



**SIM
METROLOGY
SCHOOL**

International Metrology: Organizations, Structure, Process

SPEAKER

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Why is it critical to have international mutual recognition of a country's measurement capability?





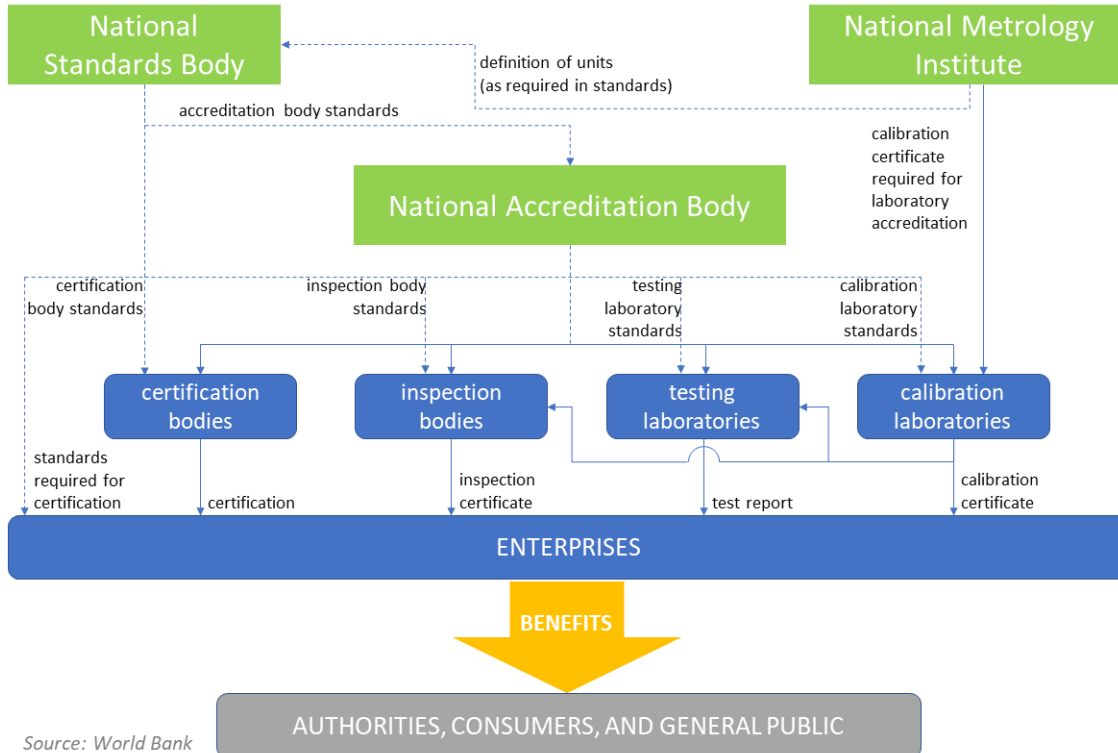
International recognition

International recognition and compatibility between national and international metrological requirements is the cornerstone of a successfully implemented national system. International mutual recognition of a country's measurement capability is critical for:

- the avoidance and removal of technical barriers to trade
- ensuring the quality of the national system, and providing opportunities for its improvement
- effectively addressing quality of life topics that rely on measurements.



Metrology in the national QI context



- Enhanced product quality and compatibility
- Enhanced safety and health
- Decreased environmental impact
- Increased trade opportunities
- Facilitating innovations to the marketplace



QI – definition

The system ..

comprising the organizations (public and private) together with the policies, relevant legal and regulatory framework, and practices

needed to support and enhance the quality, safety and environmental soundness of goods, services and processes.

it relies on

- *metrology*
- *standardization*
- *accreditation*
- *conformity assessment, and*
- *market surveillance (in regulated areas)*

“The quality infrastructure is required for the effective operation of domestic markets, and its international recognition is important to enable access to foreign markets.

It is a critical element in promoting and sustaining economic development, as well as environmental and social wellbeing.”

Definition adopted in June 2017 by **INetQI**
<https://www.inetqi.net/about/members/>



QI target groups



Importance of QI *(example)*

Guyana's Top 10 Exports

The following export product groups represent the highest dollar value in Guyanese global shipments during 2021. Also shown is the percentage share each export category represents in terms of overall exports from Guyana.

