



Bureau International des Poids et Mesures



Introduction to the CIPM MRA

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FGNMID CIPM MRA Workshop
Skopje, April 27-29, 2011

The Metre Convention



THE METRE CONVENTION

International Convention established in 1875 with 55 Member States in 2011. The institutional foundation of the International System of Units (now the SI).

CGPM – Conférence Générale des Poids et Mesures

Composed of Member State representatives. Meets every 4 years to decide on matters pertaining to the Metre Convention and the SI

CIPM – Comité International des Poids et Mesures

18 individuals of different nationalities appointed by CGPM. Supervises BIPM and generally supplies chairs to Consultative Committees.

BIPM – Bureau International des Poids et Mesures

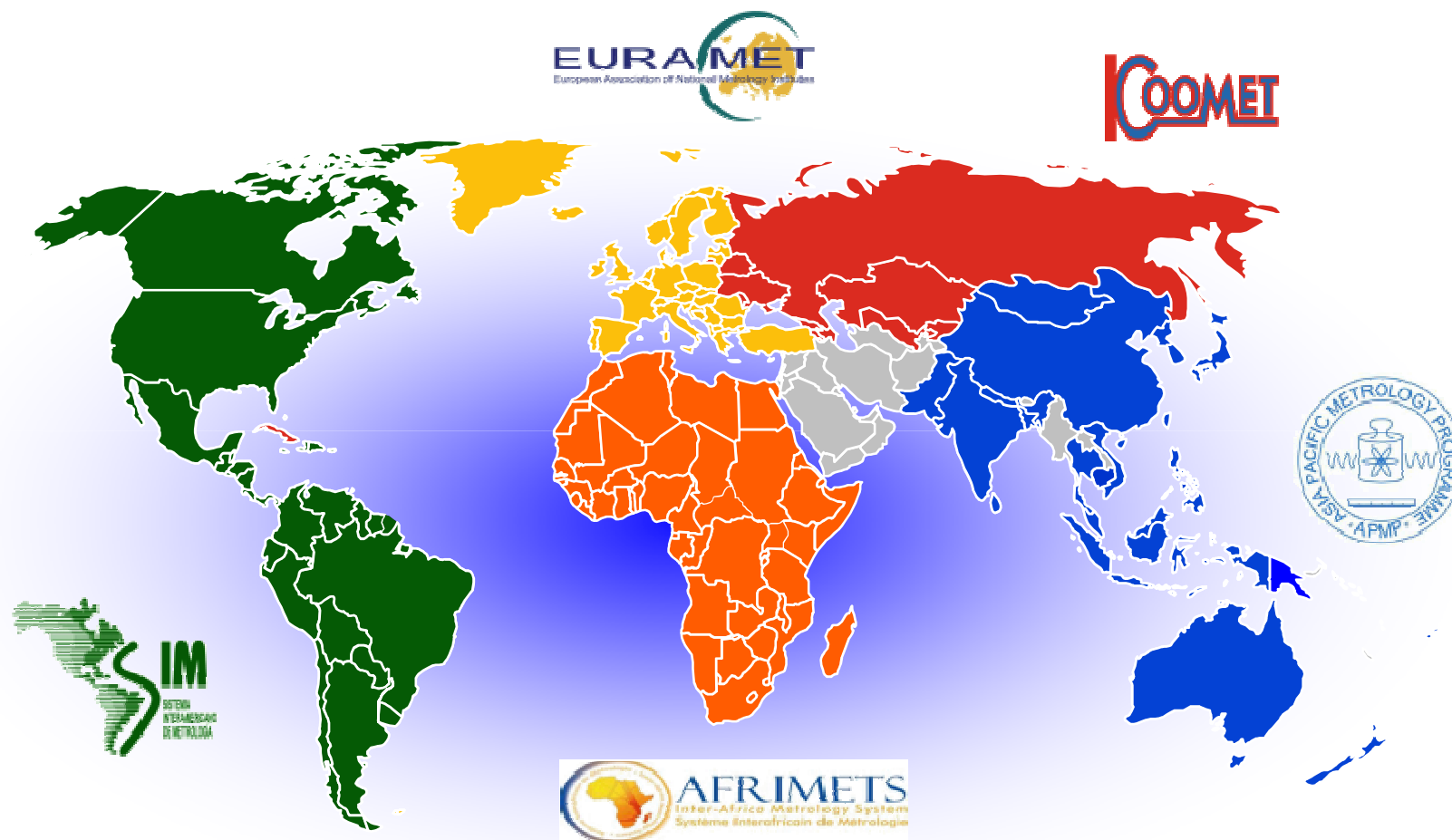
Research institute founded by the Metre Convention. Administers interlaboratory comparisons and provides measurement services to member NMIs.



