National Science Foundation

Directorate for Mathematical and Physical Sciences (MPS)

Division of Chemistry (CHE)

Outreach Presentation – April 2011

National Science Foundation (NSF)

NSF is an independent federal agency created by Congress in 1950 (NSF Act of 1950)

"to promote the progress of science;
to advance the national health, prosperity, and welfare;
to secure the national defense"

NSF is celebrating its 60th Anniversary in 2010

Executive Branch
Executive Office of the President

↓

Departments (e.g. Defense) and Independent Establishments, Agencies, and Government Corporations (e.g. Securities & Exchange Commission)

↓

National Science Foundation

www.usa.gov

NSF Vision and Goals

NSF Vision: Advancing discovery, innovation and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering.

---From National Science Foundation Investing in America's future, FY2006 – FY2011 Strategic Plan, NSF 06-48

What We Do at NSF

- Funding source for ~20% of all federally supported basic research in the U.S. with an annual budget of about $6.9 billion (FY2010)
- Support basic research and education for all fields of science and engineering
- Use grant mechanism in two forms
  - Unsolicited: curiosity-driven
  - Solicited: more focused
- Review criteria: *intellectual merit* & *broader impact*
- No intramural on-site laboratories
- Support large facilities
- Discipline-based structure
- Use of rotator program officers & management
- Cross-disciplinary mechanisms (cyberinfrastructure, nanotechnology, climate, etc.)

Find out more about NSF at http://www.nsf.gov/index.jsp

FY 2011 NSF Budget Request

NSF Budget by Appropriation (dollars in millions)	FY 2010 Estimate	FY2011 Request	Change over FY10
Research & Related Activities	$5,563.92	$6,018.83	$454.91 (8.2%)
Education & Human Resources	872.76	892.00	19.24 (2.2%)
MREFC	117.29	165.19	47.90 (40.8%)
Agency Operations & Award Management	300.00	329.19	29.19 (9.7%)
National Science Board	4.54	4.84	0.30 (6.6%)
Office of Inspector General	14.00	14.35	0.35 (2.5%)
Total, National Science Foundation	$6,872.51	$7,424.40	$551.89 (8.0%)

http://www.nsf.gov/about/budget/fy2011/index.jsp

FY 2011 NSF Budget Highlights

NSF's contribution to the National Innovation Strategy:

- ✓Restore American leadership in fundamental research
- ✓Educate the next generation with 21st century knowledge and skills while creating a world-class workforce
- ✓Support research for next-generation information and communications technology and cybersecurity
- ✓Encourage innovation-based entrepreneurship, and create competitive communities by promoting regional innovation clusters

Administration Priority Programs

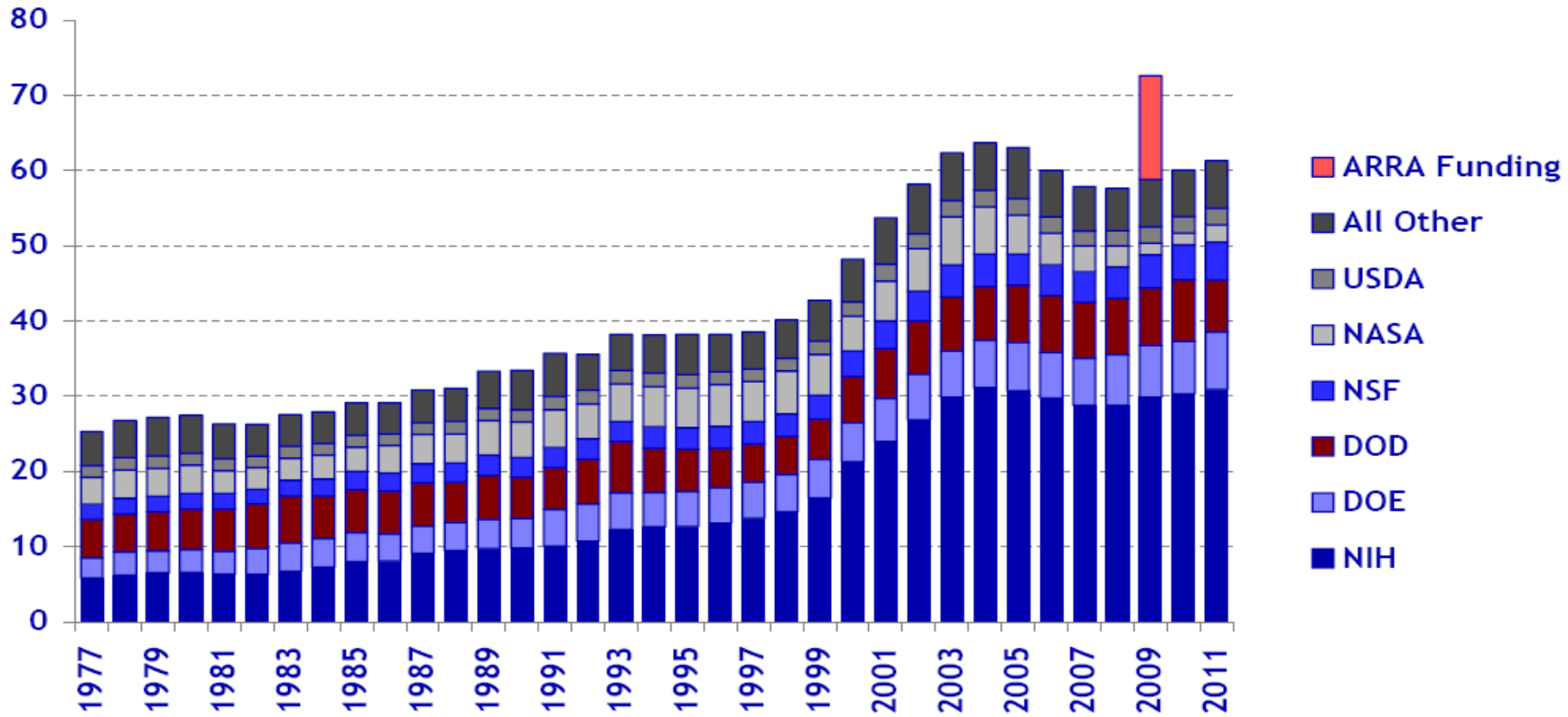
- Graduate Research Fellowships: $158 M
- Climate Change Education: $10 M
- Advanced Technological Education: $64 M
- Science and Engineering Beyond Moore's Law for MPS: $32 M
- **Faculty Early Career Development program (CAREER): $209 M**

