

# The Federal R&D Budget and Prospects for Academic Research

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# Mandatory and Discretionary Budget

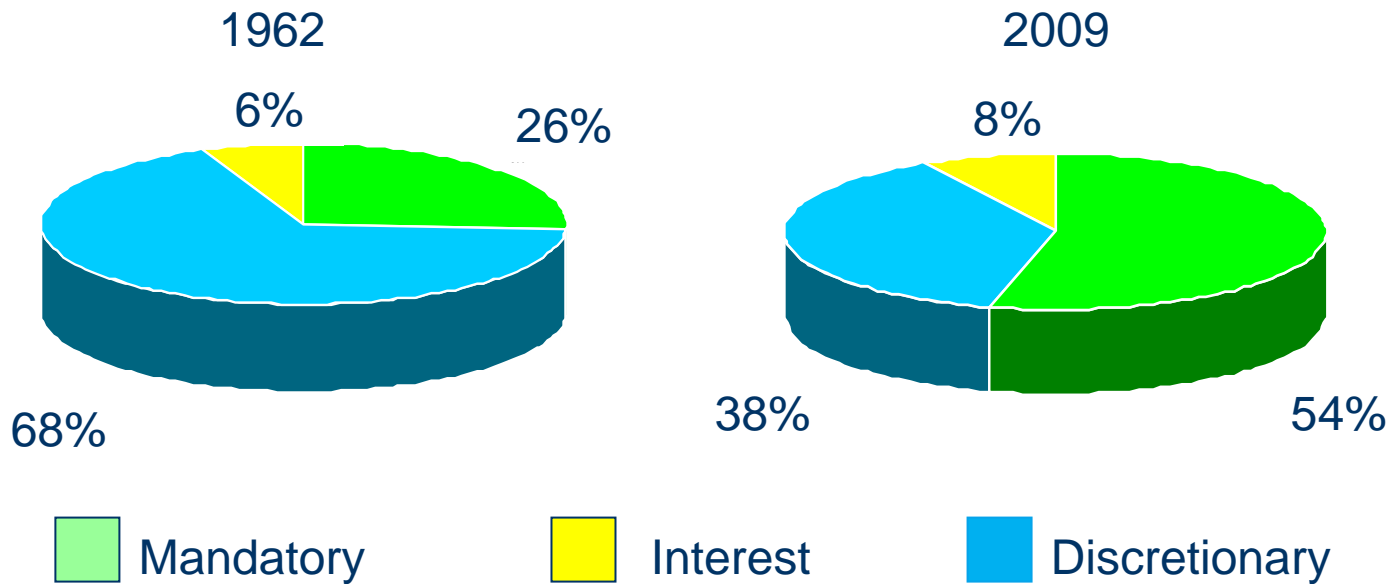
(Proposed FY2009)

- Total Federal Budget: \$3,107 billion [Bush proposed] (\$410 billion passed 10 March)
- Mandatory Spending: \$1,716 billion (55% of total)
- Entitlement programs
  - (including Social Security, Medicare, and
  - Medicaid)
- Interest: \$260 billion (8.4%)
- Discretionary Spending: \$1,212 billion = 39% (DOD largest component—more than half of discretionary budget)
  - R&D = \$151.1 billion (12.5% of discretionary spending)

