



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

# How the Mutual Recognition Arrangement Among National Metrology Institutes Supports Laboratory Accreditation

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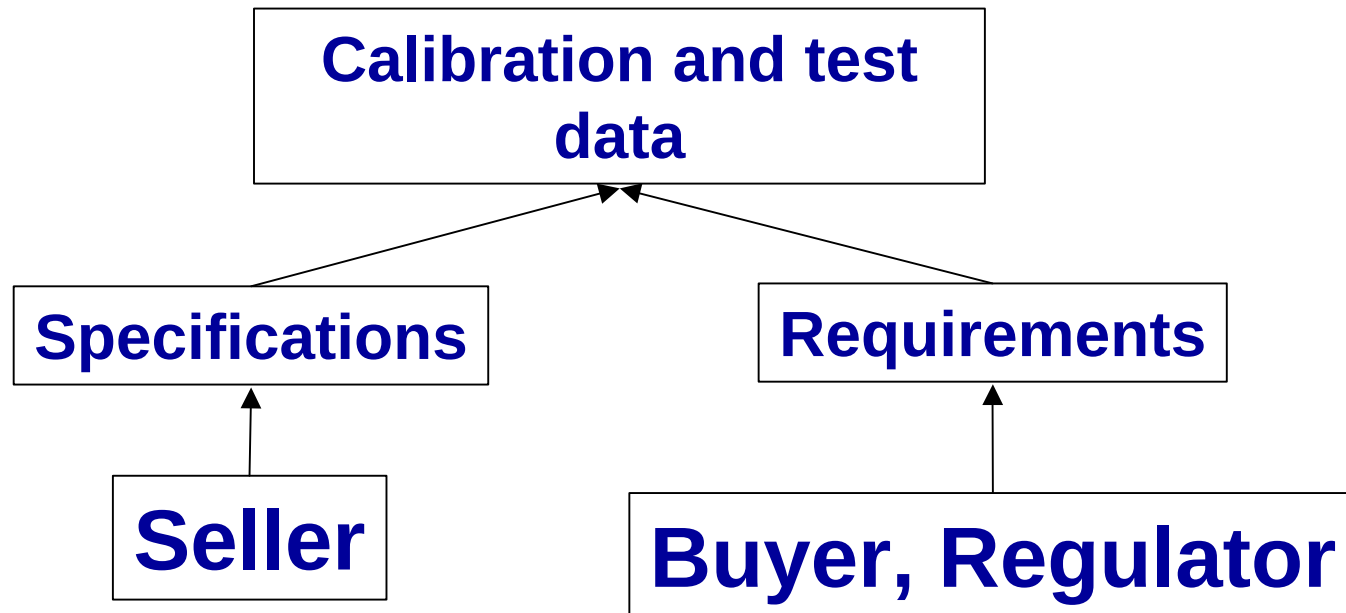
ILAC 2000 Conference

October 30, 2000

## Talk Outline

- Trade and laboratory accreditation
- ILAC and the ILAC Multilateral Arrangement
- Traceability and comparability of National Metrology Institutes (NMIs)
- Motivation for International Committee of Weights and Measures (CIPM) Mutual Recognition Arrangement (MRA)
- Highlights of the CIPM MRA
- Prospects for Global Trade

