LMK LABORATORIJ ZA METROLOGIJO IN KAKOVOST

UNIVERSITY OF LJUBLJANA
Faculty of Electrical Engineering

CCT WG-CMC Meeting

Jovan Bojkovski

21. and 22. May 2026
Sevres, BIPM

LMK LABORATORIJ ZA METROLOGIJO IN KAKOVOST

FE UNIVERSITY OF LJUBLJANA Faculty of Electrical Engineering

Agenda

Final version

1) Review of submitted CMCs – problems and suggestions

2) Review protocol amendments – changes

Decrease of number of categories (thermocouples only one category) and number of CMCs (use equations, matrices, …)

Include results of new KCs

(CMC review protocol for calibration of high temperature fixed points), Jonathan Pearce (NPL) (TEMPMEKO & ISHM 2025) - CMC review protocol for thermal conductivity measurements – Bruno Hay (LNE) May 2026

Agenda

Final version

3) Report on changes as a result of K9 and suggestions of new KCs and supplementary KCs
4) The reports (KCDB and JCRB)
5) Inter-RMO review process harmonization – difficulties and delays in CMC review process in the last two years
   - a. Which comparisons cover which calibration services

6) Update of the CCT Strategy

7) Any other business

New members

Members:

Jovan Bojkovski, Efrem Ejigu (AFRIMET), **Xiaojuan Feng** (APMP), Sergey Kondratiev (COOMET), Mohamed Sadli (EURAMET), Nasser Al Dawood (GULFMET) and **Carolina Herrera Ruiz** (SIM)

Secretary: Stéphane Solve

Present at the meeting: Andrea Peruzzi (chairman CCT WG KC), Stephanie Maniguet (KCDB), Kazuaki Yamazawa (JCRB)

ToR

to establish and maintain lists of service categories and, where necessary, rules for the preparation of CMC entries;

to agree on detailed technical review criteria;

to coordinate and, where possible, conduct inter-regional reviews of CMCs submitted by RMOs for posting in Appendix C of the CIPM MRA;

to provide guidance on the range of CMCs supported by particular key comparisons;

to examine the sufficiency of existing comparisons for supporting CMC submissions and to recommend new comparisons where deemed necessary; and

to coordinate the review of existing CMCs in the context of new results of key and supplementary comparisons.

The CCT-WG-CMC is tasked to draft and update CMC review protocols, to review fast-track submissions for inclusion in the KCDB Appendix C, and to identify new comparisons needed to support CMC submissions.

Review of submitted CMCs – problems and suggestions

- Discussion among RMOs
  - AFRIMET pointed out that sometimes existing review protocols are differently interpreted among other RMO reviewers → all agreed that further harmonization is needed
  - SIM presented a case were CMCs were sent to the JCRB, without proper intraRMO review → problem was identified that same person was writer and previous SIM chairman
  - Problems were identified by all RMOs in traceability of reviewer comments to the submitted CMC → with current version of KCDB, writer were not informed automatically about reviewer comments

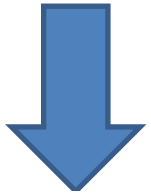
Review protocol amendments – changes

Decrease of number of categories (thermocouples only one category)

and number of CMCs (use equations, matrices, …)

2.3 Thermocouples

2.3.1 Noble-metal thermocouples
2.3.2 Base-metal thermocouples
2.3.3 Pure-metal thermocouples



2.3 Thermocouples

The best CMCs by the range for any TCs – (probably) mostly pure-metal TC
Join comparison and calibration ITS-90 fixed points

Review protocol amendments – changes

Decrease of number of CMCs – an example and suggestion

Canada
16 results

Updated 3-5 CMCs

SELECT ALL

EXPORT XLS

In the CMC uncertainty statements, $Q[a,b] = [a^2 + b^2]^{1/2}$

Unless otherwise stated the expanded uncertainties given below correspond to $k = 2$ (at a 95 % level of confidence)

GROUP ID	SERVICE PROVIDER	INSTITUTE SERVICE CODE		INSTRUMENT OR ARTIFACT UNDER STUDY	INSTRUMENT TYPE OR METHOD APPLIED	VALUE
	Canada **NRC**	NRC/33-3-4-5		type J thermocouple	Comparison	[-80 to 5
	Canada **NRC**	NRC/33-3-4-5		type K thermocouple	Comparison	[-80 to 5

It was concluded that there is potential problem of ambiguities when number of categories are decreased

The CMC entries should harmonized considering range and way how uncertainties are given

Review protocols – new updated version

CMC review protocol for calibration of thermocouples at the high temperature eutectic fixed points, Jonathan Pearce (NPL) – discussed at KC meeting to make supplementary comparisons under RMO open to other RMOs.

CMC review protocol for thermal conductivity measurements, Bruno Hay (LNE), May 2026 – to be discussed among RMOs.

Review of submitted CMCs – problems and suggestions

results of CCT.K9 and its influence to accepted and future

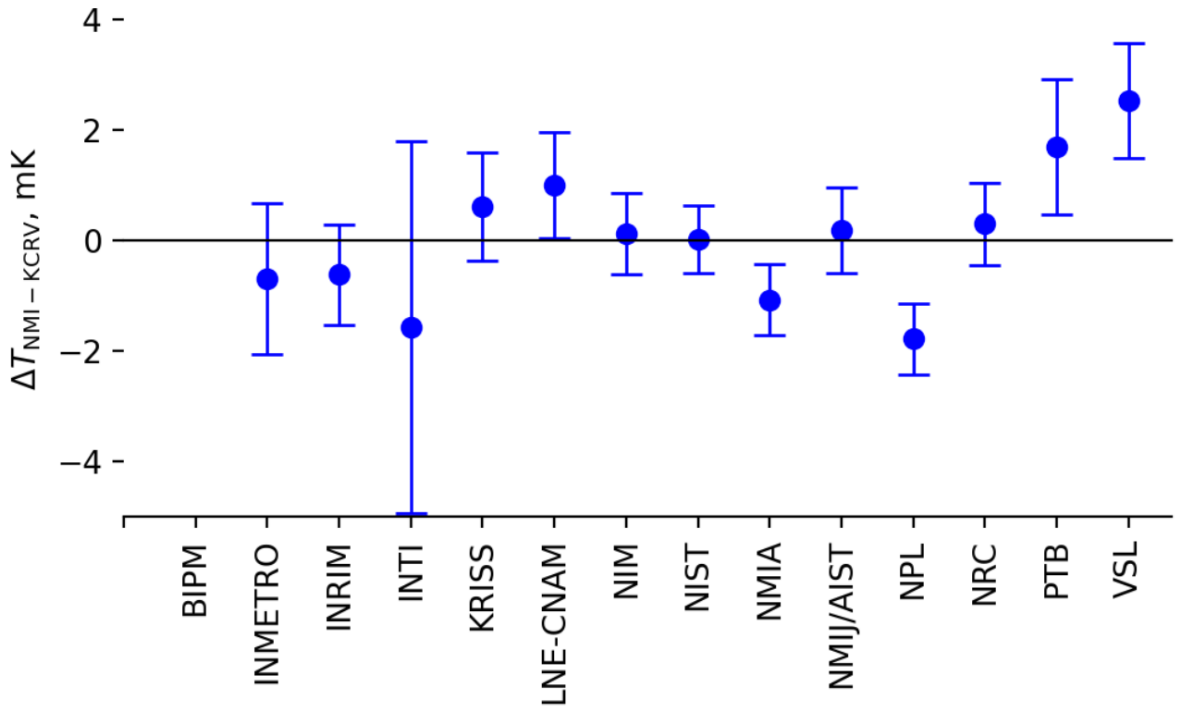


Figure 5.1: Deviationof ΔT_{NMI} from $\overline{\Delta T}$ at the zinc point measured by each NMI. Error bars represent uncertainty calculated using the uncertainty budget supplied by the NMI for this key comparison, at the $k = 2$ level.

CCT K9 – Zn point

NMI	CCT K9 result ΔT_{NMI}–KCRV mK	Unc k=2 mK	KCDB CMC mK
INMETRO	-0.69	1.37	
INRIM	-0.61	0.91	0.84
INTI	-1.56	3.37	
KRISS	0.61	0.99	1.3
LNE-CNAM	1.01	0.96	1.1
NIM	0.13	0.74	1.4
NIST	0.02	0.61	0.37
NMIA	-1.07	0.64	0.5
NMIJ/AIST	0.19	0.78	2.00
NPL	-1.78	0.64	0.90
NRC	0.30	0.75	0.6
PTB	1.69	1.23	1.3
VSL	2.53	1.04	0.9

Review of submitted CMCs – problems and suggestions

Each RMO presented actions which were done from the last meeting in order to solve problems identified during the CCT K9

Number of additional interlaboratory comparisons were performed at RMOs, additional analysis of the potential sources of differences were identified and quantified

Final conclusion was that all the actions taken further confirm existing CMCs despite some results of the CCT K9 were problematic

Further actions are foreseen in order to prevent similar experience in future

The reports (KCDB and JCRB)

All the following slides were taken from the presentation of

Stephanie Maniguet (KCDB)

Kazuaki Yamazawa (JCRB)

KCDB - User trainings

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

Capacity Building and Knowledge Transfer (CBKT) Programme

Programme highlights

- International metrology and strategic developments
- Overview of the CIPM MRA framework
- RMO Guidelines on CMCs and comparisons / practices
- CMCs: criteria, review and dispute resolution
- Comparisons: Organization, Coordination and linking to CMCs
- TC/WG management, RMO practices and Experience sharing
- Future outlook and continuous improvement

Further details are provided in the syllabus:

SYLLABUS

Target audience

- RMO TC/WG Chairs and Vice-Chairs
- New appointed or potential TC/WG Chairs

Date and venue

- 3 days, 30 June – 2 July 2026
- BIPM HQ, Sevres

Status:

- 30 TC Chairs (Deputy TC, newly appointed, potential) will attend
- Content will be delivered by the BIPM, CCs and RMO experts

KCDB - Software update 2024

Display of the CMC PID in Advanced Search

Requested by: FORUM-MD-WG-CC Priorities for TG-SIDF

CMC QUICK SEARCH

Argentina, INTI (Instituto Nacional de Tecnologia Industrial)

Matrix or material	Analyte or component	Dissemination range of measurement capability		Range of certified values in reference materials	
		Mass fraction in µg/kg	Relative expanded uncertainty in %	Mass fraction in %	Absolute expanded uncertainty in %
water	lead	2 to 20	2.9 to 1.0E1		

Mechanism for measurement service delivery : Reference measurement and calibration service

Approved on 28 September 2023

Institute service identifier : INORGW-8

CMC ID : SIM-QM-AR-00000ODN-1

CMC ADVANCED SEARCH

Results for: Chemistry and Biology > Argentina > "lead WATER"

2 results

SELECT ALL

EXPORT XLS

In the CMC uncertainty statements, $Q[a,b] = [a^2 + b^2]^{1/2}$

Unless otherwise stated the expanded uncertainties given below correspond to $k = 2$ (at a 95 % level of confidence)