<http://www.gpoaccess.gov/usbudget/index.html>

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

# Growth in Mandatory Spending



# Federal Outlays in FY 2008

**Interest 7.9%**

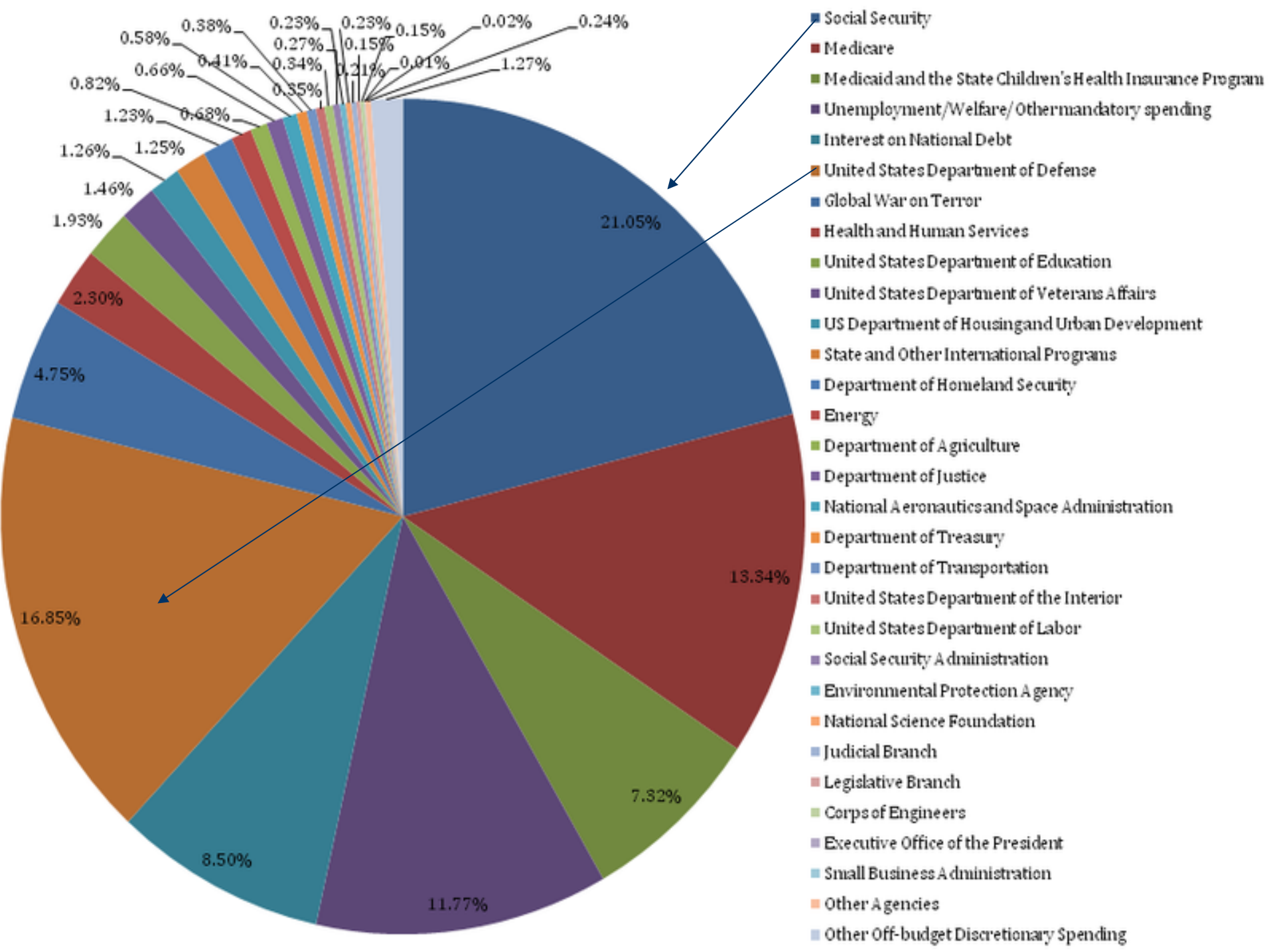
**Medicare/Medicaid 20.1%**

**Social Security 20.8%**

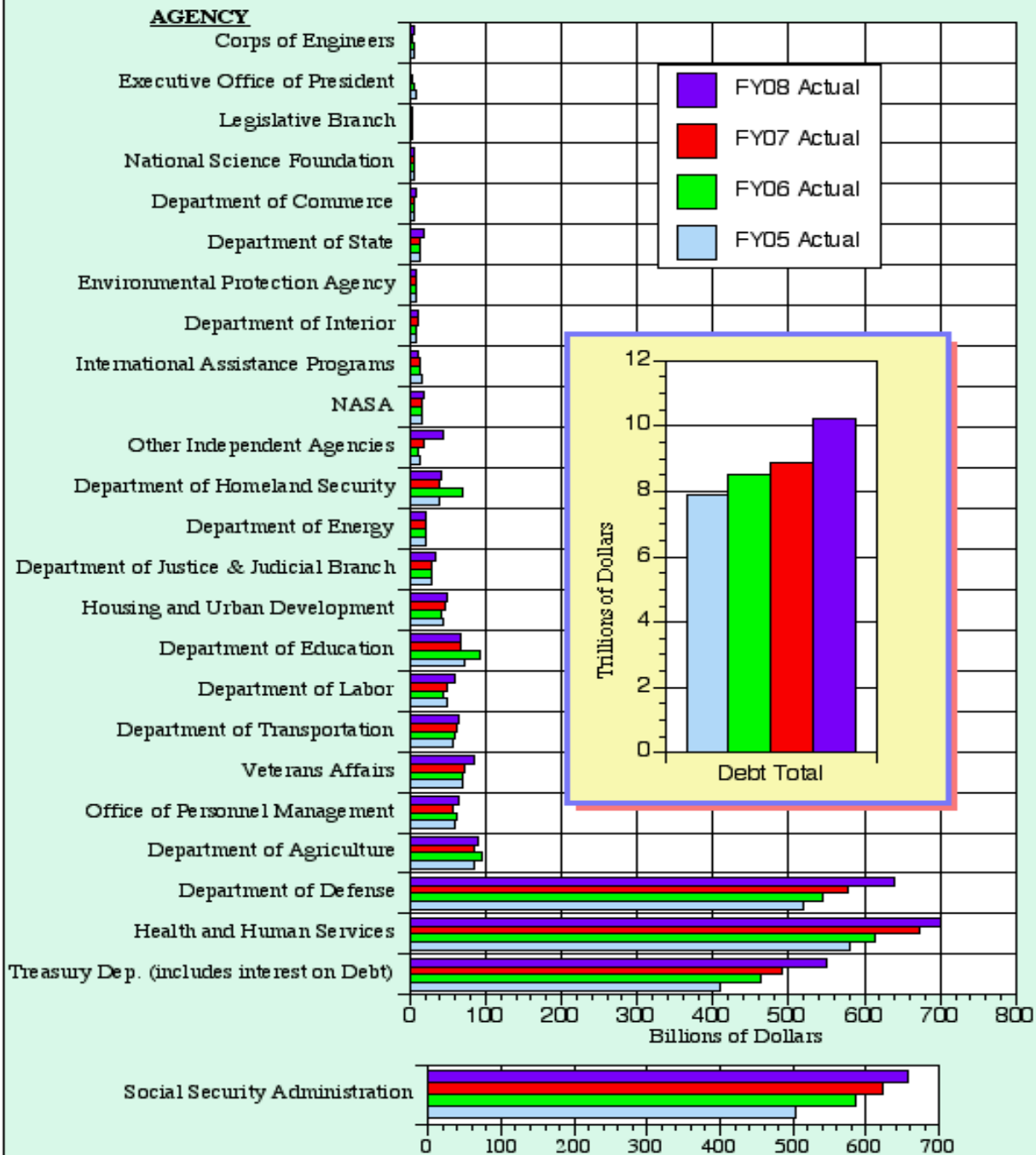
**Nondefense Discretionary 17.9%**

**Defense Discretionary 20.5%**

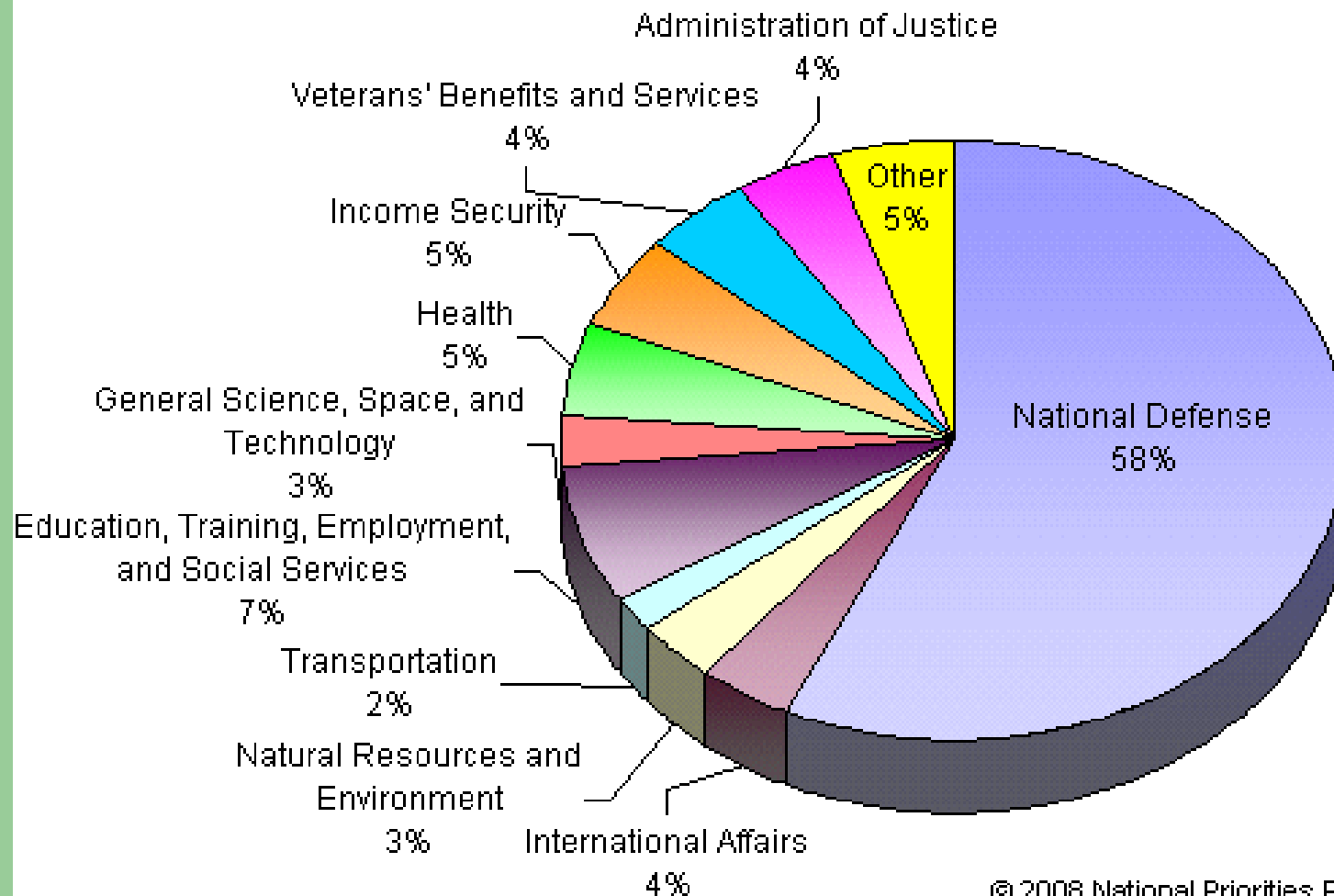