Consultative Committees (CCs)

CCAUV – Acoustics, US & Vibration
CCEM – Electricity & Magnetism
CCL – Length
CCM – Mass and related
CCPR – Photometry & Radiometry
CCQM – Amount of substance
CCRI – Ionizing Radiation
CCT – Thermometry
CCTF – Time & Frequency
CCU - Units

Regional Metrology Organizations



The CIPM Mutual Recognition Arrangement

Reconnaissance mutuelle
des étalons nationaux de mesure
et des certificats d'étalonnage et de mesurage
émis par les laboratoires nationaux de métrologie
Paris, le 14 octobre 1999



Mutual recognition
of national measurement standards
and of calibration and measurement certificates
issued by national metrology institutes

Paris, 14 October 1999

Comité international des poids et mesures

Bureau
international
des poids
et mesures

Organisation
intergouvernementale
de la Convention
du Mètre

The CIPM Mutual Recognition Arrangement (CIPM MRA) was signed on 14 October, 1999 by the Directors of the National Metrology Institutes of 38 States signatories to the Metre Convention and two international organizations.

The essence of the CIPM MRA is that it provides the institutional and technical framework (the “what”, “who” and “how”) for NMIs to recognize each others' measurement standards and calibration certificates.

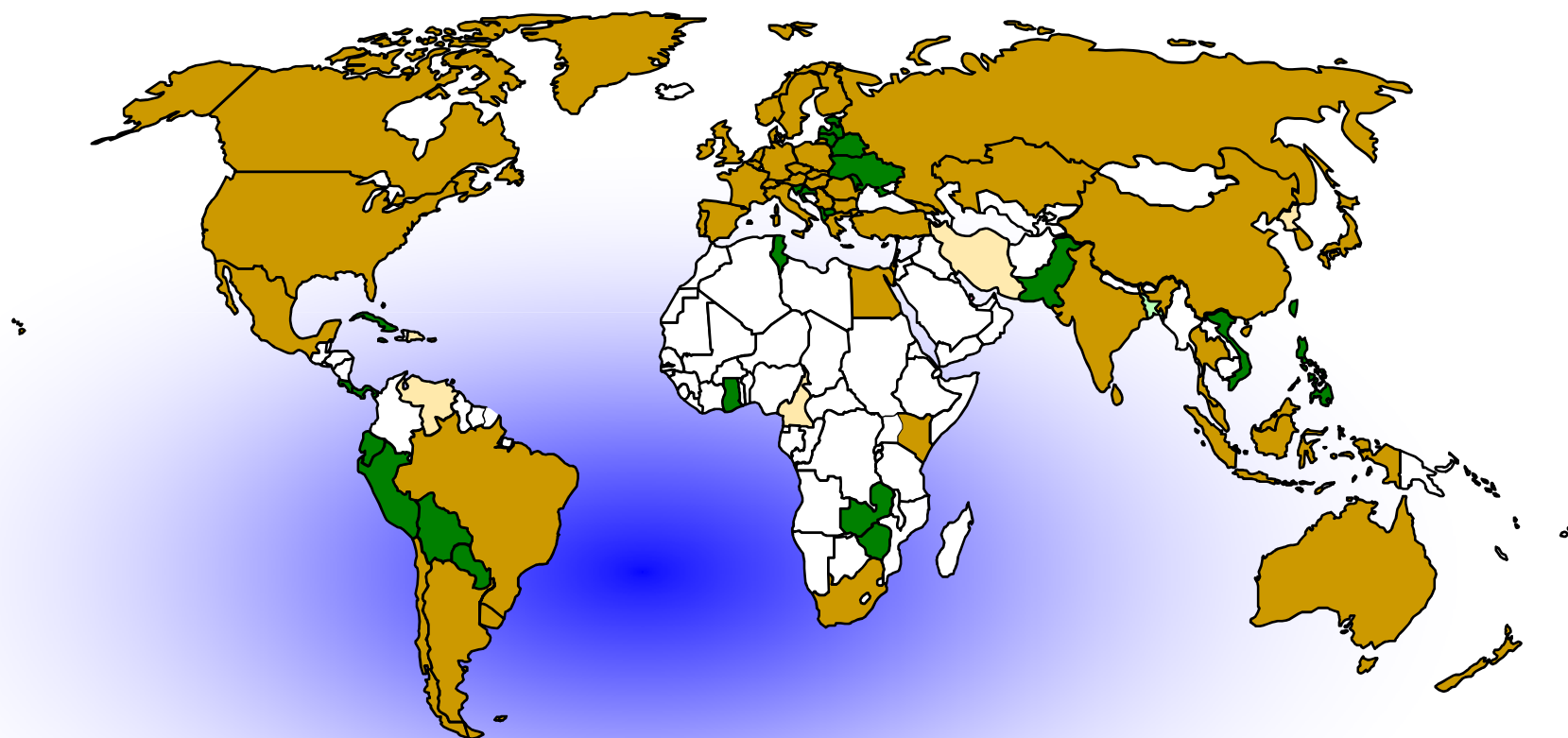


CIPM MRA Participation

| | | | | | | | | | | | |
|---|--------------------|---|---------------------------|---|--------------------|---|-------------|---|-------------------|---|-----------------------|
|  | Argentina |  | France |  | Mexico |  | Switzerland |  | Albania |  | Macedonia, the FYR of |
|  | Australia |  | Germany |  | The Netherlands |  | Thailand |  | Bangladesh |  | Malta |
|  | Austria |  | Greece |  | New Zealand |  | Turkey |  | Belarus |  | Mauritius |
|  | Belgium |  | Hungary |  | Norway |  | UK |  | Bolivia |  | Moldova, Republic of |
