Report of the CCM Working Group on Dissemination of the kilogram

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17th CCM meeting, 16 May 2019

Bureau International des Poids et Mesures

Proposed changes to membership

The Working Group is extremely sad to recognise the loss of its long-time chair Chris Sutton. Chris did a superb job leading the area and was a wonderful colleague to work with. He will be greatly missed by all the WG members and by the wider metrology community.

- No changes (Yin Hsien Fung will be the new contact person for MSL, New Zealand)
- UME accepted as members at the last WG meeting

WG Meetings held since last CCM

- Last meetings of the WGD-kg were May 2017 and May 2019 in conjunction with the CCM.

WG Meetings planned

- Next WG meeting will be in conjunction with the next CCM meeting (May 2021)

Main actions taken and main achievements

- The Task Group on the phases for the dissemination of the kilogram following redefinition (CCM TGPfD-kg) met twice to decide on the contents of the extended note on the dissemination process after the proposed redefinition of the kilogram.
- Mass CMCs have been reviewed to assess the impact of the increase in uncertainty due to the use of a consensus value for the kilogram following 20 May 2019.
- A number of RMO KCs and SCs reports have been reviewed and approved for publication in the KCDB

Review of CMC values (to reflect kilogram redefinition)

- Post kilogram redefinition (20 May 2019) CMCs will need to be increased to reflect the extra 10 µg uncertainty in the IPK
- Proposed approaches;
  1. NMIs review and if necessary updated CMCs based on the additional 10 µg uncertainty (reviewed by RMO and CCM WGD-kg)
  2. A WG steering group updates the necessary CMCs and askes the affected NMIs to review
  3. A note is added to the KCDB to detail the need for an additional uncertainty contribution to be added to mass CMCs
- Issue – (some) CMCs become invalid after 20 May so time is important
- Solution 3. was preferred by the WGD-kg BUT a lot of work for KCDB and CMC entries become less easy to interpret

Review of CMC values (to reflect kilogram redefinition)

- Proposed solution (following consultation) **for approval by CCM**

1. **WGD-kg chair with help from members reviews and recalculates CMCs of those NMIs affected**
   - 17 NMIs and a maximum of 3 lines for each
   - uncertainty changes > 10%, applies to CMCs < 50 µg at 1 kg for example
2. **NMIs confirm that they agree with the revisions**
   - RMO TC Chairs copied, timescale for acceptance fixed
3. **Spreadsheet provided to KCDB detailing CMC updates necessary**

Progressing the state of the art

- Work of the TGPfD-kg and coordination of KCs of realisation experiments promotes the development of NMI level experiments
- Encourage additional NMIs to explore the option of developing realisation experiments by providing technical support and coordination
- Consider how realisation experiments could be developed by NMIs with the aim of providing “shop-floor” level SI traceability

Liaison & stakeholders

- RMOs
- NMIs who are Non-WG members
- Other metrology organisations (OIML, WELMEC, EA, ISO etc.)
- Manufacturers
  - Balances (Mettler-Toledo, Radwag, Sartorius)
  - Weight manufactures (Mettler-Toledo, Häfner, Troemner)
- Academia

KCs completed and underway

- Pilot study for the comparison of (future) realisations of the kilogram completed 2017
- Other comparison recently completed
  - CCM.M-K7 (5 kg, 100 g, 10 g, 5 g and 500 mg) completed Dec 16
- Next comparisons scheduled
  - **CCM.M-K8.2019 comparison of realisation experiments (Start 2020)**
  - Follow on from CCM.M-K4 (due to start 2022 but could be delayed due to implementation of kilogram redefinition)

KCs planned

- As shown
- Notes:
  - Proposal that comparisons of realisation experiments to be run every 2 years
  - Scheduling of next 1 kg comparison may depend on the changes to traceability after redefinition
  - Separate (sub-)multiple comparisons will be merged and one run every 10 years

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1 kg CCM.M-K1 (2004) CCM.M-K4 (2014)				Start		End				
(sub-)multiples CCM.M-K2 (2003) CCM.M-K5 (2011) CCM.M-K7 (2016)						Start		End		
50 kg CCM.M-K3 (2005) CCM.M-K3.1 (2010) CCM.M-K6 (2015)					Start		End			
Realisation experiments CCM.M-K8.20xx	It is planned to run comparisons of realisation experiments on a biannual basis starting end 2019									

KCs planned 2019-2021

For Approval by the CCM

- CCM.M-K8.2020 - A comparison of primary realisation experiments (at the 1 kg level)
  - Pilot BIPM
  - Start March 2020
  - Target completion end 2020

Program of work for the next 5 years

- Prepare *Extended Note on the dissemination process after the proposed redefinition of the kilogram* (May 2019)
- Agree details around the calculation of the kilogram consensus value and get approval from the CCM (May 2019)
- Agree method for updating published CMCs with respect to the uncertainty change after the kilogram redefinition
- Complete first comparison of realisation experiments (2020)
- Review the need for CCM 1 kg KC with respect to the ongoing implementation of the redefined kilogram
- Ensure the 10-yearly repeat of (sub-)multiple and 50 kg KCs (2024)
- Coordinate with RMOs to ensure the effective use of KCs and minimisation of (non-linked) SCs.
- Support NMIs in continuation with or initiation of realisation experiments and to look for additional areas where the redefinition of the kilogram can have wider impact for end users (2024)

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