

Federal R&D Investments in the 2009 Budget and Beyond

Kei Koizumi

January 7, 2009

for the Joint Mathematics Meetings

AAAS R&D Budget and Policy Program

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

See the “What’s New” section for the latest updates; see the “Seminars and Presentations” section for copies of this presentation.

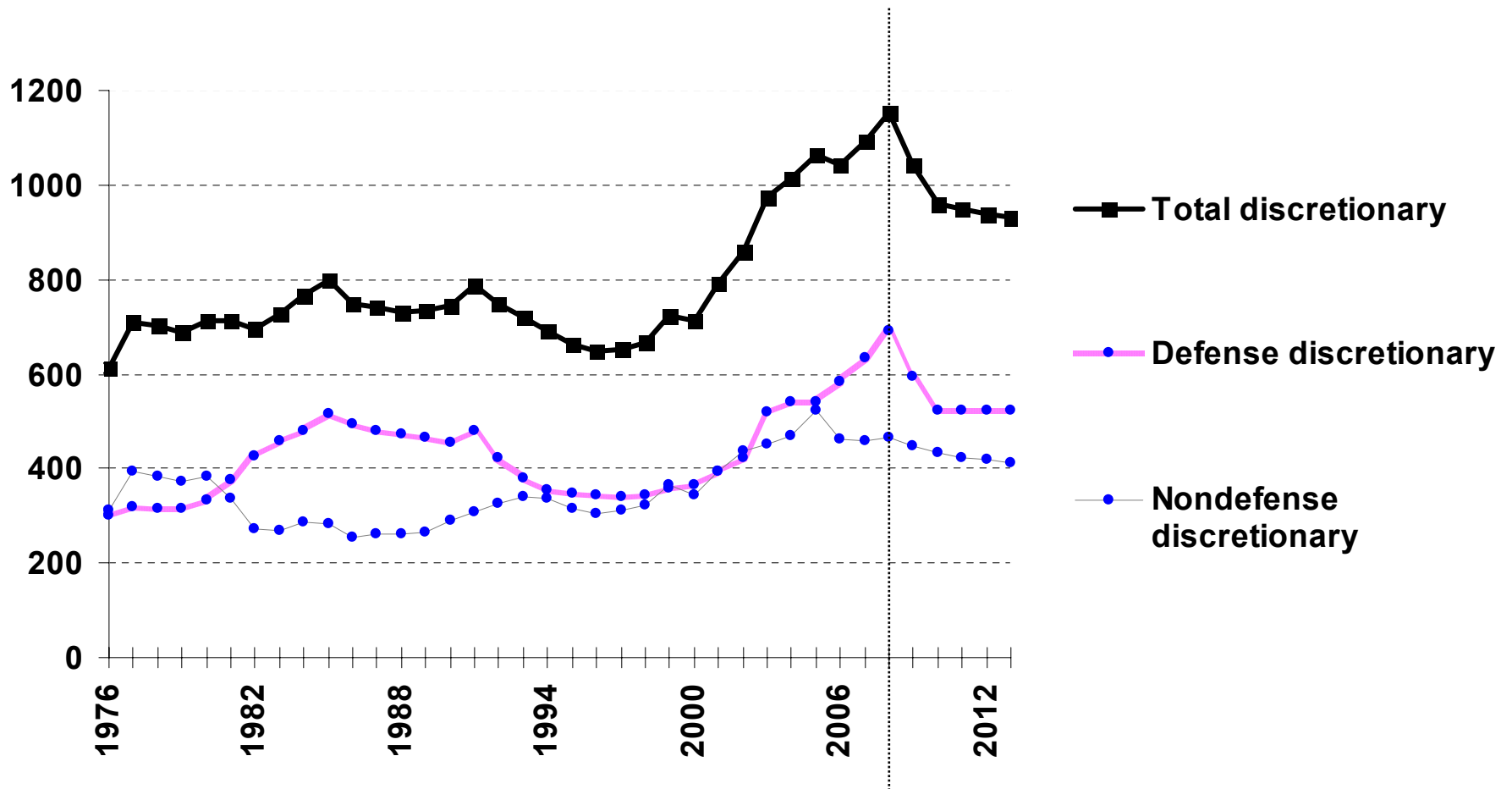


THE FY 2009 BUDGET SITUATION

- The federal government had a record budget deficit of \$455 billion in FY 2008, and will have a deficit approaching or exceeding \$1 trillion in FY 2009.
- Domestic appropriations have barely kept pace with inflation since 2004.
- Historically, federal R&D investments have closely tracked trends in discretionary spending.
- FY 2009 appropriations are unfinished, and an emergency economic stimulus bill is on its way. President-elect Obama and the new 111th Congress are negotiating these bills. Together, the bills could boost domestic spending dramatically this year and next year.

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.

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.

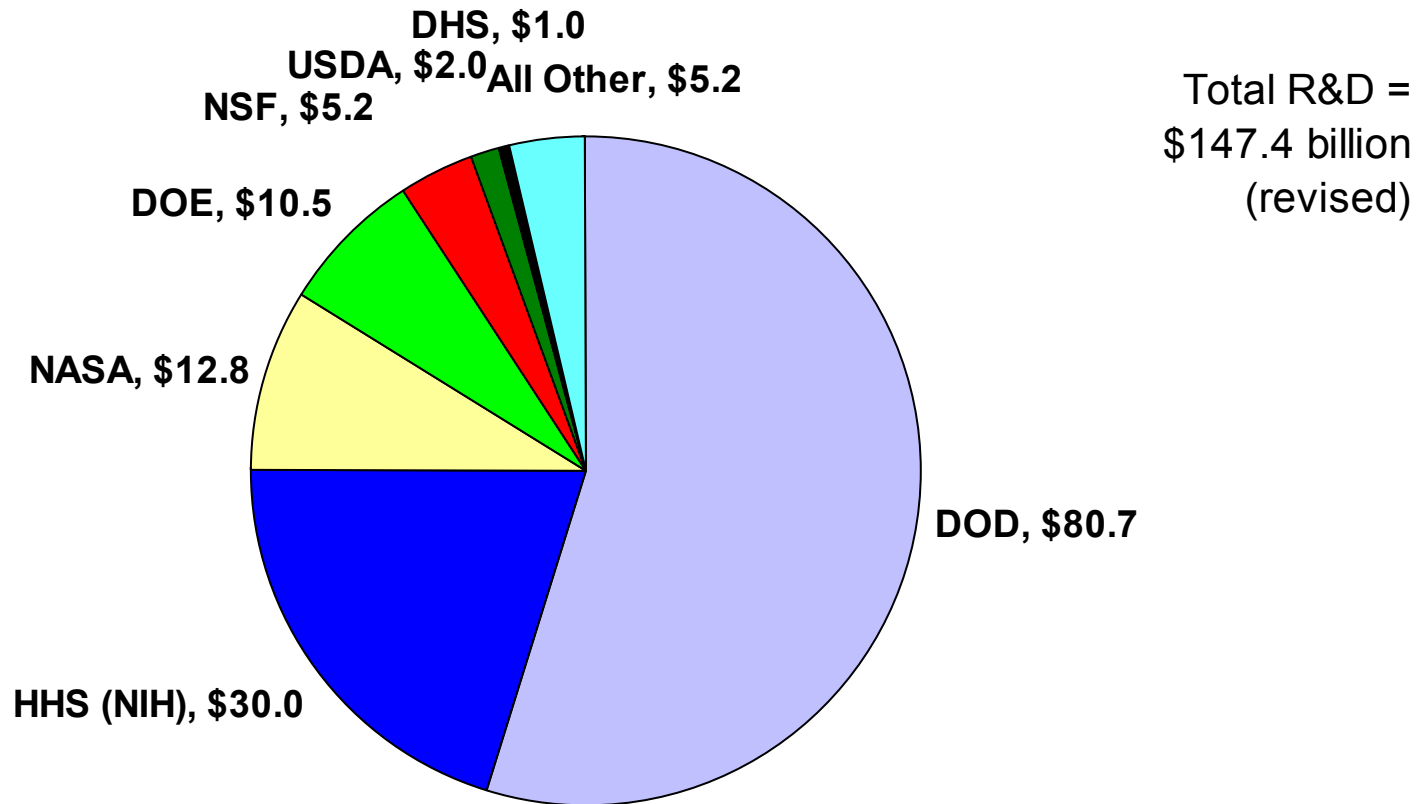
Because President Bush threatened to veto any appropriations bills that exceed his request, Congress has delayed the bills, which would collectively add \$21 billion to the request for domestic programs.

