

# BIPM Liaison Report

## to the WTO TBT Committee

*July 2022*

## THE VISION, MISSION AND OBJECTIVES OF THE BIPM

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

Its **vision** is to be universally recognised as the world focus for the international system of measurement.

Its **mission** is to work with the NMIs of its Member States, the RMOs and strategic partners world-wide and to use its international and impartial status to promote and advance the global comparability of measurements for:

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

## THE OBJECTIVES OF THE BIPM

- To represent the world-wide measurement community, aiming to maximize its uptake and impact.
- To be a centre for scientific and technical collaboration between Member States, providing capabilities for international measurement comparisons on a shared-cost basis.
- To be the coordinator of the world-wide measurement system, ensuring it gives comparable and internationally accepted measurement results.

Fulfilling our mission and objectives is underpinned by our work in:

- *capacity building*, which aims to achieve a global balance between the metrology capabilities in Member States;
- *knowledge transfer*, which ensures that our work has the greatest impact.

## KEY HIGHLIGHTS

- As of June 2022, the BIPM had 63 Member States, and 37 Associates – Cuba and Sudan ceased to be Associates of the CGPM. Seychelles withdrew as an Associate. Zimbabwe was reinstated as an Associate.
- [“Joint Statement of Intent On the digital transformation in the international scientific and quality infrastructure”](#) was signed by the BIPM, OIML, ISC, CODATA, IMEKO, ISO, IEC and ILAC in March, April and May 2022 respectively.
- The [BIPM-SIM Training course: KCDB 2.0](#) was held on 20-22 April 2022 and welcomed more than 160 participants from 20 countries over the three days.
- The World Metrology Day (20 May) theme for 2022 is "Metrology in the Digital Era". The 2022 World Metrology Day Resource Website is <https://www.worldmetrologyday.org/>.
- Suite of [CIPM MRA brochures](#) launched by the BIPM CBKT programme to provide information and assistance on key roles and mechanisms within the CIPM MRA. The brochures have been written in accessible way for both metrologists and non-experts alike.
- [“Knowledge Transfer through Metrologia”](#) initiative highlights the service rendered to the world-wide metrology community by senior scientists devoting time to publishing review papers on topics of interest and these papers being made openly available to all through Open Access publication in Metrologia.
- The BIPM Physical Metrology Department has developed [two CBKT e-learning courses on the kilogram](#) - the fundamental unit of mass in the International System of Units (SI).
- [A Session of the Units Summit](#) coordinated by BIPM and CODATA was held during SciDataCon22 on 22 June 2022.
- The draft CCQM Roadmap to Metrology Readiness for Infectious Disease Pandemic Response is now open for public consultation and comment until 15 July 2022.
- The online [Workshop on Metrology for Climate Action](#), will be hosted by the BIPM and the WMO on 26-30 September 2022.
- The 27th meeting of the CGPM will be held on 15-18 November 2022 at the Palais des Congrès de Versailles. The webpage is available at <https://www.bipm.org/en/cgpm-2022>.

## THE CIPM

Session II of the 111th meeting of the CIPM was held in June 2022. All CIPM Decisions are available on the BIPM webpage at <https://www.bipm.org/en/committees/ci/cipm/outcomes>.

The BIPM hosted a webinar in March 2022 on the topic of Git for metrology, with a focus on the “git” free software, which is widely used for “version control” in software development.

The webinar was organized by the Consultative Committee for Ionizing Radiation (CCRI) and attracted more than 250 participants. It is now available from the BIPM YouTube channel.

The draft CCQM Roadmap to Metrology Readiness for Infectious Disease Pandemic Response has been published and is open for public consultation and comment until 15 July 2022. This document identifies priorities and sets out pathways for pandemic preparedness for the metrology community resulting from the 2021 series of Consultative Committee for Amount of Substance: Metrology in Chemistry and Biology (CCQM) Webinars and Workshop held on 5-7 October 2021. The objective of the CCQM workshop was to develop a roadmap for metrology to support measurements associated with infectious disease and future pandemic readiness, based on identifying and characterizing appropriate prognostic and diagnostic technologies, platforms and data management/integration, and recommending specific metrology interventions that could enable a more rapid response and enhance clinical outcome for a future pandemic.

### Digital transformation

Most of the digital tools that accompany our lives are based on exchange of data, ruled by specific protocols. The GO-FAIR initiative [\[https://www.go-fair.org/\]](https://www.go-fair.org/), launched in 2017, promotes realizations compliant with the FAIR guiding principles, where data should be Findable, Accessible, Interoperable and Reusable, the cornerstones for the robust management of data exchange [M.D.

