Federal R&D Investments in the 2009 Budget

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October 12, 2008

for SRA International Annual Meeting

AAAS R&D Budget and Policy Program

http://www.aaas.org/spp/rd

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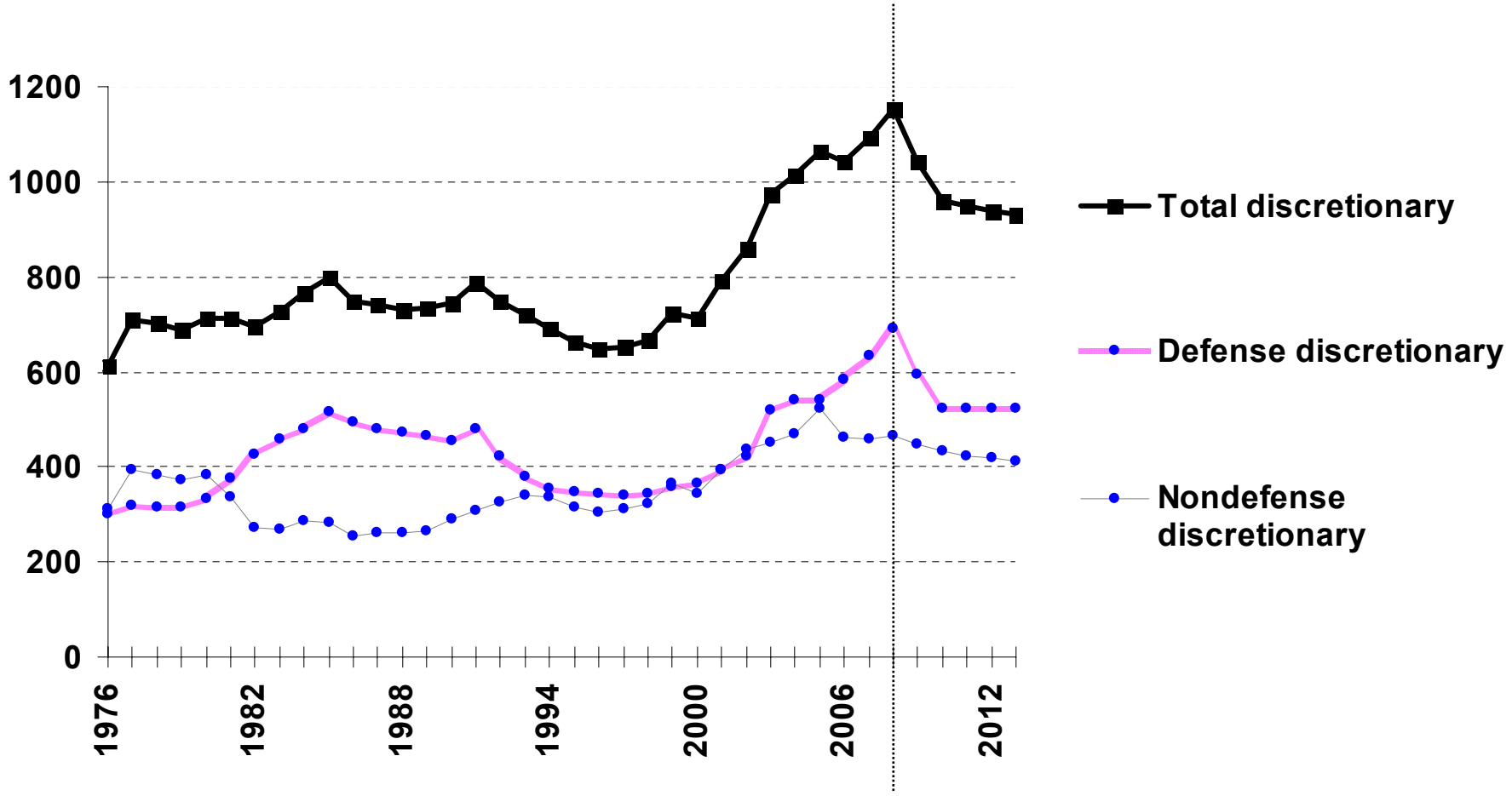
THE FY 2009 BUDGET SITUATION

- The federal government will have record budget deficits in 2008 and 2009.
- To help control the deficit, the President proposes to keep domestic appropriations flat in 2009.
- Domestic appropriations barely kept pace with inflation in 2006, 2007, and 2008.
- Historically, federal R&D investments have closely tracked trends in discretionary spending.
- Entitlement spending will grow dramatically in the next few years as the baby-boom generation hits retirement age, and the financial rescue bill will add hundreds of billions of dollars over the next few years.
- Future war costs are a big unknown.

Trends in Discretionary Spending, FY 1976-2013

in billions of constant FY 2008 dollars



Data in fiscal years. Source: *Budget of the United States Government, FY 2009.* FY 2008 data are estimates. FY 2009-2013 data are budget projections. FY 2009-2013 figures exclude Iraq and Afghanistan military costs.

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THE FY 2009 BUDGET

FY 2009 has started, but only 3 departments (DOD, DHS, VA) have their final 2009 budgets.

The remaining federal agencies are operating under a CR (continuing resolution) at or below 2008 levels through March 6.

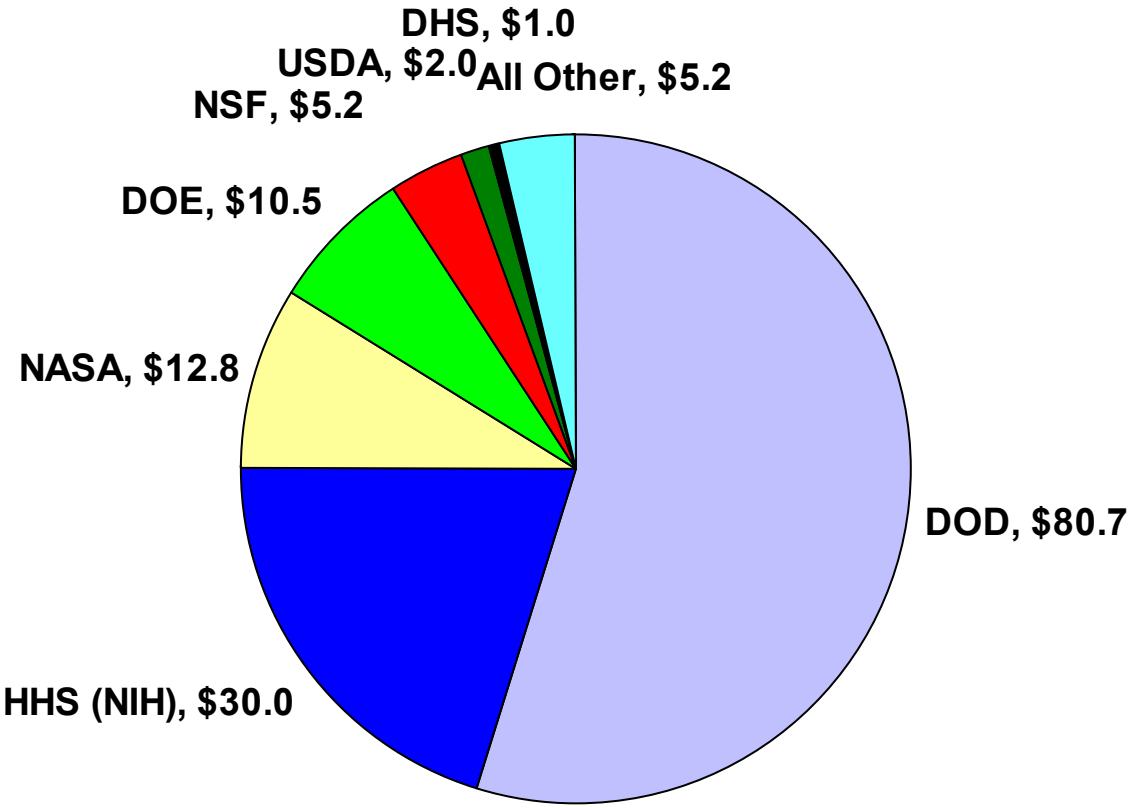
Because President Bush threatened to veto any appropriations bills that exceed his request, Congress has delayed the bills, which would collectively add $21 billion to the request for domestic programs.

The next Congress plans to send the remaining 9 (of 12) appropriations bills to a new President.

Congress may still approve 2009 supplementals for NIH, DOE, and others as part of an economic stimulus package, but hopes are fading.

