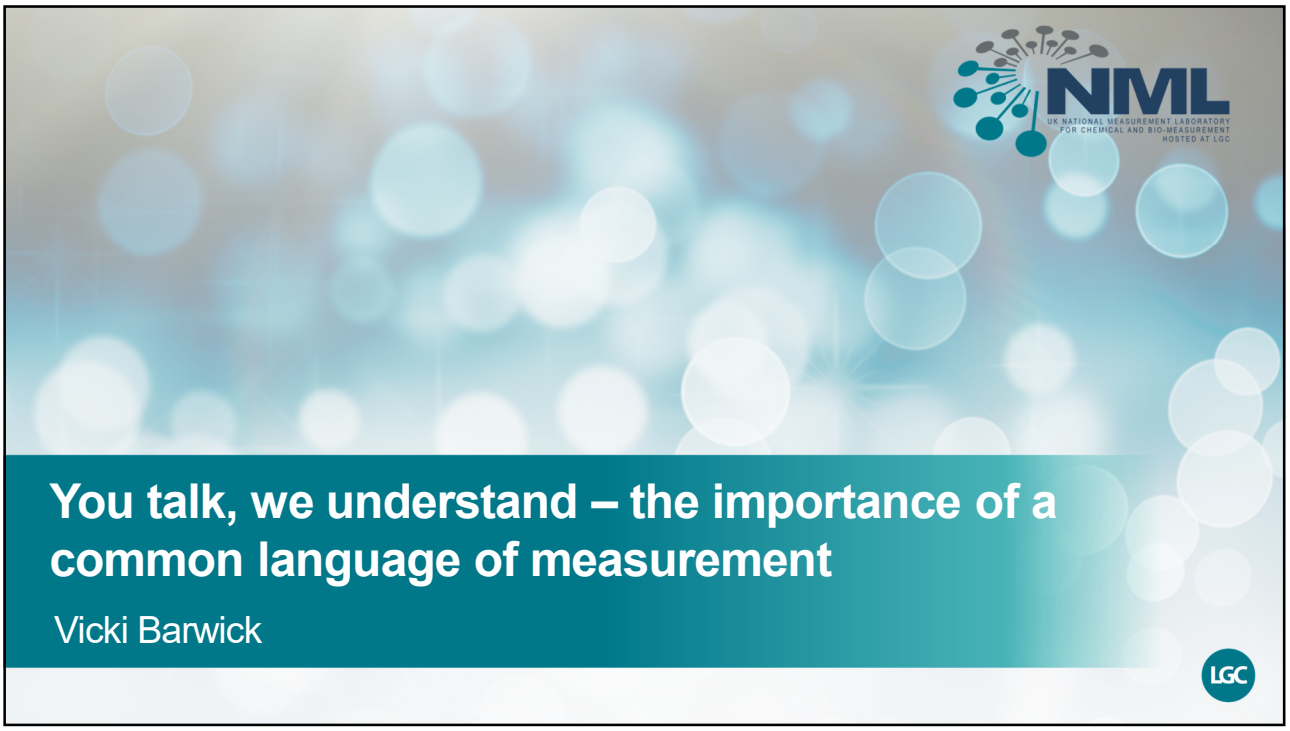


1

Overview

LGC

- Importance of a common “language of measurement”
- International vocabulary – “the VIM”
- Eurachem Terminology Guide
  - Scope
  - Content
- Important terms in analytical measurement

2

Importance of a common language

- Basic principles of measurement are the same across disciplines
  - Physics, chemistry, laboratory medicine, biology, engineering…
  - Increase in interdisciplinary activities
- Clear definitions
  - Improve communication
  - Reduce disputes/misunderstanding
  - Allow consistent interpretation
    - E.g. between regulatory/assessment bodies and laboratories
  - Facilitate translations

You talk, we understand –
The way out of the tower of Babel

The problem

We live in a "global village" but we are all different and we use many different languages to communicate.

Even when people speak the same language, the same words may be used with different meanings. See, for example, some different uses of the word "standard" in English – a normative document, a solution of known concentration or even a type of flag.

Even in the same area of activity misunderstandings do occur which may result in a waste of time and money, or even worse consequences.

When talking about laboratory tests, lack of a full understanding of key terms and inappropriate translations leaves room for different interpretations of stated requirements. For example, there have historically been a number of different but related uses of the term 'detection limit'. This may lead to inadequate fulfilment of those requirements, thus becoming an obstacle to the production of analytical data that is fit for its intended use. A shared interpretation of concepts related to quality in measurement between laboratories and accreditation bodies is also crucial for a fair and harmonised approach to laboratory assessment across the world.

Accuracy!
Trueness!

A common language

We need a common language; clear and unambiguous. We need a common vocabulary to provide consistent definitions of concepts with their associated terms.

To this end, several organisations participate in a joint effort to develop and maintain an international vocabulary of metrology (VIM) [1], which aims to achieve a unique understanding of concepts related to measurements across all sectors.

The VIM is a normative reference in the standards ISO/IEC 17025, ISO 15189 and ISO/IEC 17043, and is therefore a key document for all organisations seeking accreditation.

