

## R&D in the FY 2001 Department of Defense Budget

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### HIGHLIGHTS

- The FY 2001 request for R&D in the Department of Defense (DOD) is \$38.6 billion, \$706 million or 1.8 percent below FY 2000; the overall DOD budget, however, would climb \$11 billion or 4.0 percent to \$292.2 billion (see Table II-3).
- Acting on a bipartisan consensus that the U.S. military has been underfunded in recent years, President Clinton proposes to boost the total DOD budget to \$317 billion by FY 2005, a 13.0 percent increase over five years (2.3 percent after adjusting for expected inflation). DOD's R&D, however, is projected to decline by 14.6 percent in inflation-adjusted terms by FY 2005 (see Table I-15).
- DOD's support of basic research (the "6.1" category) would receive 4.9 percent more in FY 2001 for a total of \$1.2 billion. Applied research (the "6.2" category) would fall by 7.8 percent to \$3.1 billion. Both categories received substantial increases in FY 2000 (see Table II-2).
- The Defense Advanced Research Projects Agency (DARPA) would receive an increase of 4.0 percent to \$2.0 billion, partially to fund expanded efforts in information technology and biological warfare defense research. The Ballistic Missile Defense Organization (BMDO) would boost its R&D budget by 15.0 percent to \$3.9 billion, and would use much of the increase to accelerate development of a national missile defense system.

## **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 nearly half the total. 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 has declined by a third since its peak in FY 1987.

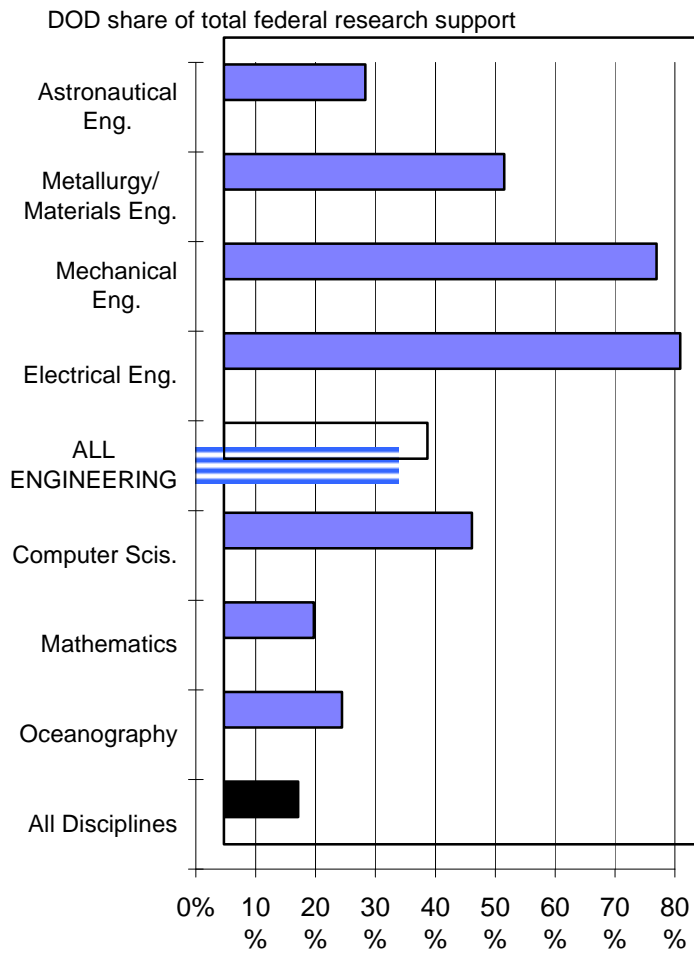
While most agencies break out R&D into the three categories of basic research, applied research, and development, DOD divides its RDT&E (Research, Development, Test, and Evaluation) account into seven categories, each with a numerical code: Basic Research (known as "6.1"), Applied Research ("6.2"), Advanced Technology Development ("6.3"), Demonstration and Validation ("6.4"), Engineering and Manufacturing Development ("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.

As Figure 1 shows, DOD is responsible for a little over 10 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 more than 40 percent of all federal research in the computer sciences and a third 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 (see Figure 1). 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.

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 with narrow military applicability. Nearly all DOD support for R&D at colleges and universities comes from the S&T accounts.

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Figure 1. DOD Funding of Research by Selected Science and Engineering Disciplines, FY 1997



Source: National Science Foundation, SRS, *Federal Funds for Research and Development Fiscal Years 1997, 1998, and 1999, 1999*. Basic and applied research only. Development and R&D facilities are not classified by discipline.

