

Trends in DOD Basic Research Support

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DoD Support for Basic Research

- *1946, Office of Naval Research (ONR) established by Vice Admiral Harold Bowen to “support advanced research in nuclear physics and other topics of interest to the Navy”*
 - *Organized to counter fears that government sponsorship of university research would be restrictive, burdened with bureaucratic rules, or subject to political pressures.*
 - *Scientists were encouraged to propose their own projects*
 - *No progress reports were required - refereed publication in the open literature was sufficient evidence of progress*
 - *Funding for graduate assistants and faculty summer salary was allowed*
 - *Awards were multiyear and renewable*
 - *Permitted full payment of overhead costs (following wartime practice)*
 - *National security focus deterred geographical distribution issues*
- *1951, Army Research Office (ARO) established*
- *1955, Air Force Office of Scientific Research (AFOSR) established*
- *1958, Defense Advanced Research Projects Agency (DARPA) established*



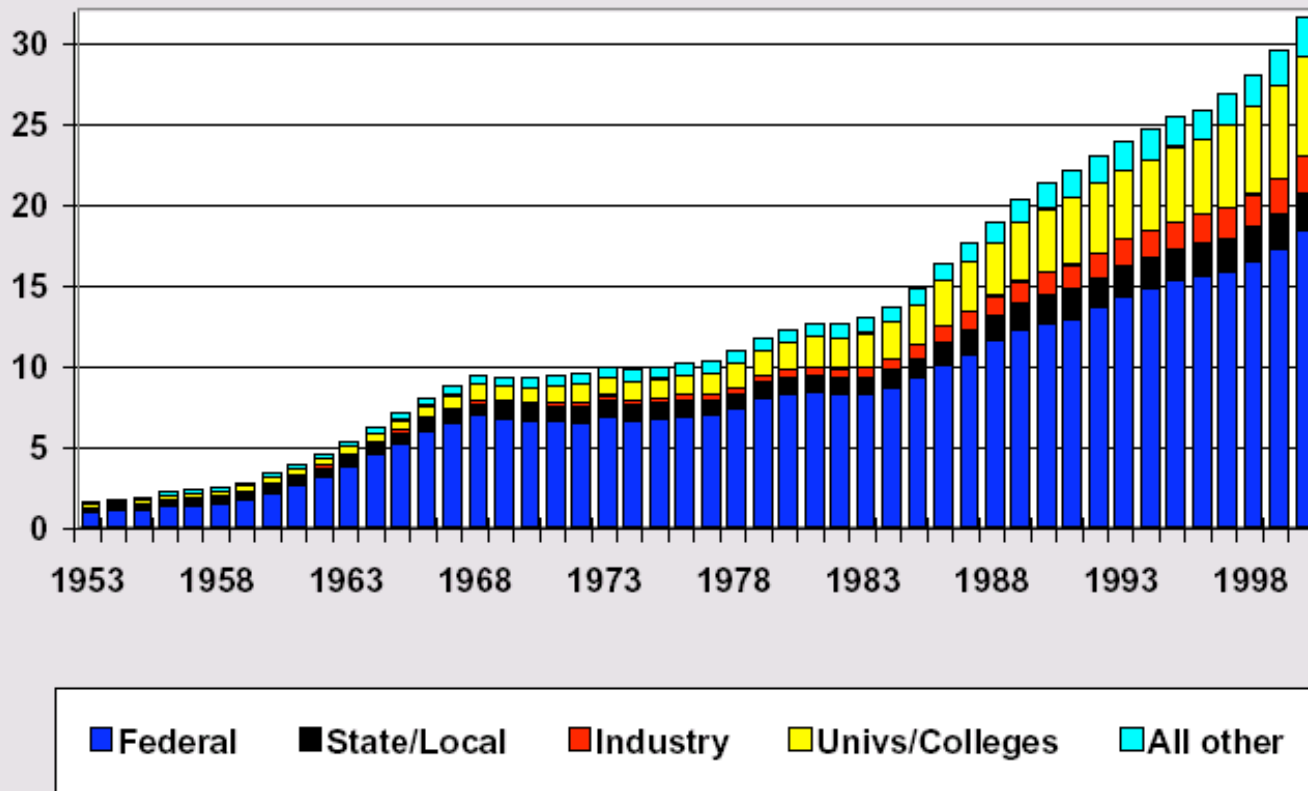
Two Modes of Scientific and Engineering Research

- *Exploratory Research (Curiosity Driven)*
 - *Direction Determined by Investigator*
 - *Sponsor Support Motivation*
 - *Opportunity-Driven*
 - *Need-Driven*
- *Problem Solving Research (Application Driven)*
 - *Direction Determined by the Sponsor*