Is this enough?

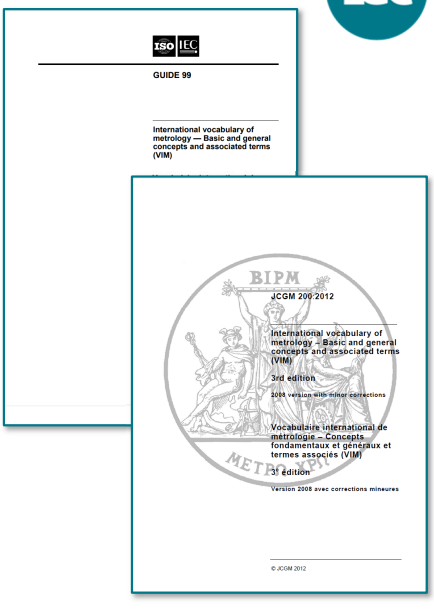
For laboratory staff some problems still stand and need to be addressed:
- Many people are confused about both concepts and terms.
- It may be difficult to understand the "formal" VIM definitions – they are short statements intended to apply to many different measurement sectors.
- Translations into local languages may add to the confusion, e.g. if different terms are used in different sectors for the same VIM concept and the translator overlooks this issue.

Eurachem
A FOCUS FOR ANALYTICAL CHEMISTRY IN EUROPE

3

"International Vocabulary of Metrology" – VIM

- International vocabulary of metrology – Basic and general concepts and associated terms (VIM)
  - 3rd edition
- JCGM 200:2012
  - 2008 version with minor corrections
  - Available from www.bipm.org
- Earlier version published as ISO/IEC Guide 99: 2007
  - Available from www.iso.org
- Under revision



ISO IEC
GUIDE 99
International vocabulary of metrology — Basic and general concepts and associated terms (VIM)

BIPM
JCGM 200:2012
International vocabulary of metrology – Basic and general concepts and associated terms (VIM)
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2008 version with minor corrections
Vocabulaire international de métrologie – Concepts fondamentaux et généraux et termes associés (VIM)
3e édition
Version 2008 avec corrections mineures
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4

VIM 3 Content

- Concepts listed in five chapters
  - Chapter 1 Quantities and Units
  - Chapter 2 Measurement
  - Chapter 3 Devices for measurement
  - Chapter 4 Properties of measuring devices
  - Chapter 5 Measurement standards (Etalons)
- 12 Concept diagrams

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Concepts

- Multiple terms for same concept permitted
  - Preferred term given first
- Cross references to earlier edition (VIM 2) included
- Concepts defined in VIM 3 printed in bold face
- Explanatory notes and examples from different sectors included for many concepts

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Concept – example

5.1 (6.1)

measurement standard

Etalon

realization of the definition of a given **quantity**, with stated **quantity value** and associated **measurement uncertainty**, used as a reference

EXAMPLE 1 1 kg mass measurement standard with an associated standard measurement uncertainty of 3 µg.

…

EXAMPLE 6 **Reference material** providing quantity values with measurement uncertainties for the mass concentration of each of ten different proteins.

NOTE 1 A "realization of the definition of a given quantity" can be provided by a measuring system, a material measure, or a reference material.

…

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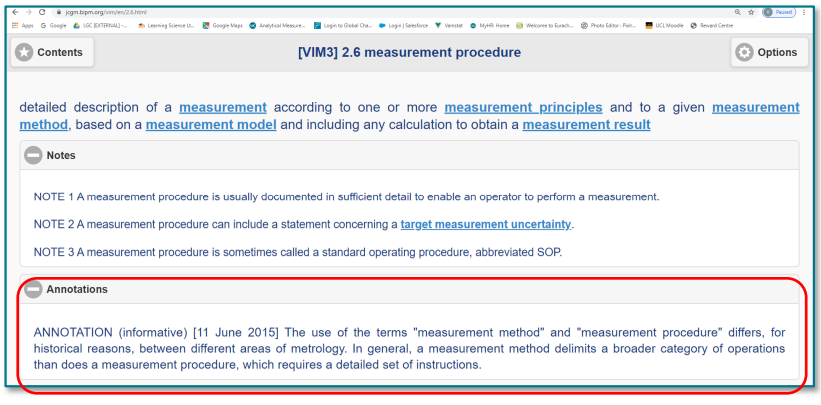
Annotated VIM

- Web-based version with additional annotations
  - https://jcgm.bipm.org/vim/en/index.html



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Development of “VIM 4”

- VIM is under revision
  - Joint Committee for Guides in Metrology (JCGM) WG 2
- Incorporate annotations from the web-based version
- Include essential definitions for nominal properties
- Simplify language

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Eurachem Guide:

Terminology in analytical measurement

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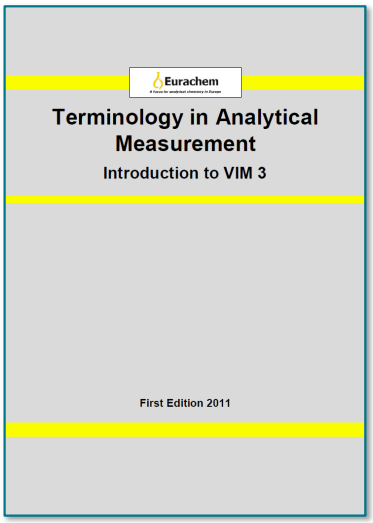
Scope of the Eurachem Guide

- Applicable to several sectors
  - Chemical analysis
  - Biological measurements
  - Clinical chemistry
- Important concepts identified
- Terms requiring special attention identified
- Link to terms used in ISO standards and Guides
  - Current terminology in the workplace



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Target audience?

