Report on BOBS' Metrology Management Quality System to AFRIMETS TC-QS

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Presentation Outline

- Botswana Bureau of Standards
- National Metrology Systems & National Quality Infrastructure
- Quality Policy and Objectives
- Organogram
- QMS Processes and Steering Mechanisms
- Current Accreditations and International Recognitions
- Current status of Transition Plan (ISO/IEC 17025:2017)
- Continual Improvement
- Internal and External Reviews
- Addressing weak and strong points and Solutions

Botswana Bureau of Standards

- Legislative Framework
  - Standards Act, 1995
  - Weights and Measures Act
  - Standard Import Inspection Regulations
- Standards Act on Metrology
  - To make arrangements for, or provide facilities for, the testing and calibration of precision instruments, gauges and scientific apparatus, for the determination of their accuracy…..
- Other Functions/Services
  - Standards development, Testing, Import Inspection, Training, Certification
- ISO 9001 Certified Organization
- National Quality Policy (Draft submitted to Parliament)

Mandate

Mission
To establish and promote national standards in order to enhance trade, benefit business and protect consumers and the environment.

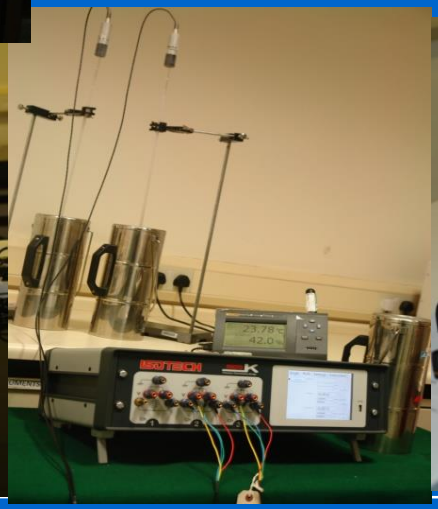
Vision:
To be recognised for excellence in standardization services

Values:

- Innovation
- Efficiency
- Transparency
- Team Spirit
- Botho


ISOTECH
PARALLEL TUBE
LIQUID BATH 915


LABCONCEPT PREMIUM 500
TRIMOS


ISOTECH

Quality Policy & Objectives

- **Quality Policy**
  - Win Stakeholder Confidence by providing calibration at competitive cost
  - Management and Staff commitment to implementing and maintaining QMS
  - Management and Staff commitment to providing accurate and reliable results
  - Calibration carried out in accordance with validated methods as per customer requirements
  - Achievement of strategic objectives through implementation of quality assurance, internal audits and error management programmes
  - Commit to continual improvement through management review, personnel development, data analysis
- In principle the Quality Policy covers all the aspects reflected in ISO/IEC 17025:2005 Standard

Quality Policy & Objectives...