R&D at Colleges and Universities by Source of Funds

in billions of constant FY 2002 dollars, FY 1953-2000

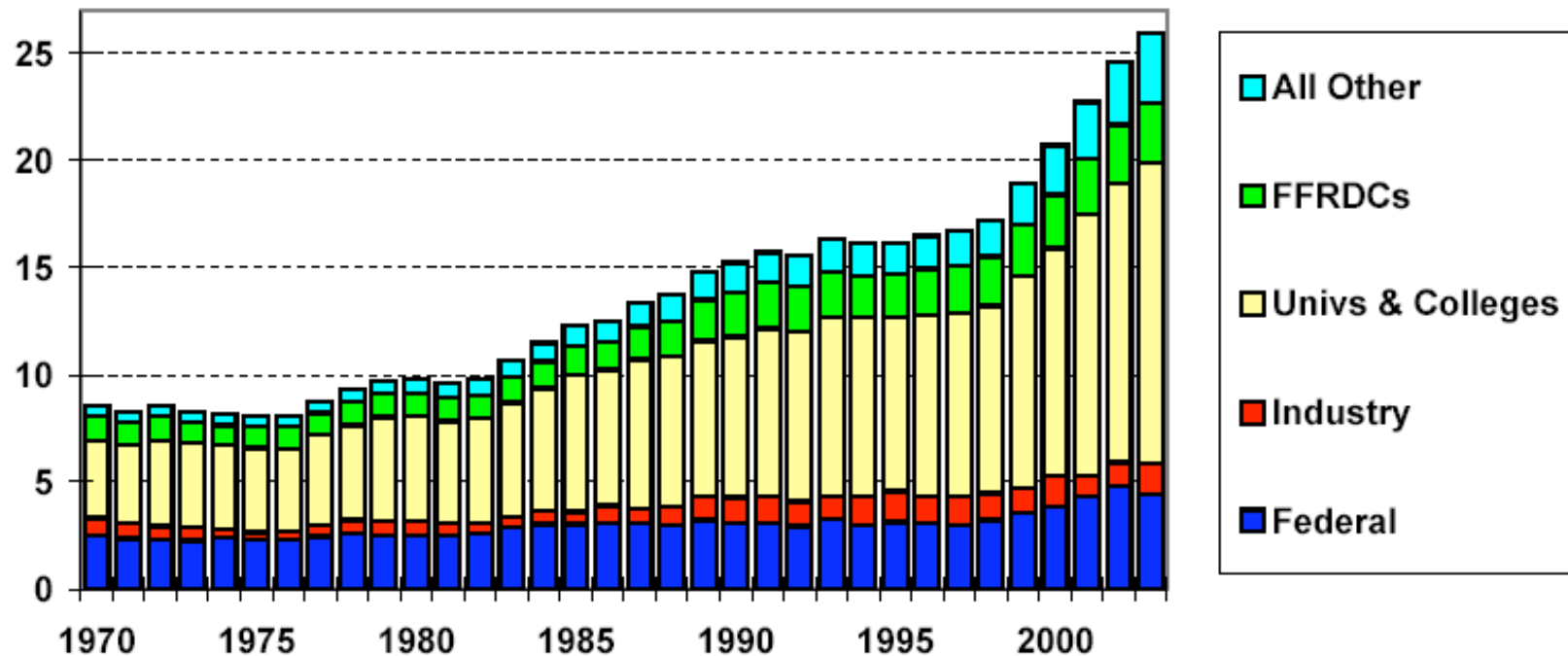


Source: National Science Foundation, Survey of Research and Development Expenditures at Universities and Colleges, Fiscal Year 2000, 2001. Constant-dollar conversions based on OMB's GDP deflators.
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Federal BASIC RESEARCH by Performer, FY 1970-2003

Obligations in billions of constant FY 2003 dollars



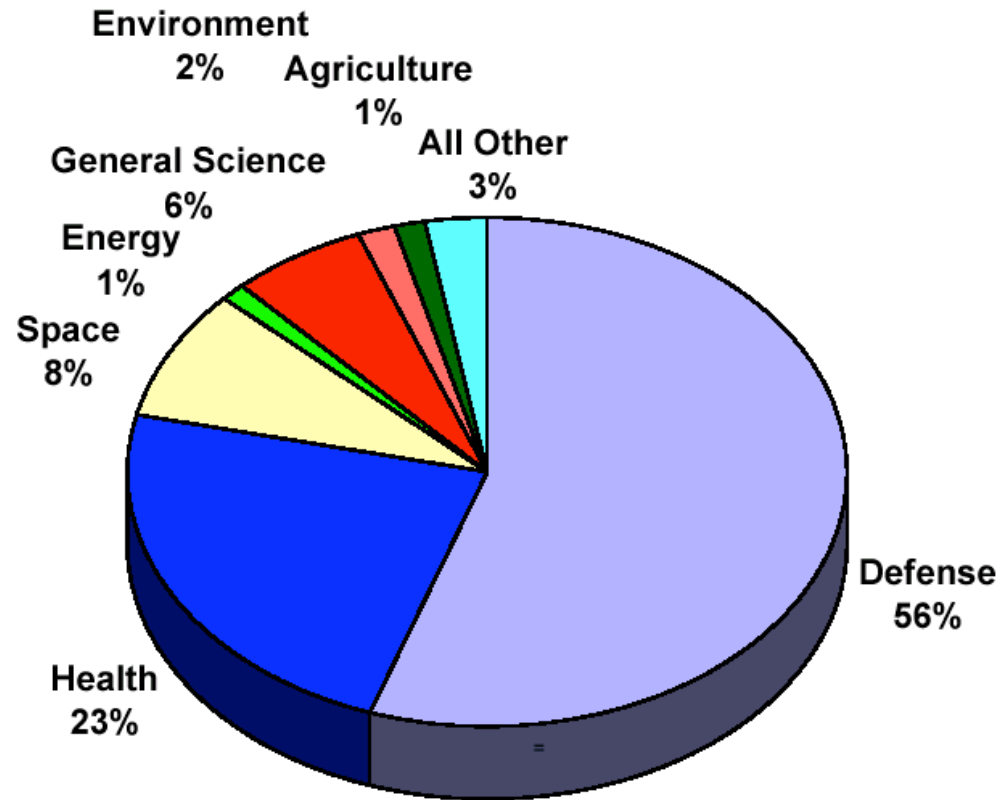
Source: National Science Foundation, *Federal Funds for Research and Development Fiscal Years 2001, 2002 and 2003* and *Federal Funds Historical Tables*, 2003. FY 2002 and 2003 data are preliminary.

