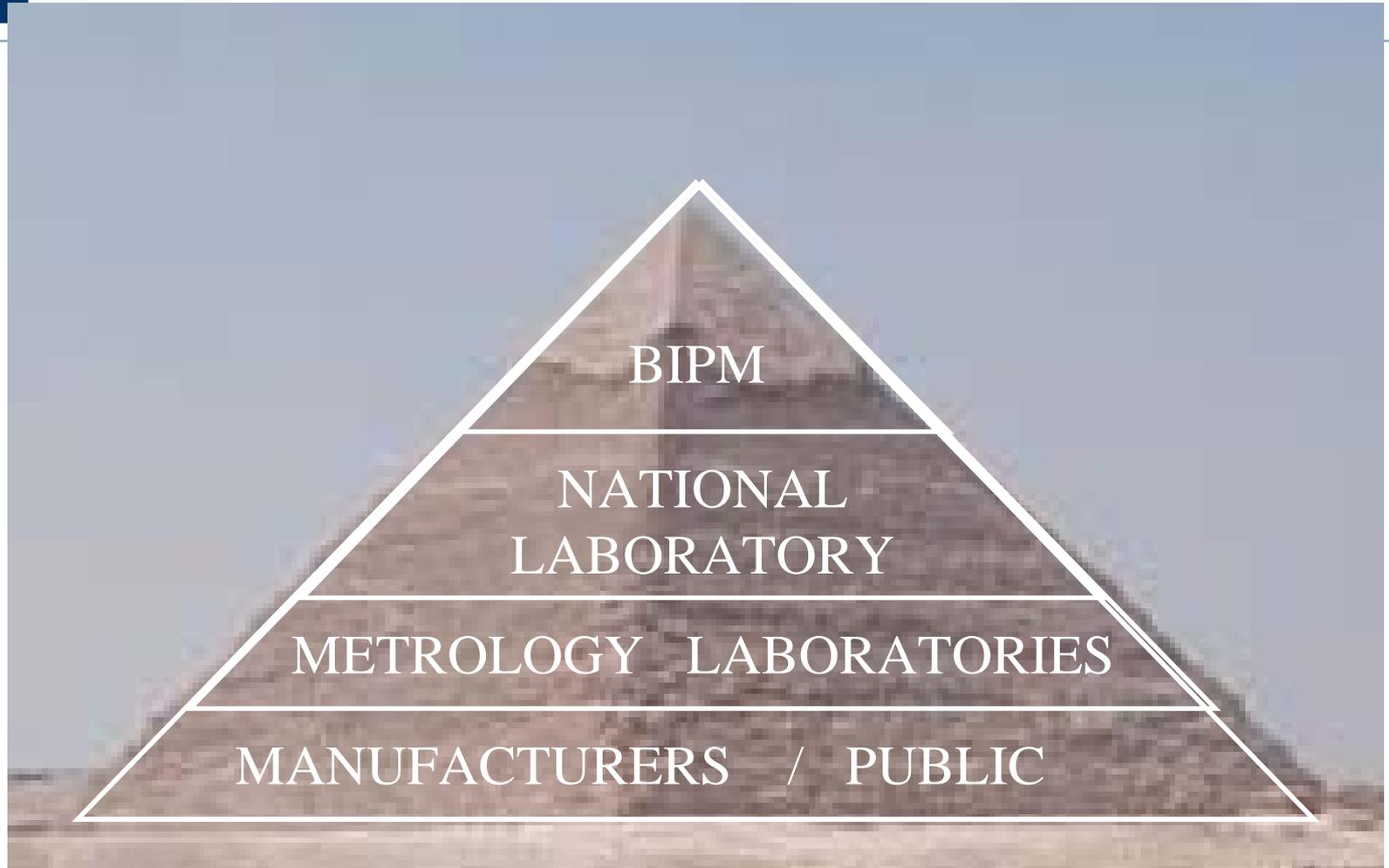




Metrology within Meteorology

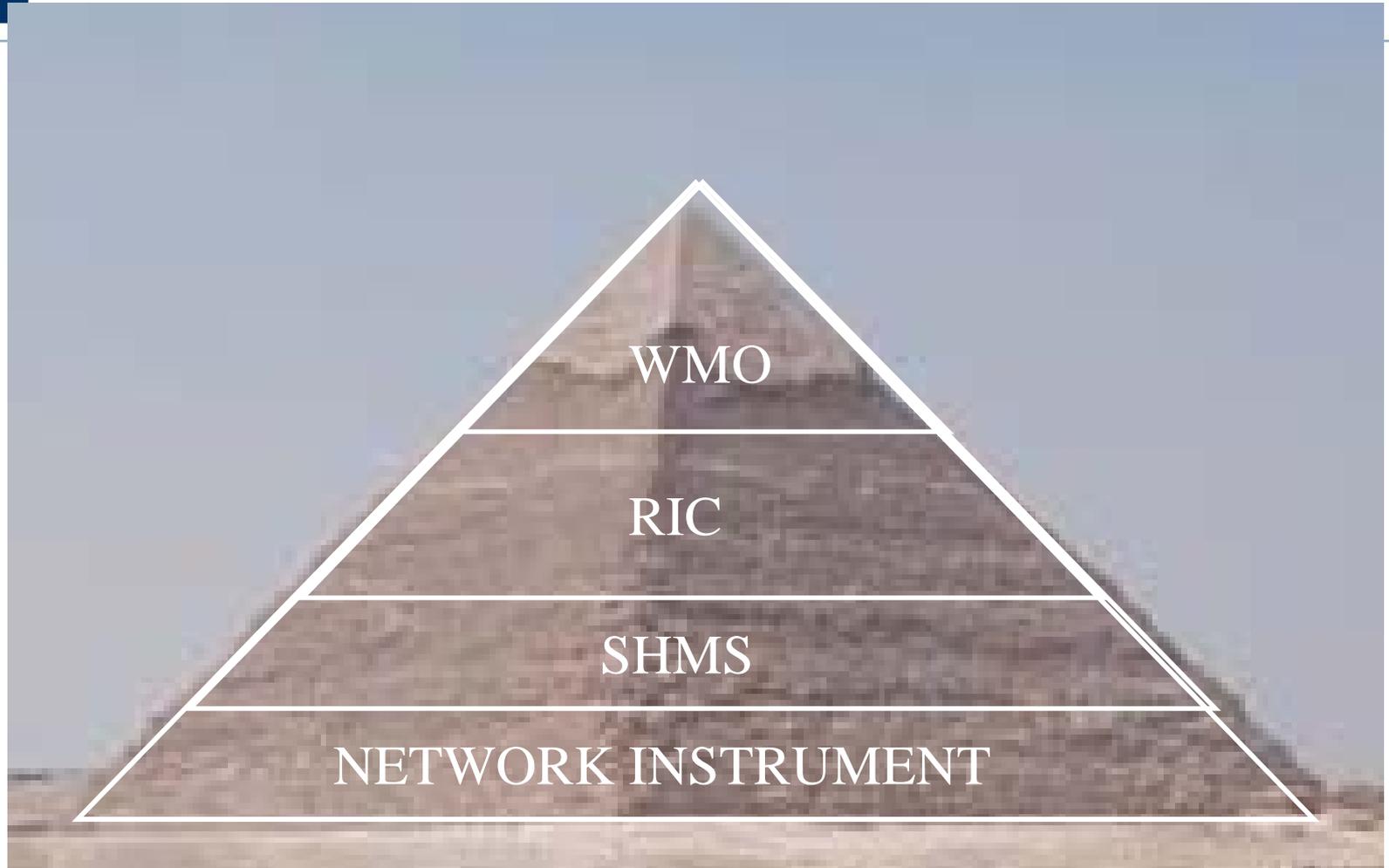


METROLOGY PYRAMID





METEOROLOGY PYRAMID



WMO

RIC

SHMS

NETWORK INSTRUMENT



Regional Instrument Centre

- Regional





Regional Instrument Centre

RA I

Alger (Algeria)
Cairo (Egypt)
Casablanca (Morocco)
Nairobi (Kenya)
Gaborone (Botswana)

RA II

Beijing (China)
Tsukuba (Japan)

RA III

Buenos Aires (Argentina)

RA IV

Bridgetown (Barbados)
San José (Costa Rica)
Mount Washington (United States)

RA V

Manila (Philippines)
Melbourne (Australia)

RA VI

Trappes (France)
Bratislava (Slovakia)
Ljubljana (Slovenia)



