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R&D in the FY 2004 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 an all-time high of \$62.8 billion**, an increase of \$4.2 billion or 7.1 percent, with all of the increase going to the development of weapons systems, coming after record increases of \$8.8 billion and \$7.1 billion the previous two years (see Table II-2).
- **The big winner in DOD would be the missile defense program**, a high priority for the Bush Administration. Funding for missile defense development would jump 22 percent to \$8.3 billion in FY 2004, mostly in the Missile Defense Agency; funding for other big development projects would also climb, particularly a \$4.4 billion development request for the Joint Strike Fighter (up 28 percent).
- By contrast, **DOD funding for basic and applied research would both decline steeply**. Basic research (“6.1”) would fall 7.7 percent to \$1.3 billion, while applied research (“6.2”) would fall 14.4 percent to \$3.7 billion in FY 2004.
- **DOD “Science and Technology” (S&T)**, which includes research, medical research, and early technology development, **would fall 8.3 percent to \$10.3 billion, below even the FY 2002 funding level** (see Table II-6).
- **DOD proposes to reorganize its basic research portfolio in FY 2004** by transferring many basic research programs funded in the Office of the Secretary of Defense (OSD) to the three services (Army, Navy, and Air Force; see Table II-5).

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 since its peak in FY 1987, bottoming out in the mid-1990s, but has increased dramatically in the past few years to new highs (see Figure 1). 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).

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

DOD is responsible for only 12 percent of all federal support of basic and applied research (in FY 2003), but is a key sponsor for several science and engineering (S&E) disciplines. DOD supports 35 percent of all federal research in the computer sciences and 39 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.

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The “6.1,” “6.2,” and “6.3” categories are often grouped together as **“Science and Technology” (S&T)**. This category includes basic research, applied research, and generic 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 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”) are performed by a diverse group of institutions. A third of DOD research is performed by DOD laboratories, while another third is performed by industry. 30 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.

Last year, in the aftermath of the September 11, 2001, terrorist attacks and a military campaign in Afghanistan, President Bush proposed a tremendous increase in the DOD budget to \$379 billion for FY 2003, nearly \$35 billion more than the FY 2002 funding level. Congress ended up appropriating \$365 billion in October, comprising most of what the President Bush requested minus \$20 billion in unallocated reserve funds for military operations, but plus additional funds for most DOD accounts, for a final increase of nearly 6 percent over FY 2002. Then, in February, Congress appropriated an additional \$10 billion in supplemental

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appropriations as part of the FY 2003 omnibus appropriations bill. **President Bush proposed a FY 2004 DOD budget of \$380 billion** earlier this month, a \$5 billion or 1.4 percent increase over the new FY 2003 total (see the second half of Table II-3).

The DOD budget leaves out the costs of the current military preparations in the Middle East, and also leaves out the operational costs of a war against Iraq. At press time, U.S. soldiers and support staff were massing in the Middle East, with thousands of U.S. military personnel and reserve personnel deployed in preparation for war. Even if they return to the U.S. without firing a shot, DOD will need additional funds in FY 2003 above and beyond the budget to cover the costs of their deployment. If the U.S. does declare war, U.S. military expenditures in Iraq could exceed \$100 billion. These additional funds will have to be provided in emergency supplemental appropriations bills outside the regular DOD budget process.

There would be increases proposed in the FY 2004 budget, with the notable exception of DOD research (see below) and military construction. **Overall, DOD R&D would share in the increase with a boost of \$4.2 billion or 7.1 percent to \$62.8 billion** (see Table II-2). In inflation-adjusted dollars, this would represent an all-time record funding level following substantial increases in each of the past three years (see Figure 1).

R&D in the Army, Navy, the Air Force, and the Defense Agencies would all increase, with particularly large increases of 21.5 percent and 8.4 percent for the Army and Air Force, respectively (see Table II-3), almost entirely for development. There would be a \$1 billion increase for the Joint Strike Fighter, a next-generation fighter plane in development for future use by all the services and U.S. allies. The system development phase ("6.5"), funded equally by the Navy and Air Force, would jump from \$3.4 billion in FY 2002 to \$4.4 billion in FY 2003, an increase of 28 percent.

