R&D in the President’s FY 2011 Budget

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for Battelle’s Community of Practice

AAAS R&D Budget and Policy Program
http://www.aaas.org/spp/rd
The FY 2011 Federal Budget

- $3.8t total budget, $1.3t unified deficit
- $1.3t discretionary budget (+0.3%)
  - $532b nondefense budget (+1.4%)
- Rescuing the Economy
- A Foundation for Economic Growth and Job Creation
  - Small business initiatives
  - Investing in science and basic research
- Restoring Responsibility
  - Three year non-security discretionary funding freeze
Composition of the Proposed FY 2011 Budget

Total Outlays = $3.8 trillion
(outlays in billions of dollars)

- Defense Discretionary: $661
- Defense R&D: $83
- Nondefense R&D: $71
- Social Security: $730
- Medicare: $491
- Medicaid: $297
- Other Mandatory: $647
- Net Interest: $251
- Nondefense Discretionary: $599
- [Defense R&D]: $83
- [Nondefense R&D]: $71

Source: Budget of the United States Government FY 2011.
Projected unified deficit is $1.3 trillion.
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Trends in Discretionary Spending
budget authority in billions of constant FY 2010 dollars

FY 2010-2015 data are budget projections.
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Federal R&D in Context

- The federal R&D investment is spread across over two dozen departments and agencies
  - Only two manage more than 10% of the investment
    - Department of Defense (52.7%)
    - Department of Health and Human Services (21.7%)
- The federal R&D investment is also spread across 11 of the 12 appropriations subcommittees.
- Role of federal R&D
  - Supports federal missions
  - Drives U.S. innovation
Character of R&D, FY 2011

Source: OMB R&D data, agency budget justifications, and agency budget documents.

Defense R&D = DOD + DOE defense.

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Federal R&D Funding by Source

outlays in billions of constant 2008 dollars

Source: NSF, Division of Science Resources Statistics,
National Patterns of R&D Resources (NSF 08-318)
2008 figures are preliminary.
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Character of R&D, 2008
outlays in billions of dollars

Source: NSF, Division of Science Resources Statistics,
National Patterns of R&D Resources (NSF 08-318)
Figures are preliminary.
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The FY 2011 Federal R&D Investment

- Total R&D: $148.1b, -0.3% from FY 2010
  - Basic Research: $30.4b, +4.3%
  - Applied Research: $31.6b, +2.1%
  - Development: $81.5b, -2.9%
  - Equipment and Facilities: $4.6b, +1.3%
- $82.2b for defense R&D, -4.8%
- $65.9b for non-defense R&D, +5.9%
- -1.4% in constant dollars from FY 2010
- +0.7% in constant dollars since FY 2004
  - Peak in FY 2009
Trends in Federal R&D
in billions of constant FY 2010 dollars

Source: AAAS analyses of R&D in annual AAAS R&D reports.
FY 2011 figures are latest AAAS estimates of FY 2011 request.
R&D includes conduct of R&D and R&D facilities.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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Total R&D by Agency, FY 2011
budget authority in billions of dollars

- DOD, $78.0
- HHS (NIH), $32.2
- DOE, $11.2
- NASA, $11.0
- All Other, $6.6
- NSF, $5.5
- USDA, $2.4
- DHS, $1.0

Total R&D = $148.1 billion

Source: OMB R&D budget data, agency budget justifications, and other agency documents.
R&D includes conduct of R&D and R&D facilities.
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Trends in R&D by Agency
in billions of constant FY 2010 dollars

FY 2010 and FY 2011 figures are latest estimates.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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R&D in the FY 2011 Budget Request
percent change from FY 2010

<table>
<thead>
<tr>
<th>Agency</th>
<th>Percent Change</th>
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<tbody>
<tr>
<td>NOAA</td>
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<tr>
<td>NIST</td>
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<tr>
<td>NASA</td>
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<tr>
<td>NSF</td>
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<tr>
<td>DOE Energy</td>
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<td>DOE Defense</td>
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<tr>
<td>DOE Science</td>
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<tr>
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<tr>
<td>EPA</td>
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<tr>
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<td>DOT</td>
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<td>DOD</td>
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<td>NASA</td>
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<tr>
<td>NIST</td>
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</tbody>
</table>

Source: OMB R&D budget data, agency budget justifications, and other agency documents.
* - Lighter colored bars indicate percent change with projected FY 2011 earmarks.

