

NIST Overview

National Institute of Standards and Technology
Technology Administration
Department of Commerce

Agenda

- Organization & Budget
- Resources, Staff & Facilities
- Mission
- Strategic Planning & Focus Areas
- Safety



Carlos M. Gutierrez
Secretary

Secretary
Deputy Secretary

**National Oceanic
and Atmospheric
Administration**

**Patent and
Trademark Office**

**National
Telecomm. & Info.
Administration**

(Other bureaus)

**Technology
Administration**



**Department of
Commerce**

**National Technical
Information
Service**

**Office of
Technology Policy**

**National Institute
of Standards and
Technology**



Theodore Kassinger
Deputy Secretary



Phillip Bond
Under Secretary



Dr. Hratch Semerjian
Acting Director



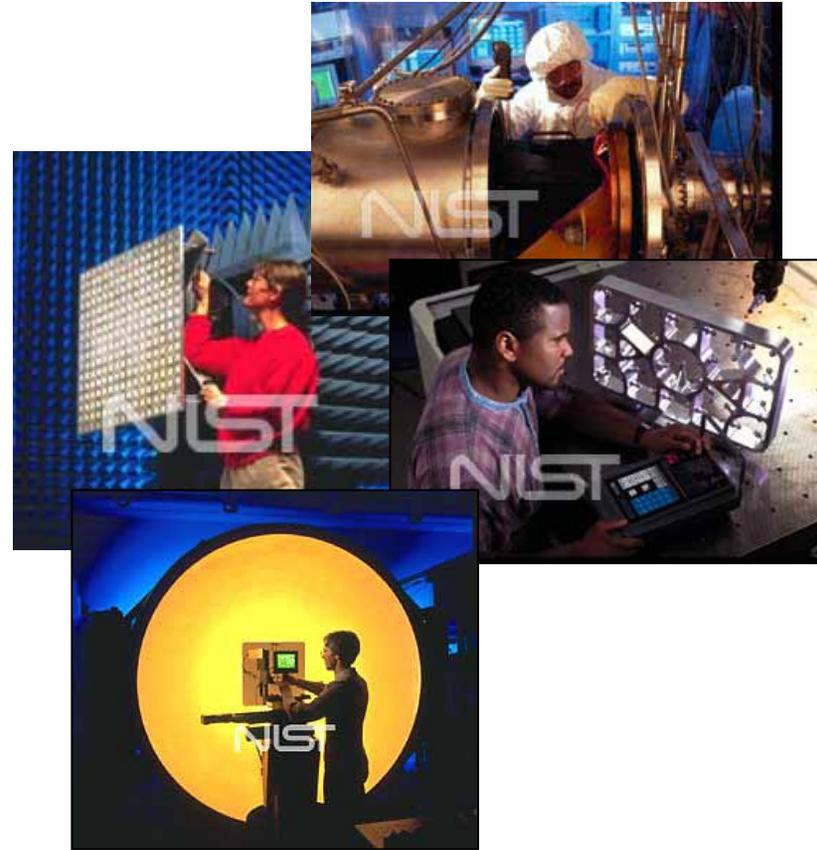
Dr. Richard Kayser
Acting Dep. Director

National Institute of Standards & Technology

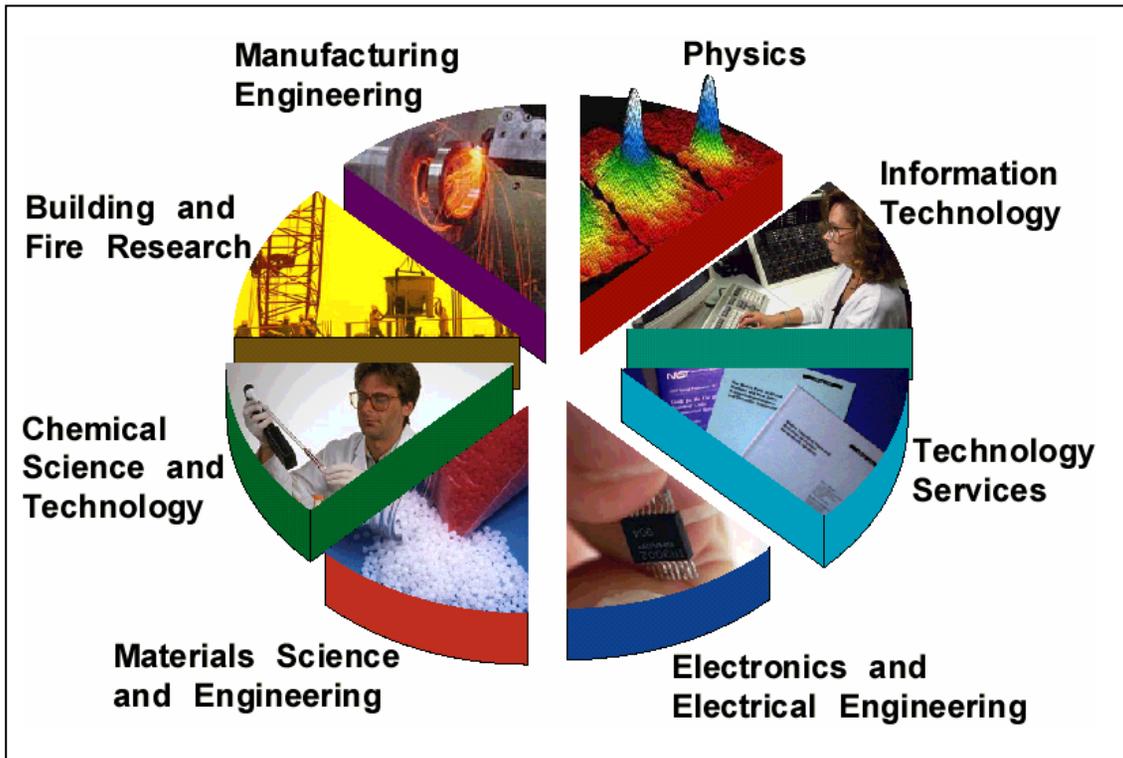
NIST's mission is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life.

