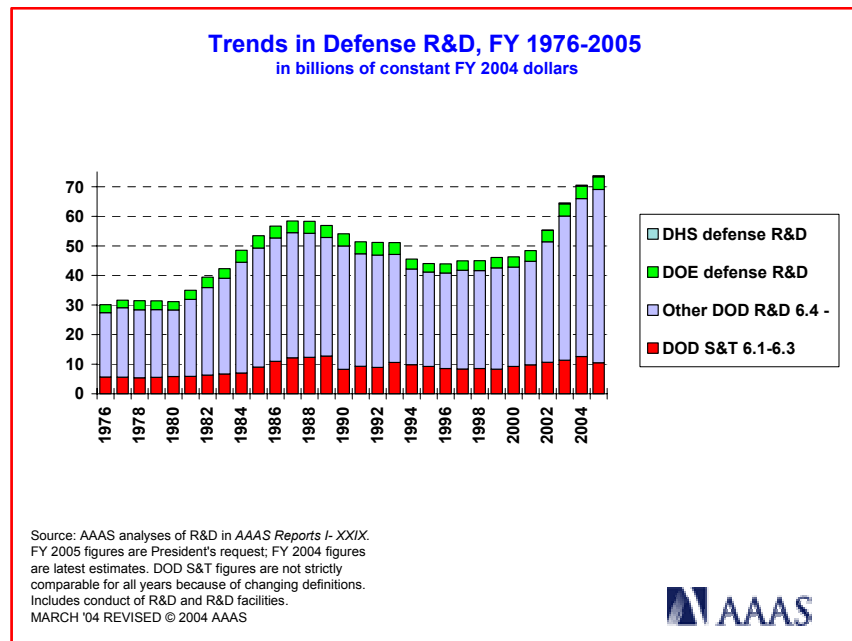


Figure 1.

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 Prototypes (“6.4”), System Development and Demonstration (“6.5”), Management Support (“6.6”), and Operational Systems Development (“6.7”). DOD also funds

R&D IN THE FY 2005 DEPT. OF DEFENSE BUDGET

some R&D and support costs in non-RDT&E accounts, and funds applied research on medical topics in the Defense Health Program.

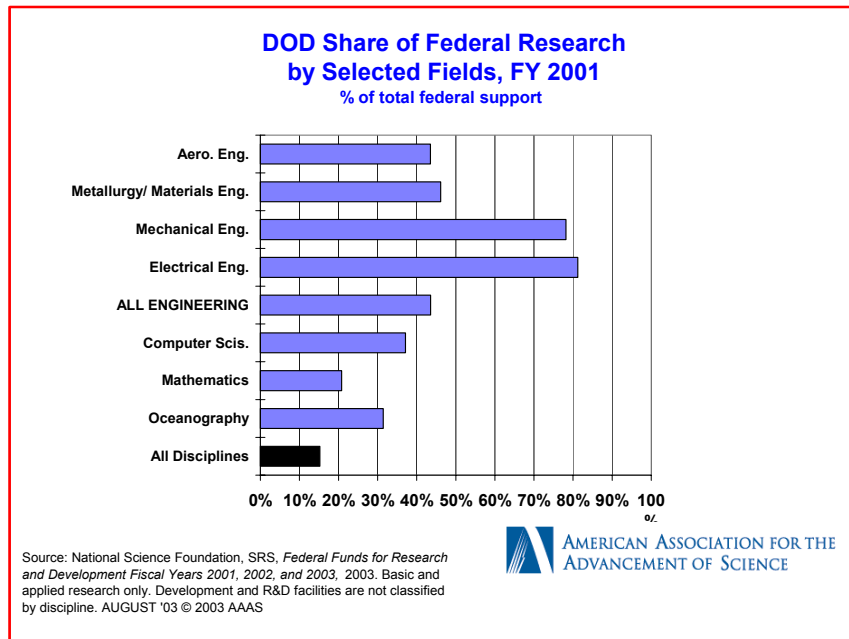


Figure 2.

DOD is responsible for only 15 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 (see Figure 2). DOD supports 37 percent of all federal research in the computer sciences and 44 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, most evident in DOD’s early support for research that led to the now-ubiquitous Internet. 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). 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-6) also include applied medical research in the Defense Health Program, which was formerly funded in the Army “6.2” 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. 39 percent of DOD research is performed by DOD laboratories, while 32 percent is performed by industry. A quarter (25 percent) 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 shows DOD R&D by character of work, and Table II-5 provides details of the DOD basic research (“6.1”) portfolio. Finally, Table II-6 shows details of the “S&T” portion of the R&D portfolio.

This year, the Pentagon is presiding over a record-breaking \$440 billion DOD budget, up slightly from \$438 billion last year. DOD’s budget is at record levels, of course, because of last year’s Iraq war and the continuing deployment of U.S. forces there during the occupation and reconstruction of Iraq. The FY 2005 budget request appears to be a sharp drop to \$402 billion (see the second half of Table II-3), but the FY 2005 budget leaves out entirely the future costs of the U.S. presence in Iraq. Even the Pentagon itself acknowledges that DOD will need \$50 billion as early as the end of this summer to pay for operational costs in Iraq, even assuming a significantly reduced presence, but President Bush refused to include any estimates in the budget proposal and has already promised Congress that he will not request additional funds until well after the November elections. These additional funds will have to be

R&D IN THE FY 2005 DEPT. OF DEFENSE BUDGET

provided in emergency supplemental appropriations bills outside the regular DOD budget process. Thus, the apparent cuts in the Operations and Maintenance and Military Personnel accounts, where most of the Iraq operations are funded, will almost certainly become increases when the true FY 2005 needs are funded.