GROUP ID	SERVICE PROVIDER	INSTITUTE SERVICE CODE	EXPANDED UNCERTAINTY CRM	MECHANISM FOR SERVICE DELIVERY	APPROVAL DATE	KCDB CMC ID
	Argentina **INTI**	INORGW-8		Reference measurement and calibration service	2023-09-28	SIM-QM-AR-00000ODN-1
	Argentina **INTI**	INORGW-11		Reference measurement and calibration service	2024-09-10	SIM-QM-AR-00000PEZ-1

KCDB - Software update 2024

Update of CMC QUICK SEARCH

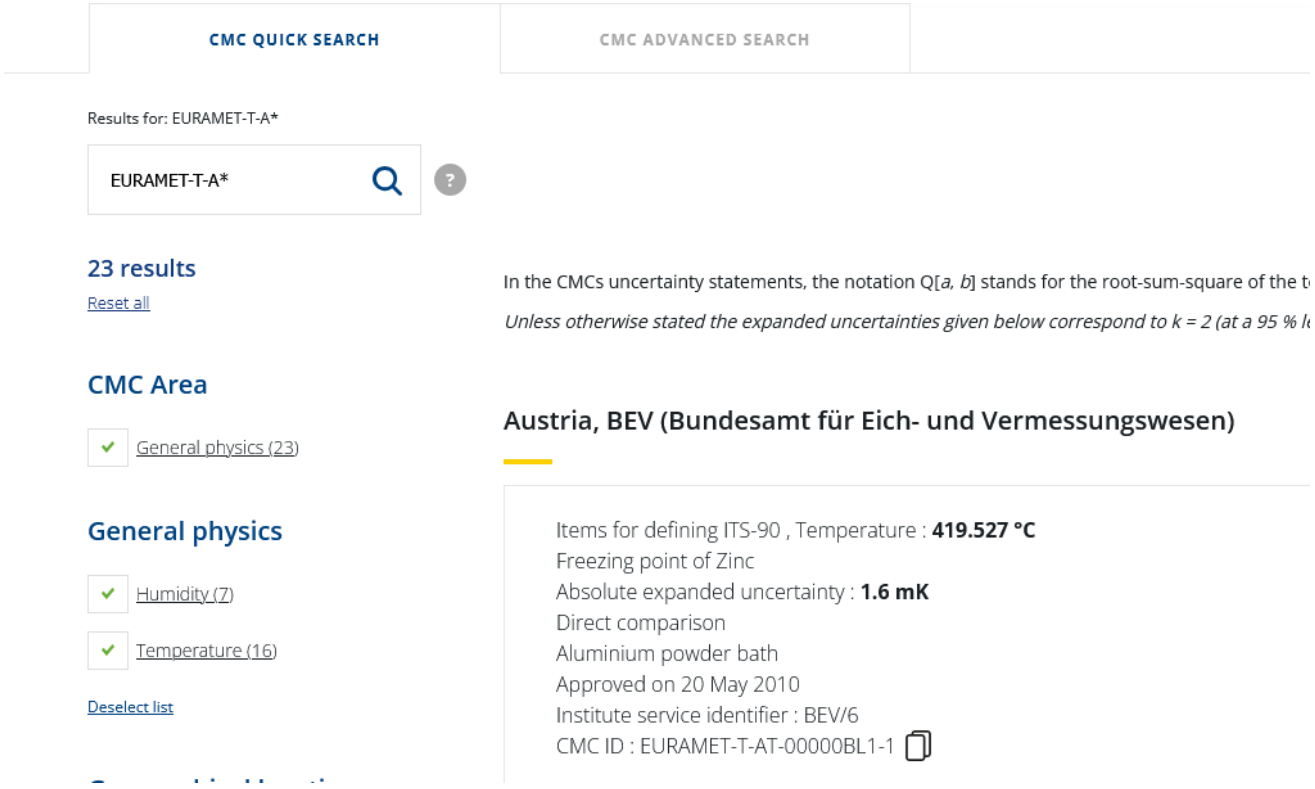
Search using part KCDB CMC ID

- Use wildcard to search by part of CMC ID

  for instance, EURAMET-T-A*

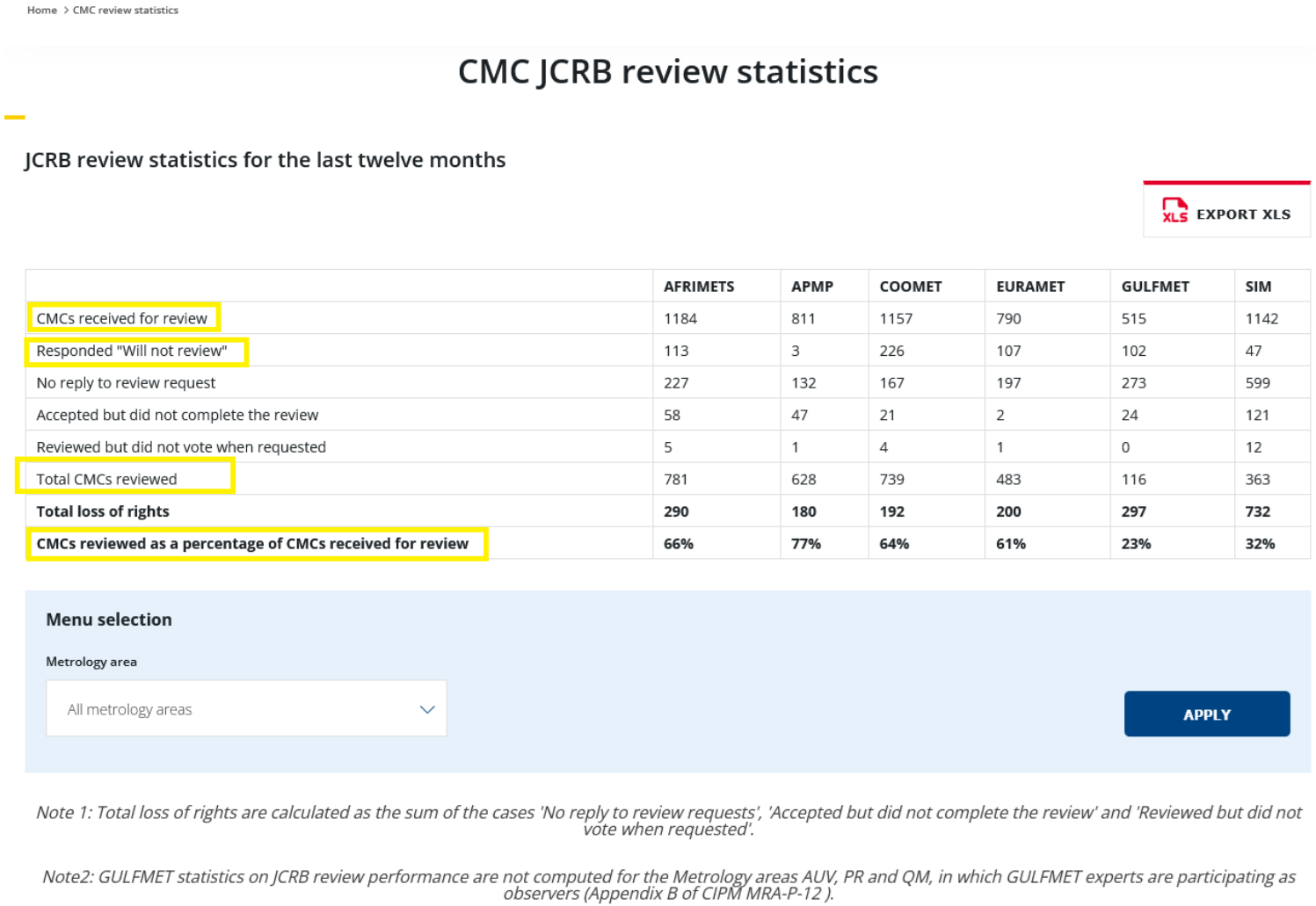
- Use keyword AND and OR (in capital) for conditional search

  for instance, EURAMET-T-A* OR EURAMET-L-A*



KCDB - Software update 2025

Update of the module for the CMC statistics on the JCRB Review performance



Home > CMC review statistics

CMC JCRB review statistics

JCRB review statistics for the last twelve months

EXPORT XLS

	AFRIMETS	APMP	COOMET	EURAMET	GULFMET	SIM
CMCs received for review	1184	811	1157	790	515	1142
Responded "Will not review"	113	3	226	107	102	47
No reply to review request	227	132	167	197	273	599
Accepted but did not complete the review	58	47	21	2	24	121
Reviewed but did not vote when requested	5	1	4	1	0	12
Total CMCs reviewed	781	628	739	483	116	363
Total loss of rights	**290**	**180**	**192**	**200**	**297**	**732**
CMCs reviewed as a percentage of CMCs received for review	**66%**	**77%**	**64%**	**61%**	**23%**	**32%**

Menu selection

Metrology area

All metrology areas

APPLY

Note 1: Total loss of rights are calculated as the sum of the cases 'No reply to review requests', 'Accepted but did not complete the review' and 'Reviewed but did not vote when requested'.

Note2: GULFMET statistics on JCRB review performance are not computed for the Metrology areas AUV, PR and QM, in which GULFMET experts are participating as observers (Appendix B of CIPM MRA-P-12).

KCDB - Software update 2026

Update of the Pilot Back-office for comparison final report submission

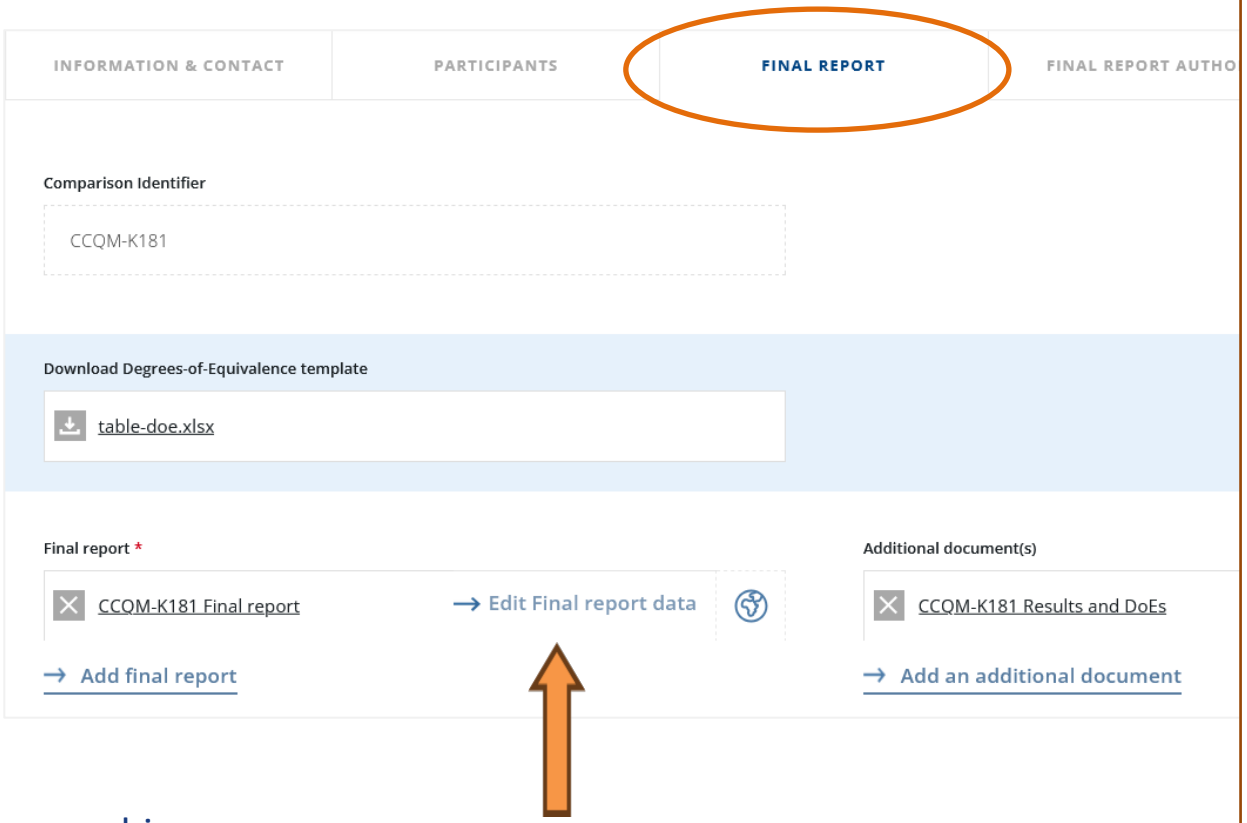
New web form for Pilot Study report submission

