



AFRIMETS Approach in Quality Systems and Specifics

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



Outline

- ❑ **General introduction**
(History ,organization, structure and members)
- ❑ **Objectives**
- ❑ **Progress in 11 years**
- ❑ **TC /WG**
- ❑ **Guidance documents (general)**
- ❑ **Support of metrology in developing countries**
- ❑ **Comparisons**
- ❑ **Guidance documents (CMCs)**
- ❑ **Quality system**
- ❑ **CMCs**
- ❑ **Activities on knowledge transfer**

AFRICA

- ♦ Africa is the world's second-largest At about 30.3 million km² including adjacent islands, it covers 6 % of [Earth](#)'s total surface area and 20.4 % of its total land area. **Countries 54** and 2 disputed.
- ♦ Africa is second-most-populous [continent](#). With 1.2 billion people as of 2016, it accounts for about 16% of the world's human population.
- ♦ Africa is the [oldest inhabited territory](#) on [Earth](#)
At about 3300 BC, the historical record opens in Northern Africa with the rise of literacy in the [Pharaonic](#) civilization of [Ancient Egypt](#). One of the world's earliest and longest-lasting civilization.
- ♦ Africa's population is the youngest amongst all the continents the [median](#) age in 2012 was 19.7, when the worldwide median age was 30.4.
- ♦ [languages](#) ([UNESCO](#) has estimated around two thousand) are spoken in Africa.



AFRICA

- ◆ Although it has abundant [natural resources](#), The continent is believed to hold 90% of the world's [cobalt](#), 90% of its [platinum](#), 50% of its [gold](#), 98% of its [chromium](#), 70% of its [tantalite](#), 64% its [manganese](#), and one-third of its [uranium](#).
- ◆ Africa remains the world's poorest and most [underdeveloped](#) continent.
- ◆ Africa's rate of economic growth increased recently, Some countries experienced still higher growth rates, notably [Angola](#), [Sudan](#) and [Equatorial Guinea](#), all of which had recently begun extracting their [petroleum](#) reserves or had expanded their [oil extraction](#)



AFRICA

- the measurement system in Africa at present does not fulfil the international requirements for free and fair trade.
- Many countries lack basic metrology infrastructure and especially a Scientific and Industrial metrology institute.
- In those with a Legal metrology and/or Scientific and Industrial metrology representative body or institute, there is a general lack of equipment and skills.
- In many instances it operates in silos, is fragmented and is not always recognised internationally.

As a response, the sub-regions and nations of Africa came together to establish an intra-Africa Metrology System.



AFRIMETS

Main Goal

- To harmonise accurate measurement in Africa,
- Establish new measurement facilities
- Gain international acceptance for all measurements critical to export,
- Environmental monitoring



AFRIMETS history

The initiative is supported by

- NEPAD (New partnership for Africa's development)
- PTB
- NMISA
- NRCS (National regulator for compulsory specifications)



- ❖ First AFRIMETS workshop, held in March 2006
- ❖ Second workshop was held in September 2006
- ❖ The first General Assembly meeting was held in July 2007 at the premises of the NEPAD in SA.
- ❖ The MOU was finalized and signed by 5 sub regional metrology organizations (SRMOs)
- ❖ AFRIMETS was officially approved by CIPM as a RMO in October 2008.

