



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
SCIENCE

Office of Workforce Development For Teachers & Scientists (WDTS)

*Presentation for PCAST Meeting on STEM Education
October 22, 2009*

*Bill Valdez
Director, WDTS
Office of Science, U.S. Department of Energy*



Federal Research Funding Rankings

Federal R&D Budget -- FY 2008 Data ⁽¹⁾ (dollars in millions)						Crosscut	Crosscut	Crosscut
	Basic Research	Applied Research	Development	Facilities/ Equipment	Total R&D	Networking And Info. Technology R&D	National Nanotechnology Initiative	Climate Change Science Program
1	HHS 16,037	HHS 12,540	DOD 68,315	NASA 2,146	DOD 74,234	DOD 1,018	NSF 373	NASA 1,025
2	NSF 3,687	DOD 4,478	NASA 6,755	DOE 1,130	HHS 28,737	NSF 904	DOD 345	NSF 205
3	DOE 3,315	DOE 2,723	DOE 1,990	NSF 482	NASA 12,245	HHS 541	DOE 258	DOC 186
4	NASA 2,226	NASA 1,118	DHS 335	DHS 181	DOE 9,158	DOE 473	HHS 173	DOE 126
5	DOD 1,422	AGRIC. 974	TRANSP. 194	HHS 123	NSF 4,548	NASA 82	COMMERCE 86	AGRIC. 61

⁽¹⁾ Source: FY 2008 Budget of the United States, Analytical Perspectives volume, R&D Chapter



Breakdown of Total R&D Spending in 2008

■ Total Federal R&D Spending

- United States – \$111.346 Billion
- Department of Energy – \$8.589 Billion
- Office of Science – \$3.39 Billion

■ Industry R&D

- United States – \$45 Billion
- Department of Energy – \$1.32 Billion
- Office of Science – \$155 Million

■ FFRDC's

- United States – \$15.449 Billion
- Department of Energy – \$5.712 Million
- Office of Science – \$2.650 Million

■ Colleges & Universities

- United States – \$24.58 Billion
- Department of Energy – \$809.6 Million
- Office of Science – \$612 Million

■ Infrastructure & People

- 250 National Laboratories part of the Federal Laboratory Consortium
 - 17 DOE Laboratories
- 210,000 Federal scientists and engineers
 - 4,000 at DOE
- Approximately 100,000 FFRDC scientists and engineers
 - 40,000 at DOE
- 10-20% of the Armed Services personnel have a technical degree or position



Our Core Strengths

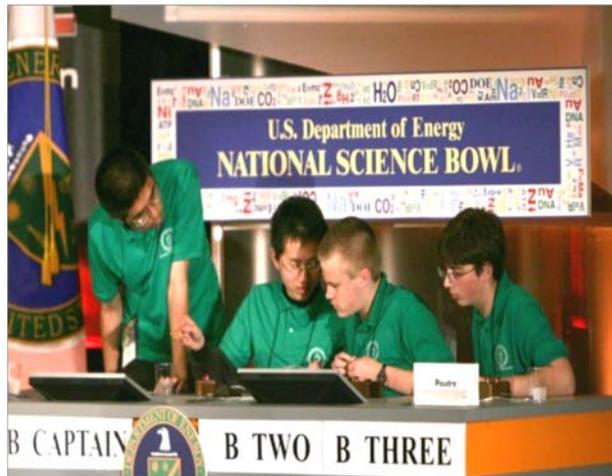
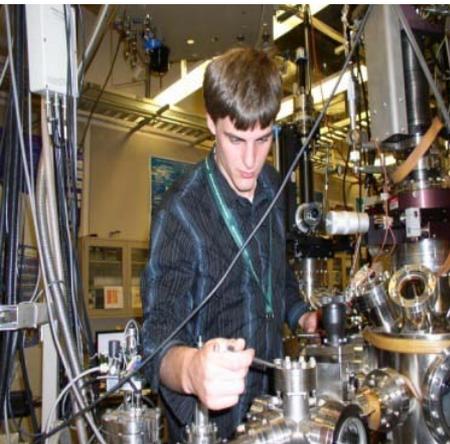
- The CORE of DOE's Education & Workforce Development Programs:
 - **National Laboratories**
 - **Partnerships with Universities**
- Why the National Laboratories & Universities?
 - Cutting-edge research & content
 - Unique facilities and immense infrastructure
 - World class mentors