The new 111th Congress plans to send the remaining 9 (of 12) 2009 appropriations bills to President Obama in January or February.

There will be significant dollars are R&D, science and math education, and science infrastructure funding as part of an economic stimulus package.

Total R&D by Agency: FY 2009 Proposed

Budget Authority in billions of dollars



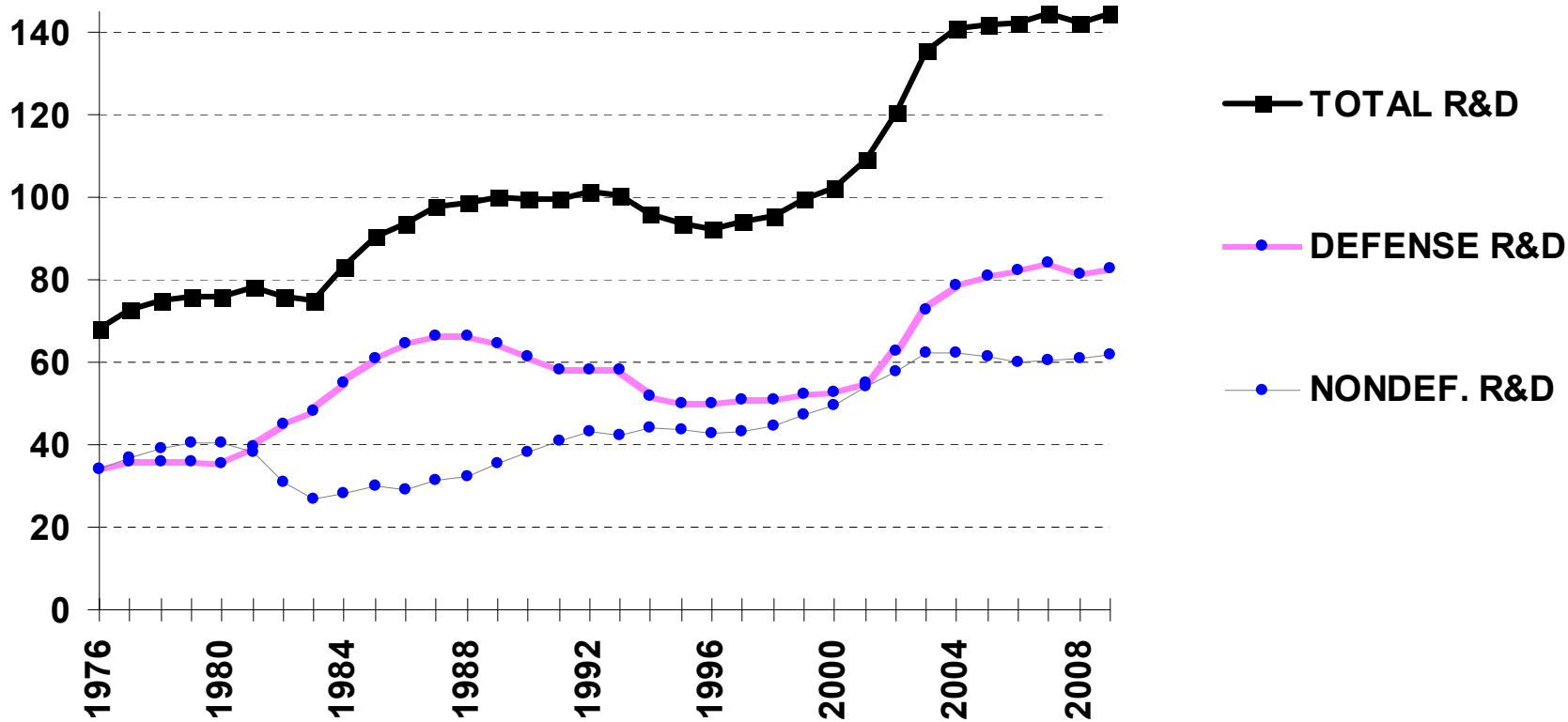
Source: AAAS, based on OMB R&D Budget Data and agency estimates for FY 2009.

MARCH '08 REVISED © 2008 AAAS



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.

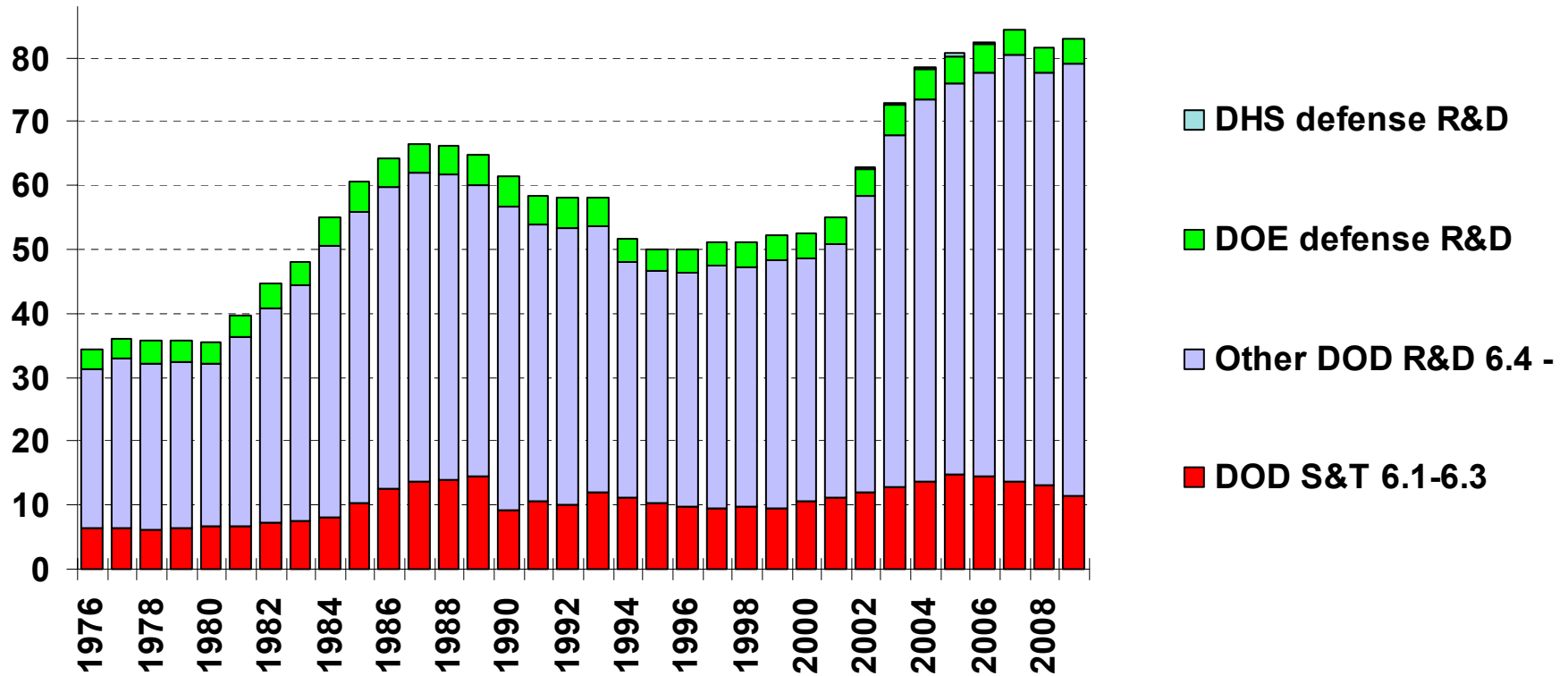
R&D includes conduct of R&D and R&D facilities.