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Major Functional Categories of R&D FY 2004 President's Budget



TOTAL R&D=
\$122.3
BILLION
(revised)

* - includes natural resources R&D

Source: AAAS, based on OMB and agency budget data.

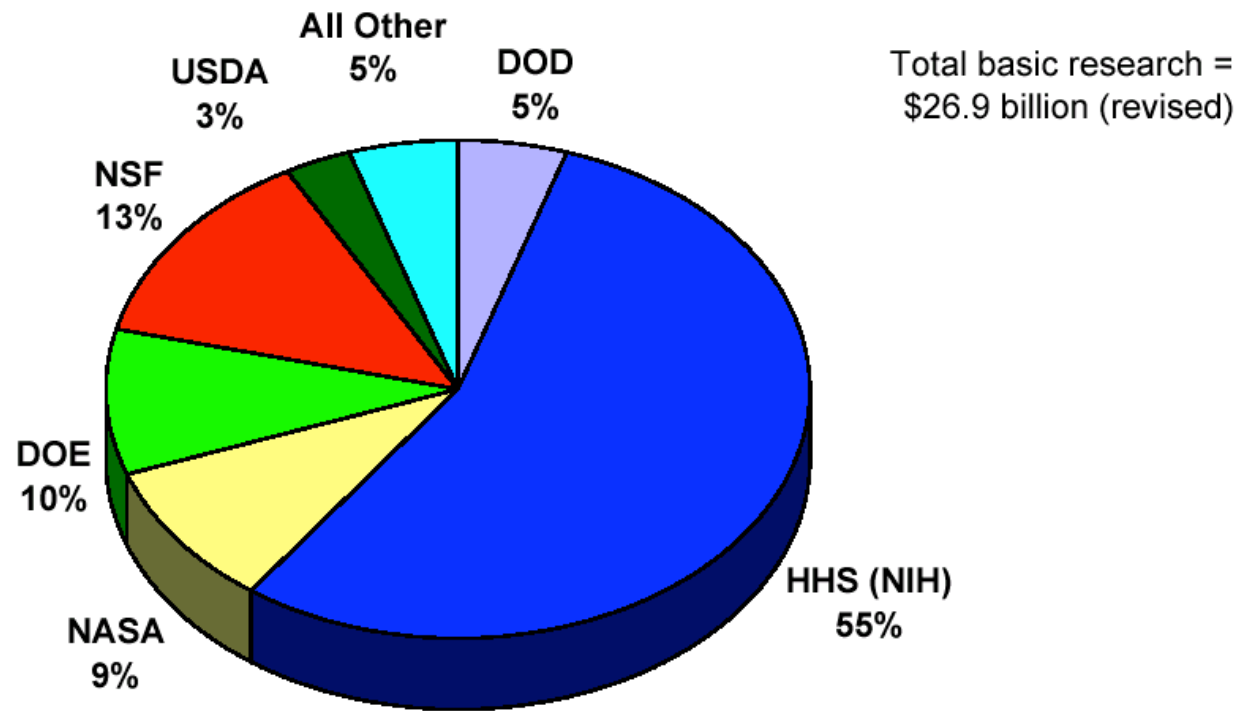
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Total BASIC RESEARCH by Agency: FY 2004 Proposed