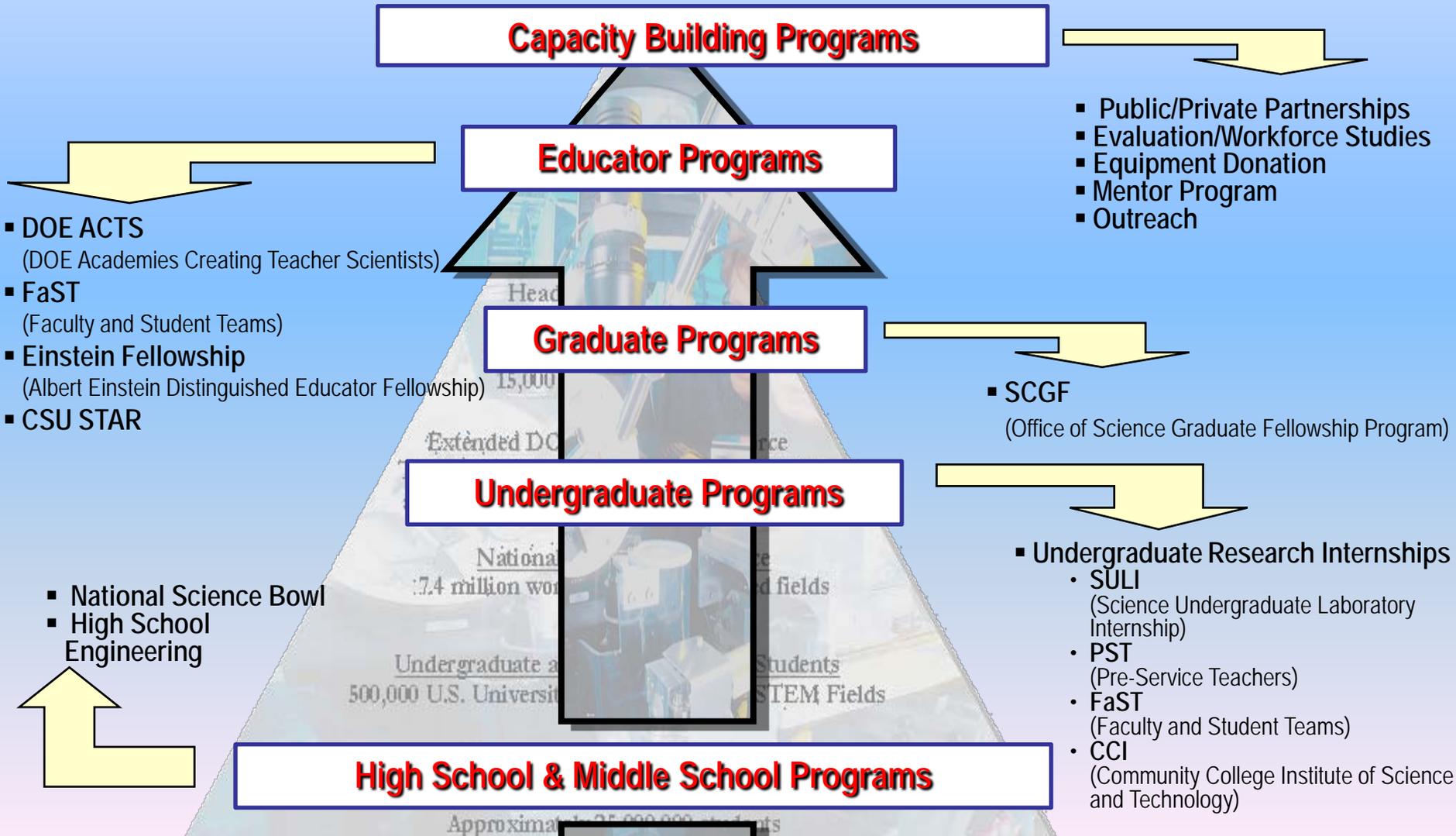
The Laboratories Are Engaged

- FY 2009 Participants:
 - 20,976 K-12 Teachers
 - 299,701 K-12 Students
 - 4,000 Undergrads
 - 3,000 Grad Students
 - 1,600 Post-Docs
- 331 Unique Education Activities:
 - National Science Bowl
 - Science Fairs & Competitions
 - Saturday Seminars for High School Students
 - Summer Camps and Institutes
 - Teacher Workshops
 - K-12 Professional Development
 - School Field Trips
 - Undergraduate Internships
 - High School Internships
 - Graduate Fellowships
 - Early Career Awards





WDTS Portfolio is Aligned To Support the STEM Continuum





We have engaged in successful partnerships with other agencies and organizations to leverage our assets:

■ National Science Foundation MOU

- Funding provided by NSF to sponsor undergraduate research internships through SULI
- Funding provided for FaST Teams
- Emerging cooperation on MSI STEM Training Programs

■ California State University System

- STAR program, NSF Noyce, NASA Centers

■ National Science Bowl

- 5,000 volunteers from industry and academia
- Shell, Areva, Honda, and other private sector sponsors

■ Einstein Fellowship

- NSF, NIH, NASA, NOAA, etc.

