

Bureau International des Poids et Mesures

Consultative Committee for Ionizing Radiation (CCRI)

Report of the workshop to discuss the CCRI Strategic Plan 2020-2025 and
the CIPM MRA Review

29 June 2017



Comité international des poids et mesures

**LIST OF MEMBERS OF THE
CONSULTATIVE COMMITTEE FOR IONIZING RADIATION
as of 29 JUNE 2017**

President

Dr Wynand Louw, member of the International Committee for Weights and Measures

Executive Secretary

Mr José María Los Arcos, International Bureau of Weights and Measures [BIPM], Sèvres

Members

Laboratoire National de Métrologie et d'Essais [LNE (represented by LNE-LNHB/CEA and LNE-IRSN)]

Federal Agency on Technical Regulating and Metrology [Rosstandart], Moscow

Korea Research Institute of Standards and Science [KRISS], Daejeon

National Institute of Metrology [NIM], Beijing

National Institute of Standards and Technology [NIST], Gaithersburg

National Metrology Institute of Japan, AIST [NMIJ/AIST], Tsukuba

National Physical Laboratory [NPL], Teddington

Physikalisch-Technische Bundesanstalt [PTB], Braunschweig

Official observers

Bundesamt für Eich- und Vermessungswesen [BEV], Vienna

Central Office of Measures/Główny Urząd Miar [GUM], Warsaw

Centro Español de Metrología [CEM], Madrid

Czech Metrology Institute [CMI], Brno

Federal Institute of Metrology METAS [METAS], Bern-Wabern

Government Office of the Capital City Budapest [BFKH], Budapest

Instituto Nacional de Metrologia, Qualidade e Tecnologia [INMETRO], Rio de Janeiro

Institutul National de Metrologie [INM], Bucharest

Istituto Nazionale di Ricerca Metrologica [INRIM], Turin

National Measurement Institute, Australia [NMIA], Lindfield

National Metrology Institute of South Africa [NMISA], Pretoria

National Research Council of Canada [NRC], Ottawa

Slovak Institute of Metrology/Slovenský Metrologický Ústav [SMU], Bratislava

Nederlands Meetinstituut Van Swinden Laboratorium [Nmi-VSL], Delft

Liaisons

European Commission - Joint Research Centre [JRC-Geel], Geel

International Atomic Energy Agency [IAEA], Vienna

International Commission on Radiation Units and Measurements [ICRU]

1–4 INTRODUCTIONS

The CCRI Workshop on “the 2020-2025 Strategic Plan and the CIPM MRA” was held at the BIPM in Sèvres on 29 June 2017.

The following were present:

T. Aalbers (VSL), C. Andersen (DTU), U. Ankerhold (PTB), A. Berlyand (VNIIFTRI), V. Berlyand (VNIIFTRI), H. Bjerke (NRPA), V. Blideanu (LNE-LNHB), J de Pooter (VSL), F. Delaunay (LNE-LNHB), S. Duane (NPL), N. Durny (SMU), S. Galer (NPL), S. Judge (NPL), L. Karam (NIST), N.E. Khaled (NIS), A. Knyziak (GUM), C. Kottler (METAS), L. Le Noir de Carlan (LNE-LNHB), J. Logar (ASTM), W. Louw (CCRI President), M. McEwen (NRC), G. Machula (BFKH), E. Mainegra-Hing (NRC), F. Maringer (BEV), A. Meghzifene (IAEA), , R. Minniti (NIST), Z. Msimang (NMISA), C. Oliver (ARPANSA), M. Pinto (ENEA-INMRI), P. Rosado (LNMRI/IRD), J. Smoldasova (CMI), V. Sochor (CMI), J. Stenger (PTB), J. Suran (CMI), A. Villevalde (VNIIM), K. Wang (NIM), J. Wu (NIM), C-Y Yi (KRISS), J. Zhang (NIM).

BIPM staff: D. Burns, J-M Los Arcos (CCRI Executive Secretary), M. Milton (BIPM Director), S. Maniguet, S. Picard, P. Roger, N. Zviagin (JCRB Executive Secretary).

Dr Wynand Louw (CCRI President) welcomed delegates to the workshop and explained that the aim was to discuss the CCRI 2020-2025 strategic plan in more detail than would be possible at the CCRI meeting, taking into account the outcomes from the CIPM review of the MRA.

5 CIPM MRA REVIEW

Dr Louw (CCRI President) reported that the CIPM had reviewed the current approach to the MRA and CMCs, and that the CIPM’s findings had been presented at the meeting of Consultative Committee Presidents. In addition, Section Chairs, RMOs and larger NMIs had been consulted. The general outcome from the CIPM review was a desire to reduce the number of key comparisons and to simplify the CMCs.

Action R1a from the CIPM meeting stated that the strategies must define a long-term plan for key comparisons, and requested that RMO TCs should plan and harmonize local comparison exercises. Possible issues with these approaches are constraints on the availability of people to attend the technical meetings, and co-ordinating comparisons between RMO TCs and the CCRI.