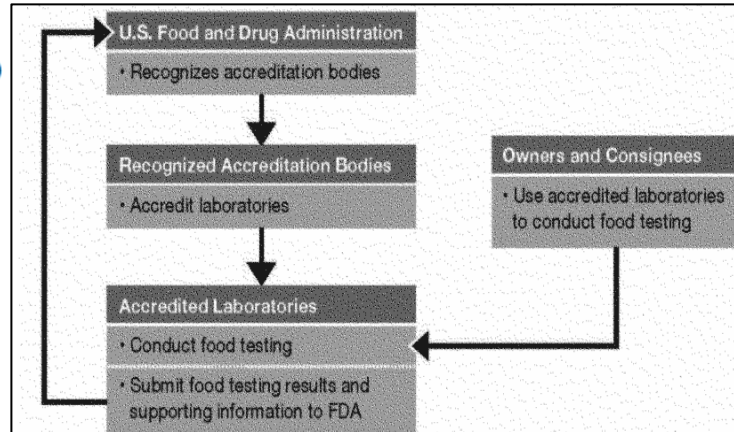
1. Mineral fuels including oil: US\$2.9 billion (69.1% of total exports)
2. Gems, precious metals: \$559.1 million (13.2%)
3. Cereals: \$207.8 million (4.9%)
4. Railways, streetcars: \$176.5 million (4.2%)
5. Ores, slag, ash: \$79.3 million (1.9%)
6. Beverages, spirits, vinegar: \$60.1 million (1.4%)
7. Wood: \$44.3 million (1%)
8. Fish: \$41.1 million (1%)
9. Pharmaceuticals: \$37.1 million (0.9%)
10. Sugar, sugar confectionery: \$19.6 million (0.5%)

Source:

<https://www.worldstopexport.com/guyanas-top-10-exports/>

Guyana's Major Trading Partners

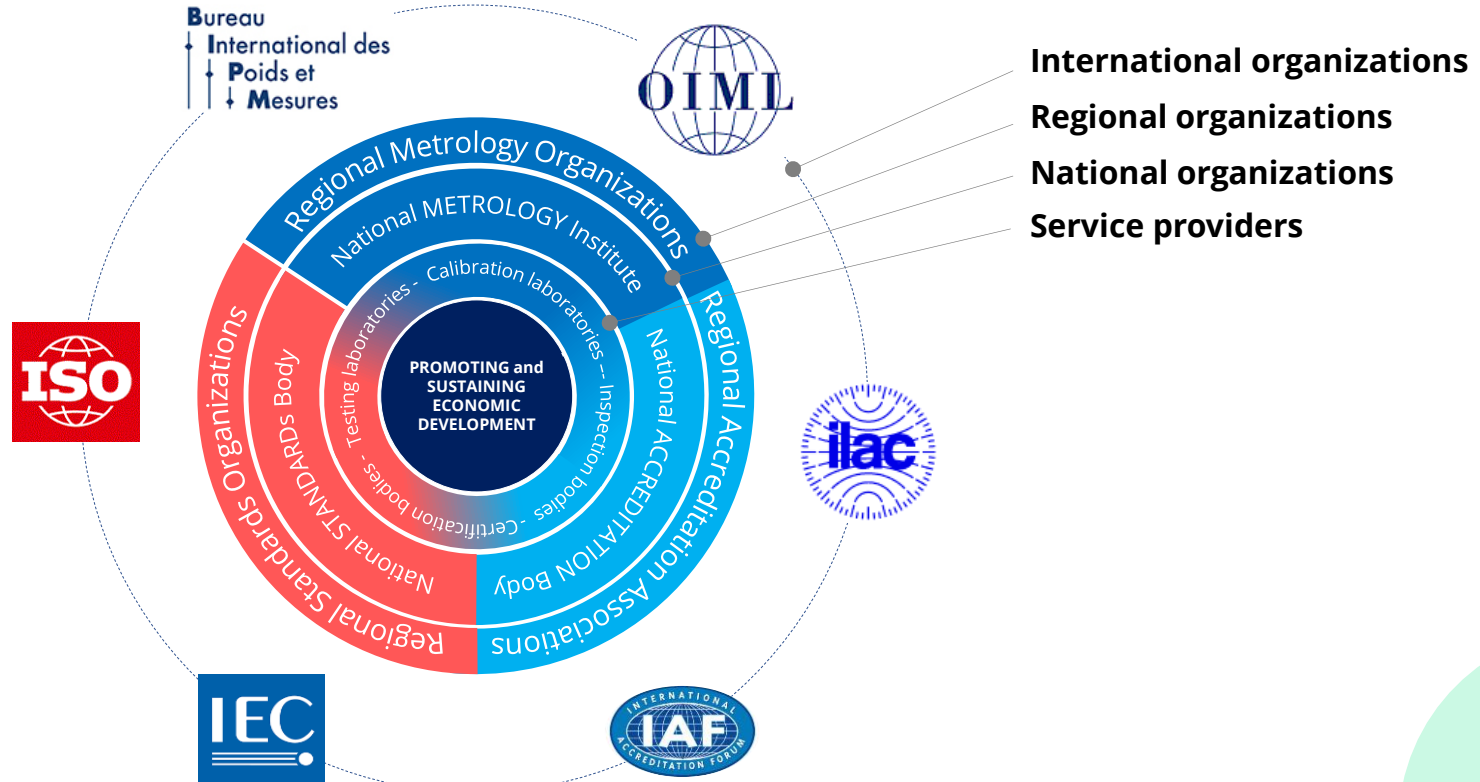
The latest available country-specific data for 2021 shows that 95.7% of products exported from Guyana were bought by importers in: the United States of America (42% of the global total), Singapore (16.5%), United Arab Emirates (6.9%), United Kingdom (also 6.9%), Canada (6.6%), Barbados (also 6.6%), India (3.5%), Trinidad and Tobago (2.4%), Venezuela (1.5%), Jamaica (1.1%), Colombia (1%) and Portugal (0.8%).



