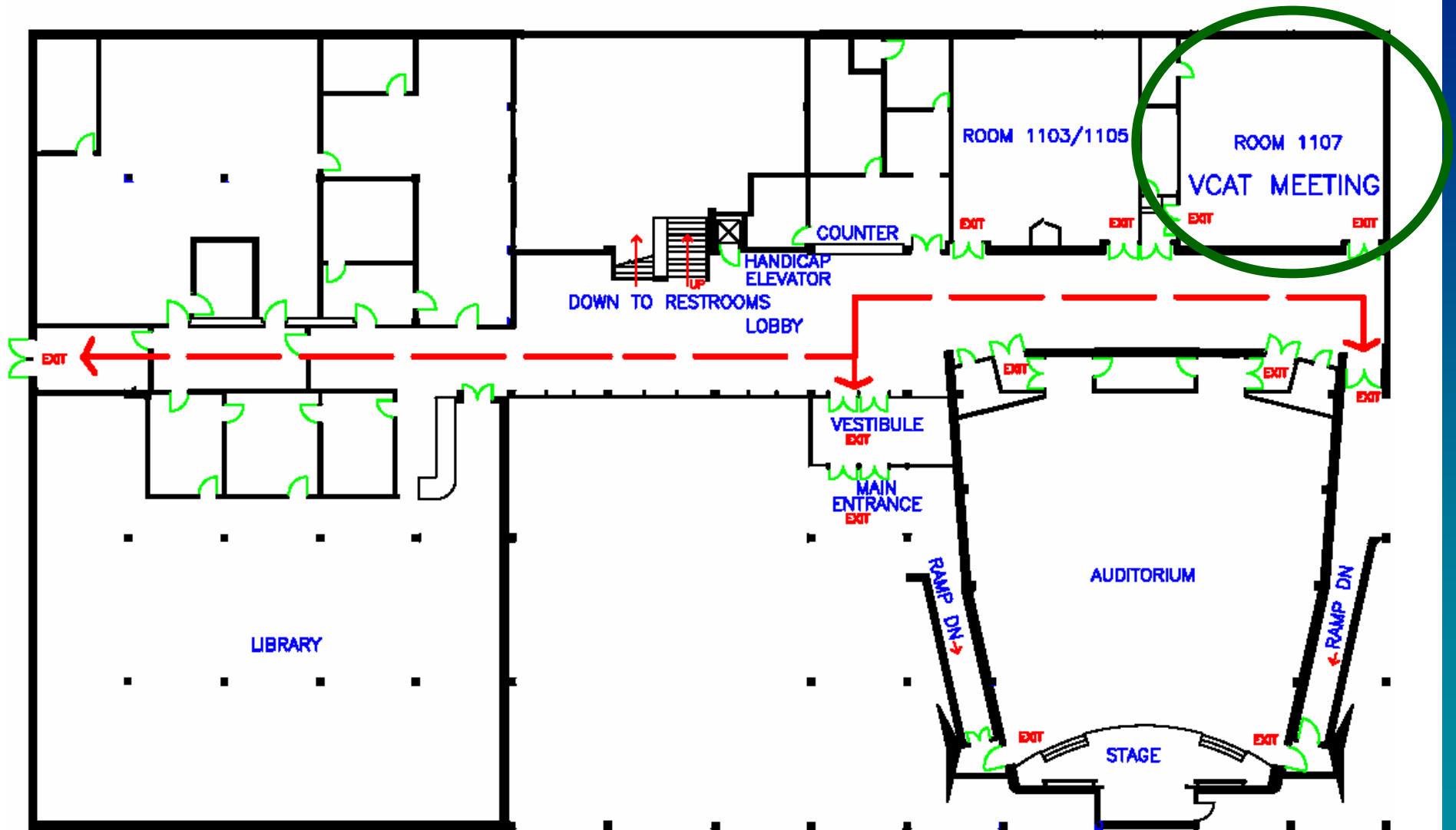


# Emergency Exits



# NIST Update

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William Jeffrey

Director

National Institute of Standards and Technology

12 September 2006

**NIST**

**National Institute of  
Standards and Technology**

Technology Administration  
U.S. Department of Commerce

# Outline

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- I. Outreach
- II. Update – People & Places
- III. Technical Highlights
- IV. Progress – Budget

