

The BIPM Capacity Building and Knowledge Transfer Programme (CBKT)

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BIPM

Bureau
◆ **I**nternational des
◆ **P**oids et
◆ **M**esures



Capacity Building and Knowledge transfer (CBKT)

Background:

At the 25th CGPM, A proposal for a **BIPM Visitor Programme** was tabled, but not funded. Conceptually the approach was strongly supported and led to an amendment of the draft Resolution.

After the 25th CGPM

- ◆ The ideas were further refined based on the discussions around the CGPM, presented to and supported by the CIPM in March 2015.
- ◆ The new voluntary programme was given a new name but broadly similar objectives...

CBKT Programme goals



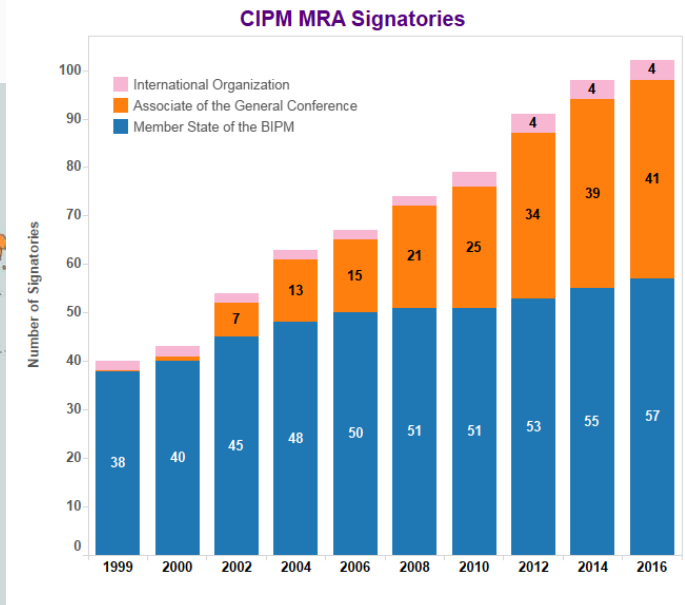
The BIPM Capacity Building and Knowledge Transfer Programme (CBKT) aims to:

- ◆ reinforce the international metrology system and balance the load among NMIs
- ◆ promote efficient operation of the system
- ◆ aid NMIs from countries and economies with emerging metrology systems engage appropriately and effectively

New hire Chingis Kuanbayev (1 July 2016): CBKT will be major focus of his portfolio

Participation in the activities of the BIPM

Currently 58 Member States and 41 Associates of the General Conference



In the 16 years leading up to the millennium
 - 3 new Member States

In the 16 years since the new millennium
 - 10 new MS, plus 41 Associate States and Economies

Includes countries and economies with emerging metrology systems (CEEMS)

At the very least Associates want to be able to participate in the CIPM MRA (the reason for Associate status)

The CIPM Mutual Recognition Arrangement today

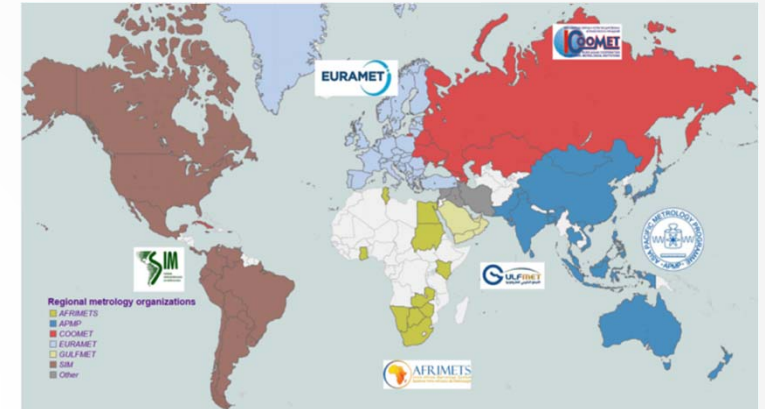


Objectives:

- to establish the **degree of equivalence** of national measurement standards maintained by NMIs
- to provide for the **mutual recognition of calibration and measurement certificates** issued by NMIs

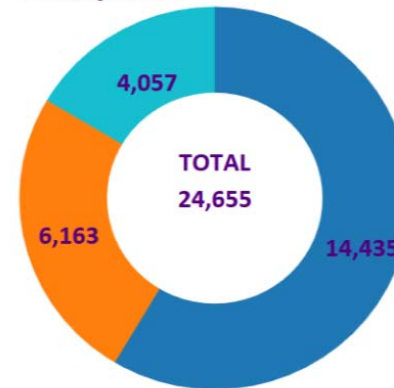
Participation

- **98 National Metrology Institutes**
 - 57 Member States
 - 41 Associates
 - **4 International organizations** (ESA, IAEA, IRMM, WMO)
 - **plus 156 Designated Institutes**
- Total: 258 Institutes**