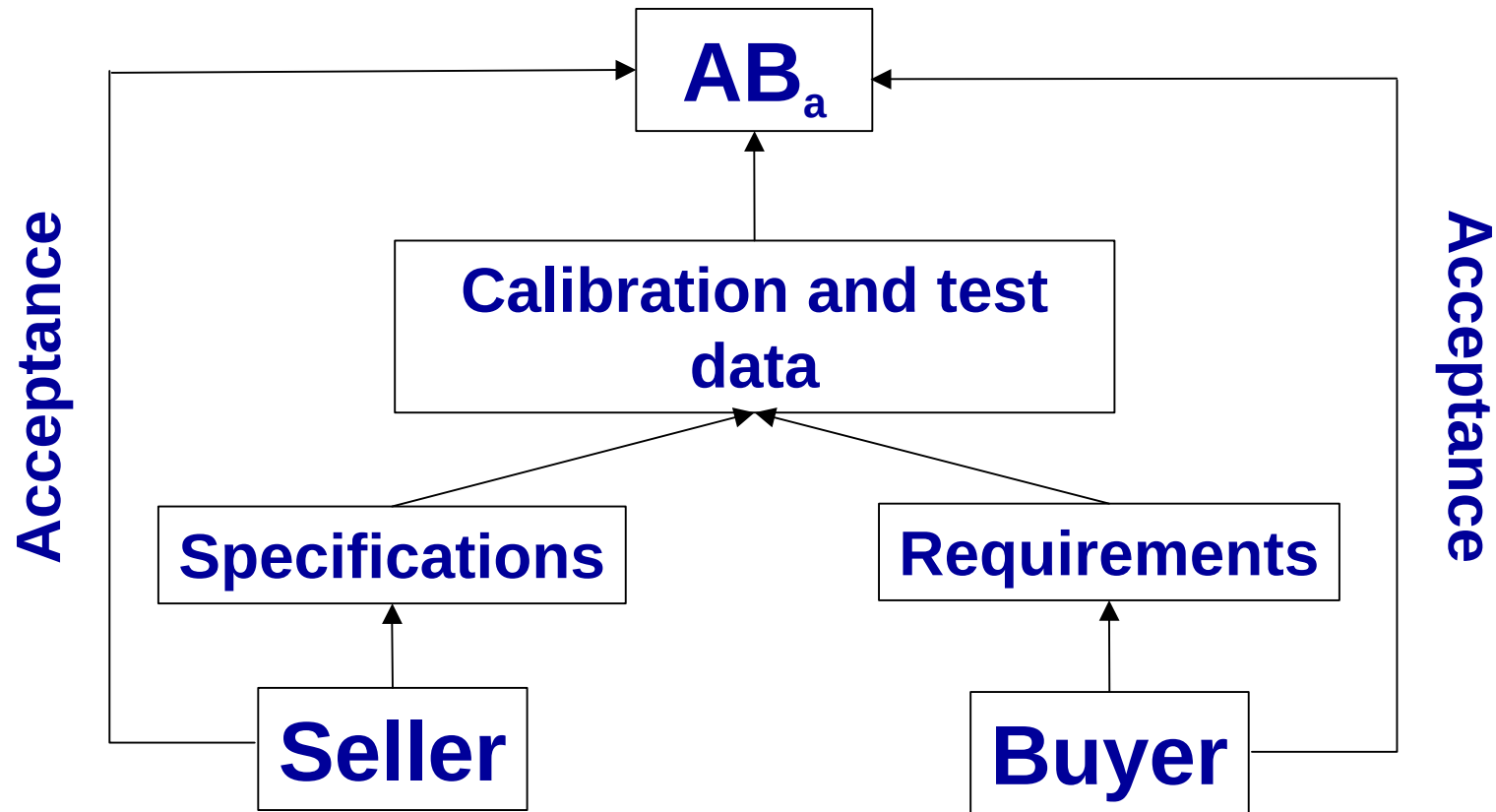
# Mutual Acceptance of Laboratory Data



# Laboratory Accreditation Model

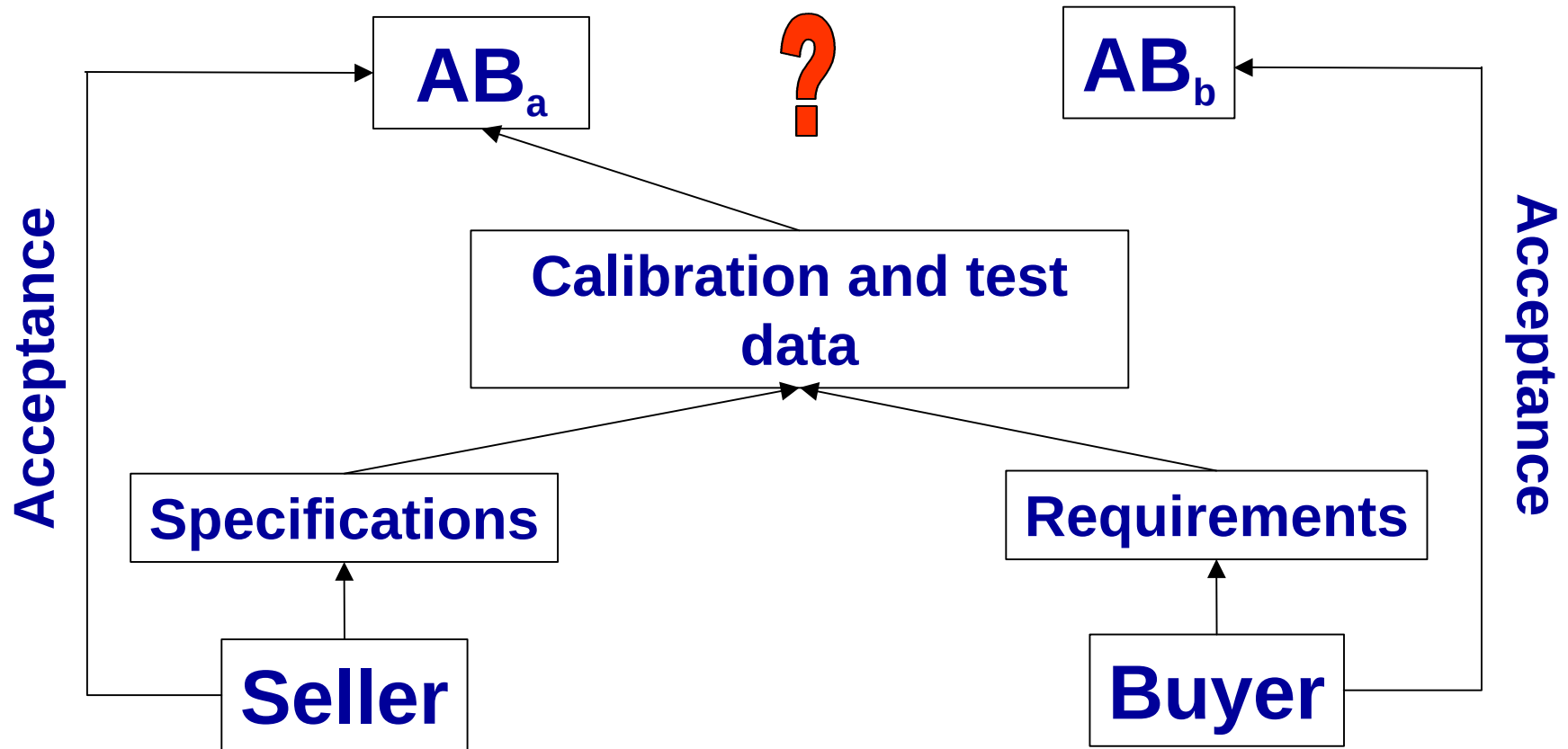
- **Confidence** in the capability of a laboratory as determined through evaluation by an accreditation body according to ISO/IEC 17025
  - Organization/management
  - Quality system/personnel
  - Equipment/environmental conditions
  - Test & calibration methods and method validation
  - Demonstrated traceability to NMI
- **Confidence** extended through MRAs among accreditation bodies

