Science, Technology, and the Federal Budget

Kei Koizumi
September 23, 2008
for the GU Public Policy For Scientists Seminar

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.
WHY THE BUDGET?

- The federal budget determines the health of U.S. science and engineering research and education.
- “The U.S. doesn’t have a science policy, it has a budget policy for science.” – Rep. George Brown
- Policy decisions and authorization bills may not be completed, but every year budget decisions are (eventually) made.
- The budget process determines priorities for the federal R&D investment.
- The federal budget funds 1/3 of all U.S. R&D and 60 percent of all university R&D.
The start of FY 2009 is just one week away, but the FY 2009 budget is far from finished.

To help control the deficit, the President proposes to keep domestic appropriations flat in 2009. The congressional budget allows domestic appropriations to keep pace with inflation. The President has threatened vetoes of any appropriations bills that exceed his request.

The $21 billion difference between the two sides has resulted in a budget stalemate.


Historically, federal R&D investments have closely tracked trends in discretionary spending.
Note: Projected Unified deficit is $407 billion.
Figures exclude most Iraq and Afghanistan military costs.
Source: AAAS, based on Budget of the United States Government FY 2009.
FEB. ’08 © 2008 AAAS
Composition of the Proposed FY 2009 Budget by Source of Funds
Total Outlays = $3.1 trillion

Income taxes
Corporate taxes
Social insurance and retirement (SS + Medicare payroll taxes)
Other taxes (excise, gas, estate, etc.)
Borrowing

Total Receipts (without borrowing): $2.7 trillion

Source: AAAS, based on Budget of the United States Government FY 2009.
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Federal Spending and Revenues as % of GDP
1962-2013


FEB. '08 © 2008 AAAS
Federal Budget Deficit (or Surplus), FY 1960-2013
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 President’s budget proposals. FY 2009 - 2013 figures exclude Iraq and Afghanistan military costs.
FEB. ’08 © 2008 AAAS
Federal Shortfall To Double This Year
Next President To Inherit Deficit Of $500 Billion

By Lori Montgomery
Washington Post Staff Writer
Wednesday, September 10, 2008; Page A01

A weak economy and a sharp increase in government spending will drive the federal budget deficit to a near-record $407 billion when the budget year ends later this month, and the next president is likely to face a shortfall in January of well over $500 billion, congressional budget analysts said yesterday.

A deficit of that magnitude could severely constrain the next administration's agenda, regardless of whether Sen. John McCain (Ariz.), the Republican candidate, or Sen. Barack Obama (Ill.), his Democratic opponent, wins in November. Each has promised billions in new tax cuts or new spending. The expanding deficit also will increase the national debt and could impair future economic growth, particularly if lawmakers are forced to pay down that debt by raising taxes.

This year's deficit will be more than double last year's $161 billion, and it will rise from 1.2 percent of the gross domestic product to nearly 3 percent. If the next...
The National Debt, 1960-2013
in billions of dollars (President's proposals)

[Graph showing the national debt from 1960 to 2013, with 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.]

FEB. '08 © 2008 AAAS
July 27, 2008

Congress Sends Housing Relief Bill to President

By DAVID M. HERZENHORN

WASHINGTON — Hoping to stretch a safety net under the nation’s tumbling housing market, the Senate on Saturday overwhelmingly approved a huge package of legislation that includes a program to save hundreds of thousands of families from losing their homes to foreclosure.

The legislation is the latest in a series of extraordinary interventions this year by the Bush administration, Congress and the Federal Reserve as they seek to limit shockwaves in the housing sector from rippling across the American economy and the world financial system. In the process, the central bank and taxpayers have taken on what critics warn are incalculable liabilities and risk.

The bill grants the Treasury Department broad authority to safeguard the nation’s two mortgage finance giants, Fannie Mae and Freddie Mac, potentially by spending tens of billions of dollars in federal money to prevent the collapse of the companies, which own or guarantee nearly half of the nation’s $12 trillion in mortgages.

To accommodate the rescue plan for the mortgage companies, the bill raises the national debt ceiling to $10.6 trillion, an increase of $800 billion and the first time that the limit on the government’s credit card has grown to 14 digits.

The Senate, convening for a rare Saturday session as it neared summer recess, approved the bill by a vote of 72 to 13, with 27 Republicans joining all the Democrats in attendance to support it.

The measure now goes to President Bush, who has said he will sign it, perhaps early this week, to send a reassuring message to the credit markets.

The White House quickly issued a statement praising the vote, but also affirming opposition to nearly $4 billion in grants to local governments to buy and refurbish foreclosed properties, which Mr. Bush views as a giveaway to lenders.

“It’s good that the Democratic Congress has finally acted,” said Tony Fratto, the deputy White House press secretary.