MARCH '08 REVISED © 2008 AAAS



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

in billions of constant FY 2008 dollars



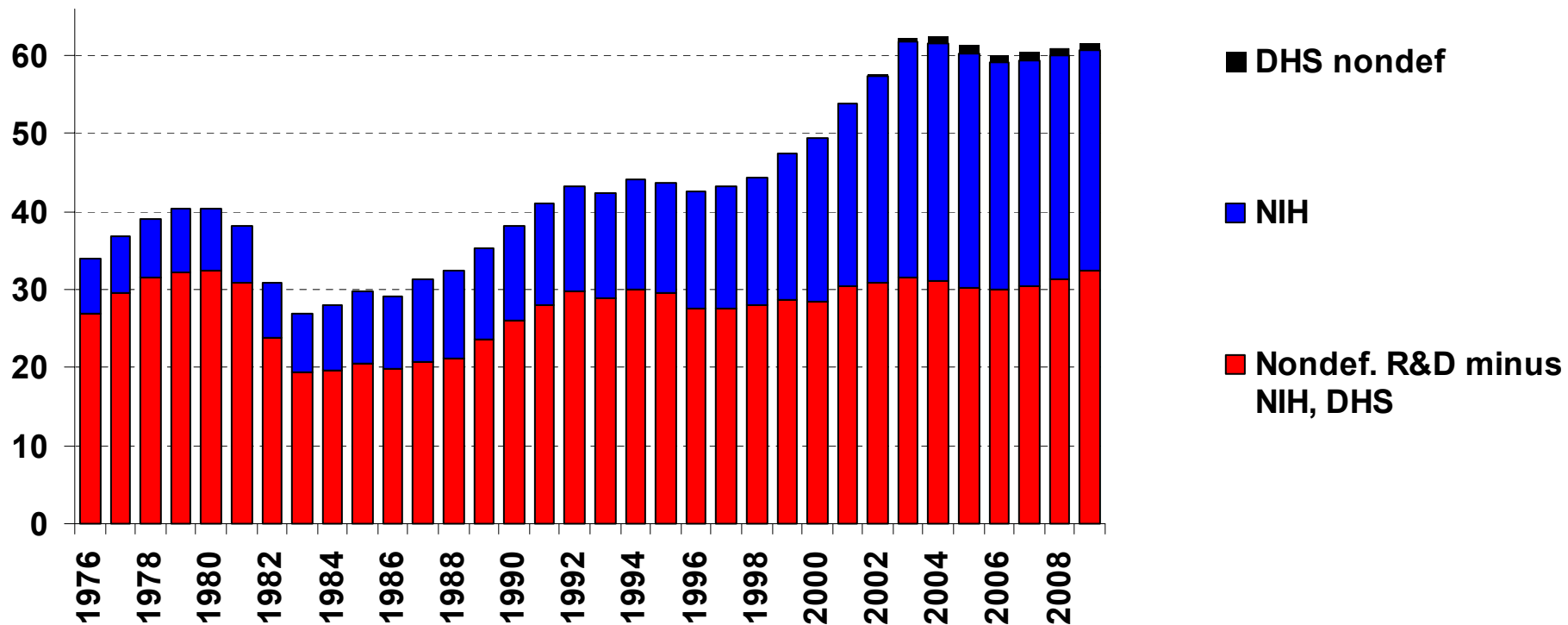
Source: AAAS analyses of R&D in annual R&D reports. * - FY 2009 figures are latest AAAS estimates of FY 2009 request. FY 2008 figures exclude pending supplementals. R&D includes conduct of R&D and R&D facilities. DOD S&T figures are not comparable for all years because of changing definitions.

MARCH '08 REVISED © 2008 AAAS



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.

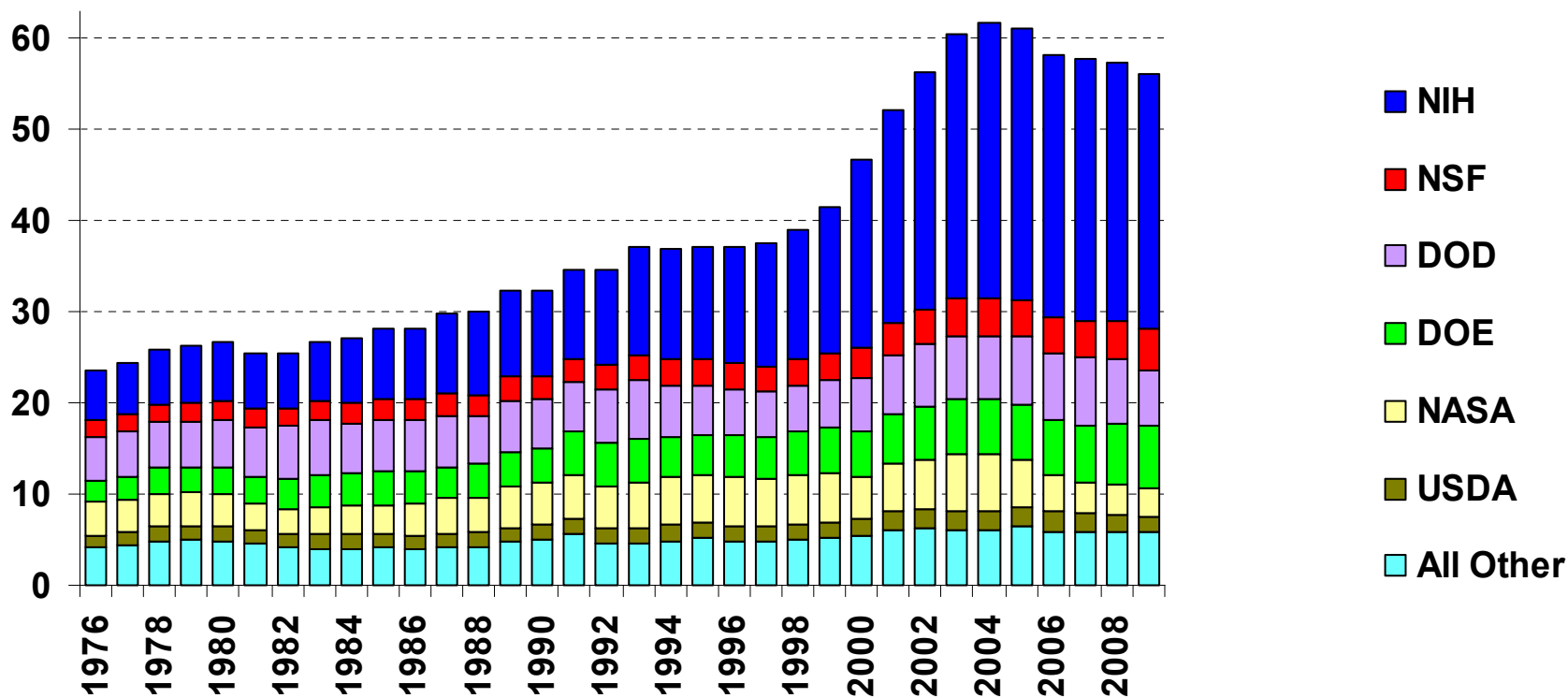
R&D includes conduct of R&D and R&D facilities.

MARCH '08 REVISED © 2008 AAAS



Trends in Research by Agency, FY 1976-2009 *

in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in annual AAAS R&D reports.

* FY 2009 figures are latest AAAS estimates of FY 2009 request. Research includes basic research and applied research. 1976-1994 figures are NSF data on obligations in the Federal Funds survey.