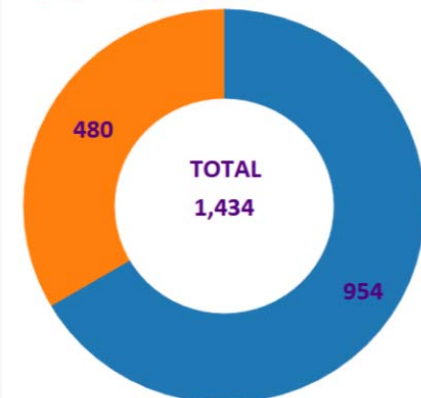
CMC area

- General physics
- Chemistry
- Ionizing Radiation



Comparisons

- Key comparisons
- Supplementary comparisons

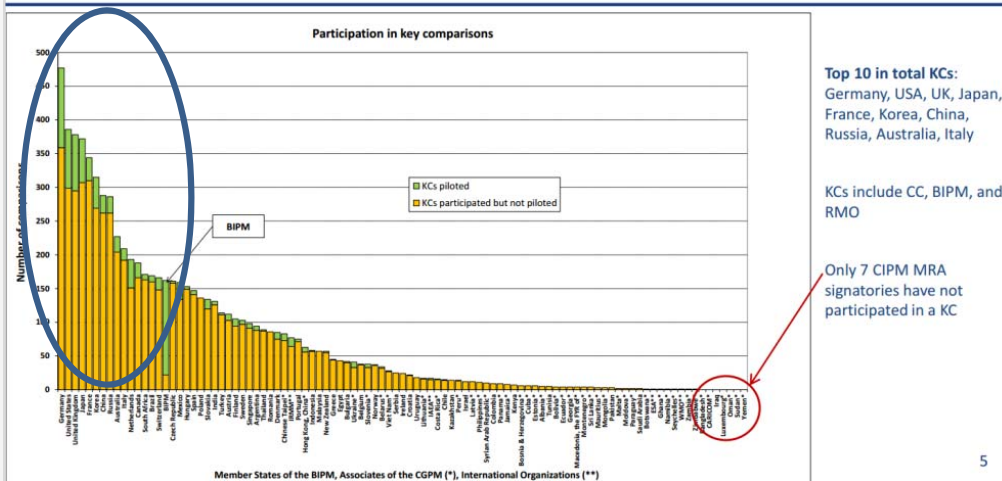


CIPM MRA: Lifetime

Data from the **CIPM MRA Review Workshop**
Held on 13 – 14 October 2015 at the BIPM, Sevres

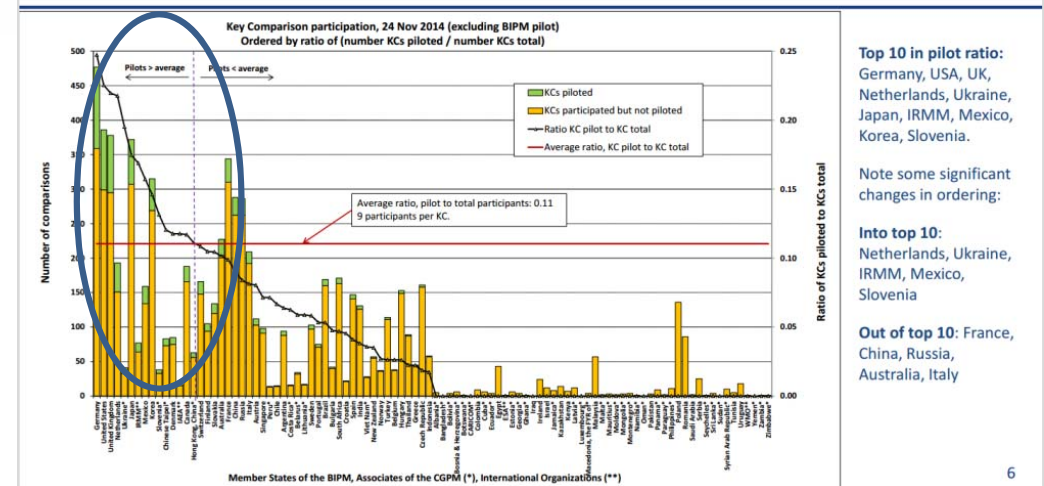
Analysis of participation in comparisons

KC participation, ordered by number of total comparisons



5

KC participation, ordered by ratio: KC piloted to KC total



6

CBKT Proposed Activities

Three main thrusts:

Focused capacity building opportunities at the BIPM

01

Engagement with the Global QI capacity building community

02

Scientific comparisons of particular interest to Member States that are developing countries

03

The programme is open to ideas from sponsors that contribute to the objectives

Within the broad objectives, the sponsor agrees with BIPM:

- ◆ Which type of action they wish to support;
- ◆ The specific topic;
- ◆ Whether to open to Associates;
- ◆ Whether to focus on supporting particular regions.

CBKT Initiatives

- ✓ 2016 BIPM-IPS joint Varenna Metrology School and METAS project
- 2016 "Leaders of Tomorrow" course
- 2016 - 2018 "Metrology for Safe Food and Feed in Developing Economies" project
- 2016 - 2019 Metrology for clean air: capabilities in gas metrology
- 2016 GULFMET- TC leadership course
- 2017 BIPM-EURAMET TC leadership course
- 2017 "Sound beginning in the CIPM MRA" course
- ?

