Objectives for today's training

What are the steps taken to ensure international acceptance of NIST's measurement capabilities.

Why are quality systems important to the industries and entities that procure and use NIST's Measurement Services?

How does metrological traceability pertain to international acceptance of the NIST measurement deliverables?

What capacity building efforts are underway in SIM, the regional metrology organization of the Americas, and what is NIST's role in this activity?

(Become an expert in acronyms)

Definitions of Acronyms

- BIPM: Bureau International des Poids et Mesures
- CIPM: International Committee for Weights and Measures
- CGPM: General Conference on Weights and Measures
- ISO/IEC: the International Organization for Standardization, and the International Electrotechnical Commission
- JCRB: Joint Committee of Regional Bodies
- MRA: Mutual Recognition Arrangement (different from Agreement)
- NMI: National Metrology Institute
- SIM: Sistema Interamericano de Metrologia (Inter-american Regional Metrology Organization)

Why the International efforts matter

Sally Bruce, Quality Manager for NIST Measurement Services

as the National Metrology Institute

- Develop, maintain and realize the national (primary) standards of measurement (physical, chemical and biological)- establish metrological traceability
- Compare national measurement standards with those of other nations (for international recognition)
- Disseminate accurate, consistent and reliable measurements to its stakeholders
- Assist industry and other government agencies with their measurement needs
- Participate as technical experts in documentary standards activities

Components for the international recognition/approval of measurement capabilities

NIST has more than 2,000 capabilities listed in the KCDB and has participated in nearly 500 key comparisons.

Part of the NIST Organic Act

SECTION 2. ESTABLISHMENT, FUNCTIONS, AND ACTIVITIES (15 U.S.C. 272)

"(b) (5) to provide United States industry, Government, and educational institutions with a national clearinghouse of current information, techniques, and advice for the achievement of higher quality and productivity based on current domestic and international scientific and technical development;

(9) to assure the compatibility of United States national measurement standards with those of other nations;

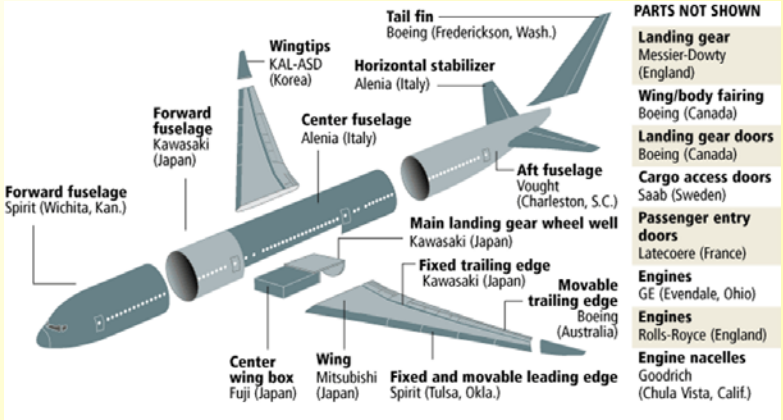
(10) to cooperate with other departments and agencies of the Federal Government, with industry, with State and local governments, with the governments of other nations and international organizations, and with private organizations in establishing standard practices, codes, specifications, and voluntary consensus standards;

(c) (5) cooperate with foreign scientific and technical institutions to understand technological developments in other countries better;"

SECTION 17. INTERNATIONAL ACTIVITIES (15 U.S.C. 278g)

What Does U.S. Industry Need in the Global Marketplace?

- Sound measurement and standards infrastructures to support trade
- Scientific and technical infrastructure to support innovation
- Global product and service acceptance
- Transparent regulatory regimes in target markets
- Supply chain interconnectivity and interoperability
- Favorable or level playing field in Intellectual Property (IP)
- Skilled technical work force



What Can/Does NIST Provide?

- Measurements and traceability in global framework
- Promotion of U.S. approach on measurements and technology
- Technical input into documentary standards development and test methods
- Policy direction for documentary standards
- Outreach and training
- Alignment of scientific, technological and metrological activities with U.S. foreign policy objectives
- Leadership in research on measurements for emerging technologies

Why do we do this?