FY2011 Investment Priorities

- Science, Engineering, and Education for Sustainability (SEES): $766 M
- Cyberlearning Transforming Education (CTE): $41 M
- National Ecological Observatory Network (NEON): $35 M

Trends in Research by Agency

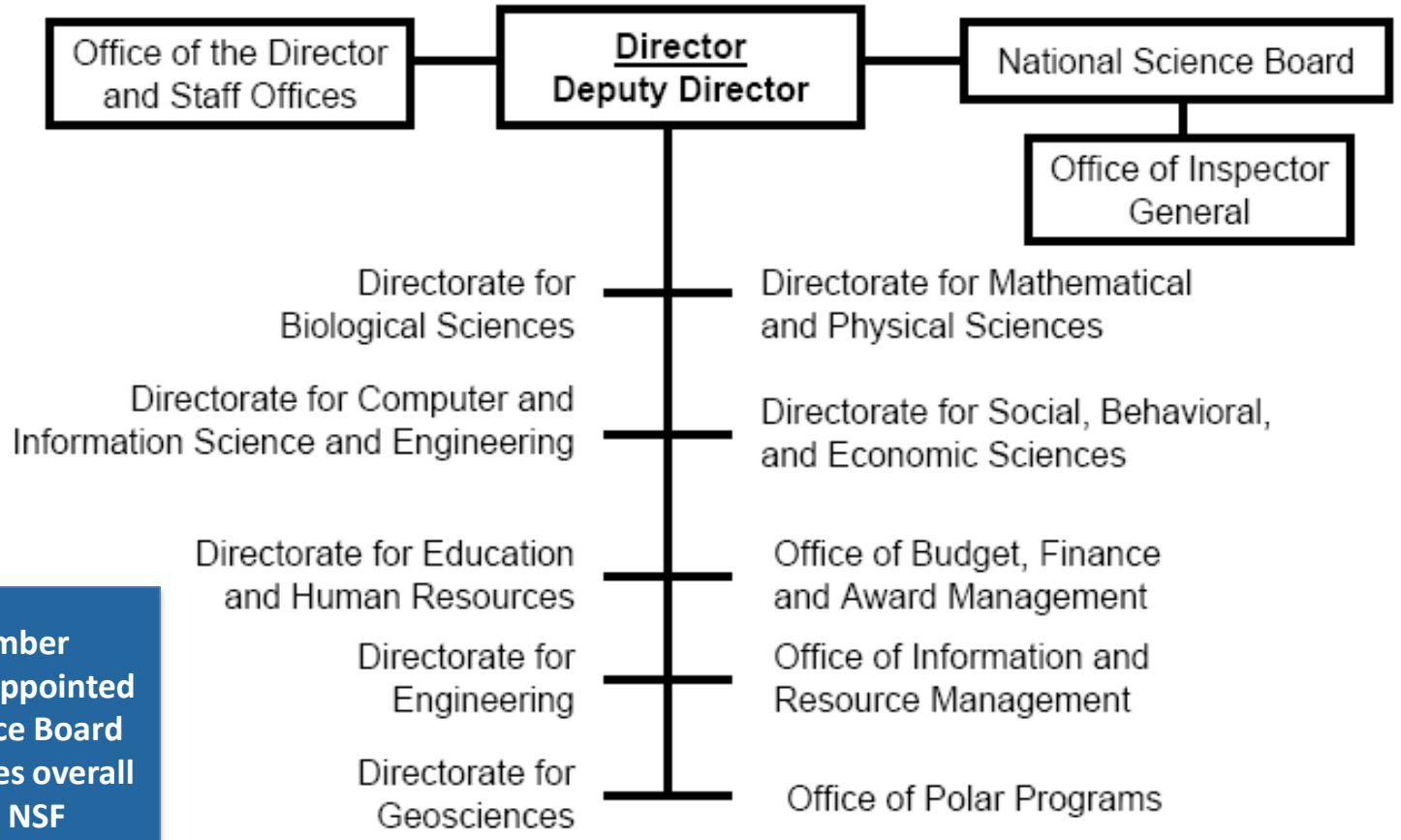
in billions of constant FY 2010 dollars



Source: *AAAS Report: Research & Development* series.
FY 2010 and FY 2011 figures are latest estimates.
Research includes basic research and applied research.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.