2016 Varenna Metrology School and METAS project

[2016 BIPM-IPS Varenna Metrology School and METAS placement](#), summer 2016 (METAS sponsored). *Complete*

3 placements from Albania, INTI, and NMISA

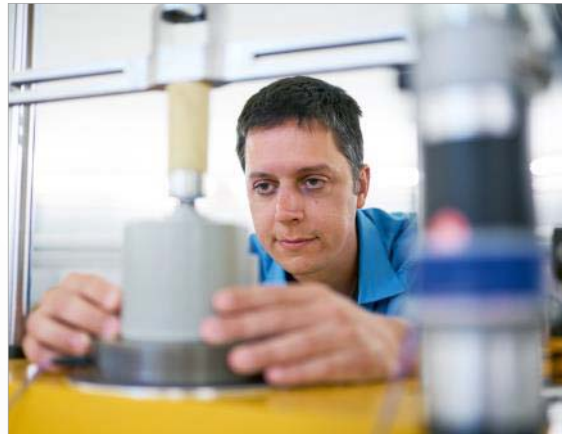
“The three METAS placements were indeed a success. It was an enriching experience for both, the three scientists and for the METAS laboratories involved.”

Dr Rudolf Thalmann, METAS program coordinator



Yljon Seferi (General Directorate of Metrology, Albania) – performed calibration and type testing to the power quality functions of smart meters.

www.bipm.org



Alejandro Savarin (INTI) – studied the influence quantities when using multiple force transducers working in parallel.



Dennis Mkhize (NMISA) – carried out physical and chemical analyses of a wide variety of alcohols from different matrices.

2016 "Leaders of Tomorrow" course



NIST sponsored 11 day course

Confirmed

Aimed at new, inexperienced and potential RMO TC and WG Chairs/ Convenors.

- Will facilitate participants ability to fulfil their CIPM MRA obligations
- Benefiting all by more effective operation of the CIPM MRA processes.

Course dates:

7 – 18 November, 2016

Location:

BIPM, Sevres

Places favoured Africa and Americas

Bureau International des Poids et Mesures – the intergovernmental organization through which Member States act together on matters related to measurement science and measurement standards.

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> You are here: BIPM CB&KT programme > Leaders of Tomorrow

2016 "Leaders of Tomorrow" course: Outline and status

→ The "Leaders of Tomorrow" course is aimed at new, inexperienced and potential Regional Metrology Organization Technical Committee Chairs and Working Group Convenors. Training will enable participants to fulfil their CIPM MRA obligations as TC Chairs/WG Convenors, with the wider benefit of ensuring the effective operation of the CIPM MRA processes.

- **Application process:**
The application period for the course has now closed. Candidates have been selected and notified of their placement in the course.
- **Financial support:**
Support is available for selected applicants covering course participation, air fare and hotel costs.
- **Course dates:**
7-18 November 2016, at the BIPM.
- **Programme:**
 Draft programme (v4)
- **Sponsor:**
The course is fully funded by NIST.

NIST National Institute of Standards and Technology
U.S. Department of Commerce

2016 "Leaders of Tomorrow" course



Trainees

Trainee	Origin	NMI	RMO
Gibson Aguko	Kenya	KEBS	AFRIMETS
Karina Bastida	Argentina	INTI	SIM
Jariya Buajarern	Thailand	NIMT	APMP
Valnei De Cunha	Brazil	INMETRO	SIM
Efrem Kebede Ejigu	South Africa	NMISA	AFRIMETS
Raphael Galea	Canada	NRC	SIM
Nedzadeta Hodzic	Bosnia Herzegovina	IMBIH	EURAMET
Gouda Hussien	Egypt	NIS	AFRIMETS
Sibusiso Jozela	South Africa	NMISA	AFRIMETS
Omar Kanakrieh	Saudi Arabia	SASO	GULFMET
Irena Kolozinska	Ukraine	NSC "Inst. of Metr."	COOMET
Katrice Lipa	USA	NIST	SIM
Alexander Matlejoane	South Africa	NMISA	AFRIMETS
Edgar Mendez	Mexico	CENAM	SIM
Luis Chaves Santacruz	Costa Rica	LACOMET	SIM
Raul Solis	Panama	CENAMEP	SIM
David Tonui	Kenya	KEBS	AFRIMETS
Maryna Yarmalovich	Belarus	BelGIM	COOMET

Lecturers

Speaker	Topic
Dr Wolfgang Schmid	Role of DIs in EURAMET
Dr Mariela Trujillo	Role of DIs in SIM
Dr Stuart Davidson	Specific guidelines for comparisons and CMCs in M
Dr Andrew Lewis	Specific guidelines for comparisons and CMCs in L
Dr Lucas di Lillo	Specific guidelines for comparisons and CMCs in EM (I)
Dr Luca Callegaro	Specific guidelines for comparisons and CMCs in EM (II)
Dr John Keightley	Specific guidelines for comparisons and CMCs in IR
Dr Angelique Botha	Specific guidelines for comparisons and CMCs in QM
Dr Ramiz Hamid	Specific guidelines for comparisons and CMCs in TF
Dr Gregory Strouse	Specific guidelines for comparisons and CMCs in T
Prof. Noha Khaled	RMO structure and QS: AFRIMETS
Dr Enver Sadikoglu	RMO structure and QS: EURAMET
Ing. Gabriela de la Guardia	RMO structure and QS: SIM
Dr Natalia Muravskaya	RMO structure and QS: COOMET
Eng. Omar Kanakrieh *	RMO structure and QS: GULFMET
Mr Ian Dunmill	OIML - General
Mr Poul Dixon	OIML – Certificate system
Mr Sean Mac Curtain	ISO
Mr Laurent Vinson	ILAC
Dr Mala Khan	Case study: Bangladesh
Prof. Philip N. Dearden	Hitting the target
CC Executive Secretaries	CC strategy, structure and operations
Other BIPM staff	CIPM MRA etc