MARCH '08 REVISED © 2008 AAAS

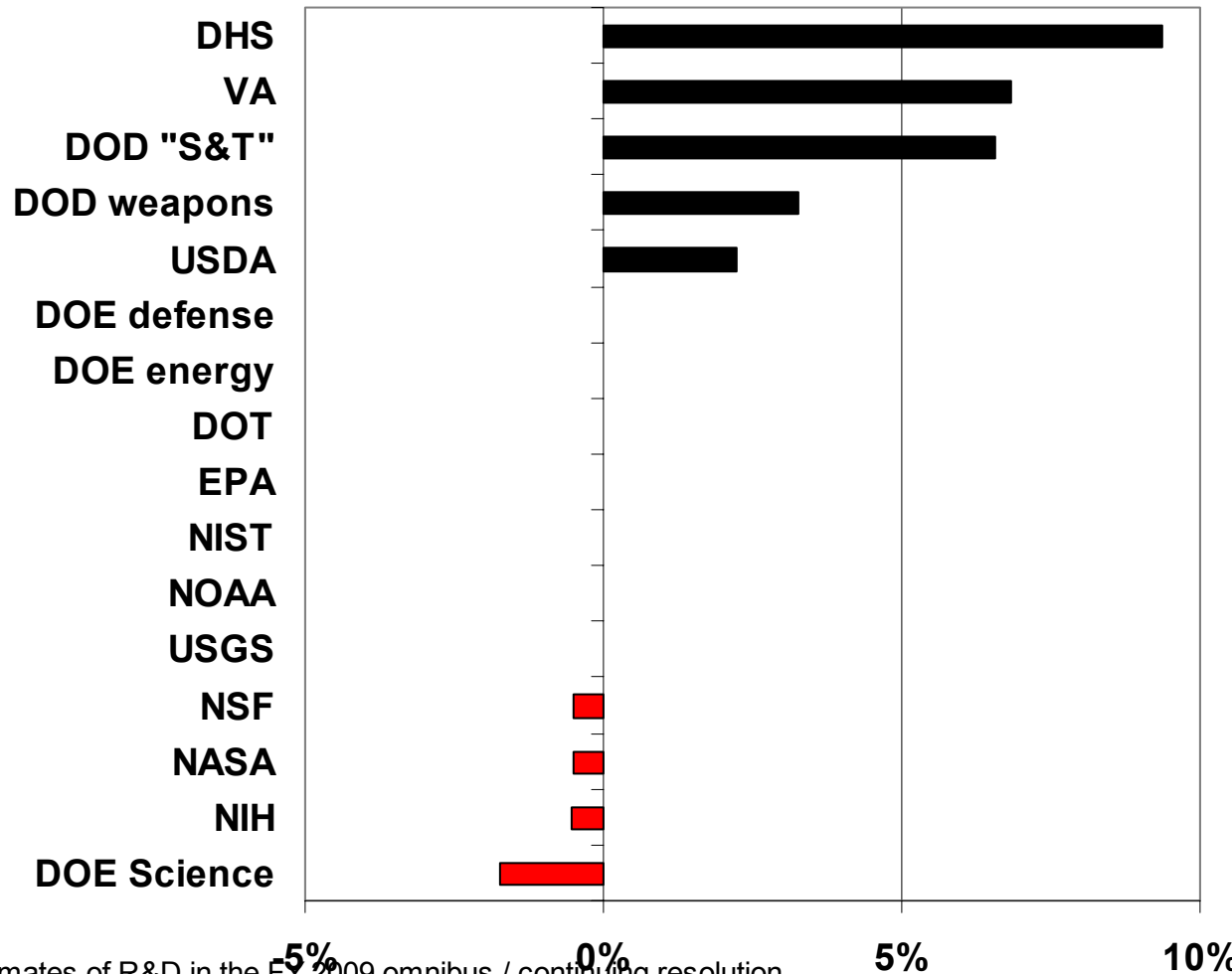


THEMES IN THE BUDGET: INNOVATION AND COMPETITIVENESS

- 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 Obama campaign platform calls for doubling federal research spending in some agencies over 10 years.

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.

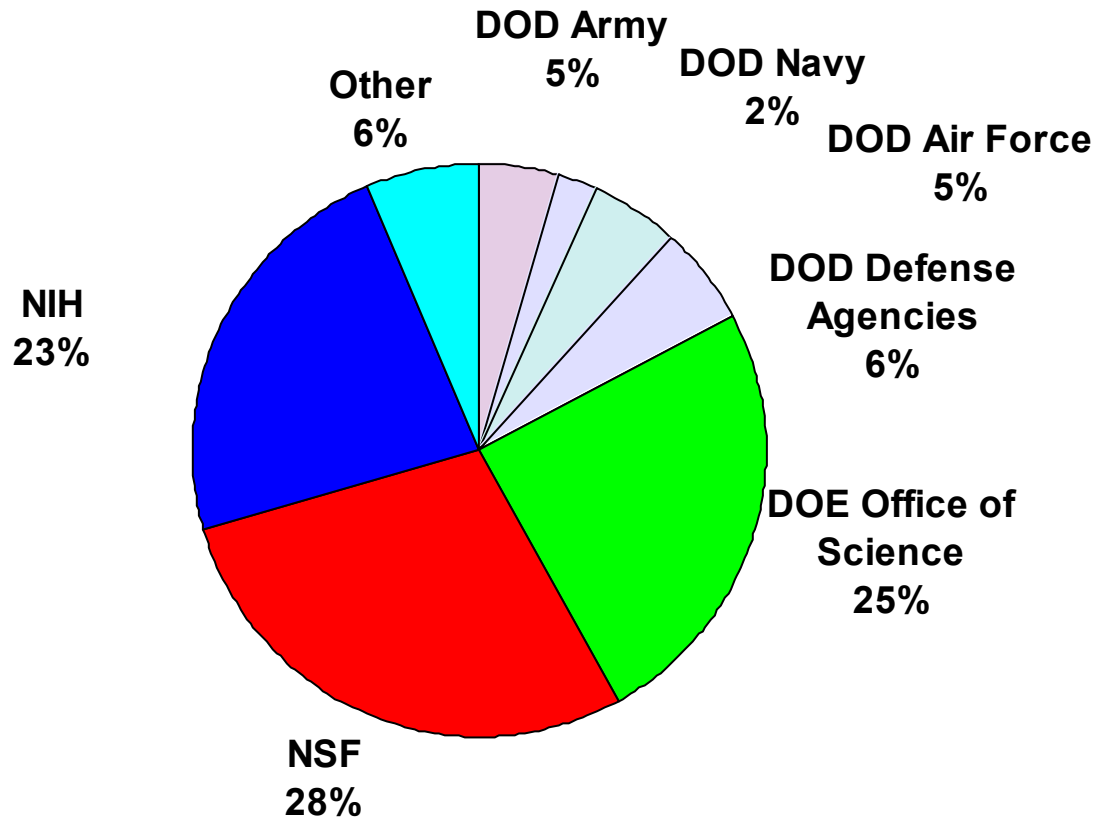
Only DOD, VA, and DHS have final FY 2009 appropriations. The remaining agencies are funded temporarily through March 6 under the continuing resolution.

DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.

SEPT. '08 REVISED © 2008 AAAS



Mathematics Research in the FY 2005 Budget (obligations)



Total Mathematics Research:
\$687 million
(includes basic research and applied research)

Source: National Science Foundation, *Federal Funds for Research and Development FY 2005, 2006 and 2007, 2008*. Data exclude development and R&D facilities.