**Other Mandatory 12.8%**



# HOW CONGRESS SPENDS YOUR MONEY



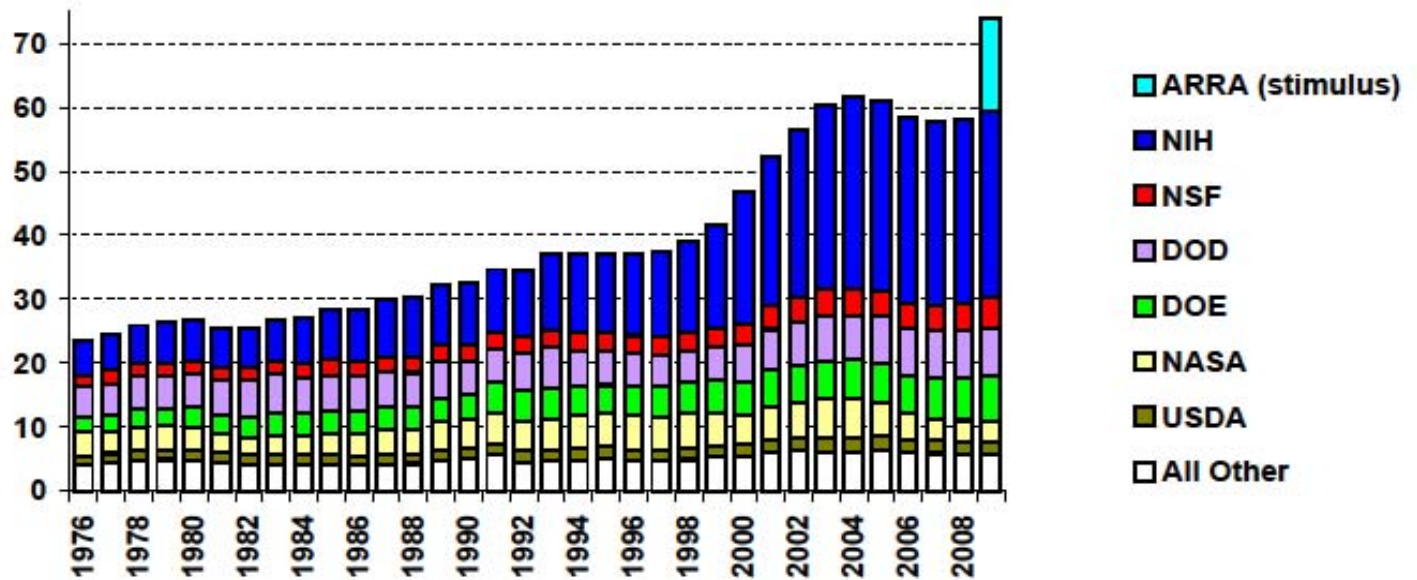
## Proposed Discretionary Budget, FY 2009



Other: energy, agriculture, commerce and housing credit, community and regional development, general government, allowances, and the administration of Social Security and Medicare

## Trends in Research by Agency, FY 1976-2009 (as of 2/09)\*

in billions of constant FY 2008 dollars



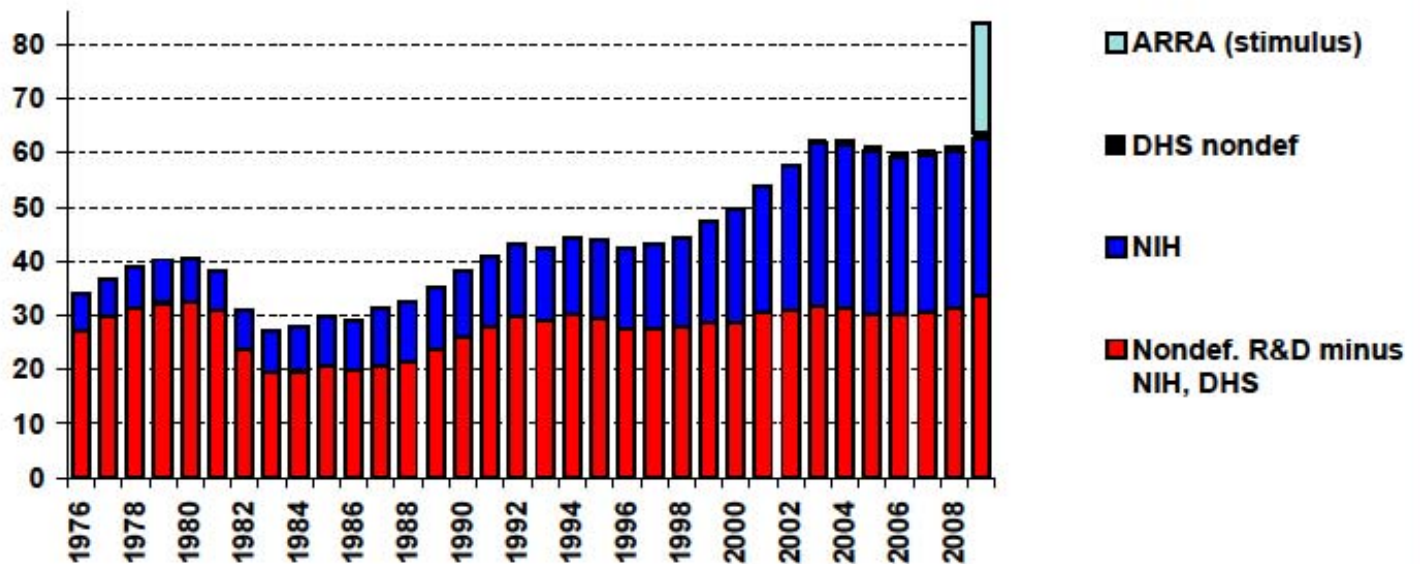
Source: AAAS analyses of R&D in annual AAAS R&D reports.

