

Large Increases for FY 2000 Defense R&D; DOD S&T Up 11.5 Percent

(The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D by agency in FY 2000 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/R&D>) in the "FY 2000 R&D" or the "What's New" sections.)

This week, Congress is expected to give final approval to the FY 2000 Defense appropriations bill (HR 2561) for the Department of Defense (DOD), and the President is expected to sign it into law. The final Defense bill provides substantial increases for most DOD R&D programs. DOD's R&D in FY 2000 totals \$39.3 billion, \$4.2 billion more than the President's request and \$1.3 billion or 3.4 percent more than FY 1999 (see Tables A and B). **The bill boosts DOD funding of basic and applied research above both the President's request and the FY 1999 funding level.** DOD's basic research ("6.1") totals \$1.2 billion, 5.8 percent above FY 1999, while applied research ("6.2") totals \$3.4 billion, nearly 8 percent above the current year funding level. Including DOD's medical research programs, DOD S&T ("6.1" through "6.3" programs, representing DOD's investment in basic and applied research and technology development) increases by 11.5 percent to \$8.7 billion.

The final Defense bill contains substantial increases for the overall DOD budget as well as for R&D programs, after a decade-long post-Cold War decline. The \$268 billion total for the Defense bill is nearly \$5 billion more than the request, which itself was a substantial increase over FY 1999 funding levels. In addition to the Defense bill, Congress has already provided more than \$2 billion in FY 2000 funds in April's emergency supplemental bill (Public Law 106-31).

The Defense bill provides large increases for most **basic research ("6.1")** accounts. Although DOD requested only a 0.5 percent increase, the House and Senate both appropriated more than the request, and the final bill provides even more, for a total of \$1.2 billion, \$64 million or 5.8 percent more than FY 1999 (see Table A). In recent years, the House has proposed cuts to basic research, the Senate has proposed increases, and the final appropriations have split the difference, but this year there was broad agreement that the basic research accounts of all the services needed increases. The Army's support of basic research rises 11 percent to \$206 million because of a \$12 million supplement to its budget for basic research in counterterrorism. The Defense bill matches the Navy's requested 4 percent increase for its basic research, provides a 3 percent increase for Air Force basic research, and provides \$378 million (an increase of 7 percent) for basic research in the Defense Agencies.

The **applied research ("6.2")** accounts total \$3.4 billion, an increase of \$250 million or 7.9 percent. This total is \$442 million more than the request. As a result, total DOD support of research (basic plus applied) is \$4.6 billion, 7.4 percent more than FY 1999.

The "6.1" and "6.2" research accounts provide a significant share of federal support for several **key scientific and engineering disciplines**. DOD provides nearly a third of all federal support for engineering research, and a majority of federal support for some key engineering subfields. DOD also provides more than 40 percent of total federal support for computer sciences research, and

plays a strong funding role in other disciplines such as mathematics, oceanography, medical sciences, chemistry, physics, and environmental sciences.

As Figure 1 shows, DOD allocates its support of basic and applied research among many disciplines, but predominantly engineering, with significant amounts of support for mathematics, computer sciences, environmental sciences (mainly oceanography), physical sciences, and life sciences.