# Common Accreditation Body



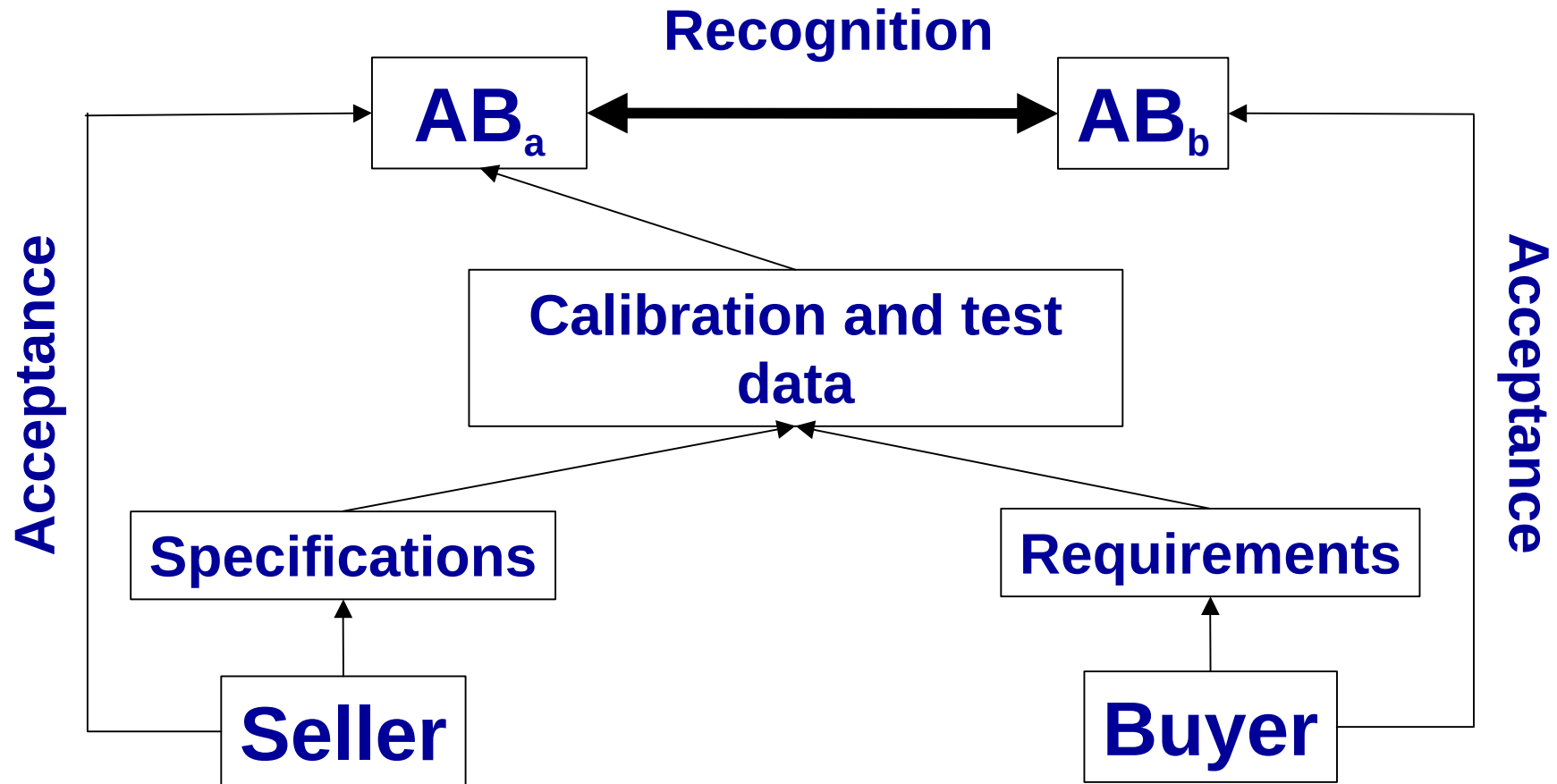
AB: Accreditation Body

# Different ABs



AB: Accreditation Body

# AB MRAs Bridge the Gap



AB: Accreditation Body

## ILAC

- Founded as a Conference in 1977 to promote understanding of principles of sound laboratory operation and use of laboratory accreditation to ensure confidence in laboratory data
- Strong support from U.S. Department of Commerce
- Formalized as a Cooperation in 1996
  - 44 National Bodies signed Memorandum of Understanding