NIST Assets Include:

- 3,000 employees
- 1,600 associates
- \$858 million FY 2005 operating budget
- NIST Laboratories -- National measurement standards
- Advanced Technology Program
- Manufacturing Extension Partnership
- Baldrige National Quality Award



NIST Laboratories

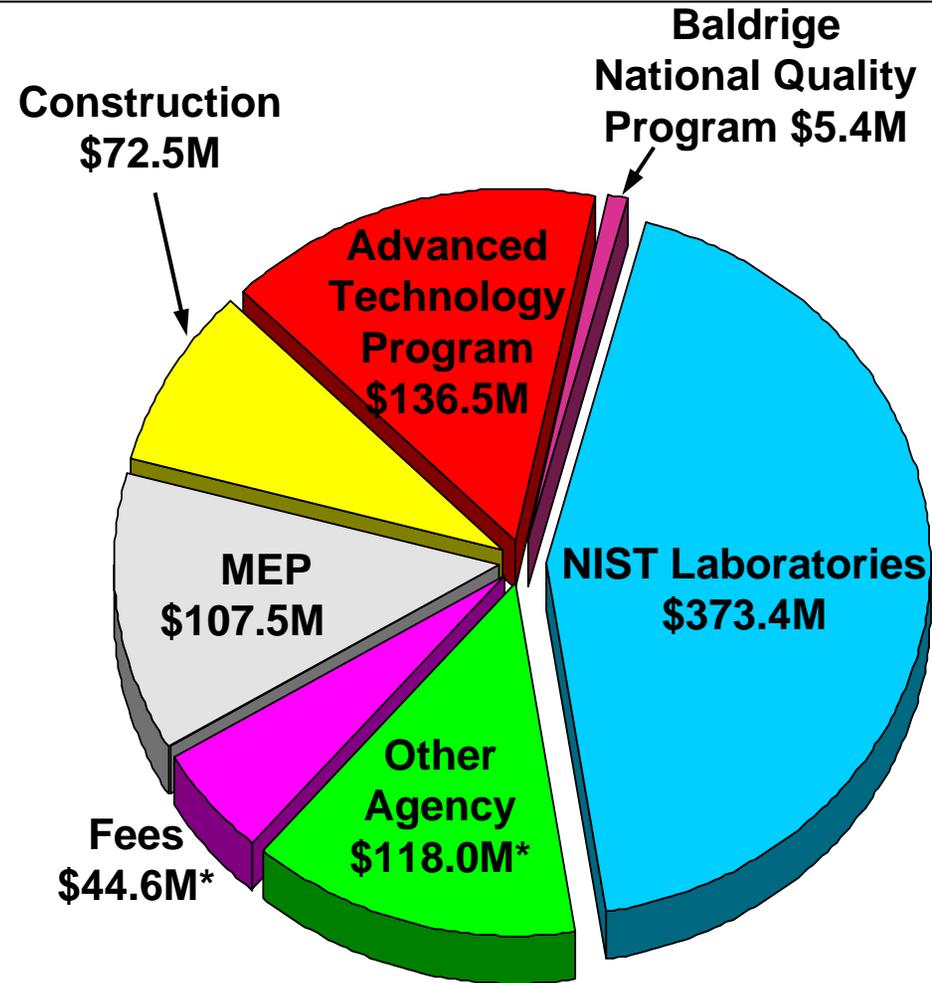
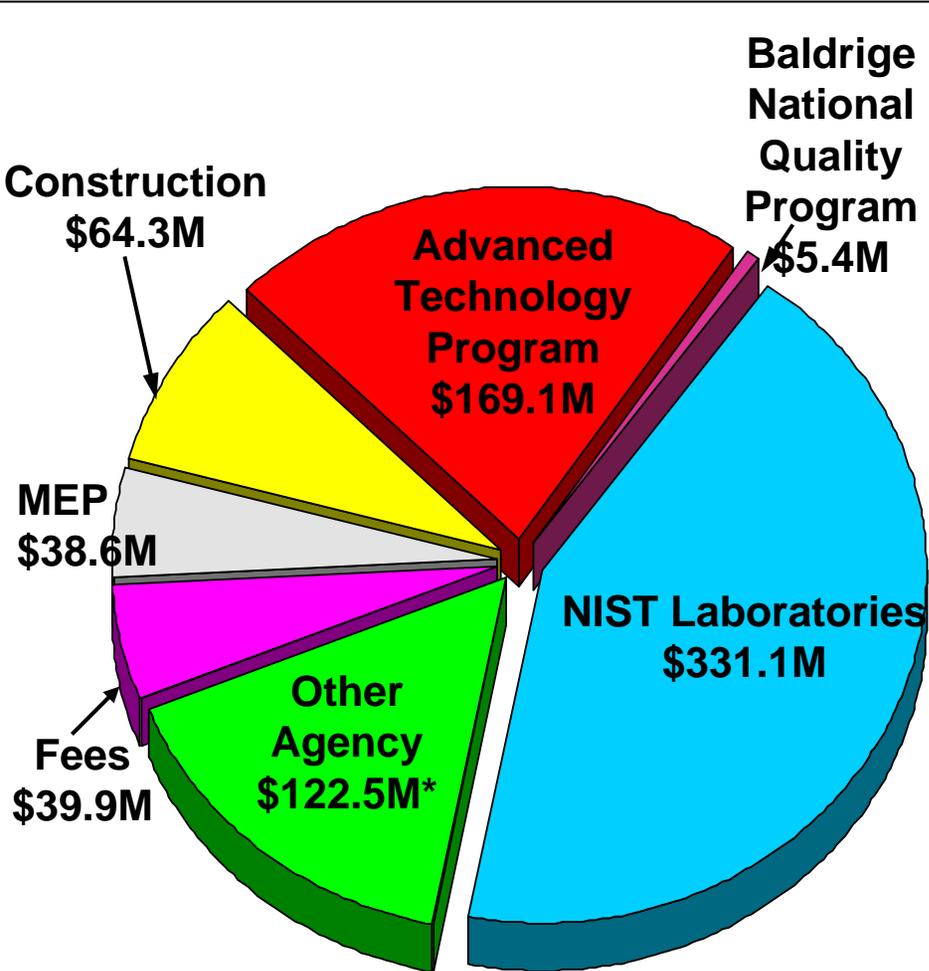


