An inconsistency between definitions of “measurement accuracy” and “measurement error” in the VIM

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To the Editor,

The current edition of the International Vocabulary of Metrology, VIM [1], defines “measurement accuracy” (entry 2.13) as “closeness of agreement between a measured quantity value and a *true quantity value* of a measured”, and “measurement error” (entry 2.16) as a “measured value minus a *reference quantity value*” (italized by the author to stress relevance). Both definitions are accompanied of several notes. Among these notes, the second point of the Note 1 of definition of “measurement accuracy” indicates that “a measurement is said to be more accurate when it offers a smaller measurement error”. After doing a logical analysis of these two definitions and the note mentioned, an inconsistency arises on the type of quantity value used for comparison. This inconsistency can be easily resolved by two ways:

- (1) In definition of “measurement accuracy”, the term “true quantity value” can be replaced with the term “reference quantity value”, or
- (2) In definition of “measurement error”, the term “reference quantity value” can be replaced with the term “true quantity value”.

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I think the first way is more appropriate because, generally, a reference quantity value is more likely to be available than a true quantity value, and, in addition, the first concept includes the second one.

Furthermore, in order to avoid confusions in some scientific fields (clinical laboratory sciences, where biological reference values are daily used, is a good example), I propose to add the modifier “metrological” before the term “reference quantity value”, which could be written “metrological reference value”, for brevity.

After these modifications, another related change might be considered. Keeping in mind the new wording proposed above, the terms “measurement accuracy” and “measurement error” when being defined with the term “reference quantity value” (as suggested under (1) above), perhaps could be replaced with “measurement conventional accuracy” and “measurement conventional error”, respectively.

Or, alternatively, it may be better to maintain the original terms “measurement accuracy” and “measurement error”, however—as considered in (2) above—basing both of them on “true quantity value”, and to introduce additionally “measurement conventional accuracy” and “measurement conventional error” with reference to “[metrological] reference quantity value”.

Finally, may I express it would be good for the future evolution of VIM that specialists in different scientific and technological fields gave their views on these proposals.

Reference

1. JCGM 200:2012 International vocabulary of metrology—Basic and general concepts and associated terms (VIM), 3rd ed., 2008 version with minor corrections; freely available at www.bipm.org/vim