National & International

Metrology Infrastructure

as part of a
Quality Infrastructure
(Metrology Standards Testing Quality)

1. NML Stakeholder Workshop with Calibration Laboratories
31 January 2013
NML/ Philippines

Dr.-Ing. Clemens Sanetra
PTB Technical Cooperation

Global agreements for Free Trade

WTO
FTA's

ISO / IEC /
CODEX / OIML

Regulations

Standardization

Metrological
Traceability

Accreditation

BIPM
CIPM

ILAC
IAF

Why strengthening the National Metrology Infrastructure?

Two important fields of application:

Economic Development (non-regulated)

Competitive products

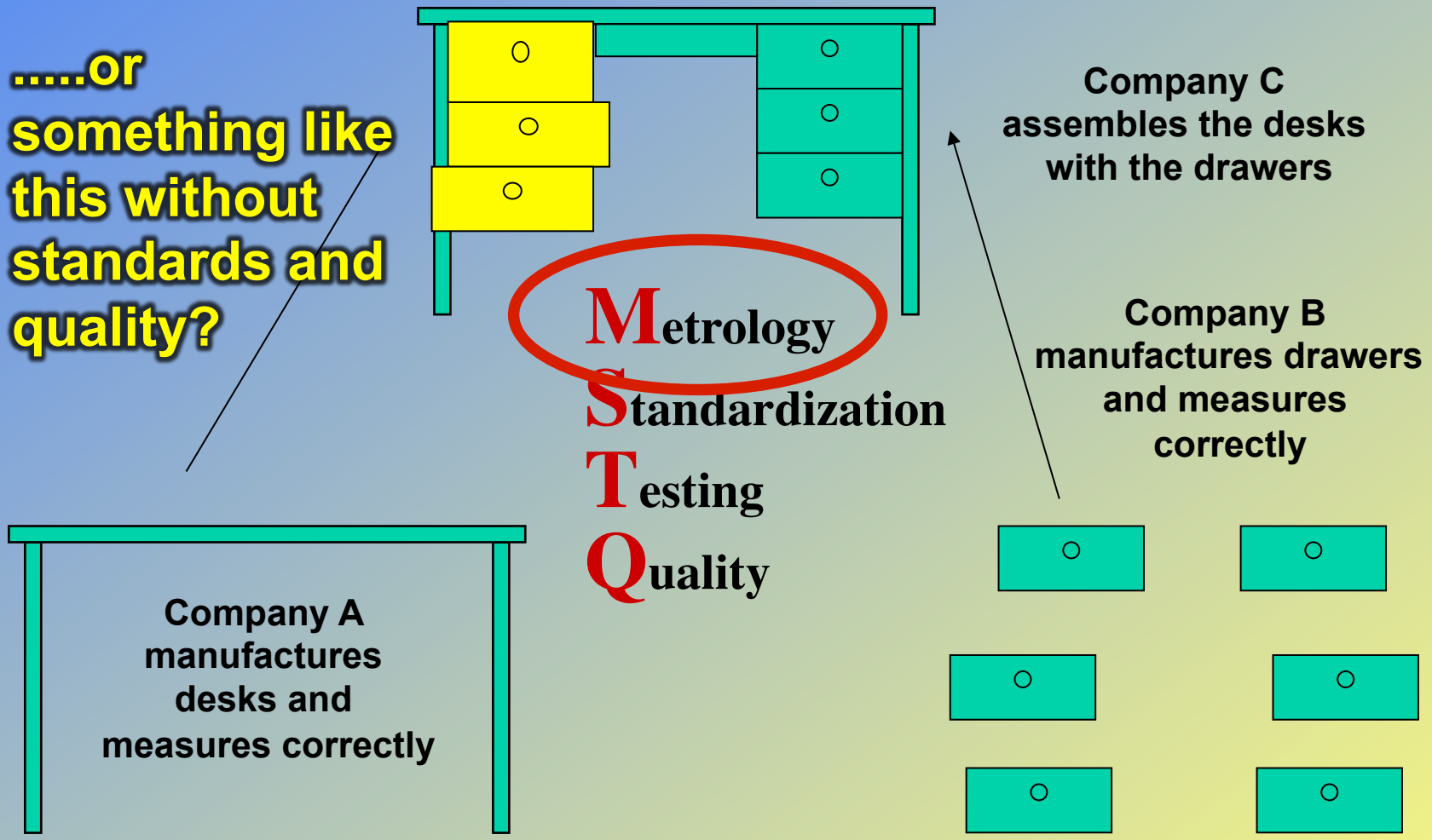
- ***in national markets***
- ***in international markets***

Protection (regulated)

Conformity assessment in the fields of

- ***health***
- ***security, safety***
- ***environment***

Requirements for successful globalization !



Requirements for successful globalization !

Company A manufactures bottles and labels, etc.

Metrology
Standardization
Testing
Quality

Company C processes and packages the milk

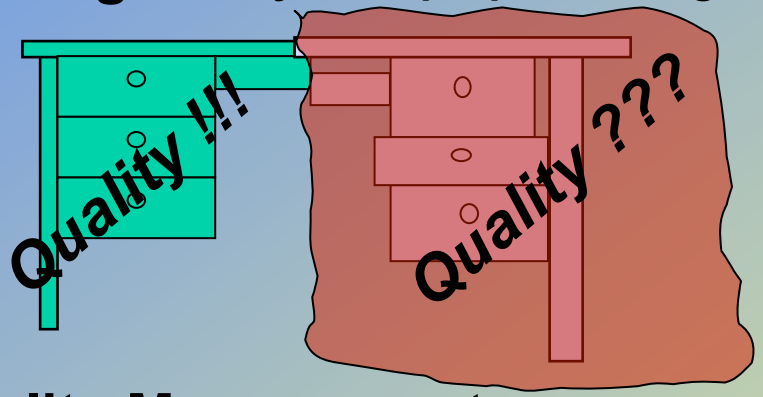
Company B produces fresh milk

Technical Quality Infrastructure

Standardization = Definition of properties, dimensions, tolerances, etc.

Metrology = Guarantee of exact and reliable measurements

Testing = Analysis of properties, ingredients, characteristics, etc.



Quality Management = Reliable application of quality standards

↳ **C**ertification = Conformity with requirements defined in standards

↳ **A**ccreditation = Recognition of **technical competence**

Technical Quality Infrastructure

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? ? **M**etrology = Guarantee of exact and reliable measurements

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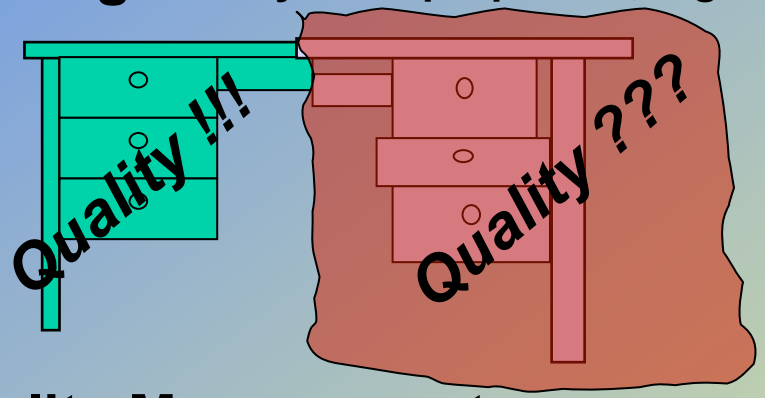