2016 GULFMET-sponsored training course



GULFMET funded 3 day course

Confirmed

The course is designed to provide GULFMET Technical Committee members with the skills, knowledge and tools to help them participate in the mechanisms of the CIPM MRA.

Course dates:

21-23 November 2016

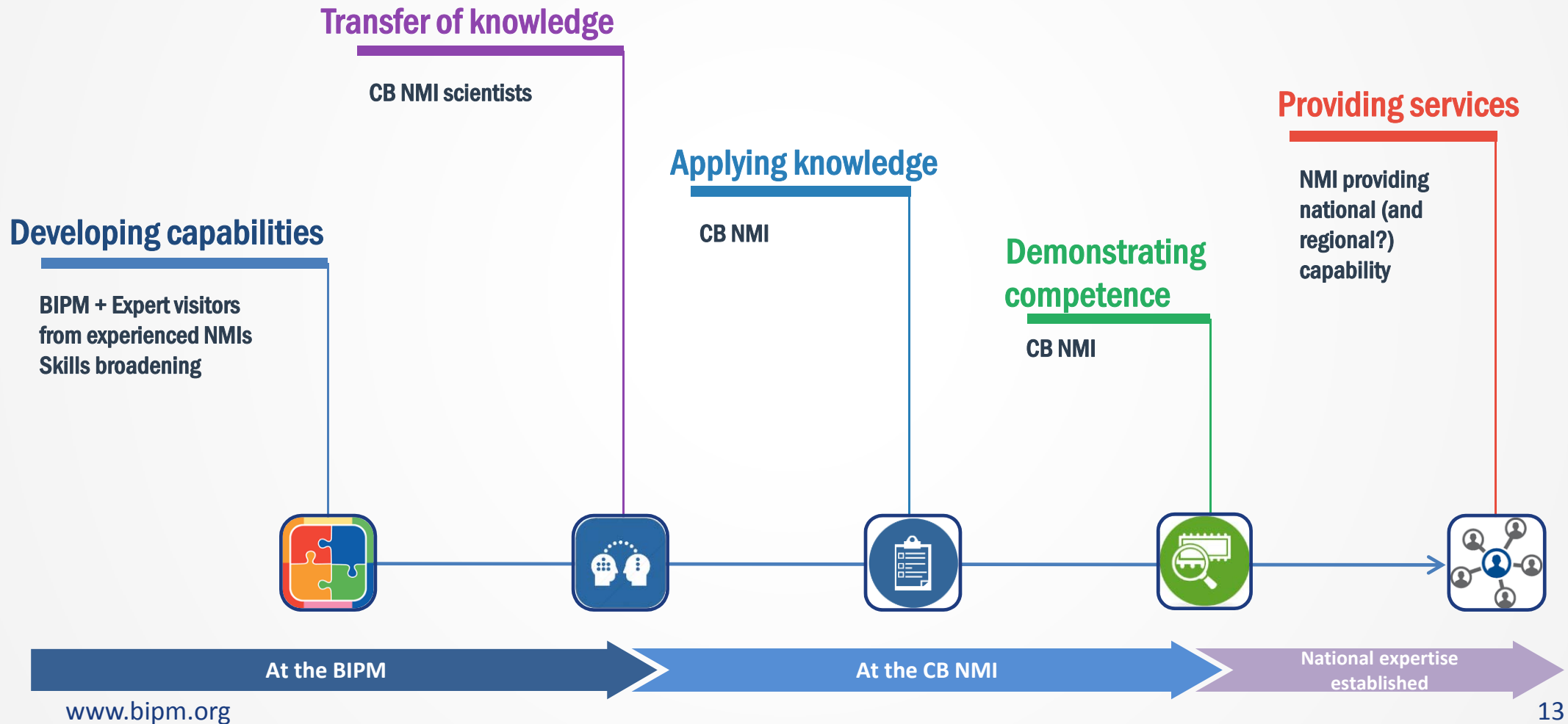
Location: Dubai, (United Arab Emirates)

The screenshot shows the BIPM website page for the 2016 BIPM-GULFMET TC Workshop. The page header includes the BIPM logo and the text "Bureau International des Poids et Mesures - the intergovernmental organization through which Member States act together on matters related to measurement science and measurement standards." The navigation menu includes "ABOUT US", "WORLDWIDE METROLOGY", "INTERNATIONAL EQUIVALENCE", "MEASUREMENT UNITS", "SERVICES", "PUBLICATIONS", and "MEETINGS". The main content area is titled "2016 'BIPM-GULFMET TC Workshop'" and contains the following information:

- Course description:** The 2016 "BIPM-GULFMET TC Workshop" is designed to provide GULFMET Technical Committee members with the skills, knowledge and tools to help them participate in the mechanisms of the CIPM MRA. The Workshop will enable Technical Committee members to understand the requirements of the CIPM MRA relating to comparisons, CMCs and Quality Systems, and their use in the CMC review, approval and publication process.
- Course dates:** 21-23 November 2016, in Dubai (United Arab Emirates)
- Programme:** Draft programme
- Support:** The course is sponsored by GULFMET.

