Overview and Rationale of the 3rd Edition of the International Vocabulary of Metrology (VIM3)

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(VIM Committee)

History of the VIM

Chairman: Pierre Giacomo, Director (Emeritus), BIPM

- First edition: 1984 (Published by ISO)
- Second edition: 1993 (Published by ISO)
- *International Vocabulary of Basic and General Terms in Metrology*

- Third edition: 2008 (Published by JCGM and others)
- *International Vocabulary of Metrology – Basic and General Concepts and Associated Terms (VIM)*
- Available (for free) on BIPM web site (www.bipm.org)

Foreword to the VIM3

- Gives historical background on JCGM and its composition: BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, ILAC

- Describes responsibilities of the two JCGM Working Groups:
- WG1 – GUM Committee
- WG2 – VIM Committee

- Provides brief history of VIM3 development timetable

Structure of the VIM3

Table of Contents

- **Foreword**
- **Introduction**
- **Conventions**
- **Scope**
- **1 Quantities and units**
- **2 Measurement**
- **3 Devices for measurement**
- **4 Properties of measuring devices**
- **5 Measurement standards (Etalons)**
- **Annex A** (informative) **Concept diagrams**
- **Bibliography**
- **List of acronyms**
- **Alphabetical index**

Motivation for the VIM3 (from Introduction to the VIM3)

- The need to cover measurements in chemistry and laboratory medicine for the first time, as well as to incorporate concepts such as those that relate to metrological traceability, measurement uncertainty, and nominal properties, led to this third edition.

Presentation of Terms

1.1 (1.1)

quantity

property of a phenomenon, body, or substance, where the property has a magnitude that can be expressed as a number and a reference

Presentation of Terms

1.1 (1.1)

quantity

property of a phenomenon, body, or substance, where the property has a magnitude that can be expressed as a number and a reference

1.19 (1.18)

quantity value

value of a quantity

value

number and reference together expressing magnitude of a **quantity**

Presentation of Terms

1.1 (1.1)

quantity

property of a phenomenon, body, or substance, where the property has a magnitude that can be expressed as a number and a reference

NOTE 6 The concept ‘quantity’ may be generically divided into, e.g. ‘physical quantity’, ‘chemical quantity’, and ‘biological quantity’, or **base quantity** and **derived quantity.**

Presentation of Terms

NOTE 1 The generic concept ‘quantity’ can be divided into several levels of specific concepts, as shown in the following table. The left hand side of the table shows specific concepts under ‘quantity’. These are generic concepts for the individual quantities in the right hand column.

length, l	radius, r	radius of circle A, r_A or $r(A)$
energy, E	kinetic energy, T	kinetic energy of particle i in a given system, T_i

Presentation of Terms

1.1 (1.1)

quantity

property of a phenomenon, body, or substance, where the property has a magnitude that can be expressed as a number and a reference

1.2 (1.1, Note 2)

kind of quantity

kind

aspect common to mutually comparable **quantities**

NOTE 1 The division of the concept of ‘quantity’ according to ‘kind of quantity’ is to some extent arbitrary.

Presentation of Terms

1.1 (1.1)

quantity

property of a phenomenon, body, or substance, where the property has a magnitude that can be expressed as a number and a reference

NOTE 2 A reference can be a **measurement unit,** a **measurement procedure,** a **reference material,** or a combination of such.

Presentation of Terms

1.26

ordinal quantity

quantity, defined by a conventional **measurement procedure,** for which a total ordering relation can be established, according to magnitude, with other quantities of the same **kind,** but for which no algebraic operations among those quantities exist

EXAMPLE 1 Rockwell C hardness.

EXAMPLE 2 Octane number for petroleum fuel.

EXAMPLE 3 Earthquake strength on the Richter scale.

EXAMPLE 4 Subjective level of abdominal pain on a scale from zero to five.

NOTE 1 Ordinal quantities can enter into empirical relations only and have neither **measurement units** nor **quantity dimensions.** Differences and ratios of ordinal quantities have no physical meaning.

Presentation of Terms

1.30

nominal property

property of a phenomenon, body, or substance, where the property has no magnitude

EXAMPLE 1 Sex of a human being.

EXAMPLE 2 Colour of a paint sample.

EXAMPLE 3 Colour of a spot test in chemistry.

EXAMPLE 4 ISO two-letter country code.

EXAMPLE 5 Sequence of amino acids in a polypeptide.

NOTE 1 A nominal property has a value, which can be expressed in words, by alphanumerical codes, or by other means.

NOTE 2 'Nominal property value' is not to be confused with **nominal quantity value.**

Presentation of Terms

VIM3 definition:

2.1 (2.1)

measurement

process of experimentally obtaining one or more **quantity values** that can reasonably be attributed to a **quantity**

NOTE 1 Measurement does not apply to nominal properties.

VIM2 definition:

2.1

measurement

set of operations having the object of determining a value of a quantity

Presentation of Terms

VIM3 definition:

2.3 (2.6)

measurand

quantity intended to be measured

VIM2 (and GUM) definition:

2.6

measurand

particular quantity subject to measurement

Presentation of Terms

VIM3 definition:

2.9 (3.1)

measurement result

result of measurement

set of **quantity values** being attributed to a **measurand** together with any other available relevant information

VIM2 definition:

3.1

result of a measurement

value attributed to a measurand, obtained by measurement

Presentation of Terms

2.9 (3.1)

measurement result

result of measurement

set of **quantity values** being attributed to a **measurand** together with any other available relevant information

NOTE 1 A measurement result generally contains “relevant information” about the set of quantity values, such that some may be more representative of the measurand than others. This may be expressed in the form of a probability density function (PDF).

