Setting standards in analytical science

Traceability

Technical Requirements

valid analytical measurement

Introduction

Setting standards in analytical science

- Traceability in practice
  - an exercise
- Requirements of ISO/IEC 17025
- Practical implementation
  - standards
  - reference materials

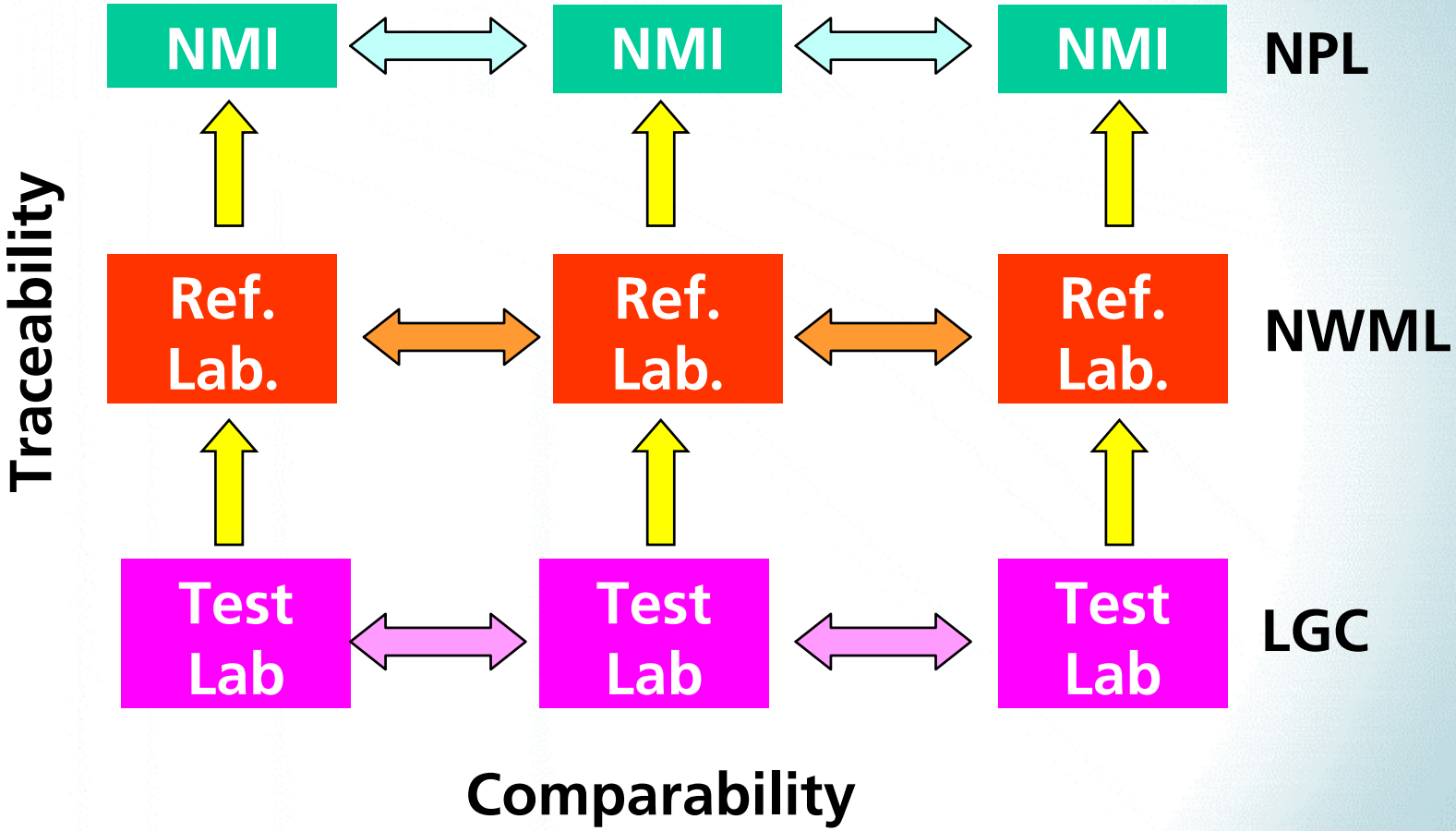
Traceability

Setting standards in analytical science

- "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards through an unbroken chain of comparisons all having stated uncertainties" (VIM 1993)
- 'Stated references'
  - calibration standards
  - traceable reference materials for independent checks