FEB. '08 © 2008 AAAS

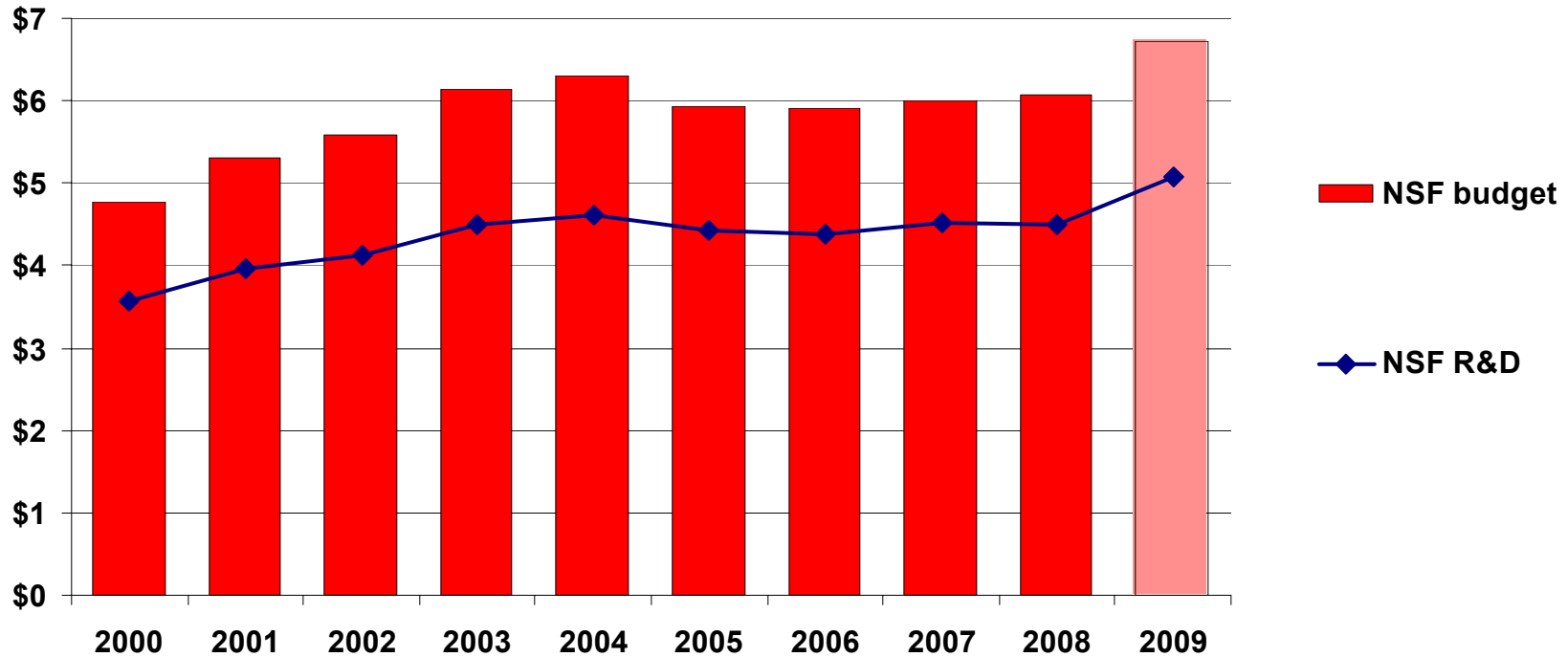


AGENCY HIGHLIGHTS

- DOD – Congress has finalized a 13 percent increase for basic research (“6.1”) for 2009.
- NSF – DMS funding would increase 16% as part of the ACI, but right now NSF has flat funding under the CR.
- DOE – Proposed increase for the Advanced Scientific Computing Research program (+5%) in the Office of Science as part of the ACI, but +13% increase for core research. Right now, flat funding under the CR.
- NIH – Flat budget overall, with few exceptions. Congress hopes to add more money in final FY 2009 appropriations.

National Science Foundation Budget, FY 2000-2009

(budget authority in billions of constant FY 2008 dollars)

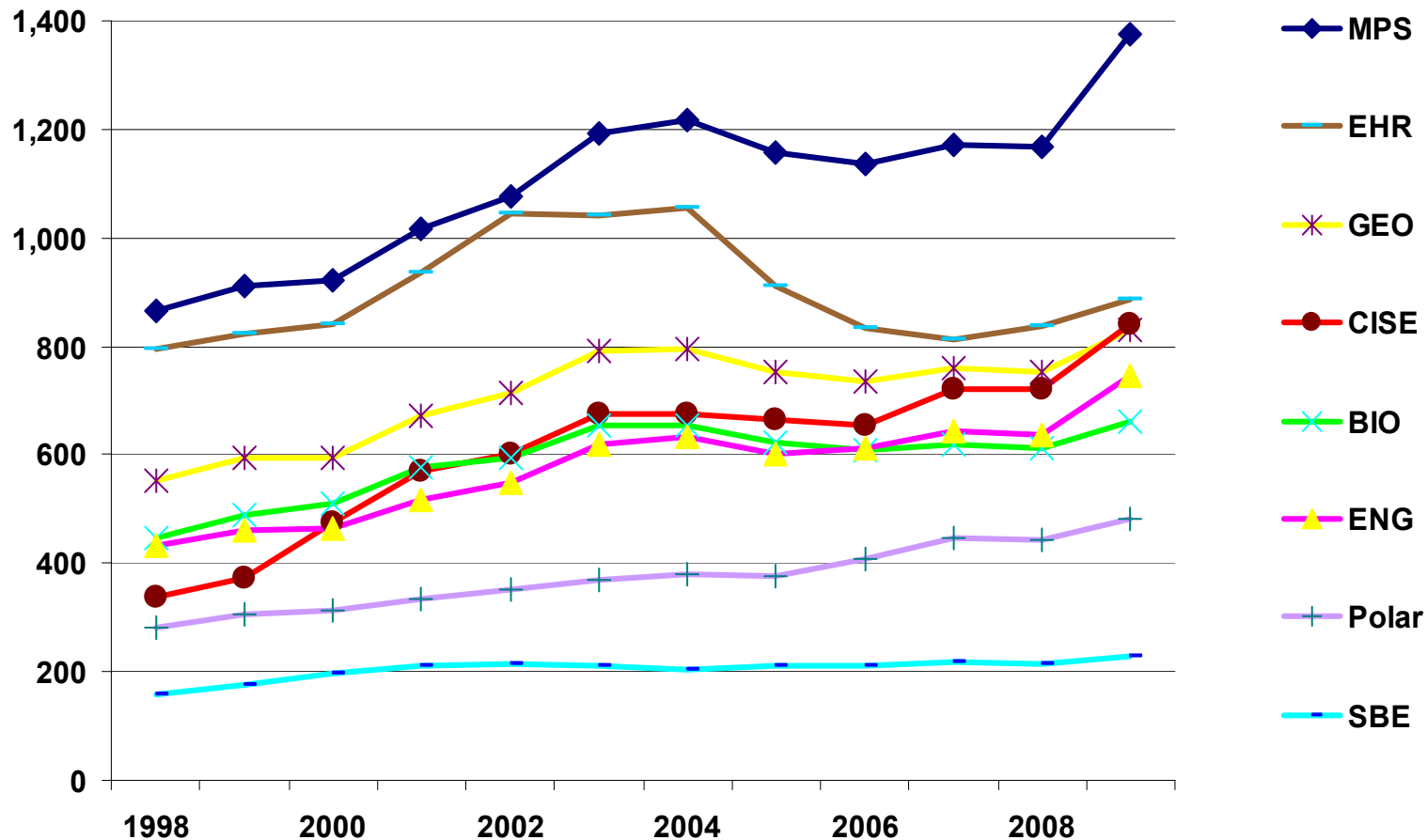


Source: National Science Foundation, and latest AAAS estimates of FY 2009 budget. FY 2009 is budget request.
FEB. '08 © 2008 AAAS



NSF Budget by Directorate, FY 1998-2009

(budget authority in millions of constant FY 2008 dollars)



Source: National Science Foundation data. FY 2009 figures are President's request.

CISE includes new Office of Cyberinfrastructure.