Total R&D by Agency: FY 2009 Proposed

Budget Authority in billions of dollars

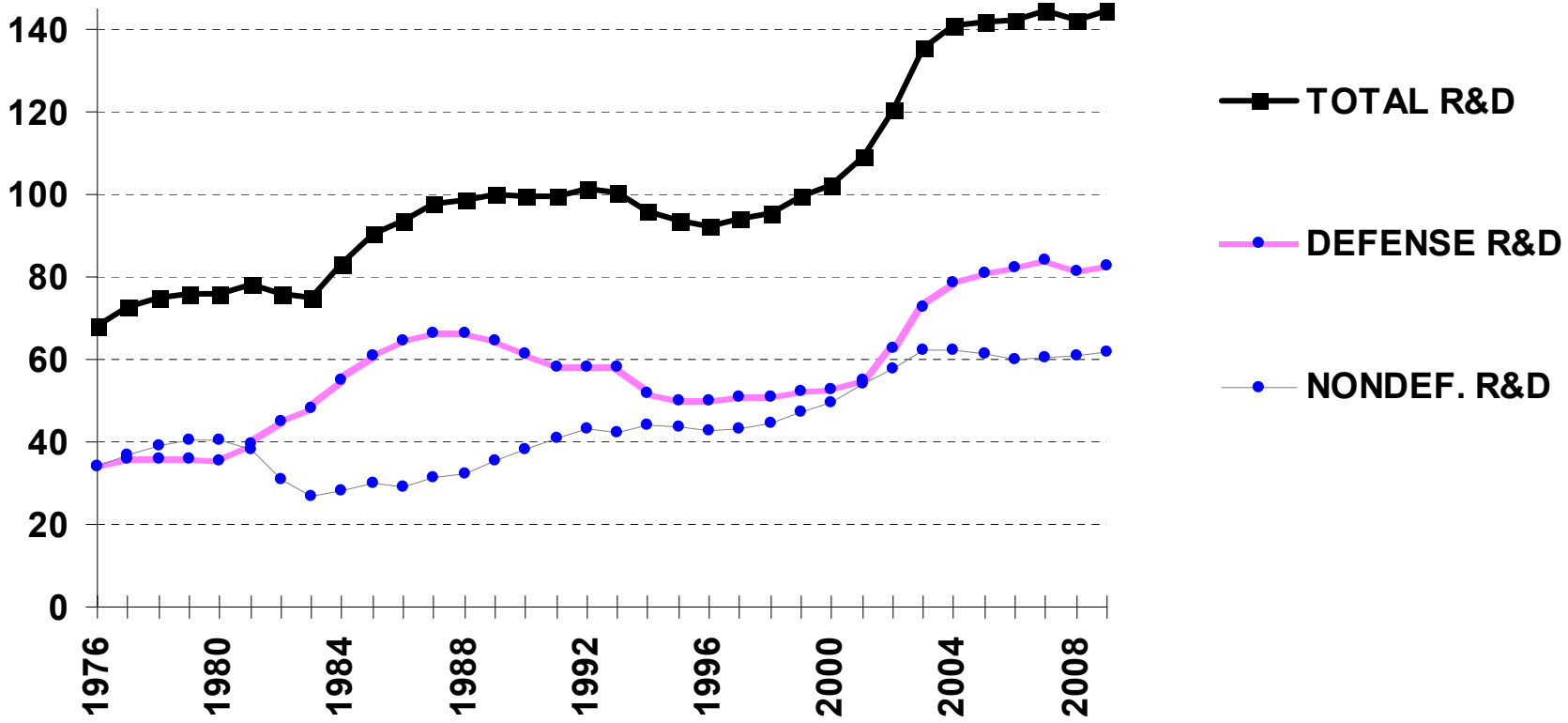


Total R&D = $147.4 billion (revised)

Source: AAAS, based on OMB R&D Budget Data and agency estimates for FY 2009.

Trends in Federal R&D, FY 1976-2009 *

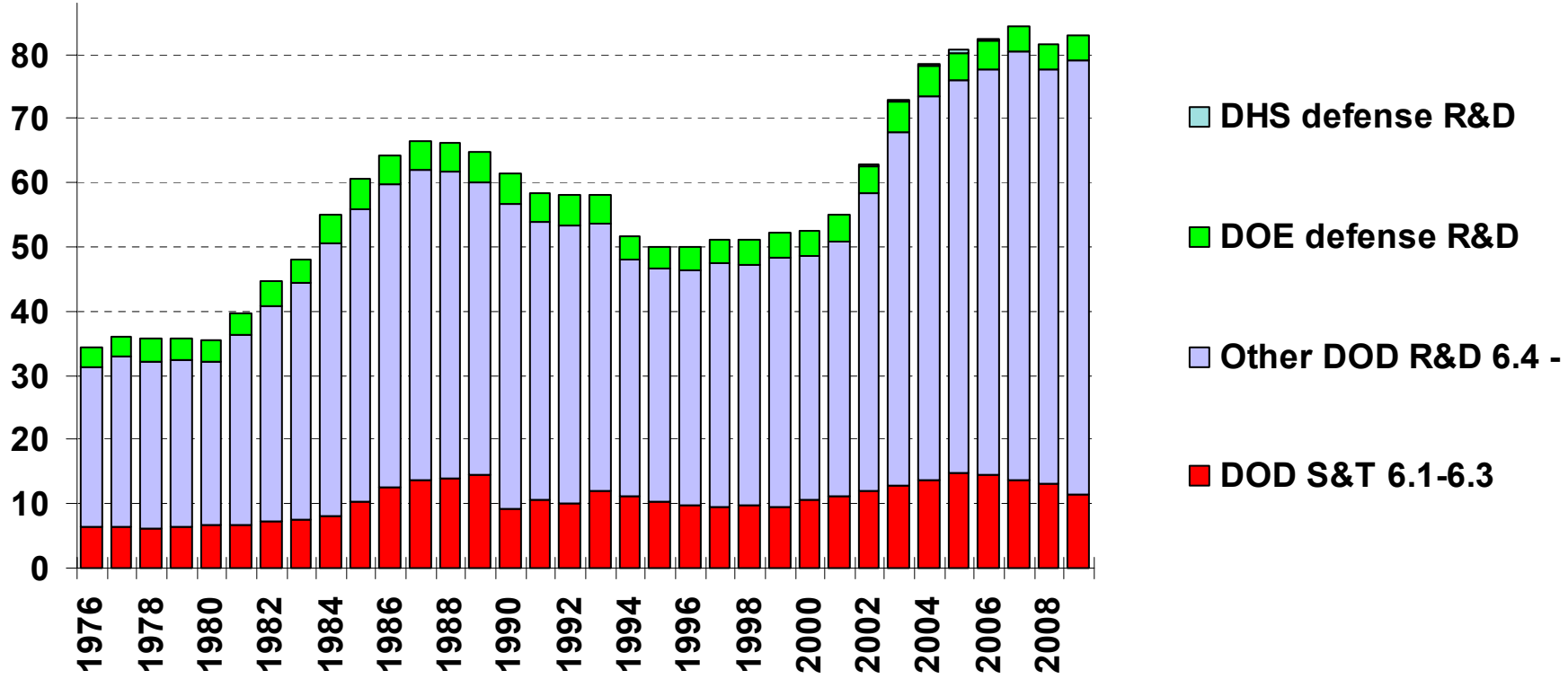
in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in *AAAS Reports VIII-XXXIII.* * FY 2009 figures are latest AAAS estimates of FY 2009 request.
R&D includes conduct of R&D and R&D facilities.
MARCH '08 REVISED

Trends in Defense R&D, FY 1976-2009 *

in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in annual R&D reports. * - FY 2009 figures are latest AAAS estimates of FY 2009 request. FY 2008 figures exclude pending supplementals. R&D includes conduct of R&D and R&D facilities. DOD S&T figures are not comparable for all years because of changing definitions.

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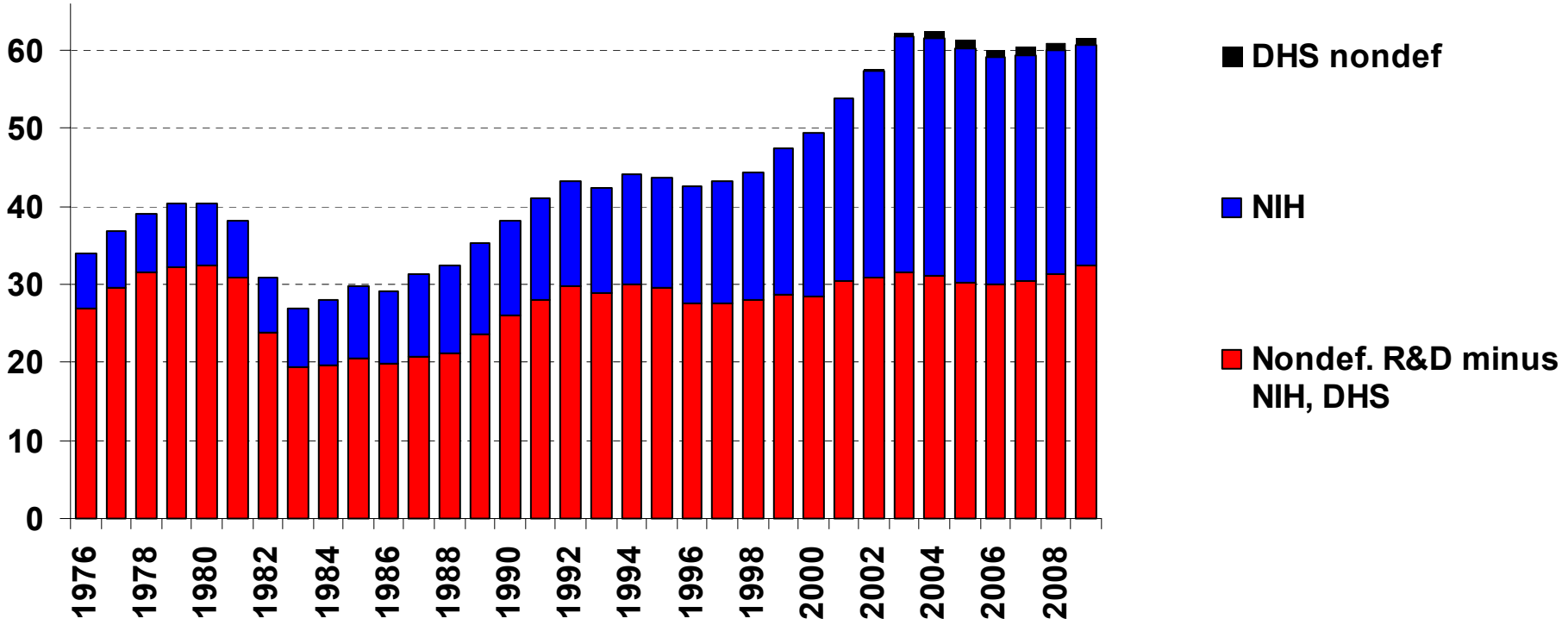
Selected Trends in Nondefense R&D, FY 1976-2009*

in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in *AAAS Reports VIII-XXXIII.* * FY 2009 figures are latest AAAS estimates of FY 2009 request.
R&D includes conduct of R&D and R&D facilities.

