



**Bureau International des Poids et Mesures**



## **The Structure of the CIPM MRA**

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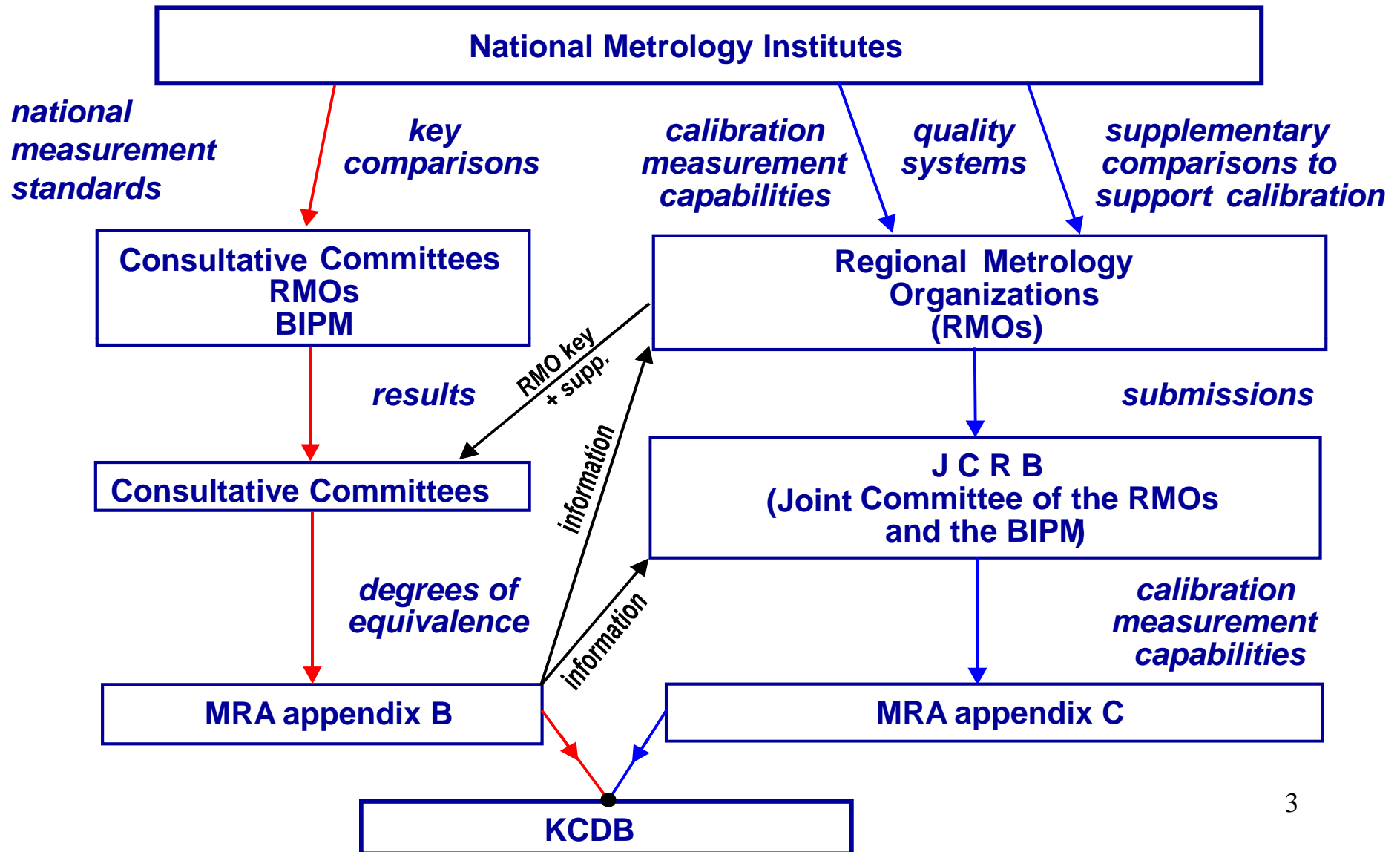
FGNMID CIPM MRA Workshop  
Skopje, April 27-29, 2011