AFRIMETS history

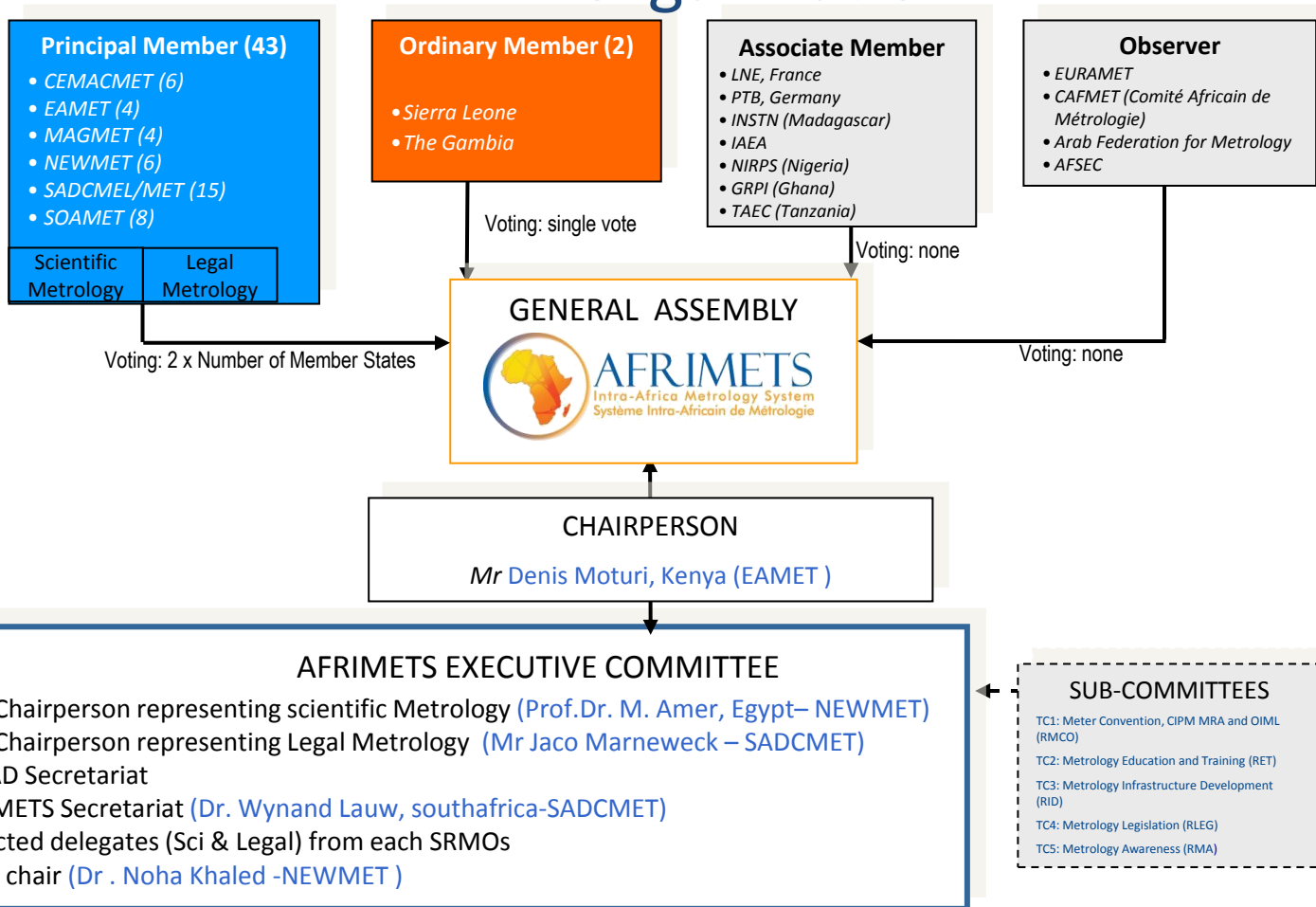
04/06-07-2007	1st AFRIMETS GA; Midrand, South Africa
02/04-07-2008	2nd AFRIMETS GA; Tunis, Tunisia
15/16-07-2009	3rd AFRIMETS GA; Magaliesburg, South Africa
22/23-09-2010	4th AFRIMETS GA; Sharm El Sheikh, Egypt
20/21-07-2011	5th AFRIMETS GA; Nairobi, Kenya
13/14-09-2012	6th AFRIMETS GA; Cotonou, Benin
3/4 -07-2013	7th AFRIMETS GA; Lusaka, Zambia
16/20 -06-2014	8th AFRIMETS GA; Addis Abeba, Ethiopia
28/30 -07-2015	9th AFRIMETS GA; Magaliesburg, South Africa
25/28 -07-2016	10th AFRIMETS GA; Cairo, Egypt
30 Jul. to 2 Aug.2017	11th AFRIMETS GA; Pretoria,SouthAfrica