Lawmakers in both parties hailed the bill, saying it was crucially needed. “It will make a difference not only in the housing market but in the entire economy,” the majority leader, Senator Harry Reid of Nevada, said.
How the Budget Becomes Law
FY 2009 Proposal = $3.1 Trillion

Net interest - automatic

Discretionary Spending - 12 appropriations bills, plus war supplemental bill(s) from Appropriations Committees

Entitlements - Reconciliation bill, other bills from various committees (such as Medicare drug bill) (optional)

Revenues - Reconciliation bill, other bills from various committees (such as the energy bill) (optional)

Source: AAAS, based on Budget of the United States Government FY 2009.
FEB. '08 © 2008 AAAS
THE FY 2009 BUDGET PROCESS (1)

SUMMER 2007 – Agencies submit their FY 2009 proposals to OMB (Office of Management and Budget) based on broad strategic guidance from OMB in spring 2007.

FALL 2007 – Agencies negotiate with OMB over their FY 2009 proposals.

January 2008 – Agencies finalize their requests.

February 2008 – President Bush releases his proposed FY 2009 budget and transmits it to Congress.
A Science Budget of Choices and Chances

In his final year, President George W. Bush has submitted a request for 2009 funding with few new wrinkles—and with probably little chance of being adopted.

Budgets are about choices, U.S. presidential science adviser John Marburger told reporters this week as he explained what his boss is asking Congress to support in 2009. And what President George W. Bush has chosen for science funding is exactly what he has requested for the past few years: Give a big boost to agencies that support the physical sciences, flat-line basic biomedical research, and put NASA between a rock and a hard place.

The betting in Washington is that the Democratic Congress won’t grant a lame-duck Republican president his wish, and that it is likely to delay approving any part of the Administration’s overall $3.1 trillion budget request for the fiscal year that begins on 1 October until after the November election. But in the meantime, the president’s support for some disciplines at the expense of others has left science lobbyists uncertain about how to react. As Robert Berdahl, president of the 62-member Association of American Universities, puts it: “Question: Is the president’s [2009] budget good or bad for the vital research and education that is performed by America’s research universities? Answer: Yes.”

The big winners are the three agencies that are part of what the Bush Administration has labeled the American Competitiveness Initiative (ACI). The $6 billion National Science Foundation (NSF) would receive a 13.6% jump, the Department of Energy’s (DOE’s) $4 billion Office of Science would get a 17.5% hike, and the $500 million core research programs at the National Institute of Standards and Technology (NIST) would get a 22% bump. The large boosts compensate for double-digit increases that were in the cards for all three agencies in 2008 until a last-minute budget deal erased most of their gains (Science, 4 January, p. 18), prompting the early termination of some experiments and scheduled layoffs at two DOE national laboratories.

There is bipartisan agreement about the value of a healthy science budget. “The president is right that basic research included in his American Competitiveness Initiative (ACI) is important to our economy and our future,” says Representative Bart Gordon (D–TN), chair of the House Science Committee. But Gordon is very unhappy with some of the choices made along the way, including what he sees as miserly increases in several education programs at NSF, the lack of proposed funding for a new high-risk research agency at DOE that he championed, and the Administration’s repeated attempts to eliminate technology and manufacturing programs at NIST.

Biomedical organizations lament not just the lost research opportunities but also the impact on the next generation of scientists. “This is a real deterrent for any young investigators who were holding out hope that biomedical research was a viable career path,” says Robert Palazzo, president of the Federation of American Societies for Experimental Biology in Bethesda, Maryland. “They have their answer today.”

Marburger disagrees that a flat budget means a gloomy future for biomedical researchers. “Frankly, I think that an argument can be made that better management [of NIH] can bring about much better productivity even with flat resources,” he says. “The private sector does it all the time.” And he says that those who advocate 6% annual growth for NIH to capitalize on its 5-year doubling that ended in 2003 will have to wait their turn. “It will be necessary to increase biomedical research in the future, but it’s important that we first fix this problem in the physical sciences.”

