WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

CIMO in support of fit-for-purpose measurements

(I. Rüedi)

WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

Mission of the WMO Commission for Instruments and Methods of Observation

Promote:

- high quality observational data
- world-wide compatibility

by:

- Defining technical standards,
- Testing and calibration
- Performing instrument intercomparisons,
- Implementing quality control procedures.
- Increasing expertise and capacity-development

for:

- Improving quality of products and services

Fit-for-purpose measurements

- WIGOS is bringing together measurements from different origins (incl. partner network)
- Emergence of other sources of data (big data,…)
- Not all applications have the same quality requirements
- Need to ensure that users and providers:
  - understand measurement quality and how fit-for-purpose measurements are achieved
  - understand the importance of the measurement process
  - are committed to measurement traceability for ECVs
  - have access to guidance material documenting the potential, quality and performance characteristics of emerging measurement technologies and their products

Measurement quality

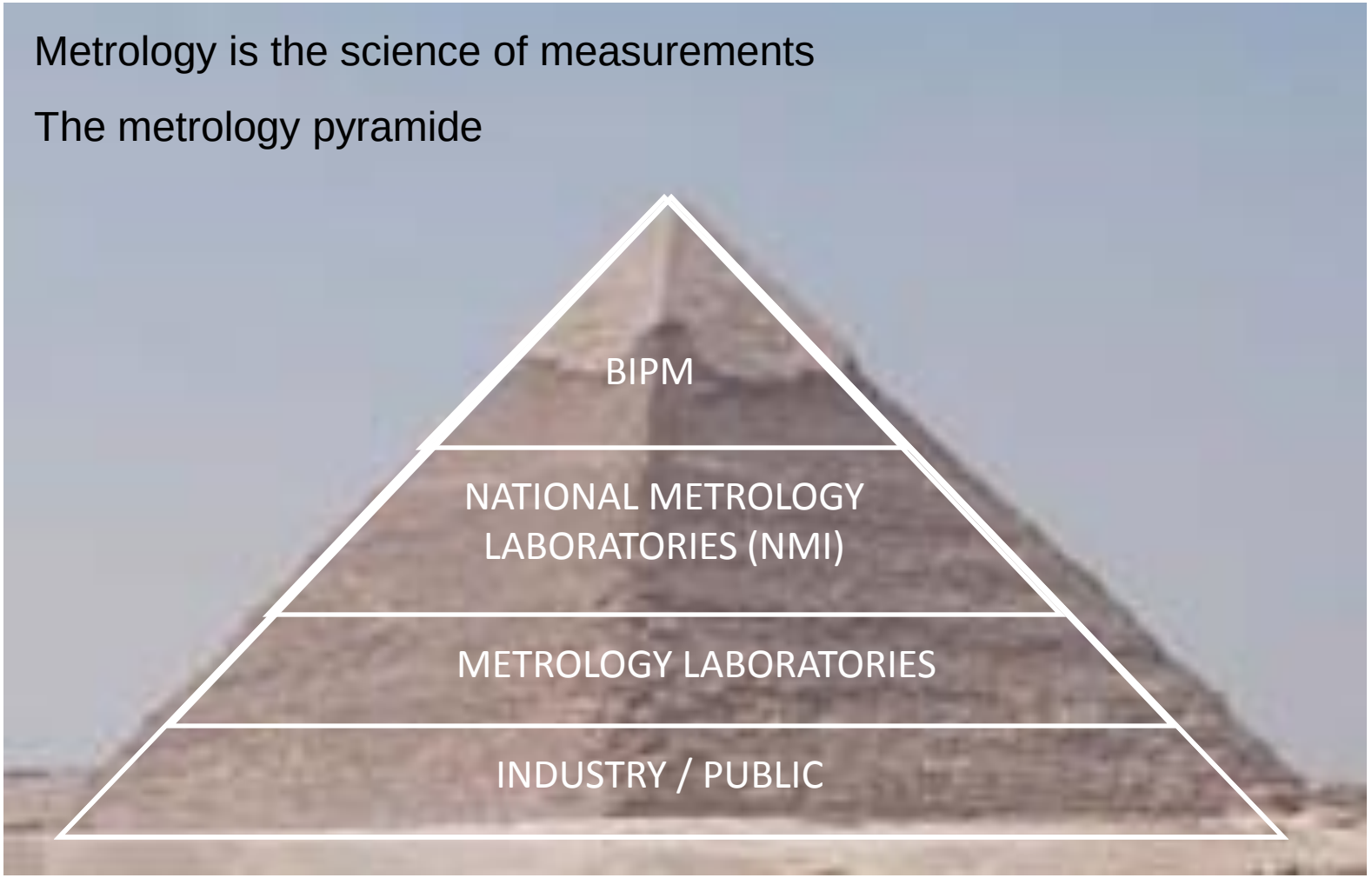
Measurement quality depends on many factors:

- Instruments
- Traceability
- Siting
- Maintenance
- Competent staff
- Procurement practices
- Etc…

Metrology

Metrology is the science of measurements

The metrology pyramide



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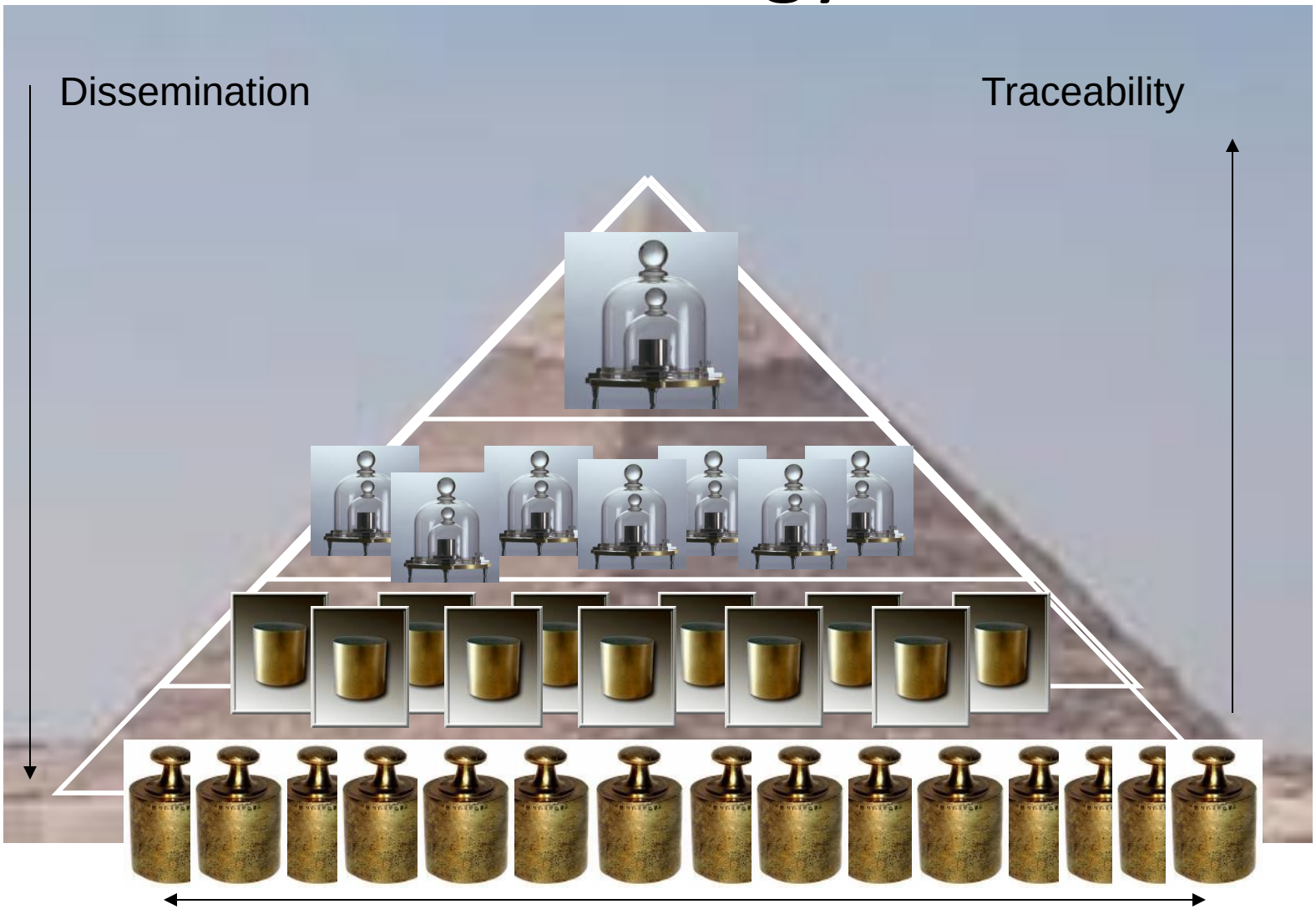
Adapted from J. Duvernoy