# Outline

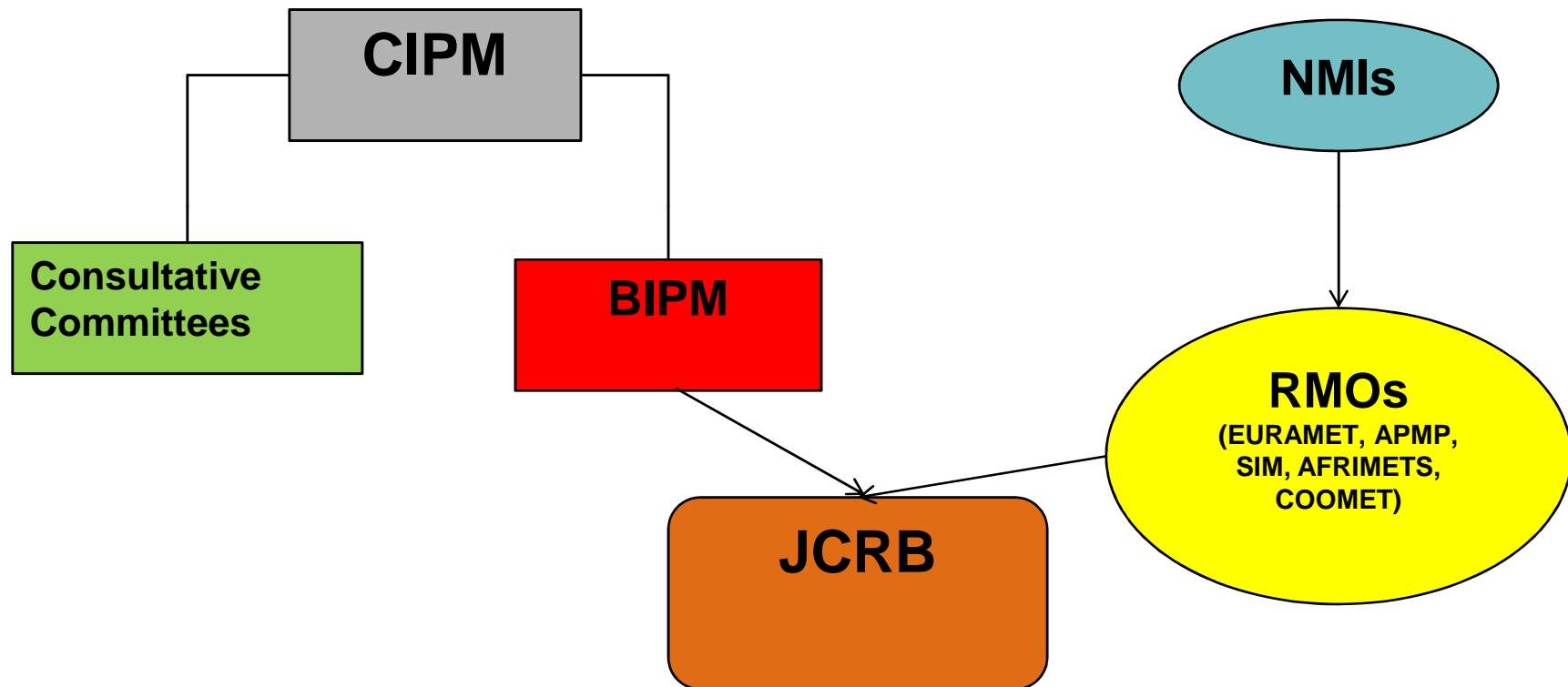
- Basic Diagram of the CIPM MRA
- Institutional Structure
  - CIPM
  - Consultative Committees
  - JCRB
  - RMOs
  - NMIs
- Processes
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# Diagram of the CIPM MRA



# Institutional Structure of the CIPM MRA

Many different actors take part in the implementation of the CIPM MRA:





## Role of the CIPM

The **CIPM** is the highest decision making body in regards to the implementation of the CIPM MRA.

- **Delegates authority** to the BIPM for the coordination of the implementation of the CIPM MRA
- **Resolves disputes** related to the implementation of the CIPM MRA, if they cannot be settled at lower levels.
- **Approves changes** to CIPM MRA guidelines and other supporting documents

## Role of the Consultative Committees

Within the context of the CIPM MRA, **Consultative Committees** play a key role in the organization of Key Comparisons, and in some cases, in the review of CMCs. Specific responsibilities include:

- to **determine** the areas in which KCs are to be conducted,
- to **initiate and organize** KCs, in collaboration with BIPM
- to **determine KC reference values and degrees of equivalence**
- to **approve** final reports of CIPM KCs for publication
- to **examine and confirm** results of RMO key and supplementary (including bilateral) comparisons