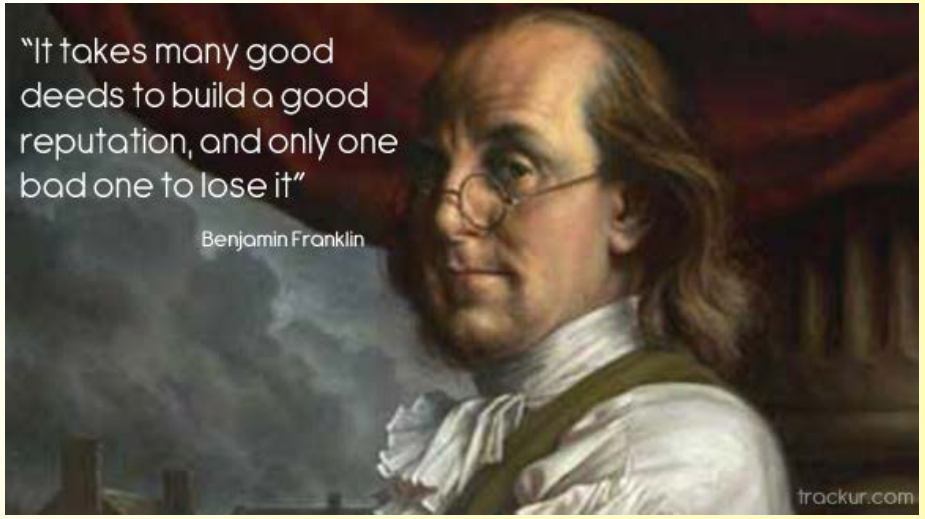
- Measurement traceability enables trade and supports manufacturing
- International approach brings robustness and validity to measurements and supports legal and regulatory requirements
- Measurements are critical to Innovation
  - If you know how to measure something, you can design it, improve it, and compare it
  - Measurement science provides foundation for innovation in every industry and economic sector, from manufacturing to health care to defense

Providing technical assistance to developing National Metrology Institutes: Why do we do this?

- Build relationships, enhance diplomacy, foster markets
- Maintain leadership, keep and improve reputation, advance international goals

In 2015, NIST hosted a total of 961 associates form 91 countries.

- Policy: Assignments must be based on the strategic interests of NIST and DOC. Outcomes must be mutually beneficial.

