Overview of Federal Research and Development Funding

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for the Science AD Sales Team

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

- Joint memorandum from Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP) lays out Presidential priorities
- Agencies deliver budget justifications to OMB
- President releases budget on the first Monday in February
- Congress approves budget resolution, the big-picture spending plan
- Appropriation committees write and approve 12 appropriations bills
- The fiscal year ends on Sept 30, any unfunded agency must shutdown unless a continuing resolution (CR) is passed
The Federal Budget Cycle

Agencies are working on 3 budgets at any given time
The FY 2011 Federal Budget

- $3.8t total budget, $1.4t unified deficit
- $1.3t discretionary budget (+1.1%)
  - $441b nonsecurity budget (-1.0%)
- 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
- Medicare: $491
- Medicaid: $297
- Social Security: $730
- Other Mandatory: $647
- Nondefense Discretionary: $599
- Net Interest: $251

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

- The Innovation Lifecycle
  - Basic Research
    - Study toward knowledge or understanding of fundamental properties and phenomena without a specific need in mind.
  - Applied Research
    - Study toward knowledge or understanding necessary to satisfy a specific need.
  - Development
    - The application of knowledge or understanding toward the production of materials, devices, systems, or methods.
- Facilities and Equipment (R&D Plant)
Character of R&D, FY 2011

budget authority in billions of dollars

Source: OMB R&D data, agency budget justifications, and agency budget documents.
Defense R&D = DOD + DOE defense.
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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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Trends in R&D and Discretionary Spending
outlays in billions of constant FY 2010 dollars

R&D totals do not include construction of facilities and equipment.
FY 2010-2011 data are budget projections.
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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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Trends in Research by Agency

in billions of constant FY 2010 dollars

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.
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Changing Priorities

- **Defense**
  - -$4.1b to $82.2b
  - 4.8% decrease

- **Nondefense**
  - +$3.6b to $65.9b
  - 5.8% increase

- **Development**
  - -$2.9b to $81.5b
  - 3.5% decrease

- **Research**
  - +$2.5b to $62.0b
  - 4.1% increase
OVERVIEW OF FEDERAL R&D FUNDING

NASA

- **Total R&D**
  - Request: $11.0b
  - House: $9.7b, +4.1%
  - Senate: $10.5b, +12.4%

- **NASA Reauthorization (S.3729)**
  - International Space Station through 2020
  - One additional shuttle mission
  - Commercial cargo and crew services for near-earth orbit
  - New space launch system and multi-purpose crew vehicle
  - New $500 million Space Research and Technology Program
OVERVIEW OF FEDERAL R&D FUNDING

USDA

- **Total R&D**
  - Request: $2.1b
  - House: $2.2b, +4.4%
  - Senate: $2.2b, +3.9%

- **Buildings and Facilities**
  - Request: -$76m
  - House: $20m (est)
  - Senate: $34m

- **Agriculture and Food Research Initiative (AFRI)**
  - Request: $429m (+$166m)
  - House: $312m, +18.9%
  - Senate: $310m, +18.1%
National Science Foundation

- **Total**
  - Request: $7.42b
  - Omnibus: $7.35b, +7.0%
- **R&D**
  - Request: $5.54b
  - Omnibus: $5.49b, +8.3%
- **National Innovation Strategy**
  - Science and Engineering
  - Beyond Moore’s Law
  - Cybersecurity
- **Workforce Development**
- **Broadening Participation**
Department of Energy

- **Total R&D**
  - Request: $11.2b
  - House: $10.9b, +1.6%
  - Senate: $11.0b, +3.3%

- **Office of Science**
  - Request: $5.1b
  - House: $4.9b, -0.1%
  - Senate: $5.0b, 2.2%

- **ARPA-E**
  - Request: $300m
  - House: $220m
  - Senate: $200m
OVERVIEW OF FEDERAL R&D FUNDING

NIST

- Total R&D
  - Request: $705m
  - House: $673m, +16.1%
  - Senate: $734m, +26.6%

- NIST Labs R&D (STRS)
  - Request: $521m
  - House: $491m, +9.0%
  - Senate: $521m, +15.6%

- Competitive Manufacturing and Construction in a Clean-Energy Economy
  - +$34.6 million
National Institutes of Health

- Total
  - Request: $32.2b
  - Omnibus: $31.9b, +2.4%
- Cancer and autism spectrum disorders
- AIDS research - Global Fund
- National Nanotechnology Initiative: +6.0% to $382m
- Therapeutics for Rare and Neglected Diseases (TRND)
- National Synchrotron Light Source-II (NSLS-II): $33m
Other NIH Priorities

- High throughput technologies - NHGRI
- Stem cell research
- Academic-Industry partnerships to revitalize drug pipeline
- Personalized medicine
- Comparative effectiveness
- Global health research
- Clinical and Translational Science Awards (CTSA)
- Basic Behavioral and Social Sciences Opportunity Network (OppNet)
- Ruth L. Kirschstein National Research Service Awards
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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Department of Defense