There had also been problems with the long timescales needed to run comparison exercises, sometimes due to delays in circulating artefacts for the exercises. Possible solutions to this problem were to limit participation to the key comparisons and arrange complementary regional comparisons, or to use multiple artefacts.

Action R2c concerned achieving better consistency in the expression of CMCs (units, uncertainty ranges etc). How to implement this is being discussed by RMOs – EURAMET have put forward a proposal.

Action R3a concerned the use of the Measurement Method Matrix as a technique for reducing the number of key comparisons, enabling one key comparison to cover a number of CMCs. The CCQM has adopted such a method, based on a set of comparisons for “core competencies”.

Actions R3b and R3c reflected that the intended use of CMCs was to enable NMIs to list the services they can offer. CMCs should be representative rather than comprehensive, and NMIs were encouraged to use the uncertainty budget to reduce the number of CMCs.

Action R4a identified the need for a risk-based approach to CMC review, in order to simplify and speed up the process. ‘Key’ and ‘derived quantities’ require a different level of scrutiny.

Action R4b also addressed the issue of simplifying the review of CMCs, by harmonizing the evidence required to support CMCs that do not arise from participation in key or supplementary comparisons. Dr Karam (NIST and Chair of Section II) reported that work has started on an interpretation document for the CCRI.

Actions R4d, R4f and R5a concerned the need to expand the number of pilot laboratories. The BIPM capacity building programme can help to support this by offering training for NMIs.

During the discussion, Dr Karam (NIST and Chair of Section II) asked if a CC could organize supplementary comparisons. Dr Milton (BIPM Director) replied that the CCQM (for example) does not organize supplementary comparisons but tends to run pilot studies instead – there was a general concern in the CIPM over the growth in key comparisons versus supplementary comparisons. Dr Louw (CCRI President) said that it would be helpful to clarify the definitions of the different types of comparison. Dr Stenger (PTB) said that the CIPM MRA does set some constraints and it would be possible to take examples from other CCs.

Dr McEwen (NRC and Chair of Section I) emphasized the value of key comparisons in the international measurement system. Dr Louw (CCRI President) agreed, and said that changes should focus on improving efficiency without impacting technical integrity.

6 BIPM IONIZING RADIATION STRATEGY

Mr Los Arcos (BIPM) reported that the BIPM strategy to 2025 had been drafted and was open for comments on the BIPM website (http://www.bipm.org/cc/PARTNERS/Allowed/2017_October/2017-08-07-BIPM-strategic-plan.pdf). The strategy would be reviewed by the CIPM in October 2017 and would then be presented to the 26th CGPM (2018).

The aims of the BIPM strategy were to maximize the impact of the international measurement system, to act as a centre for collaboration and to co-ordinate the measurement systems in different countries. Two new activities were included in the BIPM strategy: capacity building and knowledge transfer. The draft strategy also identifies the need to take account of opportunities to outsource access to facilities where feasible and necessary. In developing the plan, high value activities had been prioritized and the essential technical work needed at the BIPM had been reviewed, taking into account financial constraints. One key point from the Ionizing Radiation strategy was the need to co-ordinate the work of BIPM with that at the NMIs and the IAEA. Once the strategy had been agreed, the BIPM would develop detailed project plans.

Dr Louw (CCRI President) asked what the main risks were for the plan (for example, regulatory permission may not be given for a replacement ⁶⁰Co source). Dr Milton (BIPM Director) replied that the financial provision for the ⁶⁰Co source would be debated by the CIPM, and that some risks could be mitigated by working more closely with the NMIs and international organizations such as the IAEA and DOSEO (CEA). Dr Louw (CCRI President) agreed that sharing facilities can be very positive but some NMIs may be constrained by having to focus on their national missions.

Dr McEwen (NRC and Chair of Section I) pointed out that sharing facilities can also be difficult in practice, balancing local control of the facility and the needs of the BIPM.

7 FEEDBACK FROM THE JCRB

Dr Zviagin (JCRB Executive Secretary) explained that the outcomes from meetings of the JCRB are published on the BIPM website (<http://www.bipm.org/jsp/en/JCRBOutcomes.jsp>).

The CBKT (Capability Building Knowledge Transfer) programme (<http://www.bipm.org/en/cbkt/>) was continuing to expand, including opportunities for courses and placements.

Some changes to the CIPM MRA documentation had been agreed, including a new template for recording uncertainties and references to ISO 17034. It is possible to see an overview of the CMC reviews on <http://www.bipm.org/JCRBCMCs/> on a closed part of the BIPM website (username and password available on request to the CCRI Executive Secretary).

The key comparison database contained 4099 entries for Ionizing Radiation, of which 2882 concerned radionuclide metrology. The data showed that the average time to review a CMC was 226 days, and one review took more than 2 years. Information on some 1500 comparisons was included, and that key and supplementary comparisons have grown significantly since 2004.

During the discussion, Dr Karam (NIST and Chair of Section II) pointed out that there is risk of misinterpreting the time taken to review CMCs; the review process itself is usually very quick but laboratories can take a long time if asked to revise the submission.