Quality Management = Reliable application of quality standards

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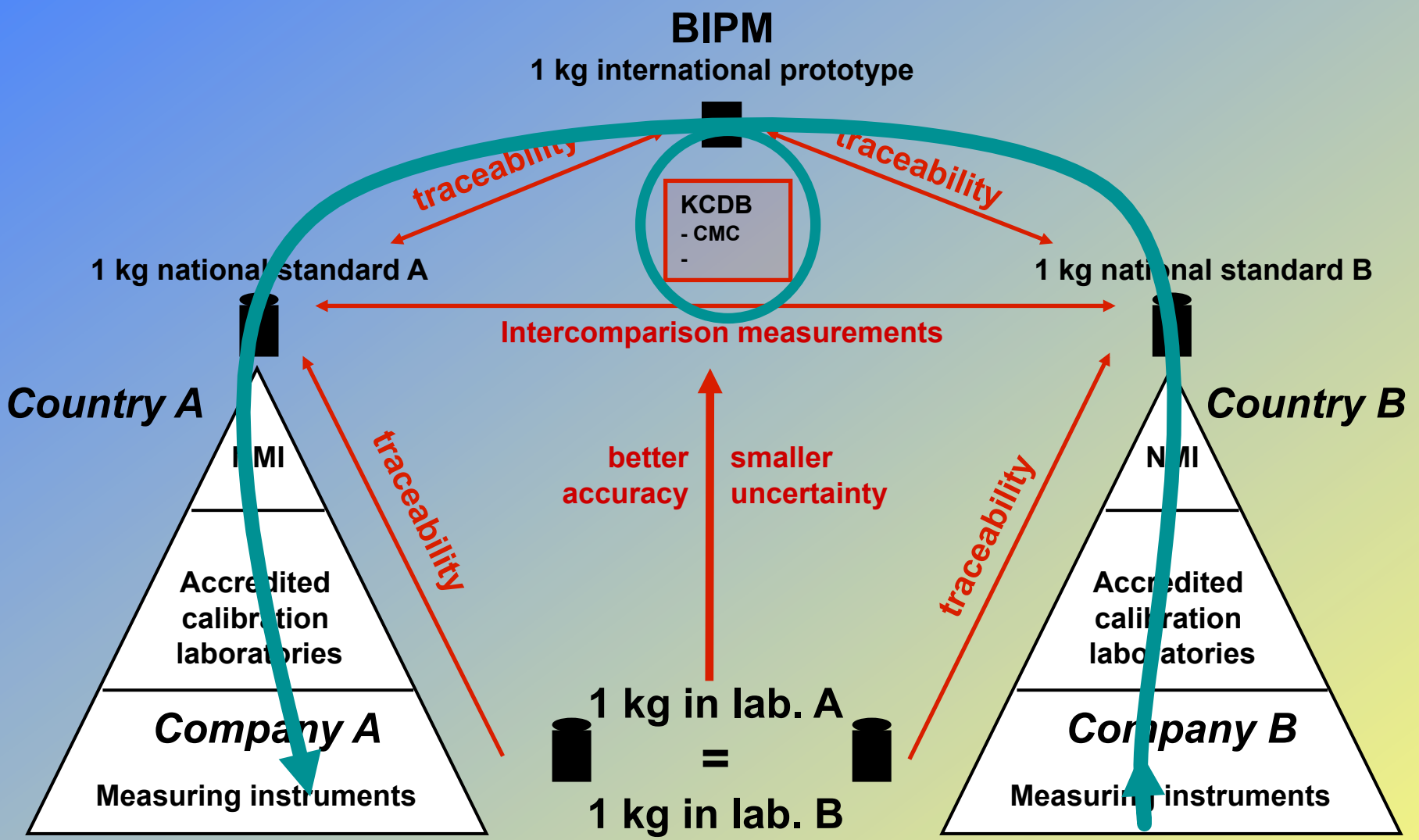
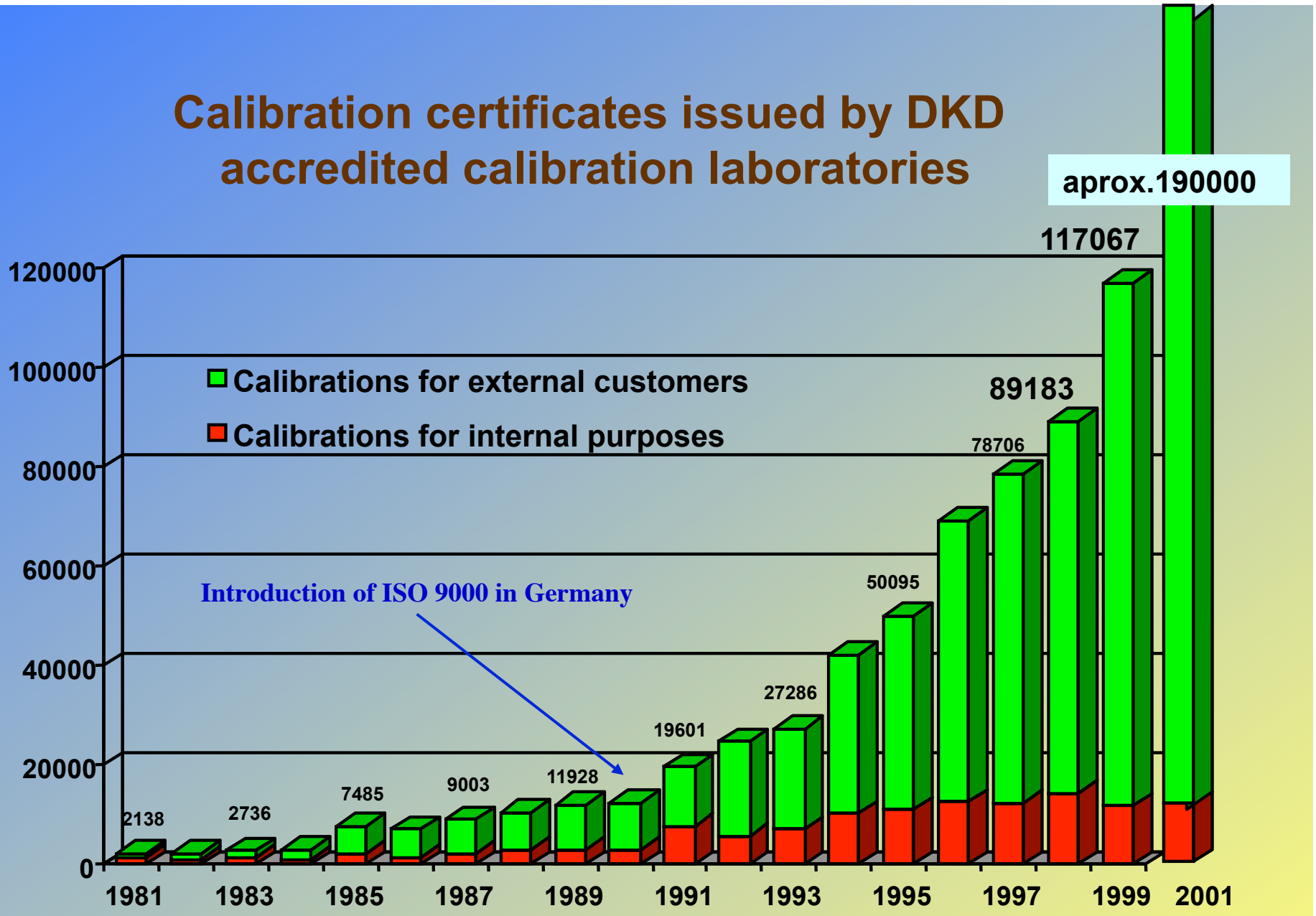
How to assure, that 1 kg in company A in any country weighs exactly the same as 1 kg in company B in Germany ?