\* FY 2009 figures are latest AAAS estimates of FY 2009 appropriations, including emergency stimulus (HR 1). Research includes basic research and applied research. 1976-1994 figures are NSF data on obligations in the Federal Funds survey. FEB. '09 REVISED © 2009 AAAS



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

in billions of constant FY 2008 dollars

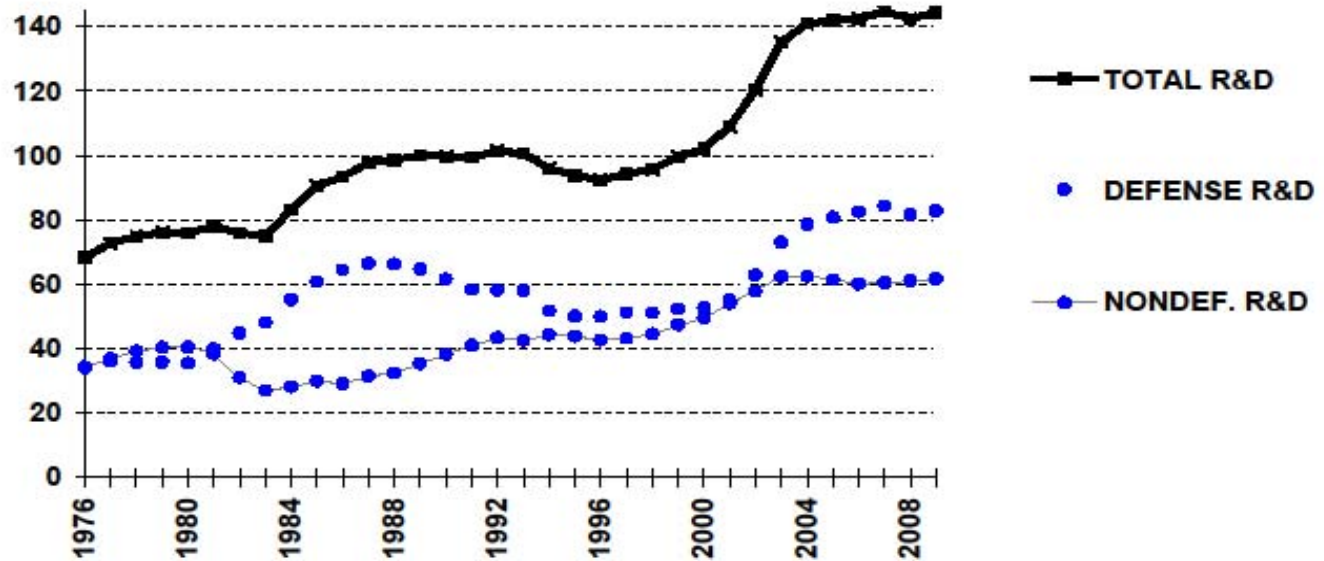


Source: AAAS analyses of R&D in AAAS Reports VIII-XXXIII. \* FY 2009 figures are latest AAAS estimates of FY 2009 appropriations, including stimulus (HR 1). R&D includes conduct of R&D and R&D facilities. FEB. '09 REVISED © 2009 AAAS



## 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



# Authorizations vs. Appropriations

- “authorization”

the formal authority provided to a federal agency to spend the money that will be appropriated in particular areas (e.g. NIH Reform Act of 2006; America COMPETES Act)
- “appropriation”

the actual money to support basic infrastructure, as well as internal and external programs. Most grants and contracts come from appropriations.

## R&D Funding by Congressional Appropriation Committees (FY09) (billions \$ and % of Total Discretionary)\*

Defense	80.5	16.4%
Labor, HHS, Education	30.2	20.7%
Commerce, Justice, Science (Commerce, NSF, NASA, DOJ)	19.2	35.7%
Energy and Water (DOE, Corps of Engineering)	10.6	33.9%
Agriculture (USDA except Forest Service)	1.8	9.4%
Interior and Environment (Interior, EPA, FS)	1.8	6.8%
Homeland Security	1.0	2.6%
Military Quality of Life/VA	1.0	1.5%
Transportation, Treasury, Judiciary (HUD)	1.0	2.0%
Foreign Operations (AID)	0.3	0.7%

*\*Represents less than 1 percent of nation's budget—and it's declining!!*

# R&D in the FY 2009 Budget by Agency

	FY2007 Actual	FY2008	FY2009	Change Amount	FY 08-09 Percentage
Defense	79,009	77,782	80,888	2,906	3.7%
Homeland Security	996	992	1,033	41	4.1%
National Science Foundation	4,440	4,479	6,176	696	15.5%
Department of Health and Human Services	29,621	29,816	29,873	157	0.5%
National Institutes of Health	28,350	28,676	28,888	-10	-0.0%
Department of Energy	9,035	9,661	10,618	858	8.9%
National Aeronautics and Space Agency	11,582	12,188	12,780	592	4.9%
Department of Agriculture	2,275	2,324	1,866	-369	-15.9%
Department of Commerce (includes NIST)	1,073	1,138	1,162	14	1.2%
Department of Education	327	321	324	3	0.9%
Environmental Protection Agency	557	548	541	-7	-1.3%

\*\*Dollars in millions.

Source: AAAS, based on OMB data for R&D for FY2009, agency budget justifications, and information from agency budget offices. Note: The projected inflation rate between FY2008 and FY2009 is 2.0 percent. FY2008 figures exclude pending supplementals. Revised March 7, 2009.