Imported food products are subject to FDA (U.S. Food And Drug Administration) inspection when offered for import at U.S. ports of entry. Both imported and domestically-produced foods must meet the same legal requirements in the United States.

<https://www.fda.gov/food/food-imports-exports/importing-food-products-united-states>

Organizations *in the international QI context*





QI links *at regional level*

Europe	Americas	Asia Pacific	Euro-Asia	Africa	Gulf
Metrology					
EURAMET	SIM	APMP	COOMET	AFRIMETS	GULFMET
Accreditation					
EA	IAAC	APLAC	-	AFRAC	GAC
Standards					
CEN/CENELEC/ ETSI	COPANT	PASC	EASC	ARSO	GCC-GSO

Regional Metrology Organizations

RMOs work to improve regional metrological capability by sharing expertise, exchanging technical services and participating in the CIPM MRA.



The BIPM

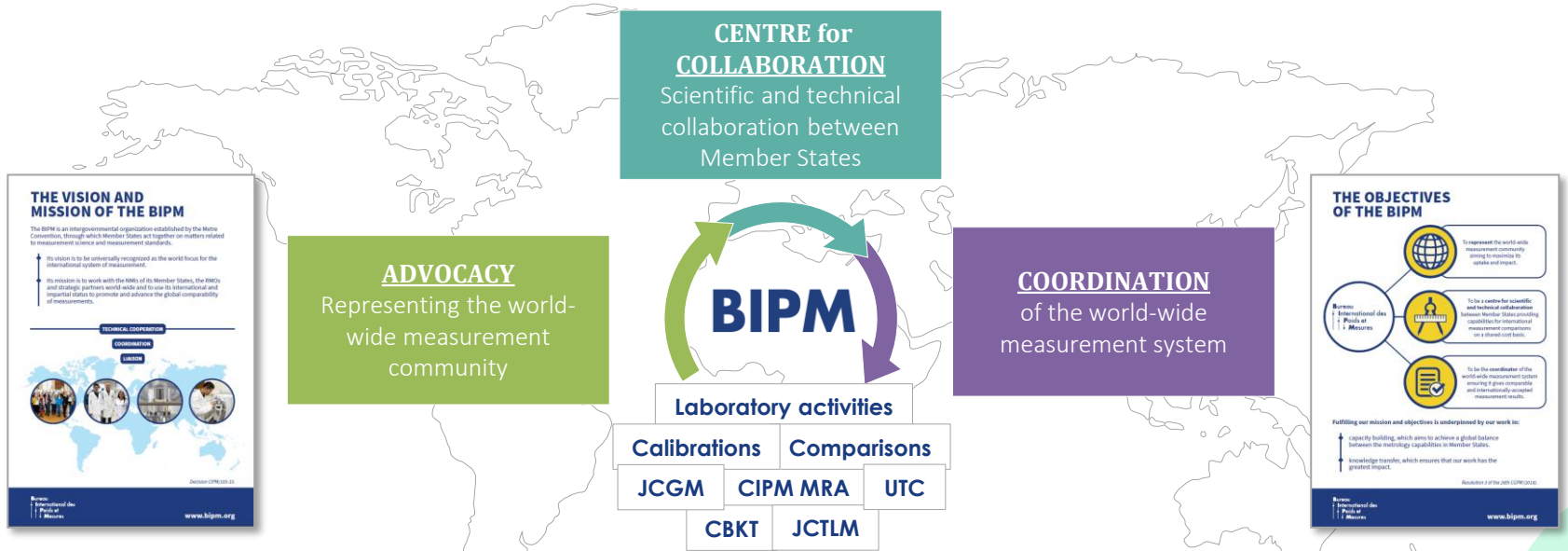
*... is the **intergovernmental organization established by the Metre Convention in 1875, through which Member States act together on matters related to measurement science and measurement standards***





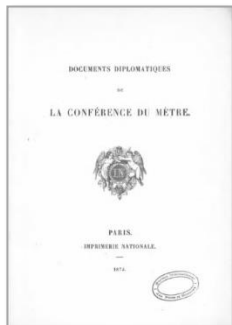
The BIPM

The **Bureau International des Poids et Mesures** – established by the *Metre Convention* in 1875, in which states work together to promote and advance the global comparability of measurement.



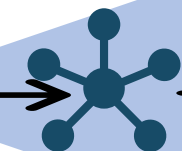
"TO ASSURE THE INTERNATIONAL UNIFICATION AND PERFECTION OF THE METRIC SYSTEM"

"...to assure the international unification and perfection of the metric system"