Dr Louw (CCRI President) contributed further information on CMCs and emphasized that the growth in CMCs in Ionizing Radiation was driven by expansions in applications in cancer therapy, nuclear medicine and nuclear energy.

8 NEW KEY COMPARISON DATABASE (KCDB 2.0)

Dr Picard (BIPM) and Dr Maniguet (BIPM) explained the progress in developing the new KCDB. Following recommendations developed by a Working Group, the new database would have a web-interface, sophisticated search facility including numerical search terms as well as text, and tools to track progress of CMC reviews and comparisons in real time. The CMC review process would be more transparent, web-based and support intra- and inter-reviews with control of access to data. Publication would be possible for individual CMCs rather than the current batch-based process.

A detailed specification had been developed for the database and an invitation to tender had been issued. The intention was to present KCDB 2.0 to the 26th CGPM (2018).

9 EURAMET STRATEGY FOR THE CIPM MRA

Dr Ankerhold (PTB and Chair of EURAMET TC-RI) presented feedback from EURAMET on proposals for a revised system for CMCs.

At present, there was a large number of CMCs for ionizing radiation metrology, dominated by entries from EURAMET members. This had resulted in many comparison exercises to support the claims and time-consuming CMC reviews. A risk was noted that the number of CMCs could be interpreted as a performance indicator for a national measurement institute, resulting in a proliferation of CMCs.

EURAMET's view was that there needed to be a paradigm shift in the CMC system, with more emphasis placed on the quality assurance management systems with CMCs regarded as representative rather than comprehensive.

The EURAMET TC-IR had carried out a detailed review, led by Dr Arnold (PTB). In summary, the proposed approach was to have one CMC entry per physical quantity, with traceability for other calibration and measurement capabilities established through the quality assurance system. Only a few core quantities would be listed as a CMC (for example, Neutron Metrology would have two entries: emission rate and fluence). BIPM key comparisons and RMO supplementary comparisons would support the CMCs. The main advantages of this proposed system would be far fewer CMCs, and it would be easier for NMIs to introduce new services. An additional advantage may be an increased coverage of services by CMCs.

During the discussion, Dr Karam (NIST and Chair of Section II) explained that SIM's experience was that CMCs are used extensively outside the NMI community, examples being Brazil (for radiopharmaceuticals and environmental measurements) and Argentina (for environmental dosimetry and radioactivity). APMP's experience was mixed, with secondary laboratories and hospitals in the region referring to CMCs but other organizations reporting that CMCs were little used. Dr Villevalde (VNIIM) said that there could be issues in reducing the number of CMCs, as the overall number is sometimes used in assessing a laboratory's performance.

Dr Meghzifene (IAEA) was concerned that the EURAMET proposal weakened the link to the end user, as the current approach describes the quantity being measured very clearly. Dr Louw agreed that such information should be available to the end users but that CMCs might not be the best approach – Dr Le Noir de Carlan (LNE-LNHB) said that users in France tend to refer to the scope published by the accreditation body (CoFRAC) rather than the CMCs.

Dr Milton (BIPM Director) said there was evidence that other fields (e.g. chemistry) use the CMCs more extensively, and that the system gives clear, internationally recognized, evidence of the services that NMIs can provide.

Dr McEwan (NRC and Chair of Section I) considered that simplification of the CMC system could be useful but care would be needed to ensure there was enough flexibility to incorporate developments in the field (new modalities) and asked whether increased reliance on the quality assurance systems would mean that CMC reviewers would have to assess these systems as well. Dr Karam (NIST) replied that CMC reviewers would have to trust the RMOs and the NMIs / DIs to ensure the quality systems were effective. Dr Karam added that, for radionuclide metrology, it may be possible to adapt the existing Measurement Methods Matrix to simplify CMCs.

To conclude the discussion, Dr Louw (CCRI President) emphasized the urgency of agreeing any changes to the CMCs as the new system could then be incorporated in KCDB 2.0. The RMOs must be involved in deciding the changes as soon as possible, the first step being to agree the service

categories by October 2017. He urged the Members to work towards a model where those NMIs that would like to implement the one CMC entry per physical parameter can do so, and those that need the full suite of capabilities published as CMCs can continue to do so. The main consideration should be to satisfy the customers of the specific NMI.

Towards this goal, EURAMET was requested to add more detail to its proposal as to how the link could be made from the “representative CMC” to the capabilities described in the quality system. RMOs were also asked to consider what their role should be in the review of these capabilities and services described in the quality system.

10 APMP STRATEGY

Dr Wu (NIM) explained the plan for comparisons in the region and emphasized that the membership of APMP is expanding, and that demand for ionizing radiation metrology is driven in part by environmental measurements following the Fukushima accident.

Dr Louw (CCRI President) commented that similar plans would be needed for all the RMOs.

11 CONCLUSIONS AND FUTURE CCRI WORKSHOPS

To conclude the workshop, Dr Louw (CCRI President) explained that the CCRI Strategy would be discussed further in the formal CCRI meeting immediately following the workshop. The CCRI strategy would be presented to the CIPM in October 2017. The format of the workshop itself would be reviewed, including the possibility of inviting external technical speakers.