

## Report from the BIPM to the 51<sup>st</sup> CIML

### Background

The **international bureau of weights and measures (BIPM)** is an intergovernmental organization established by the Metre Convention, through which Member States act together on matters related to measurement science and measurement standards. There are currently 58 Member States and a further 41 Associated States and Economies who participate in the activities of the BIPM. **The mission of the BIPM is to** ensure and promote the global comparability of measurements, including the provision of the basis for a high-level coherent international system of units for:

- Scientific discovery and innovation,
- Industrial manufacturing and international trade,
- Sustaining the quality of life and the global environment.

The unique role of the BIPM is based on its international and neutral character enabling it:

- To coordinate the realization and improvement of the world-wide measurement system to ensure that it delivers accurate and comparable measurement results.
- To undertake in its laboratories scientific and technical activities in support of this system that are more efficiently carried out on behalf of Member States.
- To promote the importance of metrology to science, industry and society, in particular through collaboration with other intergovernmental organizations and international bodies and in international fora.

### Update on recent progress:

#### Review of the CIPM Mutual Recognition Arrangement (CIPM MRA)

The Mutual Recognition Arrangement of national measurement standards and of calibration and measurement certificates issued by National Metrology Institutes (CIPM MRA) continues to expand, with the NIMs from three additional states; Iran, United Arab Emirates and Qatar, signing in the twelve month period.

The CIPM MRA has now been signed by the representatives of 102 institutes – from 57 Member States, 41 Associates of the CGPM, and 4 international organizations – and covers a further 156 institutes designated by the signatory bodies. After some 15 years and following on from Resolution 5 adopted at the General Conference in 2014 the review of the CIPM MRA is well advanced. Significant analysis and consultation has been undertaken and two preparatory workshops have been held. *The Recommendations from the Working Group on the Implementation and Operation of the CIPM MRA* have been published on the dedicated CIPM MRA Review [webpage](#) and the community is now taking the recommendations forward.

#### The Key Comparison Database (KCDB)

The KCDB is the essential vehicle for the delivery of information underpinning the operation of the CIPM-MRA. At the end of August 2016, the KCDB included a total of 24 655 Calibration and Measurement Capabilities (CMCs) - 18 492 in Physics plus 6 163 in Chemistry. Over the last six months 24 countries have published CMCs. (A detailed breakdown is given at the end of this report).

As part of the recommendations of the review of the MRA, the KCDB software platform will be renewed and a new specification is being developed.

## **BIPM Symposium with the World Anti-Doping Agency (WADA)**

A central part of the liaison and coordination role of the BIPM is the organisation of Workshops with other international organisations.

The BIPM hosted a joint symposium with the World Anti-Doping Agency (WADA) on 28-29 September. One hundred invited experts from National Measurement Institutes, the clinical chemistry and laboratory medicine community and from WADA and the WADA-accredited anti-doping laboratories met over the two days to discuss the latest initiatives in areas of metrology for organic and biological analysis relevant to this high-profile measurement sector. The aims of the symposium were:

- to assess current needs and emerging priorities for the provision of reference materials and reference measurement systems to support activities in anti-doping analysis;
- to discuss the implementation of inter-laboratory comparisons to demonstrate equivalent measurement results for quantitative and qualitative analysis for prohibited substances and endogenous markers;
- to share knowledge on the latest approaches used in NMIs, clinical chemistry and doping control laboratories for the detection and quantification of chemical and biological analytes in urine and blood matrices.

The conclusions from the workshop will be published in the BIPM webpages.

## **The BIPM Capacity Building and Knowledge Transfer Programme**

It is recognised that all advanced nations already participate in the activities of the BIPM. However, many Member States and Associates that have joined recently are working to bring their metrology systems to maturity, and that will be the case for all future potential participants. Building on the discussions at the 2014 CGPM the BIPM has since developed a Capacity Building and Knowledge Transfer Programme (BIPM CBKT). The activities are open for support by voluntary contributions. The programme aims to enhance engagement from Member States and Associates with emerging metrology systems, and to aid wider sharing of the workload of operating the CIPM MRA. The programme offers a 'Menu' of possible activities allowing donors to focus their support on those they consider most worthwhile. Support has already been secured and the first project has been formulated, funded, and indeed completed.

The BIPM and the Italian Physical Society ran a joint Metrology School "Metrology: from physics fundamentals to quality of life" in Varenna (Italy), during the summer of 2016. The BIPM teamed up with METAS (Switzerland) and supported three students, allowing them to combine attendance at the Metrology School with a short placement at METAS to pursue a specific metrology topic of interest.

In a second project, supported by NIST (USA), an 11 day training course will enable 18 new and potential technical committee and working group chairs to increase the knowledge and confidence around the effective operation of the CIPM MRA. This course begins in November 2016, and will include lecturers from OIML/BIML.

A second NIST sponsored course is scheduled for late 2017 and is aimed at those newly engaged in the CIPM MRA. A number of other initiatives are also underway and agreed. BIPM staff will deliver targeted training in Dubai to participants from GULFMET in November 2016, and at the BIPM to participants from EURAMET in February 2017.