Metre Convention:
Article 6 (1875)

*Article 6 (1875), the BIPM is charged with:
...the **periodic comparison of national standards** with the international prototypes and their official copies...*

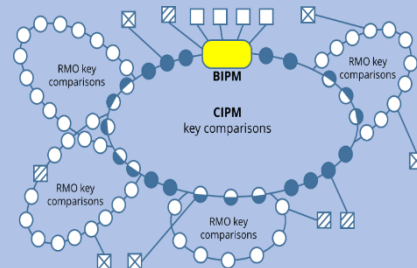


*(1889), the **CGPM** sanctioned international prototypes of the Metre and the Kilogram, and their official copies were distributed to 18 States*



*(1927), the **first Consultative Committee** was set up (CCE, now **CCEM**)*

CCPR
CCT
CCL
CCTF
CCRI
CCU
CCM
CCQM
CCAUV



CIPM MRA
October 1999

...comprehensive and coherent solution to establishing and demonstrating the degree of international equivalence

The mission of the Metre Convention continues to be met; "to assure the international unification ..."

Governance of the BIPM

The governance structure established by the *Metre Convention* follows the classical three-body institutional architecture of most international organizations. The Director of the BIPM and the staff, is subordinated to the CIPM, which is subordinated to the CGPM.



The Conférence générale
des poids et mesures
(CGPM)

Highest decision-making body



The Comité international
des poids et mesures (CIPM)

Has both a governance role overseeing the work of the BIPM Headquarters, and is an advisory committee of metrologists of high standing



The BIPM Headquarters

Provides the necessary secretarial and laboratory facilities to support the CGPM and CIPM.