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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.

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

Tables II-2 through II-6 show DOD's R&D in detail. Table II-2 shows DOD R&D by "6.x" category, Table II-3 by agency and department, and II-4 by character of work. Table II-5 provides details of DOD funding for basic research, and Table II-6 looks at historical trends in DOD R&D. Table II-3 also shows the total DOD budget of nearly \$300 billion.

The total DOD R&D budget of \$38.6 billion in FY 2001 would be a 1.8 percent cut from FY 2000. In dollar terms, the cut would be \$706 million. The Clinton Administration has requested cuts in DOD's R&D for the last five years, and Congress has responded by adding funding to the request, often with enough money to turn a requested cut into an actual increase.

In the Clinton budget, DOD's basic research would increase by 4.9 percent or \$56 million to \$1.2 billion, following an even larger increase in FY 2000. Table II-5 shows, however, that the increase would be for Navy basic research (up 6.2 percent to \$397 million) and basic research in the Defense Agencies (up 12.0 percent to \$413 million) only. Army basic research (down 1.7 percent to \$201 million) and Air Force basic research (down 3.6 percent to \$206 million) would both decline. In particular, the Air Force's requested cuts, which continue a decade-long trend of declining investments in Air Force basic research, has attracted considerable criticism from Congress and defense observers who worry that they will reduce its ability to respond to future air warfare challenges.

Applied research funding (the "6.2" category) would decline by 7.8 percent or \$266 million to \$3.1 billion in FY 2001, similar to the FY 1999 level but well below the large congressionally approved level for FY 2000. Although DOD states that most of these proposed cuts are for congressionally designated projects, the cuts are broad-ranging and affect most "6.2" programs in all three services and the Defense Agencies.

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In the Defense Agencies, the Defense Advanced Research Projects Agency (DARPA) invests in long-term research with the potential to lead to innovative defense systems. Its budget would increase \$75 million or 4.0 percent to \$2.0 billion in FY 2001 (see Table II-3). Computing and information technology (IT) research, a high priority in the overall R&D request, would also be a high priority in the DOD budget. DARPA, the original funding source for the research that eventually resulted in the Internet, would continue to be a major contributor to the multi-agency Information Technology R&D Initiative, a new package combining the longstanding High Performance Computing and Communications (HPCC) program, the Next Generation Internet initiative, and last year's Information Technology for the Twenty-First Century (IT<sup>2</sup>) initiative. DOD would fund \$397 million of the initiative's \$2.3 billion request (see Table I-10), mostly through DARPA. (For more details on computing research, please see Chapter 24.) Another DARPA priority that is part of a multi-agency effort is the \$162 million request in FY 2001 for the Biological Warfare Defense research program, up from \$132 million in FY 2000. This program tries to find innovative scientific solutions to the problem of how to protect humans, especially soldiers on the battlefield, from biological weapons, and is part of a wider DOD effort to protect soldiers from battlefield biological and chemical weapons. Civilian agencies involved in anti-bioterrorism work include the Centers for Disease Control and Prevention and the Department of Energy.

The Ballistic Missile Defense Organization (BMDO), successor to the Strategic Defense Initiative, faces a crossroads this summer and would receive additional funds in the Clinton Administration request. BMDO's R&D budget would increase \$515 million or 15.0 percent to \$3.9 billion in FY 2001. Included in the BMDO budget is a near-doubling of the budget for national missile defenses from \$950 million to \$1.7 billion. BMDO officially remains on track for a major decision by President Clinton this June, based on an assessment of the state of technology development, on whether to proceed toward deployment of a national missile defense system. But recent failures of test systems have led many military analysts to urge a postponement of that decision. If President Clinton decides to deploy in June, the target deployment date will be sometime after 2003; if he decides not to deploy, then technology development would continue.

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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 appropriated nearly all of them outside the RDT&E accounts in Defense Health Programs (see Table II-2). The FY 2000 total of \$270 million for medical research includes \$175 million for breast cancer research, \$75 million for prostate cancer, and \$20 million for peer-reviewed research on other medical topics. DOD's policy is not to request continuing funds for most congressionally designated projects, so the FY 2001 request is for only \$66 million, but Congress is almost certain to bring final FY 2001 funding close to or above the FY 2000 level. In the regular RDT&E accounts, there are other congressionally designated medical research projects on topics such as Gulf War illness, ovarian cancer, and HIV/AIDS. Most of these projects would be dramatically reduced from current levels in the FY 2001 request.