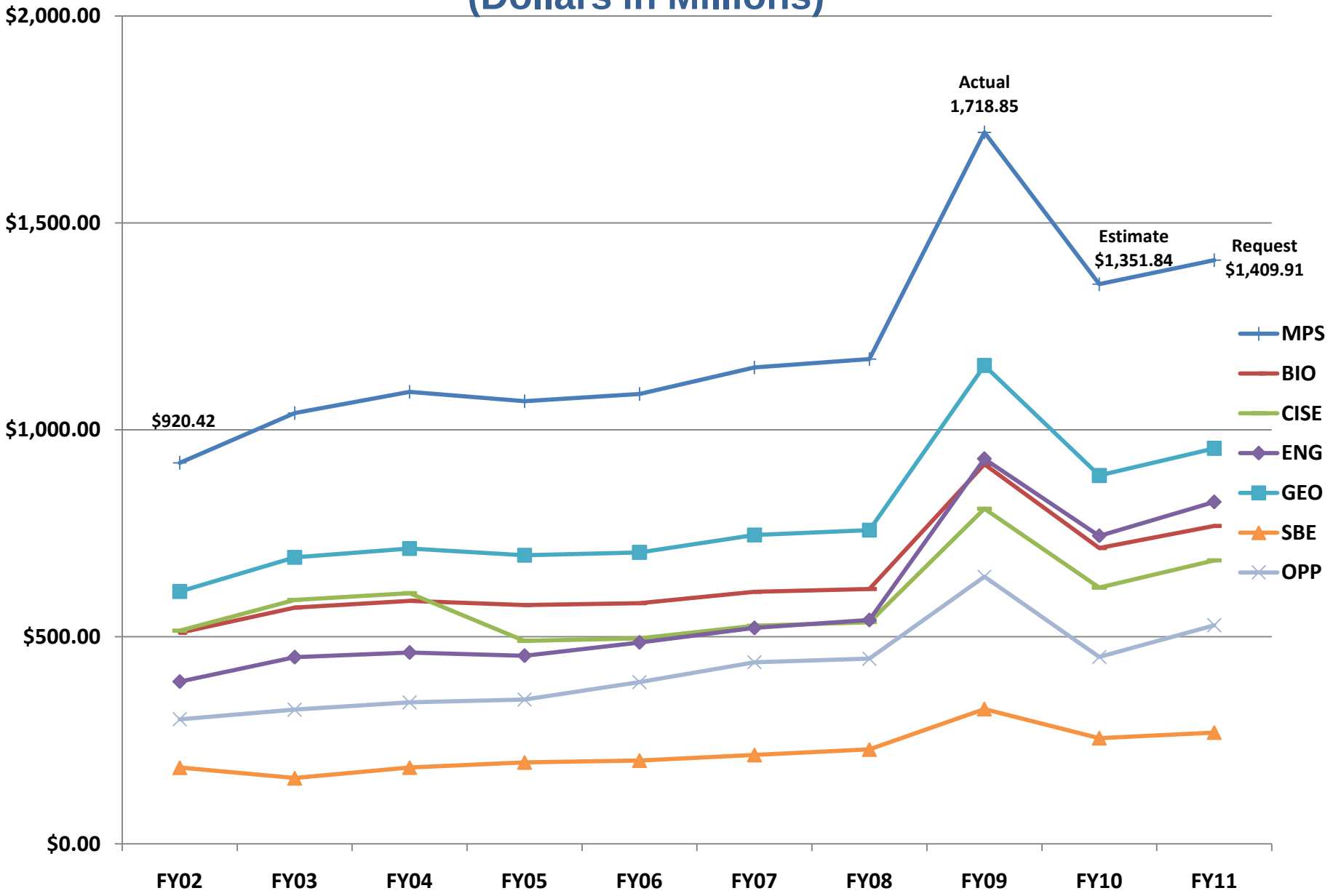
AAAS

NSF Organizational Chart



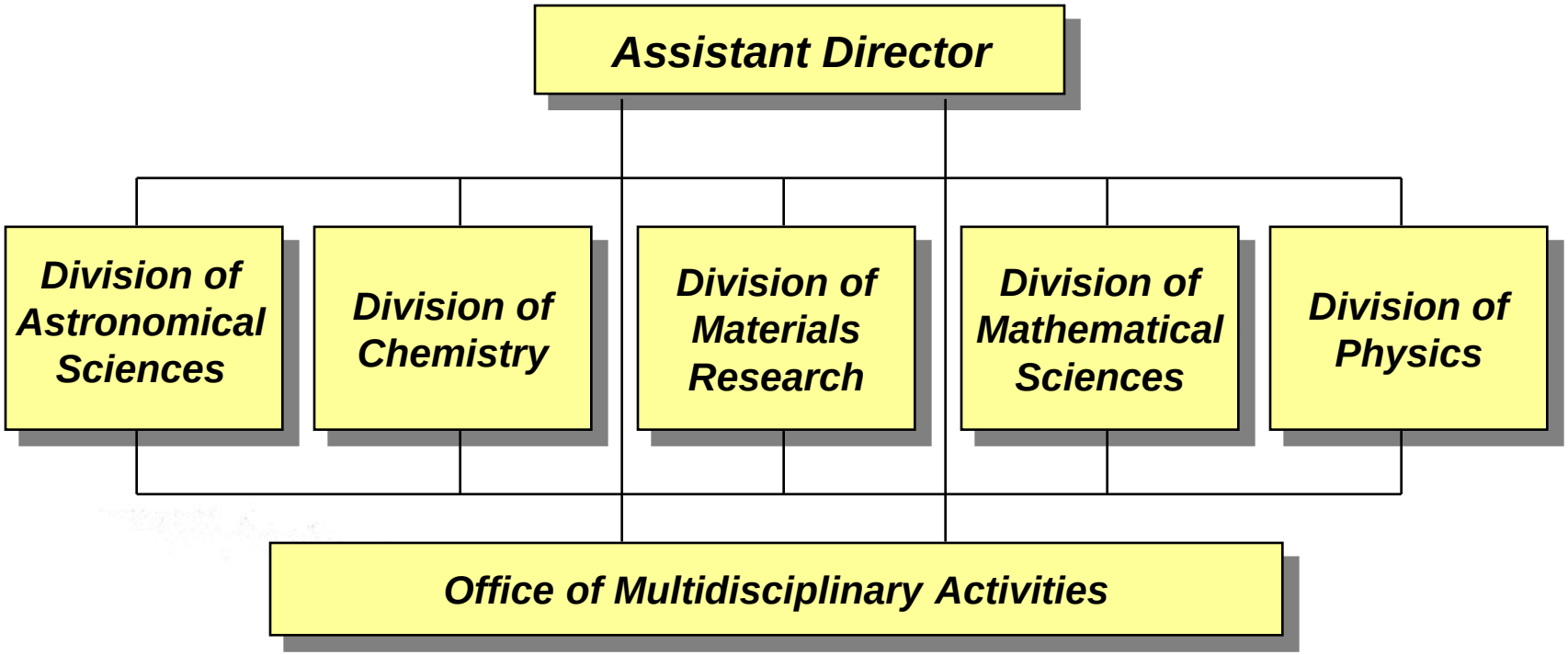
The 24-member Presidentially-appointed National Science Board (NSB) establishes overall policies for NSF
www.nsf.gov/nsb

NSF Research Directorates Funding Activity (Dollars in Millions)



Adapted from FY02 – FY11 NSF Budget Requests Research & Related Activities Funding Data, Data available at http://www.nsf.gov/about/budget/index.jsp

Directorate for Mathematical and Physical Sciences (MPS)



MPS provides 44% of federal funding for basic research at academic institutions in the mathematical & physical sciences, ranging from 34% for physics to 60% for mathematical sciences

