

NIST ... Enabling the Future

By Providing the Innovation Infrastructure

Standards in ancient times

**Length standard: “Cubit” - Length of Pharaoh’s forearm
plus the width of his palm (3000 B.C.)**

Accuracy: 0.05 % over 230 meters

Primary standard: Granite

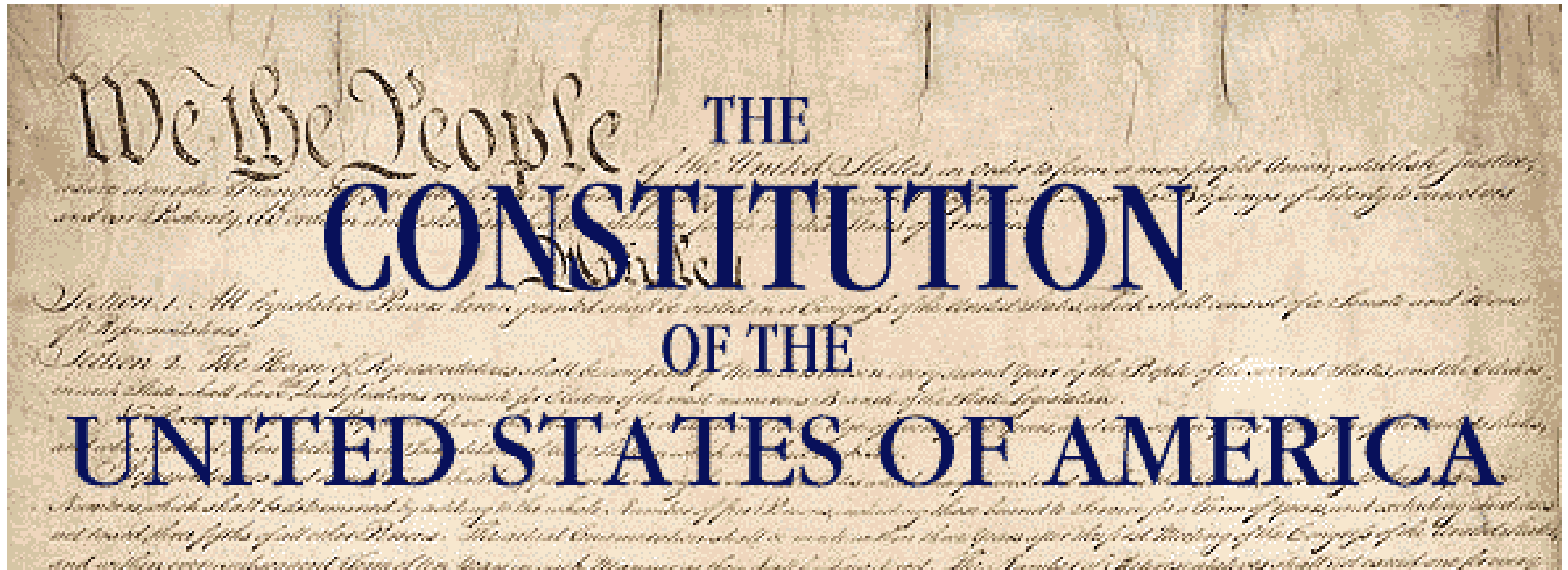
Transfer standard: Granite or wood

Enforcement: Death for noncompliance

Long term stability: Questionable!