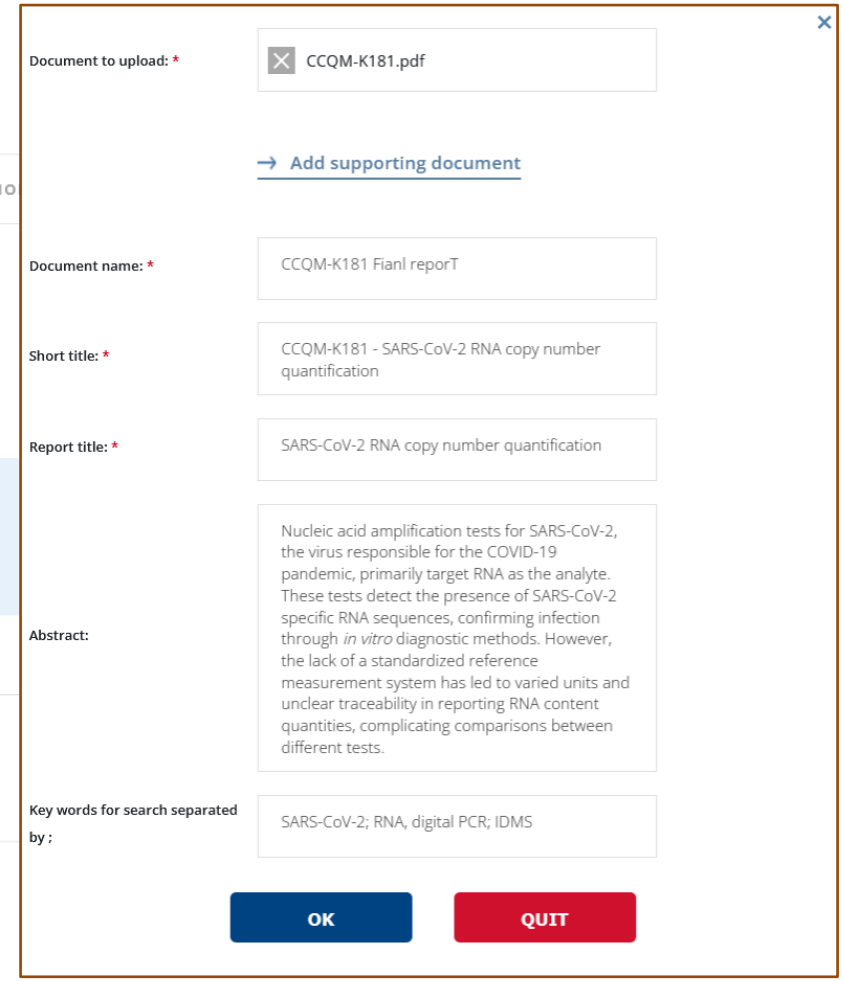
Pilot Studies are not published in the KCDB. This web form is intended solely for submitting Pilot Study information and the final report for publication on the CIPM MRA Final Reports webpage, following confirmation that the appropriate entity and all participants have approved the publication of the results.

KCDB - Software update 2026

Update of the Pilot Back-office for comparison final report submission

New web form for Final report submission



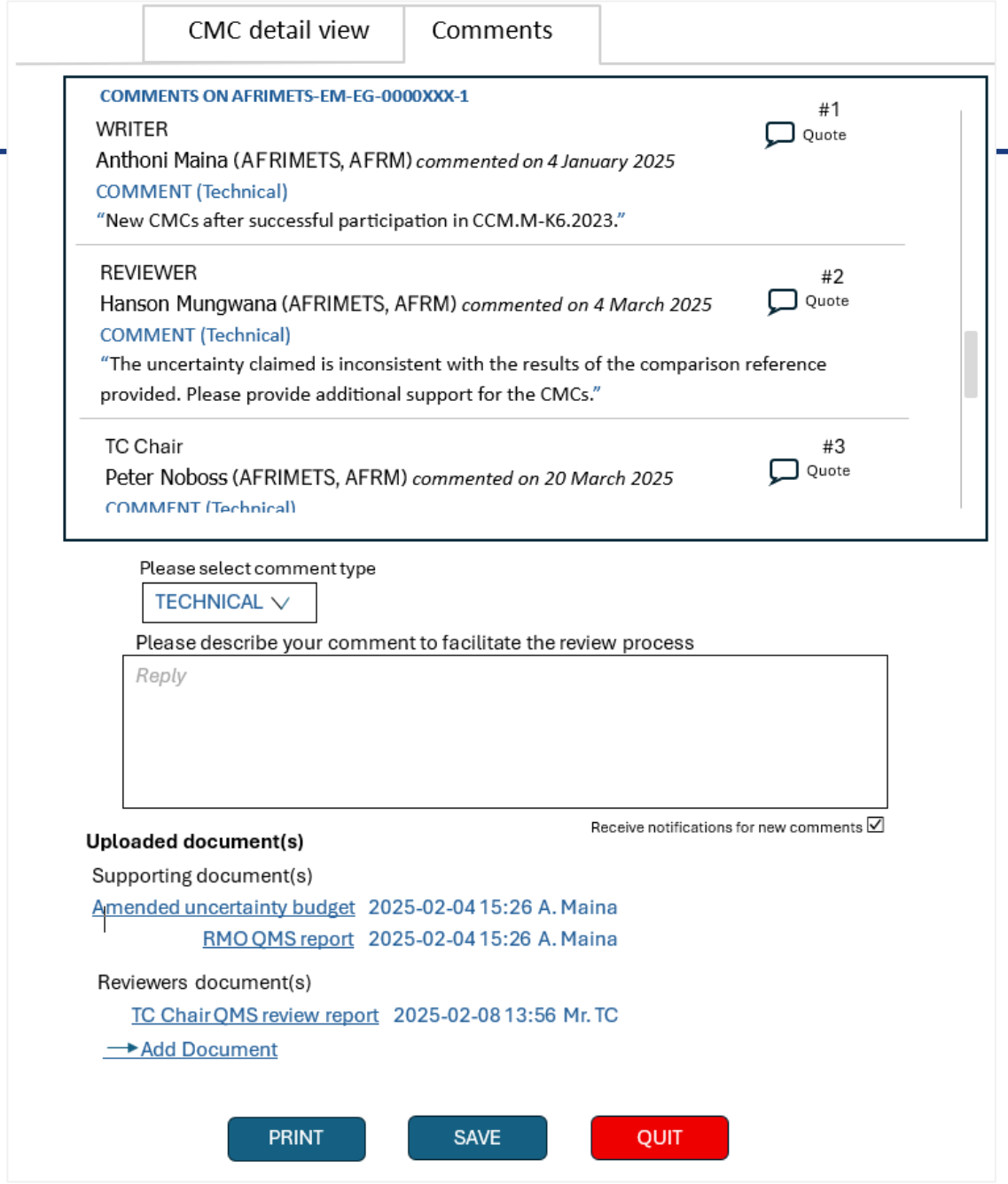


KCDB - Updates

Update of the comments tools

Improving the accessibility and usability of the comment tool by writers to address reviewers' comments

In progress



KCDB Digitalization

New version of KCDB API for CMCs Search

Requested by : FORUM-MD-WG-CC Priorities for TG-SIDF

- Expansion of the query to the record of CMCs no longer published, with the status Archived, Greyed out, Deleted
- Addition of PIDs for NMIs/Dis

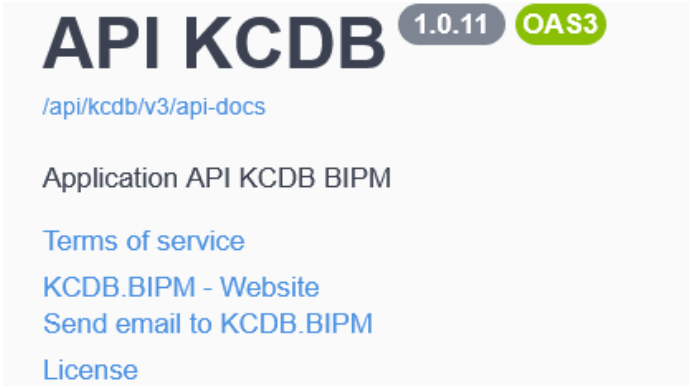
Wikidata

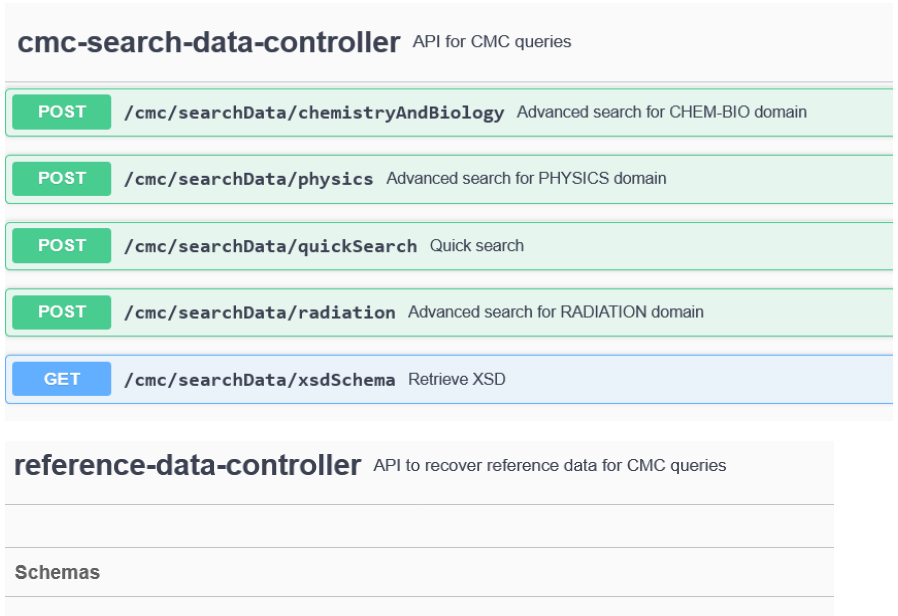
- Addition of PIDs for CC Service Category