- NIST works with**
- **Industry**
 - **Academia**
 - **Other agencies**
 - **Government agencies**
 - **Measurement laboratories**
 - **Standards organizations**

NIST's work enables

- **Science**
- **Technology innovation**
- **Trade**
- **Public benefit**

NIST Resources



FY2004: \$770.9M
Appropriations: \$608.5M

FY2005: \$857.9M
Appropriations: \$695.3M

*approximate

World Renowned Scientists and Engineers



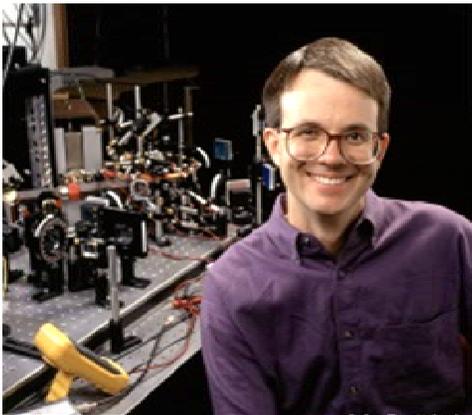
Bill Phillips
*1997 Nobel Prize in
Physics*



Gregory Linteris
Flew 2 Space Shuttle
Missions



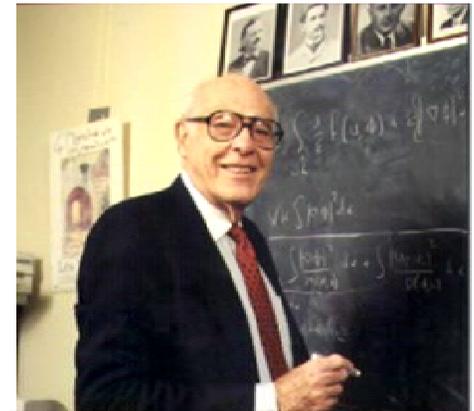
Johanna Sengers
*2003 Women in Science
Award and NAS Member*



Eric Cornell
*2001 Nobel Prize in
Physics*



Deborah S. Jin
2003 MacArthur Fellowship '*Genius Grant*'
2004 Service to America Medal



John Cahn
*1998 National Medal of
Science*

Unique NIST Measurement and Research Facilities



Advanced Measurement Laboratory -- 2004

**Advanced Chemical Sciences
Laboratory**



ACSL

**NIST Center for Neutron
Research**



NCNR

NIST Has Two Campuses...

Gaithersburg, MD



Boulder, CO



..and two joint Institutes

CARB

University of Maryland



JILA

University of Colorado



NIST has Unparalleled Facilities

Advanced Measurement Laboratory (AML)



- Complex of 5 buildings, occupancy began in Jan '04
- Stringent control of temperature, vibration, humidity, cleanliness
- Establishes state-of-the-art nano-fabrication capabilities, in the ~90,000 sq ft Cleanroom Building



The NIST Center for Neutron Research (NCNR) Guidehall

- Only U.S. capability for studies of biological dynamics, both temporal and spatial information are obtained.
- Neutron methods at the NCNR encompass an enormous range of time and length scales.