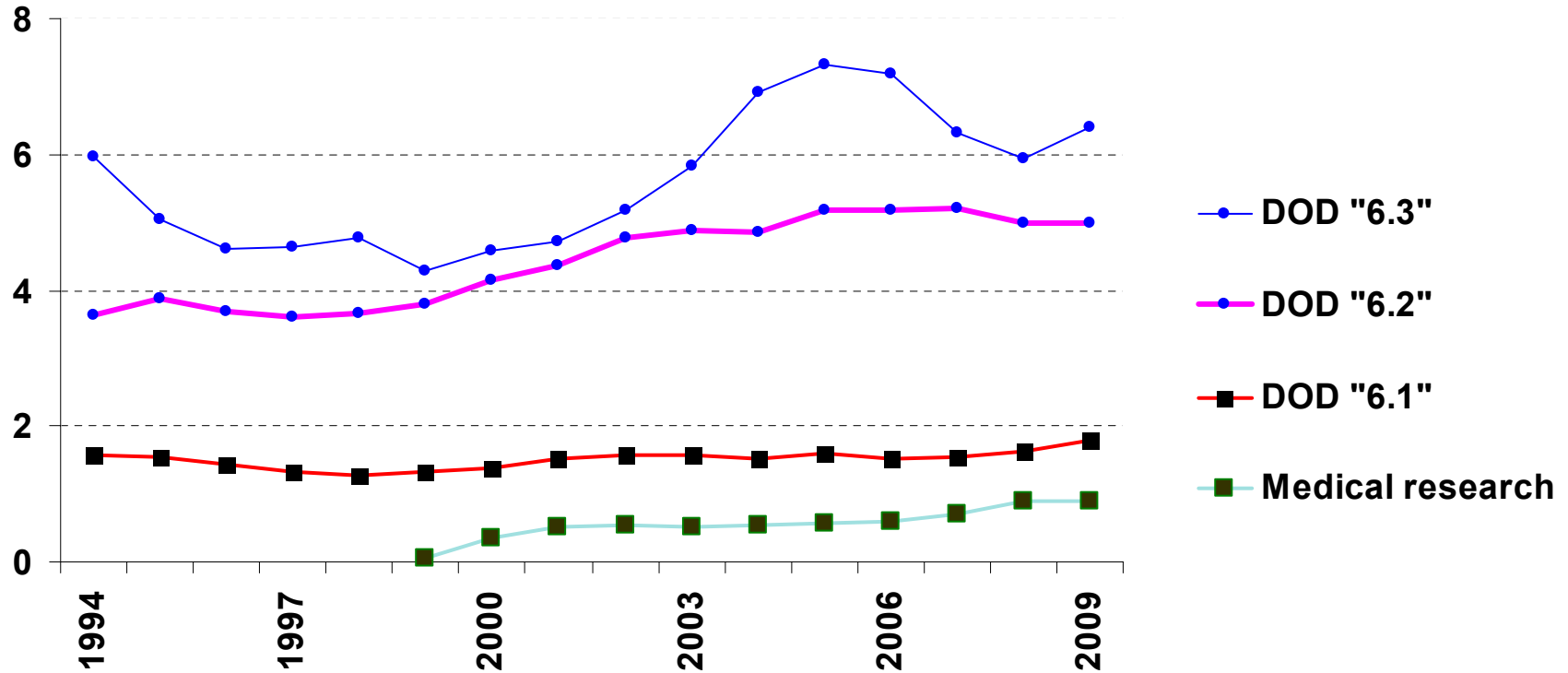
R&D and non-R&D components included in directorate budgets.

FEB. '08 © 2008 AAAS



Trends in DOD "S&T", FY 1994-2009 (Final) *

in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in annual AAAS R&D reports.

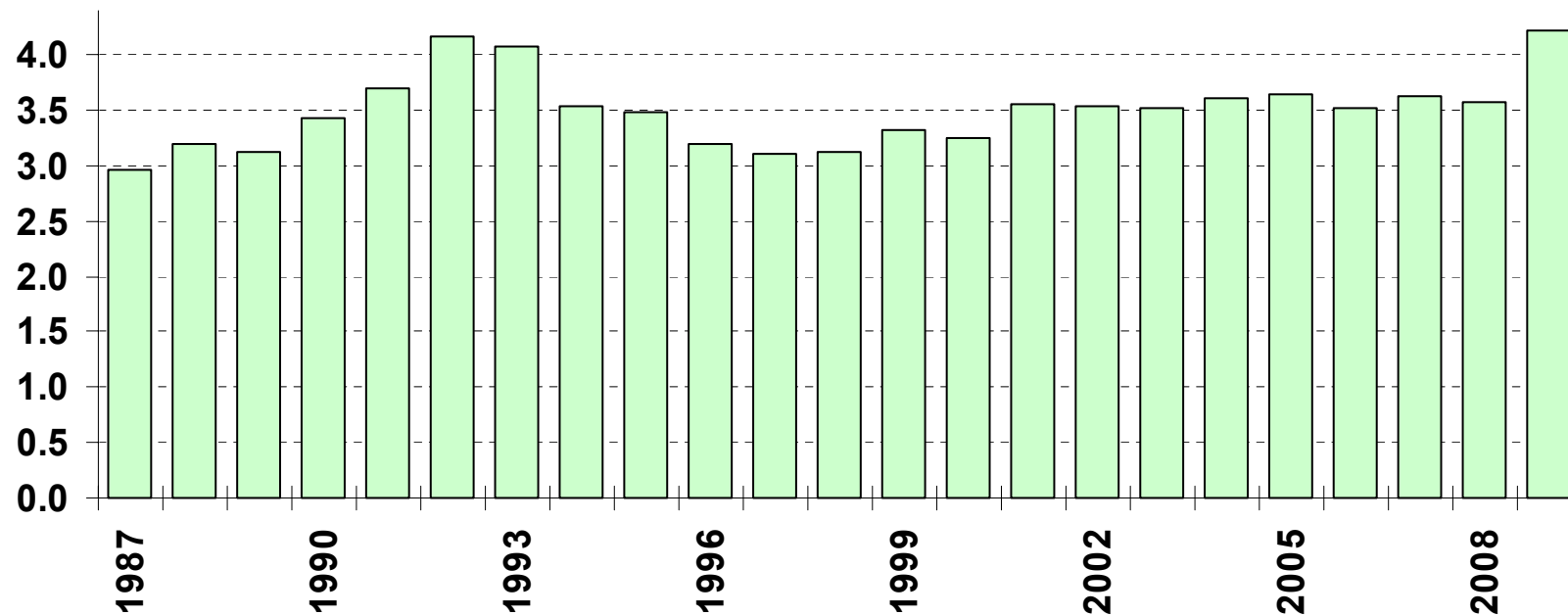
* - FY 2009 figures are AAAS estimates of final FY 2009 DOD appropriations. Figure include all enacted supplementals.

Medical research appropriated outside RDT&E; appropriated in "6.2" accounts before 1999.



Trends in DOE Office of Science 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.

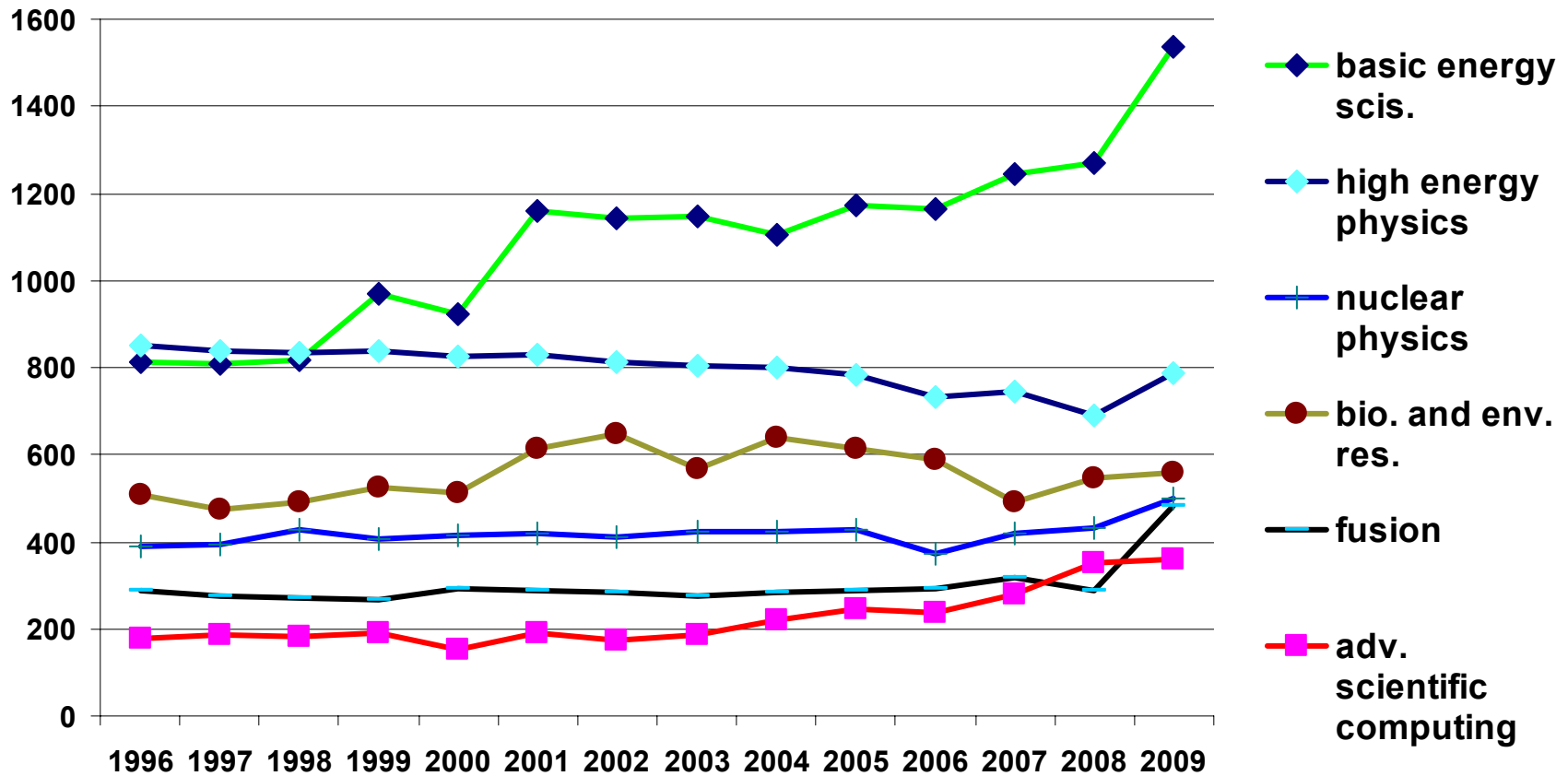
R&D includes conduct of R&D and R&D facilities.