## Role of the BIPM

The **BIPM** is responsible for the overall coordination of the CIPM MRA, under the authority of the CIPM. Other roles of the BIPM include:

- **Organization** of some KCs
- **Maintenance** of the KCDB
- **Participation** in the JCRB



## Role of the JCRB

The Joint Committee of the Regional Metrology Organizations and the BIPM (JCRB), was created by the CIPM MRA, in order to:

- **coordinate the activities among RMOs** in establishing confidence for the recognition of calibration and measurement certificates
- **make policy suggestions** to the RMOs and to the CIPM concerning the implementation of the CIPM MRA
- **analyze the application by each RMO** of the criteria of the CIPM MRA
- **manage and oversee** the CMC review process





## Role of the RMOs

RMOs are an essential component in the implementation of the CIPM MRA. Their responsibilities within the CIPM MRA include:

- organization of RMO key comparisons linked to BIPM and CC key comparisons
- organization of supplemental comparisons to support CMC declarations
- review and approval of member NMI Quality Systems and submission of an annual report to the JCRB
- initial (“intra-regional”) review of the CMC declarations of member NMIs
- participation in the JCRB

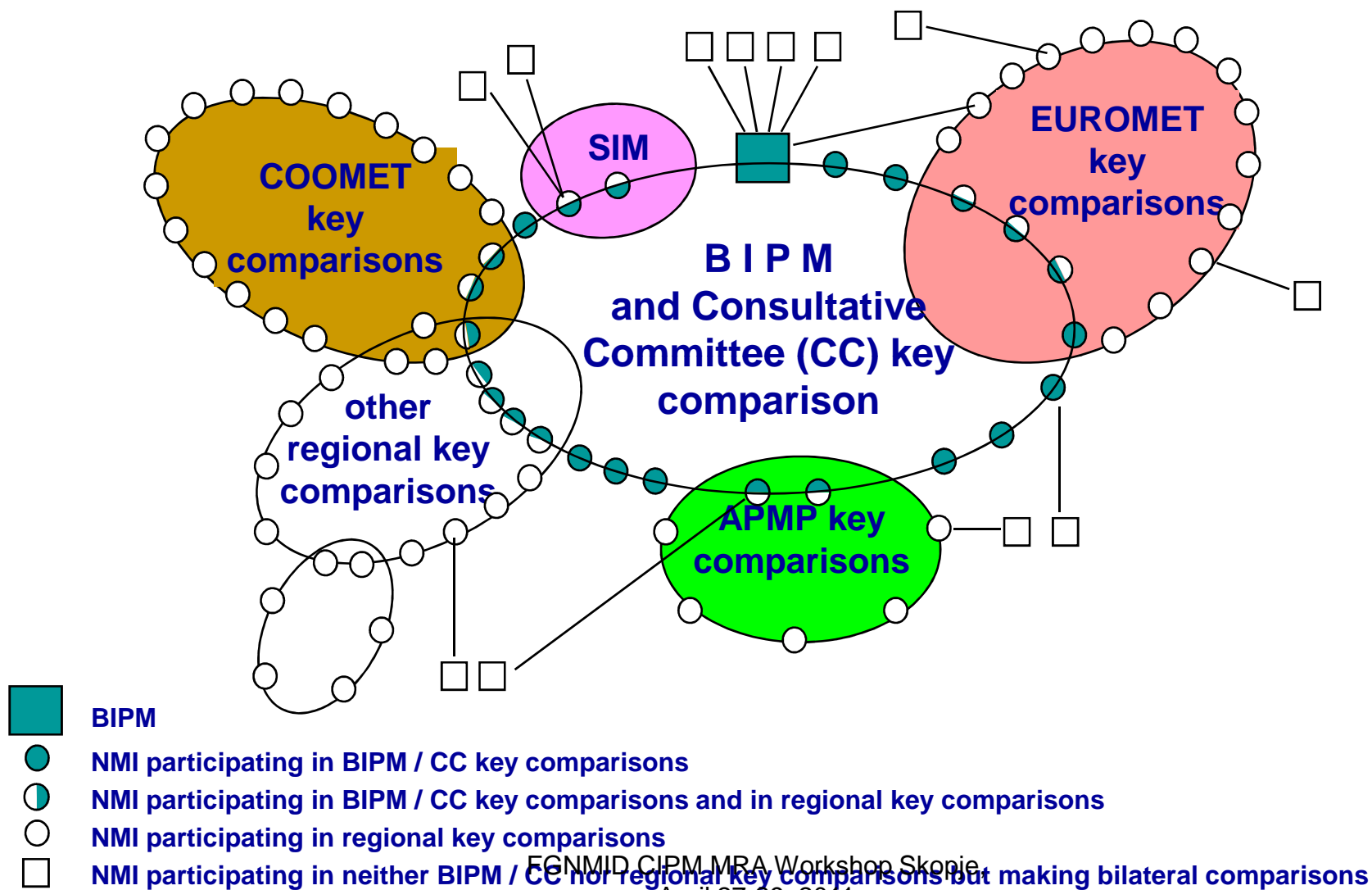


## Role of the NMIs

The CIPM MRA is essentially an agreement among NMIs, therefore NMIs have the utmost responsibility in implementing the requirements of the CIPM MRA according to established policies and guidelines. NMIs,

- participate in key and supplementary comparisons, in line with their needs
- declare their CMCs and submit them to the established review process
- implement quality systems in line with the requirements of the CIPM MRA

# Key Comparisons



# Key Comparisons in the CIPM MRA

According to Paragraph 3 of the CIPM MRA:

*3.1 The **technical basis of this arrangement is the set of results obtained in the course of time through key comparisons** carried out by the Consultative Committees of the CIPM, the BIPM and the regional metrology organizations (RMOs), and published by the BIPM and maintained in the key comparison database<sup>1</sup>. Detailed technical provisions are given in the Technical Supplement to this arrangement.*

*3.2 Key comparisons carried out by Consultative Committees or the BIPM are referred to as **CIPM key comparisons**; key comparisons carried out by regional metrology organizations are referred to as **RMO key comparisons**; RMO key comparisons must be linked to the corresponding CIPM key comparisons by means of joint participants. The degree of equivalence derived from an RMO key comparison has the same status as that derived from a CIPM key comparison.*