Division of Chemistry

Creating molecules and instruments that are transforming the 21st century

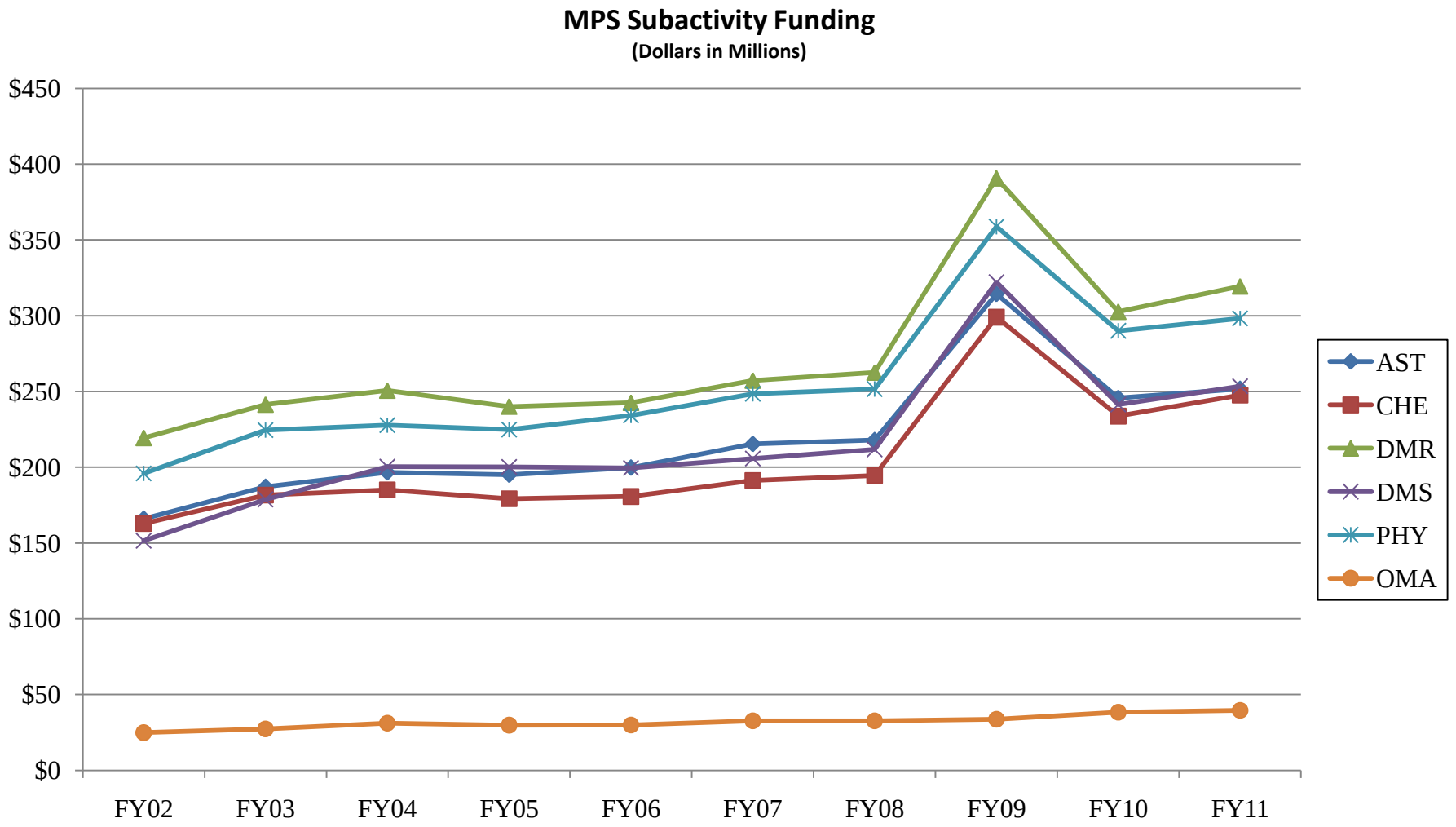
- **Mission:**

  To support innovative research in chemical sciences, integrated with education, through strategic investment in a globally engaged workforce reflecting the diversity of America

- **Topic areas:**
  - **Chemical Synthesis**
  - **Chemical Structure, Dynamics and Mechanisms**
  - **Chemical Measurement and Imaging**
  - **Theory, Models and Computational Methods**
  - **Environmental Chemical Sciences**
  - **Chemistry of Life Processes**
  - **Chemical Catalysis**
  - **Macromolecular/Supramolecular/Nanochemistry**