R&D in the Defense Agencies would increase nearly 3.4 percent to \$18.0 billion, primarily because of a \$1 billion increase to \$7.7 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 22

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percent to \$8.3 billion in FY 2004, in preparation for deploying a test system as soon as possible. The MDA (formerly the Ballistic Missile Defense Organization) no longer funds research; there would be some funds for generic technology development (\$241 million in FY 2004), but now nearly all missile defense funds go to advanced development, testing, manufacturing development, and evaluation of missile defense systems with an additional \$774 million elsewhere in the DOD budget for procurement of completed systems.

The Defense Advanced Research Projects Agency (DARPA) would see its R&D funding increase to \$3.0 billion in FY 2004, an increase of \$264 million or 9.8 percent (see Table II-3), after a similar increase in FY 2003. DARPA is mostly research-oriented, 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. While funding for applied research in Biological Warfare Defense would drop from \$162 million in FY 2003 to \$137 million in FY 2004 as the government's counter-bioterrorism research effort continues its shift to the National Institutes of Health (NIH), DARPA's efforts in areas such as tactical technology, materials, aerospace systems, electronics, and sensors and guidance technologies would receive large increases. DARPA would also initiate a new program on network-centric warfare technology with an investment of \$96 million.

But in sharp contrast to the substantial increases in most areas of the DOD budget, **DOD support of basic and applied research would fall steeply in FY 2004**. DOD's "6.1" (basic research) and "6.2" (applied research) activities combined would fall 12.7 percent to \$5.0 billion in FY 2004, below even the FY 2001 funding level.

Basic research funding (the "6.1" category) would fall 7.7 percent to \$1.3 billion after a 5 percent increase last year. Table II-5 shows apparent increases for **basic research** in the Army, Navy, and Air Force, but these increases reflect major proposed shifts in funding from the Office of the Secretary of Defense (OSD) to the three services. DOD proposes to move funding for the University Research Initiatives program, which funds competitively awarded basic research grants to university performers, from OSD to the three services. DOD would also transfer some smaller, related programs such as the Defense Experimental Program to Stimulate Competitive Research (DEPSCoR), the High Energy Laser Research Initiative, the Force Health Protection

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program, and support to historically black colleges and universities. Overall, funding for University Research Initiatives would rise 7.8 percent to \$283 million. Funding for the Defense Research Sciences program, however, which funds basic research in DOD laboratories and universities, would fall 10.6 percent to \$853 million across the three services and DARPA. The DARPA program would be especially hard hit, falling 24 percent to \$151 million.

Applied research funding (the “6.2” category) would plummet by 14.4 percent or \$619 million to \$3.7 billion in FY 2004 after a 5 percent increase last year. There would be steep cuts to applied research programs in the three services, including drops of 25 percent in the Army, 34 percent in the Navy, and 9 percent in the Air Force. Applied research in the Defense Agencies would fall 3.4 percent, representing a continuing concentration of applied research in the Defense Agencies that would run counter to the proposed shift of basic research back to the services.

DOD funding of “S&T” (the “6.1” through “6.3” categories plus medical research) **would fall to \$10.3 billion, down 8.3 percent from FY 2003** (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 nearly \$1 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, and the last two budgets have met that goal. The request, however, would cut S&T funding while increasing overall DOD spending, lowering the S&T/budget ratio to 2.7 percent.

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

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Table II-2). The FY 2003 total of \$459 million for medical research includes \$150 million for breast cancer research and \$85 million for prostate cancer research in peer-reviewed, competitively awarded grants. The FY 2003 budget also contains \$10 million for ovarian cancer research, \$50 million for peer-reviewed research on other medical topics, and miscellaneous amounts for other medical research 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 the Army "6.2" and "6.3" accounts. DOD's policy is not to request continuing funds for most congressionally designated projects; the FY 2004 request is only \$66 million for information technology development to support military medical readiness, but Congress is sure to add on funds for the above programs.

OUTLOOK FOR DEFENSE R&D

Congress has received the DOD budget, and in all likelihood Congress will only add to the request, especially for areas such as S&T that Congress feels are underfunded in the request. It is nearly impossible to predict the fate of the defense budget, however, because of the uncertainty regarding a possible war against Iraq and its aftermath. Both the FY 2003 and FY 2004 budgets could end up tens of billions of dollars higher than the present and requested levels in the event of military action, and could strain DOD resources for years to come.