NIST Laboratories Products and Services

- **Measurement Research**

2,100 publications/year

- **Standard Reference Data**

90 types available

5,000 units sold/ year

- **Standard Reference Materials**

>1,200 products available

30,000 units sold/year

- **Calibrations and Tests**

3,200 items calibrated/year

- **Laboratory Accreditation**

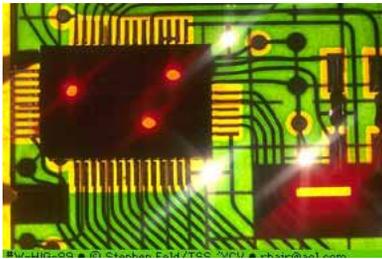
826 accreditations

- **Standards Committees**

390 NIST staff, 450 committees

NIST strengthens the innovation infrastructure to...

...advance manufacturing and services



**semiconductor
electronics**



**“lean manufacturing” of
plastics**



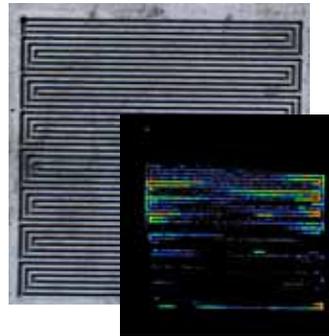
**automobile
manufacturing
interoperability**



pharmaceuticals



chemicals



**fuel cell
technology**



healthcare

NIST strengthens the innovation infrastructure to...

...facilitate trade



secure automated banking



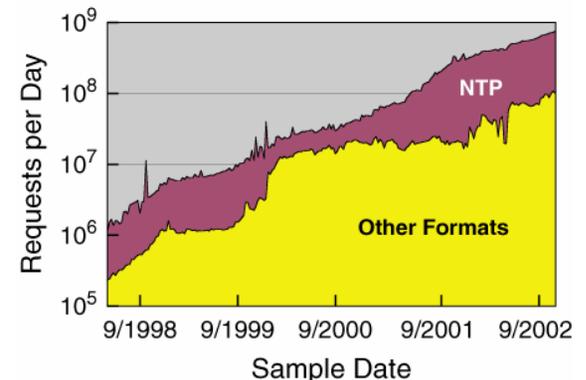
volume and flow standards



electric power metering



international standards to counteract TBTs



**www.time.gov
billions of hits daily**

NIST strengthens the innovation infrastructure to...

...improve public safety and security



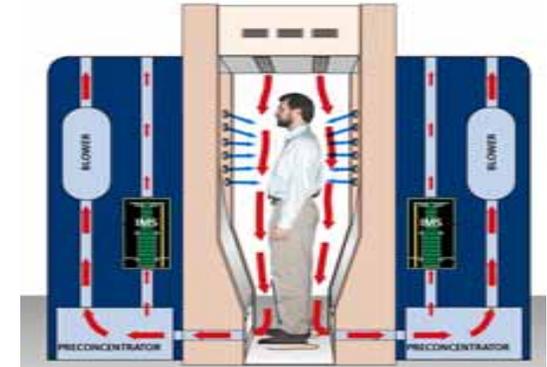
metal detectors



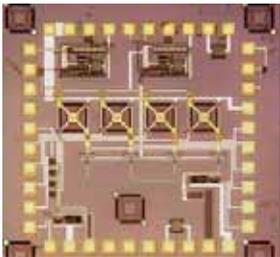
wireless
interoperability
among first
responders



smoke
detectors



Trace explosives
detection



novel sensors to
detect gases



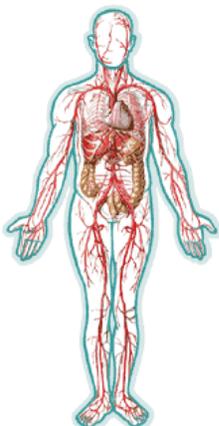
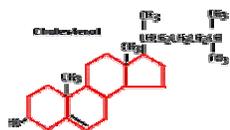
altimeter calibration

standards for
body armor



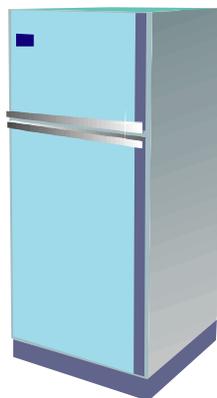
NIST strengthens the innovation infrastructure to...