11th AFRIMETS GA and Related Meetings in SouthAfrica 2017



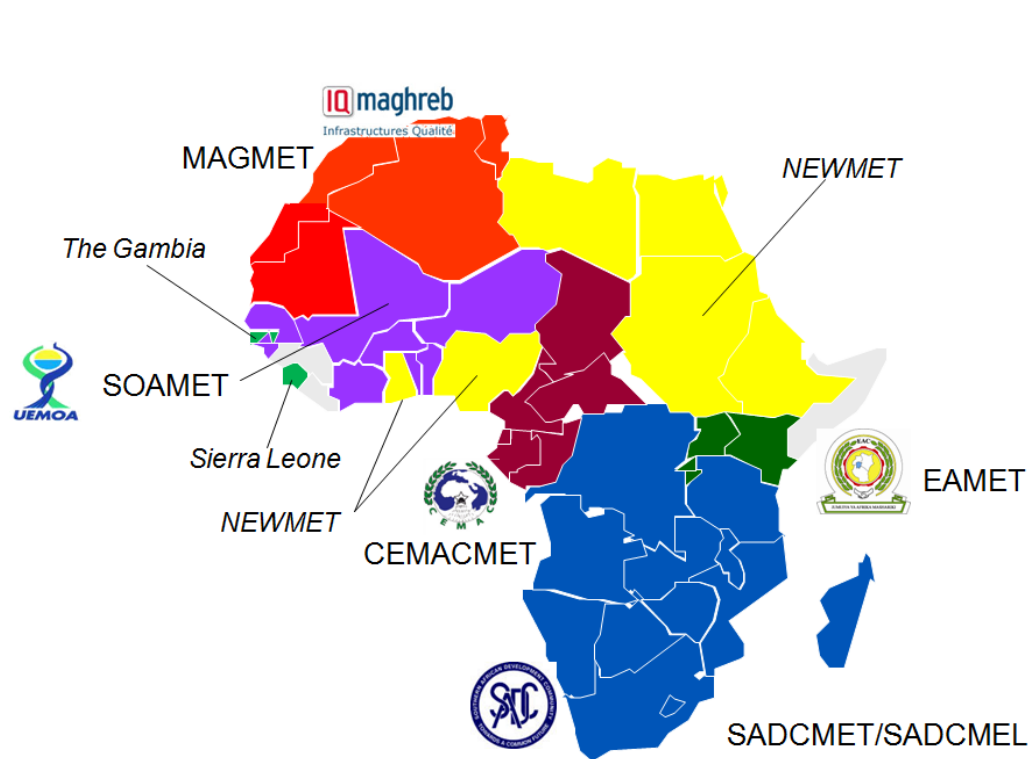
Organization



EXCO members 2017 (SRMOs)

SRMO	Scientific	Legal
CEMACMET	Mr Aristide Gabin Nguedeu	Dr Silla Semballa
EAMET	Mr Eric Karamuzi	Mr John-Paul Musimami
MAGMET	Mr Dyane Salah	Mr Samir Drissi
NEWMET	Mr Obiora Manafa	Mr Paul Date
SADECMET/MEL	Mr Donald Masuku	Mr Jaco Marneweck
SOAMET	Mr KY Oumarou	Mr Salifou Issoufou

AFRIMETS Structure



AFRIMETS members

Principal Members (43)

SADCMET	SOAMET	CEMACMET	EAMET	MAGMET	NEWMET
Angola	Benin	Cameroon	Kenya	Morocco	Egypt
Botswana	Burkina Faso	Central African Republic	Uganda	Algeria	Nigeria
Democratic Republic of Congo	Guinea Bissau	Chad	Rwanda	Tunisia	Ethiopia
Lesotho	Mali	Congo Brazzaville	Burundi	Mauritania	Ghana
Madagascar	Niger	Equatorial Guinea			Sudan (North)
Malawi	Senegal	Gabon			Libya
Mauritius	Togo				Liberia (MOU to be signed)
Mozambique	Côte d'Ivoire				
Namibia					
Seychelles					
South Africa					
Swaziland					
Tanzania					
Zambia					
Zimbabwe					

AFRIMETS members

Associate Members (7)	<ul style="list-style-type: none">■ LNE, France■ PTB, Germany■ <i>NIRPS (National Institute of Radiation Protection and Research (Nigeria))</i>■ <i>GRPI (Ghana Radiation Protection Institute)</i>■ <i>TAEC (Tanzania Atomic Energy Commission)</i>■ <i>Madagascar-INSTN</i>■ <i>IAEA</i>
Observers (7)	<ul style="list-style-type: none">■ EURAMET, APMP, SIM■ CAFMET (Comité Africain de Métrologie)■ AFSEC (African Electrotechnical Standardisation Commission),■ AFRAC (Accreditation),■ ARSO (Standardisation)
Ordinary Members (2)	<ul style="list-style-type: none">■ The Gambia■ Sierra Leone

AFRIMETS Committees:

- ◆ TC1 : Metre Convention, CIPM MRA, JCRB and OIML (RMCO)
- ◆ TC2 : Metrology Education and Testing (RET)
- ◆ TC3 : Metrology Infrastructure Development (RID)
- ◆ TC4 : Metrology Legislation harmonization (RLEG)
- ◆ TC5 : Metrology awareness (RMA)

TC 1A-Working Groups

TC-M	Mass and Related Quantities
TC-F	Flow
TC-P	Pressure
TC- F,T,H	Force, Torque and Hardness
TC-L	Length
TC-AUV	Acoustics, Ultrasound and Vibration
TC-T	Temperature
TC-TF	Time and Frequency
TC-PR	Photometry and Radiometry
TC-IR	Ionising Radiation
TC-RS	Radioactivity Standards
TC-EM	Direct Current, low Frequency (Voltage)
TC-MC	Metrology in Chemistry
TC-QS	Quality

TC 1B-Working Group

TC-WM

Weight and Measures

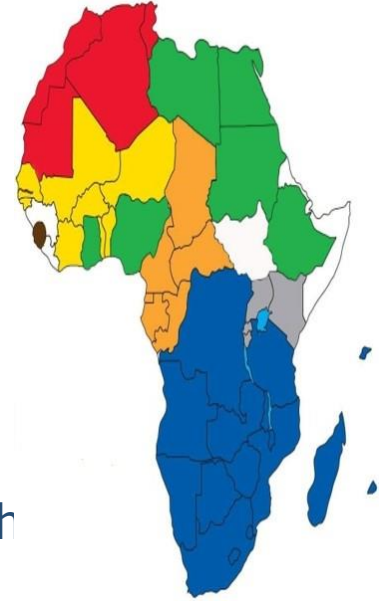
AFRIMETS Chairs and Vice-Chairs since 2016