Metrology



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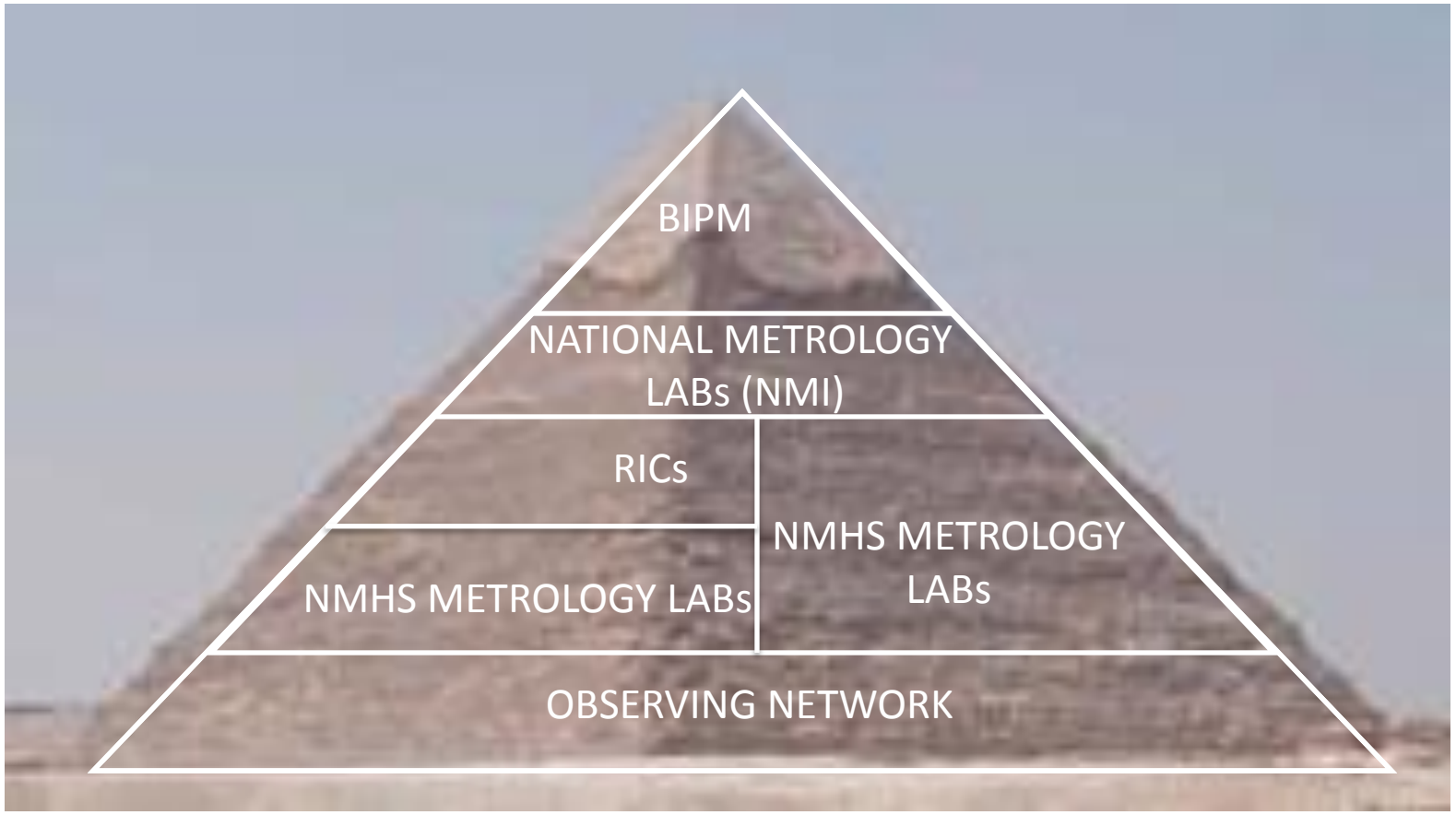
Metrology for Meteorology