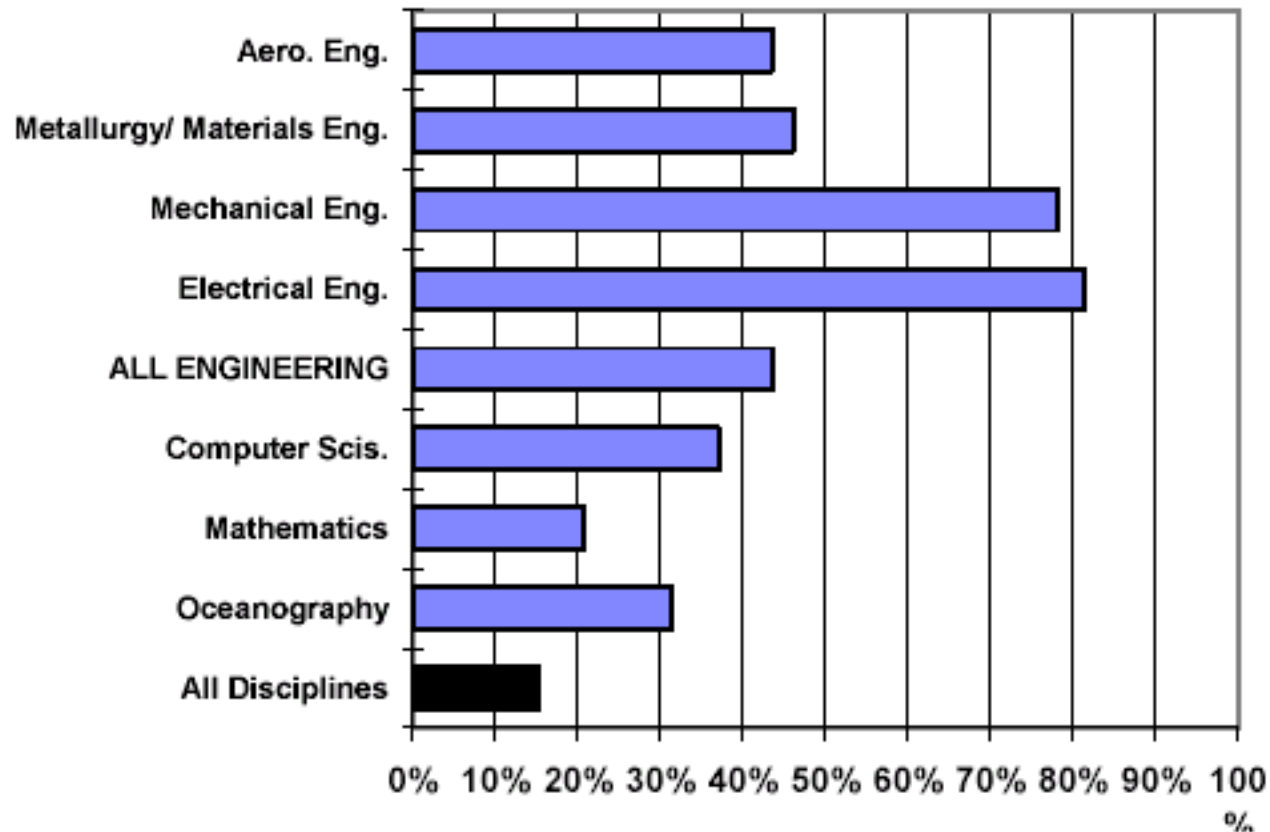
Budget Authority in billions of dollars



Source: AAAS, based on OMB R&D Budget Data and agency estimates for FY 2004.
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DOD Share of Federal Research by Selected Fields, FY 2001

% of total federal support



Source: National Science Foundation, SRS, *Federal Funds for Research and Development Fiscal Years 2001, 2002, and 2003*, 2003. Basic and applied research only. Development and R&D facilities are not classified by discipline. AUGUST '03 © 2003 AAAS



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FY04 DoD Research, Development, Test and Evaluation (RDT&E) Budget

Total FY04 RDT&E = \$65B
(6.1 thru 6.7)