TC 1A	Chair	Vice chairs
TC-EM	Alexander Matlejoane (NMISA)	Dr Mohammed Abd El-Raouf (NIS)
TC-Length	Oelof Kruger (NMISA)	Dr Osama Terra (NIS)
TC-M & RQ	Dr Alaa Eltaweel (NIS)	Mr Dominic Ondoro (KEBS)
TC-Mass	Thomas Mautjana (NMISA)	-----
TC- Pressure	Brian Yalisi (KEBS)	----
TC-Viscosity	Dr Mostafa Mikawy (NIS)	----
TC-Force	Dr Seif Osman (NIS)	---
TC-Fluid flow	Ms. Deona Jonker (NMISA)	Mr. Ali Zahran (NIS)
TC-IR	Zakithi Msimang (NMISA)	Dr Noha Khaled (Dosimetry Radiation Therapy) (NIS) Markos Fikreab (Dosimetry Radiation Protection) (KEBS) Dr Ahmed El Sersy (Neutron dosimetry) (NIS)
TC-RS		Martin van Staden (NMISA)
TC-T	Dr Efrem Ejigu (NMISA)	Dr. Mohamed Gamal Ahmed (NIS) Victor Mundembe Victor Mwazi Richard Odak (KEBS)

AFRIMETS STRATEGIC OBJECTIVES

CUSTOMER objectives:

- Satisfy and sensitize customers and stakeholders, which include the recipients of services about international requirements;
- facilitate trade;
- deliver value for money for measurements;
- increase number of services;
- facilitate consumer protection, health, safety and the protection of the environment;
- integrate the needs of members / stakeholders.



AFRIMETS STRATEGIC OBJECTIVES

FINANCIAL objectives:

- Reduce cost of metrology development by use of internal institutions in Africa;
- sustain regional resources;
- ensure financially strong sub-regional metrology bodies;
- transfer traceability to end users in a cost-effective way;
- make sure AFRIMETS will be self-sufficient;
- maximize scarce financial resources.

AFRIMETS STRATEGIC OBJECTIVES

INTERNAL PROCESS objectives:

- Regional interactions and exchange of members;
- harmonization of regulations and policies;
- put quality systems in place and comply with ISO 9000 and 17025;
- put in place continuous improvement strategies;
- improve capacity of members;
- improve standard of metrology.

AFRIMETS STRATEGIC OBJECTIVES

LEARNING & GROWTH objectives:

- Training people at lower cost;
- establishment of databases for use by members;
- use of African experts for training;
- become a forum for exchange between metrology organisations;
- facilitate the technical competence of personnel;
- share of expertise and awareness;
- develop world-class metrologists;
- establish a culture of continued learning.

The greater role of AFRIMETS in Africa

- Liaison with the AU/NEPAD
- Liaison with other RMOs
- Establishment of Metrology Infrastructure
- Coordination of donor funding
- Awareness creation
- Identify Measurement gaps
- Regional Measurement institutes
- Harmonization between SRMOs
- Metrology training

AFRIMETS within the PAQI STRUCTURE

African

Accreditation Cooperation (AFRAC)



AFRAC was established in 2010 and is a cooperation of accreditation bodies, sub-regional accreditation cooperations and stakeholders. The main objective of AFRAC is to provide accreditation support to industry and trade and to contribute to the protection of health and safety of the public and the protection of the environment.

www.intra-afrac.com

Intra –Africa

Metrology System (AFRIMETS)



AFRIMETS was formed in 2006 with membership drawn from the six African Sub-regional Metrology Organizations. The main objective of AFRIMETS is to promote metrology and related activities in Africa with the view of facilitating intra-African and international trade and to ensure the safety and health of the public and environmental protection.

www.afrimets.org

African Electrotechnical

Standardization Commission (AFSEC)



AFSEC was established in February 2008 as an organised association and has legal status in accordance with Article 24 of the Convention of the African Energy Commission. The main objective of AFSEC is to support African electricity Infrastructure development with standards and conformity assessment services in order to improve access to electricity in Africa.

www.afsec-africa.org

African Organisation for Standardisation (ARSO)



ARSO is Africa's intergovernmental standards body formed in 1977 with membership drawn from national standards bodies. The main objective of ARSO is to develop tools for standards development, standards harmonization and implementation of these systems to enhance Africa's internal trading capacity, increase Africa's product and service competitiveness globally, and uplift the welfare of African consumers creating a continental standardization forum to influence future prospects in international trade referencing for Africa's benefit and advantage.

www.arso-oran.org

QUALITY FOR AFRICA



Contact

PAQI Joint Committee Secretariat
(Currently hosted at ARSO central secretariat)
Dr. Hermogène Nsengimana
(PAQI Joint Committee Chairperson)
3rd Floor, International House,
Mama Ngina Street
P.O Box 57363-00200, Nairobi, Kenya

Tel: +254-020-224561, 311608, 311641
Cell: +254-716888522; +254-733777318

Email: paqi@arso-oran.org

www.paqi.org



**PAN-AFRICAN
QUALITY INFRASTRUCTURE**

Structure – Function – Impact

Role of Technical committees

- Under TC1A for Scientific Metrology,
Main aims of the AFRIMETS TC-WGs are to;
 - Foster technical development in NMIs,
 - organize benchmarking of NMI capabilities and get Calibration and Measurement Capabilities (CMCs) accepted in the International Key Comparison Database (KCDB)