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>FY 2007 (all figures in $ millions)</th>
<th>FY 2008</th>
<th>FY 2009</th>
<th>% CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Institutes of Health</td>
<td>29,137</td>
<td>29,465</td>
<td>29,465</td>
<td>+0.0%</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>5,916</td>
<td>6,032</td>
<td>6,032</td>
<td>+3.3%</td>
</tr>
<tr>
<td>Research</td>
<td>4,758</td>
<td>4,821</td>
<td>5,593</td>
<td>+17.5%</td>
</tr>
<tr>
<td>Education</td>
<td>696</td>
<td>725</td>
<td>790</td>
<td>+18.6%</td>
</tr>
<tr>
<td>NASA—Science</td>
<td>4,610</td>
<td>4,706</td>
<td>4,442</td>
<td>+1%</td>
</tr>
<tr>
<td>Department of Energy—Science</td>
<td>3,797</td>
<td>4,018</td>
<td>4,722</td>
<td>+17.5%</td>
</tr>
<tr>
<td>Defense Department</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic research*</td>
<td>1,525</td>
<td>1,450</td>
<td>1,699</td>
<td>+17%</td>
</tr>
<tr>
<td>DARPA*</td>
<td>2,908</td>
<td>2,959</td>
<td>3,286</td>
<td>+11%</td>
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<tr>
<td>Department of Commerce</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>NIST core labs</td>
<td>493</td>
<td>520</td>
<td>634</td>
<td>+22%</td>
</tr>
<tr>
<td>NOAA research</td>
<td>564</td>
<td>585</td>
<td>582</td>
<td>-0.5%</td>
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<tr>
<td>EPA—Science</td>
<td>561</td>
<td>542</td>
<td>550</td>
<td>+1.5%</td>
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<tr>
<td>FDA (includes user fees)</td>
<td>2,008</td>
<td>2,270</td>
<td>2,400</td>
<td>+5.7%</td>
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<tr>
<td>CDC—Overall</td>
<td>6,060</td>
<td>6,124</td>
<td>5,691</td>
<td>-7.1%</td>
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<td>USDA—Competitive research</td>
<td>190</td>
<td>191</td>
<td>257</td>
<td>+34.6%</td>
</tr>
<tr>
<td>U.S. Geological Survey—Research</td>
<td>564</td>
<td>583</td>
<td>545</td>
<td>-6.5%</td>
</tr>
</tbody>
</table>

† Includes $300 million for Global AIDS Fund.
‡ Due to an accounting change from the 2008 budget.
* Excludes earmarks.
THE FY 2009 BUDGET PROCESS (2)

Feb. – May 2008 – Agency officials, public witnesses, and others testify at congressional budget and oversight hearings; authorizing committees try to write and pass authorization bills.

Spring 2008 – Congress approves its FY 2009 budget resolution.

Various committees receive instructions from the budget resolution to draft reconciliation bills.

Appropriations committees receive 302(a) allocations: total $1.013 trillion, $21 billion more than the President’s budget.

Appropriations committees determine 302(b) allocations dividing total discretionary spending among 12 bills.

Some entitlement programs need to be reauthorized: in June, Congress completed action on a 5-year farm bill.
Senate passes fiscal 2009 budget resolution along party lines

By Humberto Sanchez  CongressDaily  June 4, 2008

The Senate by a 48-45 vote approved a compromise fiscal 2009 budget resolution Wednesday that would cap discretionary spending at $1.013 trillion, $21 billion more than President Bush requested. The House is expected to take up the measure Thursday.

If approved by both houses, it would be the first time since 2000 that Congress has approved a budget resolution in an election year. Senate approval of the budget included the vote of Sen. Barack Obama, D-Ill., who is expected to be the Democratic nominee. His rival for the Democratic nomination, Sen. Hillary Rodham Clinton of New York, did not show up for the vote. Presumptive Republican nominee Sen. John McCain of Arizona also did not vote.

Sens. John Warner, R-Va., and Pete Domenici, R-N.M., who oppose the budget, agreed to withhold their votes, also known as pairing, so that the absence of two ill Democratic senators who support the budget would not affect the outcome. Warner agreed to pair his vote with Sen. Edward Kennedy, D-Mass, who is recovering from surgery on a brain tumor and preparing to undergo chemotherapy, while Domenici paired his vote with Sen. Robert Byrd, D-W.Va., who was hospitalized this week after feeling feverish. He is expected to remain in the hospital for several days for monitoring and treatment for a mild infection. Sens. Olympia Snowe and Susan Collins, both of Maine, were the only Republicans to vote in favor of the resolution. Sen. Evan Bayh of Indiana was the only Democrat to vote against measure.

After the vote, Senate Budget Chairman Kent Conrad, D-N.D., praised the action. "We have passed a fiscally responsible budget today," he said. "This plan provides tax relief for the middle class. It makes critical investments in energy, education and infrastructure. And it returns the budget to surplus in 2012 and 2013. Passing this budget represents a major accomplishment." The budget, which includes a five-year horizon, is intended to achieve a surplus of $22 billion in 2012 and $10 billion in 2013. The proposal also calls for $340 billion in tax cuts, including permanent extension of the 10 percent income tax bracket, increased childcare tax credit, elimination of the marriage penalty and fixing the estate tax at 2009 levels. A number of so-called reserve funds have been included in the budget for energy and infrastructure spending. But this funding must be offset if enacted.

Republicans lambasted the budget in part because they contend it includes a record tax increase since it assumes some of the tax cuts enacted in 2001 and 2003 would expire. "For the second year in a row, the Democratic majority has crafted and passed a tax-and-spend budget -- one that most Americans can't afford as they struggle with a slowing economy and rising food and fuel costs," Senate Budget ranking member Judd Gregg, R-N.H., said during debate.

