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| WEATHER CLIMATE WATER | **World Meteorological Organization**  **COMMISSION FOR OBSERVATION, INFRASTRUCTURE AND INFORMATION SYSTEMS**  **Second Session** 24 to 28 October 2022, Geneva | **INFCOM-2/Doc. 7.4(2)** |
| Submitted by: Chair of SC-MINT  28.IX.2022  **DRAFT 1** |

**AGENDA ITEM 7: Technical regulations and other technical decisions**

**AGENDA ITEM 7.4: Standing Committee on Measurements, Instrumentation and Traceability (SC-MINT)**

# uncertainty assessments and Harmonization of uncertainty terminology

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| **Summary** |
| **Document presented by:** Chair of SC-MINT  **Strategic objective 2020–2023:** In line with strategic objective 2.1  **Financial and administrative implications:** within the terms of reference of INFCOM and its standing committees, within parameters of the Strategic and Operational Plans 2020–2023, will be reflected in the Strategic and Operational Plans 2024–2027.  **Key implementers:** INFCOM standing committees (mainly SC-MINT and SC-ON).  **Time frame:** 2022–2027  **Action expected:** detailed review of uncertainty-related terminology in the preparation of updates of relevant INFCOM publications. |

# DRAFT DECISION

## Draft Decision 7.4(2)/1 (INFCOM-2)

### Towards improved uncertainty evaluations and harmonization of the uncertainty terminology across the key INFCOM-related WMO publications

**The Commission for Observation, Infrastructure and Information Systems decides**:

1. To intensify activities on the assessment of uncertainty evaluations;
2. To harmonize the definitions and terminology related to the term "uncertainty" across technical publications overseen by the Commission to ensure their use is correct, consistent and understood when used among WMO communities;

**Requests** SC-MINT to further promote, organize and coordinate field experiments and studies, necessary to refine and improve the uncertainty evaluation and traceability of measurements, including in collaboration with partners from the metrology community;

**Requests** **further** its Management Group:

1. To make necessary arrangements for the development of the relevant guidance material needed to ensure and maintain harmonization and consistency of “uncertainty”-related terminology and to implement these practices in technical publications overseen by the Commission;
2. To engage with BIPM and National Metrology Institutes (NMIs) to ensure that “uncertainty”-related terminology in use in WMO is better understood by other stakeholders, and consistent with the practices in use in other communities, thus supporting the engagement of partners from the broader Earth System approach in WMO activities.

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Decision justification:

Evaluation of uncertainties in measurements, their interpretation, and representativeness are critical for measurement data quality, comparability, and compatibility, in different observing networks, for example, Global Basic Observing Network (GBON) and Global Climate Observing System (GCOS) Surface Reference Network (GSRN). The uncertainties that are already presented throughout different WMO publications and tools, such as in the Measurement Quality Classifications for Surface Observing Stations on Land and in OSCAR/Requirements, require more in-depth technical justifications. This can be achieved, among others, through continued research supported by field experiments.

The term “uncertainty” is widely used throughout WMO publications, but often it is used with different definitions and without the necessary accompanying details for its proper interpretation and use. For example, uncertainty is sometimes used to designate the root mean square error of a single standard deviation, expressed at 67% (or k=1) confidence level, and in other cases, it relates to a quantity defining an interval about the result of a measurement, designated as expanded measurement uncertainty, and is expressed at 95% (k=2) confidence level. This leads to confusion in the use of WMO publications. Furthermore, in many instances, the term uncertainty is used interchangeably with terms such as error, accuracy, and precision, although all these terms represent different concepts and have different meanings.

To avoid potential confusion in the use and interpretation of the uncertainties expressed in WMO publications, it is necessary to harmonize the definition of uncertainty and related terminology, following the definitions provided in:

1. [Joint Committee for Guides in Metrology: *Evaluation of measurement data — Guide to the expression of uncertainty in measurement (GUM)* (JCGM 100:2008)](https://www.bipm.org/en/committees/jc/jcgm/publications)
2. [Joint Committee for Guides in Metrology: *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)* (JCGM 200:2012)](https://www.bipm.org/en/committees/jc/jcgm/publications)

Already established collaboration between SC-ON/JET-EOSDE and SC-MINT/ET-MU, and with the working groups of BIPM/Joint Committee for Guides in Metrology, will be essential for the completion of this task.

The collaboration with the metrology community could later be extended, if appropriate, to cover other metrology-related vocabulary in use in WMO.

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