SI Digital Framework

CLASSIFICATION OF SERVICES

www.bipm.org/api/kcdb/swagger-ui.html#/





KCDB Digitalization

KCDB API for CMCs – Next step

To develop a concept for implementation of SI Reference Point Units and Quantities

<unit>**V**</unit>
<unit>**μV**</unit>
<quantityValue>**DC voltage sources: single values**</quantityValue>

web ontology
SI Reference Point

KCDB Digitalization

Updates planned – in consultation with CCs

1) To update of CMC Submission Web form to add control menu for CMC parameters

Restriction of parameters will allow:

- consistency of vocabulary in CMCs submissions
- progressing with making the KCDB CMC data FAIR with the possibility to refer to PIDs for parameters, e.g. SI Reference Point quantities and units or other external digital references where appropriate

2) To update comparison form to add new metadata in the list of participants for comparisons:

- date of measurement (YYYY-MM)

KCDB Digitalization

Updates planned – in consultation with CCs

3) To implement a new API to query comparison data

→ To provide comparison data in a machine-readable format

→ To support to WG Chairs' CMCs and KCs monitoring and reporting needs

4) To develop a template to streamline the submission and publication process for comparison results

→ Pilot to submit results in a digital format

→ To reduce transcription errors and improving traceability

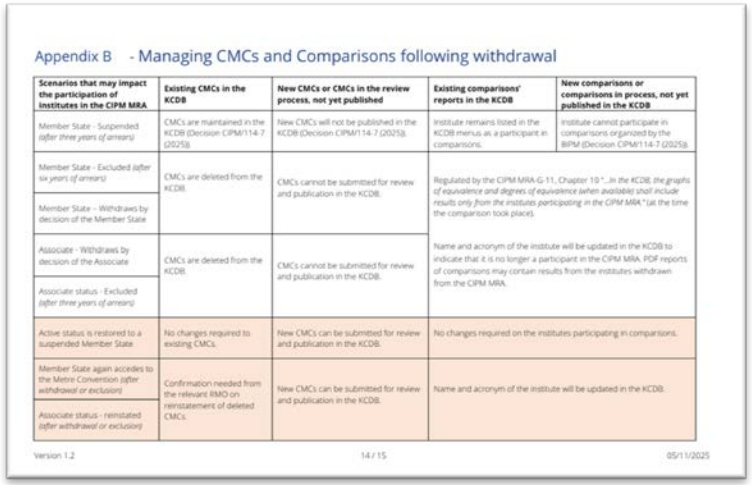
→ To reduce the delay in publication which requires human ressources

CIPM MRA Documents revised

Doc.	Basis	Changes
P-12	Action JCRB/49-3 (2025)	Formalize participation of online observers in JCRB meetings.
P-13	Resolution JCRB/49-2 (2025)	Implementation of CIPM decision CIPM/114-7 on withdrawal and suspension.
G-11	Resolution JCRB/49-3 (2025)	Change in the way comparison reports are published. Improving the uniformity of report titles.

May affect CMCs and KC participation

See Appendix B of P-13



Appendix B - Managing CMCs and Comparisons following withdrawal

Scenarios that may impact the participation of institutes in the CIPM MRA	Existing CMCs in the KCDB	New CMCs or CMCs in the review process, not yet published	Existing comparisons' reports in the KCDB	New comparisons or comparisons in process, not yet published in the KCDB
Member State - Suspended (after three years of arrears)	CMCs are maintained in the KCDB (Decision CIPM/114-7 (2025)).	New CMCs will not be published in the KCDB (Decision CIPM/114-7 (2025)).	Institute remains listed in the KCDB menus as a participant in comparisons.	Institute cannot participate in comparisons organized by the BIPM (Decision CIPM/114-7 (2025)).
Member State - Excluded (after six years of arrears) Member State - Withdraws by decision of the Member State	CMCs are deleted from the KCDB.	CMCs cannot be submitted for review and publication in the KCDB.	Regulated by the CIPM MRA-G-11, Chapter 10 "...In the KCDB, the graphs of equivalence and degrees of equivalence (when available) shall include results only from the institutes participating in the CIPM MRA." (at the time the comparison took place).	
Associate - Withdraws by decision of the Associate Associate status - Excluded (after three years of arrears)	CMCs are deleted from the KCDB.	CMCs cannot be submitted for review and publication in the KCDB.	Name and acronym of the institute will be updated in the KCDB to indicate that it is no longer a participant in the CIPM MRA. PDF reports of comparisons may contain results from the institutes withdrawn from the CIPM MRA.	
Active status is restored to a suspended Member State	No changes required to existing CMCs.	New CMCs can be submitted for review and publication in the KCDB.	No changes required on the institutes participating in comparisons.	
Member State again accedes to the Metre Convention (after withdrawal or exclusion) Associate status - reinstated (after withdrawal or exclusion)	Confirmation needed from the relevant RMO on reinstatement of deleted CMCs.	New CMCs can be submitted for review and publication in the KCDB.	Name and acronym of the institute will be updated in the KCDB.	

Version 1.2 14 / 15 05/11/2025

Further details on this will be provided from the KCDB Manager

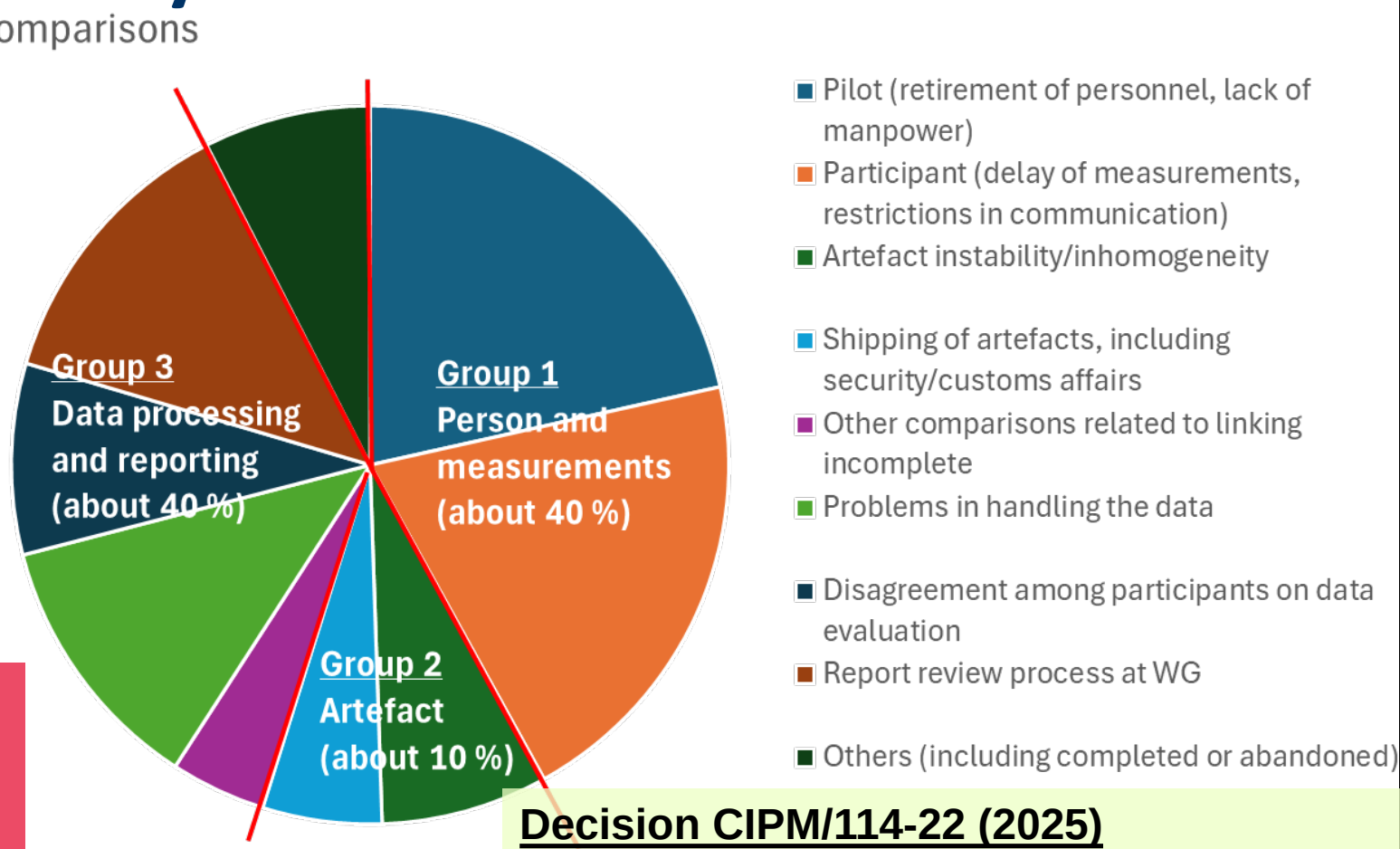
Comparisons older than 5 years

About 100 comparisons are incomplete and older than 5 years.

This issue has been focused by the JCRB since 2015. Following an action agreed at the 48th JCRB, the cause of delay and measures to resolve the delay was investigated in June.

The JCRB Executive Secretary will keep continuing to monitor the status.

CCs and RMOs are encouraged to adopt measures to address this issue including setting targets or KPIs



Action JCRB/49-1 (2025)

JCRB Executive Secretary to continue providing lists of comparisons older than 5 years to the CCs and RMOs to collect information on the “cause of delay”, “actions to address the delay” and include this topic as an agenda item at JCRB meetings. CCs and RMOs are encouraged to adopt measures to address this issue including setting targets or KPIs, and RMOs to report them to the 50th meeting of the JCRB.

Decision CIPM/114-22 (2025)

The CIPM asked the Presidents of the Consultative Committees (CCs) to review progress with key comparisons with a particular attention to those that have not been completed within five years. The CIPM encouraged CCs to set targets and take appropriate actions to reduce the number of delayed comparisons.