# FY09 Priorities

## [Office of Science & Technology Policy Memo]

- Commitment to American Competitiveness Initiative
- Major initiatives
  - national security
    - Defense against domestic nuclear event
    - Biometrics for recognition
    - Countering IEDs
  - energy independence
  - advanced networking and Information technology
  - understanding complex biological systems through multi-disciplinary collaboration
  - nanoscale research that bridges the life and physical sciences
  - next-generation air transportation system

# American Competitive Initiative (ACI)

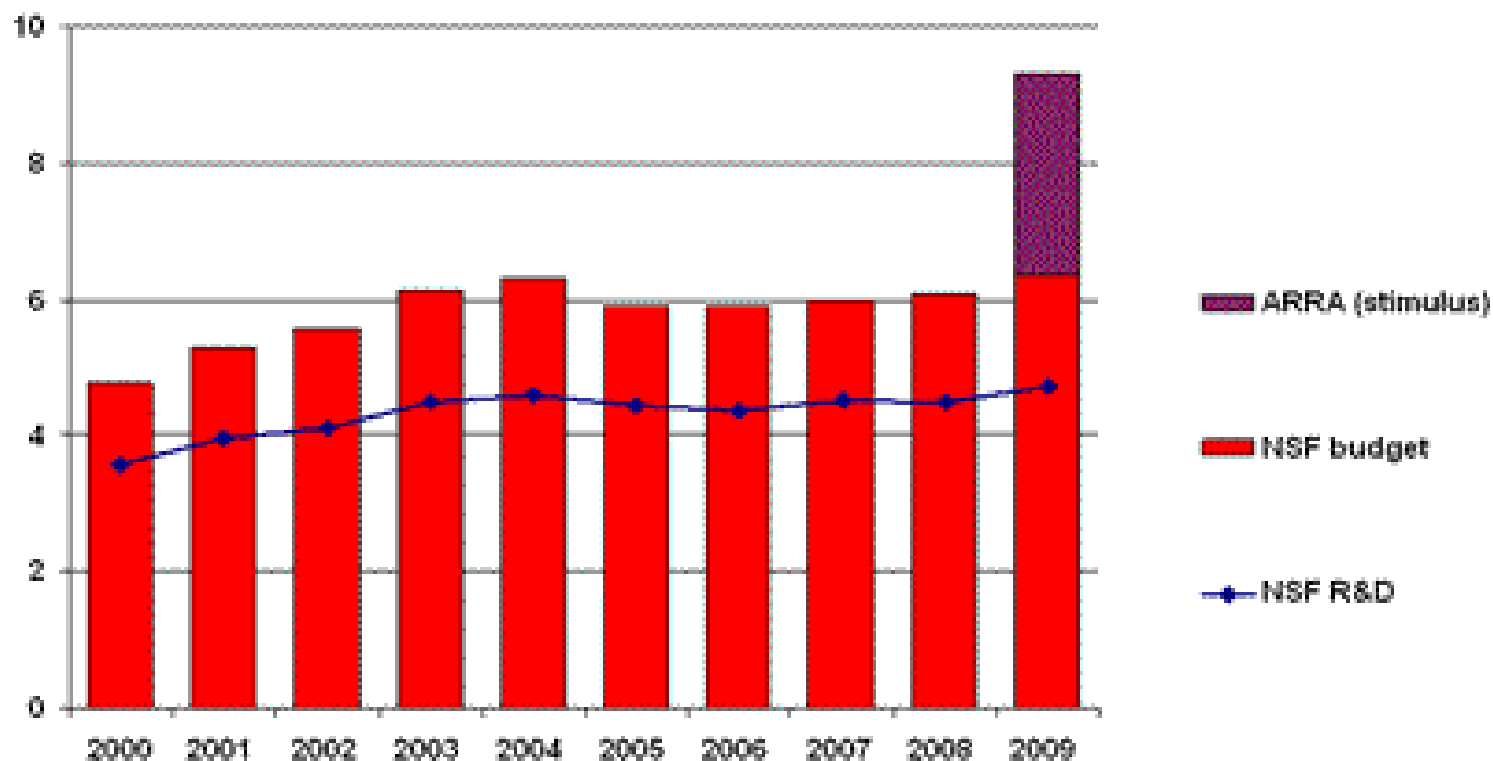
- An effort to improve the nation's ability to compete in the technological marketplace
- Focus on NSF, DOE Office of Science, and NIST
- \$136 billion initiative
  - \$50 billion for research, science education, and research infrastructure - doubling of federal R&D funding over 10 years
  - \$86 billion for an R&D tax incentive
  - Double the NSF budget over the next 10 years

# America COMPETES Act (August 2007)

- “Authorized” \$43 billion over three years for research and training programs
- Required a National Academy of Sciences study on barriers to innovation
- Directed federal research agencies to support and promote high-risk, high-reward research

## National Science Foundation Budget, FY 2000-2009 (as of 2/09)\*

(budget authority in billions of constant FY 2008 dollars)