METROLOGY

DISSEMINATION

TRACEABILITY



INTERCOMPARISON



Terms of Reference

<http://www.wmo.int/pages/prog/www/IMOP/instrument-reg-centres.html>

- Capabilities
 - Functions
-



Capabilities

- (a) A RIC must have, or have access to, **the necessary facilities and laboratory equipment** to perform the functions necessary for the **calibration** of meteorological and related environmental instruments
-



Capabilities

- (b) A RIC must maintain a set of meteorological **standard instruments** and establish **traceability** of its own measurement standards and measuring instruments to the SI
-



Capabilities

- (c) A RIC must have **qualified** managerial and technical staff with necessary experience in fulfilling its functions



Capabilities

- (d) A RIC must develop its individual technical procedures for **calibration** of meteorological and related environmental instruments using calibration equipment employed by the RIC



Capabilities

- (e) A RIC must develop its individual **quality assurance** procedures



Capabilities

- f) A RIC must participate in, or organize **inter-laboratory comparisons** of standard calibration instruments and methods



Capabilities

- (g) A RIC must, as appropriate, utilize the resources and capabilities of the Region to the best interest of the Region



Capabilities

- (h) A RIC must, as far as possible, apply international standards applicable for calibration laboratories, such as **ISO 17025**



Capabilities

- (i) A recognized authority must assess a RIC, at least every five years, to verify its capabilities and performance



Corresponding functions

- (j) A RIC must assist Members of the Region in **calibrating** their national meteorological standards and related environmental monitoring instruments



Corresponding functions

- (k) A RIC must participate in or organize, WMO and/or regional instrument intercomparisons, following relevant CIMO recommendations



Corresponding functions

- (I) According to relevant recommendations on the WMO Quality Management Framework a RIC must contribute positively to Members regarding **quality** of measurements



Corresponding functions

- (m) A RIC must advise Members on inquiries regarding instrument performance, maintenance and the availability of relevant guidance materials



Corresponding functions

- (n) A RIC must actively participate in, or assist in the organization of regional **workshops** on meteorological and related environmental instruments



Corresponding functions

- (o) The RIC must cooperate with other RICs in standardization of meteorological and related environmental measurements



Corresponding functions

- (p) A RIC must regularly **inform** Members and report¹, on an annual basis, to the president of the Regional Association and to the WMO Secretariat on services offered to Members and activities done.

¹ Web-based approach is recommended



Tools

- Training
<http://www.wmo.int/pages/prog/www/IMOP/meetings.html>
- RIC
<http://www.wmo.int/pages/prog/www/IMOP/instrument-reg-centres.html>
- Quality
http://www.wmo.int/pages/prog/www/IMOP/publications/IOM-103_RIC-Eval/Evaluation%20Scheme%20RIC%20En_V_2.1.xls



Evaluation Scheme

2.1 Objectives

- The Evaluation Scheme, based on RIC's TOR and on the ISO 17025 Standard, is an evaluation and improvement checklist system developed for the regular auditing of RICs. The main objective of the Evaluation Scheme is to measure the differences between real practices and requirements.
-



Evaluation Scheme

[Evaluation Scheme RIC En_V_2.1.xls](#)



Survey

Evaluation of the Survey on Maintenance and Calibration of Basic Meteorological Instrumentation

http://www.wmo.int/pages/prog/www/IMOP/meetings/CB/ET-RIC-2_Morocco/Doc-4_Survey.pdf

Result -> 73 questionnaires = 40 %



Survey

Maintenance		92%
Calibration	P	74%
Calibration	T	62%
Calibration	U	56%



Summary

Pressure	Dead weight	Quartz	Silicium	Capsule	Mercury
Global (62)	14	13	12	4	19

Temperature	Fixed points	SPRT	PRT	Mercury
Global (52)	3	19	10	20

Humidity	Dew point	Salt solution	Psychro	Capacitive	Hair
Global (43)	11	7	15	8	2

Wind	Hot wire	Pitot Tube	Others
Global (20)	5	12	3

Rain	Weight	Bottle
Global (20)	7	14



Survey

Availability and independency of the calibration laboratories

	Organisation	Independence	Accreditation	ISO 9001	Future
Yes	50	23	13	6	41
No	11	34	0	0	8



Conclusion

“A RIC must maintain a set of meteorological standard instruments and establish traceability of its own measurement standards and measuring instruments to the SI.”

Also applicable to every national calibration laboratory.



Conclusion

- E-meeting,
 - E-group,
 - E-forum on metrology intended for calibration laboratory managers.
 - Specialised round tables in the shade of TECO.
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