Constitutional authority in 1788

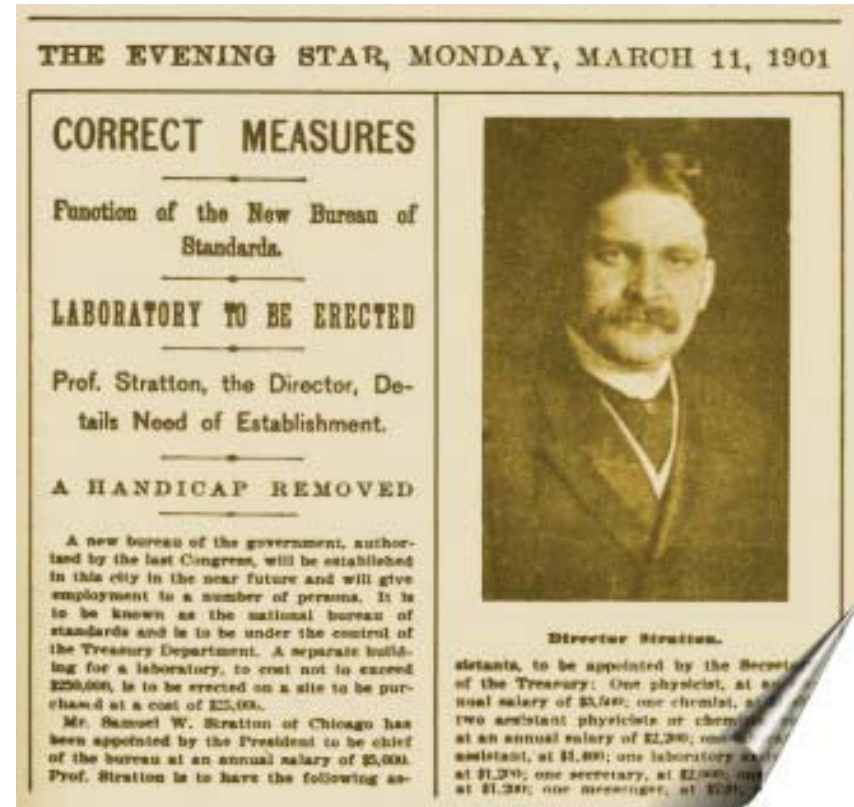


Article I, Section 8: The Congress shall have the power to ...*coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures*

NBS established in 1901

“It is therefore the unanimous opinion of your committee that no more essential aid could be given to **manufacturing, commerce**, the makers of scientific apparatus, the **scientific work** of the Government, of schools, colleges, and universities than by the establishment of the institution proposed in this bill.”

*House Committee on Coinage,
Weights and Measures,
May 3, 1900,
on the establishment of the
National Bureau of Standards
(now NIST)*



Early drivers for standards and measurements



1904

Out-of-town fire companies arriving at a Baltimore fire cannot couple their hoses to the hydrants. 1526 buildings razed.

1905

Standard samples program begins with standardized irons.

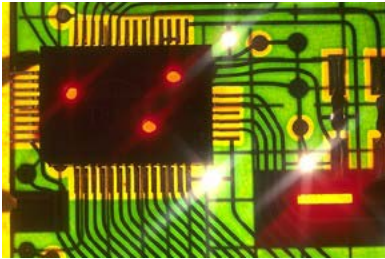


1912

41,578 train derailments in the previous decade lead to NBS measurement and test program

NIST provides innovation infrastructure to...

...advance manufacturing and services



**semiconductor
electronics**



**“lean manufacturing” of
plastics**



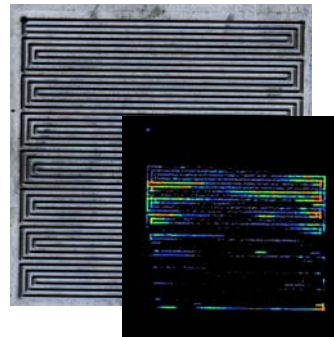
**automobile
manufacturing
interoperability**



pharmaceuticals



chemicals



**fuel cell
technology**



healthcare

NIST provides innovation infrastructure to...

...facilitate trade



**secure automated
banking**



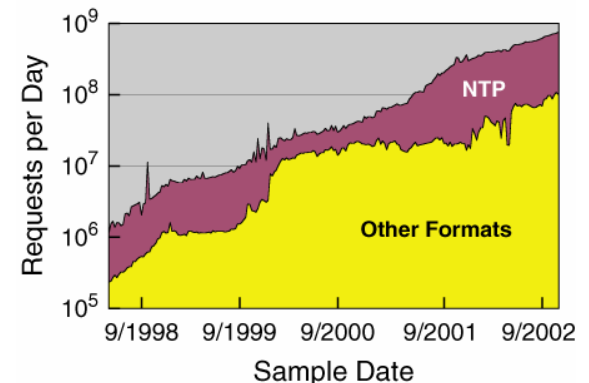
**volume and flow
standards**



**electric power
metering**



**international standards to
counteract TBTs**



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

NIST provides innovation infrastructure to...