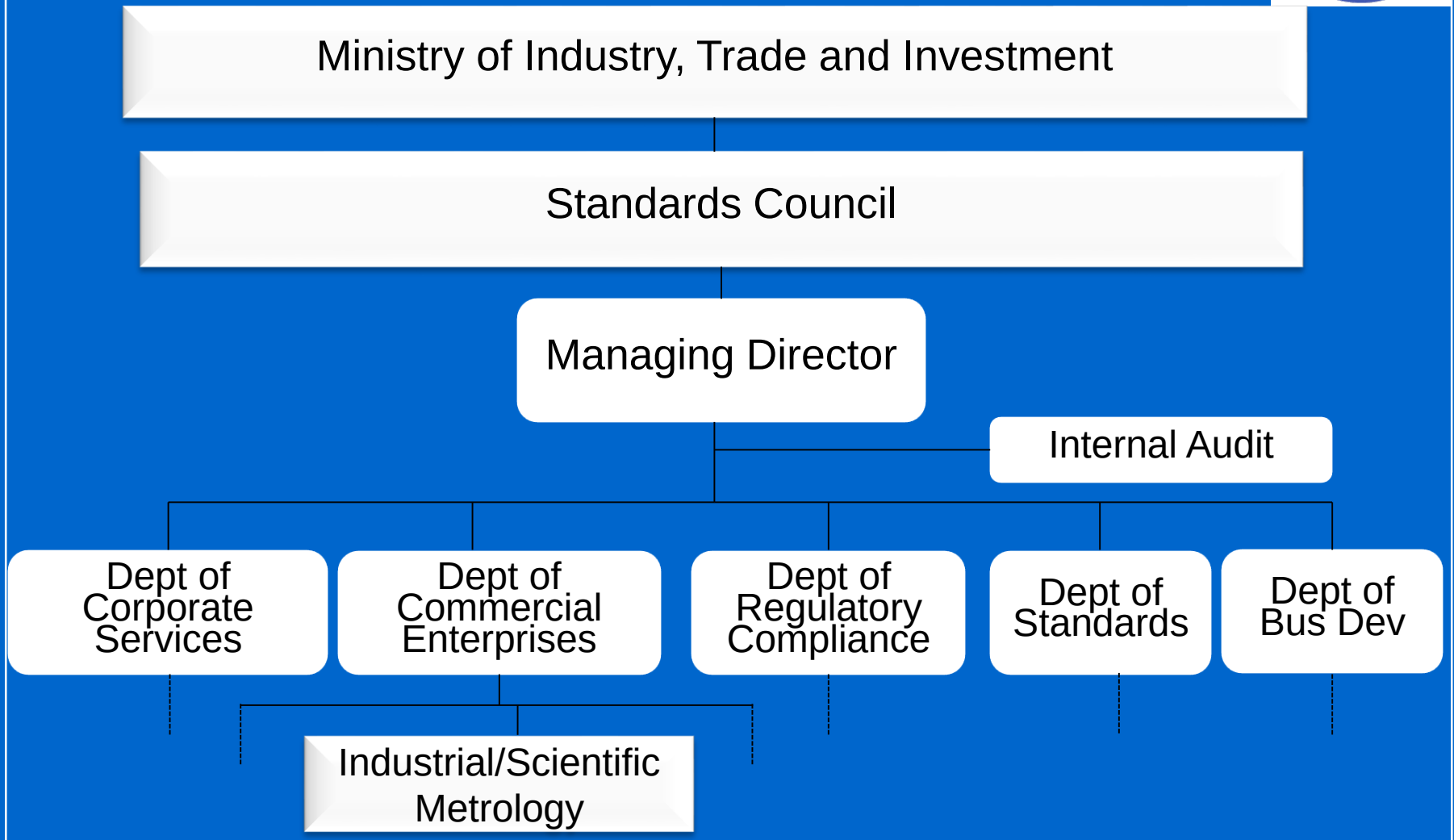
Quality Objectives at Corporate Level

Objective	Initiative	Measure
Objective 4: To enhance organizational processes	4.1 Adhere to agreed process turnaround times	% adherence to TAT
	4.2 Review Processes and Procedures	No. of process and procedures reviewed against the requirements of ISO/IEC 17025:2017 Standard
	6.4 Implement focused learning and development programs	% of training and development plan completed
	4.4 Implement Accreditation Programme	% Completion of accreditation programme

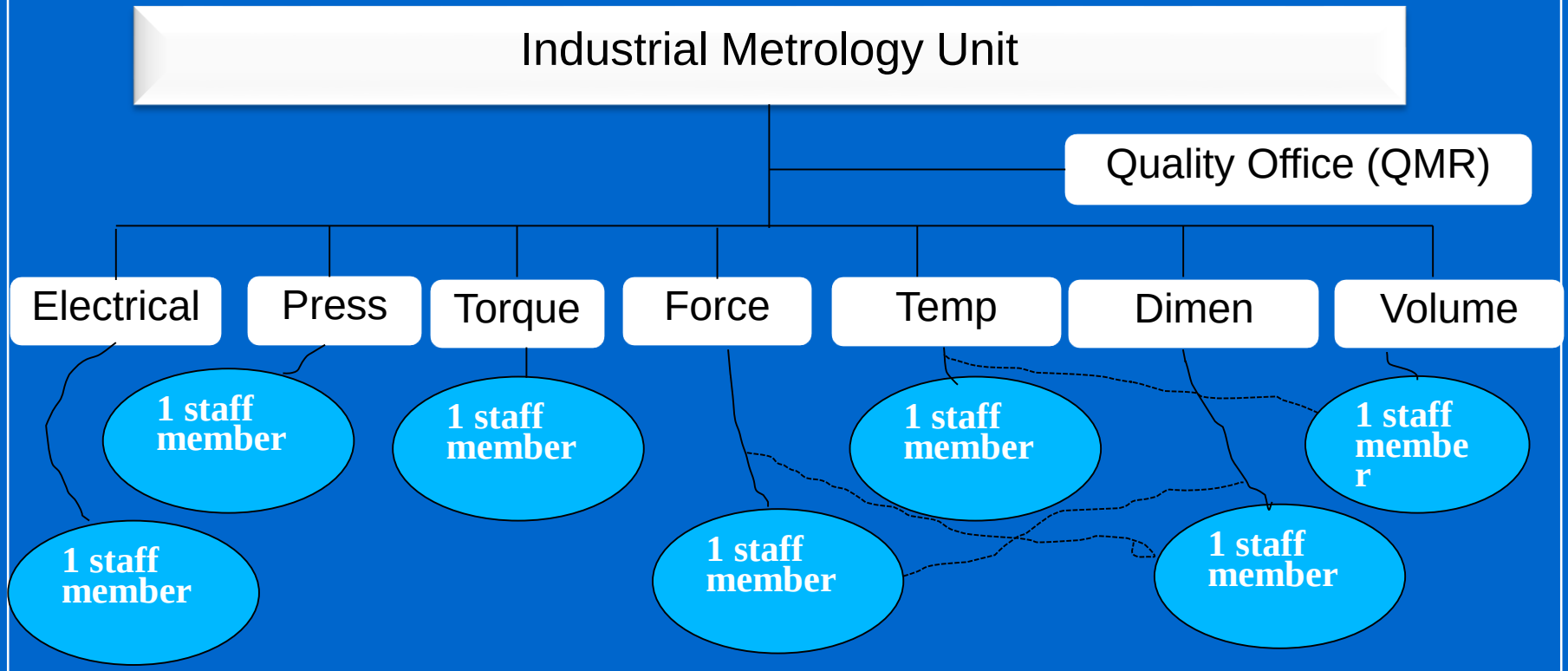
- Implementation of Audit programme
- Timely closure of findings from both internal and external audits