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THEMES IN THE BUDGET: INNOVATION AND COMPETITIVENESS

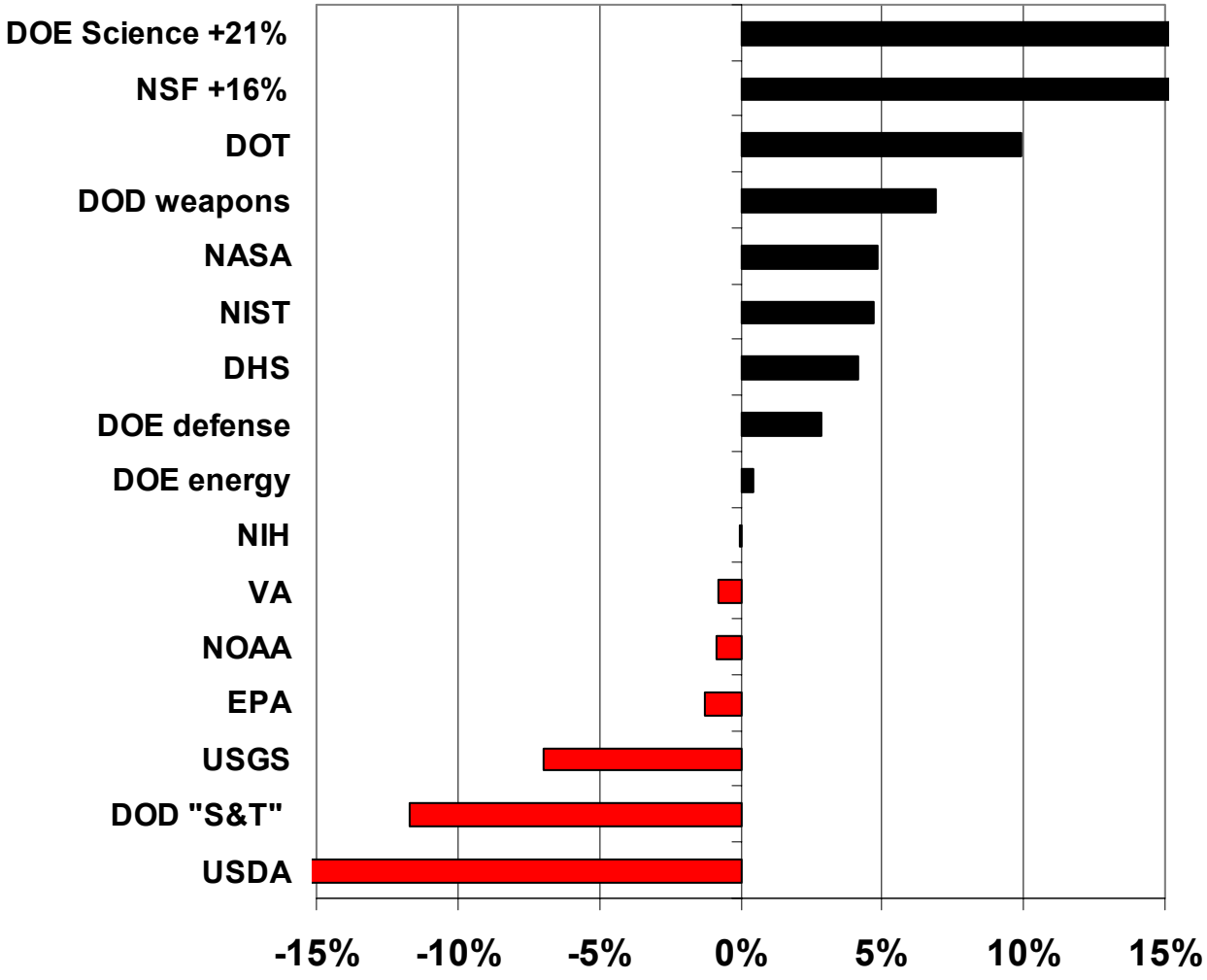
- In response to the "Gathering Storm" report and others, President Bush announced the American Competitiveness Initiative (ACI) in his 2006 State of the Union address.
- There are also several congressional responses, culminating in the America COMPETES Act of August 2007, an authorization bill.
- For R&D investments, the theme is boosting federal support for basic research in the physical sciences (broadly defined).
- The plan: Doubling the budgets of NSF, DOE Office of Science, and the NIST laboratories over 7 to 10 years. But 2007 and 2008 appropriations leave the plan off track despite COMPETES.

THE 2009 BUDGET FOR R&D

- The ACI continues for a third year, with large increases for NSF, DOE Science, and the NIST labs to catch up to a 10-year doubling track.
- Again, there would be large increases for DOD weapons and NASA spacecraft development, but also increases for most R&D programs.
- The NIH budget would be flat, agricultural and environmental R&D agencies would decline.
- Congress has a long way to go in finalizing 2009 appropriations, but is hoping to add money to the request.

FY 2009 R&D Request

Percent Change from FY 2008



Source: AAAS, based on OMB R&D data and agency estimates for FY 2009.
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.
DOD weapons = DOD R&D in "6.4" and higher categories.
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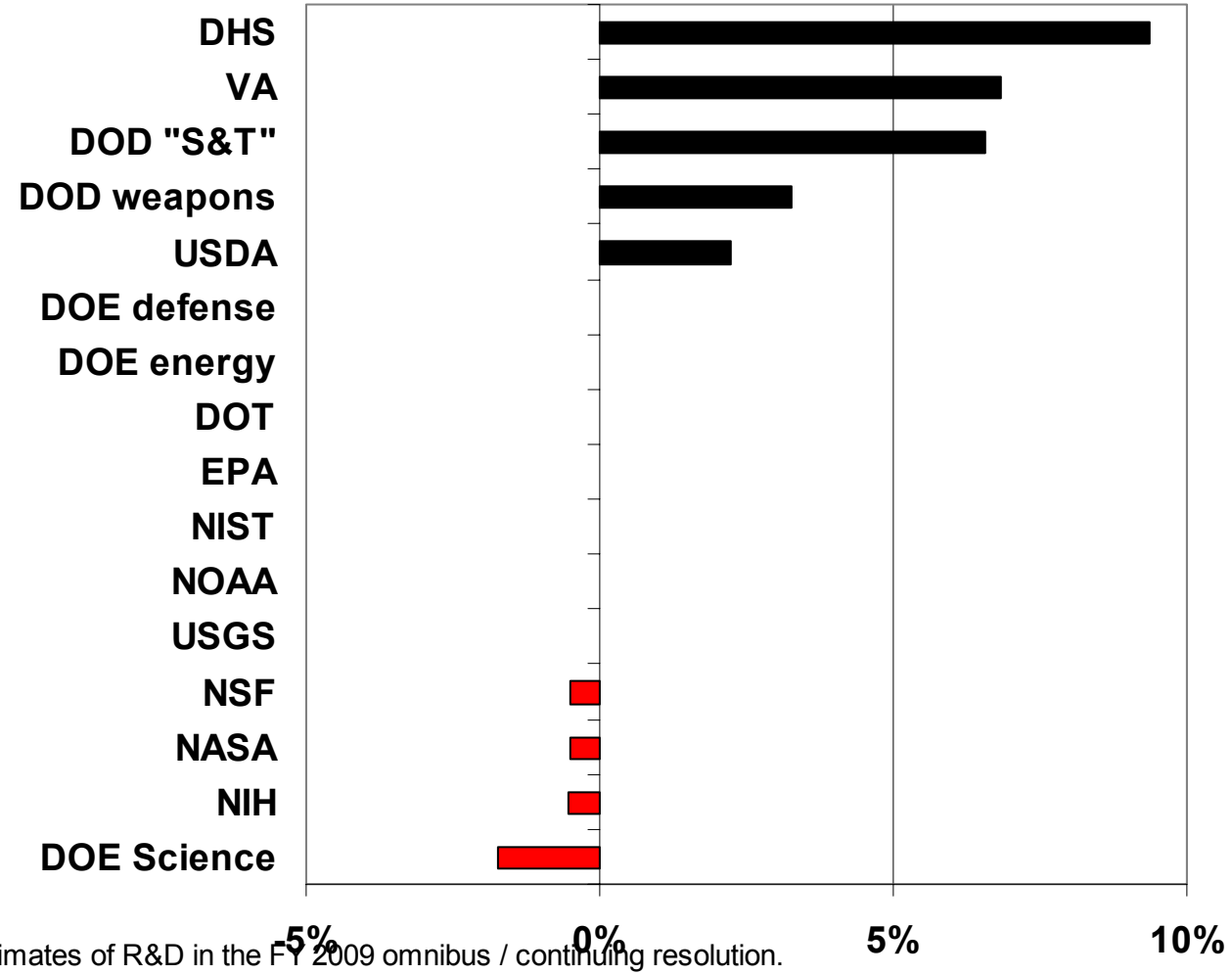
FY 2009 R&D Appropriations in the 2009 CR