Gregg and OMB Director Jim Nussle were also critical because the budget's $1.013 trillion discretionary figure would be the first time it has ever surpassed $1 trillion. They pointed out that
Trends in Discretionary Spending, FY 1976-2013
in billions of constant FY 2008 dollars

FY 2008 data are estimates. FY 2009-2013 data are budget projections. FY
2009-2013 figures exclude Iraq and Afghanistan military costs.
FEB. '08 © 2008 AAAS
Discretionary Spending by Appropriations Bill
FY 2009 Request = $992 billion

Source: Congressional Budget Office. Excludes bridge fund for Iraq and Afghanistan military operations.
FEB. '08 © 2008 AAAS
Summer 2008 – Appropriations subcommittees write appropriations bills. The full committees try to get the bills through the legislative process.

September 2008 – The House and Senate try to conference appropriations bills and send them to the President.

October 1, 2008 – FY 2009 begins. Discretionary programs must have a signed appropriations bill, or shut down. To allow more time, lawmakers pass continuing resolutions (CR’s). (For FY 2008, 4 CR’s were needed.)

Winter 2008-09 (?) – Congress will probably pass an omnibus appropriations bill. (For FY 2008, an 11-bill omnibus was enacted Dec. 26).
DETOUR: EARMARKS, OR “PORK”

- No standard definition. I use “congressionally designated, performer-specific projects” in the federal budget.
- Most earmarks are in appropriations, but many are in authorizations (like that “Bridge to Nowhere” in a transportation authorization bill).
- Bills have two parts: the bill text (legally binding) and the committee report (detailed, advisory explanations). Nearly all earmarks are in lists contained in committee reports, so technically they aren’t legally binding on agencies.
- Nearly all earmarks are portions of larger budget accounts.
BUILDINGS AND FACILITIES

For acquisition of land, construction, repair, improvement, extension, alteration, and purchase of fixed equipment or facilities as necessary to carry out the agricultural research programs of the Department of Agriculture, where not otherwise provided, $30,995,000, to remain available until expended.

The following table summarizes the Committee’s recommendations for Agricultural Research Service Buildings and Facilities:

AGRICULTURAL RESEARCH SERVICE BUILDINGS AND FACILITIES
[In thousands of dollars]

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Committee Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture Research Center, Pullman, WA</td>
<td>1.870</td>
</tr>
<tr>
<td>Alcorn State University Biotechnology Laboratory, Alcorn State, MS</td>
<td>1.780</td>
</tr>
<tr>
<td>Animal Bioscience Facility, Beltsville, MD</td>
<td>1.600</td>
</tr>
<tr>
<td>Animal Waste Management Research Laboratory, Bowling Green, KY</td>
<td>1.390</td>
</tr>
<tr>
<td>Appalachian Fruit Laboratory, Kearneysville, WV</td>
<td>1.080</td>
</tr>
<tr>
<td>ARS Agricultural Research Center, Logan, UT</td>
<td>5.584</td>
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<tr>
<td>Dairy Forage Agricultural Research Center, Prairie du Sac, WI</td>
<td>2.558</td>
</tr>
<tr>
<td>Forage-Animal Production Research Facility, Lincoln, NE</td>
<td>2.685</td>
</tr>
<tr>
<td>Hagerman Fish Culture Experiment Station, Hagerman, ID</td>
<td>639</td>
</tr>
<tr>
<td>Jamie Whitten Delta States Research Center, Stoneville, MS</td>
<td>7.080</td>
</tr>
<tr>
<td>National Plant and Genetics Security Center, Columbia, MO</td>
<td>2.080</td>
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<tr>
<td>Pacific Basin Agricultural Research Center, Idaho, ID</td>
<td>2.080</td>
</tr>
<tr>
<td>Poultry Science Research Facility, Stuttgart, WI</td>
<td>1.780</td>
</tr>
<tr>
<td>Sugarcane Research Laboratory, Houma, LA</td>
<td>3.290</td>
</tr>
<tr>
<td>Systems Biology Research Facility, Lincoln, NE</td>
<td>1.390</td>
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</tbody>
</table>

Total: $30,995,000

National Plant and Genetics Security Center.—The Committee directs ARS, when planning and designing the National Plant and Genetics Security Center, to include plans for expanded vivarium capacity.
DETOUR: WHAT IS A CR?

A continuing resolution (CR) is a temporary appropriations bill allowing federal programs to keep spending money in the new fiscal year without an enacted appropriations bill.