- Under TC1B, TC for Legal Metrology
 - Development of Metrology Laws
 - Development of Verification and Inspection capabilities
 - Adoption of OIML standard regulations
 - Harmonization of Regulations in Regional Economic Blocks

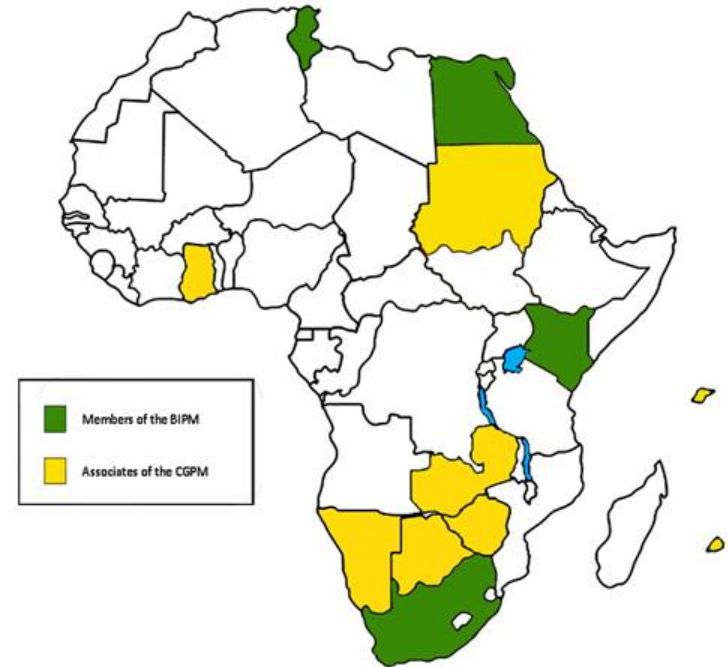
Progress in 11 years

Members of the BIPM and Associates of the CGPM

2007



2017



***Ethiopia (NMIE)** will become an Associate of CGPM by January 2018

Member Country	Members of the BIPM	Associates of the CGPM	Signatories to CIPM MRA
Egypt	X		X
South Africa	X		X
Kenya	X		X
Tunisia	X		X
Botswana		X	X
Ghana		X	X
Mauritius		X	X
Namibia		X	X
Seychelles		X	X
Sudan		X	X
Zambia		X	X
Zimbabwe		X	X

Metrology Institute Categorisation

☐ **High Level (participating in the CIPM MRA and OIML) Metrology facilities**

☐ **Legal Metrology and Scientific/Industrial Metrology facilities**

☐ **Legal Metrology and at least establishing or planning to establish Scientific/Industrial metrology facilities.**

☐ **No Metrology facilities**

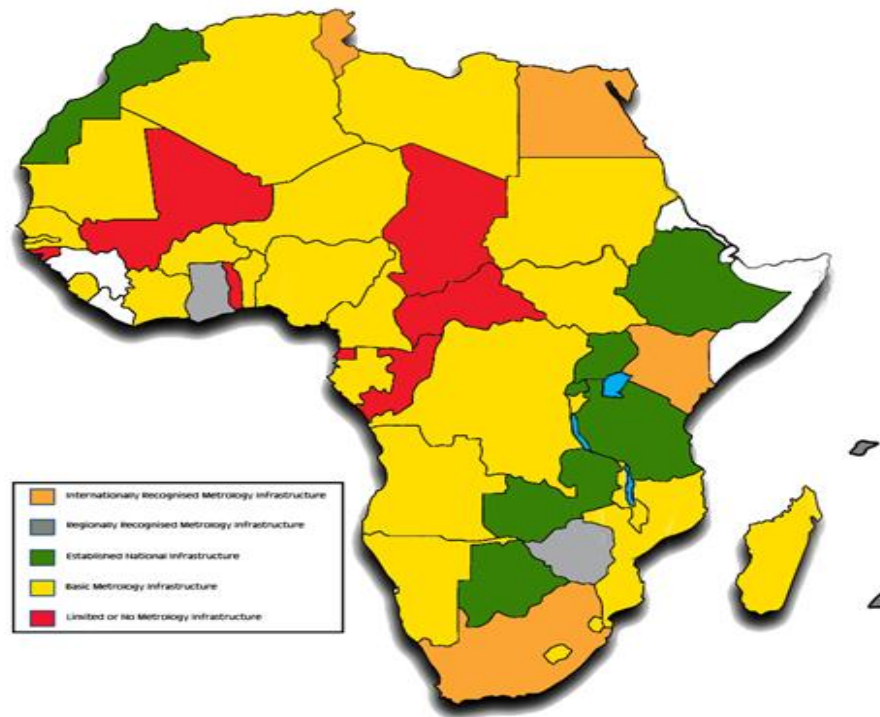
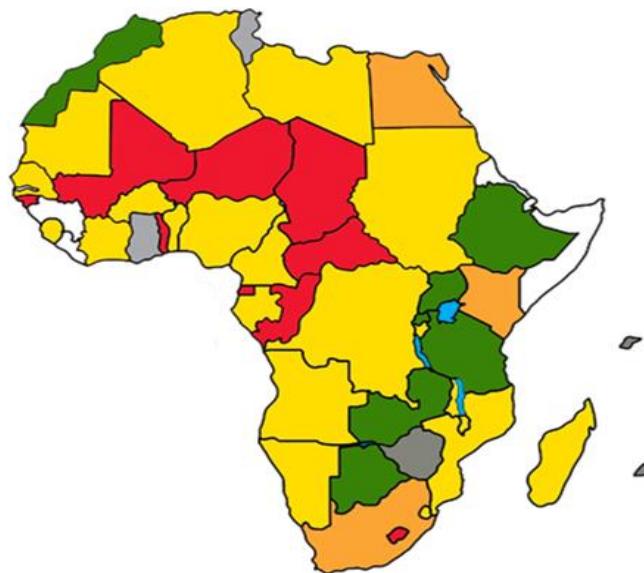
Progress in 11 years