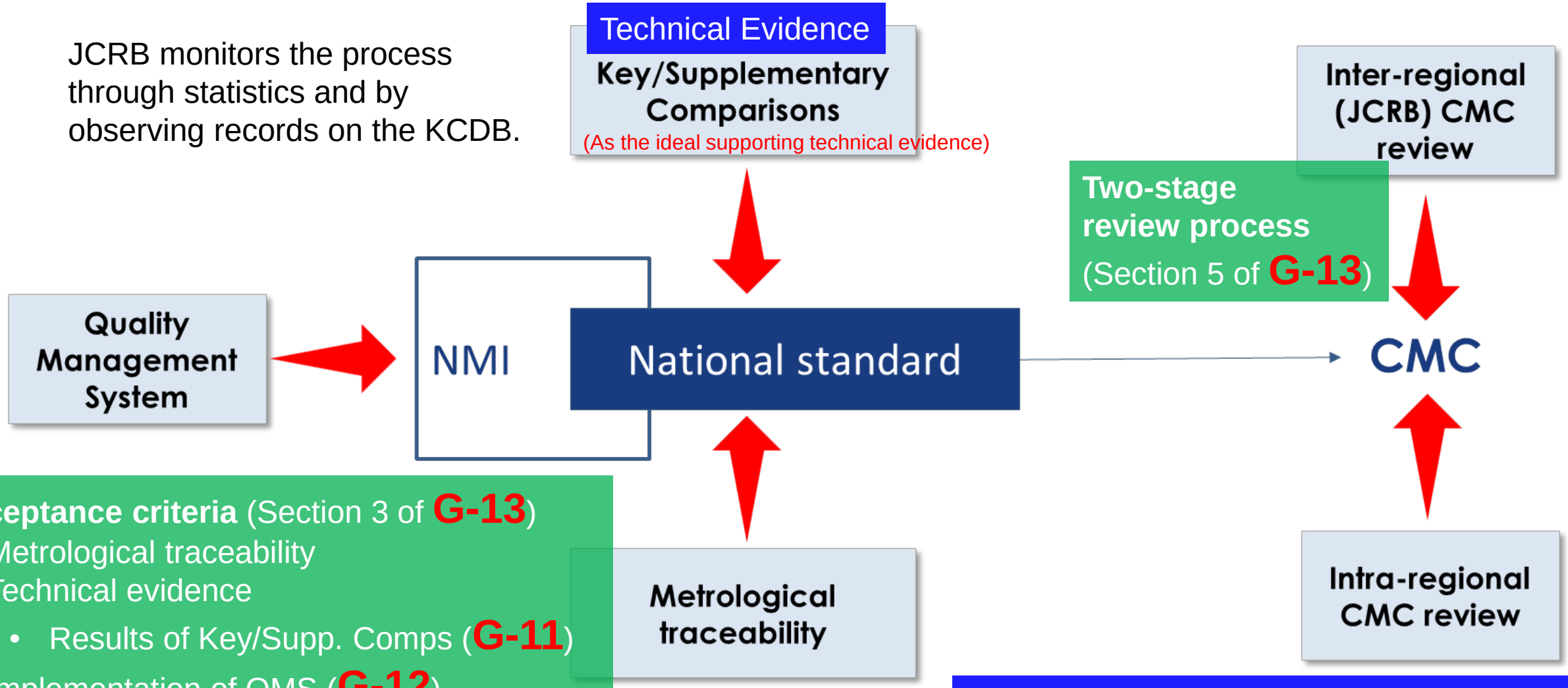
Comparisons older than 5 years for CCT

Further updates for CC comparisons (and some RMO comparisons) done in February through CCs.
An inquiry to the RMOs will be sent for RMO comparisons. (in line with Action JCRB/49-1 (2025))

Line	Comparison identifier	Meas. start year	Progress status	Main cause of delay (pull down selection)	Cause of delay (details, including additional causes of delay)	Actions to address the delay	Planned target of completion	Comments	Date of information	Information Source (or Contact person to refer to)
216	CCT-K1.1	2006	Report in progress, draft A	1-1 Pilot (retirement of staff, change of staff responsibility, lack of manpower etc.)	Lack of manpower of pilot.	Maybe over this summer I will get some time tocomplete the draft.		I will be retired by September 18. If it isn't possible to complete the draft by that time, it may result in abandoning the comparison.	4-Mar-26	Weston Tew Tew
218	CCT-K2.2	2014	Measurements in progress	2-1 Artefact instàbility/inhomogeneity instàbility/inhomogeneity	Malfunctions of NIM's cryocooler cryocooler apparatus, resulting delays on resulting delays on experiments and data experiments and data analysis. Possible analysis. Possible additional delays due to delays due to artefact shipping and and transportation between China and China and Italy.	NIM's cryostat apparatus has been been repaired, the experiment have have resumed with measurements at the measurements at the triple points of points of water, mercury and equilibrium equilibrium hydrogen. To assist and assist and further address the delay, CCT-delay, CCT-K2.2 has been introduced in the introduced in the framework of a new a new EURAMET EPM project named named 25RPT02 Setup-T.	By the end of 25RPT02 Setup-T in August Setup-T in August 2029.	None.	2/20/2026	Dario Imbraguglio o (INRIM)
222	CCT-S3	2007	Report in progress, draft B	3-1 Problems in handling data	Re-analysis of the data.	Re-analysis data and modifying report modifying report	Modified draft-B will be shared to the to the participants in March 2026, After 2026, After agreement among participants, it will be send to WG-KC for WG-KC for re-review.	According to the review comments from comments from WG-KC, the pilot is trying pilot is trying the other way for data data analysis.	23-Feb-26	Megumi Akoshima

CMCs: Monitoring the review process by the JCRB

JCRB monitors the process through statistics and by observing records on the KCDB.



Acceptance criteria (Section 3 of **G-13**)

- Metrological traceability
- Technical evidence
  - Results of Key/Supp. Comps (**G-11**)
- Implementation of QMS (**G-12**)

CIPM MRA Documents
https://www.bipm.org/en/cipm-mra/cipm-mra-documents/

Number of CMCs published

19 887 CMCs

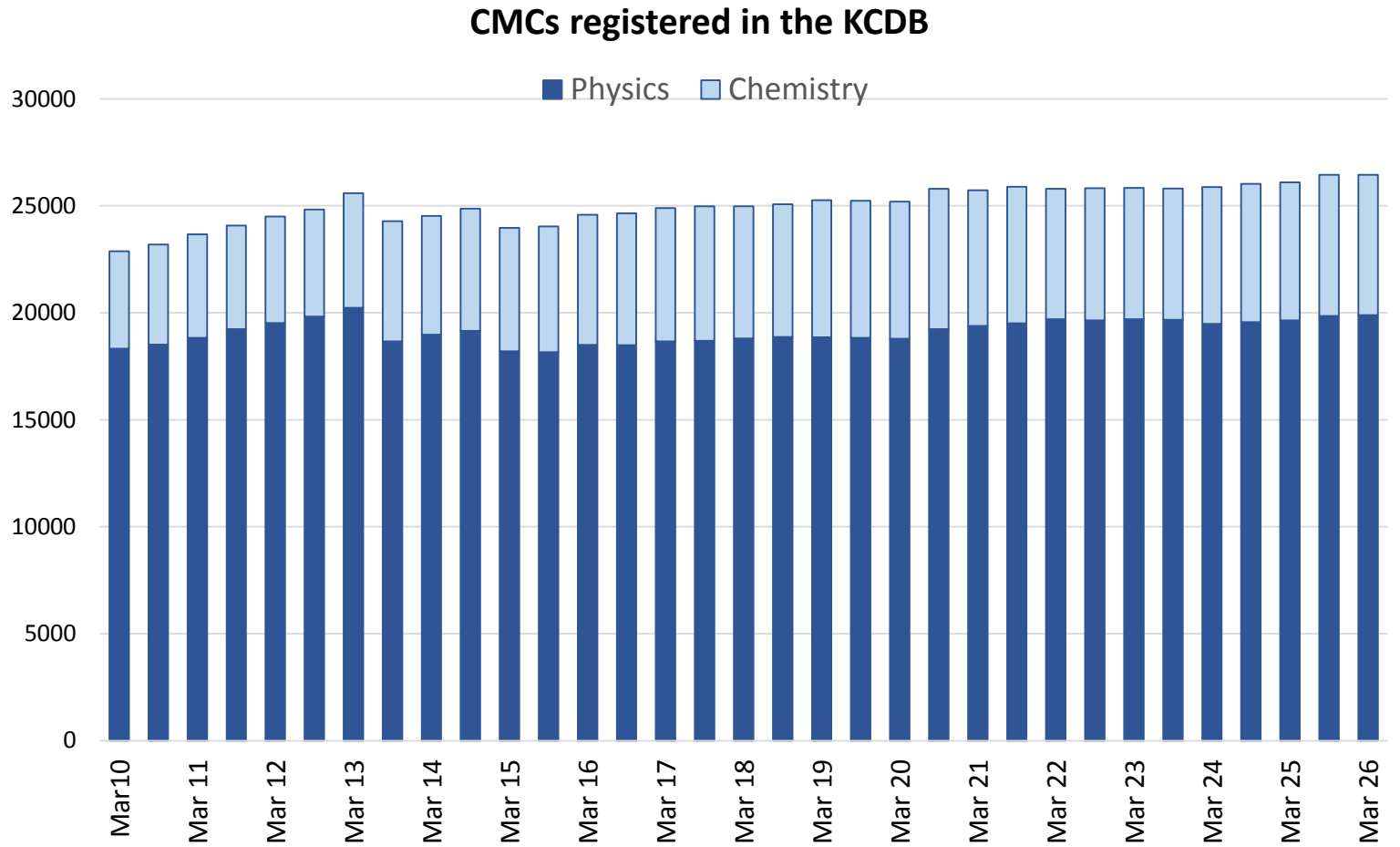
in Physics

6 571 CMCs

in Chemistry and biology

(March 2026 KCDB Report)

Metrology area	Published CMCs 6 months until 2026-03-02	Published CMCs 6 months until 2025-09-01
AUV	23	12
EM	133	119
L	21	51
M	36	42
PR	9	4
T	**31**	**128**
TF	6	17
QM	174	474
RI	42	18
Total	**475**	**865**



3126 CMCs in T
As of 18 May 2026

KCDB Reports are available from
https://www.bipm.org/en/cipm-mra/kcdb-reports

Review performance

(https://www.bipm.org/kcdb/cmc/statistics/on-review)

JCRB review statistics for CMCs whose review was completed within the last twelve months ('completed' = either 'Approved' or 'Not approved')

All metrology areas

Loss of rights
(3 categories)

	AFRIMETS	APMP	COOMET	EURAMET	GULFMET	SIM
CMCs received for review	1321	785	1287	1045	611	1242
Responded "Will not review"	136	8	340	101	186	53
No reply to review request	214	69	122	279	279	716
Accepted but did not complete the review	65	22	23	12	29	48
Reviewed but did not vote when requested	8	1	9	5	0	1
Total CMCs reviewed	898	685	793	648	117	424
Total loss of rights	**287**	**92**	**154**	**296**	**308**	**765**
CMCs reviewed as a percentage of CMCs received for review	**68%**	**87%**	**62%**	**62%**	**19%**	**34%**