- For FY 2009, a CR may cover all 12 appropriations bills until November (?), January (?) or later.
- In most CRs, programs are allowed to keep spending at the previous year’s rate.
- There could be a different formula, or a different formula for specific programs. For example, there’s a push to give NIH an increase in the CR.
- A CR can be as short as 1 page, BUT it can also be a vehicle for other legislation (this year: offshore oil drilling? Loans to Big 3 automakers? Second stimulus package?) and that could create problems. And bank bailout legislation could also be attached.
### Current Status of FY 2009 Appropriations

August 21 update:

- reported out of Appropriations Committee; **O** - approved;
  **X** - rejected (click on the links to see the latest R&D Funding Update for each agency)

<table>
<thead>
<tr>
<th>Name of bill (Bill number)</th>
<th>Major R&amp;D agencies</th>
<th>House Action</th>
<th>Senate Action</th>
<th>Conference report</th>
<th>House</th>
<th>Senate</th>
<th>President signed (Public Law #)</th>
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</thead>
<tbody>
<tr>
<td>1. Defense</td>
<td>DOD</td>
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<td></td>
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<td>2. Labor, HHS, Education (S 3230)</td>
<td>NIH, Education</td>
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<td>4. Energy &amp; Water (S 3258)</td>
<td>DOE</td>
<td>* 6/25</td>
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<td>5. Agriculture (S 3289)</td>
<td>USDA</td>
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<td>6. Interior and Env.</td>
<td>Interior, EPA</td>
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<tr>
<td>8. Military Construction &amp; Veterans (HR 6599, S 3301)</td>
<td>VA, some DOD</td>
<td><strong>O</strong> 8/1</td>
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<tr>
<td>9. Transportation &amp; HUD (S 3261)</td>
<td>DOT</td>
<td></td>
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<tr>
<td>10. State &amp; Foreign Operations (S 3288)</td>
<td>AID</td>
<td></td>
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<tr>
<td>11. Financial Services (S 3260)</td>
<td>- -</td>
<td>* 6/25</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>12. Legislative Branch</td>
<td>- -</td>
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</table>

To find the text of these bills, go to THOMAS (Library of Congress) and type the bill number into the search engine at the top of the page.

-AAAS R&D Budget and Policy Program
A DETOUR: SUPPLEMENTAL APPROPRIATIONS

Anytime – For unbudgeted needs, Congress and the President can pass supplemental appropriations bills outside the regular budget cycle in a compressed process. Usually for natural disasters and other emergencies, but in recent years Iraq and Afghanistan spending as well.

June 2008 –$187 billion FY 2008 supplemental bill, mostly for war operations.

Often, this spending is designated as ‘emergency’ spending, meaning it doesn’t count against budget resolution targets. Congress may draft another 2008 supplemental bill this month for domestic needs.
President Bush Signs H.R. 2642, the Supplemental Appropriations Act, 2008
Oval Office

9:48 A.M. EDT

THE PRESIDENT: Good morning. A few moments ago I signed legislation that funds our troops who are in harm's way. Our nation has no greater responsibility than supporting our men and women in uniform -- especially since we're at war. This is a responsibility all of us in Washington share -- not as Republicans or Democrats, but as Americans. And I want to thank leaders of the House and Senate for getting this bill to my office.

America remains a nation at war. There are enemies who intend to harm us. Standing in their way are brave men and women, who put on the uniform, who raise their right hand, and took an oath to defend our freedom. They volunteered to deploy in distant lands, far from their families, far from their homes, and far from comfort of America. And every day, they risk their lives to defeat our adversaries and to keep our country safe.

We owe these brave Americans our gratitude. We owe them our unflinching support. And the best way to demonstrate that support is to give them the resources they need to do their jobs and to prevail. The bill I sign today does exactly that. It provides necessary funds to support our troops as they conduct military operations in Iraq, in Afghanistan, and in other theaters in the war on terror.

I appreciate that Republicans and Democrats in Congress agreed to provide these vital funds without tying the hands of our commanders, and without an artificial timetable of withdrawal from Iraq. Our troops have driven the terrorists and extremists from many strongholds in Iraq; today violence is at the lowest level since March of 2004. As a result of this progress, some of our troops are coming home as result of our policy called "return on success." We welcome them home. And with this legislation we send a clear message to all that are servings [sic] on the front line that our nation continues to support them.

We also owe a debt of gratitude to our nation's military families. They endure sleepless nights, and the daily struggle of caring for children while a loved one is serving far from home. We have a responsibility to provide for them. So I'm pleased that the bill I sign today includes an expansion of the GI Bill. This legislation will make it easier for our troops to transfer unused education benefits to their spouses and children. It will help us to recruit and reward the best military on the face of the Earth. It will help us to meet our responsibilities to those who support our troops every day -- America's great military families.

The bill also includes agreed-upon funding for other critical national priorities. This bill includes $465 million for the Merida Initiative -- a partnership with Mexico and nations in Central America to crack down on violent drug trafficking gangs. The bill includes nearly $2.7 billion to help ensure that any state facing a disaster
Figure x. Stages of the federal budget process in the United States

The President

Office of Management and Budget (OMB)

Office of Science and Technology Policy (OSTP)

Federal Departments and Agencies

Executive Branch

Congress

Budget Committees (produce budget resolution)

Other committees (produce parts of optional reconciliation bill - changes in entitlements or revenues)

Appropriations Committees (draft 13 appropriations bills)

Congress approves budget resolution

Authorizations, guidance to appropriators

House version Senate version House -Senate Conference House approval Senate approval

President signs bills into law OR vetoes

Agencies receive funds

Summer Fall Winter February Spring Summer Fall (Start of fiscal year)- Oct. 1
NEXT…

Write your own appropriations bill!
This Commerce, Justice and Science bill makes key investments into some of the most important functions of our government:

- How do we keep our citizens safe?
- As American workers are struggling in this tough economy, how do we make the long term investments that ensure the future strength of our economy?
- How does our nation tackle the threat of global climate change?