The page also features the GULFMET logo (الجمع الخليجي للتكنولوجيا) and the Capacity Building & Knowledge Transfer logo.

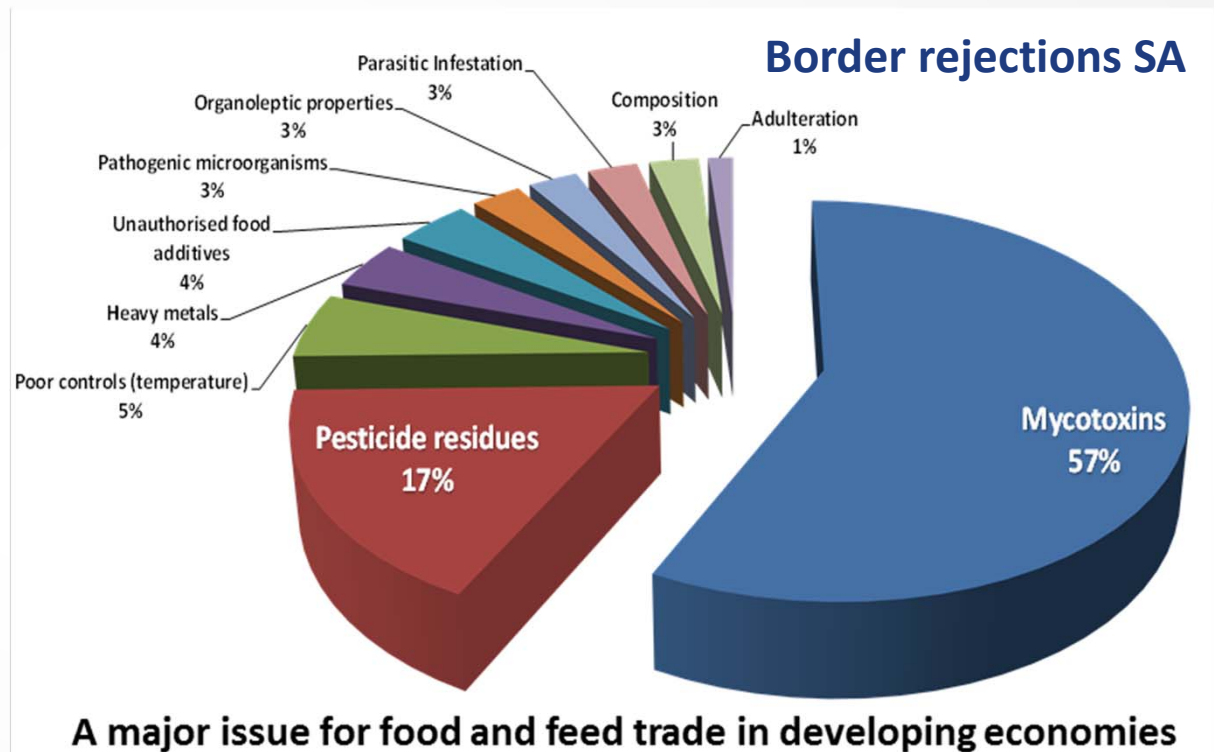
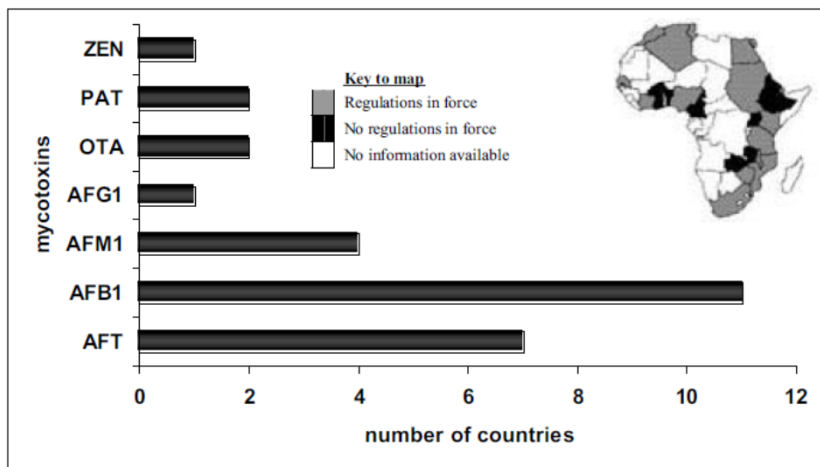
A new model for laboratory-based CBKT



“Safe Food and Feed” – project defined with AFRIMETS

Over 100 Countries have implemented regulatory limits for mycotoxins in food and feed to protect their populations.