|  | Brazil |  | India |  | Pakistan |  | USA |  | Chinese Taipei |  | Panama |
|  | Bulgaria |  | Indonesia |  | Poland |  | Uruguay |  | Costa Rica |  | Paraguay |
|  | Cameroon |  | Iran, Islamic Republic of |  | Portugal |  | Venezuela |  | Cuba |  | Peru |
|  | Canada |  | Ireland |  | Romania | | |  | Ecuador |  | Philippines |
|  | Chile |  | Israel |  | Russian Federation | | |  | Estonia |  | Seychelles |
|  | China |  | Italy |  | Saudi Arabia | | |  | Hong Kong (China) |  | Slovenia |
|  | Croatia |  | Japan |  | Serbia | | |  | Ghana |  | Sri Lanka |
|  | Czech Republic |  | Kazakhstan |  | Singapore | | |  | Georgia |  | Tunisia |
|  | Denmark |  | Kenya |  | Slovakia | | |  | Jamaica |  | Ukraine |
|  | Dominican Republic |  | Korea, DPR of |  | South Africa | | |  | Latvia |  | Vietnam |
|  | Egypt |  | Korea Republic of |  | Spain | | |  | Lithuania |  | Zambia |
|  | Finland |  | Malaysia |  | Sweden | | | | |  | Zimbabwe |
| | | | | | | | | | |  | CARICOM |

Plus 3 international organisations
 FGNMID CIPM MRA Workshop Skopje,
 IRMM, IAEA, WMO
 April 27-29, 2011

CIPM MRA Participation



83 NMIs plus a further 135 designated institutes from
48 Member States
32 Associates of the CGPM
3 international organizations

Member participating in the CIPM MRA
Associate participating in the CIPM MRA

ECN MID CIPM MRA Workshop Skopje,
April 27-29, 2011



Essential Points: Objectives

The objectives of the CIPM MRA are listed as follows:

- 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**



Essential Points: Process

The objectives of the CIPM MRA are to be achieved through:

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

Essential Points: Outcome

The outcome of the CIPM MRA processes are **statements of the measurement capabilities of each NMI** in a database maintained by the BIPM and publicly available on the Web.