Metrology Institute Categorisation

2007



2017



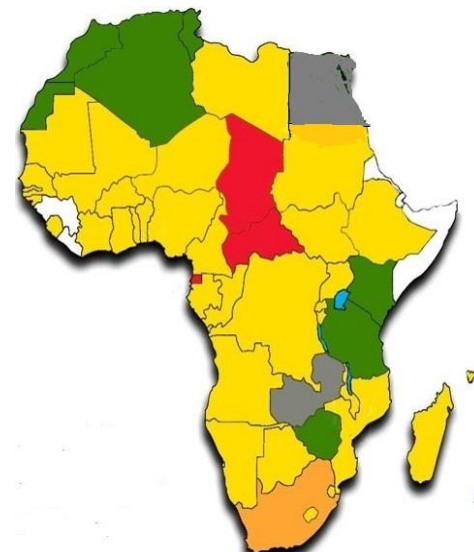
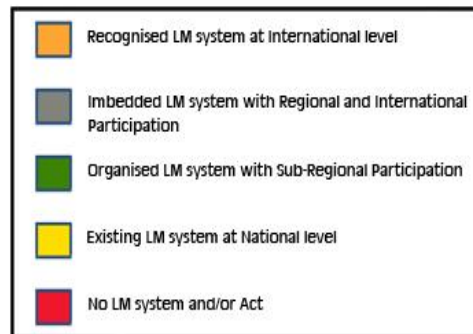
Progress in 11 years

Legal Metrology Categorisation

2007



2017



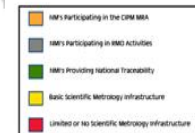
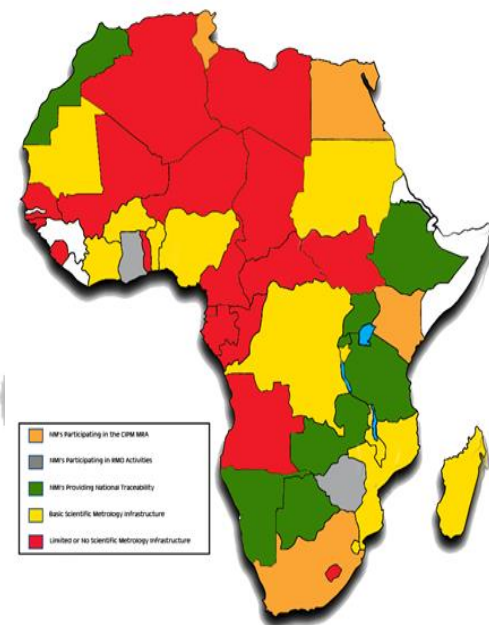
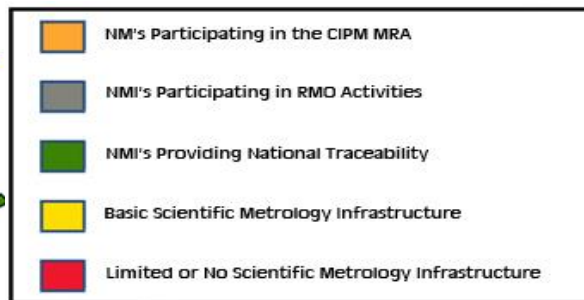
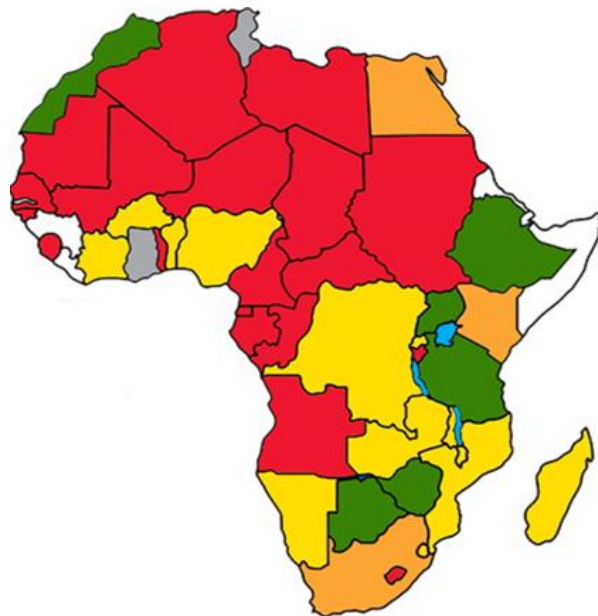
Progress in 11 years

Scientific Metrology Categorisation

2007



2017



Members of TC/WGs are

all NMIs members who are active in the region, and participate in its activity.