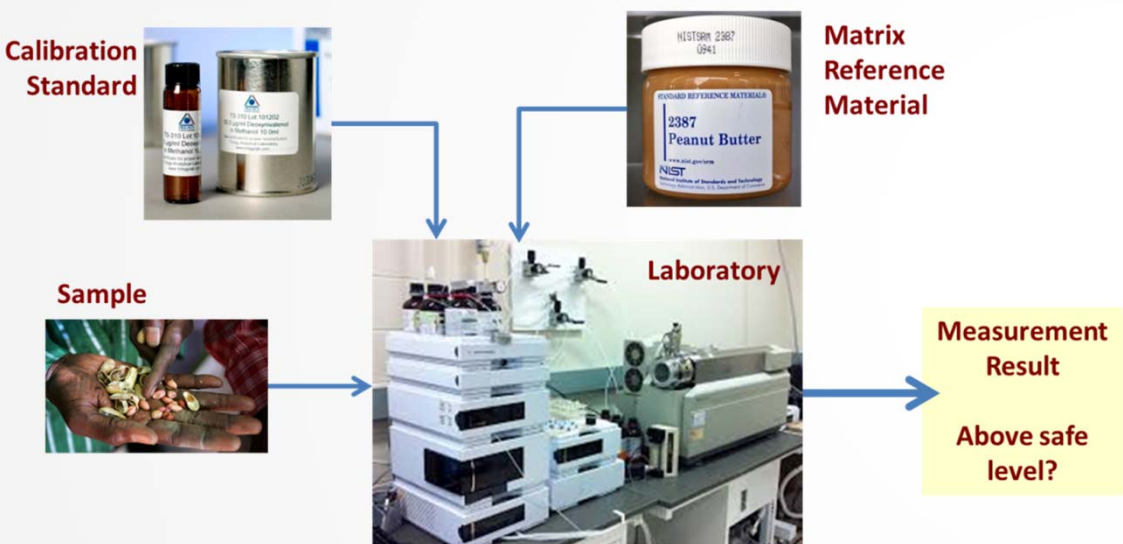
AFRIMETS has identified the regional need for **certified reference materials to support its mycotoxin** in food analysis requirements



South African Alerts/ notifications/border rejections from EU 01/01/2010 - 01/03/2014 received from the European Commission Rapid Alert System for food and feed (RASFF)

“Safe Food and Feed” – Laboratory-based CBKT

To establish Metrology Services for Mycotoxins, NMIs will need to demonstrate capabilities for:



a) Calibrant value assignment / production

CB&KT program at BIPM



b) Analytical methods for mycotoxins in food

CB&KT program at NMISA



c) Matrix CRM value assignment /production

CB&KT program at NIM



Start-up meeting at the BIPM 15 April 2016:

‘Give a man a fish, you will feed him for a day.

Teach a man to fish, you will feed him for a lifetime’

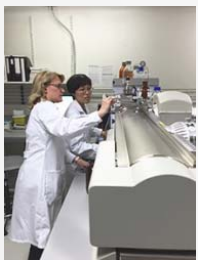
Safe Food and Feed – Mycotoxin calibrant reference materials

Transfer of knowledge

Developing capabilities

BIPM + Expert visitors from experienced NMIs

- Characterization of pure, stock and calibration solutions



Dr Xiuqin Li (NIM) and Mrs A. Daireaux (BIPM) starting the characterization of mycotoxin calibrants by LC-MS analytical Methods (2016)

CB NMI scientists

- Learning techniques including prep of stock and calibration solutions, stability, homogeneity testing and value assignment
- Learning comparison techniques
- Receive stock solution from BIPM

For 2017 (12 week programme):
INTI, NIMT, NMISA, KEBS, INMETRO

Applying knowledge

CB NMI

- Applying the techniques at home:
- Preparing calibration solutions
- Value assignment

Demonstration competence

CB NMI

- Participation in BIPM piloted comparison to demonstrate competence

Providing services

NMI

- Self sufficient national (*and hub supporting other NMIs in the region?*)
- Providing CRMs, PT and measurements
- Running comparisons



At the BIPM

At the CB NMI

National expertise established

www.bipm.org

“Safe Food and Feed” – BIPM based CBKT

Skills Broadening and Training Secondments established at the BIPM:

Activities covered at the BIPM:

1. Characterization of pure mycotoxin materials, stock and calibration solutions
2. Knowledge transfer and comparison of capabilities for pure material, stock solution and calibration solution value assignment
3. Coordination of an international comparison on mycotoxin calibrations solutions
4. Support of NMI programmes for mycotoxins in food

Visiting Scientists Can Choose:

TS 1: Q-trap on pure mycotoxin

TS 2: LC-UV, LC-CAD on pure mycotoxin

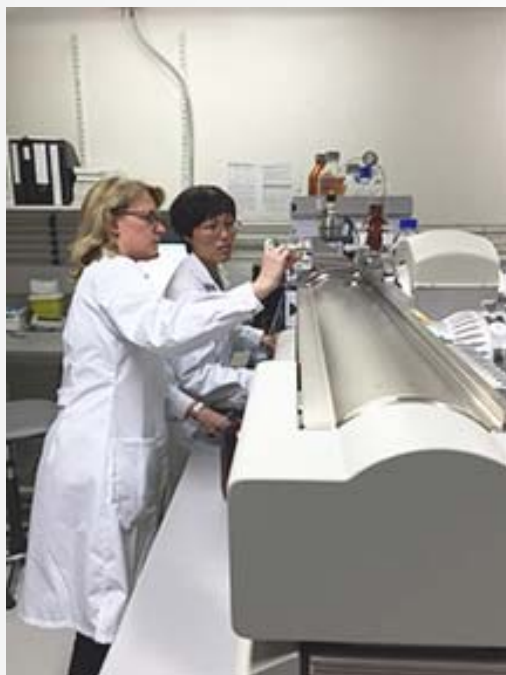
TS 3: EA, TGA, KF, SB and/or GC-VOCs on pure mycotoxin

TS 4: Calibration solution preparation and value assignment

SBS 1: qNMR on pure mycotoxin

SBS 2: Q-trap on pure mycotoxin

SBS 3: LC-UV, LC-CAD on pure mycotoxin



Dr Xiuqin Li (NIM) and Mrs A. Daireaux (BIPM) starting the characterization of mycotoxin calibrants by LC-MS analytical Methods (2016)

Secondment Planning at the BIPM 2016-2019

Year	2016	2017	2018	2019
Material for Study at BIPM	AfB1/ZON	AfB1/ZON	DON/PAT	DON/PAT
NIM	SBS2/3	SBS2/3	SBS2/3	SBS2/3
NMISA		TS4+	TS2/TS4	
UME		SBS1	SBS3/TS3	
NIMT		TS4	TS3	
INMETRO		TS4	SBS1/SBS2	
INTI		TS4		
KEBS		TS4	TS2	

TS 1: Q-trap on pure mycotoxin

TS 2: LC-UV, LC-CAD on pure mycotoxin

TS 3: EA, TGA, KF, SB and/or GC-VOCs on pure mycotoxin

TS 4: Calibration solution preparation and value assignment

SBS 1: qNMR on pure mycotoxin

SBS 2: Q-trap on pure mycotoxin

SBS 3: LC-UV, LC-CAD on pure mycotoxin

”Safe Food and Feed” – Next Steps



Secondments

- ◆ Open Call for further interest from NMIs for 2018-2019 BIPM CBKT program.
- ◆ NIM to announce Mycotoxin Matrix CRM training secondments for 2017-2018.
- ◆ NMISA will be offering training secondment opportunities during 2018/19 and 2019/2020. Training will focus on the determination of multiple mycotoxins in foods such as maize and nuts.

Mycotoxin Metrology Workshops

- ◆ Mycotoxin Metrology included in APEC Workshop on Measurement and Standards for Grain Food Safety and Free Trade, November 9-10, 2016 Da Nang, Vietnam.
- ◆ NMISA will be hosting a Mycotoxin Metrology workshop at NMISA (Pretoria, South Africa) in March 2018.

“Metrology for clean air” - Gas Metrology & FTIR

NMIs developing gas metrology capabilities and standards require measurements techniques that can operate at low uncertainties to verify and value assign their standards

- ◆ FTIR provides a cost effective and accurate solution for the NMI
- ◆ But, requires expert knowledge for operation and data analysis



Comparisons:

NO	CCQM-P73,
NO ₂	CCQM-K74
HNO ₃	CCQM-P110.B1
	CCQM-P110.B2
HCHO	CCQM-K90
Δ ¹³ C, δ ¹⁸ O	CCQM-K120

BIPM expertise in use of FTIR in key comparisons supporting CBKT at NMIs

Scientist (NMI)	Period	Project
M. Avila (CENAM)	1 June 2016- 30 November 2016	CB&KT: FTIR

“Safe Food” and “Clean Air” - confirmed financial support



Metrology for safe food and feed

- **NIM:** Funding own visiting scientists and Pure Mycotoxin Materials and visiting scientist programme at NIM (Matrix Materials)
- **NMISA:** Funding own visiting scientists and visiting scientist programme at NMISA (Analytical methods)
- **PTB:** Funding 3 times 3 month training secondments from NIMT, INTI and INMETRO
- **UME:** Funding own visiting scientists at BIPM

Metrology for clean air

- **PTB:** Funding 6 month skills broadening secondment from CENAM

2017 BIPM-EURAMET "TC Leadership" course



EURAMET funded 4 day course

Confirmed

The course is focused on the scientific and technical staff members of EURAMET's NMIs and DIs.

- Facilitating effective TC leadership in the CIPM MRA processes.
- Will help to bring important personal contributions to the further development of EURAMET.