Essential Points: Engagement

By signing the CIPM MRA, an NMI agrees to:

- **accept the process** specified in the CIPM MRA for establishing the database
- **recognize the results of key and supplementary comparisons** as stated in the database
- **recognize the calibration and measurement capabilities of** other participating NMIs as stated in the database

Essential Points: Exclusions

The 'recognition' offered by the CIPM MRA is not unlimited:

- signature of the CIPM MRA engages NMIs but **not necessarily any other agency in their country**
- **responsibility for the results of calibrations and measurements rests wholly with the NMIs that makes them** and is not, through the CIPM MRA, extended to any other participating NMI

Essential Points: Organizational Structure

Roles and responsibilities within the CIPM MRA:

- overall **coordination** is by the **BIPM** under the authority of the **CIPM**
- the **CCs** of the **CIPM**, the **RMOs** and the **BIPM** are responsible for carrying out the **key and supplementary comparisons**
- a Joint Committee of the Regional Metrology Organizations and the BIPM (**JCRB**) is responsible for analyzing and transmitting entries into the database for the **calibration and measurement capabilities** declared by the NMIs



Comparisons in the CIPM MRA

- A fundamental mechanism of the CIPM MRA
- Primary function is to **establish the degrees of equivalence of national measurement standards** which is the technical basis on which NMIs recognize each others national measurement standards
- Key and Supplemental comparisons are also **demonstrations of NMI measurement capabilities**
- Registered in Appendix B of the KCDB

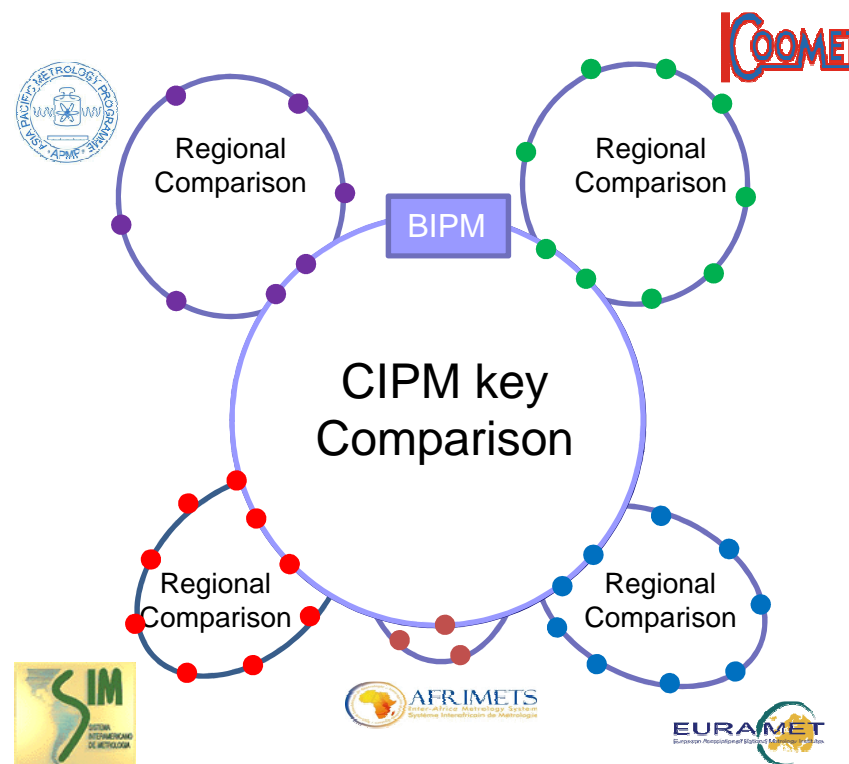
Comparisons in the CIPM MRA

There are 3 basic categories:

CIPM key

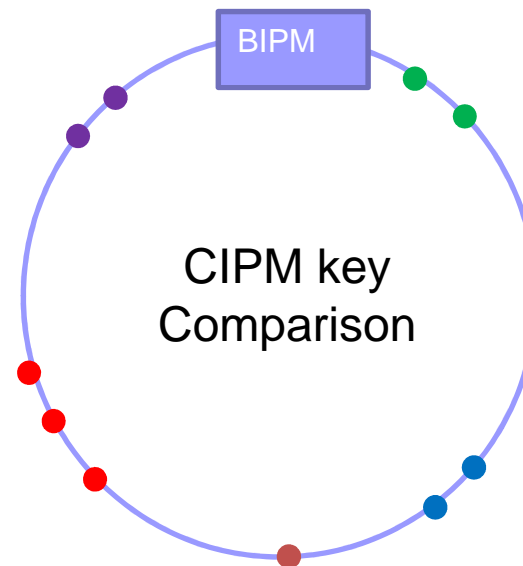
RMO key

Supplementary



Comparisons in the CIPM MRA

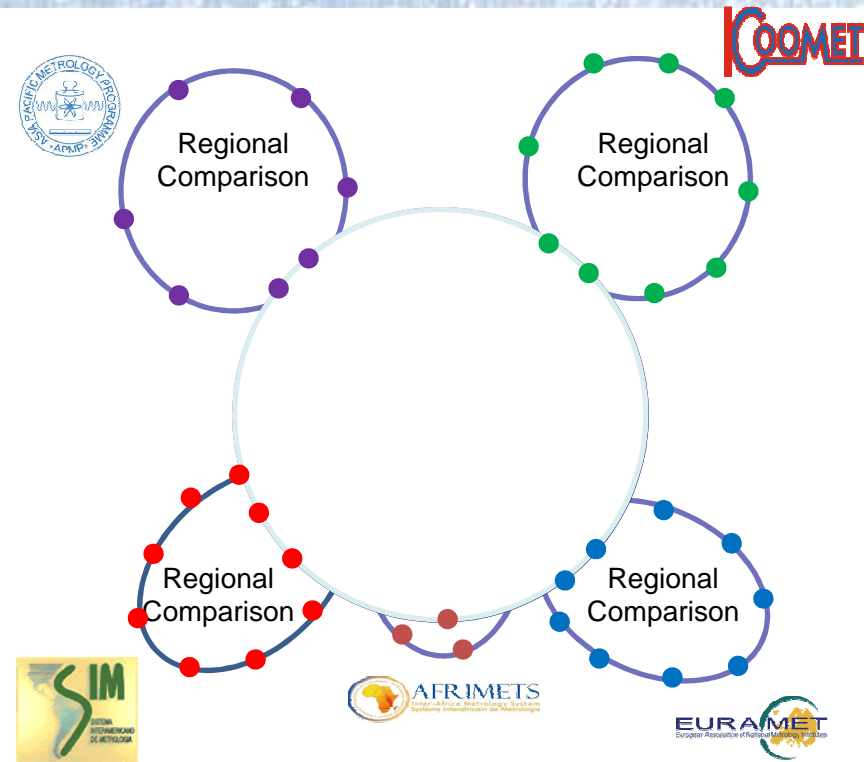
CIPM key
RMO key
Supplementary



- Highest level of accuracy
- Participation is limited to members of the Consultative Committees
- Reference value is determined by consensus among the participants