- Improve staff competence
- Improve QS processes to achieve internal and external customer satisfaction
- ILC and MC participation

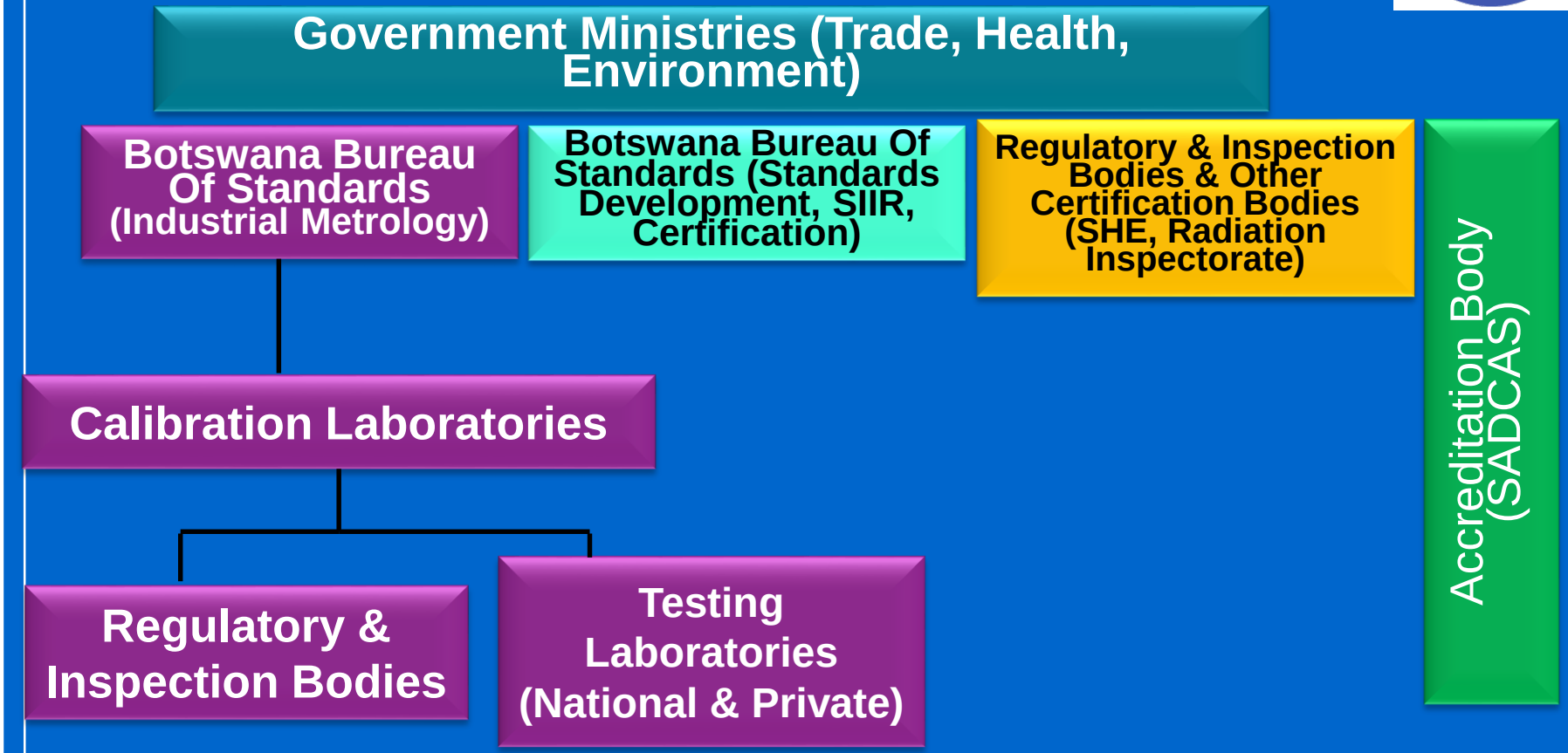
Organogram


Ministry of Industry, Trade and Investment
Standards Council
Managing Director
Internal Audit
Dept of Corporate Services
Dept of Commercial Enterprises
Dept of Regulatory Compliance
Dept of Standards
Dept of Bus Dev
Industrial/Scientific Metrology

