Metrology within Meteorology
METROLOGY PYRAMID

- BIPM
- NATIONAL LABORATORY
- METROLOGY LABORATORIES
- MANUFACTURERS / PUBLIC
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


• 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
(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

• (l) 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
(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 report\(^1\), 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

• Quality
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


Result -> 73 questionnaires = 40 %
<table>
<thead>
<tr>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
</tr>
<tr>
<td>Calibration P</td>
</tr>
<tr>
<td>Calibration T</td>
</tr>
<tr>
<td>Calibration U</td>
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### Summary

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<th>Pressure</th>
<th>Dead weight</th>
<th>Quartz</th>
<th>Silicium</th>
<th>Capsule</th>
<th>Mercury</th>
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</thead>
<tbody>
<tr>
<td>Global (62)</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>4</td>
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<th>Fixed points</th>
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<th>PRT</th>
<th>Mercury</th>
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<tr>
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<td>19</td>
<td>10</td>
<td>20</td>
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<th>Dew point</th>
<th>Salt solution</th>
<th>Psychro</th>
<th>Capacitive</th>
<th>Hair</th>
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<tbody>
<tr>
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<td>15</td>
<td>8</td>
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<th>Pitot Tube</th>
<th>Others</th>
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<tbody>
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<td>3</td>
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Survey

Availability and independency of the calibration laboratories

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<tr>
<th></th>
<th>Organisation</th>
<th>Independence</th>
<th>Accreditation</th>
<th>ISO 9001</th>
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<td>13</td>
<td>6</td>
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<td>11</td>
<td>34</td>
<td>0</td>
<td>0</td>
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</table>
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.