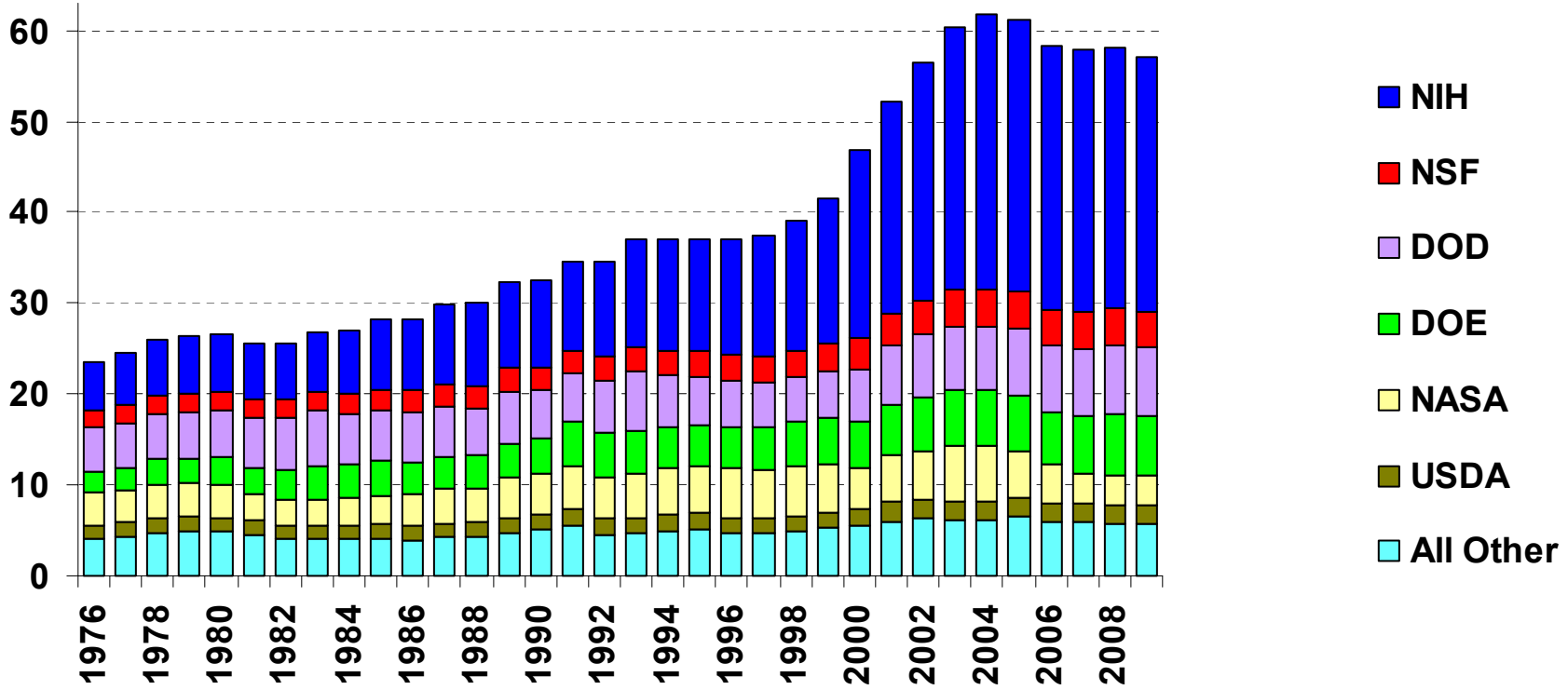
Percent Change from FY 2008 (as of SEPT. '08)



Source: AAAS estimates of R&D in the FY 2009 omnibus / continuing resolution.
Only DOD, VA, and DHS have final FY 2009 appropriations. The remaining agencies are funded temporarily through March 6 under the continuing resolution.
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.

Trends in Research by Agency, FY 1976-2009 (as of 9/08) *

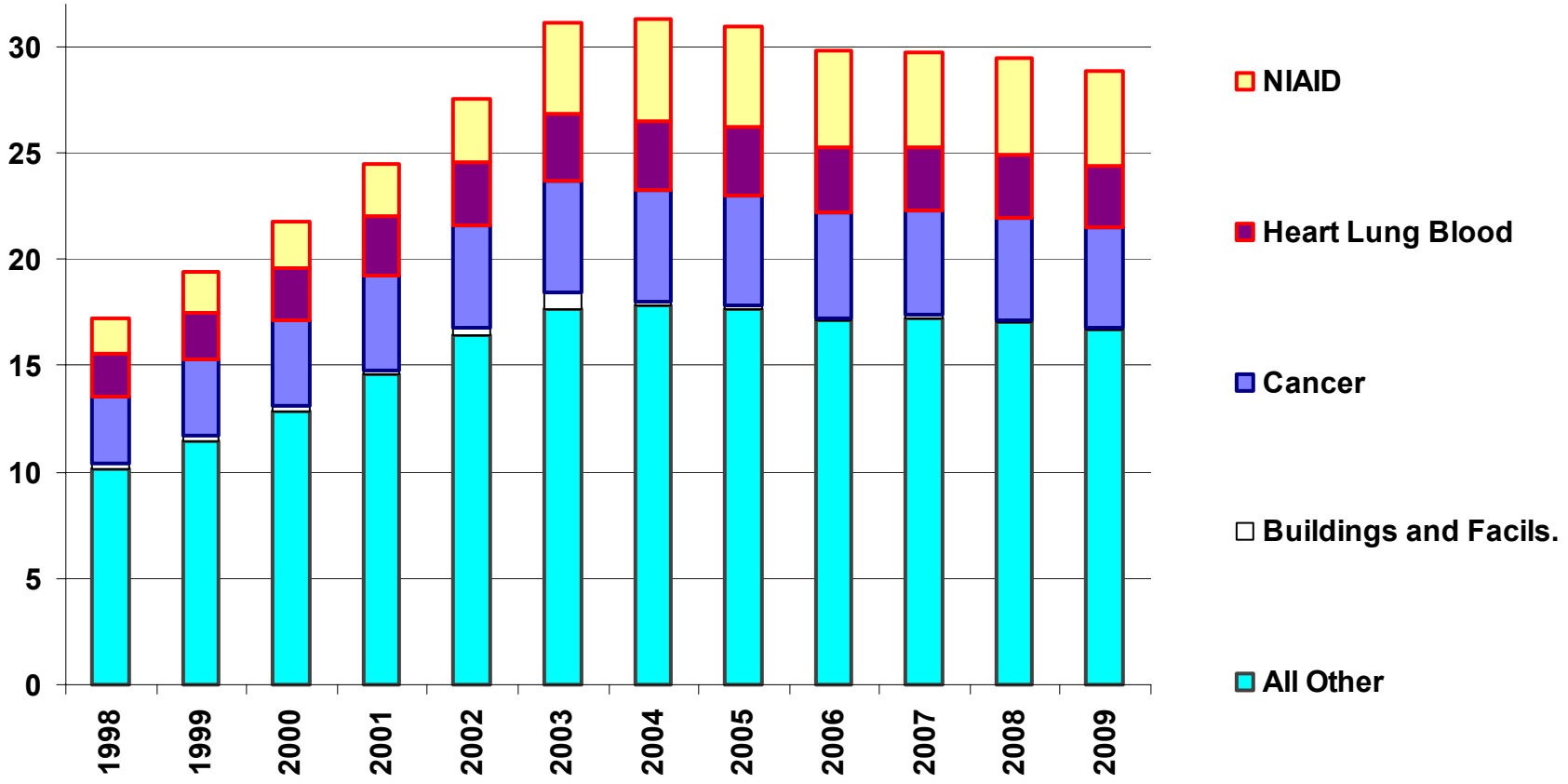
in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in annual AAAS R&D reports.
* FY 2009 figures are AAAS estimates of R&D in the FY 2009 omnibus / continuing resolution. Research includes basic research and applied research. 1976-1994 figures are NSF data on obligations in the Federal Funds survey.

National Institutes of Health Budget by Institute, 1998-2009 *

(budget authority in billions of constant FY 2008 dollars)



Source: AAAS R&D reports from NIH budget documents 1998-2009. * 2009 is latest AAAS estimates of FY 2009 request. Adjusted for inflation using OMB's GDP deflators.