DOD R&D would rise 6.0 percent to \$69.9 billion (see Table II-2). Since most R&D is long-term in nature and unconnected to current operations, R&D funding has not been affected directly by the Pentagon's refusal to budget for Iraq. In inflation-adjusted dollars, the FY 2005 R&D total would represent an all-time record funding level following substantial increases in each of the past four years (see Figure 1).

But in sharp contrast to the substantial increases for DOD's development programs, **DOD support of basic and applied research would fall steeply in FY 2005**. DOD's "6.1" (basic research) and "6.2" (applied research) activities combined would fall 10.6 percent to \$5.2 billion in FY 2005, below the FY 2002 funding level.

Basic research funding (the "6.1" category) would fall 5.3 percent to \$1.3 billion after a 2.6 percent increase last year; Congress provided an increase after the Pentagon had requested a cut. Table II-5 shows that **basic research** in the Army, Navy, and Defense Agencies would all decline, with only Air Force basic research showing an increase. Many of the cuts would be due to the proposed elimination of congressional earmarks inserted into the FY 2004 budget, but there would also be cuts in core DOD "6.1" funding. In FY 2004, funding for the University Research Initiatives program switches from the Office of the Secretary of Defense (OSD) to the three services, first proposed by the Pentagon last February and approved by Congress last fall. URI competitively awards basic research grants to university performers; in FY 2005, the program would continue in the three services at a combined level of \$275 million, down \$8 million from the FY 2004 funding level.

Applied research funding (the "6.2" category) would plummet by 12.3 percent or \$545 million to \$3.9 billion in FY 2005, after a 3.6 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 37 percent in the Army, 22 percent in the Navy, and 12 percent in the Air Force. Applied research in the Defense

Kei Koizumi

Agencies would increase 6.4 percent because of proposed jumps 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 past, 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 FY 2004 total of \$486 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 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 2005 request is only \$72 million for information technology development to support military medical readiness, but Congress is sure to add on funds for the above programs.

DOD funding of “S&T” (the “6.1” through “6.3” categories plus medical research) **would fall to \$10.6 billion, down 15.5 percent from FY 2004** (see Table II-6). 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 \$1.5 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 three budgets, including this year’s, have met that goal after taking out Iraq and Afghanistan war spending. The FY 2005 request, however, would cut S&T funding steeply, lowering the S&T/budget ratio to 2.64 percent.

R&D IN THE FY 2005 DEPT. OF DEFENSE BUDGET

R&D in the Army, Navy, the Air Force, and the Defense Agencies would all increase (see Table II-3), with the entire increase going to weapons development activities.

R&D in the Defense Agencies would increase \$1.8 billion or 9.7 percent to \$20.7 billion because of a \$1.5 billion or 19.9 percent increase to \$9.1 billion for development in the Missile Defense Agency (MDA; see Table II-3). **The missile defense program is a high priority for the Bush Administration.** Including some missile defense development funded by the Army, the total missile defense development effort would jump 17.5 percent to \$9.6 billion in FY 2005, in preparation for deploying a test system as early as this year with continuing deployment into next year. The MDA (formerly the Ballistic Missile Defense Organization) no longer funds research; there would be some funds for technology development (\$204 million in FY 2005), but now nearly all missile defense funds go to advanced development, testing, manufacturing development, and evaluation of missile defense systems with an additional \$577 million elsewhere in the DOD budget for procurement of completed systems, for a grand total of \$10.2 billion next year for missile defense (up from \$9.0 billion).

The **Defense Advanced Research Projects Agency (DARPA)** would see its R&D funding increase to \$3.1 billion in FY 2005, an increase of \$259 million or 9.1 percent (see Table II-3), after similar increases in the last two years. DARPA is research-oriented (48 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, electronics, network-centric warfare, and sensors and guidance technologies would all receive large increases. The largest part of DARPA’s portfolio would be the Materials and Electronics Technology program with an investment of \$502 million (up from \$465 million). DARPA has been dogged by controversy over the past year concerning some of its research projects. One DARPA proposal, to do research on a possible ‘futures market’ to predict terrorist attacks, was canceled on the drawing board last year after public outcry over the concept. Another DARPA project that had already started, the Terrorism Information Awareness (TIA) project to engage in R&D on creating better systems and networks to analyze, process, and find patterns in intelligence and other data, attracted

Kei Koizumi

considerable public and congressional criticism based on worries that the project could provide the military with unprecedented capabilities to monitor personal information. Last year's DOD budget bill in September 2003 terminated the TIA project, eliminated TIA's home in DARPA's Information Awareness Office, and instructed DARPA to distribute the Office's other programs among the other 7 DARPA offices.

OUTLOOK FOR DEFENSE R&D

The FY 2005 DOD budget arrives on Capitol Hill in an unusual state of uncertainty because of the ever-shifting situation in Iraq and DOD's refusal to even attempt to budget for Iraq beyond the next few months. While the current congressional and Administration concern over military matters that has led to ever-increasing DOD R&D budgets shows little sign of waning, Congress 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. These accounts, however, could be squeezed as DOD's operational budgets run out of money and the Pentagon scrambles for other funds to replace Iraq funds.