#### **THE POLICY ENVIRONMENT FOR DEFENSE R&D**

DOD's R&D is just part of a wider policy struggle between the Clinton Administration and the Republican-controlled Congress on the proper size and funding of the U.S. military to meet 21<sup>st</sup> century warfighting and peacekeeping challenges. Congress has consistently accused the Clinton Administration of not requesting enough money for DOD to meet current needs and prepare for future challenges, and has been especially critical of the increased use of the military in peacekeeping operations without a commensurate increase in resources. As a result, Congress has increased the Clinton request for DOD's total budget every year for the past five years, and this year Congress is likely to repeat this scenario for both DOD's R&D and the DOD budget as a whole.

The President's request for the total DOD budget in FY 2001 is \$292.2 billion, \$11.3 billion more than FY 2000. The FY 2001 request continues the Administration's plan, announced last year, to ramp up DOD spending after more than a decade of post-Cold War cuts. Last year's FY 2000 budget request departed sharply from past projections of declining future defense budgets by calling for current and sustained increases in DOD's budget. The FY 2001 budget stays on the same course. From a base of \$280.9 billion in FY 2000, the Administration plan calls for DOD spending

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to increase to \$317.3 billion in FY 2005. This would represent an increase of 13.0 percent (2.3 percent after adjusting for expected inflation).

Defense spending is currently subject to statutory discretionary spending caps, which allow for flat funding over the next few years. For the past several years, Congress and the President have managed to give DOD increases within these restrictive caps only through designating billions of dollars in appropriations as emergency, and therefore exempt from the caps. For FY 2001, the President proposes to repeal the existing caps and replace them with higher caps that allow discretionary spending (half of which goes to defense) to increase in FY 2001 and keep pace with inflation thereafter.

The Pentagon proposes to allocate the increases to enhancing military readiness, boosting military pay, and acquiring new weapons systems. Readiness, funded in Operations and Maintenance, would climb from \$105 billion in FY 1999 and FY 2000 to \$109 billion in FY 2001, and to \$115 billion in FY 2005. Military Personnel started at \$71 billion in FY 1999, increased to \$74 billion in FY 2000, and would reach \$86 billion in FY 2005. Spending on procurement of new weapons would see the biggest increase, from \$51 billion in FY 1999 to \$54 billion in FY 2000, with a boost to \$60 billion in FY 2001 and eventually to \$71 billion in FY 2005.

Because of these increases, however, other DOD accounts, including R&D, will be squeezed in FY 2001 and future years. The Pentagon plans to cut DOD's R&D from \$39.3 billion in FY 2000 down to \$37.0 billion in FY 2005, a cut of 14.6 percent after adjusting for inflation (see Table I-15). Part of this is due to the shift of many expensive projects from R&D to Procurement as development ends and routine production begins, but mostly due to projected cuts in R&D programs as resources are shifted elsewhere. Even basic research, for which DOD has requested an increase in FY 2001, would decline thereafter and end up 5.8 percent below the FY 2000 level in inflation-adjusted dollars by FY 2005.

#### **DOD SUPPORT OF R&D IN COLLEGES AND UNIVERSITIES**

Although it is a small portion of its R&D budget, DOD's support for R&D in universities (about \$1.2 billion a year; see Table I-7) plays a

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crucial role in many universities' research portfolios. DOD is the third largest federal sponsor of R&D in universities and colleges, behind only the National Science Foundation (NSF) and the National Institutes of Health (NIH). DOD's impact on universities, however, is concentrated in a few key fields: DOD provides a little less than a tenth of total federal support for academic R&D, but more than half of all federal support for electrical engineering and mechanical engineering at universities; nearly half of all federal support for computer sciences and materials engineering; and a large share of support in several other fields such as oceanography, mathematics, aeronautical engineering, and astronautical engineering. DOD's support of university life sciences research, although small compared to NIH, is growing rapidly because of the rapid growth of congressionally designated programs in cancer research.

Based on historical trends, over half of DOD support for academic R&D is basic research ("6.1"), about a quarter is applied research ("6.2"), and a tenth is "6.3" development. The remaining 12 percent is funded through the "6.4" and higher categories of development.

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

Because the President's long-term budget plan calls for DOD's budget to increase significantly over the next five years, there are now fewer complaints from Pentagon leaders over shrinking defense budgets. Congressional Republicans, long critical of the Clinton Administration's defense policies, are generally supportive of the upward trend but key members of defense committees charge that the Clinton Administration is still shortchanging the military and have called for even greater increases for DOD, especially for military personnel. With growing surpluses and a bipartisan consensus that the existing discretionary spending caps will be revised upward this year, it is almost certain that DOD will receive at least the requested increase, and that DOD's R&D will share in the extra dollars.