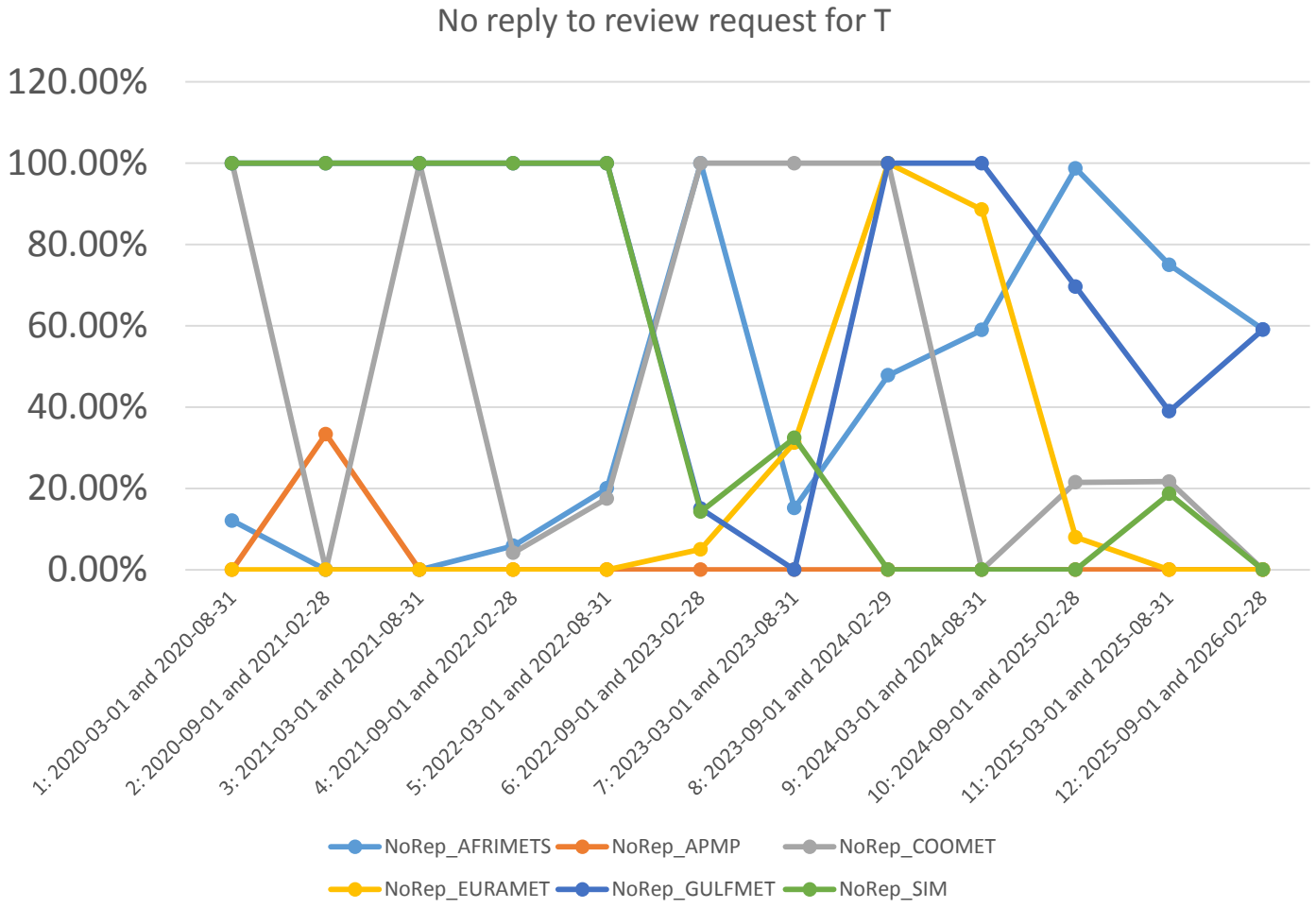
For T

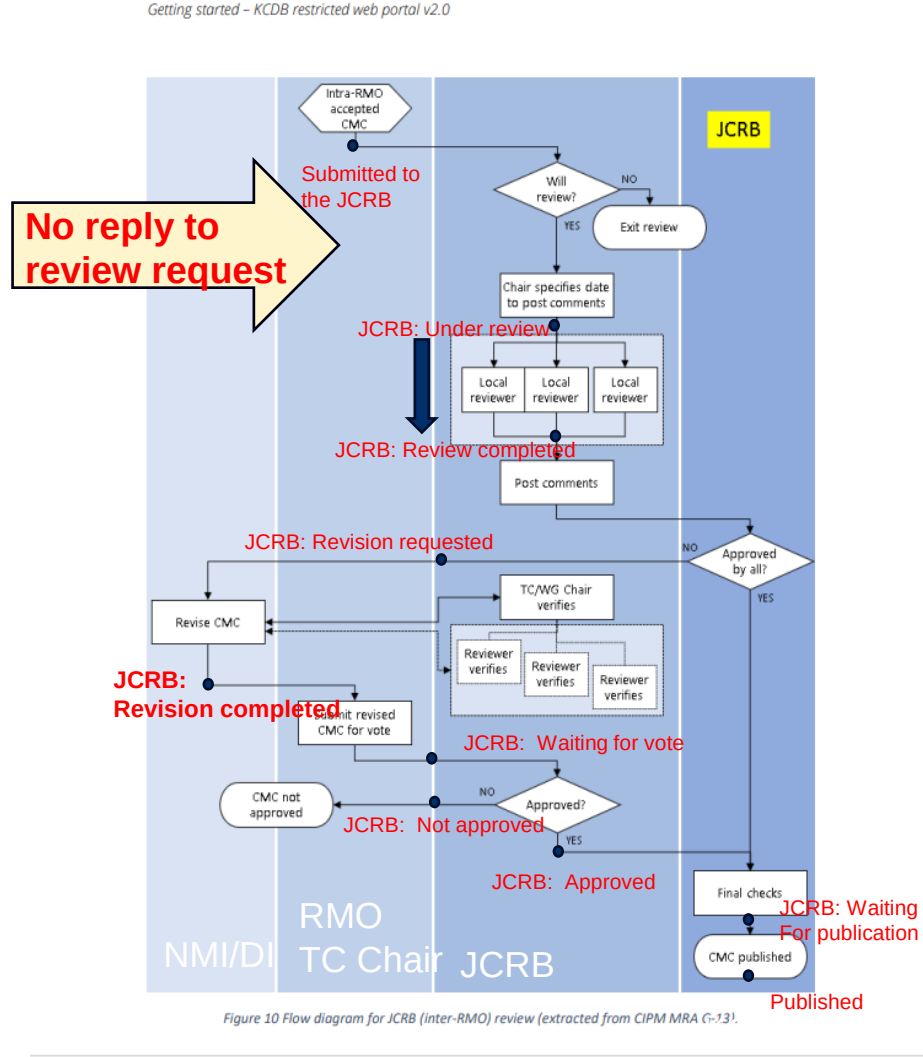
Loss of rights
(3 categories)

	AFRIMETS	APMP	COOMET	EURAMET	GULFMET	SIM
CMCs received for review	91	63	102	89	101	94
Responded "Will not review"	0	0	0	0	30	0
No reply to review request	70	0	17	6	47	11
Accepted but did not complete the review	0	0	0	4	15	4
Reviewed but did not vote when requested	0	0	4	0	0	0
Total CMCs reviewed	21	63	81	79	9	79
Total loss of rights	**70**	**0**	**21**	**10**	**62**	**15**
CMCs reviewed as a percentage of CMCs received for review	**23%**	**100%**	**79%**	**89%**	**9%**	**84%**

This data is based on "Published CMCs" by date of publication

Loss of rights: No reply to review request





This data is based on “CMC submission” date

By date submitted to the JCRB, period divided into 6 months to further observe the trend

“Hanging CMCs”