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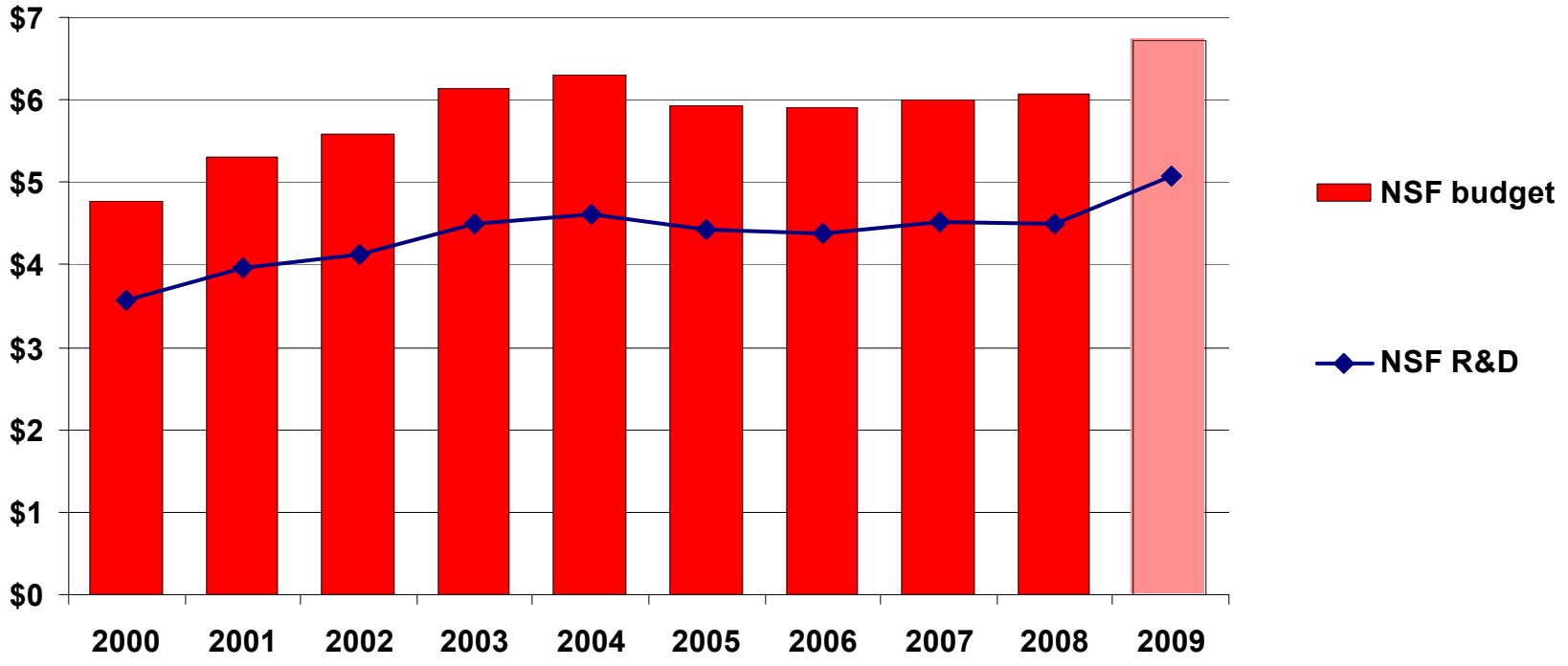
National Science Foundation Budget, FY 2000-2009

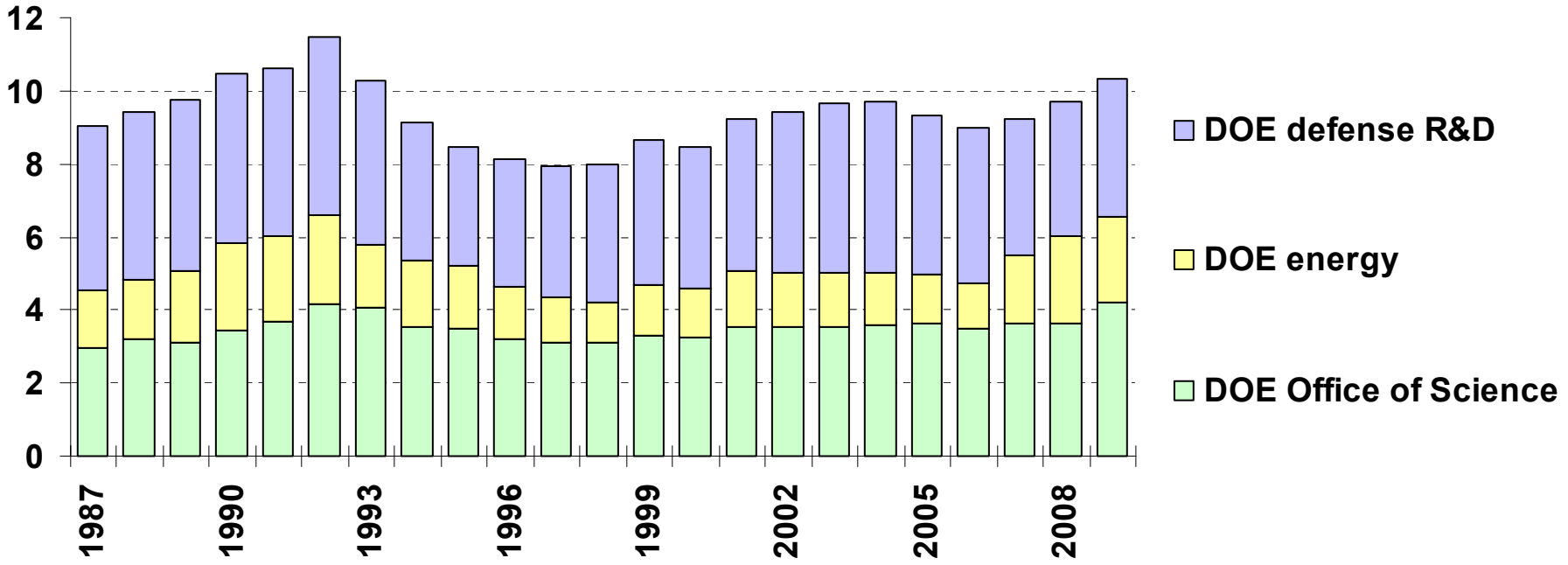
(budget authority in billions of constant FY 2008 dollars)



Source: National Science Foundation, and latest AAAS estimates of FY 2009 budget. FY 2009 is budget request.

Trends in DOE R&D, FY 1987- 2009 *

in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in *AAAS Reports VIII-XXXIII.* * FY 2009 figures are latest AAAS estimates of FY 2009 request.
R&D includes conduct of R&D and R&D facilities.

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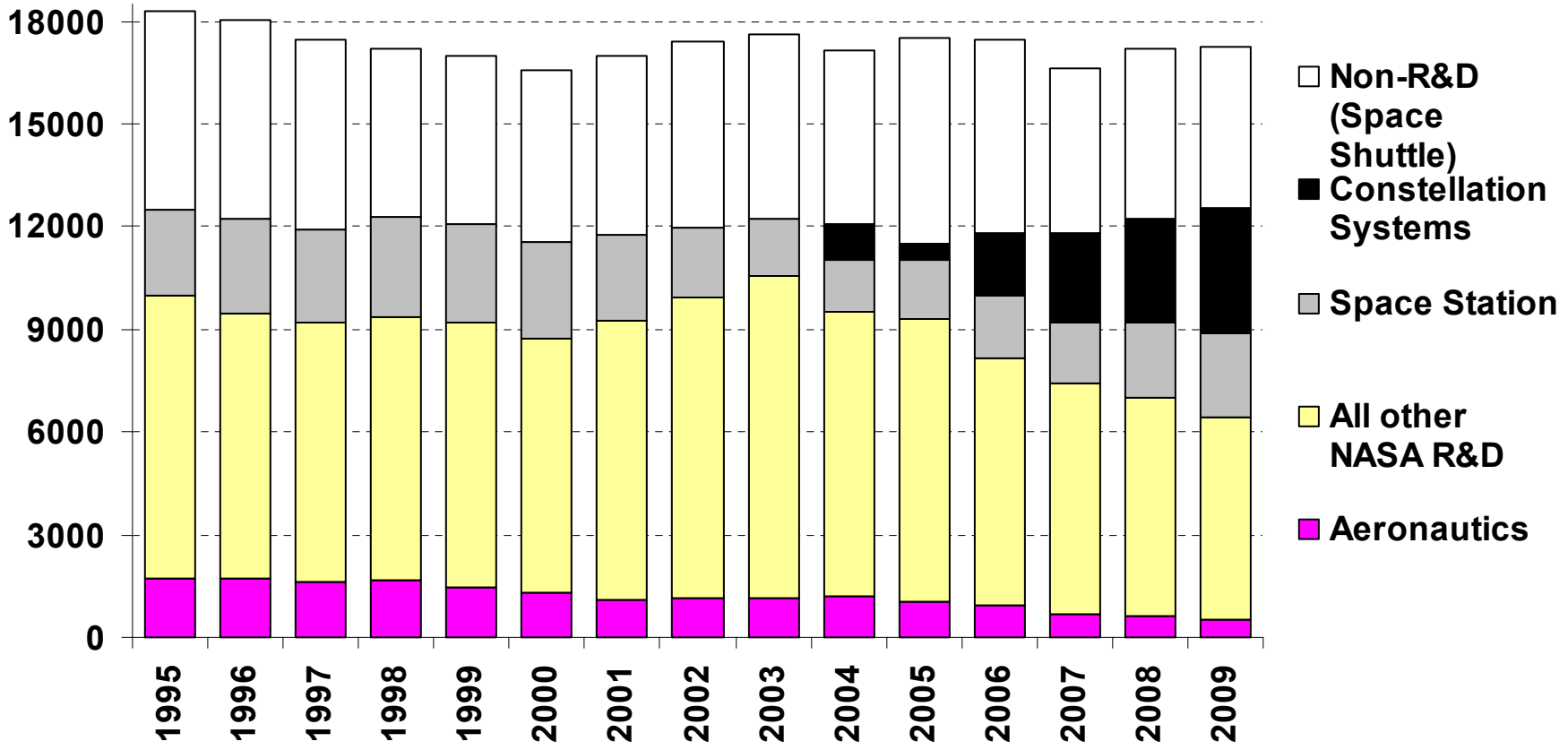
Trends in NASA R&D, FY 1995-2009 *

in millions of constant FY 2008 dollars



Source: AAAS analyses of R&D in *AAAS Reports VIII-XXXIII.* * FY 2009 figures are latest AAAS estimates of FY 2009 request. Program budgets include associated support costs.
R&D includes conduct of R&D and R&D facilities.

