You and Washington, DC: Like Oil and Water?

Or, what’s wrong with DC and what do I do to fix it?

Benn Tannenbaum, Ph.D.
Sandia National Laboratories
Outline

- The problem
- The enabling technology
- How we got here
- What I do
- What you can do
The Problem

- Science has become just another special interest
- Funding is down and decreasing
- Planning for the future is a challenge, given the inability to pass a budget
- On-again, off-again immigration reform may impact visas for students, postdocs, and visiting scientists
October 28, 2011

The Honorable Patty Murray  
Co-Chair, Joint Select Committee  
on Deficit Reduction  
U.S. Senate  
448 Russell Senate Office Building  
Washington, DC 20510

The Honorable Jeb Hensarling  
Co-Chair, Joint Select Committee  
on Deficit Reduction  
U.S. House of Representatives  
129 Cannon House Office Building  
Washington, DC 20515

Dear Members of the Joint Select Committee on Deficit Reduction:

We recognize that our nation’s deficit poses a serious threat to our economy and our future. The Joint Committee faces a daunting challenge to lower the federal deficit by $1.5 trillion over 10 years. As you accomplish this difficult task, we urge you to keep in mind that drastic cuts to research investments in the discretionary accounts, both defense and non-defense, would set a dangerous precedent that would inhibit immediate scientific progress and threaten our international competitiveness long into the future. Indeed, the bipartisan Simpson-Bowles Debt Commission last year identified federal research and development (R&D) as an area of U.S. investment too critical to be cut. We urge you to entertain a similar conclusion.

Since World War II the partnerships and collaborations between science and society, the federal government and universities, the national laboratories, and industry have yielded new knowledge, new innovations, new products, new businesses, new jobs, and improved human well-being. Examples can be seen throughout our nation. An often-cited statistic is that approximately 50 percent of U.S. economic growth since World War II has come from advances in science and technology.
The Problem

- Science is all too often dismissed by policy makers
- No real discussion of climate change
- No real changes to energy policy
- Climate skeptics chair the House Science Committee and several subcommittees
Congress is more polarized than ever.

New Highs and Lows In Presidential Support

Both Parties Raise Their Support Scores

House and Senate lawmakers from both parties on average voted more often with their caucus majorities in 2013 than they did in 2012. House Republicans set a record for party support voting on average with their caucus 92 percent of the time, up from 90 percent. Likewise, Senate Democrats supported President Barack Obama 96 percent of the time on roll call votes on which he took a clear position in 2013, beating their previous record score of 94 percent average presidential

Dividing Lines

Thirty years ago, National Journal's vote ratings revealed a Congress in which both parties spanned the ideological spectrum. Conservative Democrats and liberal Republicans were common.

Today, virtually all conservatives are Republicans and all liberals are Democrats. In the House last year, only two Republicans had scores more liberal than the most conservative Democrat, and only two Democrats had scores more conservative than the most liberal Republican.

Average voting participation rate

1982

1953  '60  '65  '66

2013

1956  '60

Source: National Journal analysis of House and Senate roll-call votes

Graphic by PETER BELL

House high 2011: 96.6%

Republicans high 2003: 94%
The Question

- How did we get here?
- How can we, as citizens and as scientists, make things better?
Some Enabling Technology
Campaign costs for 2014 winners

- $1,200,000 for a House race
- $10,500,000 for a Senate race
- $1,000,000,000 for the presidency (estimate for 2016)
Campaign costs for 2014 winners

- $1,200,000 for a House race ≈ $1600 per day
- $8,600,000 for a Senate race ≈ $1200 per hour
- $1,000,000,000 for the presidency ≈ $475 per minute
The Enabling Technology
The Enabling Technology
Shift to primary battles
The Enabling Technology
So what does this mean for us?

- People in power want to stay in power
- Money is always on their minds
- Politics seem to matter more than policy
What this means for us

- Money talks
- Ideas don’t
- Access is key
- Access is bought
Science is, unfortunately, small beer in the grand scheme of policy.
Trends in Federal R&D, FY 1976-2017
in billions of constant FY 2016 dollars, excluding mandatory proposals in FY 2017

Source: AAAS analyses of historical budget and agency data and the FY 2017 request. R&D includes conduct and facilities. © AAAS | 2016
For comparison...

http://www.federalbudget.com/
Money spent on lobbying

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Lobbying Spending</th>
<th>Number of Lobbyists*</th>
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<tbody>
<tr>
<td>1998</td>
<td>$1.45 Billion</td>
<td>10,405</td>
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<td>1999</td>
<td>$1.44 Billion</td>
<td>12,926</td>
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<td>2000</td>
<td>$1.57 Billion</td>
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<tr>
<td>2001</td>
<td>$1.63 Billion</td>
<td>11,826</td>
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<td>2002</td>
<td>$1.83 Billion</td>
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<td>$2.44 Billion</td>
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<td>2006</td>
<td>$2.63 Billion</td>
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<td>2010</td>
<td>$3.52 Billion</td>
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<td>2011</td>
<td>$3.33 Billion</td>
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<td>2014</td>
<td>$3.26 Billion</td>
<td>11,817</td>
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<tr>
<td>2015</td>
<td>$3.22 Billion</td>
<td>11,504</td>
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<tr>
<td>2016</td>
<td>$2.36 Billion</td>
<td>10,462</td>
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</table>

Some select industries

Source: http://www.opensecrets.org/lobby/index.php
So what do we do?
Have to tell good stories

Recall Robert Wilson’s Congressional testimony, when asked how particle physics helps defend the country: “It has nothing to do directly with defending our country except to make it worth defending.”