## Recent NIST Outreach...

- NIST and the University of Maryland joined in a cooperative program in nanotechnology
- NIST, the Univ. of MD, and the NSA initiated the Joint Quantum Institute
- Dr. Jeffrey testified at a joint hearing held by House Committee on Science and the Committee on House Administration regarding voting machine standards
- Senator Barbara Mikulski visited the NIST campus in Gaithersburg, MD.
- Visits by Gov. Engler (NAM), DOC Manufacturing Council, National Academy of Engineering, Univ. of TX, Sematech, George Mason University, Albany Nanotech Center
- Visits to Carnegie Mellon, Rose-Hulman, Council on Competitiveness, National Conference on Weights and Measures, NAS GUIRR and COSEPUP, ...



*“Our future depends on NIST for the discovery of new technologies that will lead to new products and create the jobs of the future that will stay in this country.” - Sen. Barbara Mikulski*

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# New People and New Positions



**Linda Acierto**



**Eric Amis**



**George Arnold**



**Belinda Collins**



**Aimee Dobrzeniecki**



**Cita Furlani**



**Todd Grams**



**Jim Hill**



**Dave Karmol**



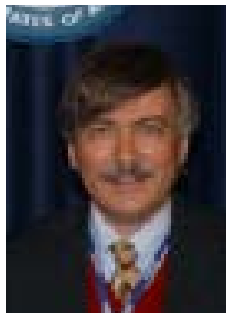
**Mirta-Marie Keyes**



**Kevin Kimball**



**Rob Kirkner**



**Mike Rubin**



**Claire Saundry**



**Hratch Semerjian**



**Jim St. Pierre**



**Shyam Sunder**

# Presidential Early Career Scientists and Engineers (PECASE)



President George W. Bush poses for a photo with the recipients of the 2005 Presidential Early Career Awards for Scientists and Engineers in the Indian Treaty Room of the Eisenhower Executive Office Building in Washington, D.C., Wednesday, July 26, 2006. The Presidential Early Career Awards for Scientists and Engineers, established in 1996, represents the highest honor that any young scientist or engineer can receive in the United States.



## **New Society Fellows**

**Manny Knill  
APS**



**Eric Shirley  
APS**



**Dave Seiler  
IEEE**



**Steve Semancik  
APS**



**Steve Cundiff  
APS**



**Eite Tiesinga  
APS**



## 2006 ARTHUR S. FLEMMING AWARDS RECOGNIZING OUTSTANDING FEDERAL GOVERNMENT SERVICE



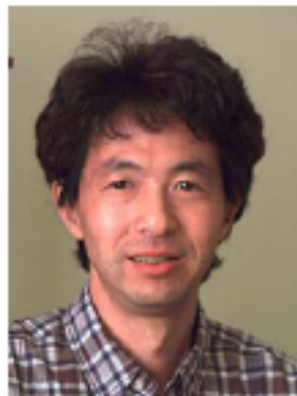
**Bradley K. Alpert, computer scientist**

His contributions have led to advances in wave propagation, antenna design, microcircuits and transducer design, and climate modeling.



**Carl J. Williams, physicist**

His work on ultracold quantum mechanics is laying the foundation for future quantum computing.



**Yoshihiro Ohno, physicist**

Recognized for his innovative research and international leadership in the optical sciences of photometry and colorimetry.