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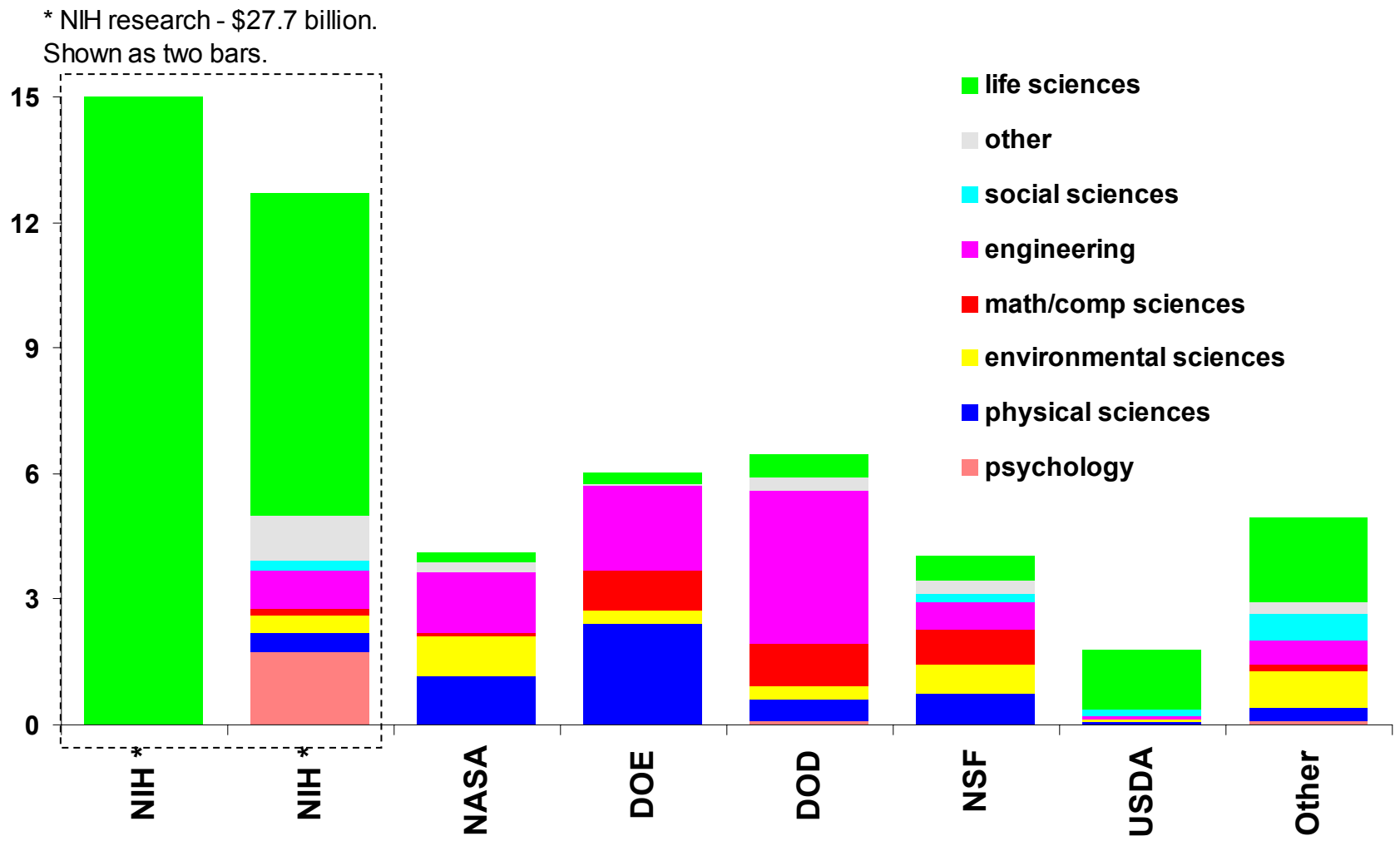
ALLOCATING FEDERAL R&D

There are numerous ways of allocating federal R&D investments; each agency is different.

- Because of mission requirements, some agencies invest heavily in “D” (DOD), others almost exclusively in “R” (NSF), and others a mix (NASA). Some agencies rely heavily on intramural performers; others are almost exclusively extramural.
- Investigator-initiated, peer-reviewed competitively awarded research grants are a way to allocate funds for scientific excellence.
- Congressional earmarks are another way to allocate funds, for geographic and political considerations.
- Most agencies use a mix, including program managers, formula funds, sheltered competitions, internal allocations with limited external review, etc.

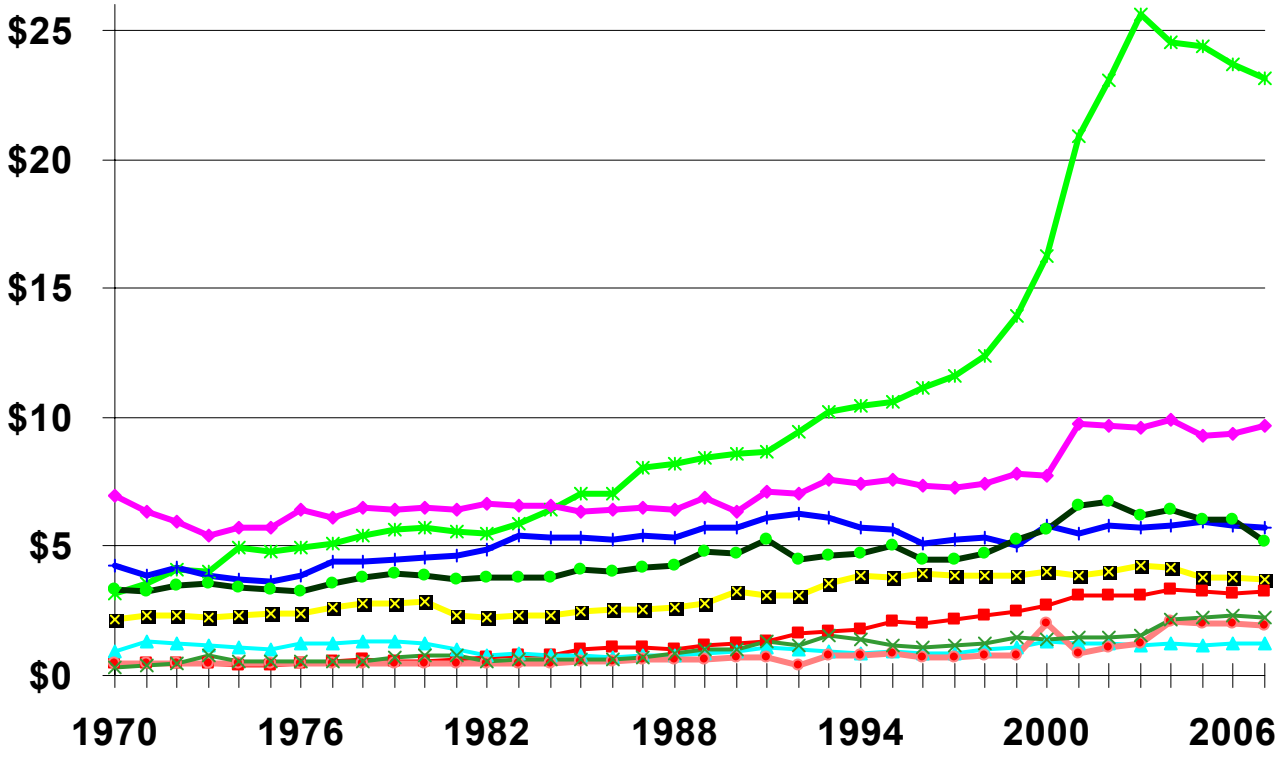
Federal Research by Discipline at Selected Agencies, FY 2007 (preliminary obligations in billions of dollars)



Source: National Science Foundation, *Federal Funds for Research and Development Fiscal Years 2005 , 2006 and 2007,* 2008. Development and R&D facilities excluded. FY 2007 data are preliminary.

Trends in Federal Research by Discipline, FY 1970-2007

obligations in billions of constant FY 2008 dollars



NIH biomedical research
Engineering
Physical Scis.
All other life sciences
Env. Scis.
Math / Comp. Scis.
Social Sciences
Psychology
Other *

* - Other includes research not classified
(includes basic research and applied research; excludes development and R&D facilities)

Life sciences - split into NIH support for biomedical research and all other agencies' support for life sciences.
Source: National Science Foundation, *Federal Funds for Research and Development FY 2005, 2006 , 2007,* 2008. FY 2006 and 2007 data are preliminary. Constant-dollar conversions based on OMB's GDP deflators.