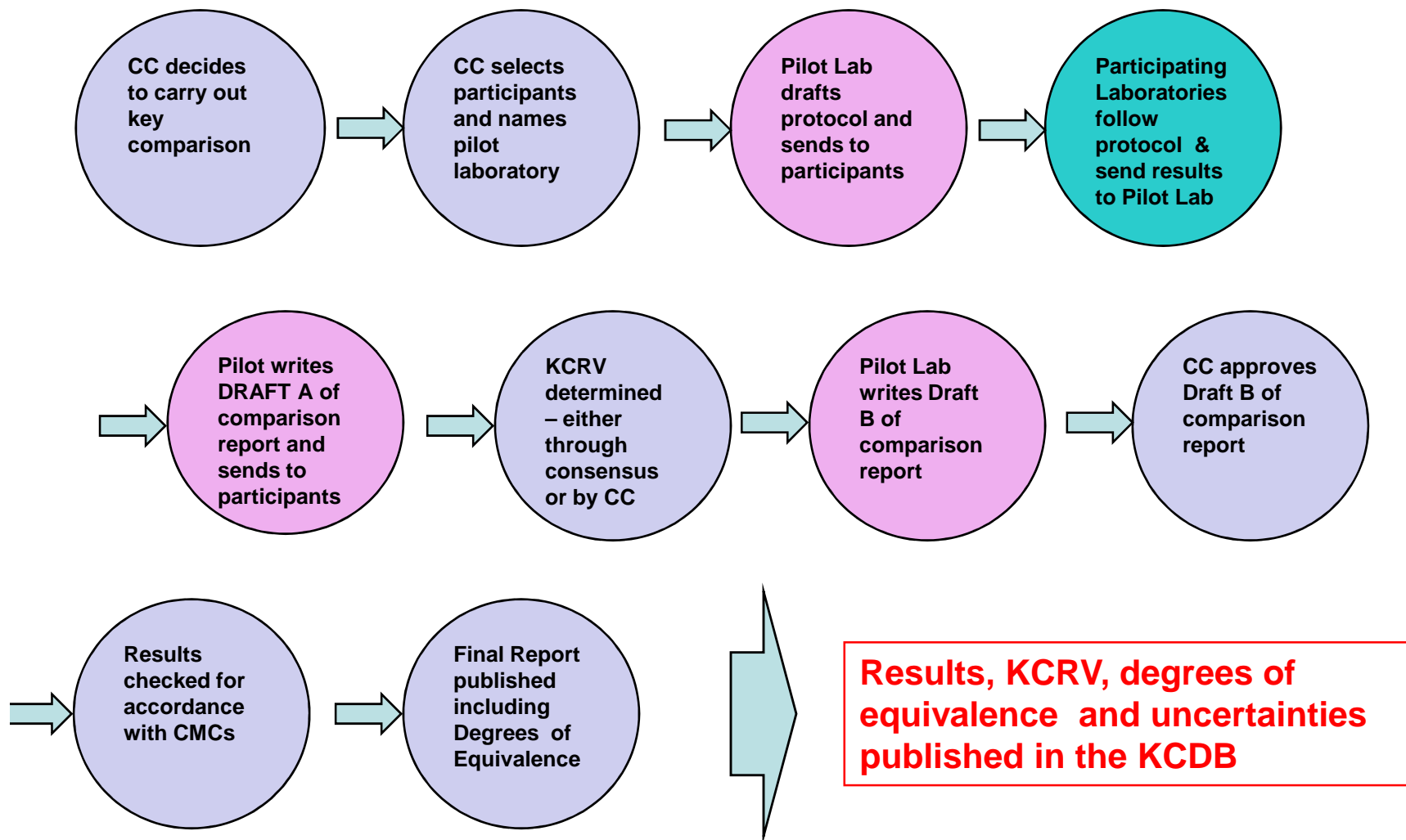
## CIPM Key Comparisons

In the selection, conduct and evaluation of KCs, the CCs take the following factors into account:

- the comparisons test all the principal techniques in the field;
- the results are clear and unequivocal;
- the results are robust;
- the results are easy to compare with those of corresponding comparisons carried out subsequently by regional metrology organizations;
- overall, the comparisons are sufficient in range and frequency to demonstrate and maintain equivalence between the laboratories participating in the CIPM MRA.



# CIPM Key Comparisons: Simplified Flow





## RMO Key Comparisons

### RMO Key Comparisons:

- Follow the same protocol as CIPM KC and frequently run parallel to them.
- Must include at least two NMIs who also participated in the CIPM KC in order to have the required link
- Assume the KCRV from the CIPM KC (There is no determination of a separate KCRV)
- Must be approved by relevant CC before proceeding



## Supplemental Comparisons

Supplemental Comparisons are conducted by RMOs in order to:

- **cover areas and/or techniques** that are not covered in key comparisons
- **to provide a demonstration of capabilities** for CMC declarations

Final reports of results are approved by the relevant CCs and are published in the KCDB.



## Bilateral Comparisons

An NMI that has either not been able to participate in a KC or SC or has obtained results that it deems unrepresentative of its performance may request to participate in a **bilateral comparison** with a participant of the KC or SC. The results are linked to the original comparison through the common participant.



## Pilot Studies

The CIPM MRA also has provisions for the conduct of Pilot Studies:

- normally undertaken to establish measurement parameters for a “new” field or instrument, or as a training exercise
- results of pilot studies are not considered sufficient support for CMCs
- an NMI that has never participated in a comparison may participate in a KC or SC in “pilot study mode”

## Quality Systems in the CIPM MRA

The CIPM MRA requires all signatory NMIs to establish and maintain a Quality System (QS) as an essential element of ensuring mutual confidence among CIPM MRA signatories concerning calibration and measurement capabilities.

An NMIs QS may be:

- **accredited** to ISO/IEC 17025 for calibration laboratories or equivalent for an NMI,
- **self declared** to ISO/IEC 17025 or a different quality system



## Quality Systems in the CIPM MRA

All CIPM MRA signatory NMIs and DIs must present their QS to the technical committee responsible for quality systems within their RMOs at least once every five years for approval. Annual Reports must also be submitted detailing any changes in the operation of QS that might affect calibration and measurement capabilities.