BIPM = International Bureau of Weights and Measures, KCDB = Key Comparison Data Base, CMC = Calibration and Measurement Capability

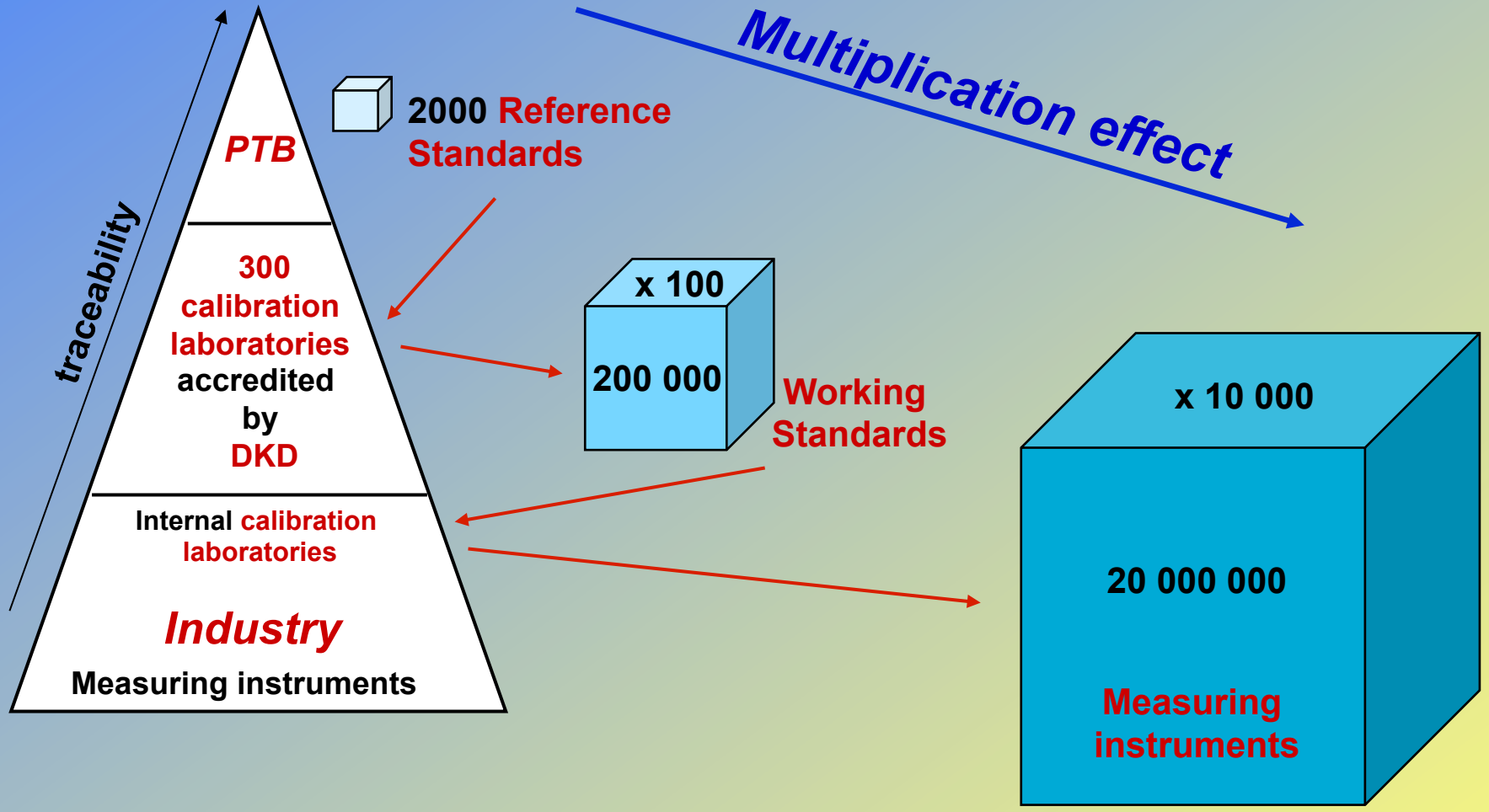
Calibration certificates issued by DKD accredited calibration laboratories