CIPM Consultative Committees (CCs)



CCAUV
CONSULTATIVE COMMITTEE FOR ACOUSTICS, ULTRASOUND
AND VIBRATION



CCL
CONSULTATIVE COMMITTEE FOR LENGTH



CCPR
CONSULTATIVE COMMITTEE FOR PHOTOMETRY AND
RADIOMETRY



CCRI
CONSULTATIVE COMMITTEE FOR IONIZING RADIATION



CCTF
CONSULTATIVE COMMITTEE FOR TIME AND FREQUENCY



CCEM
CONSULTATIVE COMMITTEE FOR ELECTRICITY AND
MAGNETISM



CCM
CONSULTATIVE COMMITTEE FOR MASS AND RELATED
QUANTITIES



CCQM
CONSULTATIVE COMMITTEE FOR AMOUNT OF SUBSTANCE:
METROLOGY IN CHEMISTRY AND BIOLOGY

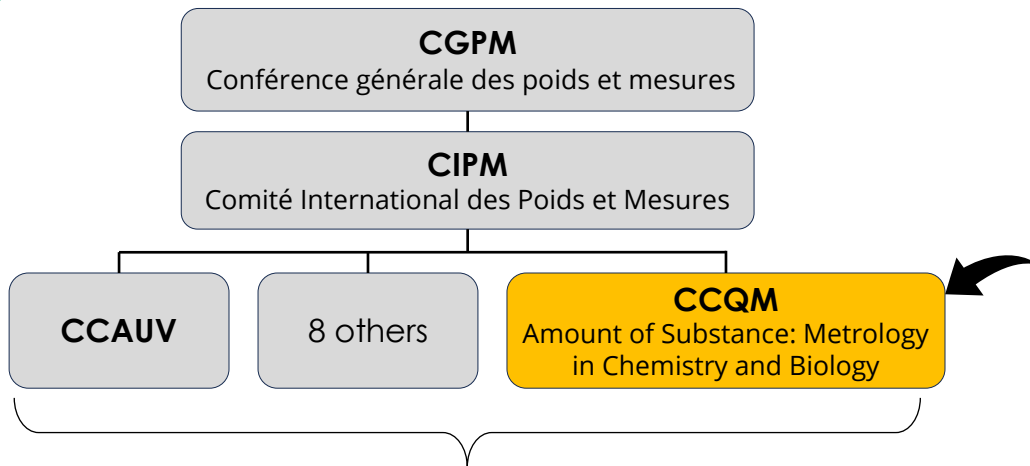


CCT
CONSULTATIVE COMMITTEE FOR THERMOMETRY



CCU
CONSULTATIVE COMMITTEE FOR UNITS

CIPM Consultative Committees (CCs)



CCQM Vision and Mission*:

- **The CCQM's vision:** A world in which all chemical and biological measurements are made at the required level of accuracy to meet the needs of society.
- **The mission of the CCQM is:** To advance global comparability of chemical and biological measurement standards and capabilities, enabling Member states and Associates to make measurements with confidence.



*[*CCQM STRATEGY DOCUMENT 2021-2030](#)*










































The responsibilities of the Consultative Committees*:

- to advise the CIPM on all scientific matters that influence metrology, including any **BIPM scientific programme** activities in the field covered by the CC
- to establish global compatibility of measurements through promoting traceability to the SI, and where traceability to the SI is not yet feasible, to other internationally agreed references
- to contribute to the implementation and maintenance of the CIPM MRA
-

**Note that the mission of the CCU is slightly different. For complete information, please refer to [CIPM-D-01](#) - Rules of procedure for the Consultative Committees (CCs) created by the CIPM, CC working groups and CC workshops.*

SIM participation in the work of Consultative Committees

 - Member
 - Observer

States and Economy	Member State or Associate	CCAUV	CCEM	CCL	CCM	CCPR	CCQM	CCRI	CCT	CCTF	CCU
Canada	Member State										
United States of America	Member State										
Mexico	Member State										
Brazil	Member State										
Argentina	Member State										
Uruguay	Member State										
Chile	Member State										
Colombia	Member State										
Costa Rica	Member State										
Ecuador	Member State										
Bolivia	Associate State										
CARICOM	Associate Economy										
Jamaica	Associate State										
Panama	Associate State										
Paraguay	Associate State										
Peru	Associate State										