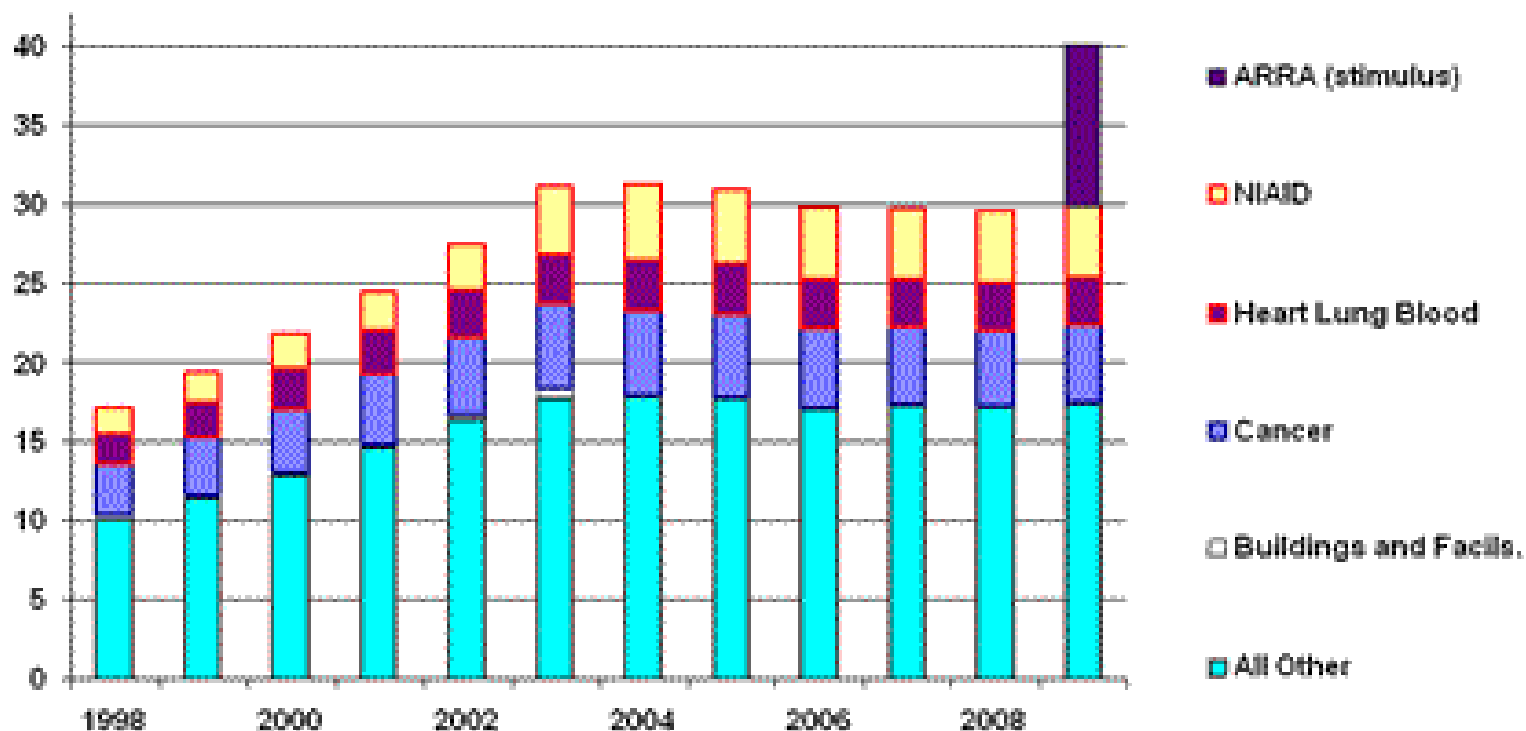


Source: National Science Foundation, AAAS, and latest AAAS estimates of FY 2009 appropriations. Includes supplemental (stimulus appropriations) in Public Law 111-5. FY 2009 NSF R&D line excludes stimulus R&D.  
 FEB. '09 © 2009 AAAS



## 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 1998-2008. \* 2009 figures are AAAS estimates of 2009 omnibus appropriations, including stimulus appropriations in HR 1. Adjusted for inflation using CMB's GDP deflators. FEB. 09  
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# DOD Medical Research Programs

## Current Research Programs

- Autism
- Breast Cancer
- Deployment Related Medical
- Gulf War Illness
- Minority & Underserved Populations
- Neurofibromatosis
- Ovarian Cancer
- Peer Reviewed Medical
- Prostate Cancer
- Psychological Health/Traumatic Brain Injury
- Tuberous Sclerosis Complex

# Major DoD Biomedical Programs

Program	Prior Years' Appropriations	Appropriations FY09	Proposals funded (FY08)
Autism	\$13.9 M (FY07)	\$8 M	18
Breast Cancer	\$2.2 B (FY92-08)	\$150 M	175
Deployment Related	\$105.2 M (FY08)		49
Gulf War Illness	\$15 M (FY06-08)	\$8 M	9 (FY06)
Neurofibromatosis	\$190.3 M (FY96-08)	\$10 M	209 (FY96-07)
Ovarian Cancer	\$121.7 (FY97-08)	\$20 M	15
Peer Reviewed Medical Research	\$394.5 M (FY99-08)	\$50 M	247 (FY99-06)
Prostate Cancer	\$89- M (FY97-08)	\$80 M	170
Psychological Health/TBI	\$301 (FY07)		201 (FY07)
Tuberous Sclerosis Complex	\$17.5 M (FY02-08)	\$6 M	48 (FY02-06)

*From DoD Congressionally Directed Medical Research Programs*

# DoD Medical Research Opportunities

- \$75 billion in DoD for Research, Development, Testing, and Evaluation (RDT&E) in FY07
- \$1.6 billion for basic research (half spent at universities)
- Congressionally-Directed Medical Research Programs information (<http://cdmrp.army.mil/>)
- Opportunities in DoD Supplementals (e.g., Autism, neurofibromatosis)

# DoD Medical Research Sources

- **Naval Research Lab (NRL):**  
<http://www.nrl.navy.mil/>
- **Air Force Office of Scientific Research (AFOSR):**  
<http://www.afosr.af.mil/>
- **Defense Threat Reduction Agency (DTRA):**  
<http://www.dtra.mil/rd/index.cfm>
- **Defense Advanced Research Projects Agency (DARPA):**  
<http://www.darpa.mil/>

# More DoD Sources

- **U.S. Army Research Laboratory (ARL)**

<http://www.arl.army.mil/main/main/>

- **U.S. Army Research Office (ARO)**

<http://www.arl.army.mil/main/main/default.cfm?Action=29&Page=29>

<http://www.arl.army.mil/main/main/default.cfm?Action=18&Page=70>

- **Army Medical**

<http://www-usamraa.army.mil>

- **Office of Naval Research (ONR)**

<http://www.onr.navy.mil>

# “Earmarks”

- Spending language placed by Congress in an appropriations bill
- 11,524 earmarks in FY2008—totaling \$16.5 billion
- Estimated at \$2.25 billion for colleges and universities in FY08
- House members who place earmarks into legislation must fully identify the recipient and certify in writing that neither they nor their spouses have a "financial interest" in the earmark

# FY 2008 Earmarks

value of earmarks \$ in thousands

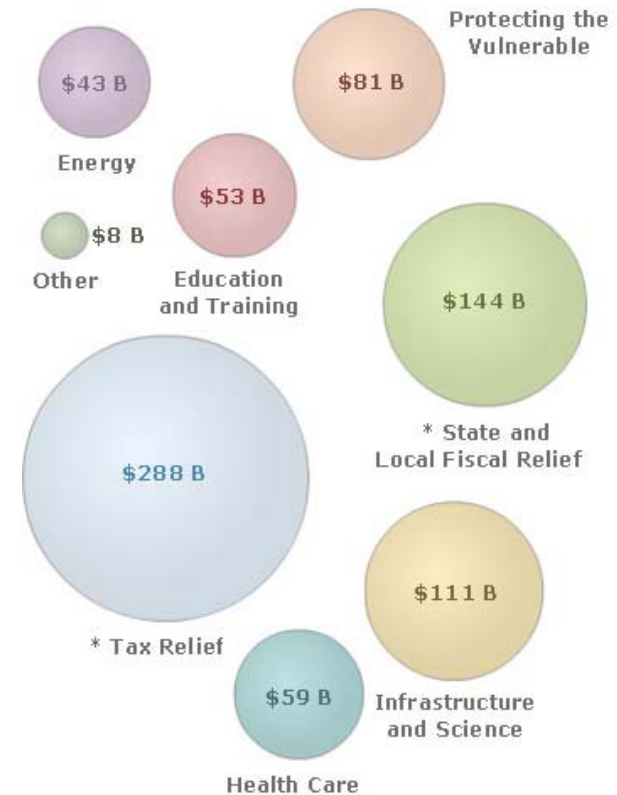
- Agriculture, Rural Development, Food and Drug Administration, and Related Agencies—528—\$330,196
- Commerce, Justice, Science and Related Agencies—1,740—\$972,252
- Defense—2,087—\$6,644,746
- Energy and Water Development—1782--\$3,690,427
- Financial Services and General Government—201—\$227,240
- Homeland Security—122--\$348,218
- Interior and Environment—565--\$429,237
- Labor, Health and Human Services, and Education—2,252—\$895,297
- Military Construction and Veterans Administration—190--\$1,177,245
- State, Foreign Operations, and Related Programs—4—\$23,012
- Transportation, Housing and Urban Development, and Related Agencies—2,053—\$1,763,963
- **Total—11,524—\$16,501,833**