... improve quality of life



**Improved clinical
measurements**

**database and
measurements
for alternative refrigerants**



drinking water quality



**prostate and breast-
cancer treatment**



**standards for sulfur
in fossil fuels**

NIST Takes Responsibility for the US Measurement System

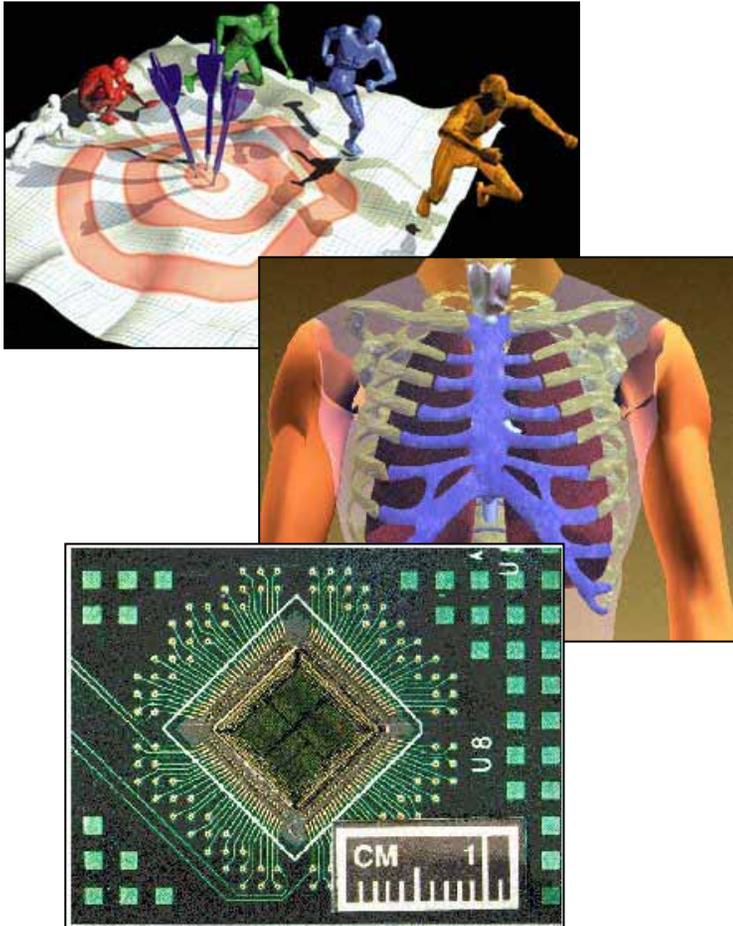
NIST assumes responsibility for:

- Assessing the state of the US Measurement System
- Advising the Administration and Congress on what needs to be done, by NIST and others, to meet the needs of the country for measurements and standards (broadly construed),
- Evaluating the consequences of not meeting those needs
- Coordinating with others to ensure that the highest priority needs are met

NIST Advanced Technology Program



Bridging the Gap Between the Laboratory and the Marketplace



- Co-funding of private sector R&D to accelerate the development of high-risk, broadly enabling technologies.
- Auto Body Consortium - improved fitting of parts to save money for manufacturers and consumers
- Tissue Engineering - new materials to repair damaged ligaments and tendons: several billion dollar impact
- "DNA Chips" - new technology for cheap, rapid genetic analysis

Manufacturing Extension Partnership

- Nationwide network providing hands-on help to smaller manufacturers to become globally competitive
- 350 locations, found in every state

- **Business assistance**

- Quality management
- Financial planning
- Other services

- **Technical assistance**

- E-commerce
- Process improvement
- Plant layout
- Product development
- Energy audits
- Other services



355,000 small U.S. manufacturers produce 55% of value added in manufactured goods, employ more than 12 million workers

Baldrige National Quality Program



- Premier U.S. award for performance excellence and quality achievement.
- Awards in Manufacturing, Service, Small Business, Education, Health Care.
- More than 2 million copies of Criteria for Performance Excellence distributed (not including downloads from Web).

- Quality programs modeled on Baldrige: 49 state and local (up from fewer than 10 in 1990); 60 international.



Strategic Planning: NIST 2010

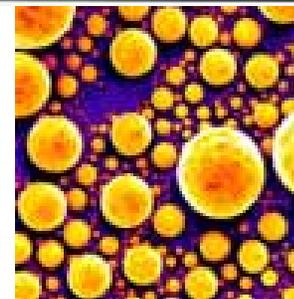


- Provides a process for long-term planning
- Covers all of NIST
- Responds to strategic environment
- Ensure preeminent performance through evaluation

Strategic Focus Areas

NIST 2010

- Biosystems & Health
- Nanotechnology
- Homeland Security
- Information / Knowledge Management



Implementation of NIST 2010

- Alignment of laboratory operational planning with guidance from NIST 2010 Strategic Plan
- External budget request derived from Strategic Plan
- Focus on leverage through strategic partnerships
- Working groups for cross-NIST programs implementation



NIST 2020 – Preparing for the Future

Strategic Planning is a cyclical process which allows NIST to continue delivering its mission.

NIST has demonstrated a complete process for delivering our mission:

- Planning
- Implementation
- Prospective and Retrospective Analysis
- Participation by management, staff, and customers, and stakeholders in the entire process.