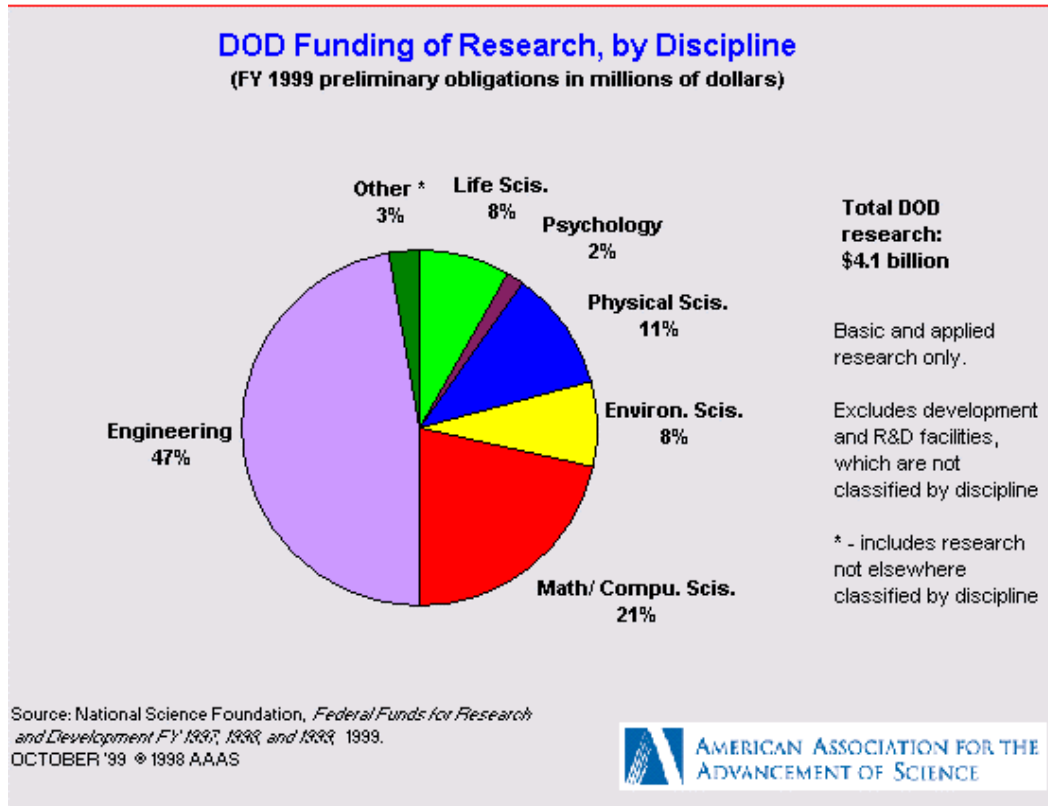


Figure 1.

In recent years, cuts in DOD's "6.1" and "6.2" accounts have resulted in **shrinking DOD support for many of these disciplines, especially engineering research**. Figure 2 shows that **DOD support of engineering research has declined by nearly a third in real terms** over the past six years, not surprising considering how important engineering is in DOD's research portfolio. There have also been cuts in DOD support of the physical sciences and a downward trend in the life sciences. Only in mathematics and computer sciences has DOD support increased over the past several years. The FY 2000 increases for DOD research should help to reverse the downward trends, but will still leave support for these disciplines well below mid-1990s levels. Even with a 5.8 percent increase in FY 2000, for example, DOD's "6.1" funding remains more than 20 percent below the FY 1993 level in inflation-adjusted terms.

The "6.1" and "6.2" accounts are especially important for the nation's **colleges and universities**, which perform more than half of "6.1" research and roughly 20 percent of "6.2" research. DOD is the third largest sponsor of federal R&D at colleges and universities, behind only the National Institutes of Health and the National Science Foundation. DOD's impact, however, is concentrated in the few key fields listed above. DOD provides a tenth of federal support for academic R&D, but more than half of all federal support for mechanical engineering and electrical engineering at universities, and nearly half of all federal support for computer sciences and materials engineering.

Although it is uncertain how DOD will allocate its FY 2000 funds among performers and disciplines, the totals suggest that DOD support for research at colleges and universities will increase in FY 2000.