We lived on that sentence for decades.

We can no longer.
How Much is Spent on Science?

Trends in R&D by Agency
in billions of constant FY 2016 dollars

We need to find new ways to be relevant
Promises of future returns are not enough
Instead, we need to meet today's needs in a way that allows us to prepare for tomorrow's
So what to do?
How Scientists Impact Policy

- Three main venues
  - Informed constituent
  - Government employee
  - NGO community
Informed Constituent

- ~730,000 people / district
- ~6.4 million people / state
- How many are scientists?
US Population = 319,000,000

One of ~425 people is a Ph.D.-level scientist

More bachelors and masters-level scientists, but still a small fraction of those in this country

Data from 2008 survey

<table>
<thead>
<tr>
<th>Field</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All fields</td>
<td>752,000</td>
</tr>
<tr>
<td>Science</td>
<td>588,000</td>
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<tr>
<td>Biological/agricultural/environmental life sciences</td>
<td>187,900</td>
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<tr>
<td>Agricultural/food sciences</td>
<td>19,800</td>
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<tr>
<td>Biochemistry/biophysics</td>
<td>29,100</td>
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<tr>
<td>Cell/molecular biology</td>
<td>20,600</td>
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<tr>
<td>Environmental life sciences</td>
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<tr>
<td>Microbiology</td>
<td>14,000</td>
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<tr>
<td>Zoology</td>
<td>12,300</td>
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<tr>
<td>Other biological sciences</td>
<td>84,300</td>
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<tr>
<td>Computer/information sciences</td>
<td>16,900</td>
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<tr>
<td>Mathematics/statistics</td>
<td>35,800</td>
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<tr>
<td>Physical sciences</td>
<td>139,200</td>
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<tr>
<td>Astronomy/astrophysics</td>
<td>5,000</td>
</tr>
<tr>
<td>Chemistry, except biochemistry</td>
<td>71,800</td>
</tr>
<tr>
<td>Earth/atmospheric/ocean sciences</td>
<td>20,900</td>
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<tr>
<td>Physics</td>
<td>41,500</td>
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<tr>
<td>Psychology</td>
<td>112,200</td>
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<tr>
<td>Social sciences</td>
<td>96,000</td>
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<tr>
<td>Economics</td>
<td>25,700</td>
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<tr>
<td>Political sciences</td>
<td>22,700</td>
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<tr>
<td>Sociology</td>
<td>17,400</td>
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<tr>
<td>Other social sciences</td>
<td>30,300</td>
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<tr>
<td>Engineering</td>
<td>131,900</td>
</tr>
<tr>
<td>Aerospace/aeronautical/astronautical engineering</td>
<td>5,800</td>
</tr>
<tr>
<td>Chemical engineering</td>
<td>17,100</td>
</tr>
<tr>
<td>Civil engineering</td>
<td>11,600</td>
</tr>
<tr>
<td>Electrical/computer engineering</td>
<td>37,000</td>
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<tr>
<td>Materials/metallurgical engineering</td>
<td>13,500</td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>18,100</td>
</tr>
<tr>
<td>Other engineering</td>
<td>28,700</td>
</tr>
<tr>
<td>Health</td>
<td>32,100</td>
</tr>
</tbody>
</table>
Informed Constituent

- ~730,000 people / district
- ~6.4 million / state
- Not so many are scientists...
- If build relationship with staff, are useful constituent
- Can all start with phone call, email or letter
- Visit [www.congress.gov](http://www.congress.gov) for info on laws
So what do I do?

Find ways to make the system do what I want it to
Chaired by retired Livermore Director Mike May
Released February 2008
Public briefings

- AAAS Annual Meeting in Boston in February 2008
- Included separate press conference
- APS Annual Meeting in St. Louis in April 2008
Our opinion

Nuclear 'return addresses'

During the Cold War, the ultimate U.S. nightmare involved a nuclear attack by the Soviet Union. But the certainty that the United States would retaliate in kind — known as MAD (for mutual assured destruction) — kept nuclear weapons locked in their silos.

Today, the nightmare is that terrorists could obtain a nuclear device and detonate it in a major U.S. city. Such an attack could kill thousands or even millions — and would generate overwhelming pressure for retaliation.

But against whom? Without knowing the "return address" of the nuclear device, it would be impossible to strike back. And if the terrorists' suppliers know the nuclear materials cannot be traced back to them, a policy of MAD loses its deterrent value.