■ NSTC Education Subcommittee

- Very useful coordinating and info sharing of best practices, partnerships



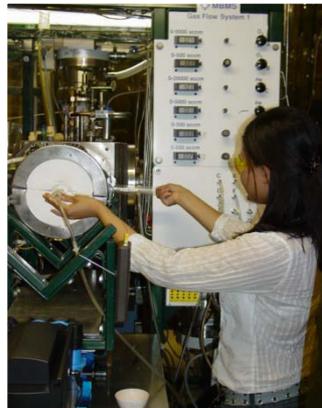
Undergraduate Internships

WDTS runs one of the Nation's largest undergraduate research internships

- **700** in FY 2009, and **800** in FY 2010 directly funded by WDTS.
- **4,000** total funded in FY 2008 at DOE National Laboratories

The Internship leads to:

- Mentored research on a world class project
- Publication in the DOE Journal of Undergraduate Research
- Eligibility for the SERCh competition
- Job possibilities at DOE





Educator Programs: Working to improve the ability of educators at the K-12 level to teach STEM content and methods is a key to improving student achievement and developing a long-term STEM pipeline.

- **DOE Academies Creating Teacher Scientists (ACTS)** — supports 220 middle school and high school educators for intensive mentored research experiences at the DOE national laboratories.
- **Albert Einstein Distinguished Educator Fellowship**—WDTS will support 6 Fellows in FY 2010, two in WDTS and four on the Hill. The Fellowship program has produced almost 200 Fellows since 1995. WDTS cooperates with NSF, NIH, NOAA, and NASA to place Fellows outside DOE (16 non-DOE Fellows in 2009). In addition, EERE accepted a Fellow for the first time in 2009.
- **Pre-Service Teacher (PST) CSU STAR** — supports more than 60 pre-service teachers in a pilot program with the California State University system, NASA and other partners. Being expanded through a NSF Noyce Grant in FY10 to 5 other states.



Faculty & Student Teams (FaST) Research Program

Purpose: To provide opportunities for faculty and student teams to conduct research with DOE scientists.

FY 2009

Number of Students: 200

Number of Faculty: 70

Number of Institutions: 65

FY 2010

Number of Students: 300

Number of Faculty: 100

Number of Institutions: 90





WDTS R&D Internship Participants By Discipline

Discipline Area	Number of participants				2009 % by Discipline
	2006	2007	2008	2009	
Biology	92	68	86	86	14.3%
Chemistry	65	75	76	100	10.1%
Computer Science	76	58	66	57	11.8%
Engineering	88	107	100	111	13.7%
Environmental Science	70	67	68	72	10.9%
Materials Science	71	53	48	70	11.1%
Medical & Health Sciences	7	25	24	17	1.1%
Nuclear Science	36	25	20	28	5.6%
Physics	108	122	98	134	16.8%
Other Sciences**	29	13	22	17	4.5%
Total participants	642	613	608	692	

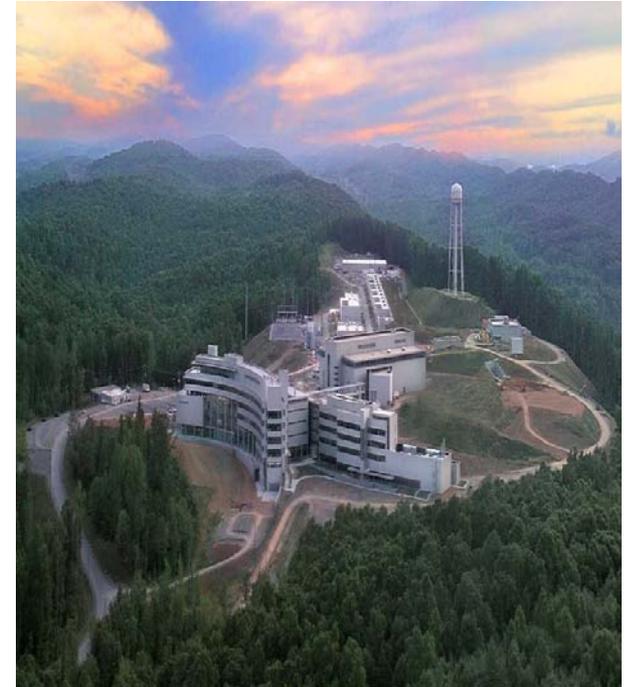


Using Federal Assets for Education

- Huge resources with the potential for national impact
- Programs are proven and effective
- National presence in communities

So What's the Problem???

- Not all S&T agencies have the Congressional authorities required
- Limited funding
- No national mandate to use these resources in this manner
- Question of Federal coordination





PCAST Could Help Us Sort Things Out:

- Should these Federal assets be more fully utilized for STEM education?
- Which Federal programs should be replicated nationally?
 - CyberLearning?
 - K-12 Teacher Professional Development?
 - Student Internships?
 - Expanded Fellowships & Scholarships?
- Are there barriers that could be reduced/eliminated that would enable the full application of these resources?
- What is the optimal role of Federal S&T agencies in STEM education?



U.S. DEPARTMENT OF
ENERGY

Questions or Comments

Bill Valdez

Director

Office of Workforce Development for Teachers and Scientists

U.S. Department of Energy

Washington, DC

Bill.Valdez@science.doe.gov