## ILAC Multilateral Arrangement

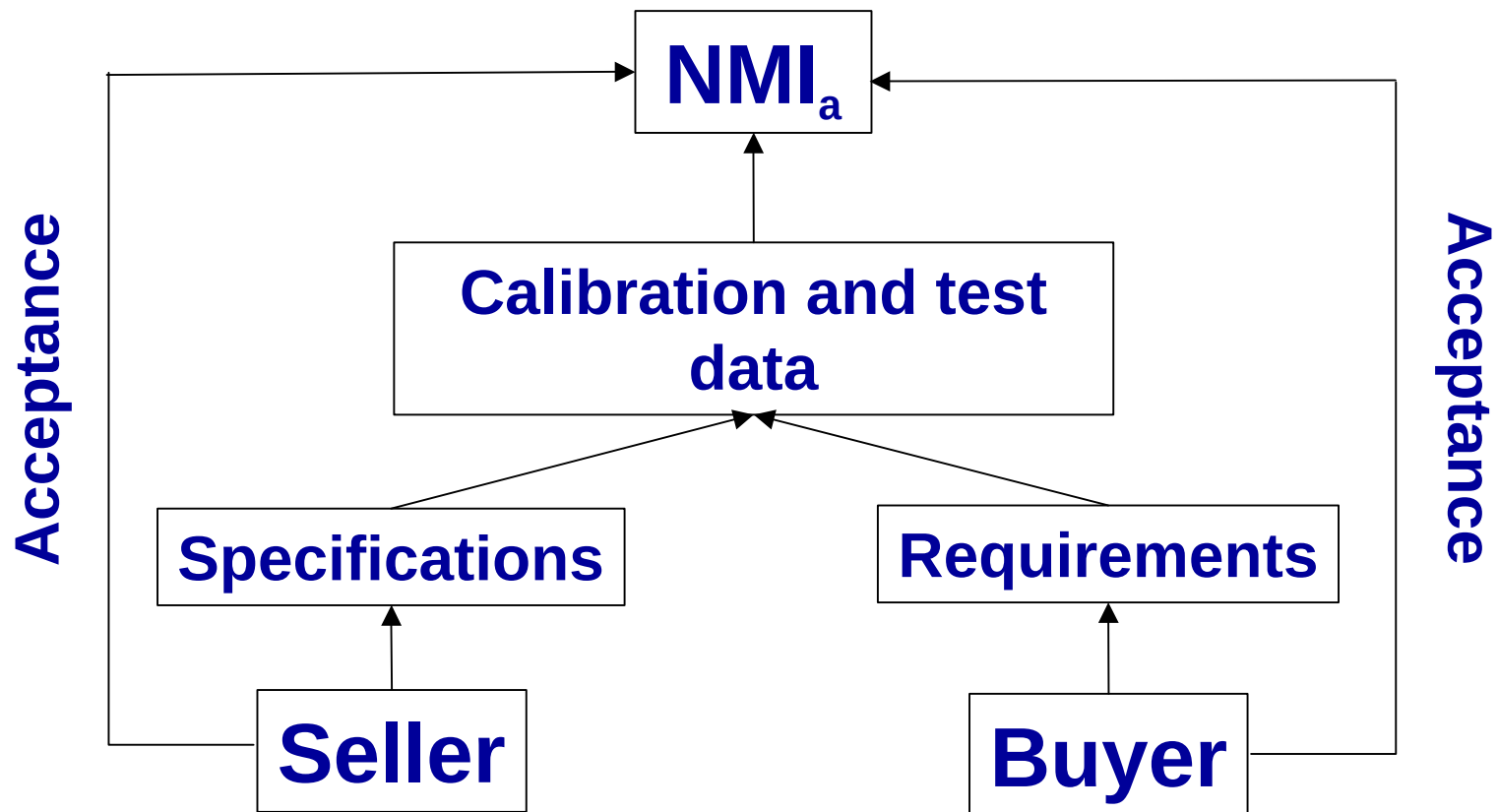
- Evaluation of competence of member/regional accreditation bodies for compliance with internationally agreed upon criteria
- Recognition provides confidence that:
  - members use international procedures appropriately
  - laboratory data are sound and are traceable to NMIs with known uncertainties at all levels
  - procedures for on-going surveillance, including proficiency testing, are in place
- Confidence eliminates the need for additional retesting, thus lessening technical barriers to trade