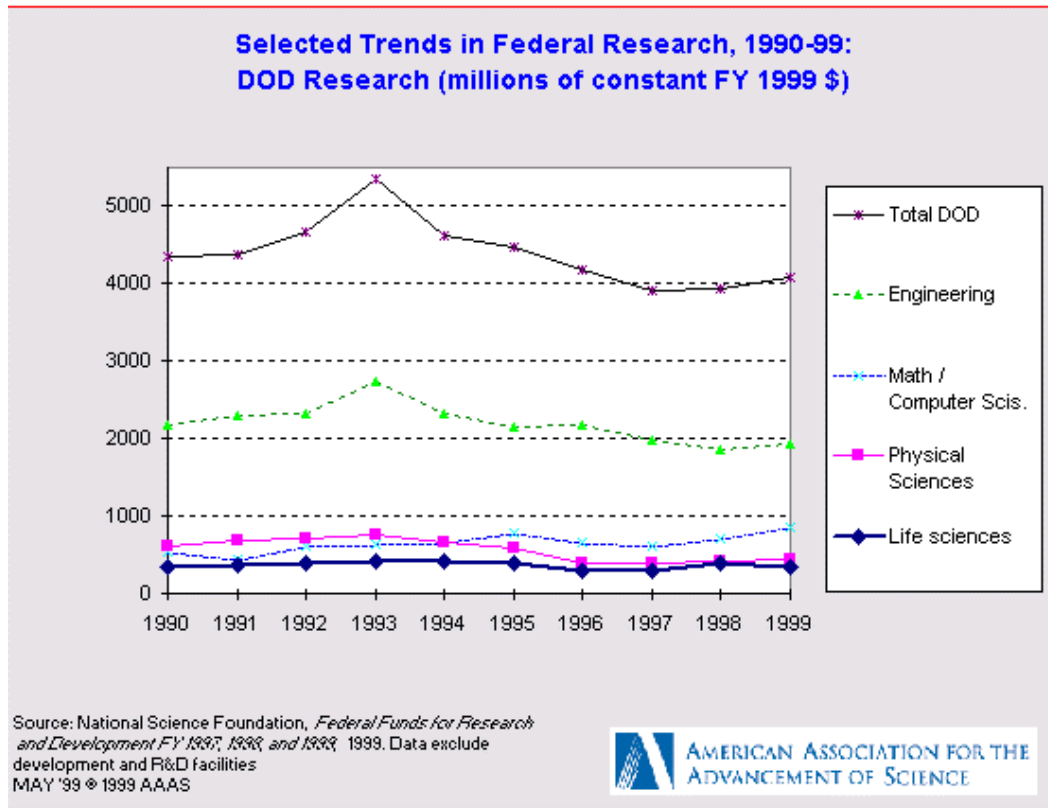


Figure 2.

The final Defense bill contains a separate \$275 million appropriation, outside the regular R&D accounts, for **medical R&D** (see Table A). In past years, Congress has appropriated these unrequested funds for medical research in the Army's "6.3" accounts. This appropriation for peer-reviewed, competitively awarded research grants continues the recent expansion of DOD's effort in medical research. The \$275 million total is divided into \$175 million for breast cancer research (up from \$135 million in the Army in FY 1999) and \$75 million for prostate cancer research (up from \$58 million), with an additional \$25 million for peer reviewed research on other topics. There are also appropriations for medical research in DOD's regular accounts, including \$12 million for ovarian cancer in the Army, and R&D on HIV, alcoholism, bone marrow disease, and Gulf War illness in the other services.

The "6.1," "6.2," and "6.3" categories are often grouped together as "**Science and Technology**" (S&T). This category encompasses basic research, applied research, and generic technology development, which 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. DOD S&T has declined steeply in recent years. In FY 2000, however, **DOD S&T**, including the medical research appropriations formerly appropriated within the "6.3" category, **totals \$8.7 billion, 11.5 percent more than FY 1999** and by far the largest increase in more than a decade.

Among the Defense Agencies, the Defense bill cuts the budget of the **Defense Advanced Research Projects Agency (DARPA)** by \$75 million or 3.9 percent for a total of \$1.9 billion (see Table B). The bill provides \$36 million for the **Next Generation Internet** (down from \$50 million in FY 1999) and \$30 million for the first year of Extensible Information Systems (down from a first-time request of \$70 million). The latter is a key part of DOD's contribution to the multi-agency Information Technology for the 21st Century (**IT²**) initiative. Although final allocation levels are uncertain, it appears that DOD received \$60 million of a requested \$100 million for IT². DOD's role in IT² is described as "basic long-range research and related equipment necessary to facilitate advances in IT." DARPA is expected to play a key part in DOD's effort through focused research in a number of topics, including research on software; human-computer interaction; information management; scalable networks; and high-end computing.

The final Defense bill trims the \$146 million request for DARPA's Biological Warfare Defense research program down to \$132 million, but this is still significantly more than the \$85 million FY 1999 funding level. The House bill language expresses concern that the requested expansion of the program is too rapid, and advises DARPA to more closely collaborate with the Army's existing biological warfare research units, which receives significant increases through the Chemical and Biological Defense program.

The **Ballistic Missile Defense Organization's (BMDO)** budget falls 10.5 percent to \$3.4 billion, but this is primarily because the FY 1999 total contains \$770 million in last-minute emergency appropriations. The BMDO appropriation funds continued development and testing of national and theater missile defense systems, including nearly \$1 billion (\$953 million) for development of a national missile defense system.