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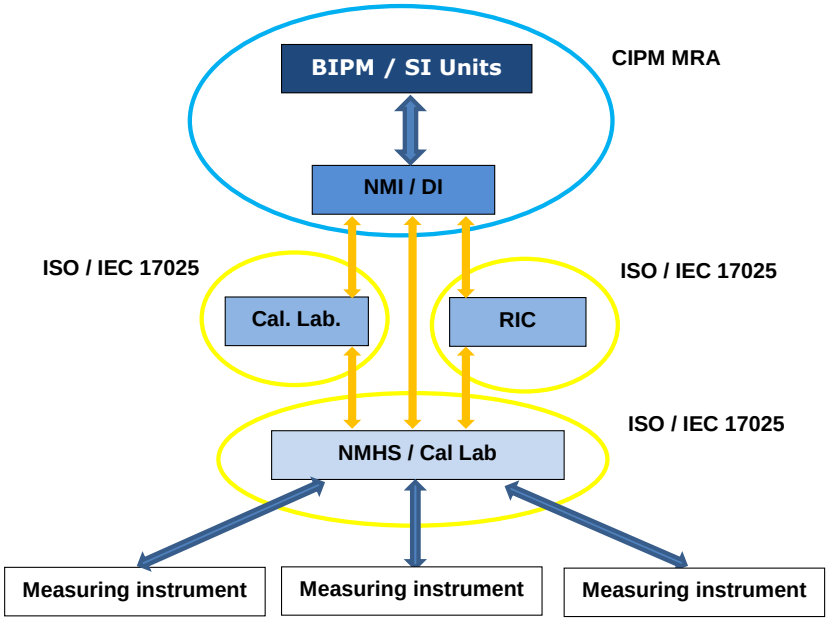
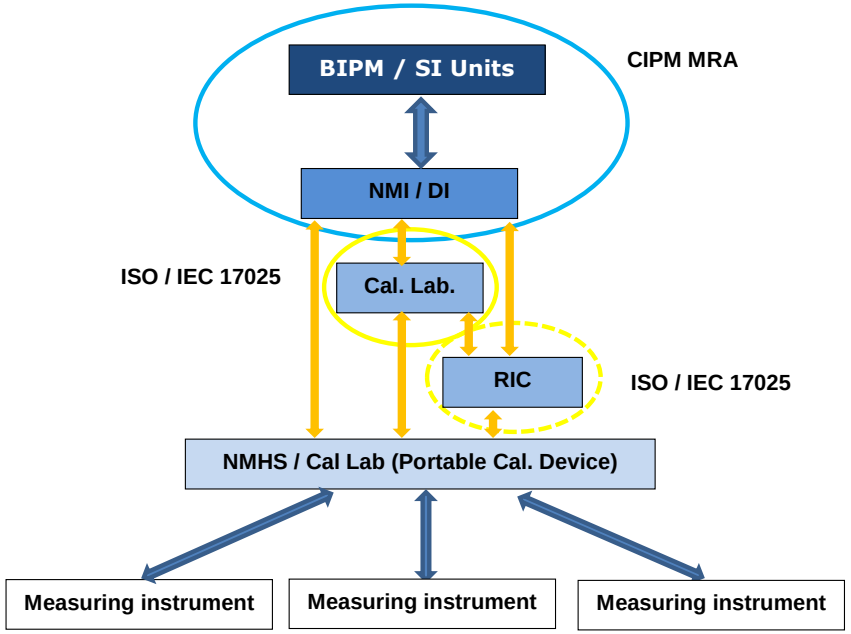
Traceability Strategy