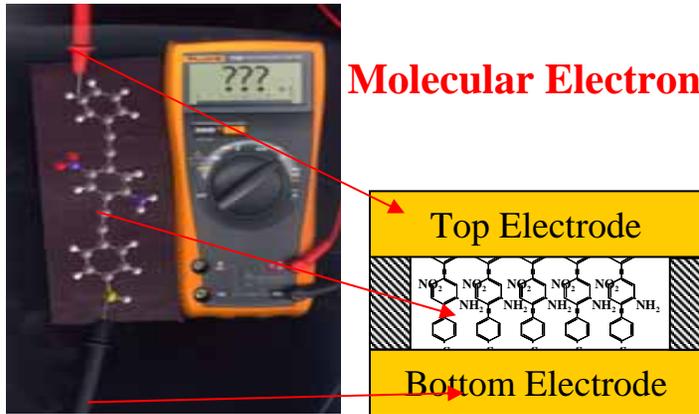


NIST

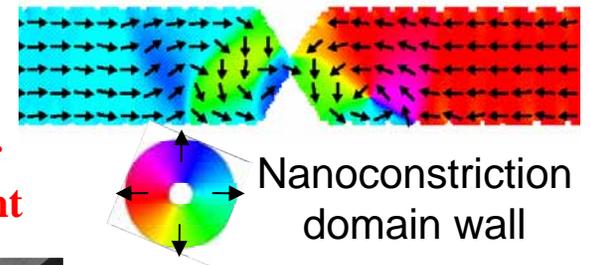
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

NIST Measurements and Standards for Nanometrology

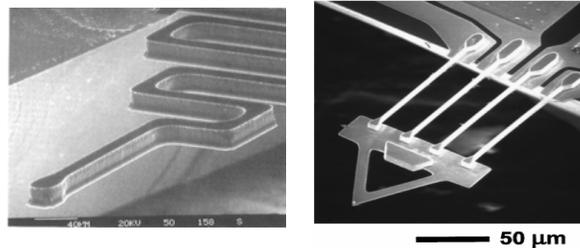
Molecular Electronics



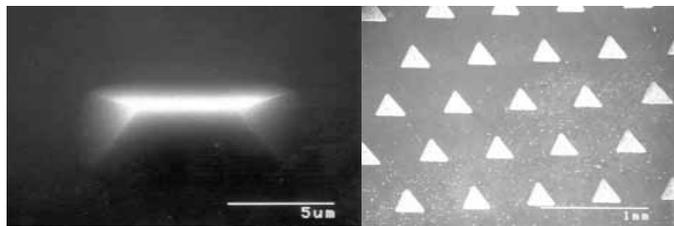
Imaging Magnetic Nanostructures



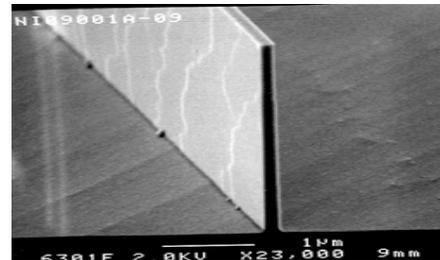
Cantilever Fabrication for Lateral Force Measurement



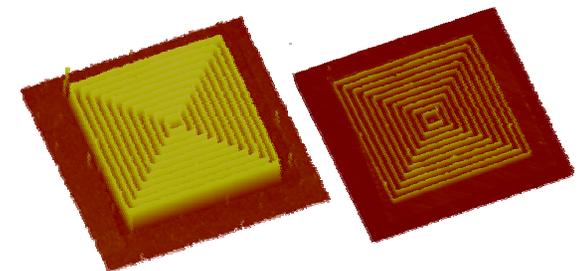
Surface Standards for Biomaterials



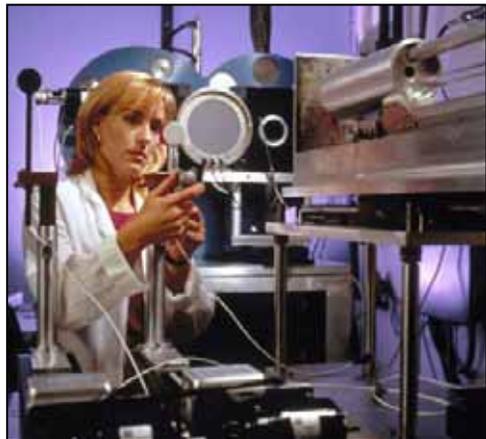
Linewidth Standards



Nanoscale Dimensional Standards

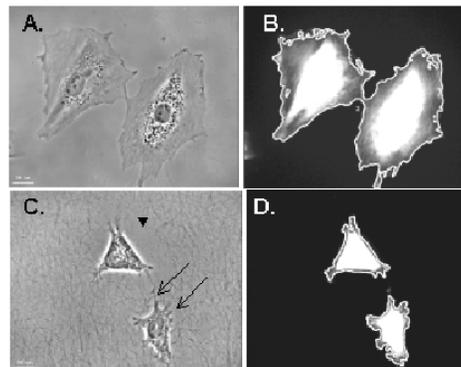


NIST Measurements & Standards for Biosystems and Health



Mammography calibrations

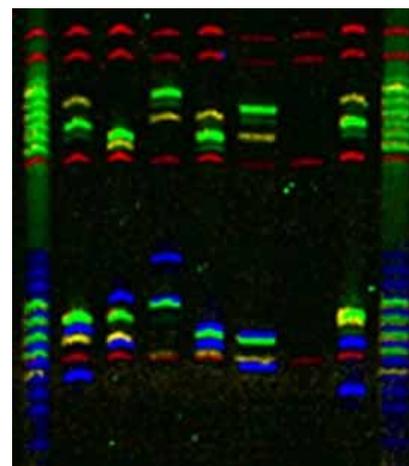
- 26 million mammograms/year
- 11,000 facilities