# American Recovery and Reinvestment Act (ARRA)

- Otherwise known as the **Stimulus bill**
  - Additional \$10.4 billion for NIH
  - Additional \$3 billion for NSF
  - Additional \$1 billion for NASA
  - Additional \$600 million for NIST
  - Additional \$300 million for DOD
  - Additional \$2 billion for DOE, + \$2.5 billion for EERE
  - Additional \$830 million for NOAA
  - Additional \$140 million for USGS
  - Additional funding for EPA, NEA, Education, USAID, State, USDA, DOC, HUG, DHS, DOL, DOI, DOJ, Treasury, SBA, Smithsonian, Social Security Admin, Army Corps of Engineers

# Overview of the Act

- \$792,000,000,000
- To create 3.5 million jobs over two years
- Includes:
  - **Federal Elements**
    - Helping Students and Families
    - Research Funding
    - Infrastructure
    - Job Training
  - **State Fiscal Relief**



# NIH Funding under ARRA

- A total of \$10.4 billion available for two years—through Sept. 2010
- \$8.2 billion in support of scientific research priorities
  - \$7.4 billion to the Institutes and Centers and Common Fund (CF), based on a percentage-based formula
  - \$800 million to the Office of the Director (OD) (For example, support for Challenge Grants)
  - To support additional scientific research-related activities
- \$1 billion to support Extramural Construction, Repairs, and Alterations
  - Allocated to the National Center for Research Resources (NCRR)
- \$300 million Shared Instrumentation and other capital equipment
  - Allocated to NCRR to support all NIH activities
- \$500 million for NIH buildings and facilities
  - To fund high priority repair, construction and improvement projects on NIH campuses
- \$400 million for Comparative Effectiveness Research (CER)

<http://www.nih.gov/recovery/index.htm>

# Further NIH funding under ARRA

Challenge Grants information: [http://grants.nih.gov/grants/funding/challenge\\_award/](http://grants.nih.gov/grants/funding/challenge_award/)

- budget may not exceed \$500,000 total costs per year for a maximum of \$1,000,000 total costs over a two-year project period.
- application Due Date: April 27, 2009

RFA-RR-09-007 - Recovery Act Limited Competition: Core Facility Renovation, Repair, and Improvement (G20) <http://grants.nih.gov/grants/guide/rfa-files/RFA-RR-09-007.html>

- budgets for direct costs between \$1M and \$10M and may not exceed five years.
- application Due Date: September 17, 2009

RFA-RR-09-008 - Recovery Act Limited Competition: Extramural Research Facilities Improvement Program (C06) <http://grants.nih.gov/grants/guide/rfa-files/RFA-RR-09-008.html>

- budgets for direct costs between \$2M and \$15M may be requested may not exceed five years.
- application Due Date(s): May 6, 2009 (projects between \$2M and \$5M); June 17, 2009 (projects between \$10M and \$15M), July 17, 2009 (projects between \$5M and \$10M)

PAR-09-118 - Recovery Act Limited Competition: High-End Instrumentation Grant Program (S10) <http://grants.nih.gov/grants/guide/pa-files/PAR-09-118.html>

- budget at least \$600,000 with a maximum of \$8,000,000
- application Due Date May 6, 2009

# NSF Funding under ARRA

## Letter from Bement on 18 March

- In keeping with this, NSF's overall framework for Recovery Act investments emphasizes the following:
  - All grants issued with Recovery Act funds will be standard grants with durations of up to 5 years. This approach will allow NSF to structure a sustainable portfolio.
  - Funding of new Principal Investigators and high-risk, high-return research will be top priorities.
  - With the exception of the MRI, ARI and Science Masters programs, the majority of proposals eligible for Recovery Act funding include those that are already in house and will be reviewed and/or awarded prior to September 30, 2009. NSF also will consider proposals declined on or after October 1, 2008. The reversal of the decision to decline must be based on both the high quality of the reviews received on the initial submission and the lack of available funding at the time the original decision was made. The cognizant program officer will contact the institution when a reversal is being considered by NSF.

# Further NSF funding under ARRA

- NSF will post a solicitation this spring for the Major Research Instrumentation Program (MRI) - \$300 million
- Academic Research Infrastructure (ARI) program - \$200 million- a solicitation will be posted this spring.
- The Science Masters program- \$15 million- a solicitation will be posted this spring.
- Other funds for the Math and Science Partnership program (funded at \$25 million); the Robert Noyce Teacher Scholarship Program (funded at \$60 million); the Major Research Equipment and Facilities Construction Account (funded at \$400 million)

<http://www.nsf.gov/recovery>

# Department of Energy funding under ARRA

- \$1.6 billion (Office of Science)
- \$400 million (ARPA-E)
- \$ 2.5 billion (EERE)
  - including:
    - \$800 million for Biomass
    - \$400 million for Geothermal
    - \$50 million for IT and Communications
    - \$300 million for an Alternative Fueled-Vehicles Pilot Grant Program

<http://www.energy.gov/recovery/index.htm>

# NASA funding under ARRA

- \$550 million
  - Science: \$400,000,000
    - to accelerate the development of the Tier 1 set of Earth Science climate research missions recommended by the National Academies
  - Aeronautics: \$150,000,000
    - to undertake systems-level research, development and demonstration activities related to aviation safety, environmental impact mitigation, the Next Generation Air Transportation System (NextGen)

<http://www.nasa.gov/recovery/index.html>

# NIST funding under ARRA

- Construction of Research Facilities
  - \$180,000,000 shall be for the competitive construction grant program for research science buildings, including fiscal year 2008 and 2009 competitions
- UT submitted a proposal in summer 2008 for new Chemistry/Environmental Sciences Building

# Department of Defense funding under ARRA

Funding Level: \$300 million

- Army: \$75,000,000
- Navy: \$75,000,000
- Air Force: \$75,000,000
- Defense Wide: \$75,000,000

<http://www.defenselink.mil/recovery/>

# Arts and Humanities funding under ARRA

- The American Recovery and Reinvestment Act provides \$50 million to be distributed in direct grants to fund arts projects and activities which preserve jobs in the non-profit arts sector threatened by declines in philanthropic and other support during the current economic downturn.
- Forty percent of such funds will be distributed to state arts agencies and regional arts organizations
- 60 percent of the funds will be competitively awarded to nonprofit organizations that meet the eligibility criteria being established for this program.

**[www.nea.gov/recovery/](http://www.nea.gov/recovery/)**

# Oversight of the ARRA

- Higher transparency
- Higher scrutiny
- Importance of cost principles, administrative regulations and award terms and conditions
- Increased sub-recipient monitoring
- Likely requiring quarterly reports showing:
  - amount received
  - amount expended
  - status of project (towards completion)
  - number of jobs created or saved
- Watch deadlines-could lose funds over late reports
- All information is subject to review and approval by Office of Management and Budget (OMB).