NOTE 2 A measurement result is generally expressed as a single **measured quantity value** and a **measurement uncertainty.** If the measurement uncertainty is considered to be negligible for some purpose, the measurement result may be expressed as a single measured quantity value. In many fields, this is the common way of expressing a measurement result.

Presentation of Terms

2.10

measured quantity value
value of a measured quantity
measured value

quantity value representing a **measurement result**

NOTE 1 For a **measurement** involving replicate **indications,** each indication can be used to provide a corresponding measured quantity value. This set of individual measured quantity values can be used to calculate a resulting measured quantity value, such as an average or median, usually with a decreased associated **measurement uncertainty.**

Presentation of Terms

VIM3 definition:

2.11 (1.19)
true quantity value
true value of a quantity
true value

quantity value consistent with the definition of a **quantity**

VIM2 definition:

1.19

true value (of a quantity)

value consistent with the definition of a given particular quantity

Presentation of Terms

VIM3 definition:

2.16 (3.10)
measurement error
error of measurement
error

measured quantity value minus a **reference quantity value**

VIM 2 definition:

3.10

error (of measurement)

result of a measurement minus a true value of the measurand

Presentation of Terms

VIM3 definition:

2.26 (3.9)
measurement uncertainty
uncertainty of measurement
uncertainty

non-negative parameter characterizing the dispersion of the **quantity values** being attributed to a **measurand,** based on the information used

VIM2 definition:

3.9
uncertainty of measurement

parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand

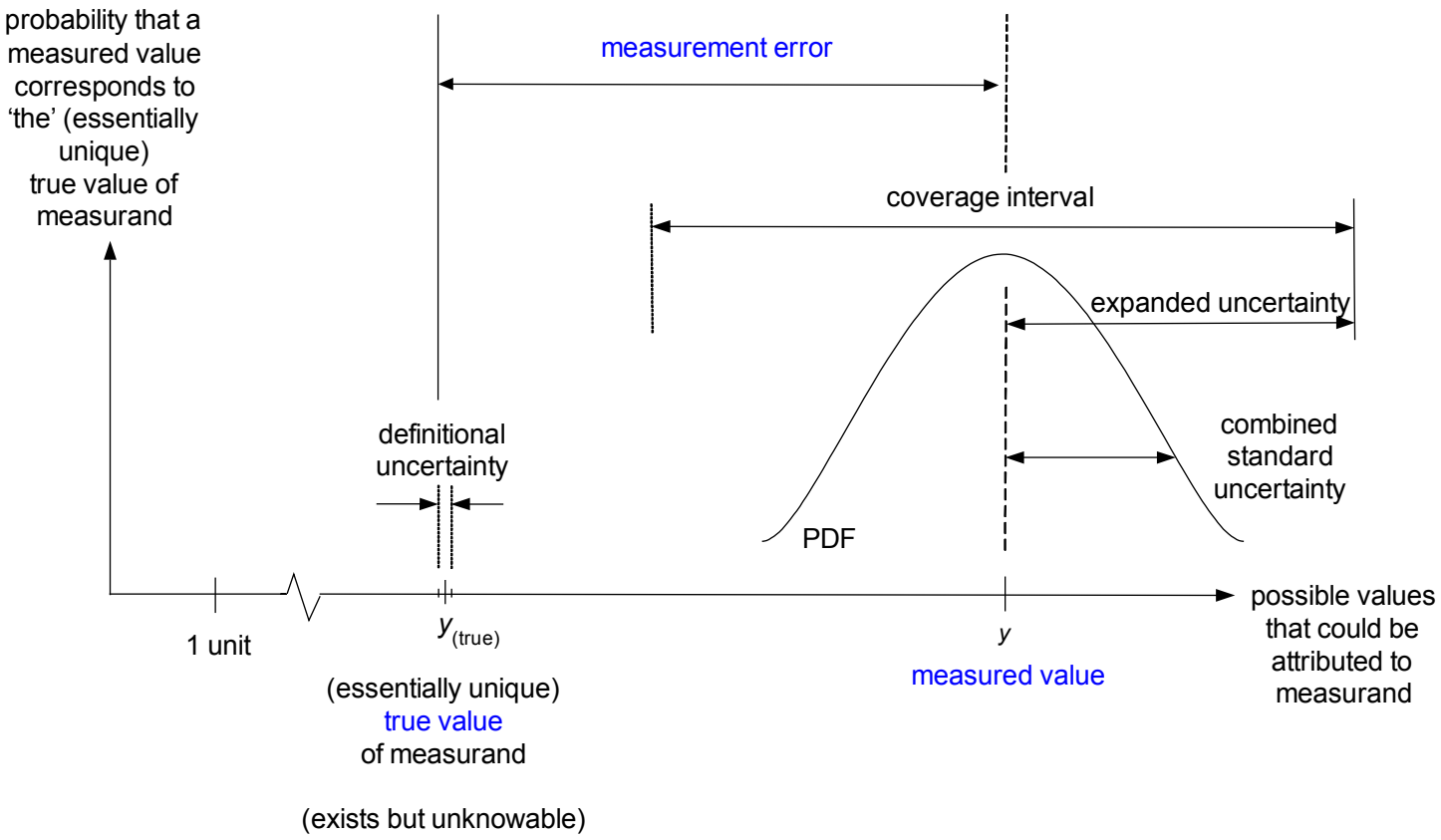
Presentation of Terms

In Simpler Terms:

measurement uncertainty

measure of how well the (essentially unique) true value of a measurand is believed to be known

VIM3 Terminology:
True Value, Measured Value and Measurement Error



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THANK YOU