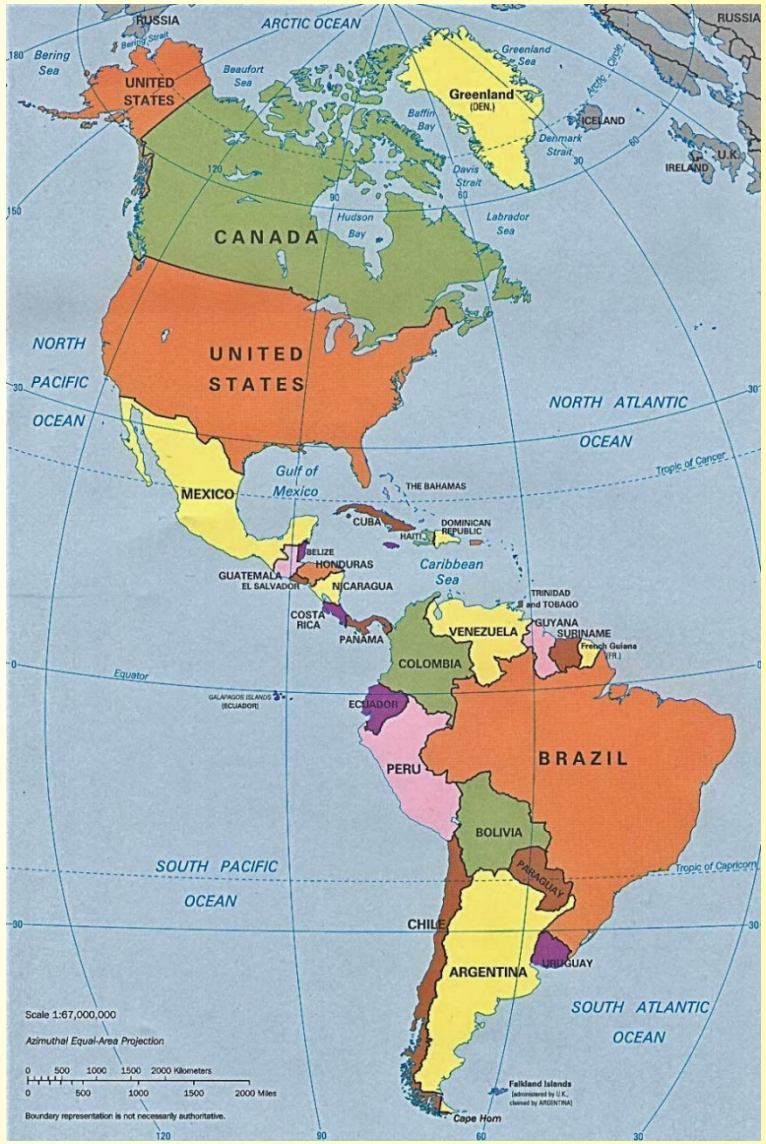


Sistema Interamericano de Metrología (SIM)

Membership: National Metrology Institutes (NMIs) located in the 34 member nations of the Organization of American States

Mission: Promote and support an integrated measurement infrastructure in the Americas that ensures equity in the marketplace, improves the quality of life and facilitates international trade.

International Role: Regional Metrology Organization (RMO) for the Western Hemisphere, within the framework of the International Committee on Weights and Measures Mutual Recognition Arrangement (CIPM MRA).



CERTIFICATE OF APPROVAL OF QUALITY MANAGEMENT SYSTEM

SIM
SISTEMA INTERAMERICANO DE METROLOGIA

CERTIFICADO DE APROBACIÓN DEL SISTEMA DE GESTIÓN DE LA CALIDAD

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

TIME AND FREQUENCY

The Quality Management System supporting the above capabilities has been reviewed under the authority of the Inter-American Metrology System and found to be in compliance with the requirement of the CIPM Mutual Recognition Arrangement to operate a Quality Management System based on ISO/IEC 17025 and /or ISO Guide 34.

El Sistema de Gestión de la Calidad en que se apoyan las capacidades arriba mencionadas ha sido evaluado bajo los términos del mandato del Sistema Interamericano de Metrología y se ha determinado que cumple con los requisitos del Acuerdo de Reconocimiento Mutuo del CIPM de implementar un Sistema de Gestión de la Calidad basado en la norma ISO/IEC 17025 y/o ISO Guia 34.

(acting)

President, SIM

Chair, SIM Quality System Task Force

Approval date: November 2015
Expiry date: November 2020

NIST Role: SIM

- **NIST supported efforts**
  - Manage 2 OAS supported Projects
  - SIM School (October 2013)
  - SIM Guest Researchers/Workshops
  - Calibrations/SRMs
  - Training 2016:
    - Fundamentals of Metrology
    - Temperature
    - Dimensional
    - Time and Frequency
    - Chemical Metrology
    - Photometry and Radiometry
- **NIST "Governing" Roles**:
  - QSTF Chair (Council Member and Member of SIM JCRB Delegation)
  - Project Coordinator, (Council Member)
  - MWG Chairs: Photometry and Radiometry; Ionizing Radiation; Statistics and Uncertainty

NIST REPRESENTATIVES TO SIM METROLOGY WORKING GROUPS

METROLOGY WORKING GROUP (MWG)	REPRESENTATIVE	DIVISION
1- Electricity and Magnetism	Rand Elmquist	Quantum Measurement
2- Photometry and Radiometry	Maria Nadal+	Sensor Science
3- Thermometry	Karen Garrity	Sensor Science
4- Length	Jack Stone	Engineering Physics
5- Time and Frequency	Michael Lombardi	Time and Frequency
6- Ionizing Radiation and Radioactivity	Lisa Karam+	Radiation Physics
7- Mass and Related Quantities	Patrick Abbott	Quantum Measurement
8- Chemistry (Amount of Substance)	Katrice Lippa	Chemical Science
9- Acoustics, Ultrasound and Vibration	Michael Gaitan	Engineering Physics
10- Flow and Volume	John Wright	Sensor Science
11- Legal Metrology	Charles Ehrlich & Maria Nadal	Office of Weights and Measures
12- Quality System	Sally Bruce	Standards Coordination Office
13- Statistics and Uncertainty	Antonio Possolo+	Statistical Engineering

+ indicates their role as Chair