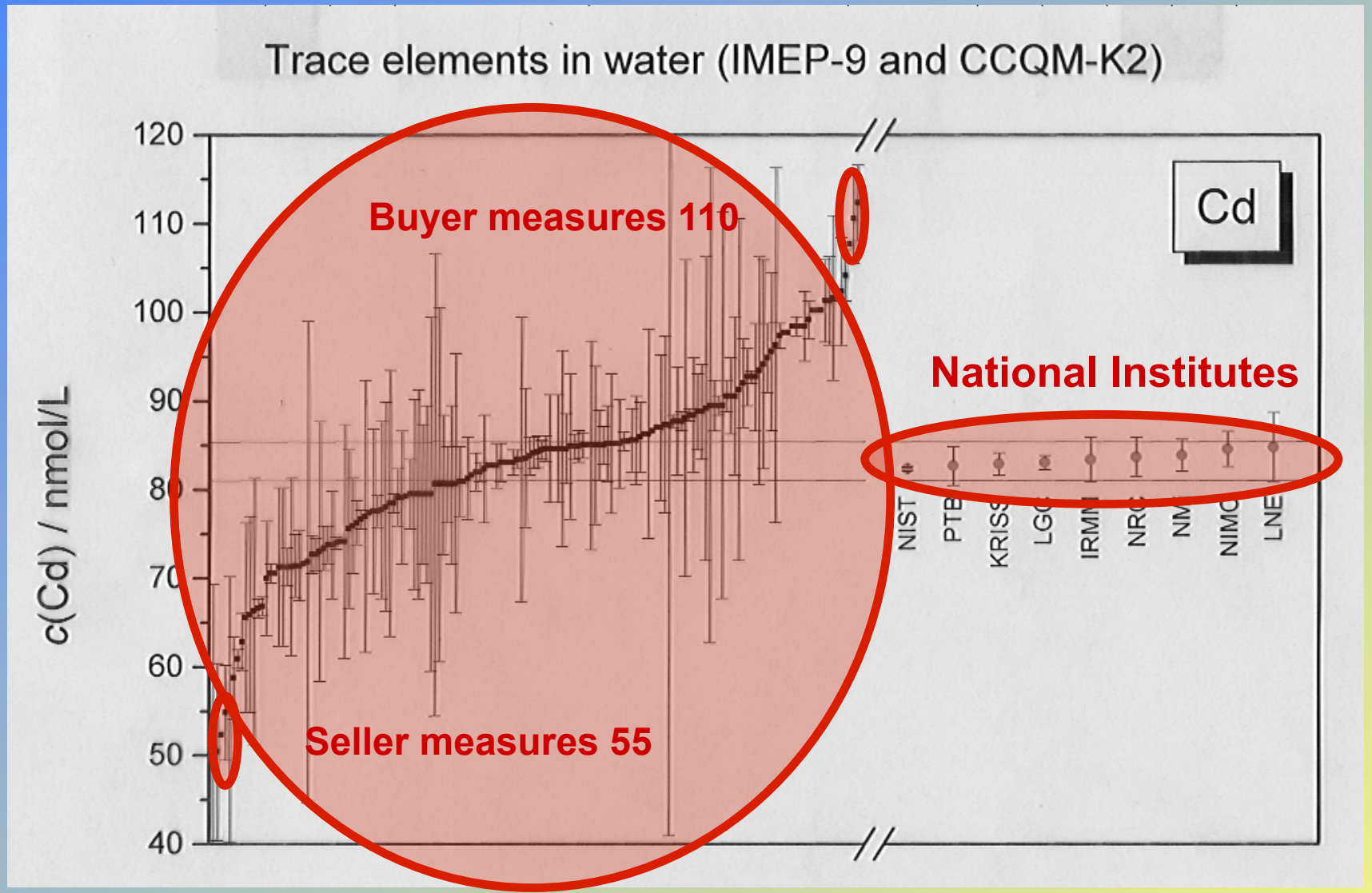


Source: PTB

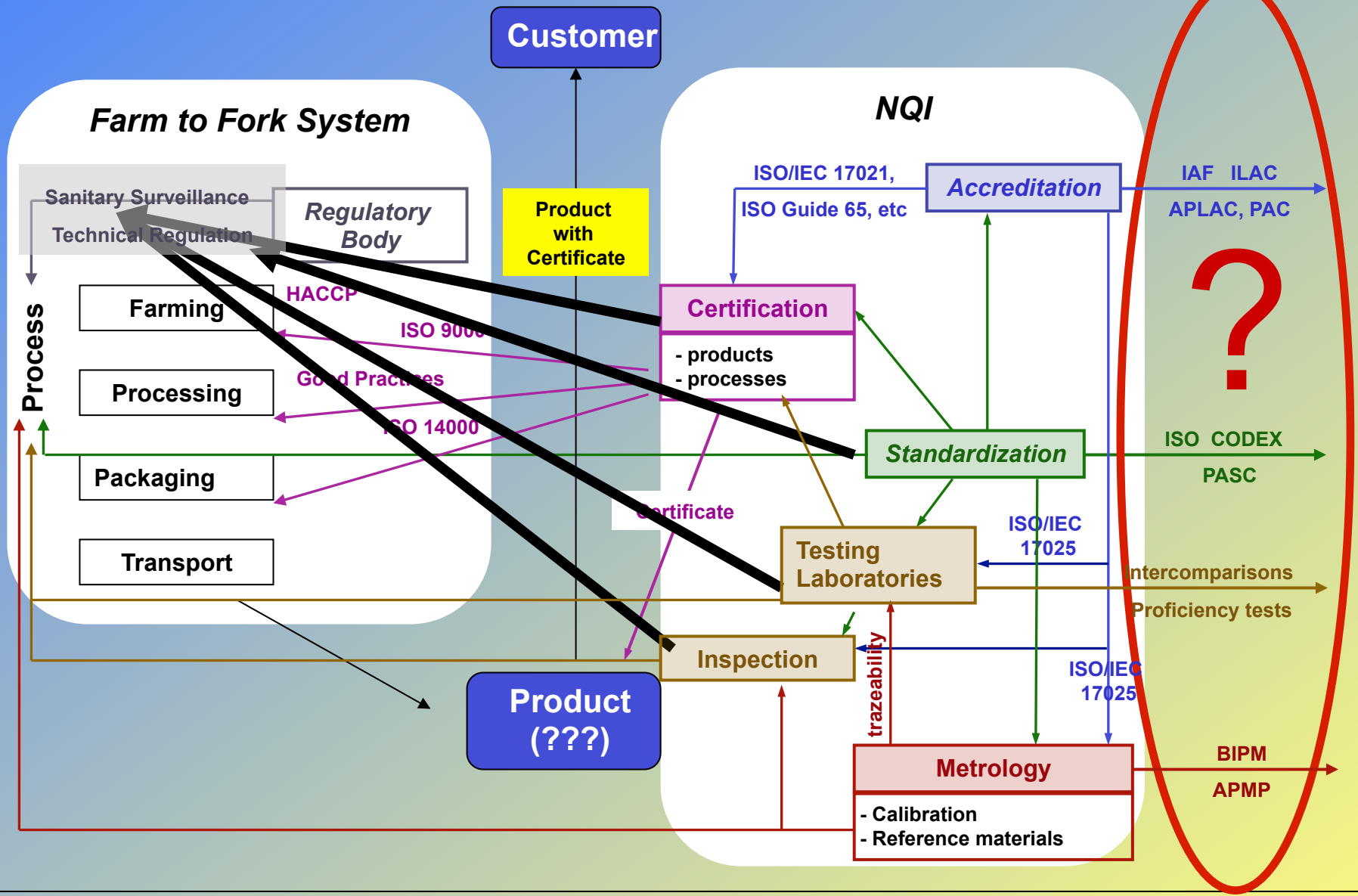
Metrological infrastructure in Germany

- Hierarchy of calibrations -

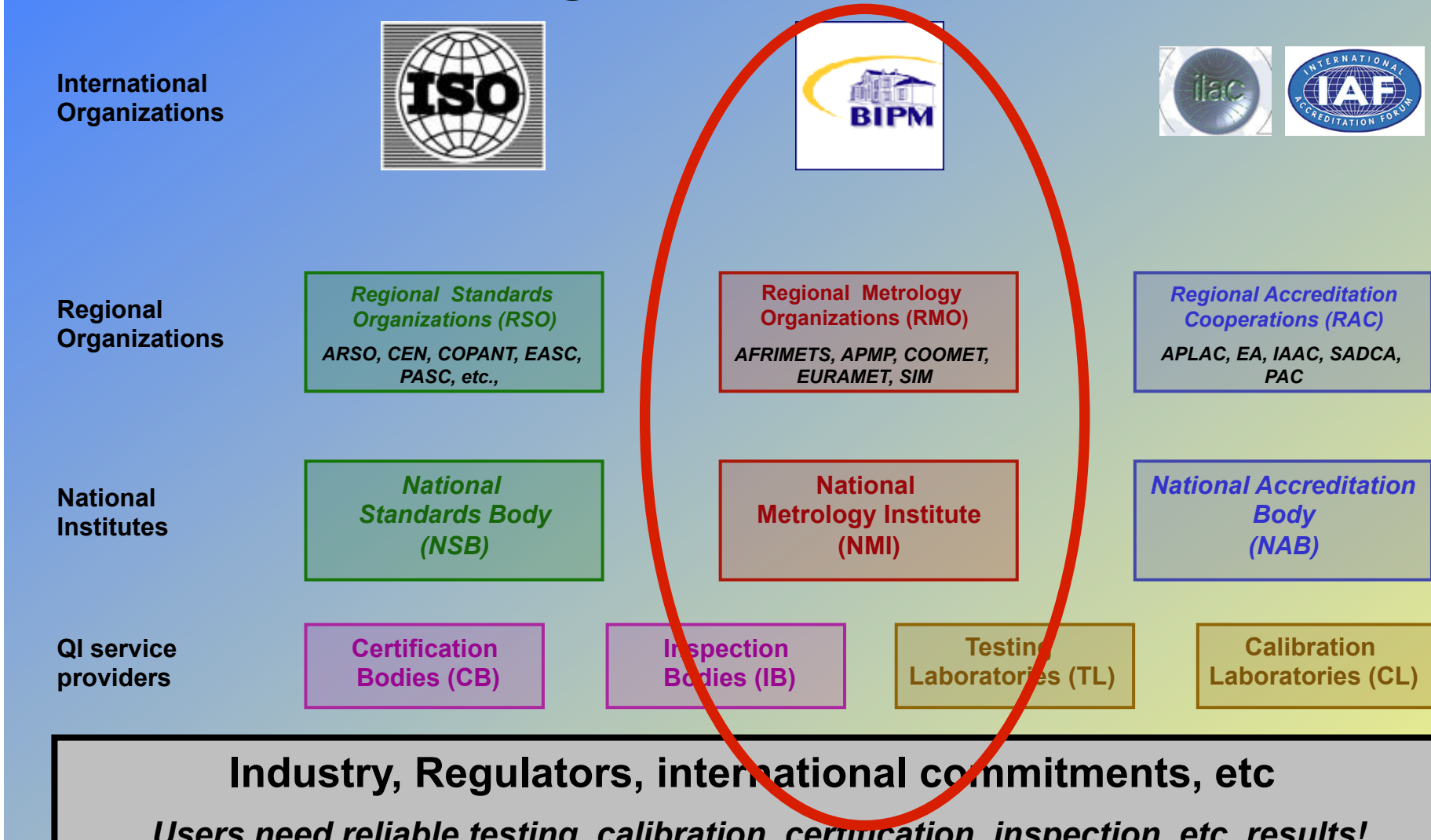



Trace elements in water (IMEP-9 and CCQM-K2)
c(Cd) / nmol/L
120
110
100
90
80
70
60
50
40
Cd
Buyer measures 110
Seller measures 55
National Institutes
NIST
PTB
KRISS
LGC
IRMM
NRC
NMIJ
NIMC
LNE