Benefits of participating in the activities of the BIPM



TO PARTICIPATE

in global decision-making on matters relating to the global comparability of measurements



TO CONTRIBUTE

to the development of consensus on technical and scientific issues relevant to measurement science and measurements standards



TO ACCESS

to technical and scientific activities by nominating a National Metrology Institute (and Designated Institutes)

Services of the BIPM



Runs the CIPM MRA, that is a secure technical foundation for wider agreements



Pilots comparisons enabling NMIs to demonstrate equivalence



Provides selected calibration services to NMIs



Operates the JCTLM for laboratory medicine



Provides a forum to advance metrology



Supports NMIs with capacity building and knowledge transfer



Liaison and Coordination – International Organizations



The BIPM works to foster cooperation with international organizations and promotes the world-wide comparability of measurements.

...cooperation with international organizations – *example*

Digital Transformation

Joint Statement of Intent *On the digital transformation in the international scientific and quality infrastructure*

Joint Statement of Intent "On the digital transformation in the international scientific and quality infrastructure"

Signed by:



CIPM MRA

- a secure technical foundation for wider agreements



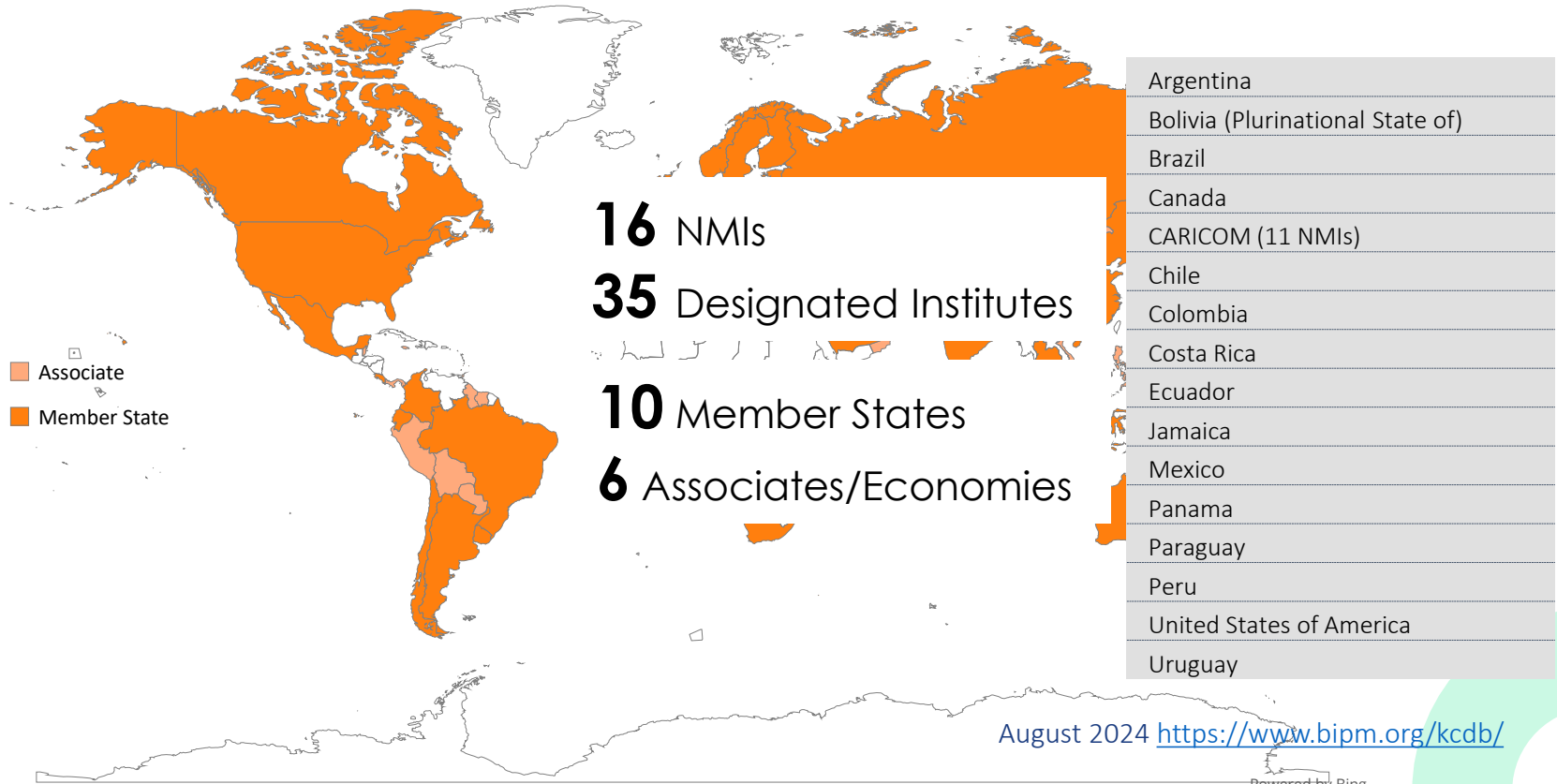
Objectives:

- to establish the **degree of equivalence** of national measurement standards maintained by NMIs
- to provide for the mutual recognition of **calibration and measurement certificates** issued by NMIs
- thereby to provide governments and other parties with a **secure technical foundation for wider agreements related to international trade, commerce and regulatory affairs**

*Today, the CIPM MRA provides **a primary source to identify internationally recognized national capabilities** within the NMI and wider metrology community. The underpinning science and the outcomes are openly available to all interested parties...*



CIPM MRA: participation from SIM

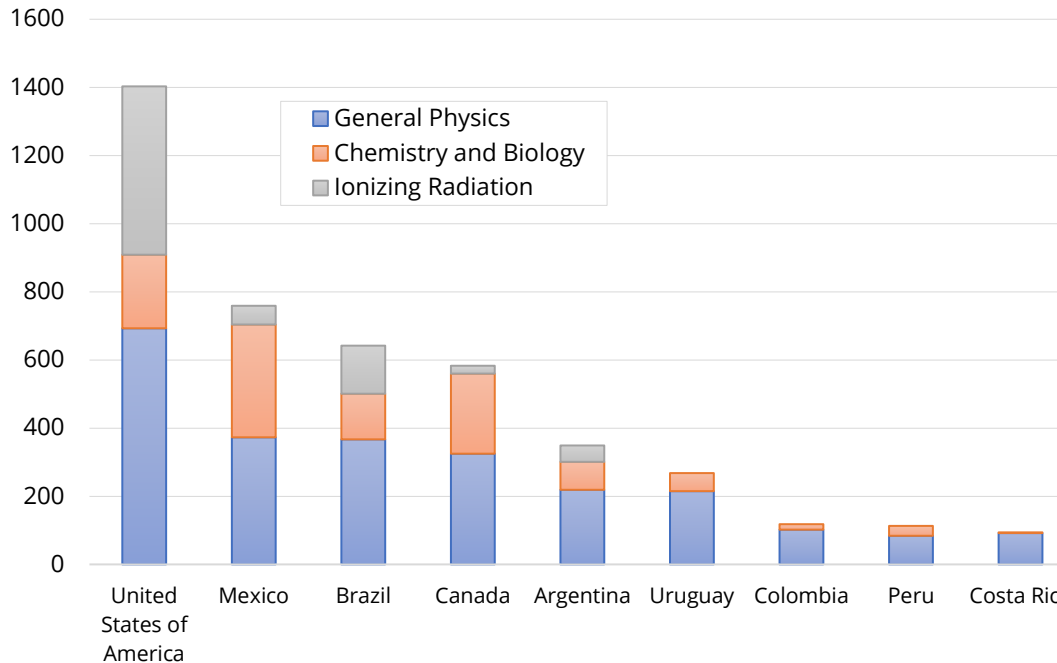




KCDB Statistics: *CMCs from SIM member NMI/Dis*

All SIM CIPM MRA participants have published CMCs

SIM CMCs by Member States and Associates (States/Economies)