Wilkinson et al. Scientific Data, 2016 **18**  
[\[https://doi.org/10.1038/sdata.2016.181\]](https://doi.org/10.1038/sdata.2016.181).

Digitalization and exchange of data will have a large impact on metrology and quality infrastructure. The CIPM, whose mission is to promote world-wide uniformity in units of measurement, has formed a task group on the digital SI (CIPM TG DSI) to develop and establish a world-wide uniform, unambiguous and secure data exchange format based on the International System of Units (SI) described in the current SI Brochure [\[https://www.bipm.org/documents/20126/41483022/SI-Brochure-9.pdf/fcf090b2-04e6-88cc-1149-c3e029ad8232\]](https://www.bipm.org/documents/20126/41483022/SI-Brochure-9.pdf/fcf090b2-04e6-88cc-1149-c3e029ad8232).

One of the tasks of its Expert Group, working under the auspices of the CIPM TG SI, is to examine the feasibility of several web ontologies using notably the KCDB as a test case.

The BIPM is presently engaged in several projects in digitalization. The initial goal is to make data machine readable, but where interoperability is to be integrated, dependent on the CIPM TG-DSI outcome.

The following project are being developed at the BIPM:

- Work on contents of the SI brochure to become a corner stone for the digitized system of units has much progressed. Associated documents known as Mises en Pratique, will be digitized subsequently, and groups within each Consultative Committee are now successively being formed to advise on the contents.
- Providing digital and interoperable Calibration and Measurement Capabilities (CMCs) as listed in the Key Comparison Database (KCDB). The integration of interoperable information to become FAIR is an extension of the realization of an Application Programming Interface (API) for search of CMCs, implemented in 2021, giving access to machine readable data [\[https://www.bipm.org/en/cipm-mra/kcdb-api\]](https://www.bipm.org/en/cipm-mra/kcdb-api).

- The realization of an API and associated database to give machine readable access to recommended frequencies for the realization of the Metre is in progress.
- Digitized dissemination of the UTC. A beta version of an API is presently available [\[https://webtai.bipm.org/api/index.html\]](https://webtai.bipm.org/api/index.html).
- New web and database support for the Joint Committee for Traceability in Laboratory Medicine (JCTLM), where data will become FAIR [\[https://www.bipm.org/jctlm/home.do\]](https://www.bipm.org/jctlm/home.do) is under validation.
- Development of a database on key values linked to comparisons of radioactive elements <https://www.bipm.org/en/radionuclide-metrology>

Other projects are planned (list not exclusive):

- Creating an accessible database on reference standards in gas metrology, supporting environmental issues.
- Creating an accessible database on quantitative nuclear magnetic resonance reference (qNMR) data in organic chemistry.
- Implementing digital calibration certificates for the calibration services provided by the BIPM.

The BIPM recently contributed to the ScDataCon 2022 <https://codata.org/call-for-sessions-scidatacon-2022/> by giving a webinar on 22 May 2022 “Developments Towards Interoperable Metrology” on a selection of the activities above <https://www.bipm.org/en/bipm-workshops/dig-met>.

### The 27th meeting of the CGPM (2022)

The 27th meeting of the CGPM will be held on 15-18 November 2022 at the Palais des Congrès de Versailles. A “Special procedure” has been proposed by the CIPM to introduce the special technical arrangements for a

hybrid meeting. The meeting webpage is available at: <https://www.bipm.org/en/cgpm-2022>.

## INSTITUTIONAL NEWS

### *Liaison with Member States and Associates of the CGPM*

As of June 2022, the BIPM had 63 Member States, and 37 Associate States and Economies of the General Conference on Weights and Measures (CGPM). In January 2022 Cuba and Sudan were ceased to be Associates and Seychelles withdrew as an Associate. On February 8, 2022, the Republic of Zimbabwe was reinstated as an Associate of CGPM after ceasing to be Associate on January 1, 2021.

The list of Member States and Associates of the CGPM is annexed to this report and is also available at the BIPM website.

### *Liaison with international organizations*

The BIPM has a series of ongoing institutional and technical interaction with over 30 international organizations and international bodies.

### World Metrology Day

Each year on 20 May, the world-wide metrology community celebrates the day the *Metre Convention* was signed in 1875. The project is run jointly by the BIPM and the OIML. The theme for World Metrology Day 2022 is “*Metrology in the Digital Era*”. This theme was chosen because digital technology is revolutionizing our community and is one of the most exciting trends in society today. The 2022 poster was designed under the auspices of the COOMET Regional Metrology Organization. The poster is translated into more than 20 languages and information on more than 30 national celebratory events are provided on the 2022 World Metrology Day Resource Website <https://www.worldmetrologyday.org/>.