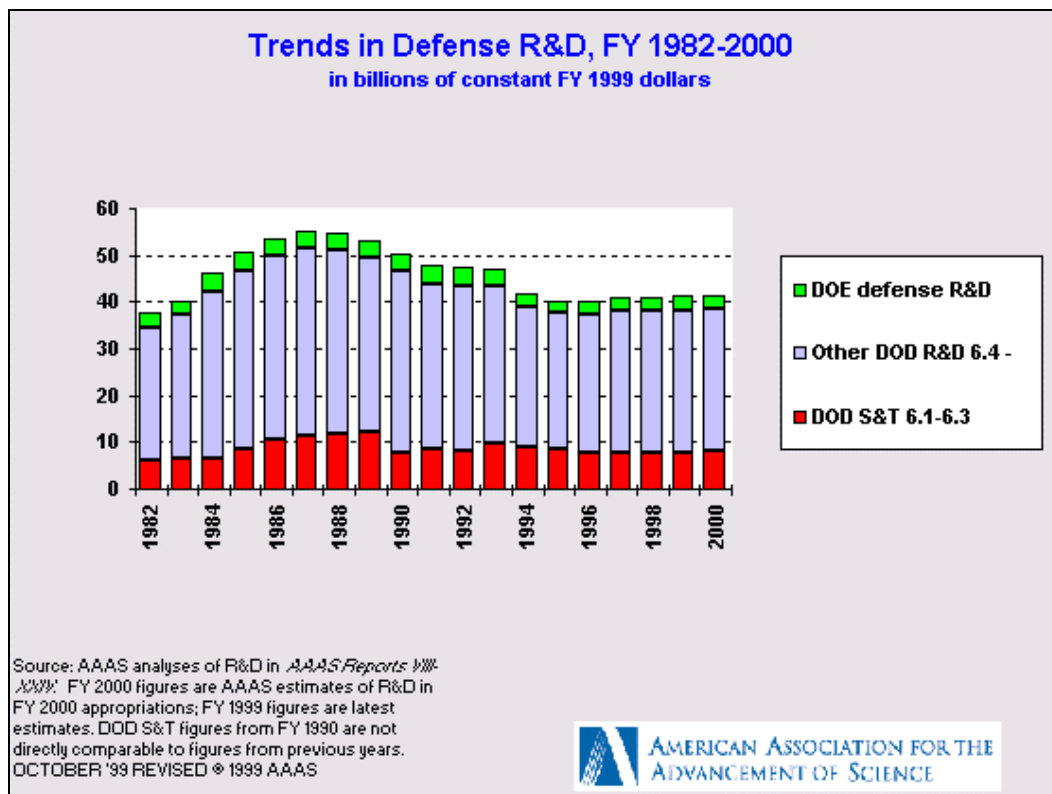


Figure 3.

On the House floor, the most controversial part of the bill was its proposed deletion of procurement funds for the **F-22** fighter for a savings of \$1.8 billion. The House bill would have funded \$1.2 billion for continued R&D on prototypes for the F-22, while the Senate bill would have funded both procurement and R&D. The House-Senate conference agreement keeps the F-22 program alive, but delays procurement and provides extra funds for continued development and prototype testing in a special transfer account. The final Defense bill provides nearly \$2 billion in development funds for the F-22.

Total defense-related R&D, including defense-related R&D in the Department of Energy (DOE) as well as DOD's R&D, is on the upswing after a decade of post-Cold War cuts. As shown in Table C, DOE's atomic weapons R&D received a generous 5.2 percent increase for a total of \$3.4 billion. **Total defense R&D is \$42.7 billion in FY 2000, an increase of \$1.5 billion or 3.5 percent** above the FY 1999 level. In recent years, because of small increases in DOD's development accounts and large percentage increases in DOE's defense R&D, total defense R&D has increased slightly in real terms after bottoming out in FY 1996 from a steep post-Cold War drop (see Figure 3). In FY 2000, the increase extends to the DOD S&T accounts, which have languished in recent years.

The House approved the Defense bill on October 13, and the Senate is expected to approve it this week. President Clinton is expected to sign it into law later this week or early next week.

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**Table A. Department of Defense by Program
House-Senate Conference on R&D in the FY 2000 Budget
(budget authority in millions of dollars)**

	FY 1999 Estimate	FY 2000 Request	House-Senate Conference				
			FY 2000 CONF.	Chg. from Request Amount	Percent	Chg. from FY 1999 Amount	Percent
Research, Development, Test, and Evaluation:							
Basic Research ("6.1")	1,108	1,113	1,172	59	5.3%	64	5.8%
Applied Research ("6.2")	3,151	2,959	3,401	442	14.9%	250	7.9%
Total Research, or Tech. Base	4,259	4,072	4,573	501	12.3%	314	7.4%
Advanced Tech. Dev. ("6.3")	3,532	3,314	3,837	523	15.8%	304	8.6%
Total Science and Technology	7,791	7,386	8,410	1,023	13.9%	619	7.9%
Demonstration/Validation ("6.4")	7,237	5,580	6,561	980	17.6%	-676	-9.3%
Engineering and Manuf. Dev. ("6.5")	7,931	7,538	8,656	1,118	14.8%	725	9.1%
RDT&E Management Support ("6.6")	2,930	2,406	2,560	154	6.4%	-370	-12.6%
Operational Systems Dev. ("6.7")	11,554	11,465	12,147	682	6.0%	593	5.1%
BA Adjustment	-38	0	0	--	--	--	--
TOTAL RDT&E	37,405	34,375	38,333	3,958	11.5%	929	2.5%
Other appropriations ¹	570	690	650	-40	-5.8%	80	14.0%
Medical research ²	0	0	275	275	--	275	--
Total DOD R&D	37,975	35,065	39,258	4,193	12.0%	1,284	3.4%

AAAS estimates. Includes conduct of R&D and R&D facilities.