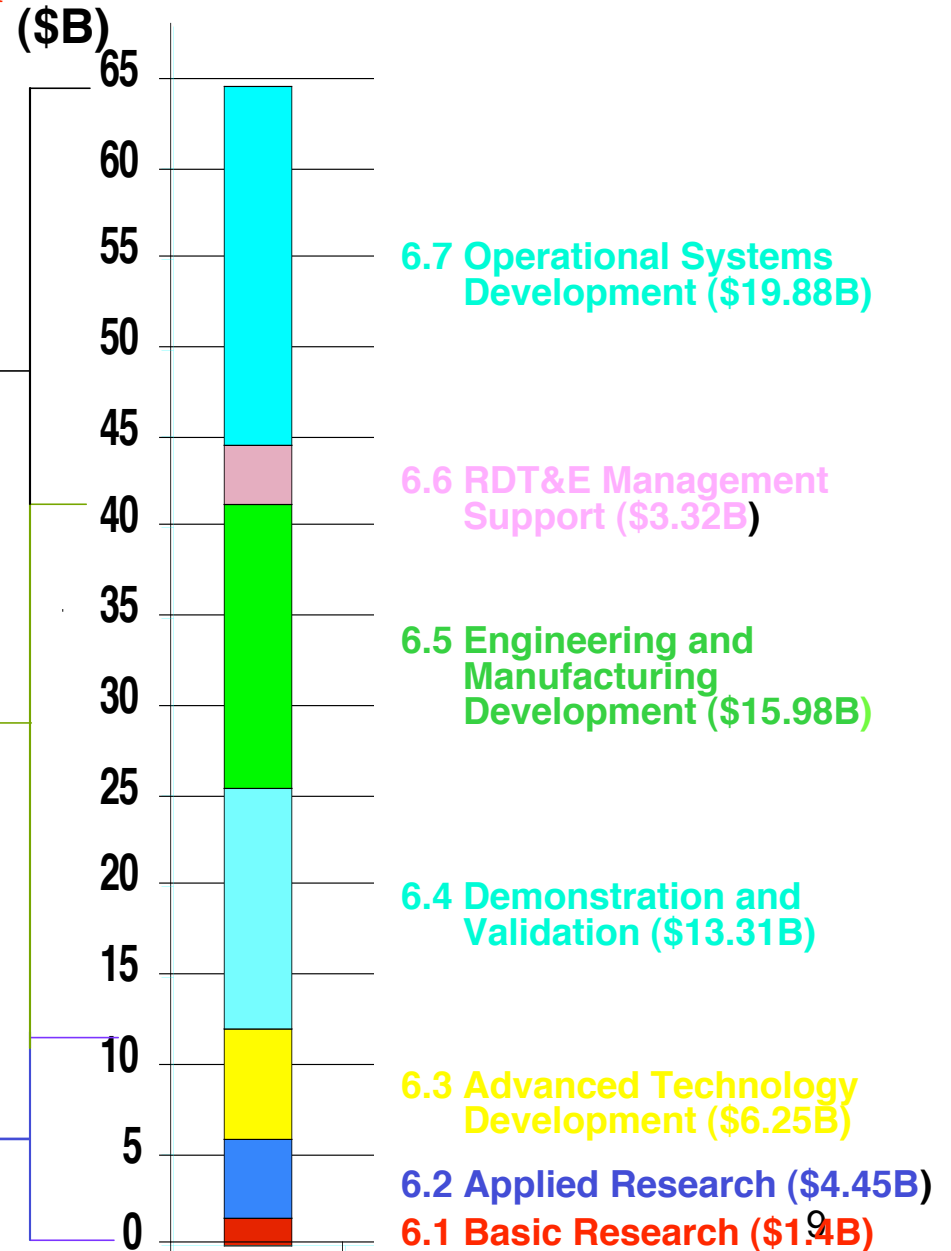
(6.6 + 6.7 = \$23.2B)

Development
(6.4 + 6.5 = \$29.3B)

S&T = 21.8% of RDT&E

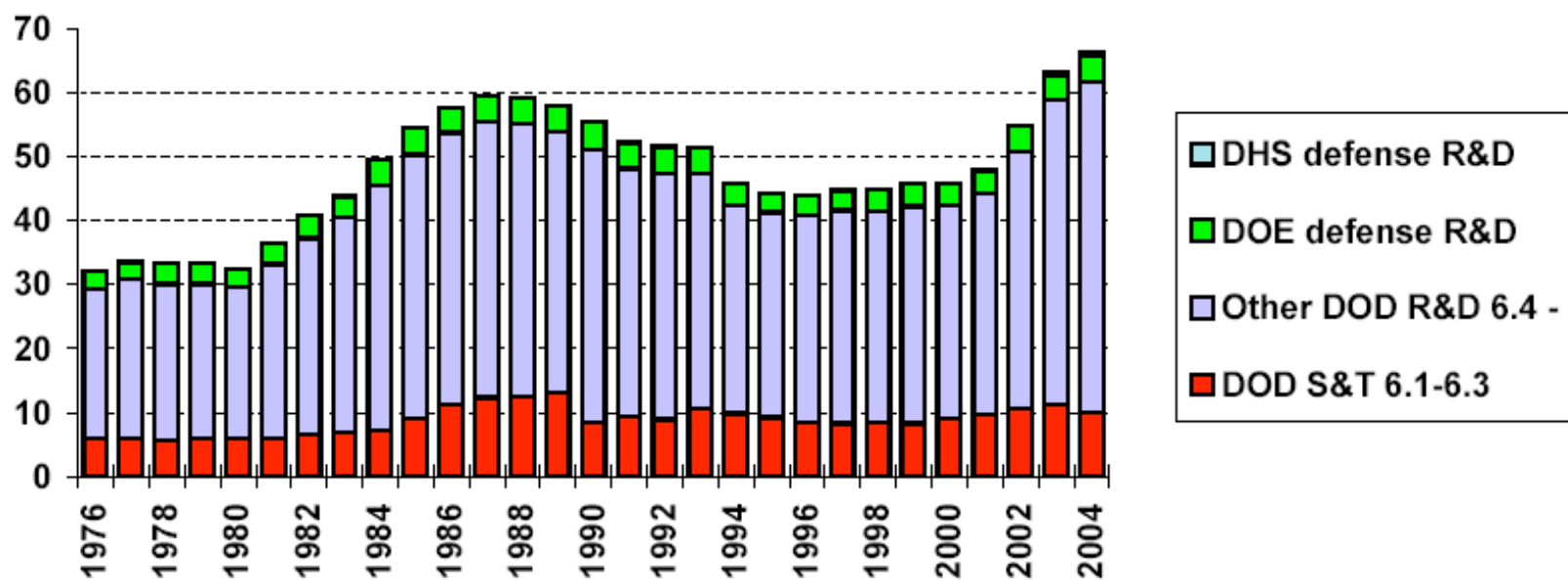
Science and Technology
(6.1 + 6.2 + 6.3 = \$12.1B)