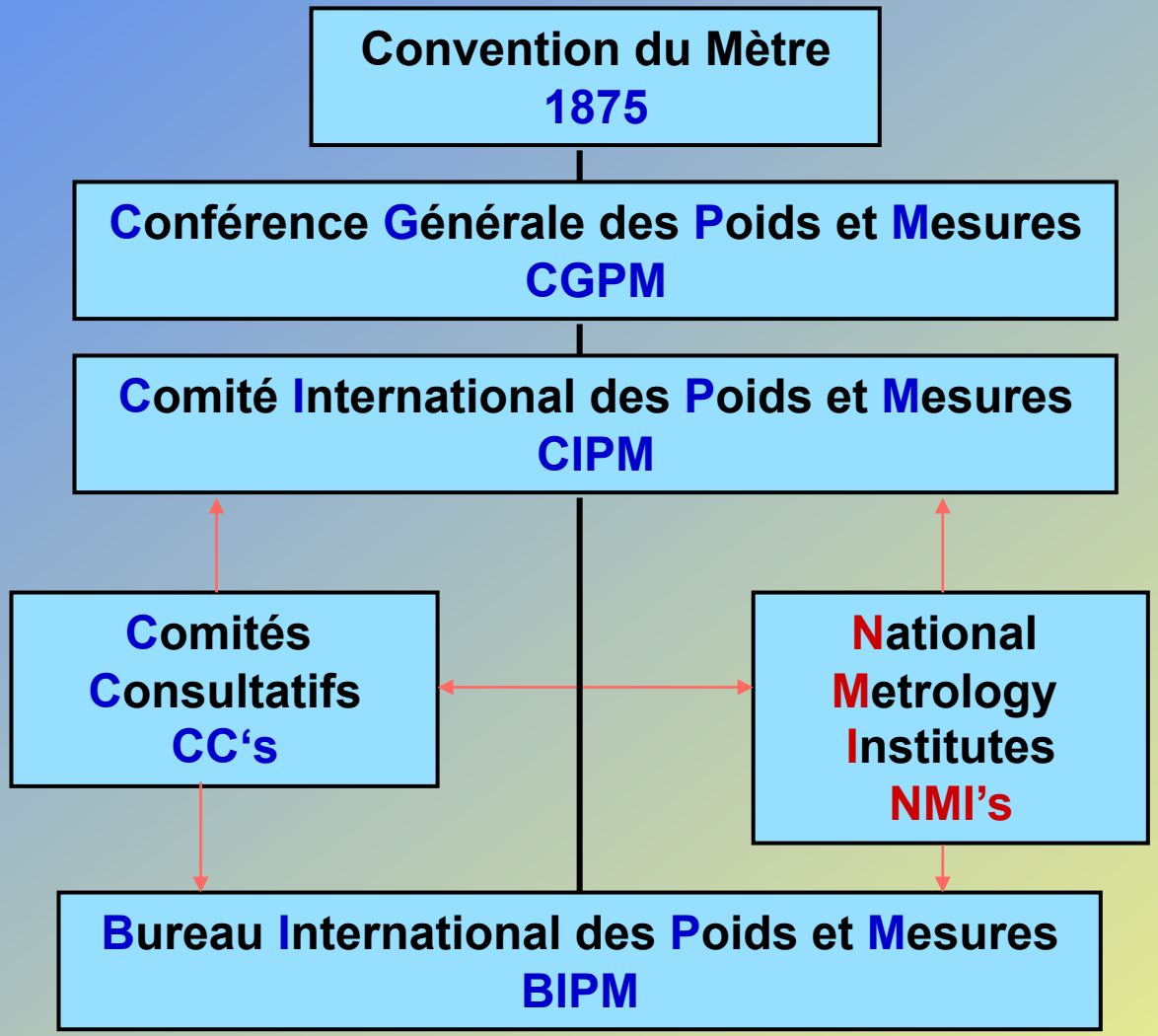
National Quality Infrastructure & Value Chain



International, regional and national QI scheme



Metre Convention



The Multilateral Recognition Agreement under the Metre Convention

Comité International des Poids et Mesures

Mutual Recognition of National Measurement Standards and of Calibration and Measurement Certificates Issued by National Metrology Institutes

Paris, 14 October 1999

CIPM - MRA:

MRA Mutual recognition arrangement:

In 1999 the CGPM implemented the MRA to achieve more transparency and equivalence between National Metrology Institutes. Its administrated by BIPM.

The MRA is based on verified information about the participating NMI`s, documented in KCDB Key Comparison Data Base (www.bipm.org):

Ap. A: Participating institutes

Ap. B: Results of key comparisons and supplementary comparisons

Ap. C: Best measurement capability, uncertainty

Information about implementation of quality system

BIPM Key Comparison DataBase - KCDB

BIPM
Bureau International des Poids et Mesures

Search facility:

Welcome to the BIPM website

Version française

Forthcoming meeting

From 18 to 22 February 2013
14th meeting of the CCM and its Working Groups
[Full list of meetings]

Databases

- Direct access KCDB
- Direct access JCTLM

metrologia

Metrologia is an international journal dealing with the scientific aspects of metrology.
[More]

Direct access

- BIPM METROLOGY PORTAL
- USEFUL LINKS
- ACRONYMS
- CIPM MRA
- KCDB
- JCTLM DATABASE
- MEETINGS
- CC DIRECTORY

Introduction

Sèvres, 30 January 2013

- **BIPM Events**
- **CODATA Task Group on Fundamental Constants (TGFC)**

The task of the BIPM is to ensure world-wide uniformity of measurements and their traceability to the International System of Units (SI).

It does this with the authority of the Convention of the Metre, a diplomatic treaty between fifty-four nations, and it operates through a series of Consultative Committees, whose members are the national metrology laboratories of the signatory States, and through its own laboratory work.

The BIPM carries out measurement-related research. It takes part in, and organizes, international comparisons of national measurement standards, and it carries out calibrations for Member States.

Highlights

Vacancy announcement: Personal Assistant to the Director – Closing date for applications: 11 February 2013

Vacancy announcement: Engineer in precision mechanical design or mechantronics for the BIPM Mass Department : Two-year fixed-term appointment. – Closing date for applications: 15 February 2013

***Circular T* celebrates its 25th birthday** : The 300th issue of *Circular T* was published by the BIPM Time Department on 10 January 2013, after 25 years of uninterrupted monthly publication. – All previous issues of BIPM Circular T, as well as updated information on data and results are available via the FTP server of the BIPM Time Department.

The 13th Director of the BIPM : The New Year 2013 marks the move of the directorship of the BIPM from Professor Michael Kühne to Dr Martin J.T. Milton. – Click here for more information

The BIPM presents its best wishes for 2013 – Happy New Year!

New issue of the *BIPM e-News* – December 2012

[See more highlights]

Calibration and Measurement Capabilities - CMC's

BIPM
Bureau International des Poids & Mesures

Home | Key and supplementary comparisons | Calibration and Measurement Capabilities - CMCs

KCDB home > **Free search results**

The BIPM key comparison database

KCDB

Refine your search

CMC AREA

- CMCs General Physics (417)
- CMCs Chemistry (20)

PHYSICS >

- AC voltage, current, and power (254)
- Dimensional metrology (32)
- DC voltage, current, and resistance (31)
- Impedance up to the MHz range (28)
- Mass, mass standards (19)
- Sound in air (18)
- Pressure (11)
- Temperature (11)
- Properties of detectors and sources (5)
- Frequency (5)
- Laser frequencies (2)
- Time interval (1)

CHEMICAL MATERIAL >

- rice and rice flour (4)
- soybean and soybean powder (4)
- cereal and cereal products (4)
- aqueous buffer solution (3)
- PP, PE, and PVC (3)

CHEMICAL ANALYTE >

- cadmium (4)
- zinc (3)
- pH (3)
- copper (3)
- calcium (3)

GEOGRAPHIC LOCATION

- APMP (437)
  - Thailand (437)

Result of the search

Your query 'thailand' produced 437 results — New search

1 2 3 [Next >>]

Thailand, NIMT (National Institute of Metrology (Thailand))
Complete CMCs in Chemistry for pH for Thailand (.PDF file)

Matrix or material	Analyte or component	Dissemination range of measurement capability: pH	Dissemination range of measurement capability: Absolute expanded uncertainty (k = 2, 95%)
aqueous buffer solution	pH	3.99 to 4.02	0.02

Mechanism(s) for measurement service delivery: Calibration
Approved on 23 November 2009.
Internal NMI service identifier: NIMT/12030-10102

Thailand, NIMT (National Institute of Metrology (Thailand))
Complete CMCs in Chemistry for Gases for Thailand (.PDF file)

Matrix or material	Analyte or component	Dissemination range of measurement capability: Amount-of-substance fraction in mol/mol	Dissemination range of measurement capability: Relative expanded uncertainty (k = 2, 95%) in %
nitrogen	oxygen	0.05 to 0.30	0.25