Their responsibilities are

- To report annually about their activities
- Report about the CC / TC meeting attended
- Participate in the Inter comparisons and various activities of the RMO
- Participate in the review of CMCs (if capable)

Resources for TC/WG chairs

- Their own NMIs
- Donors such as PTB and UNIDO sometimes support for travel to meetings
- **1A WG chairs**
Represent an NMI with scientific metrology and shows active participation at the CIPM MRA work and attend the CCs meeting to guarantee the link with the international system
- **Members**
All AFRIMETS members who are actively participate in its activities

Guidance documents (General)

- ◆ AFR-16-001 AFRIMETS MOU FOR Membership (English)
- ◆ AFR-08-006 AFRIMETS MOU FOR Membership (French)
- ◆ AFR-17-002 AFRIMETS Requirement to host a GA
- ◆ AFR-17-003 AFRIMETS JCRB representatives

support of metrology in developing countries and emerging economies

- Scientific Metrology
 - Support in technical development in NMIs,
 - Support in Quality system development,
 - Support in Measurement Capabilities (CMCs) to be accepted in the International Key Comparison Database (KCDB)
- Legal Metrology
 - Support in development of Metrology Laws
 - Support in development of Verification and Inspection capabilities

Support of metrology in developing countries and emerging economies

- ◆ **Training on the whole AFRIMETS level**
 - such as Legal metrology school
 - Scientific metrology school

- ◆ **Training on the sub RMOs level**
 - Such as in NEWMET
 - MAGMET
 - SADCMET

- **Training programs by NMIs**
 - NMISA – NIS - KEBS

AFRIMETS comparisons

- . **Reasons for organization of comparisons (Pilot study)**
 - CMC published on the KCDB
 - Exercise for capabilities
- **Planning of comparisons through the Working group meeting**
 - Discussion
 - planning
- **comparison registration**
 - Chair or vice chair of WG
- ✓ **Reporting**
 - TC1A
 - working group
 - GA

Guidance documents (CMCS)

- ◆ AFRIMETS Guidelines for Accepting a QS
AFR-13-014b QS Review 2014
- ◆ AFRIMETS Review of CMCs
AFR-11-009d

AFRIMETS Quality system:

(AFR-13-014b QS Review 2014)

A. a quality system (QS) that meets the requirements of ISO/IEC 17025, or equivalent, for an NMI, assessed by an accreditation body fulfilling the requirements of ISO/IEC 17011.

B. a different way of assuring quality or a different QS, or a QS based on ISO/IEC 17025 without assessment by an accreditation body.

AFRIMETS Quality system:

- ◆ Compliance with the requirements for a QS as stated in the CIPM MRA can be demonstrated through one of the following **two pathways**:
 - (a) Third party accreditation to ISO/IEC 17025 and/or ISO Guide 34, and or ISO/IEC 17043, or
 - (b) Attestation against the requirements of ISO/IEC 17025 and/or ISO Guide 34 and, by a team consisting of quality system experts and technical peers appointed by the TCQS

AFRIMETS Quality system:

- ◆ Procedure A and subsequently pathway (a) is the preferred route for compliance)
- ◆ Third party accreditation must be from an accreditation provider operating to ISO/IEC 17011 and that is a signatory to the ILAC MRA.
- ◆ Criteria for selecting technical peers and quality system experts are according to document CIPM 2007-25,

AFRIMETS Quality system:

- ❑ NMIs following pathway (a) must submit the following evidence to the AFRIMETS TC-QS:
 - ◆ Copies of accreditation certificate(s),
 - ◆ Scopes of accreditation covering the CMCs,
 - ◆ Names and affiliations of technical assessors,
 - ◆ The Assessment report,
 - ◆ CMCs intended for submission,
 - ◆ Other documents could be requested by TCQS to satisfy itself.
- ◆ The first time the NMI applies for the approval of the QS as fit-for-purpose for the CIPM MRA, where possible the NMI will be visited by the AFRIMETS TC-QS or its appointed representatives to assess the above documentation on site.

AFRIMETS Quality system:

- ❑ NMIs following pathway (b) ,must submit the following evidence to the AFRIMETS TC-QS (in compliance with CIPM MRA-G-02);

Report by the review team, prepared after the review visits must have the following minimum contents:

- ◆ Names, affiliations, qualifications and experience of the quality experts;
- ◆ Scope of the review (including the QMS)
- ◆ Schedule of the review;
- ◆ Organogram of the NMI;
- ◆ Quality system management mechanisms;
- ◆ Detailed table of contents of the quality manual;
- ◆ List of administrative and technical procedures;
- ◆ Table of cross references between ISO/IEC 17025 and the Quality documentation of the NMI;
- ◆ List of calibration capabilities covered by the quality system;
- ◆ Customer complaints –process employed and statistics;
- ◆ Non-confirming work –process employed & corrective actions;
- ◆ Report on internal audits;
- ◆ Status of management reviews.