Comparisons in the CIPM MRA

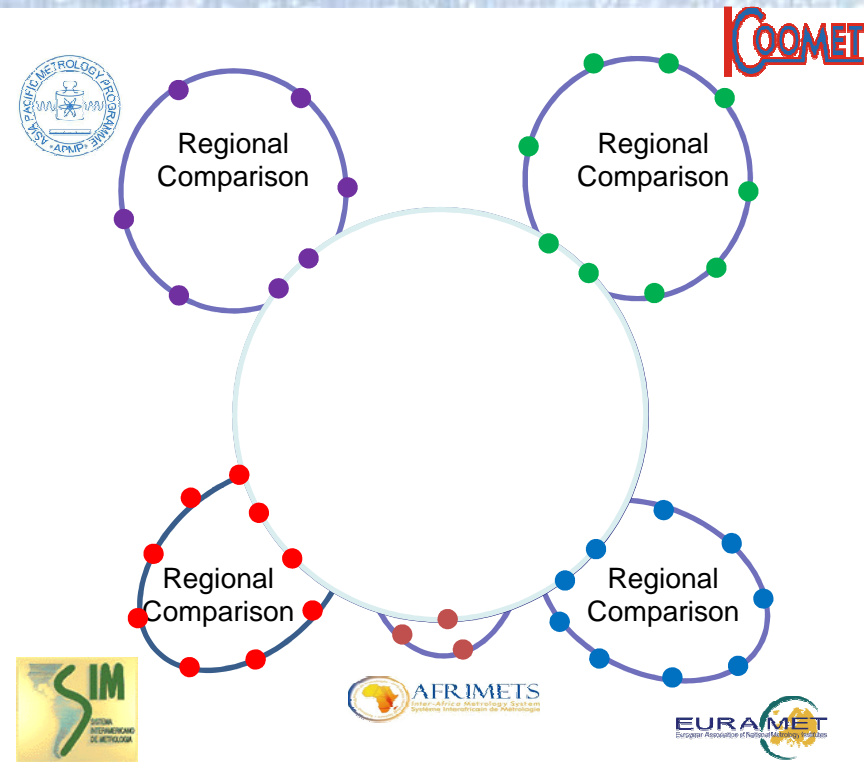
CIPM key
RMO key
Supplementary



- Follow the same protocol of the CIPM Key Comparisons
- The reference value is linked to the CIPM KC through the NMIs that participate in both comparisons (at least two NMIs)