Mechanism(s) for measurement service delivery: Calibration
Approved on 06 December 2011.
Internal NMI service identifier: NIMT/12050-10201

Thailand, NIMT (National Institute of Metrology (Thailand))
Complete CMCs in Chemistry for Advanced materials for Thailand (.PDF file)

Matrix or material	Analyte or component	Dissemination range of measurement capability: Mass fraction in mg/kg	Dissemination range of measurement capability: Relative expanded uncertainty (k = 2, 95%) in %
PP, PE, and PVC	cadmium	20 to 80	1.5 to 2.0

Mechanism(s) for measurement service delivery: Provision of reference values for both in-house and external PT/RM samples

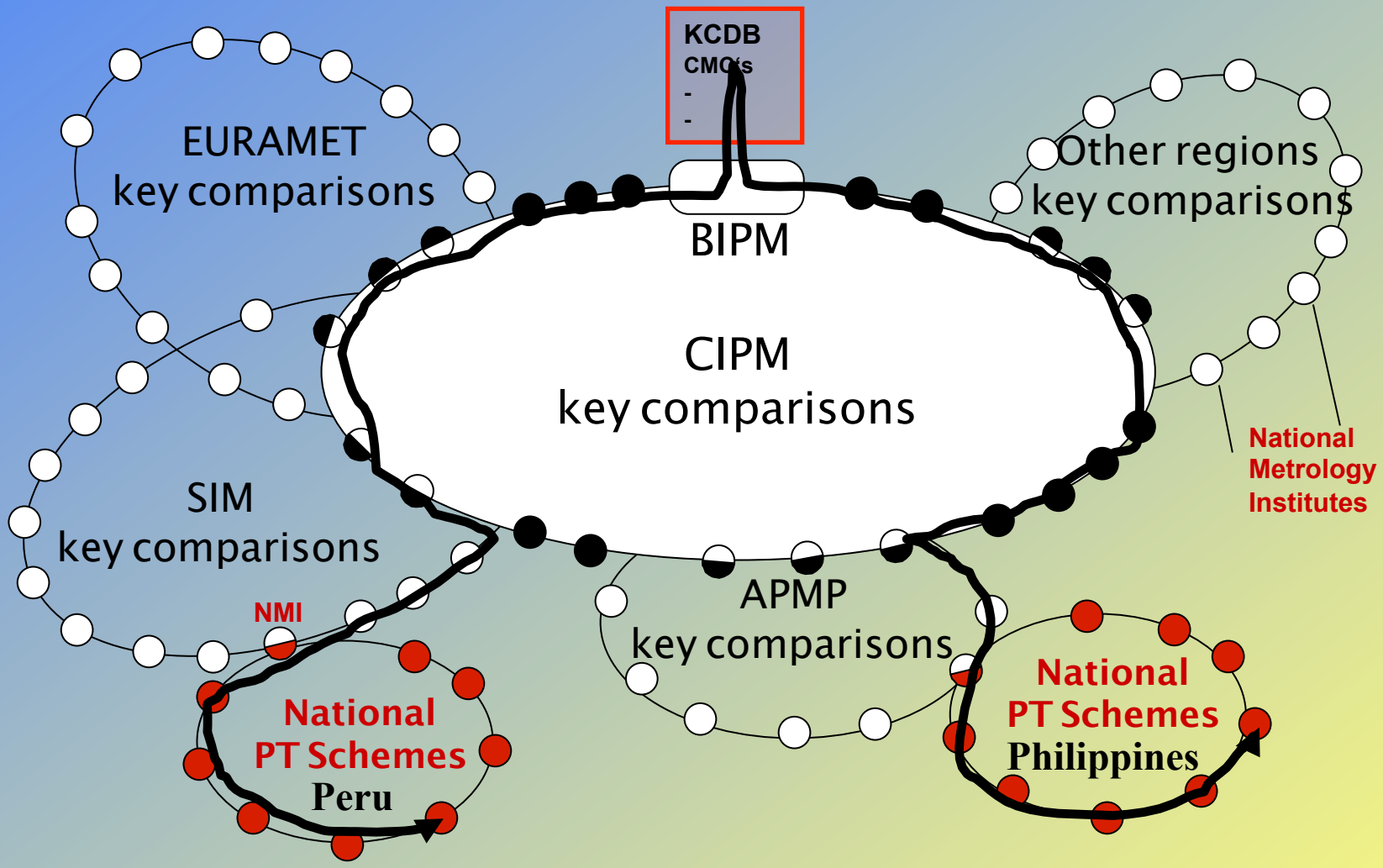
Uncertainty convention 1.
Approved on 06 September 2012.
Internal NMI service identifier: NIMT/12020-60210

Thailand, NIMT (National Institute of Metrology (Thailand))
Complete CMCs in Chemistry for Food for Thailand (.PDF file)

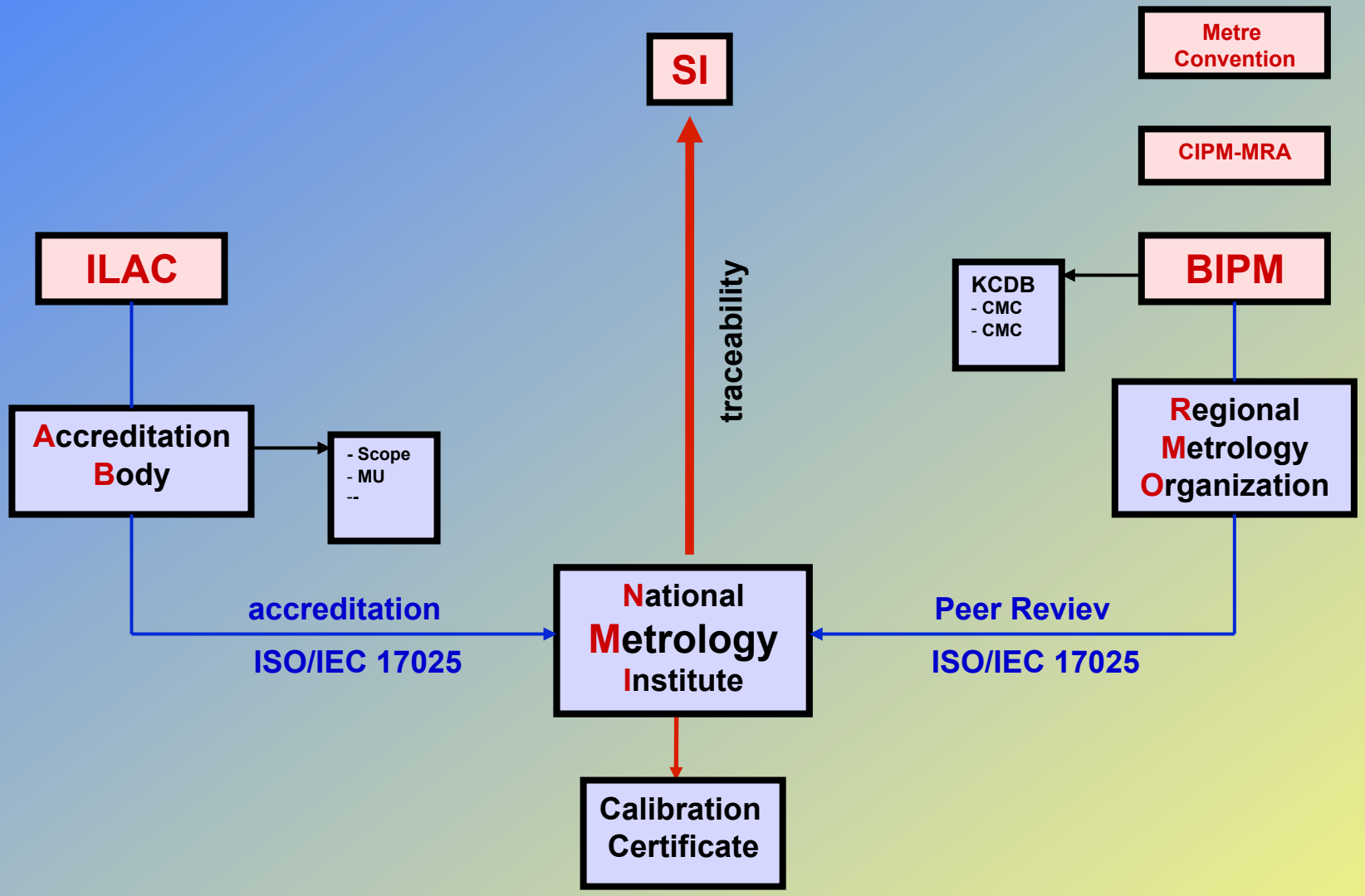
Matrix or material	Analyte or component	Dissemination range of measurement capability: Mass fraction in mg/kg	Dissemination range of measurement capability: Relative expanded uncertainty (k = 2, 95%) in %
rice and rice flour	calcium	1000 to 2000	3.0 to 3.5