Technology Base
(6.1 + 6.2 = \$5.9B)



Trends in Defense R&D, FY 1976-2004

in billions of constant FY 2003 dollars



Source: AAAS analyses of R&D in AAAS Reports I-XXVIII. FY 2004 figures are President's request; FY 2003 figures are latest estimates. DOD S&T figures are not strictly comparable for all years because of changing definitions. Includes conduct of R&D and R&D facilities.
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**Table A. Department of Defense by Program
House-Senate Conference on R&D in the FY 2004 Budget
(budget authority in millions of dollars)**

	FY 2003 Estimate	FY 2004 Request	FY 2004 CONF.	House-Senate Conference			
				Chg. from Request Amount	Percent	Chg. from FY 2003 Amount	Percent
Research, Development, Test, and Evaluation:							
Basic Research ("6.1")	1,417	1,309	1,404	96	7.3%	-13	-0.9%
Applied Research ("6.2")	4,289	3,670	4,445	775	21.1%	156	3.6%
Total Research, or Tech. Base	5,706	4,979	5,849	871	17.5%	143	2.5%
Advanced Tech. Dev. ("6.3")	5,067	5,253	6,245	993	18.9%	1,178	23.3%
Total Science and Technology	10,773	10,231	12,094	1,863	18.2%	1,322	12.3%
Adv. Component Dev. ("6.4")	10,754	13,197	13,306	109	0.8%	2,551	23.7%
System Dev. And Demon. ("6.5")	14,503	15,913	15,976	63	0.4%	1,473	10.2%
Management Support ("6.6")	3,106	3,028	3,323	296	9.8%	218	7.0%
Operational Systems Dev. ("6.7")	18,628	19,458	19,884	426	2.2%	1,257	6.7%
BA Adjustment	-227	0	0	0	--	--	--
TOTAL RDT&E	57,536	61,827	64,584	2,757	4.5%	7,047	12.2%
Other appropriations ¹	701	928	928	0	0.0%	227	32.4%
Medical research ²	459	66	486	421	639.2%	27	6.0%
Total DOD R&D	58,696	62,821	65,998	3,177	5.1%	7,302	12.4%
DOD S&T ("6.1" - "6.3" & medical)	11,232	10,297	12,581	2,284	22.2%	1,349	12.0%

AAAS estimates based on FY 2004 appropriations bills. Includes conduct of R&D and R&D facilities.

FY 2003 and FY 2004 request figures based on OMB R&D data and supplemental agency budget data.

FY 2003 figures adjusted to reflect rescissions and supplementals enacted in Public Laws 108-2 and 108-11.

FY 2004 Conference figures adjusted to reflect general reductions contained in the FY 2004 Defense conference report.

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

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 Medical research appropriated in Defense Health Programs, not RDT&E. These funds are not included in "6.2."

September 29, 2003 - House-Senate conference funding levels.

These funding levels are final unless the conference report is vetoed.

Table C. Department of Defense S&T by Agency
House-Senate Conference on R&D in the FY 2004 Budget
(budget authority in millions of dollars)

	FY 2003 Estimate	FY 2004 Request	House-Senate Conference				
			FY 2004 CONF.	Chg. from Request Amount	Chg. from Request Percent	Chg. from FY 2003 Amount	Chg. from FY 2003 Percent
"Science and Technology" (S&T; "6.1" through "6.3" plus medical research)							
Army	2,143	1,790	2,665	875	48.9%	522	24.4%
- Basic Research ("6.1") *	244	343	382	39	11.2%	137	56.1%
- Applied Research ("6.2")	858	641	1,073	432	67.4%	216	25.2%
- Advanced Tech. Dev. ("6.3")	1,040	806	1,210	404	50.2%	169	16.3%
Navy	2,031	1,714	2,217	503	29.3%	186	9.2%
- Basic Research ("6.1") *	412	457	484	28	6.0%	72	17.4%
- Applied Research ("6.2")	806	536	724	188	35.1%	-82	-10.1%
- Advanced Tech. Dev. ("6.3")	813	722	1,009	287	39.8%	196	24.1%
Air Force	1,751	2,226	2,322	96	4.3%	571	32.6%
- Basic Research ("6.1") *	218	322	331	9	2.9%	113	52.0%
- Applied Research ("6.2")	829	758	897	139	18.3%	68	8.2%
- Advanced Tech. Dev. ("6.3")	704	1,146	1,094	-52	-4.6%	390	55.4%
Defense Agencies	4,839	4,488	4,877	389	8.7%	38	0.8%
- Basic Research ("6.1") *	542	187	207	20	10.9%	-335	-61.8%
- Applied Research ("6.2")	1,796	1,735	1,751	16	0.9%	-45	-2.5%
- Advanced Tech. Dev. ("6.3")	2,501	2,566	2,920	353	13.8%	419	16.7%
Operational Test & Evaluation ("6.3")	9	13	13	0	-0.9%	4	48.1%
TOTAL "6.1" through "6.3"	10,773	10,231	12,094	1,863	18.2%	1,322	12.3%
Medical research ¹	459	66	486	421	639.2%	27	6.0%
DOD S&T ("6.1" - "6.3" + medical)	11,232	10,297	12,581	2,284	22.2%	1,349	12.0%