**The QS must cover all declared CMCs.**



## CMC Declarations and Reviews

In 2008, the BIPM and ILAC agreed to a common definition of the term CMC:

*“A CMC is a calibration and measurement capability available to customers under normal conditions:  
(a) as published in the BIPM key comparison database (KCDB) of the CIPM MRA; or  
(b) as described in the laboratory’s scope of accreditation granted by a signatory to the ILAC Arrangement. ”*



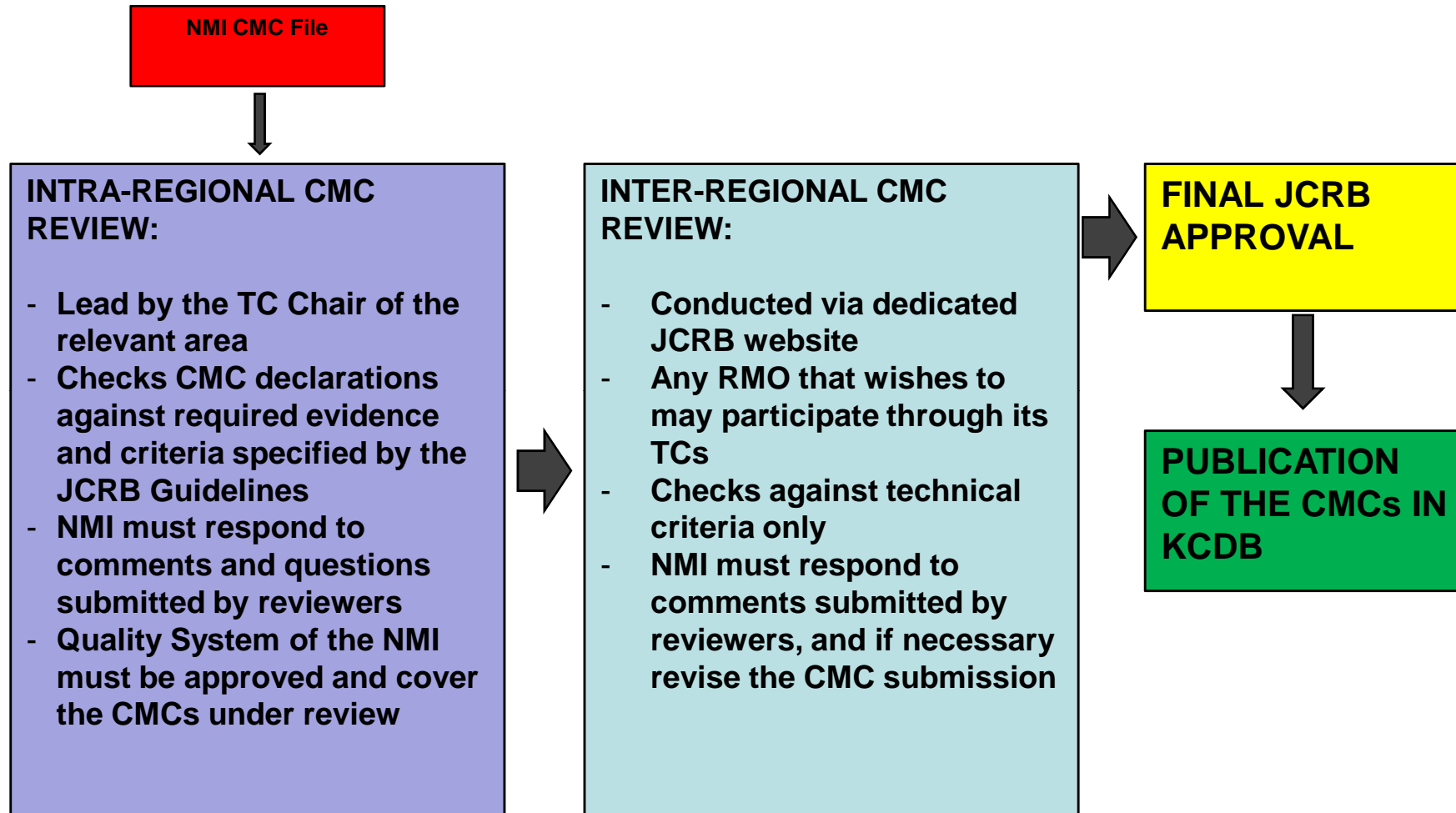
## CMC Review

An NMI that has participated in comparisons and that has implemented a QS that has received the approval of its RMO may submit CMCs for review and, if approved, publication in the KCDB.

There are two stages to the CMC review process:

1. Intra-regional review
2. Inter-regional review

# CMC Declarations and Reviews





## CIPM MRA Documents

After the signing of the CIPM MRA, the CIPM approved a number of policy and guidance documents concerning implementation of the CIPM MRA.

These detail the requirements, procedures and processes pertaining to all aspects of the implementation of the CIPM MRA.

The documents are available at:

<http://www.bipm.org/en/cipm-mra/documents/>



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**Thank you for your attention**