The BIPM CBKT also encompasses laboratory activity. The 2016-2018 "Metrology for Safe Food and Feed in Developing Economies" project is up and running. This project is designed to allow NMIs to work together to strengthen mycotoxin metrology infrastructure; provide knowledge transfer to scientists developing capabilities in this area, including periods as visiting scientists at the BIPM; and enable NMIs to provide mycotoxin calibrant and matrix reference materials and proficiency test materials to support mycotoxin testing laboratories within their countries. A second laboratory based BIPM CBKT activity is focusing on Metrology for

clean air- capabilities in gas metrology. The project is underway and aims to strengthening CENAM's (Mexico) roll as regional trainer for gas metrology.

Details of BIPM CBKT activities are available from the dedicated [webpage](#).

### **Working with OIML/BIML**

Collaboration with OIML continues to be very good.

The jointly organised World Metrology Day initiative has become an excellent and widely appreciated tool helping NMIs and authorities to raise awareness of metrology. The day is celebrated annually on May 20, the anniversary of the signing of the Metre Convention. The theme for 2016 is '*Measurements in a Dynamic World*', chosen to align with the increasing rapid pace of change in measurement science, and indeed of the world around us. The poster design work for 2016, overseen jointly by the two organisations, was undertaken with VNIIMS from the Russian Federation. World Metrology Day has become a major and effective awareness raising initiative, particularly welcomed in countries and economies with emerging metrology systems (CEEMS). In 2016 again participation in posters and events was very pleasing indeed with events organised in 31 countries (as well as an 'international;' event organised by CERN), and posters available in some 20 languages. The theme for 2017 will be '*Measurements for transport*' and the poster design will be undertaken in partnership with the Instituto Nacional de Metrología de Colombia (INM) in Colombia.

BIPM and OIML work alongside each other in a wide range of forums, including the quadripartite arrangement with ILAC and ISO, in the working groups of the JCGM, in the DCMAS Network where we have been jointly working to overhaul the dedicated website, and more recently within the ISO CASCO WG44 looking at the revision of ISO/IEC 17025. The two organisations also collaborate closely in terms of achieving the maximum impact in terms of raising the profile of metrology. When one or other organisation is unable to attend important meetings, the other organisation presents or speaks on their behalf. In the last year this approach has been used a number of times at, for example, the WTO TBT Committee. OIML/BIML representatives will lecture on the new BIPM training courses developed under the BIPM Capacity Building and Knowledge Transfer Programme (see below). OIML/BIML involvement ensures students hear first-hand how the key elements of the work of the international legal metrology community.

### **The proposed revision of the SI**

Work towards new definitions of the kilogram, ampere, kelvin, and mole in terms of fixed numerical values of the Planck constant, elementary charge, Boltzmann constant, and Avogadro constant, respectively continues. The scientific results are converging such that the expectation remains that redefinition will occur at the General Conference (CGPM) in 2018. Work is advanced on the new *mise en pratiques*, that is the set of instructions that allows the definition to be realized in practice at the highest level.

The 9th edition of the SI brochure is being finalised in anticipation of redefinition and is open for consultation.

### **BIPM staff and CIPM changes**

- Chingis Kuanbayev joined the BIPM International Liaison and Communication Department in July 2016 to strengthen the CBKT and programme monitoring capability.
- Doug Olson will complete his two-year secondment from NIST as JCRB executive Secretary at the end of 2016, and we will welcome Nikita Zviagin seconded from VNIIM who will take over the role for 2017 and 2018.
- The 18 Members of the CIPM are now elected at each CGPM for a period that runs until the next CGPM. Where CIPM Members need to step down between CGPMs, provisional elections are held

provisional appointments made. There are currently three such vacancies and an election process is currently underway. Full details of CIPM Members are available on the BIPM website.

### News and developments in the participation in the activities of the BIPM

Slovenia, an active Associate since 2002, acceded and became a full Member State on the 23rd March 2016. We welcomed Qatar as a new Associate of the CGPM on the 10<sup>th</sup> March 2016, and also welcomed back Sri Lanka as an Associate of the CGPM on the 17 August 2016 (Sri Lanka having previously been an Associate from 2007 until the end of 2014).

In October 2015 the CIPM granted provisional acceptance of GULFMET as a Regional Metrology Organization (RMO) in accordance with the procedures of the JCRB and within the meaning of the CIPM MRA. This allows GULFMET to participate in the CIPM MRA meetings and contribute to the CMC reviews to gain experience whilst its members build their capability.

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### Information from the Key Comparison Database

Full data is available from: <http://kcdb.bipm.org/>

### Key and Supplementary Comparisons registered on the KCBD at BIPM on 1 Sept 2016

Entity	KC	SC
BIPM	91	1
CC	470	28
AFRIMETS	4	17
APMP	133	98
COOMET	45	78
EURAMET	152	175
GULFMET <sup>4</sup>	0	1
SIM	59	82

### Calibration and Measurement Capabilities (CMCs) registered on the KCBD at BIPM on 1 Sept 2016

Entity	Total number of CMCs 1 September 2016	Increase/decrease last 12 months
AFRIMETS	521	+16 %
APMP	5615	+5 %
COOMET	2399	+2 %
EURAMET	11001	+2 %
GULFMET <sup>3</sup>	0	0 %
SIM	4872	1 %
ESA	0	
IAEA	26	
IRMM	218	
WMO	3	