Adjusted to reflect general reductions, rescissions, supplementals, and emergency appropriations.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

FY 2000 Conference figures adjusted to reflect general reductions to RDT&E accounts.

¹ R&D support in military personnel, military construction, and other DOD appropriations.

Includes chemical agents and munitions destruction R&D funded outside RDT&E.

² The final Defense bill appropriates some medical research and development in a separate account. In FY 1999, these programs are funded in the Army ("6.3").

Based on House-Senate conference funding levels.

These figures are final unless additional appropriations or rescissions are enacted in an omnibus appropriations bill.

**Table B. Department of Defense by Agency
House-Senate Conference on R&D in the FY 2000 Budget
(budget authority in millions of dollars)**

	FY 1999 Estimate	FY 2000 Request	House-Senate Conference				
			FY 2000 CONF.	Chg. from Request		Chg. from FY 1999	
				Amount	Percent	Amount	Percent
Research, development, test, and evaluation:							
Army	5,032	4,426	5,247	821	18.5%	215	4.3%
Navy	8,640	7,984	9,055	1,071	13.4%	415	4.8%
Air Force	13,683	13,078	14,305	1,227	9.4%	622	4.5%
Defense Agencies	9,757	8,609	9,430	820	9.5%	-327	-3.4%
<i>Defense Adv. Res. Projects Agcy.</i>	1,930	2,003	1,856	-147	-7.3%	-75	-3.9%
<i>Ballistic Missile Defense Org.</i>	3,845	2,944	3,442	498	16.9%	-403	-10.5%
<i>Other</i>	3,982	3,662	4,132	470	12.8%	150	3.8%
Director of Test and Evaluation	259	253	266	13	4.9%	7	2.8%
Director of Operational Test & Eval.	34	24	31	7	28.6%	-3	-8.2%
TOTAL RDT&E	37,405	34,375	38,333	3,958	11.5%	929	2.5%
Other appropriations ¹	570	690	650	-40	-5.8%	80	14.0%
Medical research ²	0	0	275	275	--	275	--
Total DOD R&D	37,975	35,065	39,258	4,193	12.0%	1,284	3.4%

AAAS estimates. Includes conduct of R&D and R&D facilities.

Adjusted to reflect general reductions, rescissions, supplementals, and emergency appropriations.

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Table C. DOE Atomic Energy Defense Activities

	FY 1999 Estimate	FY 2000 Request	House-Senate Conference				
			FY 2000 CONF.	Chg. from Request		Chg. from FY 1999	
				Amount	Percent	Amount	Percent
Naval Reactors	650	644	657	13	2.0%	7	1.1%
Weapons Activities	2,180	2,390	2,350	-40	-1.7%	170	7.8%
<i>(Stockpile Stewardship)</i>	2,116	2,286	2,250	-36	-1.6%	134	6.4%
- <i>ASCI 3</i>	301	341	316	-25	-7.3%	15	5.0%
- <i>Inertial Confinement Fusion</i>	219	218	228	10	4.6%	8	3.8%
- <i>National Ignition Facility</i>	284	248	248	0	0.0%	-36	-12.7%
- <i>All Other Stockpile Steward.</i>	1,312	1,480	1,459	-21	-1.4%	147	11.2%
Nuclear Safeguards & Security	24	27	37	10	36.4%	14	58.6%
Intelligence	4	4	4	0	0.0%	0	0.0%
Nonproliferation & Verification R&D	187	191	191	0	0.0%	4	1.9%
Fissile Materials Disposition	54	53	53	0	0.0%	-1	-1.9%
Environmental Management	135	108	108	0	0.0%	-27	-20.0%
TOTAL Atomic Defense	3,234	3,417	3,400	-17	-0.5%	167	5.2%
Total Defense R&D (DOD+DOE)	41,208	38,483	42,659	4,176	10.9%	1,450	3.5%

AAAS estimates. Includes conduct of R&D and R&D facilities.

¹ Accelerated Strategic Computing Initiative.