Mechanism(s) for measurement service delivery: Provision of reference values for PT schemes and reference material producer

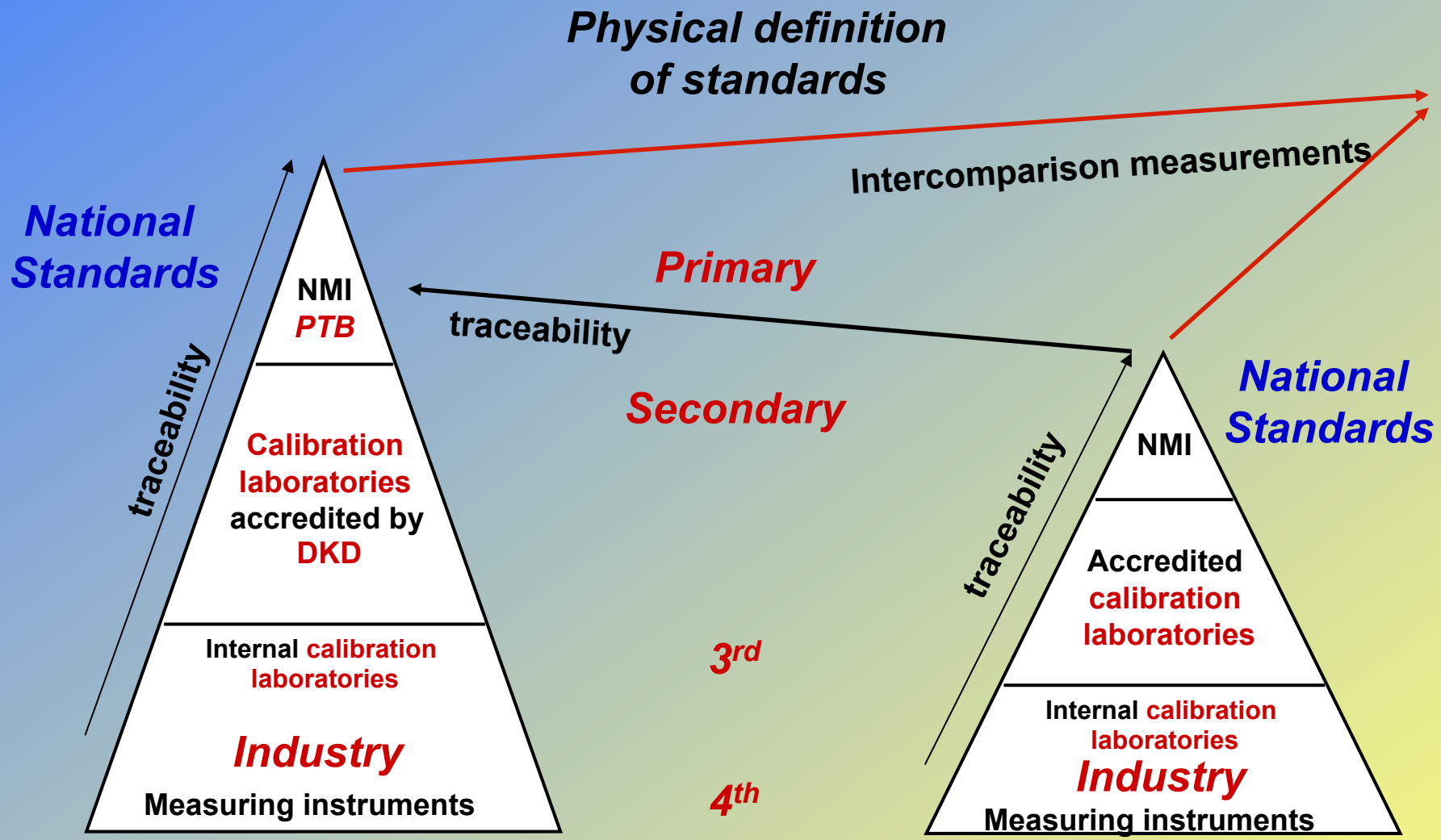
International intercomparisons for the CIPM-MRA and national PT schemes