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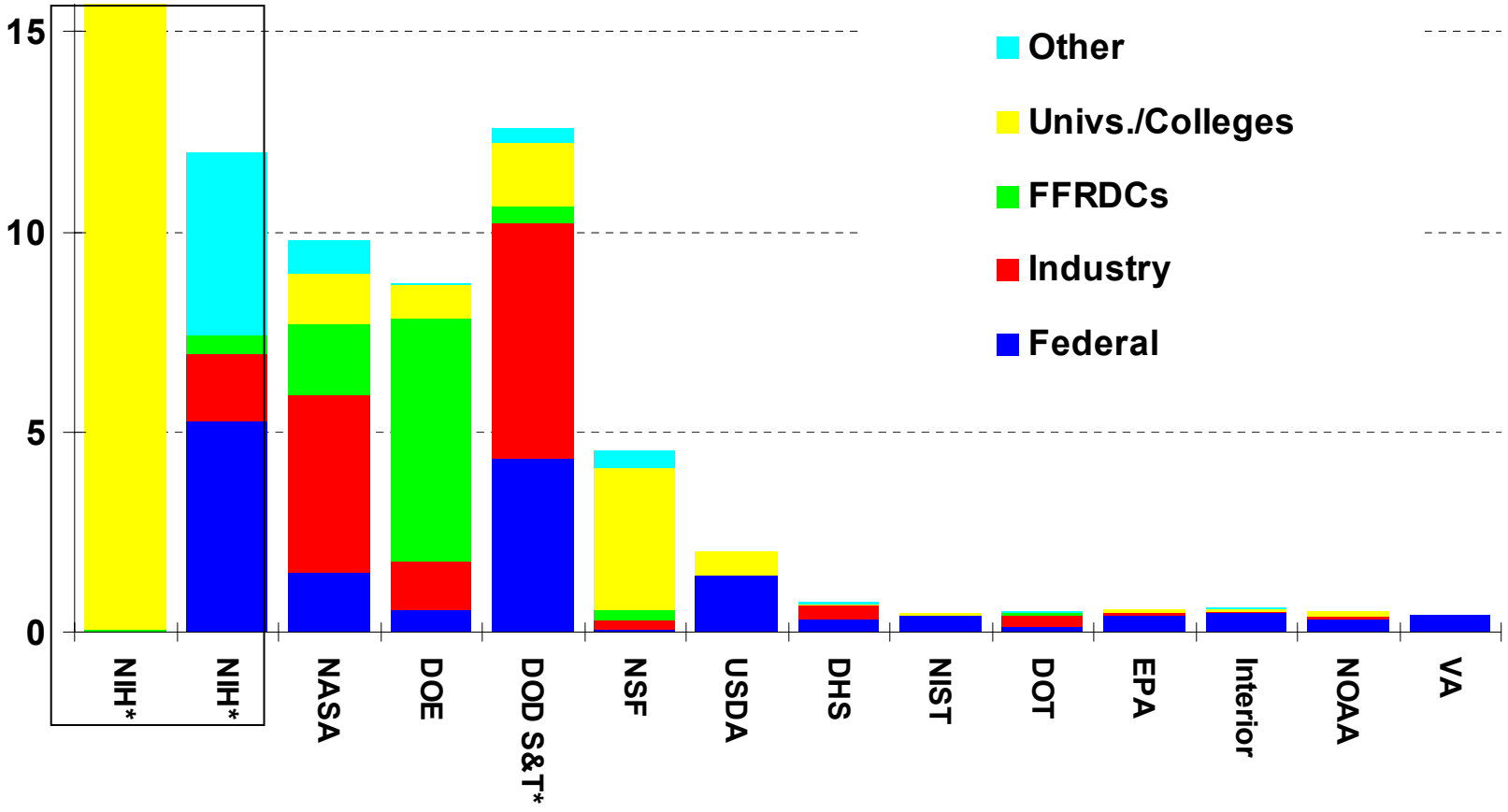
Federal R&D by Performer at Selected Agencies

billions of FY 2007 obligations (preliminary)

* NIH R&D - $27.8 billion.
Shown as two bars.



Source: AAAS, based on NSF, Federal Funds for Research and Development, Fiscal Years 2005, 2006, and 2007, 2008. R&D includes research, development, and R&D facilities. * - DOD R&D in "6.1" through "6.3" categories.

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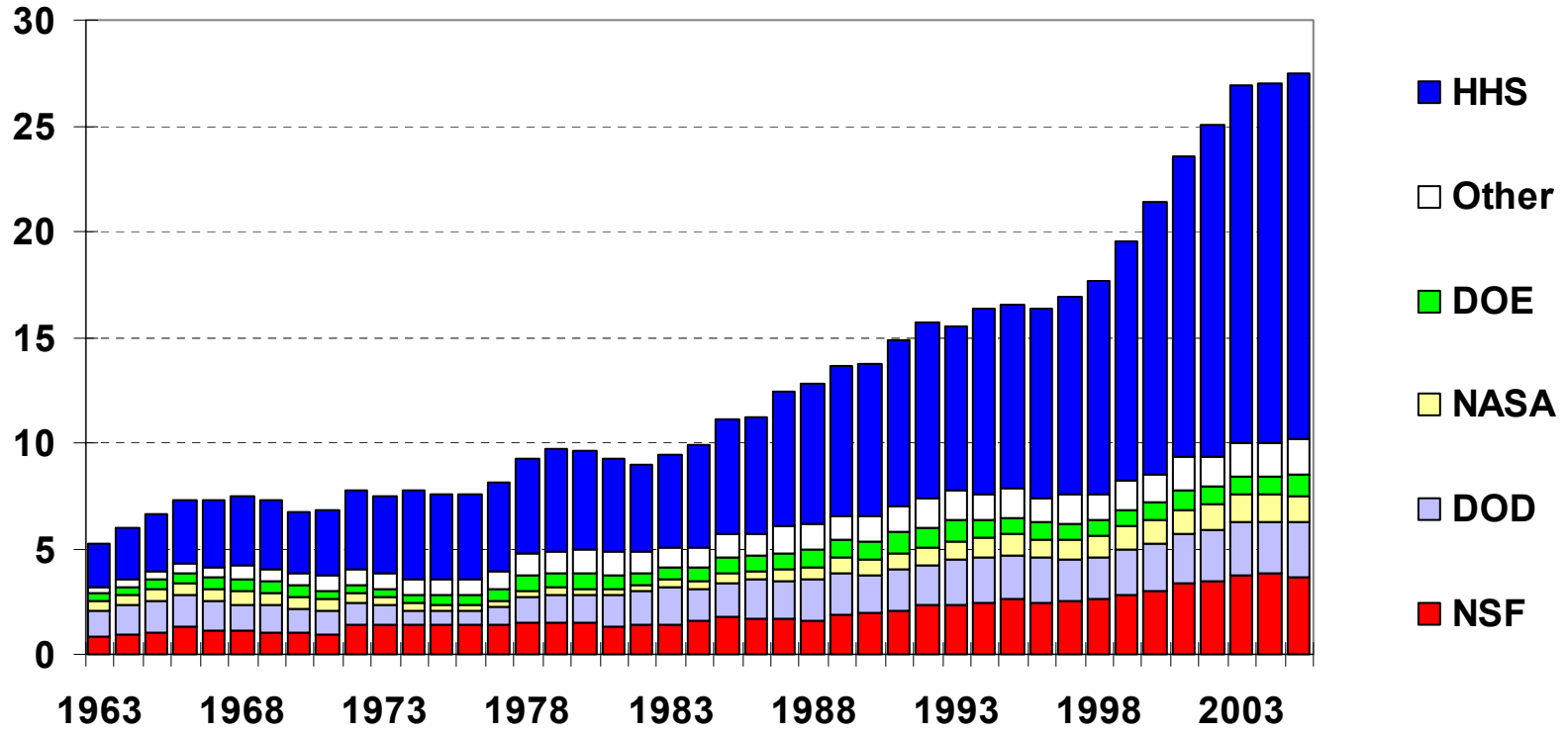
Federal R&D Funding to Colleges and Universities FY 1963-2005

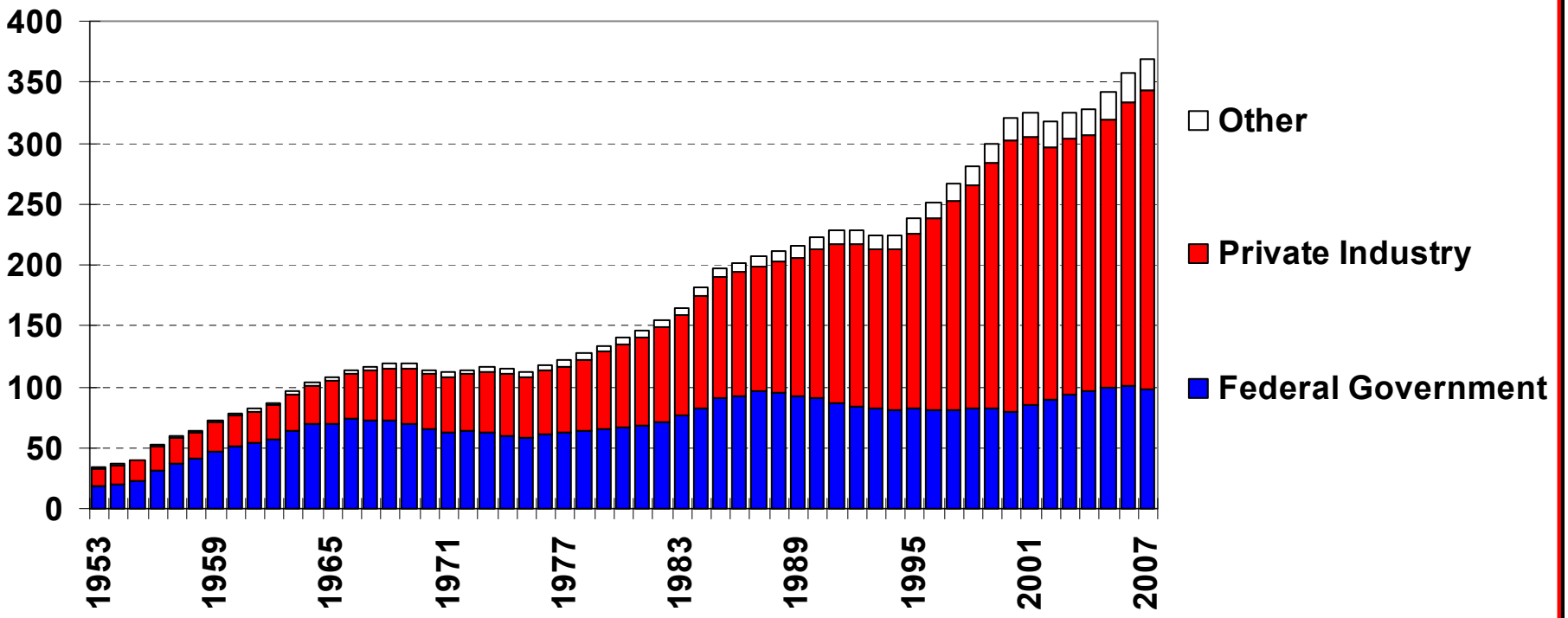
Obligations by agency in billions of constant FY 2008 $