Organogram


Industrial Metrology Unit
Quality Office (QMR)
Electrical
Press
Torque
Force
Temp
Dimen
Volume
1 staff member
1 staff member
1 staff member
1 staff member
1 staff member
1 staff member
1 staff member

National Quality Infrastructure

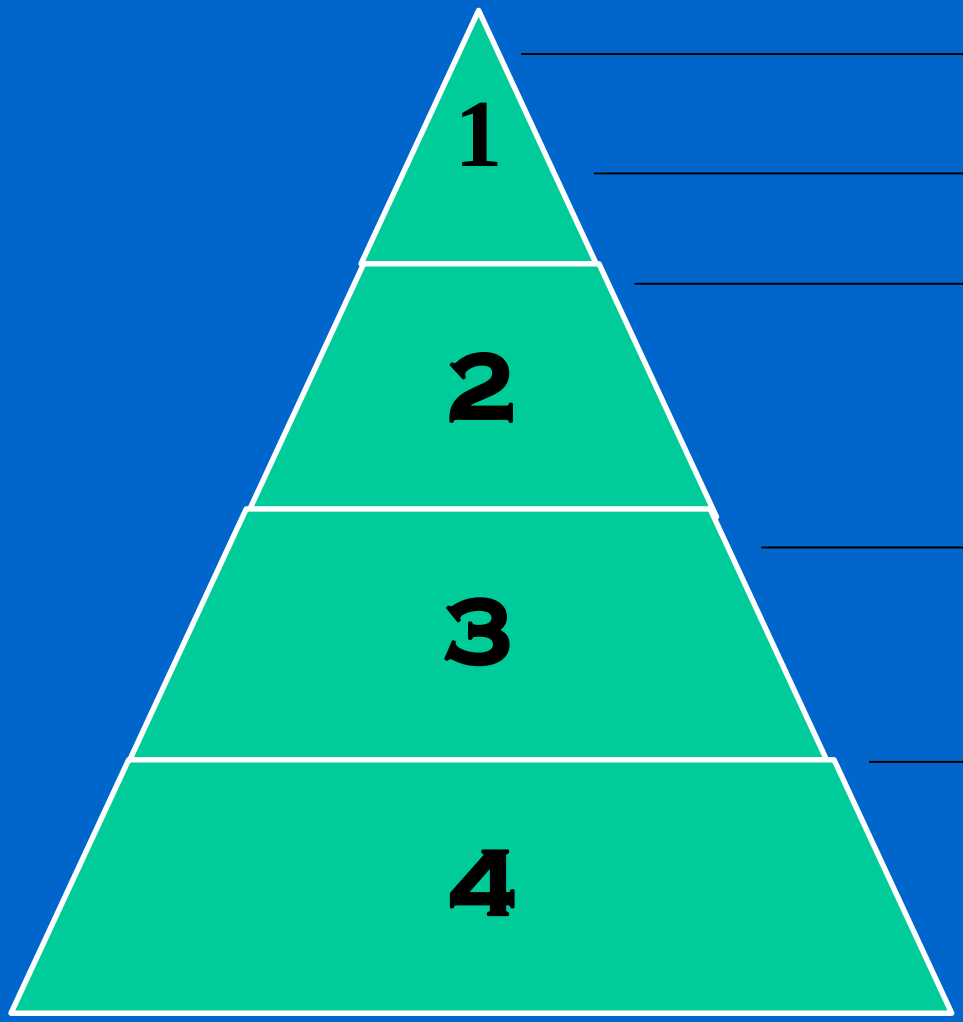


National Quality Policy Seeks to address fragmentation

Progress- Transition Plan

- Training for all staff conducted as expected and more training scheduled under SADCMET
- Extensive gap analysis conducted and report generated
  - Determine the extent of compliance with the current Standard
- Quality Policy Manual reviewed completed and new version generated in April 2019
- Other documents review completed to be completed July 2019
- Internal Audits scheduled for September/October 2019

QMS Processes and Steering Mechanisms



Quality Policy and Objectiv

Corporate Governance

Process Descriptions

Standard Operating Procedures

Forms/Records

QMS Processes and Steering Mechanisms

(1) Quality Policy Manual describes the Quality Policy Statement and the Quality Objectives, overview of BOBS' governance, description of the calibration activities, policies, objectives of the laboratory quality management system and the hierarchy of documentation adopted for the LQMS.

(2) Process descriptions depict the sequence and interactions of activities, both from the perspectives of the BOBS overall operations and the specific operational processes.

(3) Standard Operating Procedures detail best practices on how to carry out the activities necessary to achieve the objectives of the laboratory in a consistent and systematic manner.