The bill starts by rejecting the President’s proposal to once again gut funding – a $1.6 billion cut – for state and local law enforcement programs, ensuring that law enforcement has the tools they need to fight crime. It also rejects the administrations shortsighted plans not to fund the Adam Walsh Act requirements to track child predators. And it fully funds the needs of the FBI, ATF, and DEA, so Federal law enforcement officials can do their work.

This bill makes critical investments into scientific discovery. These long-term investments improve our quality of life and will ensure the strength of our economy for generations to come.

Key investments target global climate change, providing our scientists with the tools they need to measure its progress, predict its path, and find ways we can slow it down and adapt to it.

**Bill Total**

2008 Enacted: $51.8 billion – Base Bill
$286 million – Emergency Funds: Cyber & Border Security

President’s Request: $53.7 billion
Committee Mark: $56.9 billion

**KEY INVESTMENTS**

**JUSTICE**

**Fighting Methamphetamines:** $68 million, $45 million above the President’s request, rejecting the President’s proposal to eliminate funding for grants to fight meth in “hot spots” and investing new funds into DEA meth enforcement programs.

**Adam Walsh and Child Exploitation:** $113 million, not requested by the President, to locate missing children, investigate child pornography and child prostitution, and begin to track down the 100,000 registered sex offenders whose whereabouts are currently unknown.
FEDERAL R&D IN THE BUDGET

- There is no “R&D budget.” Federal R&D spending comes from 24 federal departments and independent agencies scattered throughout the budget.
- R&D funding trends have closely mirrored trends in the overall discretionary budget.
Total R&D by Agency: FY 2009 Proposed
Budget Authority in billions of dollars

- DOD, $80.7
- HHS (NIH), $30.0
- NASA, $12.8
- DOE, $10.5
- NSF, $5.2
- USDA, $2.0
- DHS, $1.0
- All Other, $5.2

Total R&D = $147.4 billion (revised)

Source: AAAS, based on OMB R&D Budget Data and agency estimates for FY 2009.
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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.
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R&D and Discretionary Outlays (Nondefense), 1962-2013
in billions of constant FY 2008 dollars

Source: AAAS, based on Budget of the U.S. Government FY 2009 Historical Tables. FY 2008 data are estimates. FY 2009-2013 data are budget projections.
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In our mission-oriented system, each department funds only the R&D necessary to carry out its mission, and integrates R&D programs with other programs.

“Innovation” or “funding basic research for future economic competitiveness” is not an explicit mission, though it is often stated as the primary rationale for federal support of research.

Only NSF and DOE’s Office of Science have a science mission.

Only NIST in Commerce has an “economic development” mission.

The relative importance of missions varies over time, and thus R&D for various missions changes according to changing national needs.
Major Functional Categories of R&D
FY 2009 President's Budget

Defense, $84.5
Health, $30.8
General Science, $10.2
Energy, $2.5
Space, $12.3
Environment*, $2.1
Agriculture, $1.6
All Other, $3.3

TOTAL R&D= $147.4 Billion (Revised)

* - includes natural resources R&D
Source: AAAS, based on OMB and agency budget data.
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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.

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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.

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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.
- 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.
THE 2009 BUDGET FOR R&D

- The ACI continues for a third year, with large increases for NSF, DOE Science, and the NIST labs to catch up to a 10-year doubling track.
- Again, there would be large increases for DOD weapons and NASA spacecraft development, but also increases for most R&D programs.
- The NIH budget would be flat, agricultural and environmental R&D agencies would decline.
FY 2009 R&D Request
Percent Change from FY 2008

-15% -10% -5% 0% 5% 10% 15%

DOE Science +21%
NSF +16%
DOT
DOD weapons
NASA
NIST
DHS
DOE defense
DOE energy
NIH
VA
NOAA
EPA
USGS
DOD "S&T"
USDA

Source: AAAS, based on OMB R&D data and agency estimates for FY 2009.
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.
DOD weapons = DOD R&D in "6.4" and higher categories.
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Trends in DOE 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.

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Trends in NASA R&D, FY 1995-2009 *

in millions 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. Program budgets include associated support costs. R&D includes conduct of R&D and R&D facilities.

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SETTING PRIORITIES AND STRATEGIES

● In a decentralized, mission-oriented system, how does the U.S. set priorities when R&D areas cut across agency missions?

1/ Give one agency the mission, and put nearly all the R&D in that agency: NIH for biomedical research.

2/ Consolidate separate agency programs into a new agency and give it authority over other agencies: DHS for homeland security.