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Earmarks

- Early February - Senate Republicans introduce amendment to make earmarks a point of order requiring 60 votes to overcome
- March 9/10 - House Democrat leaders announce ban on earmarks to for-profit entities
- March 10/11 - House Republicans vote in closed-door session to ban all earmarks
- March 17 - Senate amendment fails
- Early April - Some House Republicans, including Young (R-AL), Cao (R-LA), and Paul (R-TX), break rank and request earmarks
Funding Shifts: Function

- **Defense**
  - -$4.1b to $82.2b
  - 4.8% decrease
- **Nondefense**
  - +3.6b to $65.9b
  - 5.8% increase

Total R&D
in billions of constant FY 2010 dollars

- **Nondefense**
- **Defense**
- **ARRA**
Funding Shifts: Character

- **Development**
  - $-2.9b to $81.5b
  - 3.5% decrease
- **Research**
  - $+2.5b to $62.0b
  - 4.1% increase
Funding Shifts: NASA

- Retire space shuttle and cancel Constellation Program
- Frees $6.5b over 2 yrs
- Near-earth orbit through private industry
  - +$6.1b over 5 yrs
- Heavy Lift and Propulsion
  - +$559m
- International Space Station
  - +$905m to $3.2b over 4 yrs
NASA Update

- Congressional Concerns
  - U.S. space leadership
  - Reliance on industry/Russia for near-earth orbit
  - Jobs
- Administration Response - Kennedy Space Center - April 15
  - Use Orion technology for Space Station rescue vehicle
  - Heavy lift and propulsion: $3b over next few years
    - Final design by 2015
  - Job assistance: $40m
- Sen. Nelson (D-FL) letter to Sen. Mikulski (D-MD) - June 14
  - International Space Station through 2020; one additional shuttle mission
  - Commercial cargo capability and crew services
  - International effort for beyond-Earth orbit; Heavy-lift and crew exploration vehicles
Funding Shifts: USDA

- **Buildings and Facilities**
  - -$147m to -$76m in R&D after rescissions

- **Agriculture and Food Research Initiative (AFRI)**
  - +$166m to $429m in total budget
  - 63.4% increase
Funding Shifts: Dept of Energy

- Fossil, -$53m
- Nuclear, -$122m
- EERE, +$35m
- Electric Grid, +$22m
- Office of Science, +$172m
- ARPA-E, +$273m
Funding Shifts: Dept of Defense

- Basic Research
  - +6.7% to $2.0b

- Development
  - -5.0% to $71.0b

- DARPA
  - +3.7% to $3.1b

- From major weapons systems to counter insurgency in future years
Funding Doubling for Basic Research

- National Science Foundation
  - Total Budget: +8.0% to $7.4b
  - R&D: +9.4% to $5.5b
- National Innovation Strategy
  - Next-Generation Information and Communications Technology
  - Innovation-Based Entrepreneurship
- Workforce Development
- Broadening Participation

National Science Foundation
in billions of constant FY 2010 dollars

- Total R&D
- ARRA
- COMPETES
Funding Doubling for Basic Research

- **DOE Office of Science**
  - Total Budget: +4.4% to $5.1b
  - R&D: +3.8% to $4.6b
  - New Energy Innovation Hub
    - Batteries and Energy Storage
  - Energy Frontier Research Centers (EFRCs)
  - Advanced Computing
  - Scientific User Facilities
  - Education and Workforce Development
Funding Doubling for Basic Research

- National Institute of Standards and Technology
  - Total Budget: +7.3% to $919 million
  - NIST Labs (STRS)
    - +13.5% to $585 million
  - R&D
    - +21.7% to $706 million
  - Competitive Manufacturing and Construction in a Clean-Energy Economy
    - +$34.6 million
Trends in Nondefense R&D by Agency

in billions of constant FY 2010 dollars

FY 2010 and FY 2011 figures are latest estimates.
FY 2012 through FY 2015 are projections.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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National Institutes of Health