...improve public safety and security



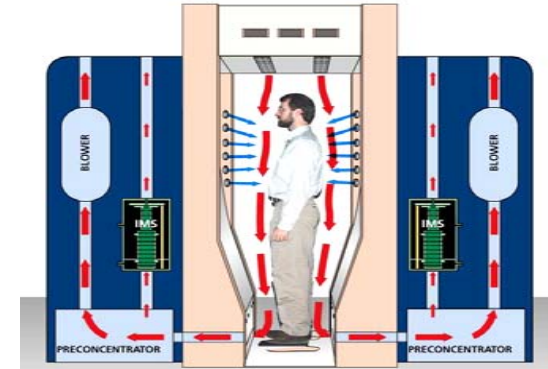
metal detectors



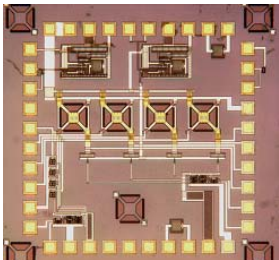
**wireless
interoperability
among first
responders**



**smoke
detectors**



**Trace explosives
detection portal**



**novel sensors to
detect gases**



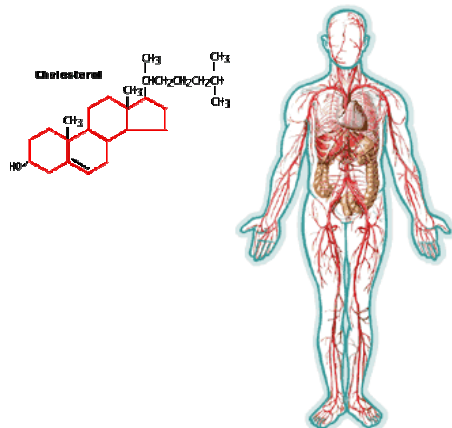
altimeter calibration

**standards for
body armor**



NIST provides innovation infrastructure to...

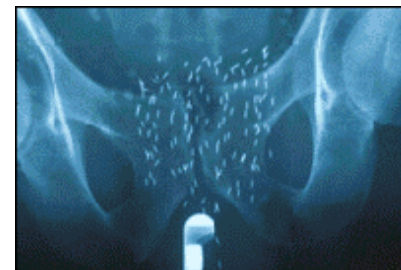
... improve quality of life and jobs



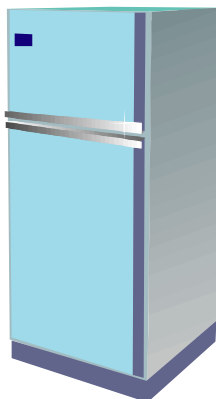
**cholesterol standard
reference material**



drinking water quality



**prostate and breast-
cancer treatment**

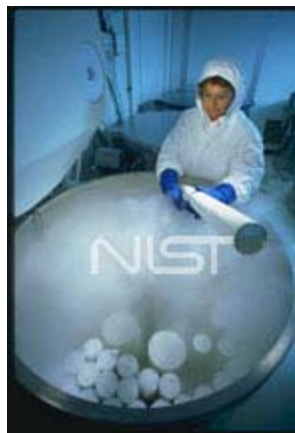


**database and
measurements
for alternative refrigerants**



**standards for sulfur
in fossil fuels**

NIST serves a broad customer base...



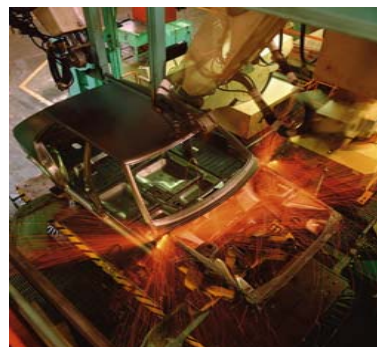
Environmental
Technologies



Manufacturing



Food and
nutrition



Transportation



Pharmaceuticals



Law
enforcement



Biotechnology



Computer software
and equipment



Construction



Microelectronics

...with many services and products



Calibration Services



Quality Guidelines



Standard Reference Data



Standard reference materials



Best Practices



Laboratory Accreditation

Did you know...

NIST services provide the basis for the fairness and efficiency of sales totaling more than \$5 trillion—roughly half of the U.S. economy?

3 - 6 % of the US GDP is tied to measurements and measurement-related operations that rely on NIST for accuracy, reliability, and international recognition?

58,000 types of Army equipment require “NIST traceable” calibrations that ensure performance and interoperability on the battlefield?

The United States spends more than \$1 trillion on health care, and 10 to 15 percent of that is associated with making measurements—NIST’s specialty?