### Joint Statement of Intent

The BIPM, the International Organization of Legal Metrology (OIML), the International

Measurement Confederation (IMEKO), the International Science Council (ISC) and its Committee on Data (CODATA), the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC) and the International Laboratory Accreditation Cooperation (ILAC) signed the [Joint Statement of Intent On the digital transformation in the international scientific and quality infrastructure](#) in March, April and May 2022, respectively.

The joint statement provides a platform for the signatory organizations to come together to indicate their support, in a way appropriate to their particular organization, to the development, implementation, and promotion of the SI Digital Framework as part of a wider digital transformation of the international scientific and quality infrastructure. The addition of IEC and ILAC further strengthens the collaboration and global reach of the initiative.

The joint statement is part of an ongoing initiative by the CIPM and its Task Group on the Digital SI (CIPM-TG-DSI) to develop and establish a world-wide uniform and secure data exchange format based on the International System of Units (SI).

### Liaison with the WMO

The online workshop on Metrology for Climate Action, to be hosted by the BIPM and the World Meteorological Organization (WMO) on 26-30 September 2022 aims to present progress and identify requirements for further development of advanced measurements, standards, reference data, comparisons, calibrations and metrological techniques to support the physical science basis for and adaptation to climate change, as well as efforts to mitigate greenhouse gas emissions.

The workshop will cover the themes of metrology in support of the physical science basis of climate change and climate observations, as well as metrology towards a coordinated system to evaluate greenhouse gas emission budgets based on accurate observations. The output of the workshop will

be a set of recommendations on key technical challenge areas for metrology over the next decade.

### International Congress of Metrology - CIM 2023

The 21st edition of the International Congress of Metrology - CIM 2023 - will be held in Lyon (France) from 7 to 10 March 2023.

The CIM is the one event where metrology meets science, industry and quality infrastructure bodies. More information regarding the main aims of the congress can be found at <https://www.cim2023.com/en/>.

The CIM 2023 call for papers is now open with a submission deadline set for late July. The following link will bring you directly to the call for papers web page which also includes the detailed scope of the congress: <https://www.cim2023.com/en/call-for-paper>.

### Liaison with CODATA

A Session of the Units Summit coordinated by BIPM and CODATA was held during SciDataCon22 on 22 June 2022. The session included talks about how the BIPM was working on the digital transformation of its databases and services as well as the work being initiated in the Consultative Committees, with examples of the work going on within the Consultative Committee for Time and Frequency and the Consultative Committee for Length.

### Liaison with the OECD

The OECD established the *Partnership of international organisations for effective international rulemaking (IO Partnership)* as a voluntary platform of IOs, academics and OECD Regulatory Policy Committee delegates, to exchange good practices and promote greater quality, effectiveness, and impact in international rulemaking. The French version of the [Compendium of International Organisations' Practices: Working Towards More Effective International Instruments](#) published in 2021, was launched in March 2022. The Spanish version was launched in July 2022.

The Compendium lists the BIPM practices such as World Metrology Day, CBKT Programme, CIPM MRA Review, JCGM, etc. in five core focus areas.

The BIPM is the focal point of the WG2: Enhancing inclusiveness of international rulemaking.

## CIPM MRA AND KCDB

The CIPM MRA is the '*Mutual Recognition Arrangement of National Measurement standards and of calibration and measurement certificates issued by National Metrology Institutes*'. Participation in the CIPM MRA continues to grow: it has been signed by representatives from 63 Member States, 37 Associates of the CGPM, and four international organizations – and covers a further 152 institutes designated by the signatory bodies.

On 5 July, the [KCDB](#) included a total of 25 843 CMCs. There are 1129 key comparisons and 655 supplementary comparisons registered in the KCDB.

## CAPACITY BUILDING AND KNOWLEDGE TRANSFER (CBKT) PROGRAMME

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

To date, there are 2739 participants in the various CBKT activities (in-person and online) from 102 countries, covering all six RMOs. At the time of writing, over 76 % of Member States and Associates have participated in the CBKT Programme (as trainees, lecturers and sponsors).

The covid-19 crisis accelerated the strategic plan to offer remote-learning opportunities for the NMI/DI and RMO communities. With remote-learning in the form of short courses and technical exchanges implemented in 2020, the BIPM took a further significant step

in 2021 by working with an external contractor to develop a bespoke e-learning solution based on the Moodle - Open-Source software. The platform is accessible around the clock and is optimized for desktop and hand-held devices to provide learning support to metrologists as conveniently as possible.