# ARRA Development

Information is changing daily and what has been presented here is subject to change

UT has set up a website for further ARRA information at

[www.utoledo.edu/research/StimulusInformation.html](http://www.utoledo.edu/research/StimulusInformation.html)

or

[www.recovery.gov](http://www.recovery.gov)

# State of Ohio

- Third Frontier
  - Wright Centers
  - Ohio Research Scholars
  - Advanced Energy
  - Fuel Cells
  - Research Commercialization

[http://www.ohiochannel.org/your\\_state/third\\_frontier\\_project/index.cfm](http://www.ohiochannel.org/your_state/third_frontier_project/index.cfm)

# Wright Centers

- **Wright Centers of Innovation in Biosciences (WCIB)**  
Grants to support large-scale world-class research and technology development platforms designed to accelerate the pace of Ohio commercialization. Wright Centers are to be collaborations among Ohio higher education institutions, non-profit research organizations, and Ohio companies in the Biosciences.
- **Wright Centers of Innovation in Engineering and Physical Sciences (WCIEPS)**  
Grants to support large-scale world-class research and technology development platforms designed to accelerate the pace of Ohio commercialization. Wright Centers are to be collaborations among Ohio higher education institutions, non-profit research organizations, and Ohio companies in the areas of advanced materials, power and propulsion, information technology and instruments, controls and electronics.

# More Wright Center Info

- **Wright Mega-Centers of Innovation (WMCI)**

Provides grants which establish centers of excellence that will clearly define Ohio as an international leader in research and commercialization for one or more technology platforms that will have a substantial, measurable, and sustainable impact on the State's economy. The Center must be a multi-organizational collaboration that could involve the state's universities, medical centers and other non-profit research organizations, and private sector businesses large and small in the areas of advanced materials, bioscience, power and propulsion, information technology and instruments, controls and electronics. Awards will be made in the range of \$50- 60 million per center.

- **Wright Projects (WP)**

Provides grants to support specifically defined near term commercialization projects requiring major capital acquisitions and improvements at Ohio higher education institutions and non-profit research organizations. Projects must involve one or more Ohio companies and be in the areas of Advanced/Alternative Energy; Advanced Materials; Advanced Propulsion; Biomedical; and Instruments, Controls and Electronics.

# Ohio Research Scholars

- **The Ohio Research Scholars Program (ORSP)**

Jointly funded and administered by the Ohio Department of Development and the Chancellor of the Ohio Board of Regents, the ORSP provides grants to strengthen and increase the number of clusters of research excellence, led by Ohio's academic institutions that support regional economic priorities. The ORSP will achieve this through 1) aggressive investment in the attraction of senior research talent and related facilities and equipment, and 2) promotion of unique collaborations needed to build and sustain scientifically and commercially promising lines of research. The ORSP is placing high priority on building a critical mass of research scientists and engineers in the five targeted technology/research focus areas identified below. The emphasis of this program is on the recruitment of research talent from outside Ohio. However, some funding will be available to support the retention or hiring from within Ohio of personnel that are important to the growth of a research cluster. The ORSP will be accepting proposals from Ohio's universities and colleges. Each proposal must define the technology/research focus area of the research cluster and the areas of investigation to be pursued by the newly hired scholars in one or more of the state's targeted technology/research focus areas: 1) Advanced materials; 2) Biosciences; 3) Instruments-controls-electronics; 4) Information technology; and 5) Power and propulsion (includes Advanced energy). Awards will be made in the range from \$2.5 million to \$50 million.

# Advanced Energy and Fuel Cells

- **Third Frontier Advanced Energy Program (TFAEP)**

Grants to accelerate the development and growth of the advanced energy industry in Ohio by direct financial support to organizations seeking to commercialize new products, manufacturing processes or technologies, or to adapt or modify existing components or systems that can reduce the cost of advanced energy systems or address technical and commercialization barriers.

- **Third Frontier Fuel Cell Program (TFFCP)**

The Third Frontier Fuel Cell Program provides grants that support the growth of Ohio's fuel cell industry through collaborations that involve Ohio higher education institutions, non-profit research organizations, and Ohio companies. Projects must focus on research and development that addresses technical and cost barriers to commercialization and adapting fuel cell components produced in Ohio for use in fuel cell systems.

# Research Commercialization

- **Biomedical Research and Commercialization Program (BRCP) [formerly the Biomedical Research and Technology Transfer (BRTT) Partnership Award Program.]**  
Provides grants which support biomedical and biotechnology research leading to Ohio commercialization and long-term improvements to the health of Ohioans. Projects are to be collaborations among Ohio higher education institutions, non-profit research organizations, and Ohio companies in the areas of human genetics and genomics, structural biology, biomedical engineering, computational biology, plant biology and environmental biology.
- **Engineering and Physical Science Research Commercialization Program (EPSRCP)**  
Provides grants to support technology-based economic development through research, development, and commercialization activities in Ohio. Projects are to be collaborations among Ohio for-profit firms, Ohio higher education institutions, and Ohio non-profit research organizations. Proposals must focus on technologies in the fields of advanced materials, power and propulsion, information technology, and instruments-controls-electronics.

# Other State Agencies

- **Lake Erie Commission**

<http://www.lakeerie.ohio.gov/LakeErieProtectionFund/GrantsInformation.aspx>

- **Education**

<http://education.ohio.gov/GD/Templates/Pages/ODE/ODEDefaultPage.aspx?page=1>

- **EPA**

<http://www.epa.state.oh.us/>

[http://www.epa.state.oh.us/oeef/html/grantee\\_resources.html](http://www.epa.state.oh.us/oeef/html/grantee_resources.html)

- **Jobs and Family Services**

<http://jfs.ohio.gov/oca/>

# State Agencies (cont.)

- DNR  
<http://www.dnr.state.oh.us/tabid/10762/Default.aspx>
- Health  
<http://www.odh.ohio.gov/about/grants/grants.aspx>
- Transportation  
<http://www.dot.state.oh.us/Divisions/Planning/Research/Pages/default.aspx>

# State Agencies (cont.)

- Ohio Arts Council  
<http://www.oac.state.oh.us/>  
<http://www.oac.state.oh.us/grantsprogs/deadlines.asp>
- Clean Ohio Fund (brownfields, farmlands, green space, recreational trails)  
<http://clean.ohio.gov/>
- Department of Agriculture  
<http://www.agri.ohio.gov/Grants/Grants.aspx>

# State Agencies (cont.)

- Commerce  
<http://www.com.ohio.gov/Grants.aspx>
- Justice  
<http://www.ocjs.ohio.gov/funding.htm>
- Developmental Disabilities Council  
<http://ddc.ohio.gov/Grant/index.htm>
- History (mostly resources for the researcher)  
<http://www.ohiohistory.org/NoFlash.html>

**Thank you**

**Questions?**