US manufacturers of IVD products such as glucose and cholesterol test kits rely on NIST to meet European Union regulations. Otherwise, they would be shut out of the \$7 billion European market where they now have more than 60 % of the business?

Did you know...

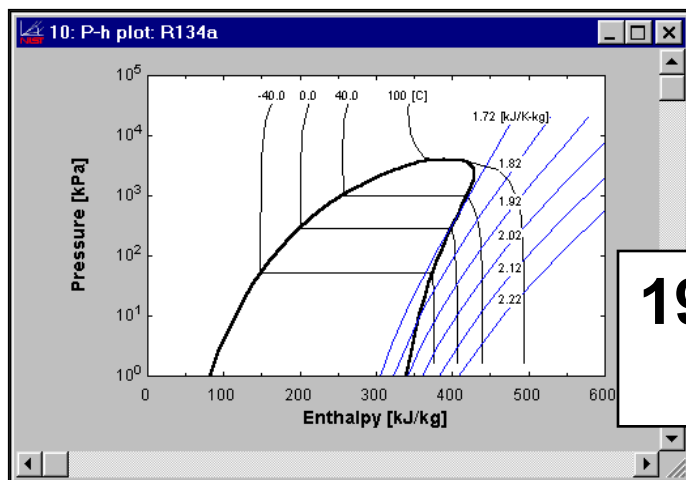
NIST contributions to encryption standards have saved private industry more than \$1 billion—and give consumers and businesses confidence about the billions of dollars of daily electronic transactions, including ATM withdrawals?

Based on analysis of past usage of measurement and standards in the semiconductor industry NIST estimates the industry current spending on measurement at 6-7 Billion dollars?

Recent studies of the annual costs of inadequacies in supply chain infrastructures to be in excess of \$5 billion for the automotive industry, almost \$3.9 billion for the electronics industry, and \$15.8 billion in the commercial buildings and industrial facilities sector?

Economic assessment of NIST programs

**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**

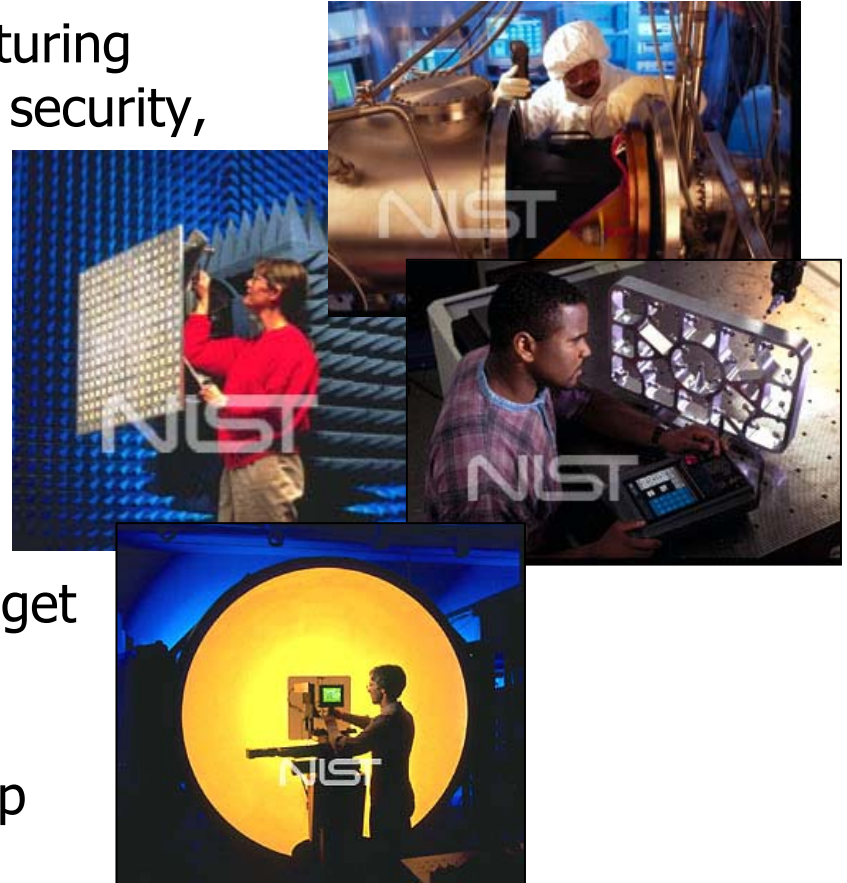


NIST mission and assets

NIST's mission is to strengthen the nation's innovation infrastructure for manufacturing and services, trade, public safety and security, quality of life, and jobs.