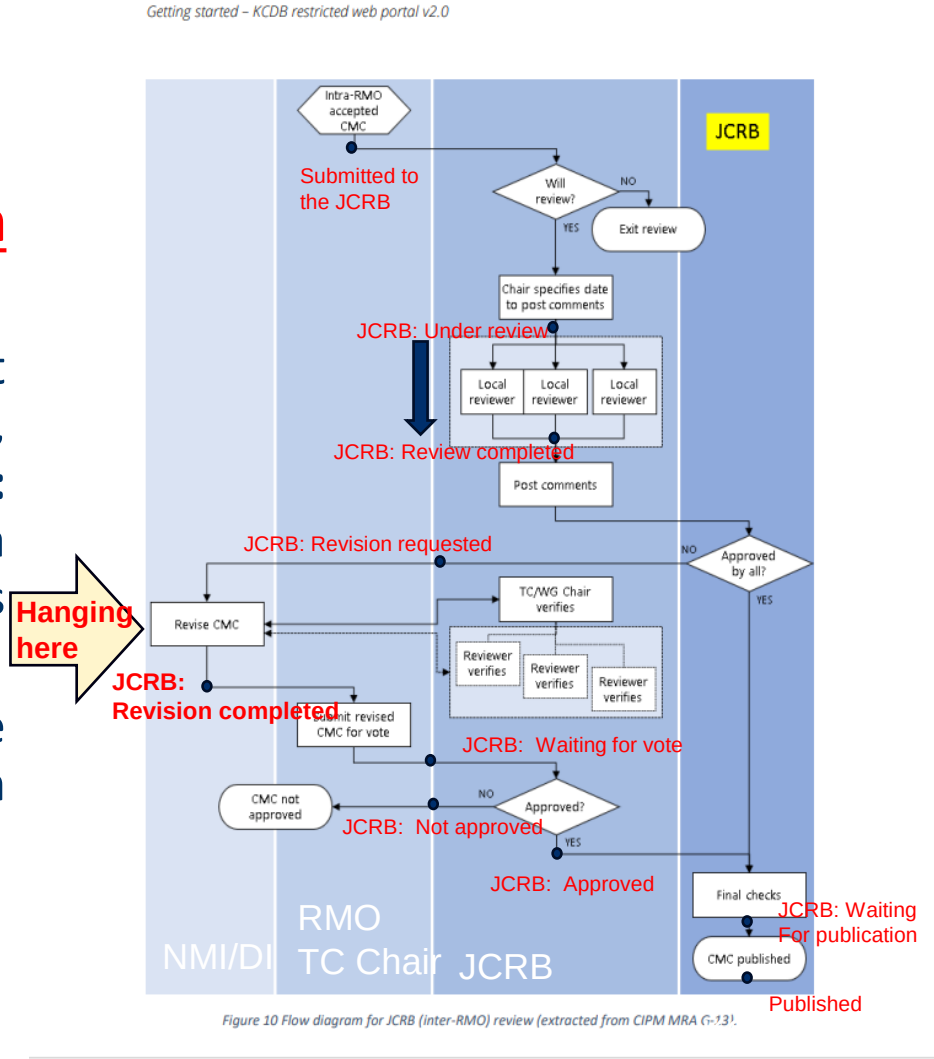
- **What is a “Hanging CMC”?**

  A CMC submission remaining in "JCRB: Revision Requested“ for over 6 months

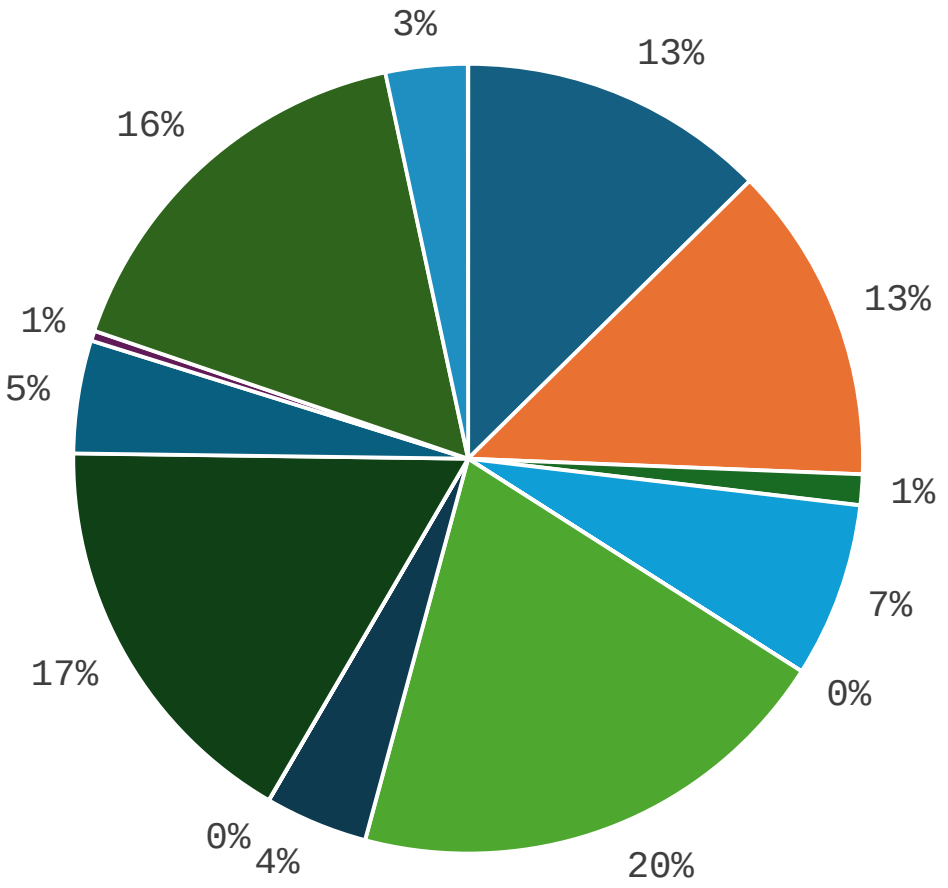
  Upon the JCRB Review, if any of the reviewing RMOs request for revision to the CMC submission as a result of their review, the CMC submission will be placed under the status **"JCRB: Revision Requested"** and the Writer is encouraged to make a revision as soon as possible, then re-submit the CMC towards the final vote *(Item 7 of section 5.2 of CIPM MRA-G-13)*.

  However, some CMCs remain not been responded to by the Writer for a long time. The CMCs will be left **"JCRB: Revision Requested“** until the Writer takes appropriate actions.

- **We can simply prevent “Hanging CMCs” by having sufficient communication between Writers and Reviewers**



Investigation on “Hanging CMCs”: Cause

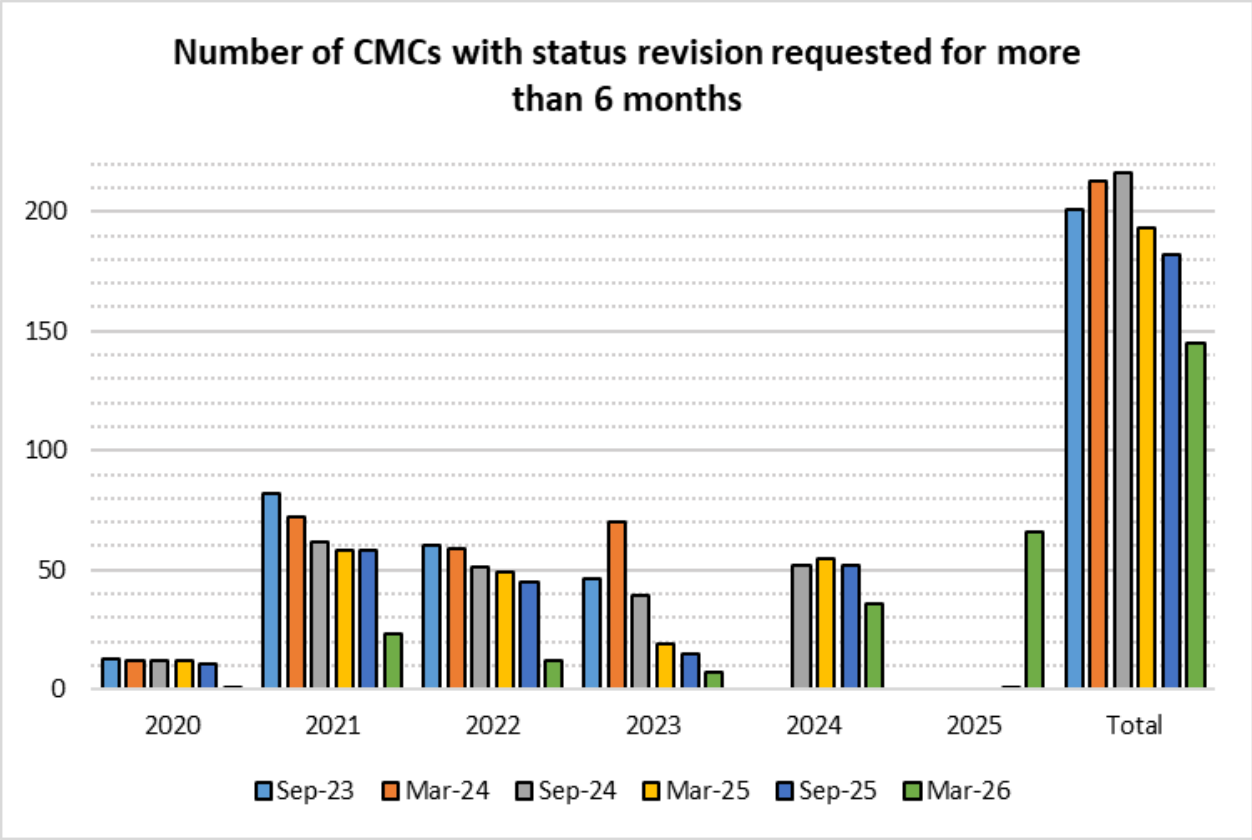


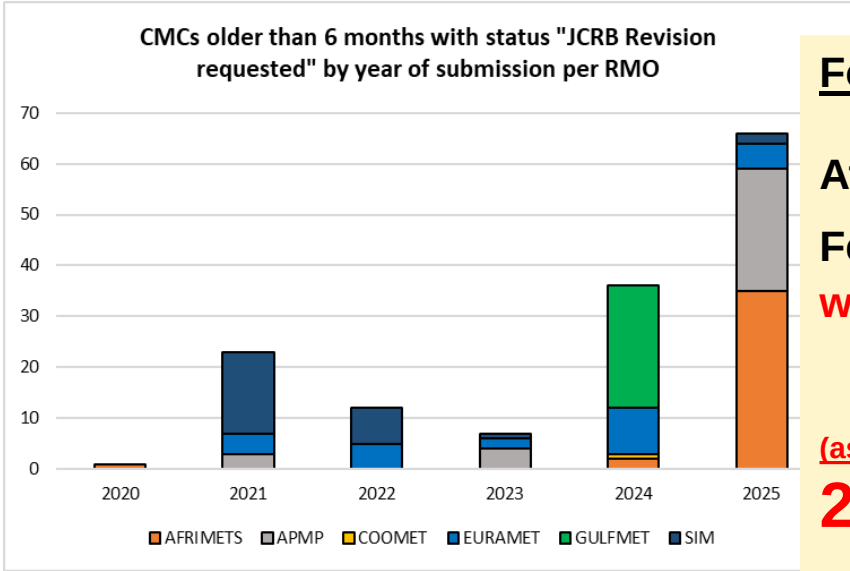
- Retirement/change of responsibility of the Writer
- Writer being unaware of the CMC being returned for revision
- Not convinced with the reason asked for the revision
- Review comments are significantly difficult to resolve
- Conflict/dead lock of comments raised from different RMOs
- Awaiting for further supporting evidence such as completion of comparisons
- Do not need that CMC anymore
- Lack of guidance in the CC guideline documents (please detail in Comments)
- Lack of time/motivation to get the submitted CMC up to publication

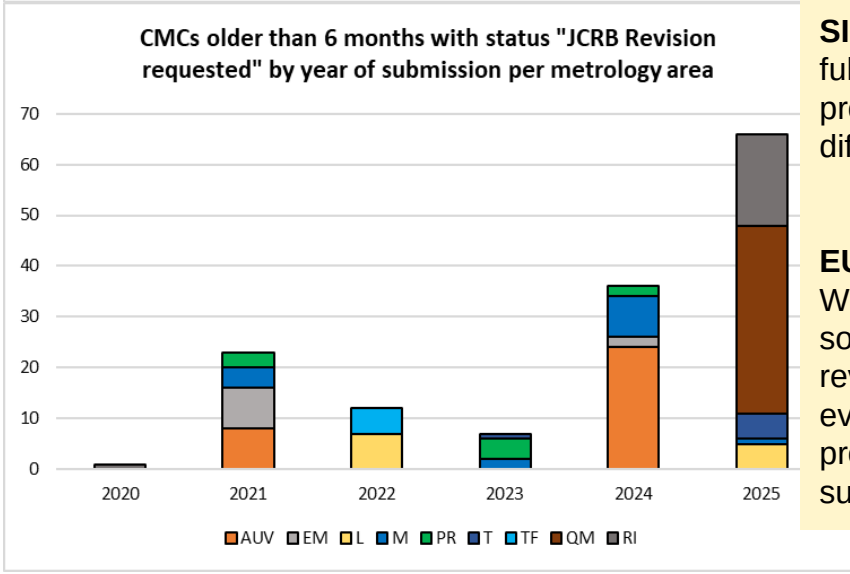
Number of “Hanging CMCs”

145 CMCs hanging

(From March 2026 KCDB Report)







For T

At the beginning of February 32 CMCs were “Hanging”

(as of 30 April)

2 CMCs “Hanging”

SIM-T-US-00000NW4-1 with fulfilment of humidity review protocol requirement being difficult.

EURAMET-T-AT-00000PT9-1 Writer intends to re-submit soon, with having the reviewers pointing out that evidence required on review protocol lacking from submission.

Communication prevents “Hanging CMCs”

- **Misunderstanding of review comments**

Reviewers may be able to provide more details within their comments

  - One RMO may complete their review by “Accepting”, but be aware that other RMOs are reviewing in parallel
  - G-13 Section 5.2 item 6
    - If at least one of the reviewing RMOs require revision, the CMC will be made available to the Writer for appropriate action;

Many cases, the Writer was not aware of the CMC being returned to the Writer

Did you know? *--- The difference between **"Accepted"** and **"Approved"** for JCRB Reviews and what they mean---*

The Reviewers assigned by the TC Chair can place "**Accepted** (indicated as green tick)" or "**Not accepted** (indicated as red cross)" on the dashboard. However, this is merely a recommendation to the TC Chair.