- Total Budget: +2.8% to $32.2b
- R&D: +2.8% to $31.4b
- Cancer and autism spectrum disorders
- AIDS research - Global Fund
- National Nanotechnology Initiative: +6.0% to $382m
- Therapeutics for Rare and Neglected Diseases (TRND)
  - +$26m to $50m
- National Synchrotron Light Source-II (NSLS-II): $33m
R&D Investment Priorities

- **New Industries and Jobs**
  - Advanced materials and manufacturing methods
  - $6.1b over 5 years for commercial earth orbit

- **Cleaner Energy**
  - +$155m (+6.8%) for DOE Energy R&D

- **Healthier America**
  - +$956m (+3.1%) for National Institutes of Health R&D

- **Enhanced Security**
  - DOD Basic Research: +6.7% to $2.0b
FY 2011 R&D Budget Request by Function
percent change from FY 2010

Transportation: 43.0%
Commerce: 17.3%
Space: 12.0%
Environment: 7.4%
Energy: 6.5%
Health: 6.5%
General Science: 6.3%
International: 0.0%
Defense: -4.8%
Agriculture: -5.8%
Justice: -31.8%

Source: OMB and agency budget data.

Environment includes natural resources R&D
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STEM Education

- $3.7b, +$32m from FY 2010
- K-12 Education
  - Dept of Ed: $450m, NASA: $63m, NSF: $41m
- RE-ENERGYSE (Undergraduate)
  - NSF: $19m, DOE: $55m
- Undergraduate Diversity
  - NSF: +14% to $103m
- Graduate Fellowships
  - NSF: +16% to $158m, NIH: +5% to $824m, EPA: +55% to $17m
  - DOD: +4% to $40m, DOE: +$10m to $15m
International R&D Investment

- The United States leads the world in R&D investment
  - $369b PPP, 35.7% of world R&D investment
- But, others are quickly increasing their investment
  - Over 1997 - 2007,
    - South Korea, +0.99% of GDP to 3.47%
    - China, +0.85% of GDP to 1.49%
    - Taiwan, +0.81% of GDP to 2.63%
    - Japan, +0.57% of GDP to 3.44%
    - United States, +0.10% of GDP to 2.68%
- President Obama set goal of 3.0% of GDP investment in R&D
Trends in Federal R&D as Percent of GDP, FY 1976-2010

FY 2010 figures are latest AAAS estimates of the FY 2010 request.
R&D includes conduct of R&D and R&D facilities.
Data to 1984 are obligations from the NSF Federal Funds survey.
GDP figures are from OMB, Budget of the U.S. Government FY 2010.
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Total World R&D, 2007
in billions of PPP $

- US, $369
- China, $102
- Japan, $148
- Germany, $72
- U.K., $39
- Other EU, $97
- Korea, $42
- All Other, $186

Total World R&D = $1,054 billion

Source: OECD, Main Science and Technology Indicators, May 2009.
World = OECD members plus Argentina, China, Israel, Romania,
Russian Federation, Singapore, Slovenia, South Africa, Taiwan.
Calculated using purchasing power parities.
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National R&D Investment

percent of GDP

Source: OECD, Main Science and Technology Indicators, May 2009.
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Next Steps

- The Senate Budget Committee has approved a budget resolution.
  - The House leadership is deciding whether to put one together and is negotiating funding levels.
- Fall elections might push budget action back to November.
- After the budget resolution, Congress determines the 302(b)s, allocating a specific amount to each appropriation subcommittee.
- Congress needs to pass 12 appropriation bills, ideally by Sept. 30, the end of FY 2010.
- FY 2012: OMB Memos: 5% reduction; list low-impact programs
For More Information...

The AAAS R&D web site is
http://www.aaas.org/spp/rd/

The FY 2012 AAAS Forum on
Science and Technology Policy
is May 5-6, 2011
in Washington, DC