NIST assets include:

- 3,000 employees
- 1,600 associates
- \$771 million FY 2004 operating budget
- NIST Laboratories
- Advanced Technology Program
- Manufacturing Extension Partnership
- Baldrige National Quality Award

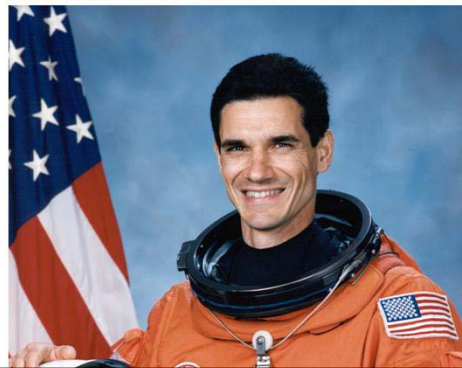


NIST has...

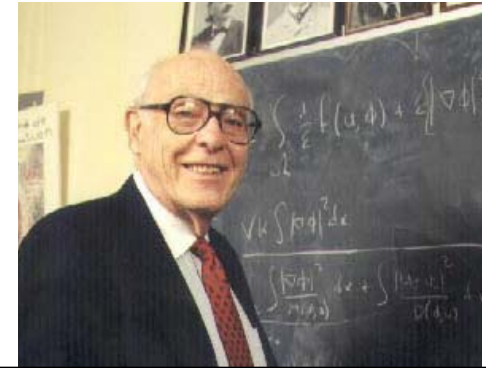
...world-class staff



Bill Phillips
*1997 Nobel Prize
in Physics*



Greg Linteris
2 Space Shuttle missions



John Cahn
*1998 National Medal of
Science*



Eric Cornell
*2001 Nobel Prize
in Physics*



Anneke Sengers
*2003 L'Oréal-UNESCO
Women in Science Award*



Debbie Jin
*2003 MacArthur
Fellowship*

NIST has...

...unique research facilities



**Advanced Measurement
Laboratory (2004)**

**Advanced Chemical Sciences
Laboratory (1999)**



**NIST Center for
Neutron Research**

NIST has...

...strong partnerships

Partnerships with industry, academia, and other government agencies have been an **integral part of NIST culture** since 1901.



National Institute of Standards and Technology

NIST

NIST has...

...strong partnerships



National Institute of
Standards and Technology

NIST

Bottom line: “Innovate or abdicate”

America’s enterprises, educational institutions, labor and public sector organizations and citizens must make innovation – across all sectors of business, society and government – the underlying strategic priority for ensuring the nation's economic strength and security.

Council on Competitiveness (2004)

“... we live in a competitive world ... We shouldn't take our preeminence as the world's greatest economy for granted. We've constantly got to make sure the economic environment here is strong. We've got to make sure that we're innovative.”

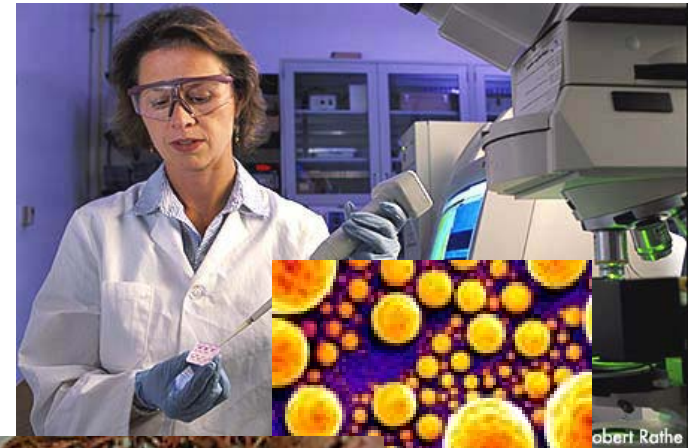
President G.W. Bush (April 5, 2004)

NIST enables the future...

by providing the innovation infrastructure to:

- **advance manufacturing and services**
- **facilitate trade**
- **enhance public safety & security**
- **improve quality of life and jobs**

...through effective partnerships with industry, academia, and other government agencies.



Robert R. R. R.