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* FY 2004 request proposes to transfer University Research Initiative and other program funds from Defense Agencies "6.1" to Army, Navy, and Air Force "6.1" accounts. FY 2004 Defense conference report follows this proposal.

¹ Medical research appropriated in Defense Health Programs, not RDT&E.

September 29, 2003 - House-Senate conference funding levels.

These funding levels are final unless the conference report is vetoed.

DoD and Basic Research Support (FY04)

- *Several Basic Research (6.1) Programs were Devolved from OSD to Services in FY04*
 - *URI, High-Energy Lasers,*
- *Congress is concerned:*
 - *Conference report: “The department’s investment in basic research provides the foundation upon which our modern military is built. It is critical the basic research investment remain strong, stable, and focused on the fundamental search for new knowledge.”*
 - *Requiring a report for any reduction or reprogramming of funds*
 - *Ordered a study by the NRC on DoD Basic Research*

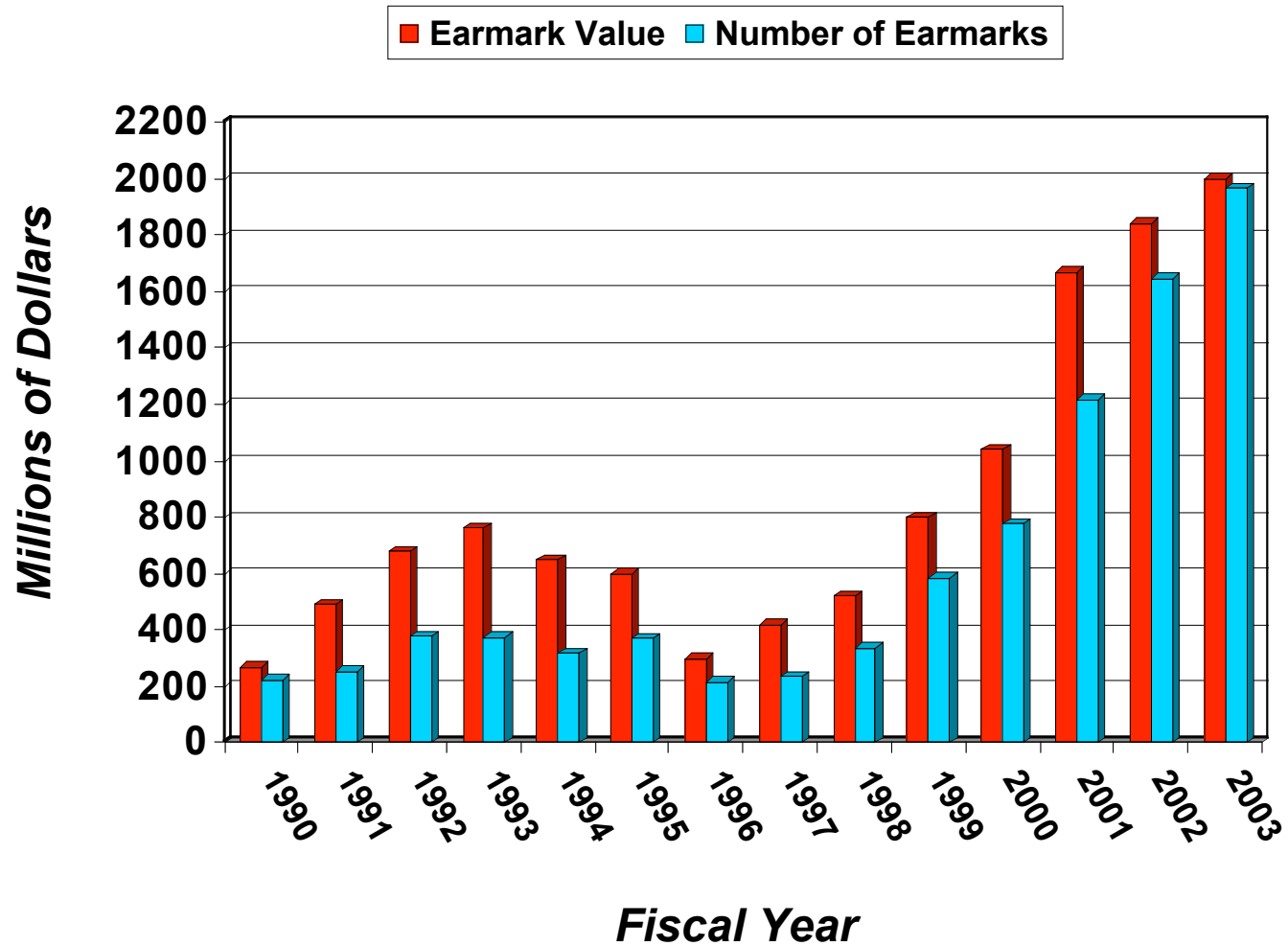


Two Main Basic Research Problems

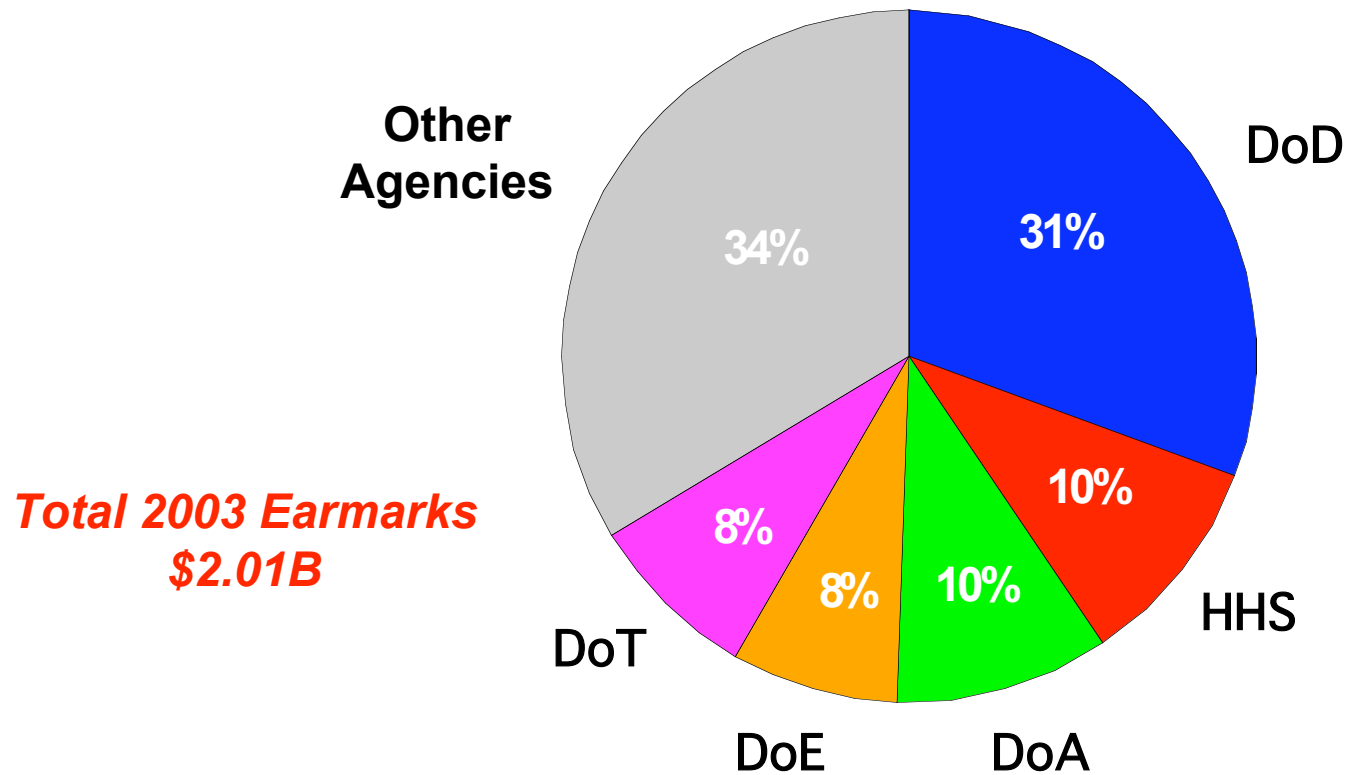
- *Budget!*
 - *Declining*
- *Use*
 - *Diverted to non 6.1 projects*
 - *Near term, applied projects*
 - *'Bill payer' for 'pet' projects*



Earmarks to Academic Institutions



FY 2003 Earmark Distribution



Earmarks and Agencies

- *Government Program Managers very much dislike earmarks.*
- *Why?*
 - *It circumvents their strategic planning process*
 - *The process takes control of their programs away from them (quite often Congress will ‘fence’ the project...not provide the money)*
 - *They lose flexibility and their ability to ‘fund the best’*



Student Challenges

- *International Students*
 - *Currently, about 50% of graduate enrollments*
 - *U.S. academic system would essentially collapse without them*
- *Visa Problems Increasing*
 - *Applications declining*
- *ITAR Restrictions*