Traceability and comparability

Setting standards in analytical science



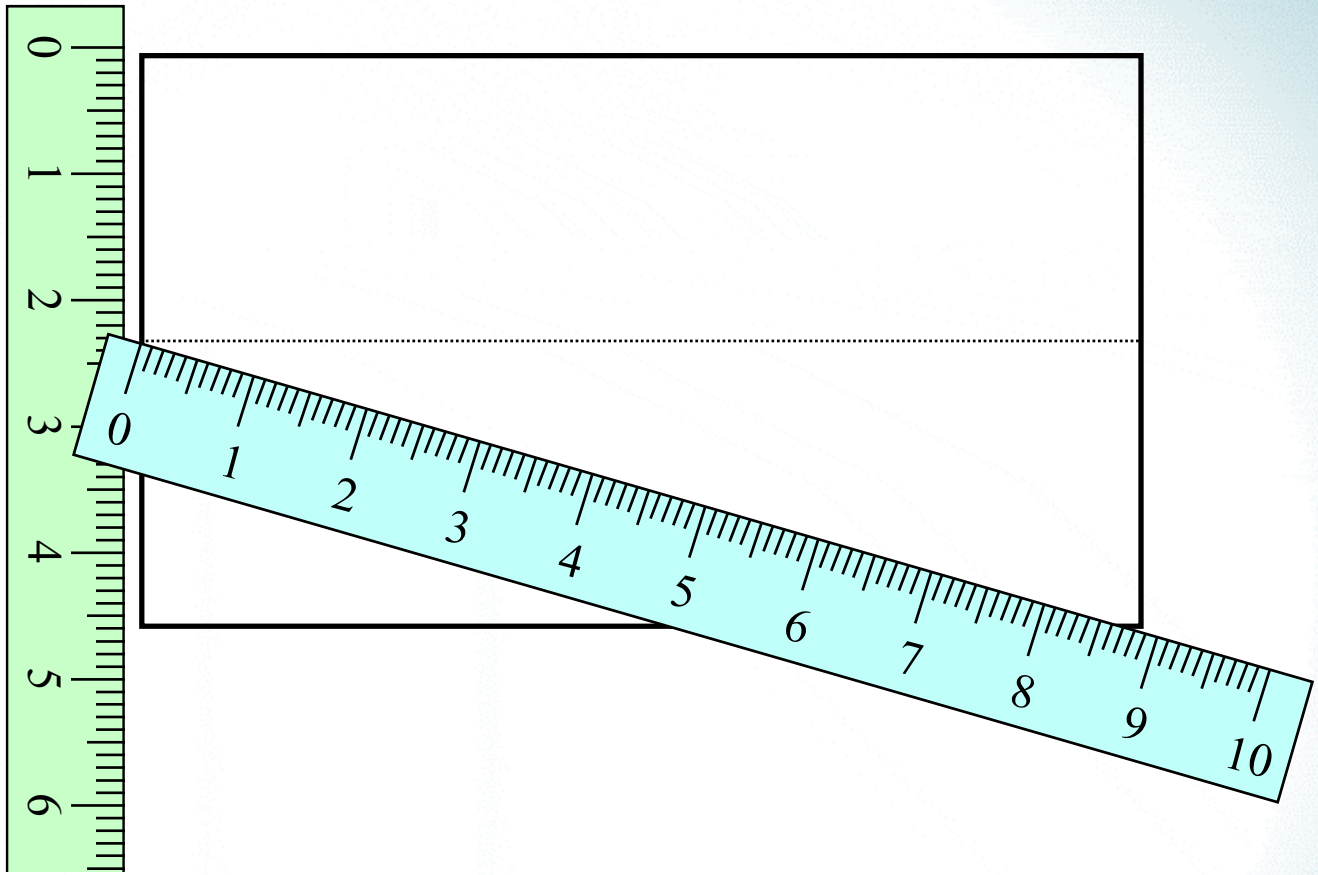
Traceability in practice

Setting standards in analytical science

- A measurement exercise
- Will consist of:
  - a round of product ‘analysis’
  - an intercomparison
  - a calibration exercise
  - a final round of ‘analysis’
  - a thought experiment

Standard method

Setting standards in analytical science



Traceability: A thought experiment

Setting standards in analytical science

- New method
  - measure a 4x4 square of card using the ruler
  - cut it out
  - weigh the square on a traceable balance
- Does the ruler still need calibrating? Why?

Measurements and traceability

Setting standards in analytical science

- Traceable measurements are more consistent
- Traceability is essential for calibrations
- Traceability is needed for all parameters that significantly affect the result

ISO/IEC 17025 requirements

Setting standards in analytical science

- 5.6.1 All equipment.. calibrated; programme for calibration established
  - traceable to SI for calibrations
  - traceable to SI if possible for testing
- 5.6.3.1 Reference standards
  - procedure for calibration...
  - reference materials traceable to SI (where possible)

Practical implementation - transfer standards

Setting standards in analytical science

- Reference materials
  - e.g. pure substance CRMs, standard solutions, matrix CRMs
- Physical standards
  - e.g. mass, temperature
- Reference values
  - e.g. atomic mass values
- Results from primary / reference methods
- Used for both validation and calibration

Reference standards and equipment

Setting standards in analytical science

- Mass standards
- Spectroscopic solutions, reagents etc.
- Equipment
  - including significant environmental controls

..... Must be calibrated

Summary

Setting standards in analytical science

Traceability guarantees that:

- Results do not vary because of changes in standards
  - within limits!
- Results are comparable with other laboratories
  - comparison guarantee is no better than the uncertainties on reference standards

Acknowledgement

- This lecture material was produced by LGC under contract with the Department of Trade and Industry as part of the National Measurement System Valid Analytical Measurement (VAM) programme
- For further information on the VAM programme visit www.vam.org.uk