AFRIMETS Quality system:

- ◆ Final attestation by the reviewers, or at least the leader of the review team, stating that all the non-conformances raised during the review process have been satisfactorily addressed.
- ◆ Information about QS
(website or contact Chair or Vice chairs)

Approved Quality system:

- ❑ NMIs must report annually on the status of the QS to the AFRIMETS TC-QS and in particular;
 - ◆ Summary of the review / assessment process;
 - ◆ Any changes in key personnel,
 - ◆ Any new installations
 - ◆ Any changes in facilities that would restrict the NMIs capability to provide measurement services covering the CMCs;
 - ◆ Other relevant information, which will help build inter-regional confidence (e.g. training, and courses/workshops on QS, exchange of information between NMIs on QS, interaction with other RMOs on QS);
 - ◆ An update on greyed out CMCs, e.g. progress towards the re-instatement.

Reporting

- ◆ A call for the QS annual report on January
- ◆ AFR-14-01b QS Accr 2
- ◆ AFR-14-01 QS Annual Report
- ◆ A presentation to the JCRB on March by TC QS chair

AFRIMETS TCQS

The organization of the AFRIMETS TCQS is as follow

Chair	Dr Noha Khaled	(NEWMET)
Vice chair	Dr Wynand Lauw (CMC Submission and Review)	(SADCMET)
Vice chair	Mr. Peter Kahihia (QS review -English)	(EAMET)
Vice chair	Colonel Abene Lassaad (CMC and QS review -French)	(MAGMET)
Secretariat :	Dr. Gouda Mohamed	(NEWMET)

AFRIMETS CMCs

- ◆ AFRIMETS Review of CMCs
(AFR-11-009d)
- ◆ Once an application by a member NMI for the inclusion of its CMCs in Appendix C
- ◆ The recipient shall forward the received application and CMCs to
 - chairperson of TC-1A,
 - chairperson of Working Groups
 - chairperson of Quality WG
 - copy to the Regional contact point for Scientific metrology.

AFRIMETS CMCs

- ◆ (TC-QS) shall confirm to TC-1A or the WG that the CMCs are supported by an AFRIMETS **approved Quality system**.
- ◆ the relevant Working Groups involved shall check whether the submitted CMCs are in **the correct format** required by the JCRB .
- ◆ the relevant WG Chair shall discuss with the Working Group members the composition of the regional **technical peer review panel**, and augmented, if considered necessary or advisable by the WG members, by suitable **international metrology experts**.

AFRIMETS CMCs

- ◆ The relevant **TC-WG Chair**, in consultation with the AFRIMETS **JCRB representative**, shall **forward the reviewed CMCs** together with an appropriate **covering letter** outlining the procedure followed and the conclusions reached to the JCRB Secretary for distribution to JCRB members, or place it on the relevant JCRB review site –depending on the procedure outlined by the relevant CC.

AFRIMETS monitor existing CMCs

- ◆ AFRIMETS follows the rules of the Consultative Committee for the re-evaluation of CMCs,
- ◆ the CC will decide how frequently the CMCs must be re-evaluated.
- ◆ the NMI reports annually on all issues pertaining to issues that can have an effect on existing CMCs
- ◆ if such occurs, liaises with the NMI to either update, grey out or remove the CMC.

Activities on knowledge transfer

- ◆ AFRIMETS has a number of training exercises organized centrally (the Metrology schools, Scientific and Legal)
- ◆ Training of TC-WG chairs are conducted periodically during TC-WG meetings
Two have been organized centrally by AFRIMETS the past 9 years.
- ◆ NMIs such as NIS, NMISA, KEBS and NSI (Namibia) routinely offers training courses.

Activities on knowledge transfer

- ◆ NIS started an annual program for training of undergraduate students since 2016.
- ◆ NIS is starting Knowledge transfer program for NEWMET members to be hosted at NIS from 1 to 3 months in one of its laboratories.
- ◆ NMISA (with assistance from SADC) develops web based training modules.
- ◆ It was proposed at the last GA to prepare for training by AFRIMETS to the members following the CBKT program by BIPM to increase the benefit.

Activities on knowledge transfer

- African Food and Feed Reference Materials Programme
- Metrology Capacity Building for Safe Food and Feed in Developing Economies
- Nuts, maize, spice, cereal, coffee, cacao, wine, fruits, fruit juices, cheese
 - Enable NMIs to provide mycotoxin calibrants
 - Matrix reference materials
 - Proficiency Testing Schemes

Mycotoxins



**Multiple
toxins in
maize &
wine**

**Afla Toxins
in African
ground nuts**



Thank you

nemadnis@yahoo.co.uk

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