## *Confidence the Key to Acceptance*

- Laboratory accreditation
  - Capable and competent laboratories
  - Assurance of the validity of calibration and test data
- Mutual recognition through MRAs (e.g., ILAC)
  - Equivalence of calibration and test data

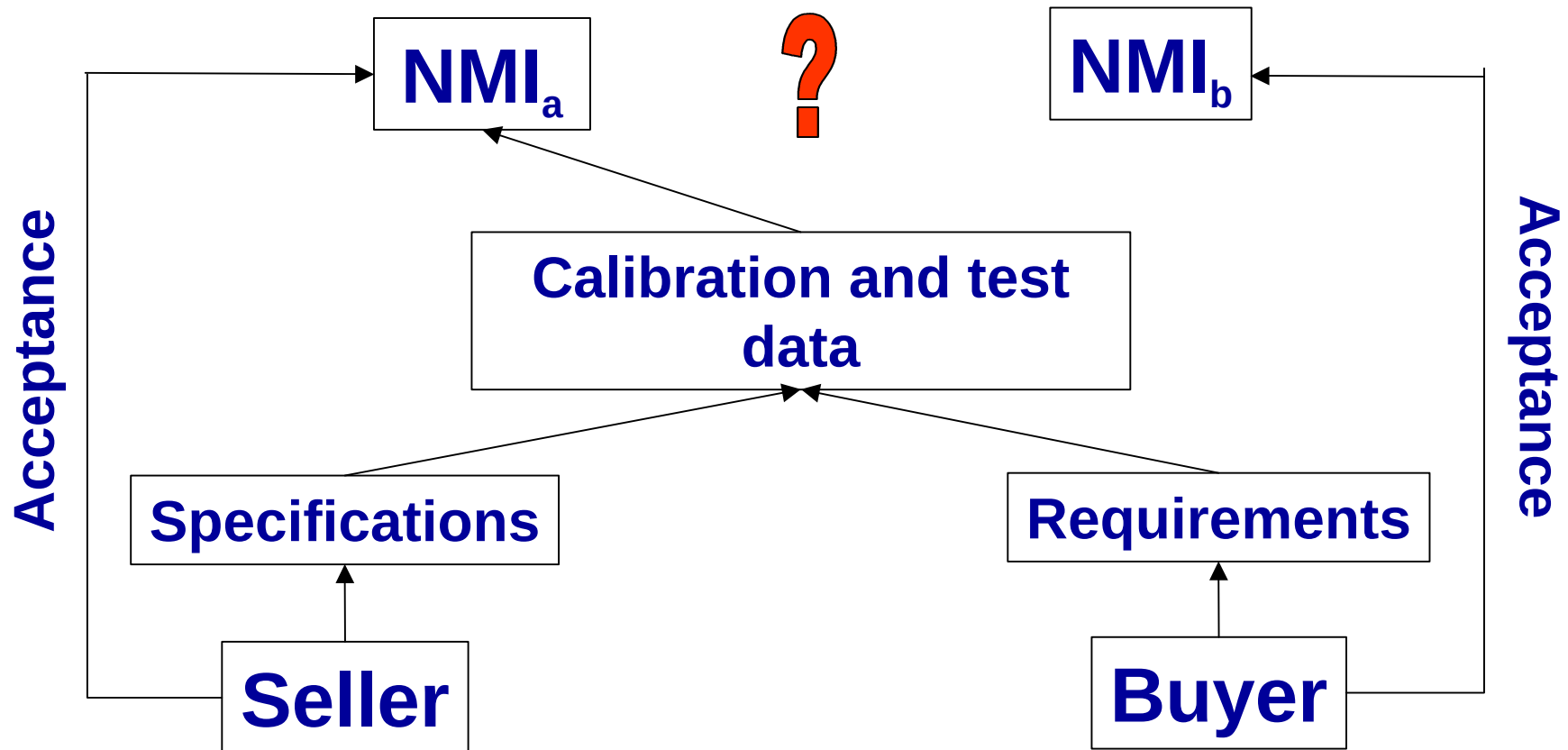
*BUT* the validity of calibration and test data  
requires traceability of measurement results to  
NMIs....