# More Staff Recognition

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**Talapady Bhat**  
*Science Spectrum  
Trailblazer Award*



**Jeffrey Kelley**  
*George T. Hanyo  
Award*

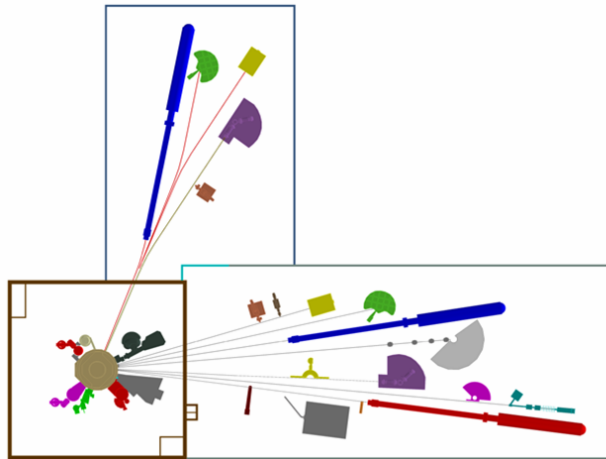


**Johanna Levelt  
Sengers**  
*Yeram S. Touloukian  
Award*



**Steven Wise**  
*Harvey W. Wiley  
Award*

# Places (New and Improved)



**NCNR New Guide Hall**

**Building 222**



**Central Utility Plant  
(Boulder)**



**Visitor Center  
(Boulder)**



**Visitor Center  
(Gaithersburg)**



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# American Competitiveness Initiative

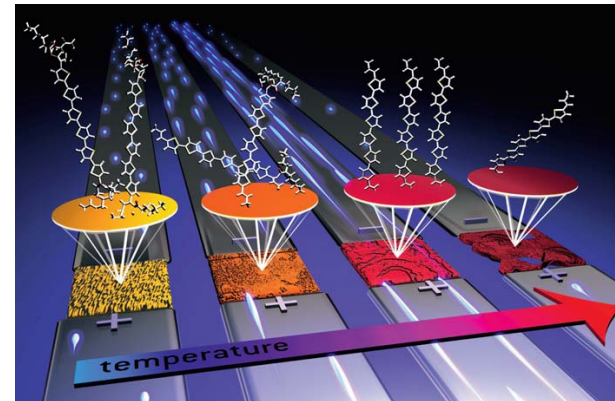


## Rapidly developing technologies

Nanotechnology from Discovery to Manufacture  
Quantum Information Science  
Enabling the Hydrogen Economy  
Innovations in Measurement Science  
Cyber Security

## Critical national assets

NIST Center for Neutron Research  
Synchrotron Measurement



## Immediate measurement needs

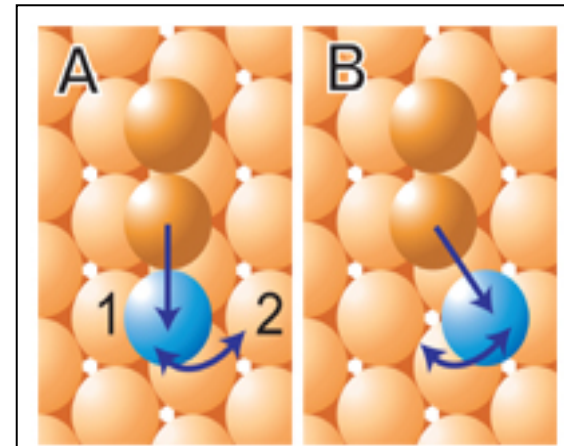
Innovation through Supply Chain Integration  
Structural Safety  
International Standards and Innovation  
Bioimaging  
Biometrics



## Technical Highlights ... *Rapidly Developing Technologies*

### Atomic Switches:

- NIST Scientists have used a beam of electrons to move a single atom in a small molecule back and forth between two positions on a crystal surface
- This research is a significant step toward learning how to build an “atomic switch” that turns electrical signals on and off in nanoscale devices



NIST researchers used a scanning tunneling microscope (STM) to move a single cobalt atom (blue sphere) in a small molecule back and forth between two positions on a crystal surface (first two images). A computer-generated spatial map of the atom switching speed and probability shows that switching is most likely when the STM tip is positioned to the left of the cobalt atom (blue and white speckled area in the third image). Credit: J.A. Stroscio, J.N. Crain and R.J. Celotta, NIST

## Technical Highlights ... *Critical National Assets*

### New Advanced Imaging Facility Peers Inside Hydrogen Fuel Cells:

- With visualization powers 10 times better than those achieved previously, researchers using the newly commissioned Neutron Imaging Facility in the NCNR can “see” water production and removal in fuel cells under a range of simulated operating conditions, from arctic cold to desert heat.
- Better water management is fundamental to meeting targets for fuel cell performance, reliability and durability.