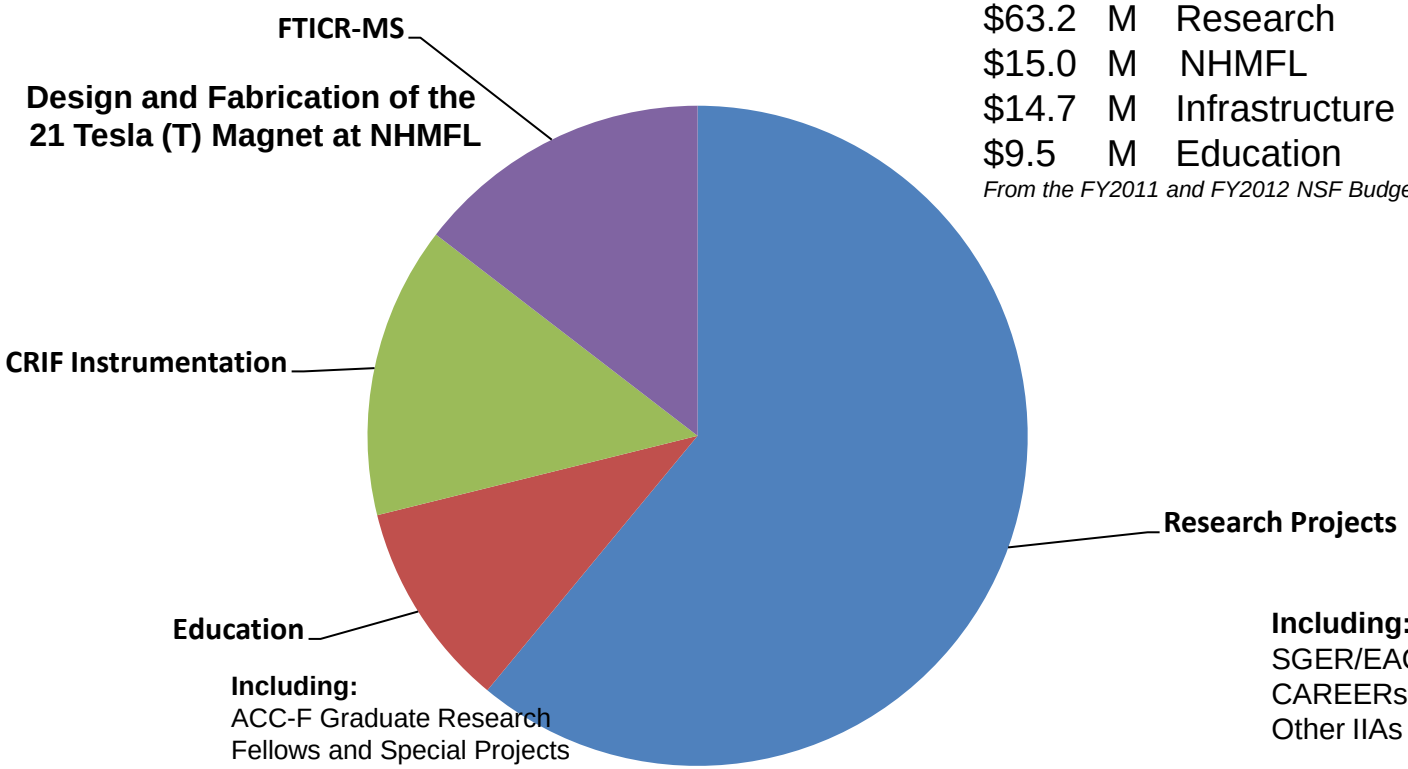
Find out more about Chemistry Programs & Activities at http://www.nsf.gov/div/index.jsp?div=CHE

Chemistry (CHE) in MPS



http://www.nsf.gov/about/budget/fy2011/pdf/09-MPS_fy2011.pdf

American Recovery and Reinvestment Act of 2009 (ARRA, aka "Stimulus Act")
NSF Division of Chemistry Investment Portfolio



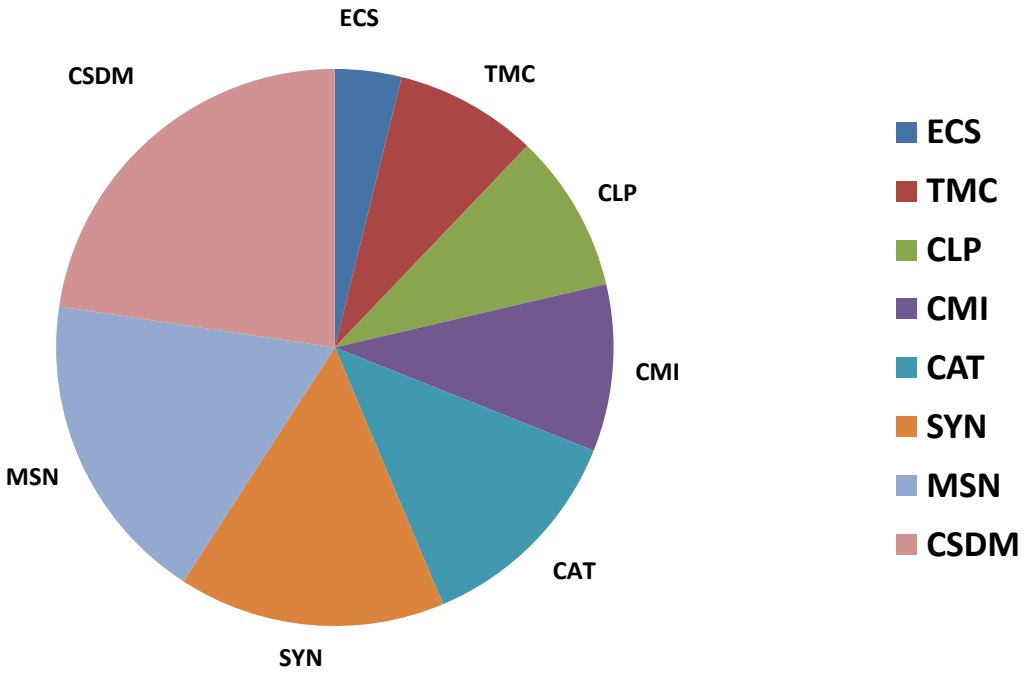
CHE FY2009 ARRA Actual:

$63.2 M Research
$15.0 M NHMFL
$14.7 M Infrastructure
$9.5 M Education

From the FY2011 and FY2012 NSF Budget Requests to Congress

Sources: FY10 and FY11 NSF Budget Request to Congress (http://www.nsf.gov/about/budget); NSF Internal Enterprise Information System; NSF Chemistry Awards Visualization Map (http://www.nsf.gov/awards/award_visualization.jsp?org=CHE#showAwardDollars=true&showARRAAwards=true), www.recovery.gov

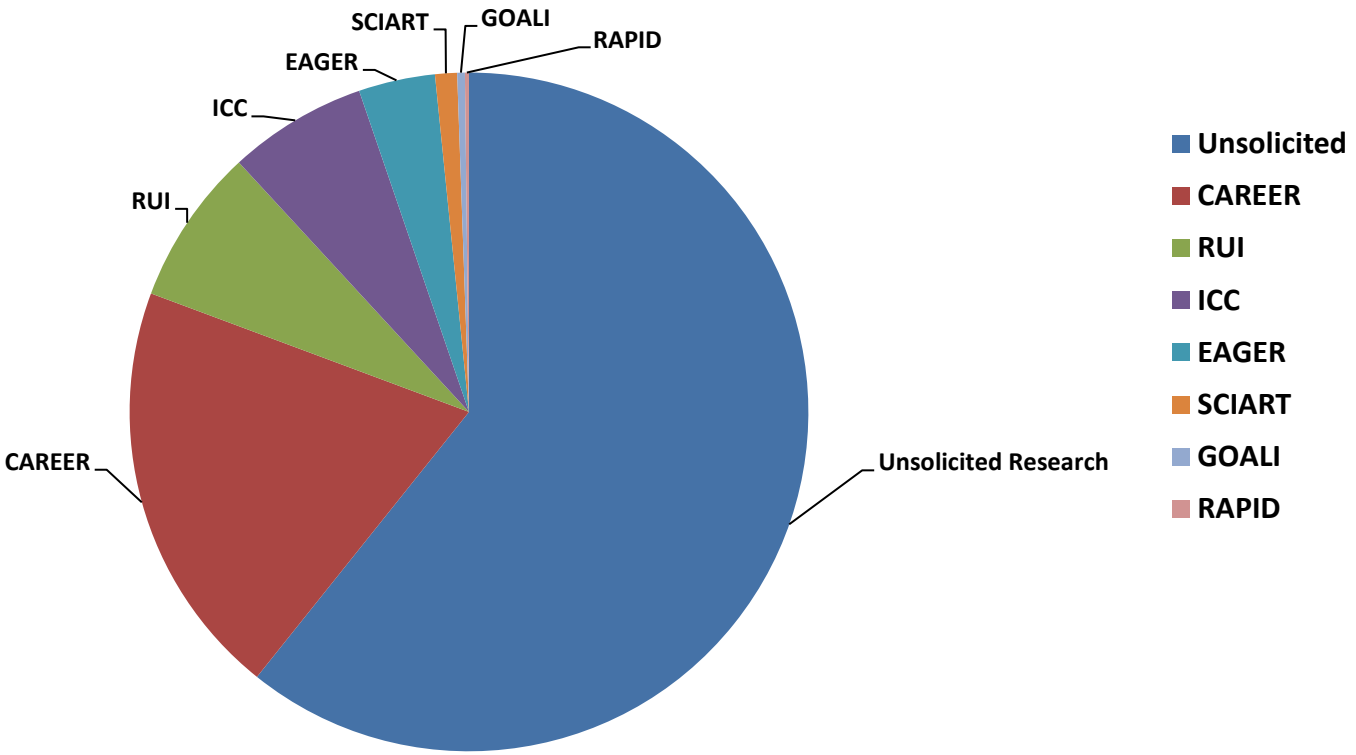
Fiscal Year 2010 Distribution of Individual Investigator Awards in Chemistry