(4) Forms/Records provides evidence of compliance to the requirements of BOS ISO/ IEC 17025: 20172017 and the Laboratory Quality Management System

Accreditation and Capabilities

Accreditation prioritized according to the needs of the economy/industry/customers

Field of Metrology	Measured Quantity or type of gauge/instrument	Range	CMC (±)
Temperature	Thermocouple- Noble Metals	-30 ^{0}C to 250 ^{0}C 250 ^{0}C to 1000 ^{0}C	0.3 ^{0}C 5.0 ^{0}C
	Thermocouple- base metals	-30 ^{0}C to 250 ^{0}C 250 ^{0}C to 1000 ^{0}C	0.4 ^{0}C 5.0 ^{0}C
	Ice Point Reference	0.0 ^{0}C	0.02 ^{0}C
	PRT	-30 ^{0}C to 250 ^{0}C	0.03 ^{0}C
	LIG thermometers	-30 ^{0}C to 250 ^{0}C	0.16 ^{0}C
	Digital Thermometers	-40 ^{0}C to 250 ^{0}C 250 ^{0}C to 1000 ^{0}C	0.03 ^{0}C 5.0 ^{0}C

Accreditation and Capabilities...

Field of Metrology	Measured Quantity or type of gauge/instrument	Range	CMC (±)
Dimension	Engineers Steel Rule	0 to 1000 mm	0.29 mm
	External Micrometer	0 to 300 mm	2 µm
	Calliper (Electronic & Vernier)	0 to 500 mm	18 µm
	Dial gauge	0 to 20 mm	2 µm
Pressure	Gas Medium-gauge Pressure	0 to 700 kPa	0.5%+10 Pa
	Liquid Medium-gauge Pressure	0 to 70 MPa	0.5%+100 Pa

Accreditation and Capabilities...

Field of Metrology	Measured Quantity or type of gauge/instrument	Range	OIML Class	CMC (±)
Mass	Mass Pieces	1 g to 1000 g	Class M1	0,003 g
		1000 g to 2000 g	Class M1	0,01 g
		5 kg to 20 kg	Class M1	0,10 g
	Weighing Instruments	200 g to 500 g	Class M1	± 0,01 g
		500 g to 2 kg	Class M1	0,05 g
		2 kg to 20 kg	Class M1	0,50 g

Progress- Transition Plan

PROJECT PLAN: TRANSITION FROM ISO/IEC 17025:2005 STANDARD BASED LQMS TO ISO/IEC 17025:2017 BASED STANDARD

Project Milestones	Apr'18	May'18	Jun'18	Jul'18	Aug'18	Sept'18	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19	Apr'19	May'18	Jun'19	Jul'19	Aug'19	Sept'19
Transition Training- 2005 Version Vs 2017 Version																		
Conducting Gap Analysis																		
Completion of Gap Analysis Report and Implemtation Plan																		
Review of Management System Documentation as per GAR																		
Review of Technical System Documentation as per GAR																		
Implementation of the Revised Lab Managament System																		
Conduct Internal Audit (Priority on Accredited Fields)																		
Corrective actions of Findings from Internal Audit																		
Follow-up Audit (if necessary)																		
Management Review Conducted & Minutes availed																		
Address Management Review Applicable Findings																		
External Audit/Assessment																		

Progress- Transition Plan

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- Other documents (management system and technical) review completed to be completed July 2019
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List of Published CMCs Covered by QS

Calibration and Measurement Capabilities

Thermometry, Botswana, BOBS (Botswana Bureau of Standards (BOBS)

Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty					Comments
Quantity	Instrument or artifact	Instrument Type or Method	Minimum value	Maximum value	units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	
Temperature	Liquid-in-glass thermometer	Comparison in Liquid Bath	0	50	°C			0.13	°C	2	95 %	No	Total Immersion LIG, Mercury In Glass, 0.2 °C graduation. The uncertainty is evaluated at the measurement points and it is the maximum over the range. The resolution of the UUT component included in the CMC calculation. The uncertainty was evaluated for total immersion and the resolution of UUT was 0.2 °C. ELC Correction evaluated and included in the UB. Approved on 12 April 2019.
Temperature	Liquid-in-glass thermometer	Comparison in Liquid Bath	50	100	°C			0.08	°C	2	95 %	No	Total Immersion LIG, Mercury In Glass, 0.1 °C graduation. The uncertainty is evaluated at measurement points and it is the maximum over the range. The resolution of the UUT component included in the CMC calculation. The uncertainty was evaluated for Total Immersion and the resolution of UUT was 0.1 °C. ELC Correction evaluated and included in the UB. Approved on 12 April 2019.
Temperature	Liquid-in-glass thermometer	Comparison in Liquid Bath	100	200	°C			0.09	°C	2	95 %	No	Total Immersion LIG, Mercury In Glass, 0.1 °C graduation. The uncertainty is evaluated at measurement points and it is the maximum over the range. The resolution of the UUT component included in the CMC calculation. The uncertainty was evaluated for Total Immersion and the resolution of UUT was 0.1 °C. ELC Correction evaluated and included in the UB. Approved on 12 April 2019.

Continual Improvement...