3/ Set up multi-agency initiatives with a coordinating office and interagency dialogues: nanotechnology, etc.

4/ Muddle through as best as we can: physical sciences, environmental R&D, social sciences.
Life Sciences Research in the FY 2007 Budget
(preliminary obligations)

Total Life Sciences Research:
$27.8 billion

* - Includes Centers for Disease Control, Food and Drug Administration, Agency for Healthcare Research and Quality

National Institutes of Health Budget by Institute, 1998-2009 *
(budget authority in billions of constant FY 2008 dollars)

FEB. ‘08 © 2008 AAAS
National Institutes of Health
Research Project Grants

Source: NIH agency budget justification for FY 2009.
Average proposed award size $408,800 in FY 2008. Other years adjusted for inflation.
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HOMELAND SECURITY R&D IN THE BUDGET

- ‘Homeland Security’ is a collection of programs cutting across government missions such as health, defense, transportation, and justice.
- Total HS spending in FY 2009 could be $68.5 billion (up 5 percent), of which $5.5 billion goes to R&D.
- The majority of HS R&D investments are outside the Dept. of Homeland Security, but DHS theoretically has legal authority over the NIH biodefense investment.
- But HS R&D is now de-consolidating: programs and authority over biodefense are moving from DHS to HHS (Strategic National Stockpile, BARDA, Project Bioshield); DOD is taking a larger role again.
(requested budget authority in millions of dollars)

Total homeland security R&D: $5.5 billion
(includes conduct of R&D and R&D facilities)

Source: AAAS, based on Office of Management and Budget data.
Includes conduct of R&D and R&D facilities.
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Federal Homeland Security R&D, by Agency
(budget authority in millions of constant FY 2008 dollars, FY 2002-2009)

Source: AAAS, based on Office of Management and Budget data.
Includes conduct of R&D and R&D facilities.
Note: DOD expanded its reporting of HS spending beginning in 2005.
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MULTI-AGENCY INITIATIVES

- Priority research areas that cut across agency lines.
- There’s usually a coordinating office at the lead agency; the National Science and Technology Council is a coordinating mechanism.
- Agencies work together to coordinate research priorities and budgets, and produce strategic plans; the initiative and coordinating processes are authorized by law.

A/ Networking and Information Technology R&D  
B/ Nanoscale Science and Engineering  
C/ Climate Change Science Program  
- But each agency’s budget is decided separately based on overall budget constraints and agency-specific priorities.
Federal Nanoscale Science and Engineering R&D, by Agency
(budget authority in millions of constant FY 2008 dollars, FY 1999-2009)

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FOR MOST RESEARCH…

- Centralized control and policy-setting is nearly impossible in a fragmented, mission-oriented system in which multiple agencies contribute to a goal or to a discipline.

- Most disciplines are funded by multiple agencies in which no agency has a large enough share to set priorities.

- Environmental R&D, for example, is a national mission in which a dozen agencies are responsible (NASA, EPA, Interior, Corps, NOAA, etc.) but there is very little coordination and no agency has a lead in the health of the discipline.
Federal Funding of Research By Agency and Discipline, FY 2005

(preliminary obligations)

<table>
<thead>
<tr>
<th>Life Sciences</th>
<th>Physical Sciences</th>
<th>Engineering Sciences</th>
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<td>NIH 83%</td>
<td>DOE * 41%</td>
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<tr>
<td>Other 2%</td>
<td>Other 2%</td>
<td>Other 1%</td>
</tr>
<tr>
<td>USDA 2%</td>
<td>USDA 1%</td>
<td>NIST 2%</td>
</tr>
<tr>
<td>DOD 5%</td>
<td>NIH 10%</td>
<td>HHS* 3%</td>
</tr>
<tr>
<td>Other 5%</td>
<td>NSF 14%</td>
<td>NSF 7%</td>
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<tr>
<td>Other 2%</td>
<td>Other 2%</td>
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<tr>
<td></td>
<td>USDA 2%</td>
<td>NIST 2%</td>
</tr>
<tr>
<td></td>
<td>DOD 9%</td>
<td>DOD 33%</td>
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Federal Funding of Research By Agency and Discipline, FY 2005
(preliminary obligations)

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<th>Agency</th>
<th>Environmental Sciences</th>
<th>Computer Sciences*</th>
<th>Social Sciences</th>
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<tr>
<td>NIST</td>
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<tr>
<td>NSF</td>
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<td></td>
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<tr>
<td>Other</td>
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<td></td>
<td></td>
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<td>DOE</td>
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<td></td>
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</tr>
<tr>
<td>DOD</td>
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<tr>
<td>USDA</td>
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<td></td>
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</tr>
<tr>
<td>Defense</td>
<td>4%</td>
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<tr>
<td>Education</td>
<td>16%</td>
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</tr>
<tr>
<td>HHS</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
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<td>Smithsonian</td>
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<tr>
<td>Social Security</td>
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<td>NOAA</td>
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<tr>
<td>Labor</td>
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<td></td>
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<tr>
<td>HHS</td>
<td>30%</td>
<td></td>
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</tr>
</tbody>
</table>