Member State / Associate	General Physics	Chemistry and Biology	Ionizing Radiation	Total
United States of America	693	216	494	1403
Mexico	373	331	55	759
Brazil	367	134	141	642
Canada	325	235	23	583
Argentina	219	82	48	349
Uruguay	215	53	0	268
Colombia	102	16	0	118
Peru	84	29	0	113
Costa Rica	92	2	0	94
Chile	75	1	0	76
Panama	38	0	0	38
Bolivia	18	4	0	22
Jamaica	22	0	0	22
Paraguay	14	0	0	14
Ecuador	10	0	0	10
CARICOM	1	0	0	1
Total	2648	1103	761	4512

CBKT - *Capacity Building and Knowledge Transfer*

The BIPM CBKT Programme aims to increase the effectiveness with which Member States and Associates engage in the world-wide coordinated metrological system.

CAPACITY BUILDING (CB)

CORE: Covers areas that are of vital importance to Member States and the BIPM.

TOPIC-Based: Flexible to address topics of interest to specific groups of Member States and Associates.

KNOWLEDGE TRANSFER (KT)

Takes many forms, involving the BIPM staff, Visiting Scientists from NMIs/DIs, as well as groups of experts assembled from around the world. It also includes a wide range of other knowledge transfer activities defined by the BIPM.

<https://www.bipm.org/en/cbkt/>

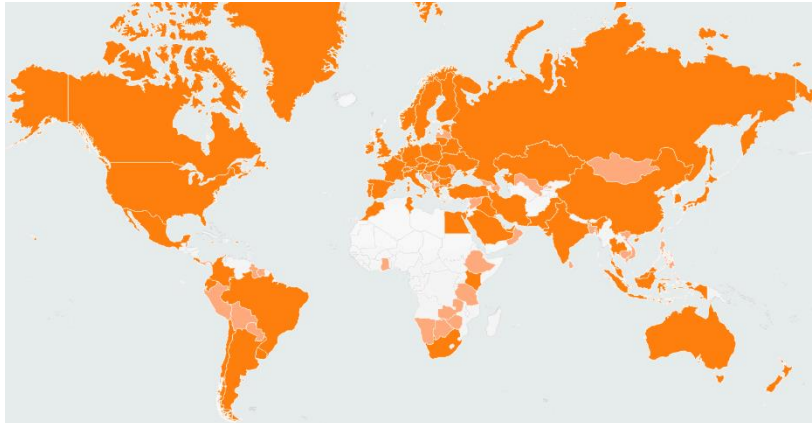
<https://e-learning.bipm.org/> *...accessible around the clock
and on any device*





Member States and Associates

(August 2024)



- 64 Member States*

- 36 Associates of the CGPM

(States and Economies)

* The official term is "States Parties to the Metre Convention"; the term "Member States" is its synonym and used for easy reference.

The CIPM MRA has been signed by:

- representatives of 100 institutes
 - 64 Member States
 - 36 Associates of the CGPM
- 4 international organizations (ESA, IAEA, JRC, WMO) and covers a further 149 designated institutes.

253
institutes


1 884 comparisons
1182 KCs, 702 SCs

26 032 CMCs



Member State or Associate?

A State may choose to become either:

- **Member State** *has a significant engagement in, and influence on, the world metrology system*
 - **Associate** *participates in the CIPM MRA and can be part of the world metrology system at lower costs*
 - *Generally speaking, «Associate State» status is seen as the first step to becoming a Member State*
- 


Takeaway messages:

Success factors for international engagement






International recognition and participation

- International recognition underpins other important agreements and is critical for trade
 - International recognition can only be achieved through participation in appropriate international and regional organizations
 - Participation has the benefit of being an important source of information and benchmarking
- 




Dedicated resources and level of participation

- International participation requires dedicated resources
 - Many international organizations offer a variety of levels of participation
 - It is important to select the level that is appropriate taking into account the economy and its level of development
- 




The role of the central government

- Successful participation requires an appropriate institutional and legal framework
 - The role of the central government is key and it should take the lead in setting the national agenda
 - Regional participation also offers excellent possibilities for collaboration and improvement
- 



The NMI mandate and holding of national standards

- The NMI's mandate should include the ability to engage appropriately in international and regional activities, most notably in the CIPM MRA
 - Clarity is important if national standards are held not only in the NMI but also in other designated institutes
- 



Thanks!



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