Management Review

- Ascertain the suitability and effectiveness of the QMS

Customer Feedback/Complaints

- Used for continual improvement
- Have always attained 85% or more satisfaction level

Training

- ISO/IEC 17025: 2017 Standard
- Risk Management

Increase Accreditation Scope

- Volume (small) and Temperature (Installations)

Measurement Comparisons/ILCs

Continual Improvement...

Measurement Comparisons to Support CMCs

Area	Artefact	Range	ILC Scheme Provider	Date	Results Status
Temperature	LIG Thermometer	-35 ^{o}C to 250 ^{o}C	AFRIMETS.T-S5)	January 2016	En< 1 on above zero measurements
Temperature	Noble Metal Thermocouple	231.9 °C, 419.5 °C, 660.3 °C, 961.8 °C and 1084.6 °C	AFRIMETS.T-S7)	2019/20	In progress

Continual Improvement...

ILCs to support accreditation

Area	Artefact	Range	ILC Scheme Provider	Date	Results Status
Pressure	Hydraulic Pressure Gauges	0-10 MPa	Bilateral-BOBS & Intercal	08-12 February 2016	En Values< 1
Pressure	Hydraulic Pressure Gauges	0-70 MPa	Bilateral-BOBS & Intercal	08-12 February 2016	En Values< 1
Dimension	Vernier Micrometer Dial Gauge	0-500 mm 0-300 mm 0-20 mm	Bilateral-NMISA	May-June 2018	Working on the report

Continual Improvement...

ILCs to support accreditation

Area	Artefact	Range	ILC Scheme Provider	Date	Results Status
Temperature	PRT	-40 ^{o}C – 450 ^{o}C	NLA (Ref value by NMISA)	08-19 February 2016	En Values< 1

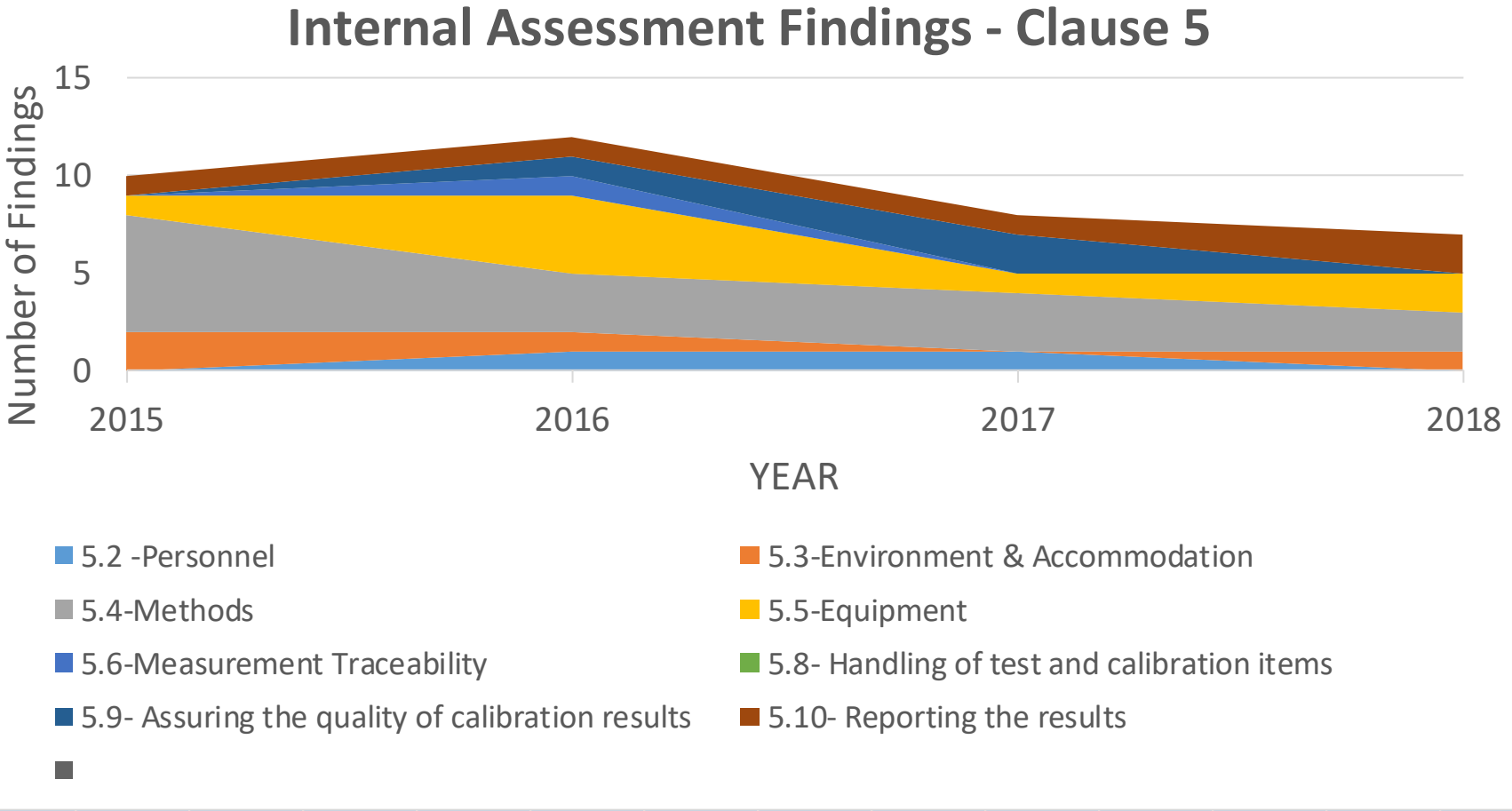
Continual Improvement...