Applications:

open from 12th September until 1st November

Maximum number of participants is 20

Selection:

15th November candidates will be notified of their placement in the course

Course dates:

7-10 February 2017

Location: BIPM, Sevres

www.bipm.org

The screenshot shows the BIPM website page for the 2017 BIPM-EURAMET "TC Leadership" course. The page header includes the BIPM logo and the text "Bureau International des Poids et Mesures" and "the intergovernmental organization through which Member States act together on matters related to measurement science and measurement standards." The navigation menu includes "ABOUT US", "WORLDWIDE METROLOGY", "INTERNATIONAL EQUIVALENCE", "MEASUREMENT UNITS", "SERVICES", "PUBLICATIONS", and "MEETINGS". The breadcrumb trail reads "> You are here: BIPM CB&KT programme > TC Leadership". The main heading is "2017 BIPM-EURAMET 'TC Leadership' course". The content area contains a paragraph describing the course, followed by a list of key information points: "Application process" (with an icon of a document), "Financial support", "Course dates", "Programme" (with an icon of a book), and "Support". The EURAMET logo is visible at the bottom left, and the Capacity Building & Knowledge Transfer logo is at the bottom right.

2017 BIPM-EURAMET "TC Leadership" course

→ The BIPM-EURAMET "TC Leadership" course is focused on the scientific and technical staff members of EURAMET's NMIs and DIs who are active in the EURAMET Technical Committees and have shown potential for TC leadership. Training will enable participants to be highly effective in their involvement in the CIPM MRA processes and bring important personal contributions to the further development of EURAMET.

- **Application process:**
 - Online application form
 - Applications are open from 12 September 2016 until 1 November 2016.
 - Candidates will be selected and notified of their placement in the course by 15 November 2016.
- **Financial support:**
 - There are no course fees and lunches will be provided free of charge. Each participant's home institute shall cover the costs related to travel, accommodation and subsistence.
- **Course dates:**
 - 7-10 February 2017, at the BIPM.
- **Programme:**
 - Draft programme
- **Support:**
 - The course is fully funded by EURAMET.

2017 "Sound beginning in the CIPM MRA" course



NIST sponsored 11 day course

Confirmed

Training aimed at relevant staff from NMIs that have signed the CIPM MRA but not yet submitted CMCs (or are early in the process)

Will help both, to optimize the NMI success rates and minimize the burden on the wider community that will conduct the reviews.

Applications:

open in early 2017

Course dates:

13 to 24 November 2017

Location:

BIPM, Sevres

Places favoured Africa and Americas

The screenshot shows the BIPM website page for the 2017 "Sound beginning in the CIPM MRA" course. The page header includes the BIPM logo and a search facility. The main content area features a blue header with navigation links: ABOUT US, WORLDWIDE METROLOGY, INTERNATIONAL EQUIVALENCE, MEASUREMENT UNITS, SERVICES, PUBLICATIONS, and MEETINGS. Below the header, the page title is "2017 'Sound beginning in the CIPM MRA' course". The main text describes the course, stating it is aimed at relevant staff from NMIs that have signed the CIPM MRA but not yet submitted CMCs (or are early in the process). Training will aim to help debutant NMIs achieve 'right first time' submissions into the CMC peer review system. This will help both optimize the NMI success rates and minimize the burden on the wider community that will conduct the reviews.

- **Status:**
The course is fully funded by NIST. Support is available for selected applicants covering course participation, air fare and hotel costs.
- **Dates:**
The course will be held over 11 days at the BIPM. Course dates are tentative and are for the 2nd and 3rd week of November 2017.
- **Application process:**
The application process is expected to open early in 2017. For further information please contact Andy Henson at the BIPM.

The page footer includes the NIST logo (National Institute of Standards and Technology, U.S. Department of Commerce) and the Capacity Building & Knowledge Transfer logo.

Well...

- ◆ **It's still early days... but proving very popular!**
- ◆ We have successfully completed our first CBKT project
- ◆ We have a number of others fully planned or under way
- ◆ We have more in the pipeline

Although we were disappointed not to be funded by the dotation...

- ◆ The sponsor based approach gives great flexibility

We are now thinking about CBKT as a “spectrum of activities”...

- ◆ Some activity benefit the entire community and feel like it is ‘must do’ ... particularly training for TC Chairs from RMOs in the operation of the CIPM MRA
- ◆ Others activities add value around topical challenges such as supporting CEEMS
- ◆ **Your suggestions, requests for future CBKT topics ... and funding all welcomed!**

CBKT Status summary

- ◆ “Leaders of tomorrow”, **7 to 18 Nov 2016**. *Confirmed – sponsors: NIST*
- ◆ “Sound beginning in the CIPM MRA”, **13 to 24 Nov 2017**. *Confirmed – sponsors: NIST*
- ◆ “Metrology for safe food and feed in developing countries” *Confirmed, sponsors: (NIM, NMISA, PTB, UME).*
- ◆ “Metrology for clean air “ *Confirmed, sponsors: PTB (seeking further participation/sponsorship)*
- ◆ “TC Workshop, Dubai” **22 to 23 Nov 2016**. *Confirmed, sponsors: GULFMET*
- ◆ “TC Leadership, BIPM”, **7 to 10 Feb 2017**. *Confirmed, sponsors: EURAMET*
- ◆ *Training in the calibration of time transfer equipment for UTC (under consideration)*

Thank you.

Andy Henson

BIPM

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<http://www.bipm.org/en/cbkt/>

Bureau

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