- Total R&D
  - Request: $78.4b
  - House: $79.3b, -5.1%
  - Senate: $79.3b, -5.1%

- S&T (6.1-6.3 + medical)
  - Request: $12.4b
  - Senate: $14.0b, -5.5%

- From major weapons systems to counter insurgency in future years
R&D in the FY 2011 Budget Request

percent change from FY 2010

NOAA 22.0%
NIST 21.6%
NASA 17.8%
NSF 9.4%
DOE Energy 6.8%
DOE Defense 5.0%
DOE Science 3.8%
NIH 3.1%
USGS 2.8%
EPA 1.8%
VA 1.5%
DOT -1.3%
DOD -5.2%
USDA -5.5%
DHS -9.0%

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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Industry Innovation Initiatives

- **S.3839 - SBIR/STTR Extended through January 31, 2011**
  - Keeps same percentages (SBIR: 2.5%, STTR: 0.3%)

- **R&D Tax Credit Proposal**
  - Make the tax credit permanent
  - Increase simple formula credit from 14 to 17 percent

- **ARRA Report: $100 billion in innovation**
  - $18.7 billion in R&D

- **H.R.5297 - Small Business Jobs and Credit Act**
  - $30 billion small business lending fund
  - $12 billion in tax breaks

- **“Make it in America” Agenda**

- **Patent Reform**
Next Steps

- Congress passed a second CR which extends funding until December 18.

- FY 2011 Appropriations Possibilities
  - 12-bill omnibus
    - $1.108 trillion, some earmarks ($9b), priorities funded
  - Year-long CR
    - $1.091-$1.098 trillion, very few earmarks, status quo

- FY 2012: OMB Memos: 5% reduction; list of low-impact programs totaling 5% of discretionary budget. Initial budget submissions were due to OMB by September 13.
FY 2012 R&D Challenges

- Promoting sustainable economic growth and job creation
- Defeating the most dangerous diseases and achieving better health outcomes for all while reducing health care costs
- Moving toward a clean energy future to reduce dependence on energy imports while curbing greenhouse gas emissions
- Understanding, adapting to, and mitigating the impacts of global climate change
- Managing the competing demands on land, fresh water, and the oceans for the production of food, fiber, biofuels, and ecosystem services based on sustainability and biodiversity
- Developing the technologies to protect our troops, citizens, and national interests
FY 2012 Outlook

- **Democrats**
  - Obama: “I don't think we should be cutting back on research and development.”
  - Total Budget: 5-10% decrease in FY 2012
  - R&D: Smaller decreases or priority funding for R&D

- **Republicans**
  - Senate: $1.108 trillion (-$28b request) omnibus spending bill
  - Total Budget: Inflation adjusted FY 2008 levels in FY 2012 (-$100b)
  - R&D: “Strong oversight... of multiple new and duplicative programs” - Rep. Ralph Hall (R-TX)

- Earmarks
FY 2012 Outlook

- Fiscal Commission
  - “… we must invest in education, infrastructure, and high-value research and development…”
  - Long-term: Revenue and spending balance at 21% GDP
  - Inflation-adjusted FY 2008 levels in 2013, limit annual increase to half of the inflation rate through 2020.
  - No biennial budget recommendation
  - Notable R&D in $200 billion illustrative savings options
    - 10% decrease in DOD RDT&E, eliminate new funding for DOE Fossil R&D, eliminate private sector funding for spaceflight developments
R&D Priorities

- National Security
- Health
- Jobs / Innovation / Economy
- Energy

- Democrats
  - Clean Energy
  - Action on Global Climate Change

- Republicans
  - Energy Security
  - Resource Management
Trends in Federal R&D
in billions of constant FY 2010 dollars

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NIH Policy Issues

- Merger of National Institute on Drug Abuse (NIDA) and National Institute on Alcohol Abuse and Alcoholism (NIAAA)
- Creation of National Center for Advancing Translational Sciences
  - Merge select programs from NHGRI, NCRR, Common Fund, and contain the Cures Acceleration Network (CAN).
- Research Capacity (Bruce Albert’s Editorial)
  - New working group to access workforce needs of biomedical research community at present and future
  - Also to analyze “the current composition and size of the workforce to understand the consequences of current funding policies on the research framework.”
- Stem Cell Research
STAR-METRICS

- $1 million to measure the impact of R&D funding
  - OSTP, NSF, NIH initially involved
- Starting with Recovery Act monies
- Phase 1 - Employment statistics from university records
- Phase 2 - Measure economic growth, scientific knowledge, social outcomes from a broader set of records
- Phase x - Measure impact of yearly budgetary funding
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

percent of GDP

FY 2011 figures are latest AAAS estimates of the FY 2011 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 Budget of the U.S. Government FY 2011.
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Total World R&D, 2007
in billions of PPP $

Total World R&D = $1,054 billion

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

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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For More Information...

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

Twitter: @AAAS_RDBudget

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