Source: National Science Foundation, Federal Funds for Research and
PRIORITY-SETTING IN THE EXECUTIVE BRANCH

- The decentralized, mission-oriented system we have makes coordinating S&T policy difficult.
- The Office of Science and Technology Policy (OSTP) has the lead role, but it’s a small office with no budget power.
- OSTP works with OMB in establishing interagency R&D priorities, and runs various National Science and Technology Council (NSTC) committees to coordinate interagency programs and cross-cutting issues (peer review system, science and math education, etc.).
PRIORITIZATION IN CONGRESS

- Unfortunately, even these limited coordinating mechanisms don’t translate well to Congress, except where only a single agency is involved (NIH or DHS).
- There are separations between the House and the Senate, and between authorizers and appropriators.
- Jurisdictions vary widely between committees, with strange results: a recent nanotechnology authorization excluded DOD and NIH, for example, because the House S&T Committee didn’t have jurisdiction.
- The federal R&D investment is appropriated in 10 of the 12 appropriations bills, each of which is (usually) debated and enacted separately.
R&D and Non-R&D Funding by Appropriations Bill
FY 2009 Request, Billions of dollars budget authority

Source: AAAS, based on estimates of R&D in FY 2009 budget and Budget of the U.S. Government FY 2009. Defense bill is in three lines. Includes conduct of R&D and R&D facilities.
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ALLOCATING FEDERAL R&D

There are numerous ways of allocating federal R&D investments; each agency is different.

- Because of mission requirements, some agencies invest heavily in “D” (DOD), others almost exclusively in “R” (NSF), and others a mix (NASA). Some agencies rely heavily on intramural performers; others are almost exclusively extramural.
- Investigator-initiated, peer-reviewed competitively awarded research grants are a way to allocate funds for scientific excellence.
- Congressional earmarks are another way to allocate funds, for geographic and political considerations.
- Most agencies use a mix, including program managers, formula funds, sheltered competitions, internal allocations with limited external review, etc.
In the absence of explicit priorities and policies, scattered agency budget decisions make a *de facto* U.S. S&T policy:

- Over time, R&D investments change to reflect changes in national goals.
- Until recently, there was increasing funding for the biomedical sciences, stagnant funding for most other disciplines.
- Because the university-oriented NIH and NSF budgets have done well, there have been dramatic increases in support of university R&D.
- Over time, industry has come to play a greater role in U.S. R&D; industry spending determines the R&D intensity of the U.S. economy but the federal government remains the most important for RESEARCH. (There are very few policy tools for the federal government to affect industry spending.)
Trends in Nondefense R&D by Function, FY 1953-2009

outlays for the conduct of R&D, billions of constant FY 2008 dollars

Source: AAAS, based on OMB Historical Tables in Budget of the United States Government FY 2009. Constant dollar conversions based on GDP deflators. FY 2009 is the President's request.
Note: Some Energy programs shifted to General Science beginning in FY 1998.
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Federal Research by Discipline at Selected Agencies, FY 2007 (preliminary obligations in billions of dollars)


FEB. '08 © 2008 AAAS

obligations in billions of constant FY 2008 dollars

Life sciences - split into NIH support for biomedical research and all other agencies’ support for life sciences.


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Federal R&D by Performer at Selected Agencies
billions of FY 2007 obligations (preliminary)

* NIH R&D - $27.8 billion.
Shown as two bars.

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Federal R&D Funding to Colleges and Universities FY 1963-2005
Obligations by agency in billions of constant FY 2008 $

R&D includes research, development, and R&D facilities support. Constant-dollar conversions based on OMB's GDP deflators.
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U.S. R&D Funding by Source, 1953-2007

expenditures in billions of constant 2007 dollars

Source: NSF, Division of Science Resources Statistics. (Data for 2007 are preliminary.)

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Character of Federal and Industry R&D
2007 Data, Expenditures in Billions

Source: NSF, Division of Science Resources Statistics. (Data for 2007 are preliminary.)
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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**

Sources:
- OECD, Main Science and Technology Indicators, 2008.
- 2007 data or latest year available.
- World = OECD members plus Argentina, China, Romania, Israel, Russia, Singapore, Slovenia, South Africa, Taiwan. 2007 or most recent year available.
- Calculated using purchasing power parities.

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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?

- Congress is way behind schedule in finishing the 12 FY 2009 appropriations bills. After the election? After the inauguration?
- The big budget battle between the President and Congress is over how much to spend on domestic discretionary programs.
- 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 remains how to find the resources, especially with the U.S. financial system in crisis.
- Because many 2009 appropriations bills haven’t even been drafted, this fall is still a key time for deciding the fate of R&D funding.
FOR MORE INFORMATION…

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