Division of Chemistry Disciplinary Research Programs
Environmental Chemical Sciences (ECS)
Theory, Models & Computational Methods (TMC)
Chemistry of Life Processes (CLP)
Chemical Measurement & Imaging (CMI)
Chemical Catalysis (CAT)
Chemical Synthesis (SYN)
Macromolecular, Supramolecular, & Nanochemistry (MSN)
Chemical Structure, Dynamics, and Mechanisms (CSDM)

NSF Award Search (http://www.nsf.gov/awardsearch/); NSF Internal Enterprise Information System

Fiscal Year 2010 Research Awards in Chemistry



Research Proposal Type
Unsolicited Research Proposals (Individual and Collaborative)
NSF CAREER (Faculty Early Career Development Program)
NSF RUI (Research in Undergraduate Institutions)
CHE ICC (International Collaboration in Chemistry Program)
NSF EAGER (Early Concept Grants for Exploratory Research)
CHE SCIART (now Cultural Heritage Science)
NSF GOALI (Grant Opportunities for Academic Liaison with Industry Program)
NSF RAPID (Rapid Response Grants)

NSF Award Search (http://www.nsf.gov/awardsearch/); NSF Internal Enterprise Information System

Fiscal Year 2010 Research Funding Rates in Chemistry

Research Proposal CHE Classification	Approximate Funding Rate for Research Proposals
CAREER	20%
RENEWAL	54%
PRIOR	44%
NEW	17%

Funding Rate - Sometimes referred to as "success rate", the proposal funding rate for a given period is calculated by dividing the number of new awards made in a fiscal year by the number of new awards and declines made in that fiscal year. http://www.nsf.gov/about/glossary.jsp#fundingrate

New – refers to proposals that are being awarded for the first time in the Division of Chemistry or were previously supported in CHE on the same general research idea, but were subsequently not funded from the previous two proposal submissions.

Prior – refers to proposals that were previously supported in the Division of Chemistry, but received one declination following submission of a renewal proposal.

Renewal – refers to proposals that request additional funding for support subsequent to that provided by a standard or continuing grant in the Division of Chemistry.

NSF Internal Proposal & Award Database, NSF Grant Proposal Guide (http://www.nsf.gov/pubs/policydocs/pappguide/nsf11001/nsf11_1.pdf)
Report to the National Science Board on the NSF's Merit Review Process Fiscal Year 2009 (http://www.nsf.gov/nsb/publications/2010//nsb1027.pdf)

Merit Review Criteria
Intellectual Merit

- How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields?
- How well qualified is the proposer (individual or team) to conduct the project?
- To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts?
- How well conceived and organized is the proposed activity?
- Is there sufficient access to resources?

Merit Review Criteria
Broader Impact

From the America Competes Act

(1) Increased economic competitiveness of the United States.
(2) Development of a globally competitive STEM workforce.
(3) Increased participation of women and underrepresented minorities in STEM.
(4) Increased partnerships between academia and industry.
(5) Improved pre-K–12 STEM education and teacher development.
(6) Improved undergraduate STEM education.
(7) Increased public scientific literacy.
(8) Increased national security.

NSF CAREER PROGRAM

Faculty Early Career Development Program

President Barack Obama talks to CAREER recipients awarded the Presidential Early Career Award, January 2010

CAREER Facts & Figures

- CAREER was established in February 1996 by President Clinton. Awardees are selected on the basis of:
  - Pursuit of innovative research at the frontiers of STEM
  - Commitment to community service as demonstrated through scientific leadership, public education, or community outreach
- Over 5,000 CAREER awards in the past 14 years
- NSF MPS invested ~$48 M in CAREER awards for FY 2010
- All NSF programs support young investigators as part of regular programs and activities; some Directorates have special programs for young investigators (e.g. BIO, ENG)

NSF CAREER Program (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214)

What is Special About CAREER?

- NSF's most prestigious award for early career faculty
- Size and duration of CAREER awards are commensurate with the award's prestige
- Presidential Early Career Awards for Scientists and Engineers (PECASE) are selected from this group

CAREER Award Details

- CAREER minimum award size is $400,000, except for BIO (minimum award size is $500,000)

- All CAREER awards are 5 years in duration

CAREER Program Goals

- Provide stable support at a sufficient level and duration for outstanding new teacher-scholars in the context of the mission of their organization
- Build a foundation for a lifetime of integrated contributions to research and education
- Increase participation of those traditionally underrepresented in science and engineering
- Provide incentives to universities to value the integration of research and education

CAREER Eligibility Criteria

At the time of proposal submission:

- Hold a doctoral degree in a field supported by NSF
- Be untenured
- Have not previously received an NSF PECASE or CAREER award
- Have not had more than two CAREER proposals reviewed

PECASE Recognition

- 20 nominees for the Presidential Early CAREER Awards for Scientists and Engineers (PECASE) are nominated by program officers from new CAREER awardees

- U.S. Citizen or Permanent Resident


NSF
Celebrating
60 Years
of Discovery
THANK YOU!