ILCs to support accreditation (Planned)

Area	Artefact	Range	ILC Scheme Provider	Date	Results Status
Dimension	Vernier Micrometer Dial Gauge	Various ranges	SADCMET	2019	In progress

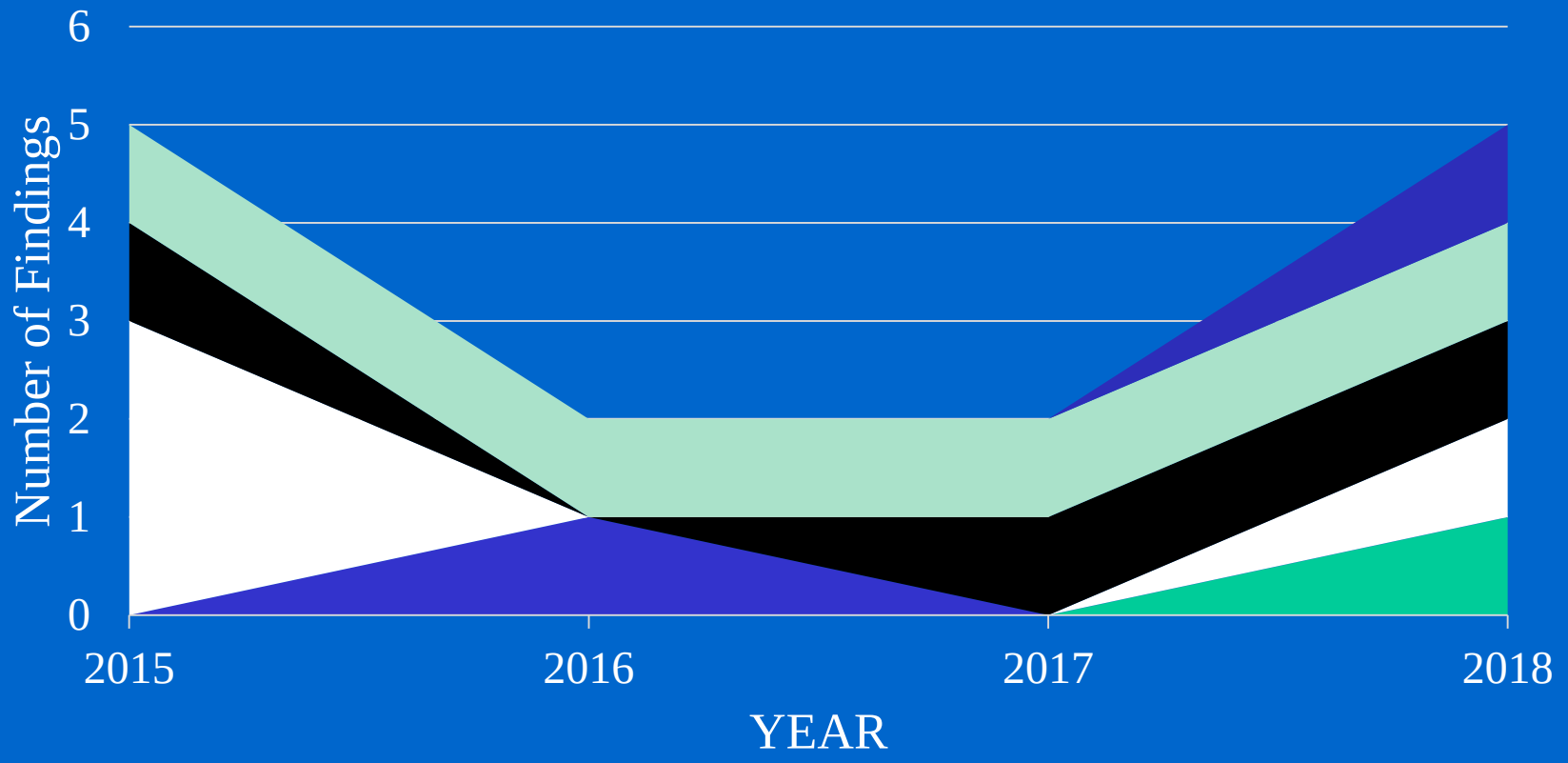
Internal Audits

Internal Audits Findings Analysis

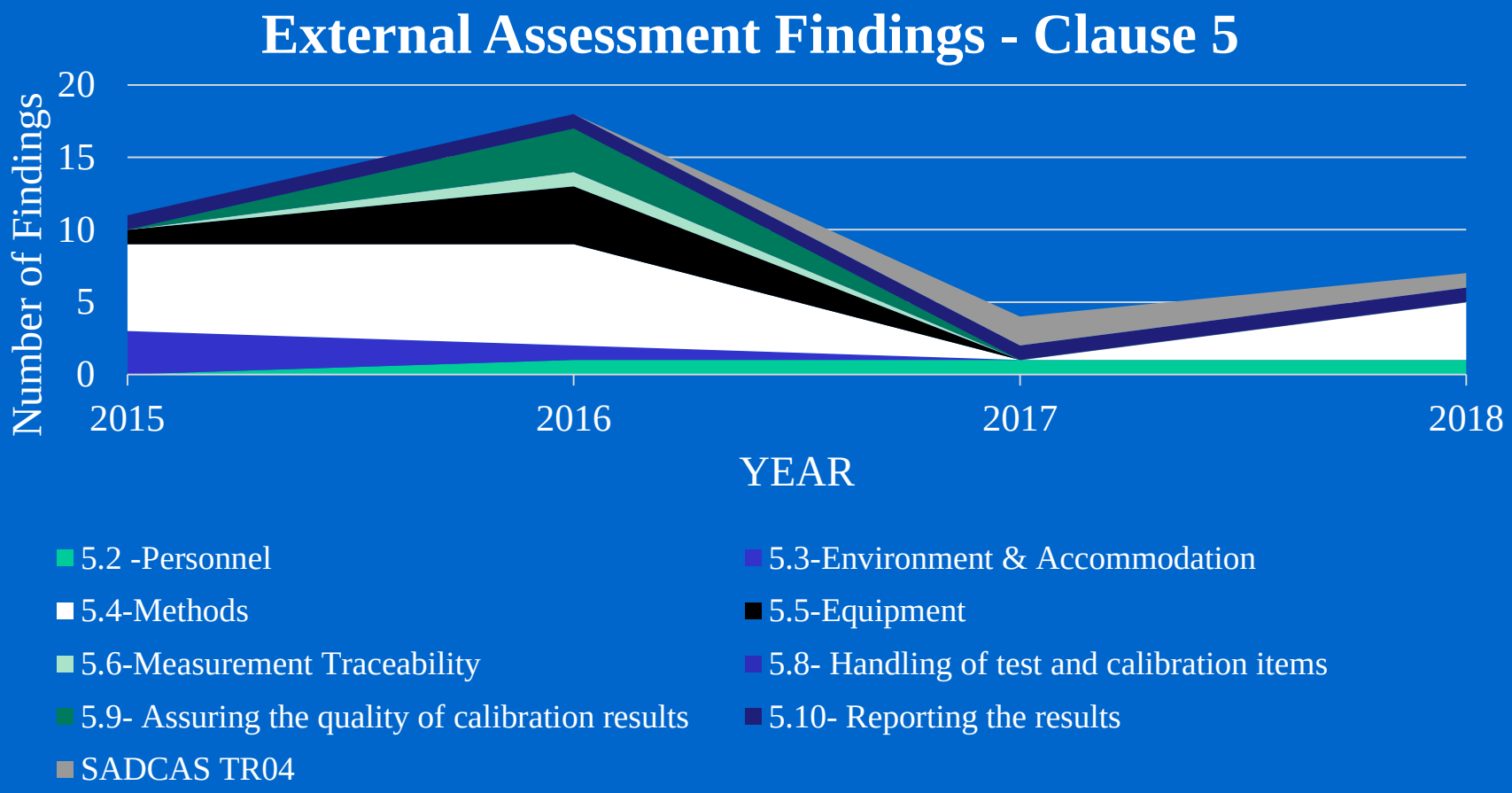


External Audits/Assessment

External Assessment Findings- Clause 4



External Audits/Assessment...



External Review (AFRIMETS)

Findings

- Ambient temperature stated in the calibration certificate different from the recorded one
- ILCs Plan not covering the other range

Proposed Improvements

- Ambient conditions monitoring and recording to establish the trends
- Work on malfunctioning of the water purifier to improve on our capabilities and stand for the binocular
- Reporting ELC as a separate entity in the calibration certificate

Addressing weak and strong points and Solutions

- Effective implementation of Error management process and procedures
- Ineffective root cause analysis: Conducted root cause analysis workshops to minimize the number of recurring findings
- Effectiveness of CAPA used to measure the level of risk associated with the QS
- Competence of Technical Assessor- Having participated in submission of CMCs
- Working on improvements proposed from AFRIMETS QS Review
- Semi/Full Automated system (Checking Criteria)

BOBS' Quality System is suitable and effective