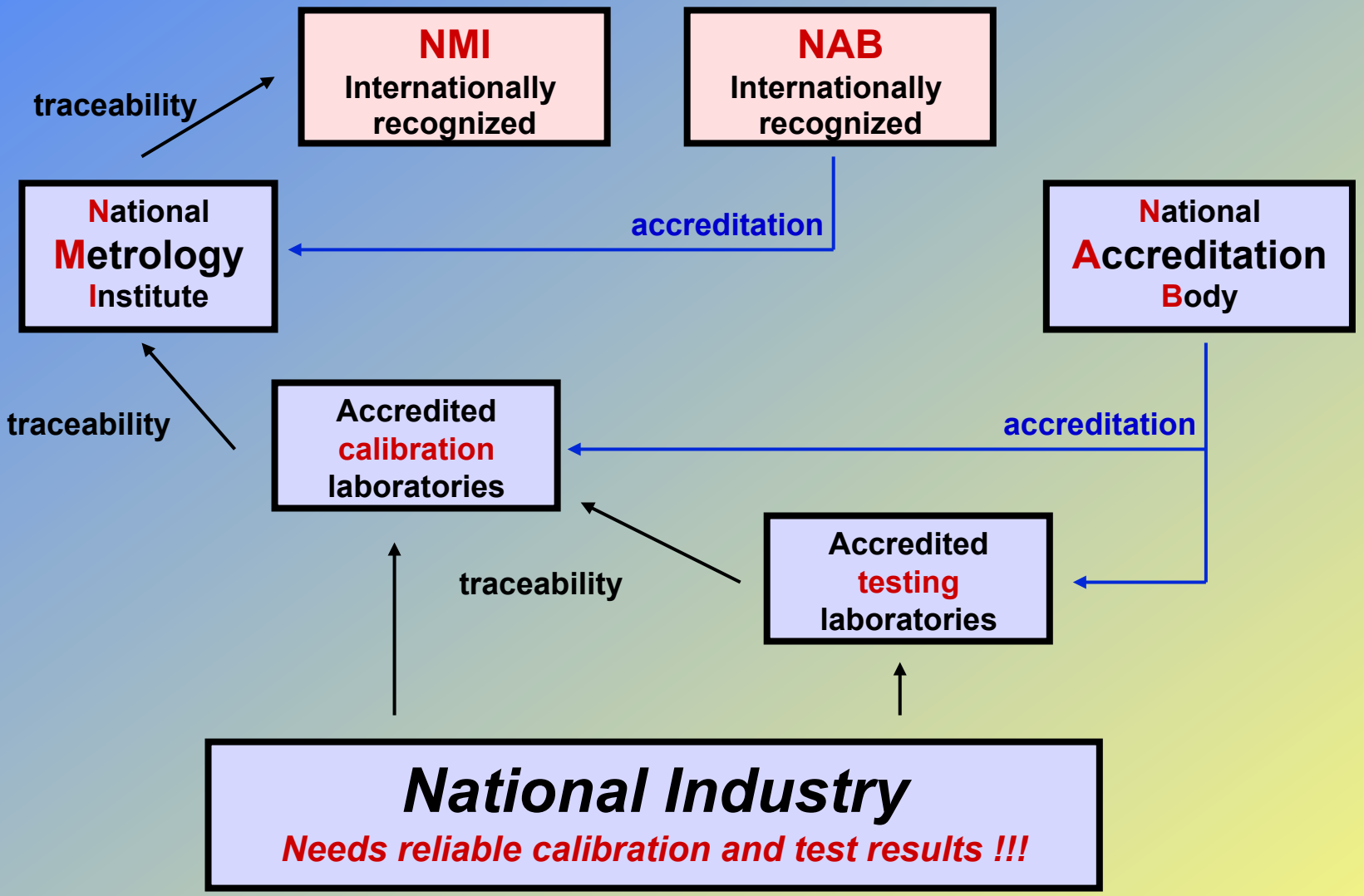
International Recognition



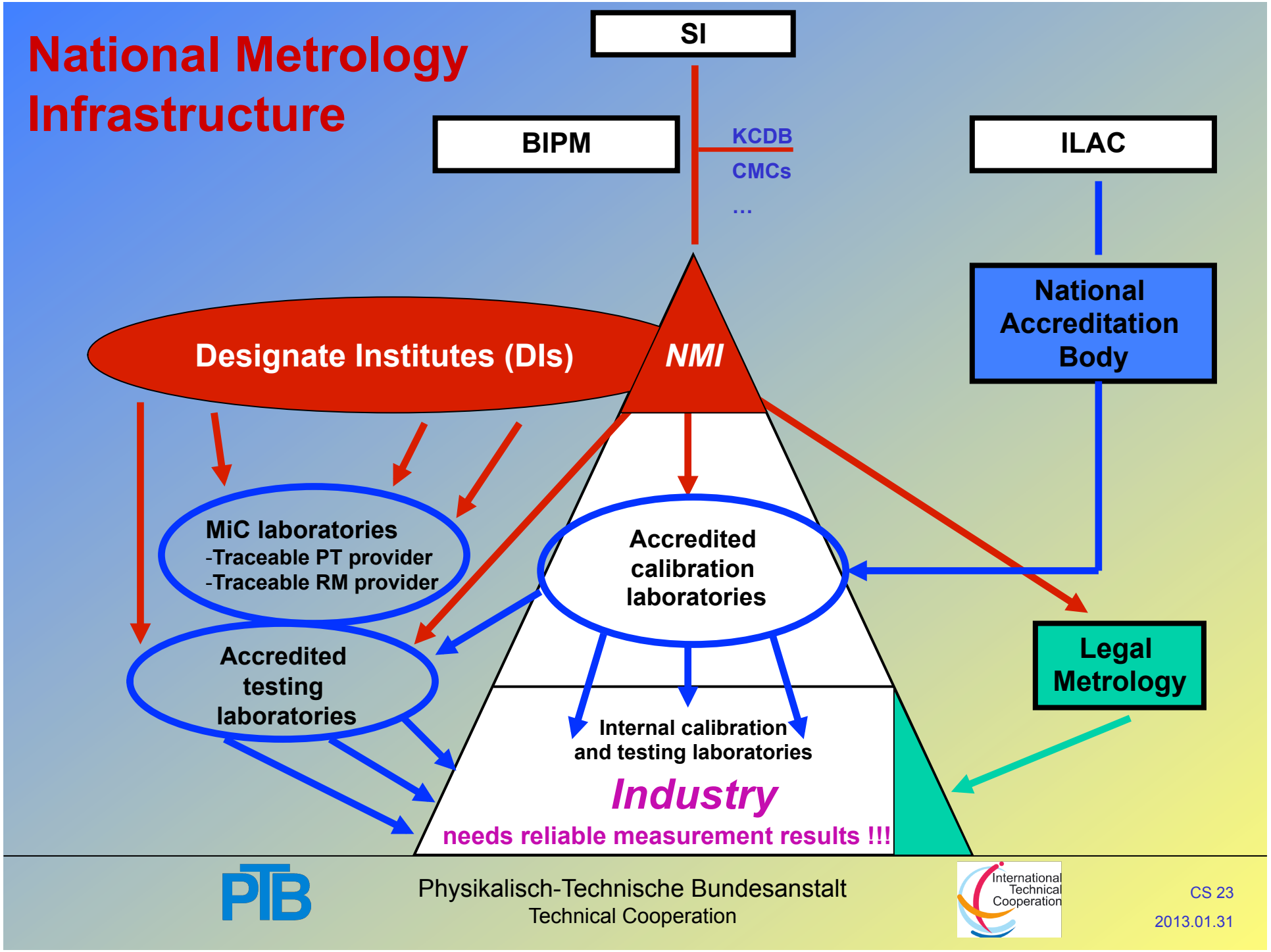
Metrological Infrastructures



Reliable and recognized laboratory infrastructure



National Metrology Infrastructure



National Metrology Strategy

Vision:
Mission:

Key strategic elements	short 2 – 3 y	mid 5 – 6 y	long > 10 y	Final targets
1.) National Metrology Policy a. Competent advisory board for NMI b. Modern metrology law + harmonized link laws c. Government support for NMI + metrology strategy implementation d. Implementation of SI Units				➢ National metrology (or quality) policy developed, regularly actualized, implemented and involved in the National Development Plan.
2.) NMI + Designated Institutes (DI) a. Designation criteria & policy b. Implementation & coordination c. Funding for DIs				➢ DIs in all relevant areas existing and working according to NMI best practices.
3.) NMI's regional and int'l relations a. Active participation in APMP TCs b. Active participation in BIPM CCs c. Collaboration with other NMIs				➢ NMI and DIs actively participating in all relevant CIPM-MRA activities.
4.) NMI's institution building a. Efficient administration and procedures b. Quality management system c. Funding for all NMI/DI tasks d. Institutional corporate identity e. Strategic planning				➢ NMI + DIs operating according to CIPM-MRA best practices. ➢ NMI + DIs offer efficient and customer oriented service.

National Metrology Strategy

Key strategic elements	short 2 – 3 y	mid 5 – 6 y	long > 10 y	Final targets
5.) NMI's technical competence building a. Building, laboratories, installations, equipment b. Personnel, training, competence c. Standards, traceability, procedures d. Services (calibration, science, advising,..) e. Intercomparisons, assessments, peer reviews				➢ NMI + DIs have CMCs in all relevant areas achieved and maintained. ➢ NMI + DIs can satisfy high level metrological demand. ➢ Physical & chemical national standards are established + maintained by NMI + DIs.
6.) NMI – Cal labs and MIC labs relation a. Metrology clubs b. National intercomparisons c. Promotion programs				➢ Cal labs and MiC labs (secondary laboratories) satisfy routine calibrations / MiC dissemination and get traceability from NMI + DIs.
7.) NMI – Regulators relation a. Legal Metrology b. Food safety c. Environmental protection d. Health assurance				➢ Metrological traceability implemented in technical regulation enforcement.
8.) NMI – NQI relation a. National Standards Body b. National Accreditation Body c. Value Chain approaches				➢ Metrology is integrated part of a systemic operating National Quality Infrastructure.
9.) NMI – Industry relation a. Demand survey, metrological mapping, .. b. Consulting services, ..				➢ Metrological demand in traceability, knowledge, etc. from industry is satisfied.
10.) Diffusion, Education, Marketing a. General awareness, .. (horizontal education) b. Train-the-Trainer, univ. curricula.. (vertical edu.) c. Metrology material, multiplication, alliances, ..				➢ NMI recognized by all relevant sectors as national knowledge center for metrology.

Conclusions (logic sequence):

⇒ ***National Quality Policy***

⇒ **National Strategy QI *(S-M-A)* 10 – 20 years (short – mid – long term)**

⇒ **Demand – Offer – Gap Analysis**

⇒ **Masterplan (Actions, Actors, Contributions)**

⇒ **Projects (Funding)**

⇒ **Annual Plans & Ajustments**

⇒ **Monitoring & Evaluation**