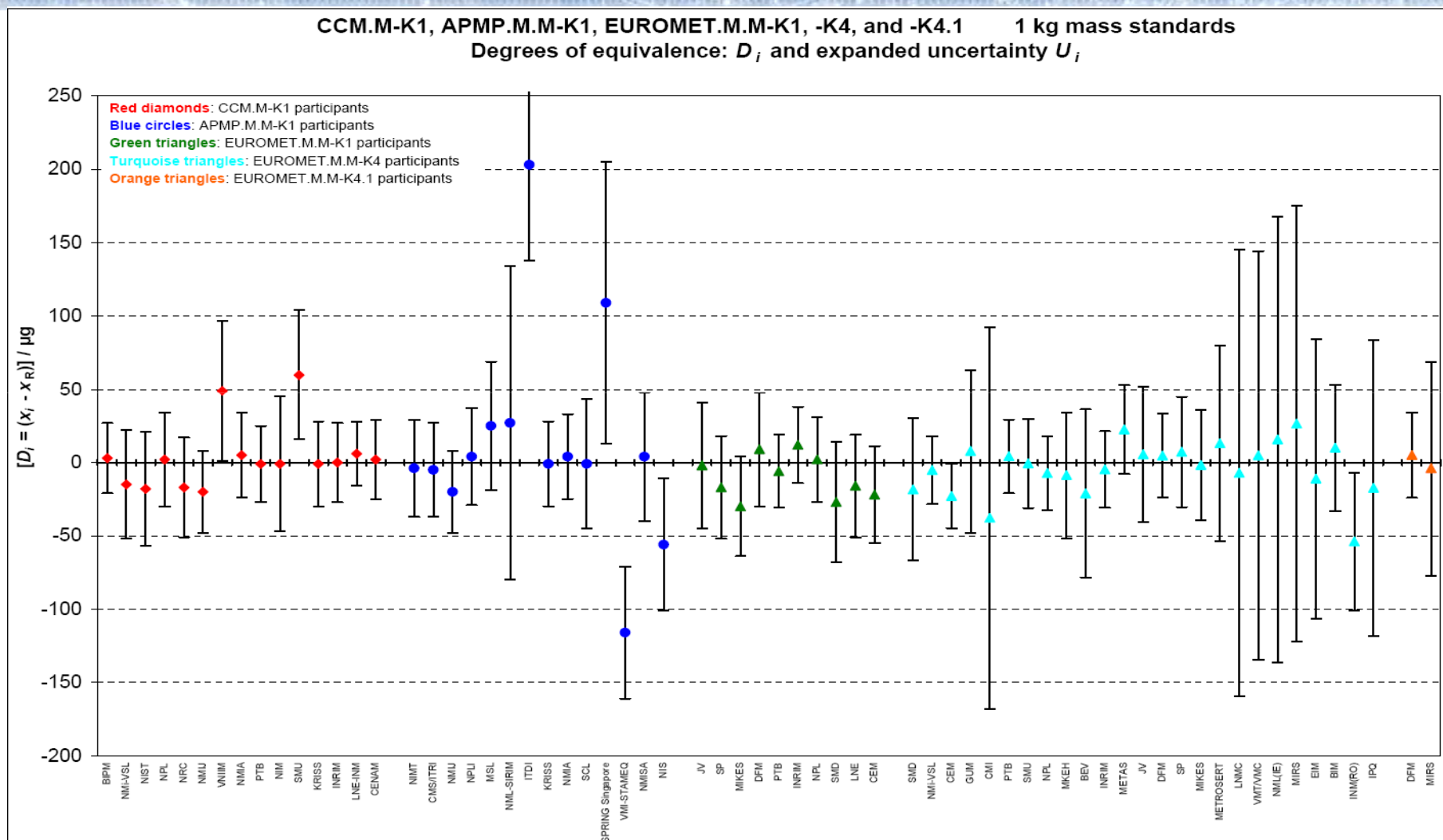
Comparisons in the CIPM MRA

CIPM key
RMO key
Supplementary



- Usually takes place in regions
- Covers areas not covered by Key Comparisons – lower accuracy measurements and different techniques

Comparisons in the CIPM MRA



Quality Systems in the CIPM MRA

- CIPM MRA requires that all signatory NMIs establish and maintain an appropriate Quality System (QS) as the basis of establishing confidence in each others calibration and measurement activities.
- NMIs have a choice between accreditation and self-declaration of their QS
- RMOs are responsible for oversight and approval of the QSs of their member NMIs
- RMOs must conduct full review of member NMI QSs at least every five years.



CMCs in the CIPM MRA

- Under the CIPM MRA, the Calibration and Measurement Capabilities (CMCs) of signatory NMIs are the fundamental object of mutual recognition.
- CMCs are described in terms of **measurand**, the **method** used, the **range**, the **uncertainty**, and if necessary, the influence **parameters**.
- CMCs declared by NMIs within the CIPM MRA undergo a **review process** at RMO and inter-RMO level
- CMCs are published in **Appendix C of the KCDB**

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Users of the CIPM MRA

Participating labs

- Benefit from coordination, greater rigour and increased acceptance of capabilities

Those NMIs wanting to hold a national standard that is not primary

- able to identify which NMIs can provide the traceability to the SI

The accredited laboratory community

- able to identify which NMIs can provide the traceability to the SI
- easily able to demonstrate valid traceability route to accreditors

Industry

- able to source top level measurement capability

Regulators

- who need a technical basis to underpin acceptance of non national calibrations



Evaluation of the CIPM MRA

- It has improved the quality of national standards
- It has improved the quality of services of NMIs and DIs
- It has made visible and transparent the capabilities of NMIs and DIs
- It has considerably reduced the number of bilateral comparisons and corresponding agreements
- It has increased the knowledge and mutual trust amongst NMIs and DIs
- It has contributed to removal of TBTs
- It has put a heavy work load on BIPM, NMIs, and DIs



Bureau International des Poids et Mesures

Thank you for your attention