# Common NMI



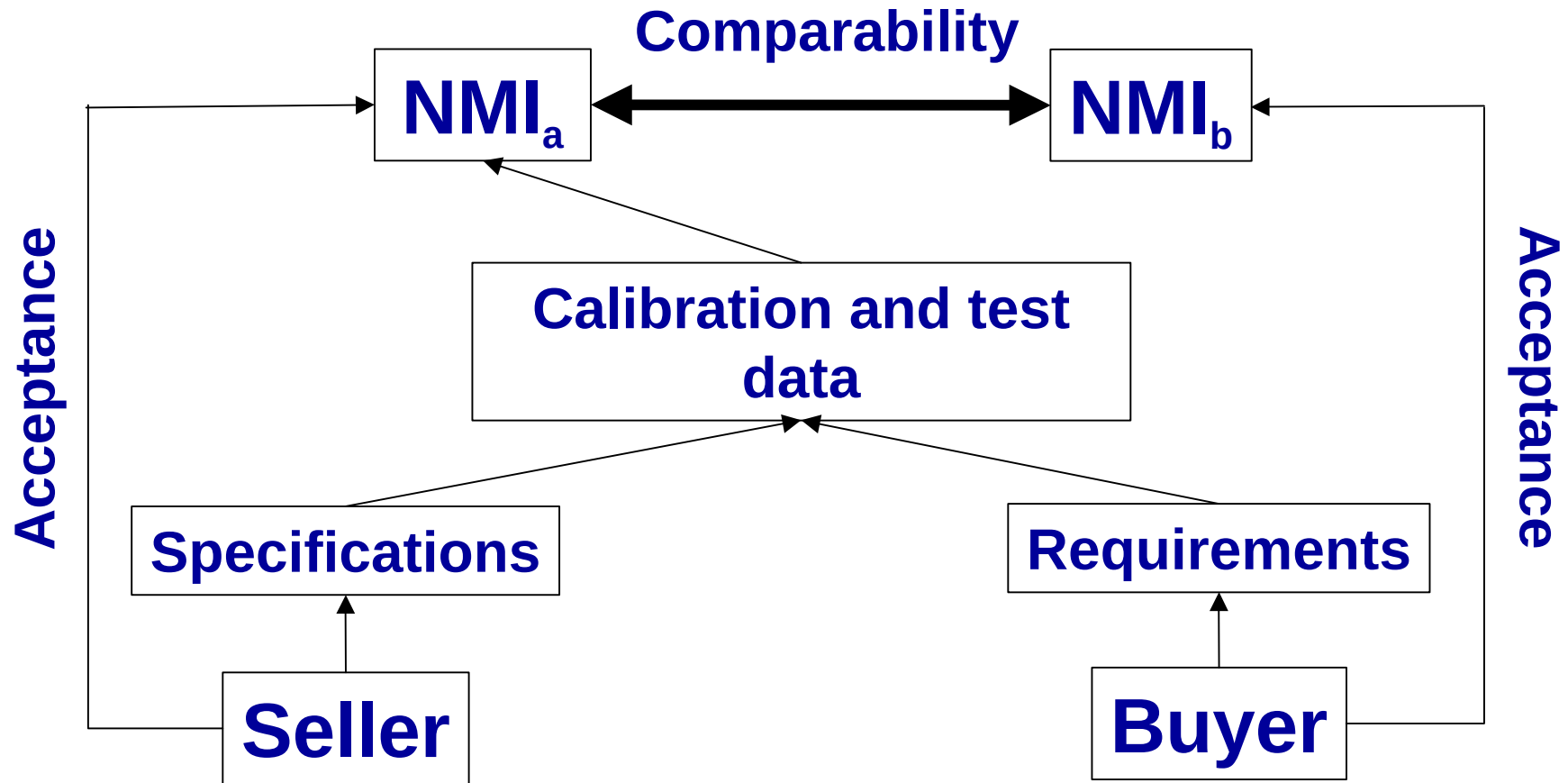
NMI: National Measurement Institute

## Different NMIs



NMI: National Measurement Institute

# CIPM MRA Bridges the Gap



NMI: National Measurement Institute

## **International Comparability Assurance – the Old Way**

- Participants largely comprising the 48 Meter Convention signatories
- Comparisons carried out by NMIs driven by academic “push” for the best metrology
  - uneven participation, metrological coverage, analysis, and access to results
- Historically “good feeling” about how well NMIs agree

# International Comparability Methods Must Change

- Continuing expansion of national and regional metrology systems (beyond the 48 Meter Convention signatories)
- Need for more rapid turn-around in comparability exercises to match product life-cycles
- Emerging agreement that comparison measurement data shall serve as the basis for mutual recognition of national standards and calibrations
- Recognition that users of calibration and test data need a formal basis for evaluating the degree of equivalence of measurement results traceable to different NMIs

# CIPM MRA

## Objectives:

- Establish the degree of equivalence of national measurement standards maintained by NMIs
- Provide for the mutual recognition of calibration and measurement certificates issued by NMIs
- Provide a secure technical foundation for wider agreements related to international trade, commerce, and regulatory affairs
  - Assure that results traceable to different NMIs can be accepted across borders



## CIPM MRA (cont.)

### Process:

- International comparisons of measurements, to be known as key comparisons
- Supplementary international comparisons of measurements
- Quality systems and demonstration of competence by NMIs