FEBRUARY '08 REVISED © 2008 AAAS



DOE Office of Science Programs, FY 1996-2009

(budget authority in millions of constant FY 2008 dollars)

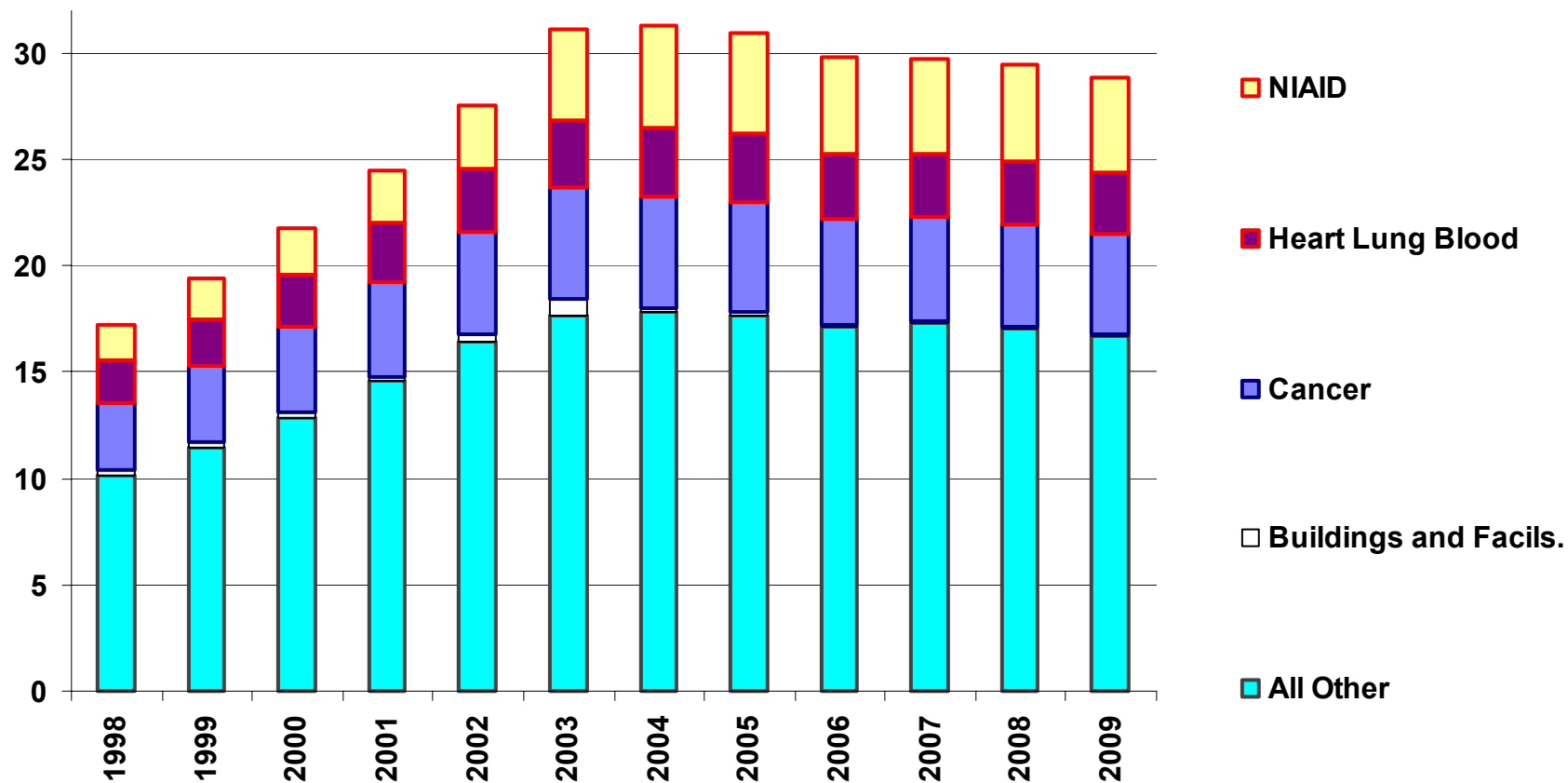


Source: AAAS Reports on R&D, various years, and DOE historical budget documents. Adjusted for inflation using OMB's GDP deflators. BES includes Spallation Neutron Source funds. BER includes earmarks for most years (not 2007 through 2009). FY 2009 figures are the budget request.



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

(budget authority in billions of constant FY 2008 dollars)



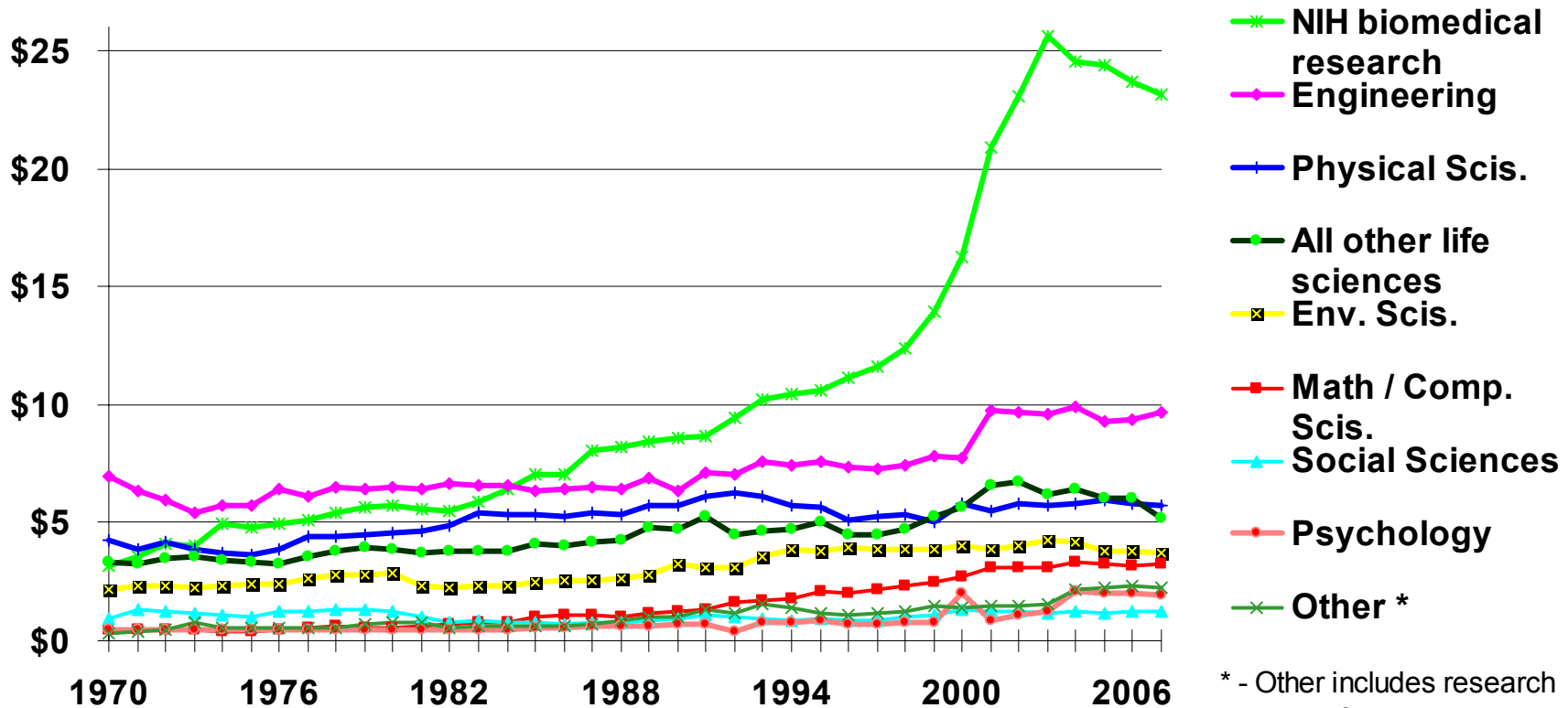
Source: AAAS R&D reports from NIH budget documents 1998-2009. * 2009 is latest AAAS estimates of FY 2009 request. Adjusted for inflation using OMB's GDP deflators.