Development of highly reproducible cell culture surfaces



Calibration of radioactive sources for treatment of cancer and heart disease



New SRM for Y Chromosome DNA

NIST Measurements & Standards for Information Technology

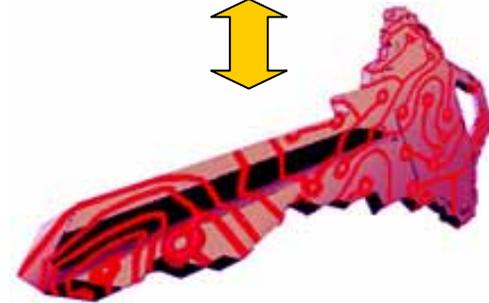
Computer Security

- Public Key Infrastructure
- Advanced Encryption Standard
- Best practices for security
 - Computer Security Act - responsibility for standards for Federal computer systems
- Testing security measures

AES

A Crypto Algorithm for the Twenty-first Century . . .

Working closely with industry



KEY: *NIST@100NIST@100*
(128-bit)

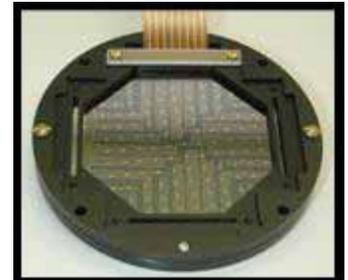
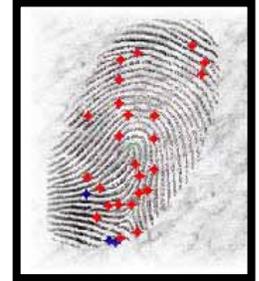


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275b8f8e0db1f14c9d33e72d598f1
2a14fc

NIST Roles in Homeland Security

Provide the measurements, standards, and data infrastructure necessary for support of government and industry homeland security efforts to:

- Develop new homeland security technologies
- Effectively and efficiently deploy homeland security technologies
- Test and compare different homeland security technologies
- Ensure safe and effective response to homeland security incidents



NIST also:

- Has signed Memorandum of Understanding (MOU) with the DHS S&T Directorate
- Is helping to convene standards developers to serve DHS and homeland security goals

World Trade Center Investigation

- NIST leading broad public-private partnership to determine the technical cause of the WTC collapse and apply lessons learned to improve safety, survivability and emergency response.

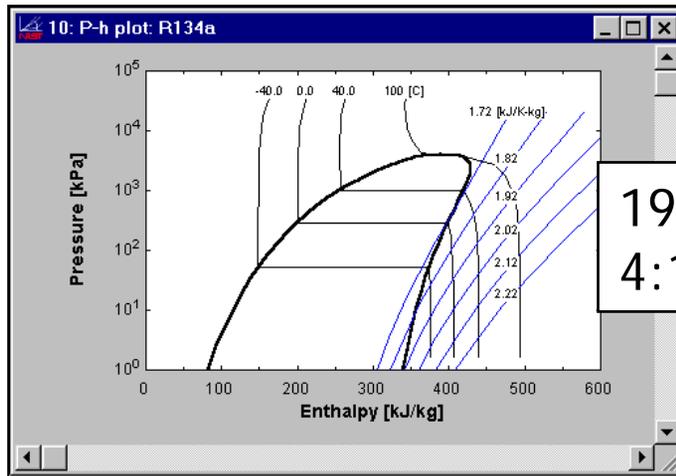
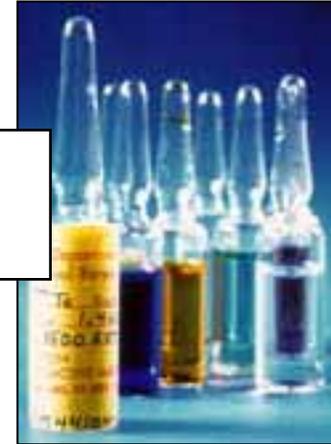


- Details of investigation published on NIST website.
- NIST has received over 235 pieces of WTC steel for analysis.

NIST World Trade Center Investigation:
<http://wtc.nist.gov/>

Economic Impact Assessment Studies

1997: Radiopharmaceutical standards
97:1 benefit-to-cost ratio



1998: Alternative refrigerants
4:1 benefit-to-cost ratio

2000: Sulfur in fossil fuels
113:1 benefit-to-cost ratio



Programs Guided by Stakeholder Roadmaps and Needs Assessment

Semiconductor Industry Association



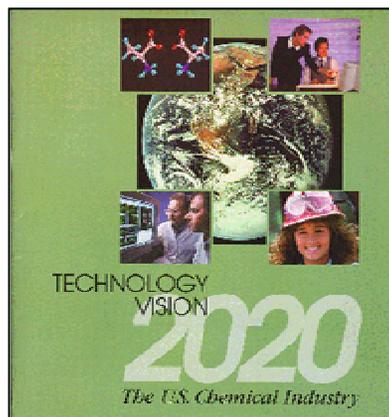
International Technology Roadmap for Semiconductors