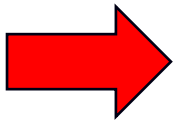
Upon considering the recommendation from the Reviewers, the TC Chair needs to place the final position of the Reviewing RMO by "**Approved** (also indicated as green tick)" or "**Return for revision** (also indicated as red cross)".

Without this final position placed by the TC Chair, it will fall into a situation "**Accepted but did not complete the review**" which is one of the categories of "**Loss of rights**“.

From the Writer’s point of view, the RMO should be aware that "Approved” is merely a decision of one of the RMOs, and the decision of other RMOs may differ. Any negative decision will prevent the publication of the CMC.

“Hanging CMCs” been aware by the Writer

- **Waiting for further evidence**
- **Comments difficult to resolve**



These seems to be the case for many CMCs in T
- Interpretation of review protocol
- Evidence for the claimed CMC

For these cases, Writer is aware of its existence, however, is waiting for something to be resolved before proceeding further.

If you have a problem, communicate with your Reviewers with including your TC Chair in the communication loop.

When the issue may be upon the interpretation of guideline documents issued by the CC, ask the CC’s relevant WG through your TC Chair.

- **Retirement/change of responsibility**

Please smoothly hand over your responsibilities on the CMC submissions to your colleagues.

Grey-out of CMCs

- 33 CMCs in T are temporally withdrawn (Greyed-out)
- Detailed procedures could be found in Section 10 of G-13

No	code	last_update	Institute service identifier	service
1	APMP-T-IN-00000BRD-1	2023-11-20	NPLI/T17	Liquid-in-glass thermometers
2	APMP-T-IN-00000BRF-1	2023-11-20	NPLI/T3	Long-stem SPRTs including HTSPRTs
3	APMP-T-IN-00000BRC-1	2023-11-20	NPLI/T16	Liquid-in-glass thermometers
4	APMP-T-IN-00000BRE-1	2023-11-20	NPLI/T12	Platinum resistance thermometers (PRTs)
5	SIM-T-US-0000065G-1	2023-12-20	NULL	Long-stem SPRTs including HTSPRTs
6	SIM-T-US-00000655-1	2023-12-20	NULL	Long-stem SPRTs including HTSPRTs
7	SIM-T-US-0000065F-1	2023-12-20	NULL	Long-stem SPRTs including HTSPRTs
8	SIM-T-US-00000650-1	2023-12-20	NULL	Long-stem SPRTs including HTSPRTs
9	SIM-T-US-0000065H-1	2023-12-21	NIST/33310C	Long-stem SPRTs including HTSPRTs
10	SIM-T-US-0000065A-1	2023-12-21	NULL	Long-stem SPRTs including HTSPRTs
11	EURAMET-T-FI-00000964-1	2024-06-05	NULL	Noble-metal thermocouples
12	EURAMET-T-FI-0000096M-1	2024-06-05	NULL	Standard radiation thermometers
13	EURAMET-T-FI-0000096T-1	2024-06-05	NULL	Noble-metal thermocouples
14	EURAMET-T-FI-00000976-1	2024-06-05	NULL	Radiation thermometers and visual optical pyrometers
15	EURAMET-T-FI-0000096H-1	2024-06-05	NULL	Cells for contact thermometry
16	EURAMET-T-FI-0000096S-1	2024-06-05	NULL	Noble-metal thermocouples

No CMCs observing the 5-year limit during the coming year.

The JCRB Executive Secretary can provide support on the reinstatement process when contacted from the Writer and/or RMO TC Chair

Grey-out of CMCs (continued)

- 33 CMCs in T are temporally withdrawn (Greyed-out)
- Detailed procedures could be found in Section 10 of G-13

No	code	last_update	institute_service_identifier	service
17	EURAMET-T-FI-00000975-1	2024-06-05	NULL	Long-stem SPRTs including HTSPRTs
18	APMP-T-VN-000006YD-1	2024-09-27	VMI-STAMEQ/T-1-132	Long-stem SPRTs including HTSPRTs
19	APMP-T-VN-000006YF-1	2024-09-27	VMI-STAMEQ/T-4-132	Long-stem SPRTs including HTSPRTs
20	APMP-T-VN-000006YE-1	2024-09-27	VMI-STAMEQ/T-3-132	Long-stem SPRTs including HTSPRTs
21	APMP-T-VN-000006YG-1	2024-09-27	VMI-STAMEQ/T-5-132	Long-stem SPRTs including HTSPRTs
22	EURAMET-T-NO-0000076D-1	2024-11-07	NULL	Noble-metal thermocouples
23	EURAMET-T-NO-0000076I-1	2024-11-07	NULL	Radiation thermometers and visual optical pyrometers
24	EURAMET-T-NO-0000076H-1	2024-11-07	NULL	Variable temperature blackbody radiation sources
25	EURAMET-T-BG-00000B9O-1	2025-05-23	BIM/2.2	Long-stem SPRTs including HTSPRTs
26	COOMET-T-CU-00000Q41-1	2026-03-10	INIMET/5	Liquid-in-glass thermometers
27	COOMET-T-CU-00000Q43-1	2026-03-10	INIMET/7	Liquid-in-glass thermometers
28	COOMET-T-CU-00000Q3Y-1	2026-03-10	INIMET/2	Long-stem SPRTs including HTSPRTs
29	COOMET-T-CU-00000Q40-1	2026-03-10	INIMET/4	Thermistors and other resistive thermometers
30	COOMET-T-CU-00000Q42-1	2026-03-10	INIMET/6	Liquid-in-glass thermometers
31	COOMET-T-CU-00000Q3X-1	2026-03-10	INIMET/1	Cells for contact thermometry
32	COOMET-T-CU-00000Q44-1	2026-03-10	INIMET/8	Liquid-in-glass thermometers
33	COOMET-T-CU-00000Q3Z-1	2026-03-10	INIMET/3	Platinum resistance thermometers (PRTs)

No CMCs observing the 5-year limit during the coming year.

Upon reinstatement, the Writer and the RMO TC Chair (and TCQS Chair when appropriate) need to confirm that the reasons behind the grey-out is identified and solved. See G-13, Sections 10 (and 8).

Specific cases monitored on JCRB Review for T

- **Scope description of CMC**
  - A case where the inconsistency of the scope claim of the CMC and the content of the uncertainty table being pointed out during the vote of the CMC.
    - Due to the CMC already in placed to vote, the CMC was not approved.
- **Lack of evidence in respect of the review protocol seems to be the causes of CMCs returned for review (and sometimes not approved)**

Writers need to be aware that under the G-13, there is only one opportunity to revise in the JCRB review stage.

Way to highlight the processes in place to ensure the “validity” of CMCs on the KCDB

A proposal submitted from EURAMET to the 49th meeting of the JCRB titled “Recording CMC validations through successive comparisons in the KCDB” was discussed at the meeting.

Action JCRB/49-2 (2025)

JCRB Executive Secretary to prepare a proposal for the 50th meeting of the JCRB on a way to highlight the processes in place to ensure the “validity” of CMCs on the KCDB.

Which comparisons cover which calibration services

The BIPM key comparison database

KCDB

CLASSIFICATION OF SERVICES IN THERMOMETRY

Version 1.3, January 2022

METROLOGY AREA: THERMOMETRY

BRANCH: TEMPERATURE

7. Temperature – Items used for disseminating thermodynamic temperature
- **7.1 Radiation thermometry**
  - 7.1.1 Fixed-point blackbody cells and apparatus
  - 7.1.2 Radiation thermometers
  - 7.1.3 Variable temperature blackbody radiation sources

1. Temperature – Items used for defining ITS-90
- **1.1 Primary fixed-point cells**
  - 1.1.1 Cells for contact thermometry
  - 1.1.2 Cells for radiation thermometry

Revison of the CIPM MRA implementation

- Why ?
  - The increased demand of resources and the time required for bringing comparisons to conclusion
  - Many signatories continuously expand the number of declared capabilities
  - Staff changes and new techniques appear, the validity of a comparison is limited in time and its ability to underpin CMC expires
  - It is impossible to perfom comparisons for every CMC entry
  - Does the comparison in range of SPRT at fixed points also covers CMC for PRT by comparison ?
  - Taking a broader view of the impact of the comparisons, while preserving the scientific objectiveness of the process
- When do we have to repeat comparison ?

CCT KC in contact thermometry

KC	Measurements	Year of publication of report
CCT-K1	1997 to 2001	2006
CCT-K2	1997 to 2001	2001
CCT-K3	1997 to 2001	2003
CCT-K4	1998 to 2000	2002
CCT-K7	2002 to 2004	2006
CCT-K9	2011 to 2015	2023
CCT-K7.2021	2021 to 2022	2023

CCT KC in contact thermometry

GROUP ID	SERVICE PROVIDER	INSTITUTE SERVICE CODE	C	PARAMETERS	APPROVAL DATE	KCDB CM
	Hungary **BFKH**	BFKH/21		Stirred liquid bath : oil	2001-10-21	EURAMET HU-00000
	Italy **INRIM**	INRIM/T/05/01		Stirred liquid bath : water	2001-10-21	EURAMET IT-00000C
	Italy **INRIM**	INRIM/T/05/01		Stirred liquid bath : ethanol	2001-10-21	EURAMET IT-00000C
	Hungary **BFKH**	BFKH/22		Stirred liquid bath : oil	2001-10-21	EURAMET HU-00000
	Italy **INRIM**	INRIM/T/05/01		Stirred bath : silicon oil	2001-10-21	EURAMET IT-00000C

- Which comparison covers these CMCs ?

Discussion

- Currently the KCs are testing only the ITS-90 realization, however, with the redefinition of the kelvin in 2019, we should start reflecting on how the kelvin redefinition will affect the way KCs are performed and the way CMCs are classified

- It is suggested that KC are performed on the need basis

- CMCs of the thermodynamic temperature, T, can be calculated using the well-known calculated differences from international temperature of 1990, T_{90} and adding the uncertainty of these differences for non-contact thermometers above silver point

Key and supplementary comparison

- New key comparisons to support CMCs
  - New K4 (Al and Ag), new K9 with fixed point cells, not SPRTs, new K2 other KCs to support CMCs ?
- How to speed up data processing after the measurements ?
  - Good example CCTK7.2021 (TPW)
  - Not too good example CCTK8 (high temperature dew-point)

Any other business ?

- Taking into account time frame of the comparisons, CMCs should have additional information:
  - Is the equipment still the same ?
    - If not additional support with report – paper, to provide evidence and linkage with original comparison
  - Is the location of the laboratory still the same ?
  - Is the staff still the same ?
  - How many calibrations were performed in particular CMC category
  - What is the lifetime of the CMCs linked with results of the comparisons ?
    - For example K2 results are now 25 years old, are the CMCs supported by this comparison still valid ?
- Do we need a survey among RMOs to make an estimate about (obsolete) CMCs?

LMK LABORATORIJ ZA METROLOGIJO IN KAKOVOST

FE UNIVERSITY OF LJUBLJANA Faculty of Electrical Engineering

Next meeting May 2028, CCT, BIPM?

Thank you very much