- Laboratory staff
- Laboratory managers
- Accreditation bodies
- Universities
- Training events

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Layout of guide

- Terms divided into ‘families’
  - General metrology
  - Metrological traceability
  - Measurement uncertainty
  - Validation/verification and method performance
- Potential problem terms identified within family
- Terms frequently used in routine laboratories

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Outline of Guide

- Concept definition given
  - An explanation provided with examples where required
- Terms defined in VIM 3
  - Shown in bold
  - Referenced to VIM 3
  - Conflict with common usage highlighted

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Potential problem terms

- Measurement procedure
- Calibration (curve and diagram)
- Validation and verification
- Measuring interval

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Description of the “test method”

VIM 3 concepts

- Measurement principle
  - Phenomenon serving as basis of a measurement
- Measurement method
  - Generic description…of operations used in a measurement
- Measurement procedure
  - Detailed description of measurement
    - NOTE 3 A measurement procedure is sometimes called a standard operating procedure …

Common usage

- Method
  - Considered synonymous with VIM “measurement procedure” (ISO/IEC 17025)
- Method validation
  - Rather than “measurement procedure validation”
- Examination procedure
  - ISO 15189

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Calibration curve and diagram

- Calibration curve
  - Expression of the relation between indication and corresponding measured quantity value
    - Note: does not supply a measurement result as it bears no information about the measurement uncertainty
- Calibration diagram
  - Graphical expression of the relation between indication and corresponding measurement result

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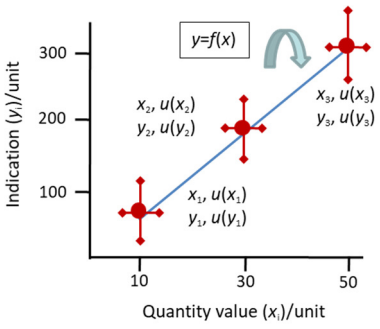
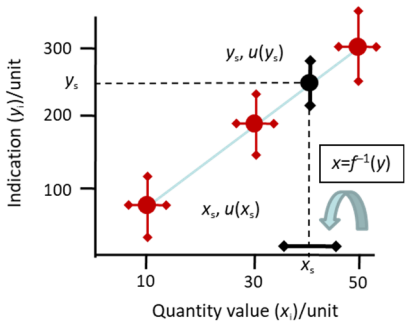
Calibration

- Calibration – two steps
  - Establish relation between quantity values provided by measurement standards and corresponding indications (calibration diagram 1)
  - Use the information to establish a relation for obtaining a measurement result from an indication (calibration diagram 2)



Calibration diagram 1



Calibration diagram 2

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Validation and verification

- Verification
  - provision of objective evidence that a given item fulfils specified requirements
    - EXAMPLE 3 Confirmation that a target measurement uncertainty can be met.
    - NOTE 2 The item may be, e.g. a process, measurement procedure, material, compound, or measuring system.

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Validation and verification

- Validation
  - **verification**, where the specified requirements are adequate for an intended use (VIM 2.45)
- 'Specified requirements' (e.g. targets for limit of detection, trueness, precision) agreed with customer
  - Adequate for the intended use of the measurement procedure
- Demonstrate (on the basis of objective evidence) that the specified requirements are met

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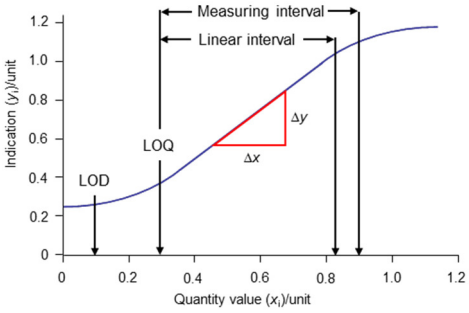
Measuring interval

- Set of **values** of **quantities** of the same kind that can be measured by a given **measuring instrument or measuring system** with specified **instrumental uncertainty**, under defined conditions
- Common terms
  - Working range, measurement range (ISO/IEC 17025)
- VIM – range is a difference



Measuring interval: 0.3 to 0.9
[0.3,0.9]
Range: 0.6

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Summary

- VIM 3 aims to
  - Promote global harmonisation of terminology in metrology
  - Form a common reference for scientists and engineers
  - Be a reference for governmental bodies, trade associations and accreditation bodies, regulators and professional bodies
- Eurachem Guide aims to help less experienced metrologists understand the content

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Any questions?

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