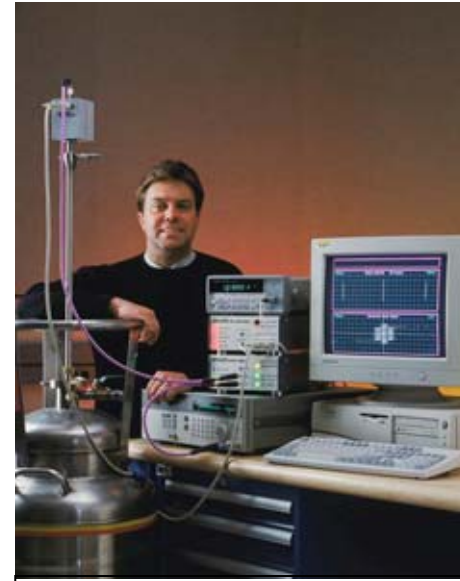
NIST scientist David Jacobson prepares an experimental fuel cell for real-time imaging at the NIST Center for Neutron Research. A new research station at the center produces still images akin to CAT scans and movies recorded at a rate of up to 30 frames per second, or 30 times faster than a first-generation instrument.



## Technical Highlights ... *Immediate Measurement Needs*

### Improved Methods for AC Voltage Measurement

- 10 years of research at NIST has unveiled the world's first precision instrument for directly measuring alternating current (AC) voltages
- The instrument is being tested for use in NIST's low-voltage calibration service, where it is expected to increase significantly the measurement precision of industrial voltmeters, spectrum analyzers, amplifiers and filters.



***Charles Burroughs with the 1 volt programmable voltage standard system showing (left to right) the low thermal probe, the microwave and high-speed bias electronics, and the computer control.***