- Proposes various solutions differentiating:
  - Are laboratories accredited according to ISO 17025 or not?
  - Does laboratory follow ISO17025 procedures or not?
  - Calibration in laboratory vs field verifications



Fully assured traceability - target, high confidence level in measurements



Assured traceability (without accreditation) – good confidence level but some risks

Regional Instrument Centres

- Capabilities (must):
  - Have the necessary facilities and lab equipment;
  - Maintain a set of meteorological standard instruments;
  - Participate in interlaboratory comparisons
  - Apply international standards for cal labs (ISO 17025).
- Functions (must):
  - assist in calibrating national meteorological standards and related instruments;
  - advise on enquiries regarding instrument performance, maintenance and the availability of relevant guidance materials;
  - actively participate, or assist, in the organization of regional workshops on instruments;
  - inform on an annual basis on the services provided and activities carried out.
- New RICs nominated in RA-VI (willing to support other regions as well).

Strengthening RICs and NMHSs calibration laboratories

- Guidance on the computation of calibration uncertainties
- Procedures for inter-laboratory comparisons
- Evaluation tool for RICs, based on ISO17025:

Back to User Manual

REGIONAL INSTRUMENT CENTRE EVALUATION SCHEME

View global Results

RUN

Topic	Questions	Answers				
Chapter	**Chapter 4: Management Requirements**				View Chapter 4 Results	
4.1 Organization	Is the RIC's position clearly defined in the parent organisation structure?	YES			NO	I don't kno
	Are RIC relationships with other services defined?	YES			NO	I don't kno
	Are RIC and maintenance services clearly separated?	YES			NO	I don't kno
	Are there policies and procedures relating to the protection of its clients confidential information?	YES	Rath	YES	Rath	Not NO	I don't kno
	Are there organigrams describing internal RIC organization?	YES	Rath	YES	Rath	Not NO	I don't kno
	Are responsibility, authority and interrelationships of all personnel specified?	YES	Rath	YES	Rath	Not NO	I don't kno
	Has a member of staff been appointed as quality manager?	YES			NO	I don't kno
	Have deputies been appointed for key personnel?	YES	Rath	YES	Rath	Not NO	I don't kno

SITING CLASSIFICATION

- Published as a WMO-ISO standard
- Estimation of how well the siting of an instrument meets the WMO siting recommendations
- Helps identify acceptable sites and improve existing sites
- Enables to rapidly assess the value of stations from partner networks
- Many countries are implementing it, and many studies have been made => likely update of the classification in a few years.