Source: AAAS, based on NSF, *Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Insitutions, FY 2005,* 2007.
R&D includes research, development, and R&D facilities support. Constant-dollar conversions based on OMB's GDP deflators.

U.S. R&D Funding by Source, 1953-2007

expenditures in billions of constant 2007 dollars

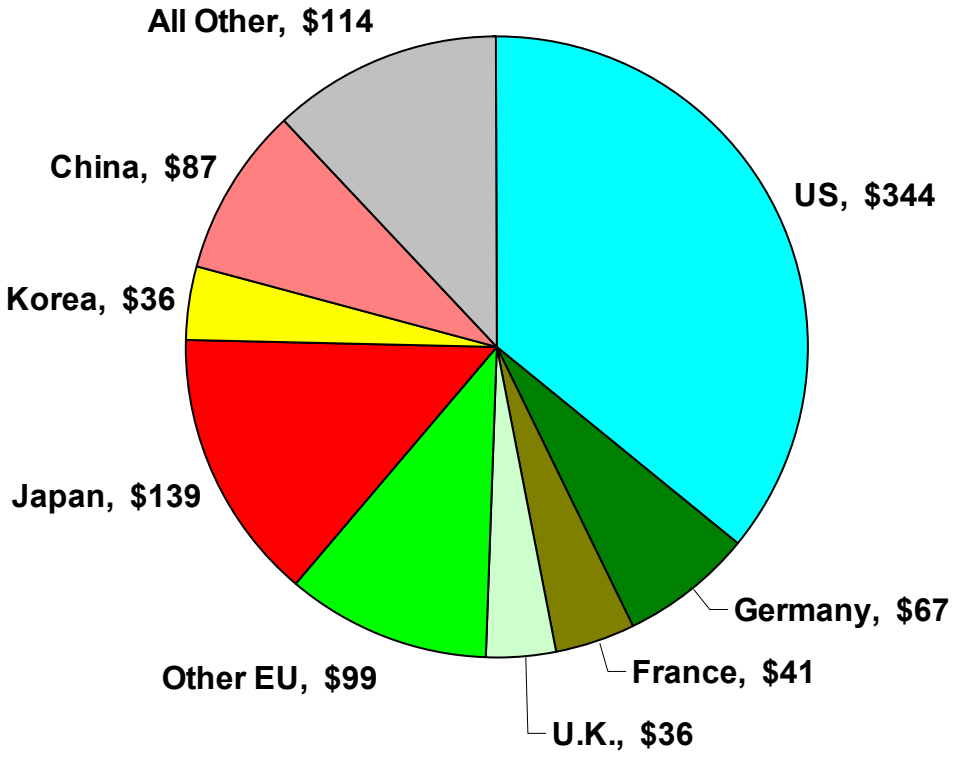


Source: NSF, Division of Science Resources Statistics. (Data for 2007 are preliminary.)

HOW DOES THE U.S. COMPARE?

- The U.S. is still the leading science and technology superpower in R&D investments, but the lead is shrinking.
- The U.S. R&D / GDP ratio compares favorably with other nations, but defense development is a big factor in the U.S.
- Other nations:
  - EU – A plan to reach 3% of EU GDP by 2010, but it won't happen.
  - Korea – R&D growing by 10%+ a year, R&D/GDP ratio surpasses U.S. ratio in 2004 and hits 3%.
  - China – R&D spending grew 20% in 2004 and 25% in 2005; basic research still small, but expanding rapidly.
  - India – Not big in R&D spending yet, but there are plans to boost its R&D capabilities to compete in high-tech industries.

Shares of Total World R&D, 2007*

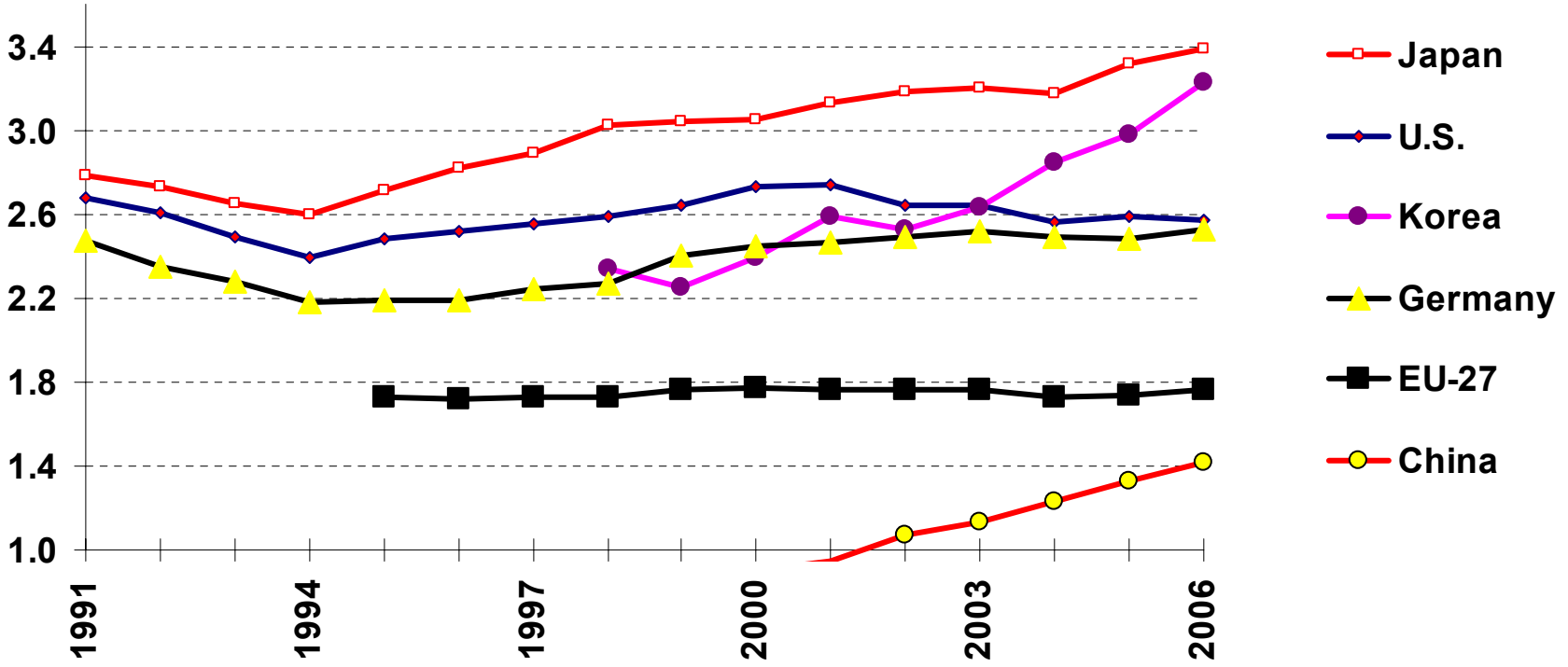


Total World R&D = U.S. $962 billion**

* World = OECD members plus Argentina, China, Romania, Israel, Russia, Singapore, Slovenia, South Africa, Taiwan. 2007 or most recent year available.

Source: OECD, Main Science and Technology Indicators, 2008.
2007 data or latest year available.
* *- calculated using purchasing power parities.

Total National R&D as % of GDP, 1991-2006



Source: National Science Foundation, National Patterns of R&D Resources and OECD, Main Science and Technology Indicators. Data not available for all nations for all years. AUGUST '08 © 2008 AAAS

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WHERE IS FEDERAL R&D FUNDING HEADED?

- Congress is way behind schedule in finishing FY 2009 appropriations. After the inauguration?
- The big budget battle between the President and Congress is over how much to spend on domestic discretionary programs, but the difference of $21 billion is between a slight cut and an inflationary increase.
- Even at a time when policymakers are concerned about U.S. leadership in science and technology eroding, and when proposed R&D increases are authorized in the America COMPETES Act and other legislation, the problem remains how to find the resources.
- Don’t expect increased funding for research: the broader budget choices policymakers make will constrain future investments in R&D.

FOR MORE INFORMATION…

The AAAS R&D web site is

www.aaas.org/spp/rd