FEB. '08 © 2008 AAAS



Trends in Federal Research by Discipline, FY 1970-2007

obligations in billions of constant FY 2008 dollars



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

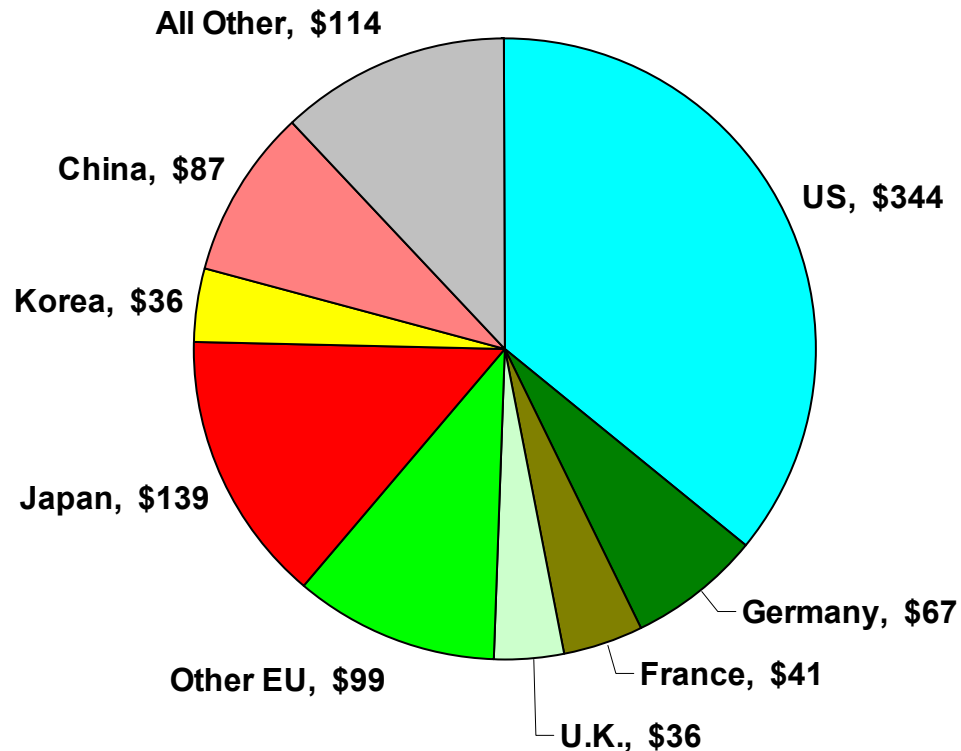
Life sciences - split into NIH support for biomedical research and all other agencies' support for life sciences.
 Source: National Science Foundation, *Federal Funds for Research and Development FY 2005, 2006, 2007, 2008*. FY 2006 and 2007 data are preliminary. Constant-dollar conversions based on OMB's GDP deflators. FEB. '08 © 2008 AAAS



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.

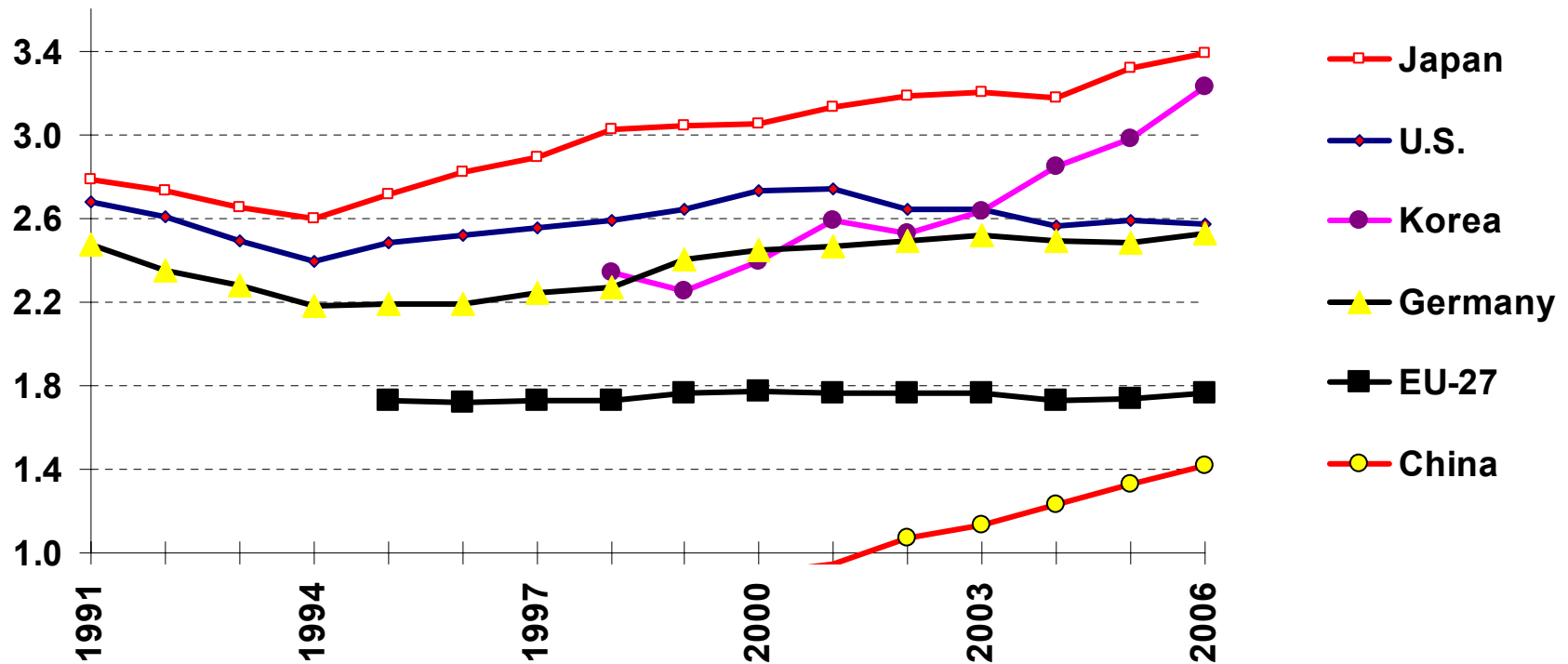
Source: OECD, Main Science and Technology Indicators, 2008.
2007 data or latest year available.

** - calculated using purchasing power parities.

AUGUST '08 © 2008 AAAS



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

WHERE IS FEDERAL R&D FUNDING HEADED?

- The new Congress and President Obama could finish FY 2009 appropriations with increased funding for key R&D programs, and could split funding between the economic stimulus bill and an omnibus appropriations bill.
- The FY 2010 budget proposal will be released in April; it will be the first budget to be formulated under current economic conditions.
- 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 is how to find the resources in a recession. New sources of revenue (such as from climate change legislation for energy R&D) may be years away.
- 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

The AAAS Forum on
Science and
Technology Policy is
30 April – 1 May 2009
in Washington, DC