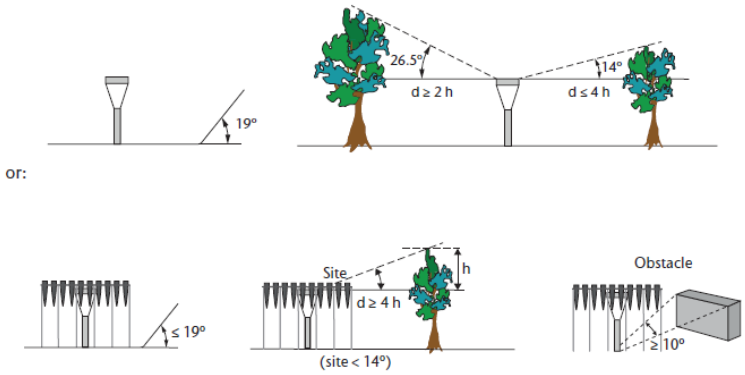


Figure 1.B.5. Criteria for precipitation for class 1 sites

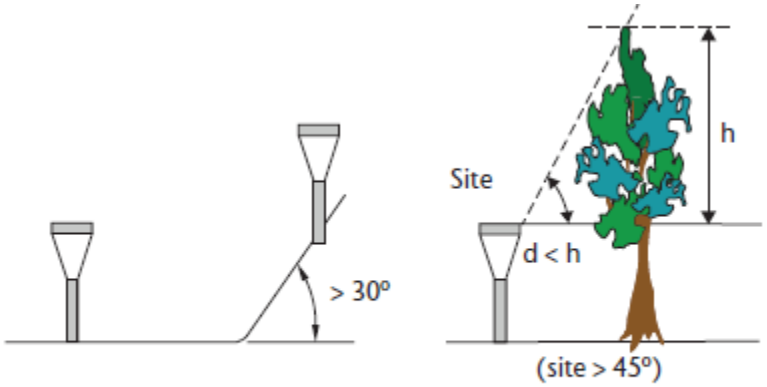


Figure 1.B.8. Criteria for precipitation for class 4 sites

SUSTAINED PERFORMANCE CLASSIFICATION (coming soon)

- Classifies the maintenance that is performed on a network to achieve specific measurement uncertainties (frequency of calibrations and field verifications)
- Consists of 4 classes A-B-C-D
- Breaks down the sources of uncertainties
- Is complementary to the siting classification
- Is being proposed for endorsement by CIMO-17 (and inclusion in the WMO Guide No. 8)

		Class A	Class B	Class C	Class D
Air Temperature	Target Uncertainty	0.2 K	0.5 K	1.0 K	> class C or unknown
	Uncertainty Example	Sensor: 0.10 K Drift: 0.02 K Screen: 0.10 K Logger: 0.02 K Total: 0.2 K	Sensor: 0.30 K Drift: 0.02 K Screen: 0.30 K Logger: 0.10 K Total: 0.5 K	Sensor: 0.4 K Drift: 0.1 K Screen: 0.7 K Logger: 0.2 K Total: 0.9 K	-
	Resolution	0.1 K	0.1 K	1 K	-
	Calibration Regime	Yearly	3 yearly	3 yearly	None or unknown
	Verification Regime	6 monthly	Yearly	Yearly	None or unknown
	Maintenance Regime	Yearly	Yearly	Yearly	None or unknown

4 COMPETENCY FRAMEWORKS

Competency frameworks for:

1. Observations
2. Instrumentation
3. Calibration
4. Observing programme and network management

Each Framework consists of 5-7 high-level competencies. For each of them the following is provided:

- Competency description
- Performance components are described
- Knowledge and skills are described

4 COMPETENCY FRAMEWORKS

Competency frameworks for instrumentation:

1. Install instruments and communications systems
2. Maintain instrument and system performance
3. Diagnose faults
4. Repair faulty instruments and systems
5. Maintain a safe work environment

Competency framework for observing programme and network management

1. Plan the observing programme
2. Procure equipment
3. Select and acquire sites
4. Install network components
5. Manage the network operation
6. Manage the observing programme

AWS PROCUREMENT SPECIFICATIONS

Problem:

- For NMHSs: following a procurement, some observing networks do not meet the expected requirements
- For manufacturers: quality of some tenders is such that they cannot respond to them (e.g. irrealistic, non-neutral, based on specific instruments,…)

Possible solution: WMO and HMEI are collaborating on the development of neutral AWS tender procurement specifications

- Based on Manual on the GOS and CIMO Guide
- Modular and open to modern network designs
- Current version is available for testing
- Feedback would be welcome

Intercomparisons

- Report of the Solid Precipitation Intercomparison Experiment (SPICE) will be published prior to CIMO-17
  - 20 sites
  - 15 countries
  - 20 instr. manufacturers (TB,WG, NCI)

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SOME USEFUL RESOURCES

www.wmo.int/pages/prog/www/IMOP/IMOP-home.html

- Guide to Meteorological Instruments and Methods of Observations in all WMO languages (2017 Ed)
- TECO-2016 proceedings and recordings available
- TECO-2018 (Amsterdam, Netherlands, Oct. 2018)
  - Abstract-submission is open on: www.wmocimo.net
- AWS- Conference (Oct. 2017, Germany)
  - Sharing experiences/challenges/best practices on AWS
  - Proceedings and recording available

- WMO Instruments and Methods of Observation Reports:
  - Includes report of raingauge intercomparisons, experiences with siting classification, outcome of interlaboratory comparisons,….
- List of RICs with their contacts and capabilites
- Knowledge sharing portal

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Thank you
Merci

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