### Outcome:

- Statements of the measurement capabilities of each NMI in a publicly available database
- All users of test and calibration data know the extent to which NMIs are comparable

# Principal MRA Components

## Appendix B

### Comparisons

- Metrology areas
- Protocol specifications
- Participants
- Measuring conditions
- Results and uncertainties

## Appendix C

### Capabilities

- Measurement or calibration area
- Applicable range
- Uncertainties attainable
- Means of traceability to the SI

Recorded in the BIPM MRA Database  
originally developed by NIST (<http://icdb.nist.gov>)  
and maintained by the BIPM (<http://kcdb.bipm.fr/BIPMKCDB/>)

# **Recognition of Calibration and Measurement Certificates: Requirements for Mutual Confidence**

- Successful participation by each NMI in key and supplementary comparisons
- The operation by each NMI of a suitable way of assuring quality in the results of its calibration and measurement services

# Prospects for Global Trade

## Together the CIPM MRA and ILAC Arrangement

- provide confidence in the accuracy and reliability of measurement results
  - through laboratory accreditation based on international standards, traceability of measurement results to NMIs, and comparability of NMIs
- provide buyers and regulators with a strong framework for accepting measurement results across borders
- provide a secure technical foundation for wider agreements related to international trade, commerce, and regulatory affairs

## *BUT* CIPM and ILAC need to strengthen the links

- between the CIPM MRA and ILAC Arrangement
- between the CIPM MRA and ILAC Arrangement and acceptance by buyers and regulators of test reports and calibration and measurement certificates