Optoelectronics Industry Development Association

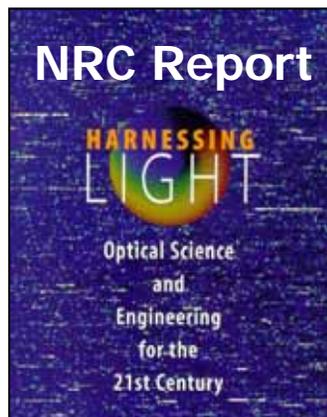


Multiple Roadmaps

President's Information Technology Advisory Committee



Chemical industry vision/roadmap



Optics needs



Roadmap

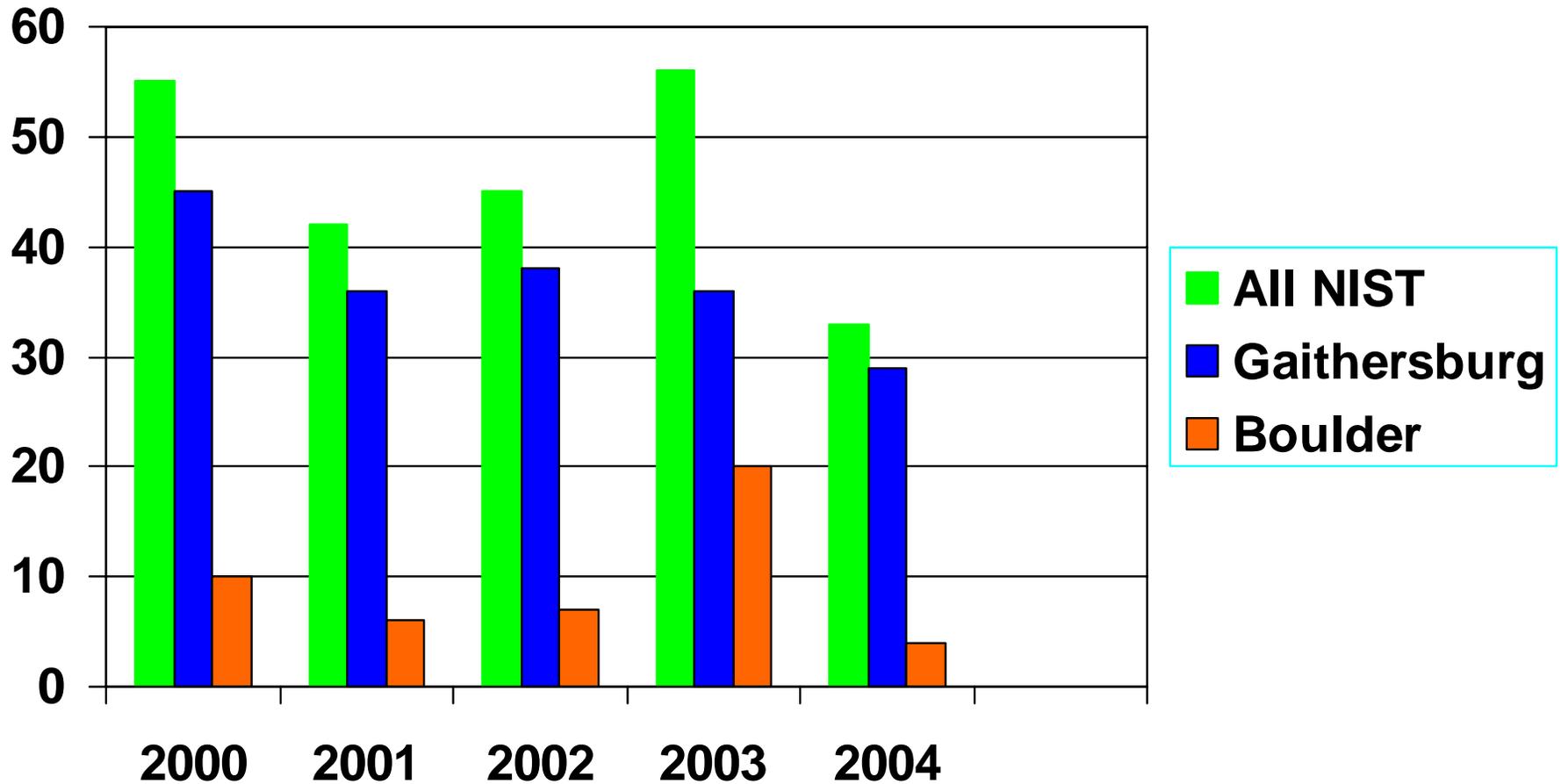


National Center for Manufacturing Sciences

Vision for NIST Measurement Services in the 21st Century

As one of its essential responsibilities, NIST will provide a robust and accessible suite of measurement services based upon the SI units and other national measurement standards that will enable the U.S. to continue its lead in technology for the 21st century and so sustain the strength of the economy and the security of the nation.

NIST Safety Incidents: FY00 - FY04



Benchmarks vs. Other Institutions

Total Case Rate per 100 Employees for FY2004

<u>Agency</u>	<u>Total Case Rate*</u>
NIST	1.11
NOAA	1.50
NIH	0.80
USDA/ARS	2.87
CDC	1.55
FDA	0.98

*Includes medical treatment and lost work day incidents