That's why "nuclear forensics" — essentially the science of identifying the DNA of nuclear materials — needs a new and urgent emphasis.

Since the Cold War ended, nuclear material and expertise have proliferated with fewer safeguards. Nuclear materials in the former Soviet Union are not always well secured. Iran is developing nuclear weapons and has links with terrorist networks. The father of Pakistan's nuclear bomb has sold technology and know-how. Ditto for the erratic leader of North Korea. The list goes on.

Given the new realities, it makes sense to focus on being able to identify and trace nuclear materials and those who handle them, much as criminal forensic experts home in on DNA or fingerprints.

A new report by the American Physical Society and the American Association for the Advancement of Science offers a useful blueprint.

At home, the key recommendations involve developing state-of-the-art equipment and training enough scientists with nuclear forensics expertise. Only about 35 to 50 now work at U.S. national laboratories, far fewer than would be optimal to identify the source of an explosion set off by a faceless enemy.

International cooperation on nuclear forensics requires everything from building databases to overcoming suspicions that the United States has ulterior motives. One possible forum is the existing Global Initiative to Combat Nuclear Terrorism, co-chaired by the United States and Russia, which own more than 90% of the world's nuclear weapons and related materials.

The best defense, of course, is to keep those weapons and materials out of the hands of terrorists and rogue regimes in the first place. But if that fails, nothing is more important than the ability to trace a weapon back to its source.
More Briefings


- Over 700 downloads from AAAS website; more from APS website
So what happened?

- Legislation introduced by Rep. Bill Foster (D-IL; particle physicist) to enact 4 of 5 recommendations.
- Most eventually made it into law, including $25M over 5 years to train the next generation of forensics experts et al (the Nuclear Science and Security Consortium) hosted by UC Berkeley.
What do I do now?

- I am Sandia National Laboratories’ “Man in DC”
- I track a variety of policy issues for the lab and connect our lab leadership with policy makers—both inside and outside of government
- I make Sandia “famouser”
- I also help train the next generation of policy makers
Sandia’s History

Exceptional service in the national interest

- July 1945: Los Alamos creates Z Division
- Nonnuclear component engineering
- November 1, 1949: Sandia Laboratory established
- 1949–1993: AT&T
- 1995–Present: Lockheed Martin Corporation (contract runs through March 31, 2014)
Sandia’s Sites

Albuquerque, New Mexico
Livermore, California
Kauai, Hawaii
Waste Isolation Pilot Plant, Carlsbad, New Mexico
Pantex Plant, Amarillo, Texas
Tonopah, Nevada
Sandia’s Mission Work Reflects National Security Challenges

1950s: NW production engineering & manufacturing engineering
1960s: Development engineering
1970s: Multiprogram laboratory
1980s: Missile defense work
1990s: Post-Cold War transition
2000s: Expanded national security role post 9/11
2010s: Cyber Biosecurity Proliferation

- Vietnam conflict
- Energy crisis
- Cold War
- Stockpile stewardship
- Evolving national security challenges
Sandia’s Foundation

*In concert, these elements form a solid base supporting our national security missions*

**People**
- Highly educated workforce
- Strategically managed workforce of diverse skills and competencies
- Modern business practices and operations in support of our missions

**Research**
- Management framework ensures innovation and quality in our differentiating products
- Disciplined-based Research Foundations
- Multidisciplinary research challenges
- R&D Investments

**Example Facilities and Tools**
- Major Environmental Test Facilities
- Microsystems and Engineering Sciences Applications (MESA)
- High-Performance Computing
- Pulsed-Power Facility
- Center for Integrated Nanotechnologies (CINT)
- Combustion Research Facility (CRF)
- ...

**Capabilities for Solving 21st Century National Security Challenges**
- High-reliability engineering
- Sensors and sensing systems
- Cyber technology
- Reverse engineering
- Modeling & simulation and experiment
- Natural and engineered materials
- Micro- & nanoelectronics and systems
- Safety, risk, and vulnerability analysis
- Pathfinders
Sandia’s R&D Workforce

- Total workforce: ~12,000
- R&D staff: ~5,500

R&D staff by degree

- Masters: 39%
- PhD: 29%
- Bachelors: 15%
- Associates: 9%
- Non Degree: 8%

Sandia Yale Graduates

- PhD: 12
- Masters: 14
- Bachelors: 8

R&D staff by discipline

- EE: 20%
- Computing: 18%
- Mech Engineering: 17%
- Other Engineering: 15%
- Physics: 6%
- Other Science: 5%
- Chemistry: 2%
- Math: 6%
- Other Fields: 11%
But what do I really do?

I help Sandia understand what is happening in and important to Washington

I help Washington understand the capabilities and products of Sandia

I help *amplify* Sandia’s national security impact
What can you do?

Get involved
What can you do?

Join me!

Policy is an exciting field

Join me!

The national labs are exciting places to work