In 2022 the e-learning platform was expanded to enable it also to host the material from the interested RMOs.

The BIPM-SIM Training course: KCDB 2.0 was held on 20-22 April 2022 and welcomed more than 160 participants from 20 countries over the three days. The online course was organized for member NMIs and DIs of the Inter-American Metrology System (SIM). The three-day (3.5 hours/day) online training course was designed to deliver information for those who: write CMCs in the KCDB; review the CMCs; pilot comparisons; and for TC/WG Chairs who operate the CIPM MRA processes.

Since May 2020, fifteen online projects have been organized involving more than 1300 participants from NMI/DI community and 604 from ILAC community.

Metrology for Clean Air: on-line Knowledge Transfer Programme on the Dynamic gas standard generation will be launched in 2022.

Metrology for Laboratory Medicine: Peptide standards will be launched in 2023.

The joint initiative "BIPM-TÜBİTAK UME project placements" was extended for another two cycles, which will be delivered in 2022 and 2023. This extension follows the success of the previous four cycles.

Over four cycles of this initiative (from 2018 to 2021), the BIPM and TÜBİTAK UME have hosted thirty-seven talented metrologists from twenty-four countries for a period of 1 to 3 months at the TÜBİTAK UME laboratories. The reports received from the participants on completion of their placements have demonstrated that the projects were an extremely valuable method of knowledge transfer. The research projects have covered

a diverse range of subjects from decreasing the uncertainty of measurement standards through to expanding metrological capabilities in the laboratory to underpin scientific activities, healthcare, and industry.

The BIPM Physical Metrology Department has developed two CBKT e-learning courses on the kilogram - the fundamental unit of mass in the International System of Units (SI), which was redefined on 20 May 2019. The courses describe how to realize the mass unit and how the kilogram is disseminated following its redefinition.

Two e-learning courses are available:

- Dissemination of the kilogram following its redefinition.
- Realization of the kilogram following its redefinition.

A suite of [brochures](#) has been published under the auspices of the BIPM CBKT programme to provide information and assistance on key roles and mechanisms within the CIPM MRA. The brochures have

been written in accessible way for both metrologists and non-experts alike.

“Knowledge Transfer through Metrologia” initiative highlights the service rendered to the world-wide metrology community by senior scientists devoting time to publishing review papers on topics of interest and these papers being made openly available to all through Open Access publication in Metrologia.

Authors interested in proposing a review paper for open-access publication are invited to contact the Editor of Metrologia.

The courses are available at:

<https://e-learning.bipm.org/> and require self-enrolment.

Full details of the BIPM CBKT Programme are available at:

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

For highlights of the BIPM scientific programme for the period, please refer to the BIPM Annual Review 2020/2021:

<https://www.bipm.org/en/publications/annual-review>

## ANNEX

### 63 Member States

(as of June 2022)

Argentina	Korea (Republic of)
Australia	Lithuania
Austria	Malaysia
Belarus	Mexico
Belgium	Montenegro
Brazil	Morocco
Bulgaria	Netherlands
Canada	New Zealand
Chile	Norway
China	Pakistan
Colombia	Poland
Croatia	Portugal
Czechia	Romania
Denmark	Russian Federation
Ecuador	Saudi Arabia
Egypt	Serbia
Estonia	Singapore
Finland	Slovakia
France	Slovenia
Germany	South Africa
Greece	Spain
Hungary	Sweden
India	Switzerland
Indonesia	Thailand
Iran	Tunisia
Iraq	Turkey
Ireland	Ukraine
Israel	United Arab Emirates
Italy	United Kingdom
Japan	United States of America
Kazakhstan	Uruguay
Kenya	

### 37 Associates of the CGPM (States and Economies\*)

(as of June 2022)

Albania	Mongolia
Azerbaijan	Namibia
Bangladesh	Oman
Bolivia	Panama
Bosnia and Herzegovina	Paraguay
Botswana	Peru
Cambodia	Philippines
CARICOM* (11 members: <i>Antigua and Barbuda</i> <i>Barbados</i> <i>Belize</i> <i>Dominica</i> <i>Grenada</i> <i>Guyana</i> <i>Saint Kitts and Nevis</i> <i>Saint Lucia</i> <i>Saint Vincent and the Grenadines</i> <i>Suriname</i> <i>Trinidad and Tobago</i> )	Qatar
	Sri Lanka
	Syrian Arab Republic
	Tanzania
	Uzbekistan
	Viet Nam
	Zambia
	Zimbabwe





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