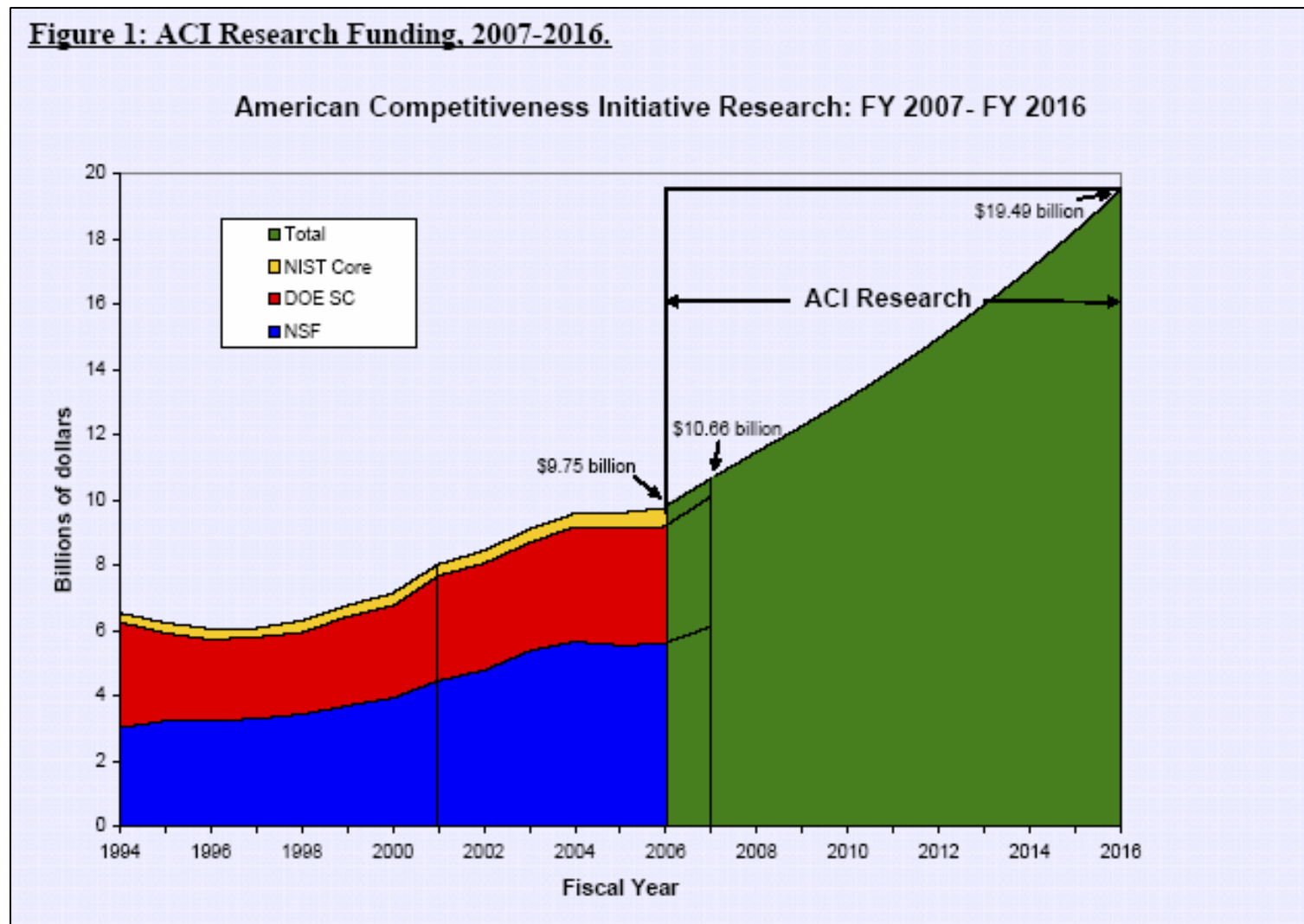
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# Doubling Basic Research

**Figure 1: ACI Research Funding, 2007-2016.**



# FY2007 Budget Status

(Dollars in Thousands)

	<u>Request</u>	<u>House</u>	<u>Senate Comm.</u>
<u>Scientific and Technical Research and Services (STRS)</u>			
Laboratories	459,439	453,022	459,439
Quality Program	7,563	7,563	7,563
Congressional Directed Grants		6,417	
Subtotal STRS	<u>467,002</u>	<u>467,002</u>	<u>467,002</u>
<u>Industrial Technology Services (ITS)</u>			
ATP	0	0	0
Hollings MEP	46,332	92,000	106,000
Subtotal ITS	<u>46,332</u>	<u>92,000</u>	<u>106,000</u>
<u>Construction of Research Facilities (CRF)</u>			
New Projects	22,100	22,100	22,100
SCMMR	45,898	45,898	45,898
Congressional Directed Grants			123,000
Subtotal CRF	<u>67,998</u>	<u>67,998</u>	<u>190,998</u>
NIST Total	<u><u>\$581,332</u></u>	<u><u>\$627,000</u></u>	<u><u>\$764,000</u></u>

# Outline of VCAT Agenda

## September 12, 2006

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- NIST Update
- Systems Medicine: Measurement and Computational Challenges in the Emergence of Predictive, Preventive, Personalized and Participatory Medicine
- Vision and Overview of NIST's Bioscience and Health Care Activities
- A Metrology Infrastructure for Innovations in Cell-Based Technologies
- Research at the NIST's Center for Nanoscale Science and Technology (CNST)
- Overview of JILA
- Overall Discussion of Measurement Science and Standards for Bioscience and Nanotechnologies
- Laboratory Tours at JILA