Some discussion points regarding metrology & calibrations

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Ozflux meeting, Perth, June 2011

Content

- See document on Ozflux website for specific questions & more detail.
- Outline of organisation of the metrology system.
- Introduction & application of ISO 17025:
  - Assessment of measurement uncertainty.
  - Documents & document control
  - Test/calibration methods.
  - Measurement traceability.
  - Compliance.
  - Competence testing.
- Speculation...
- Useful References

The metrology structure

- National Measurement Institute: responsible for the national measurement infrastructure and for maintaining Australia's units and standards of measurement. The Law...
- National Association of Testing Authorities: responsible for laboratory accreditation.
- Standards Australia: responsible for documentary standards.
- *Joint Accreditation System of Australia and New Zealand: responsible for certification of management systems, products and personnel.*

ISO 17025: *General requirements for the competence of testing and calibration laboratories*

- "... *the requirements that ... laboratories have to meet if they wish to demonstrate that they operate a management system, are technically competent, and are able to generate technically valid results*"

- "... *use of this International Standard will facilitate cooperation between laboratories and other bodies, and assist in the exchange of information and experience, and in the harmonisation of standards and procedures*"

Application

- ISO 17025 can be applied to any measurement situation.
  - Application documents available.
- Provides a framework to build a management system to ensure quality measurements.
- What measurements are important to OZflux members?
  - Gas & water measurements.
  - Temperature.
  - Solar radiation etc.

Some main points:

- Assessment of measurement uncertainty.
- Documents & document control of procedures & records.
- Selection & validation of measurement/calibration methods.
- Measurement traceability.
- Auditing to ensure compliance with written procedures, records, training etc.
- Competence testing.

Measurement Uncertainty

- What uncertainty does the ‘user’ want or need?
  - Depends on what data is used for?
- Uncertainty of calibration of individual instruments (usually under controlled conditions).
- Uncertainty during use: drift, environmental changes etc.
- All parts of system need to be included: instruments, logger, software etc
- There are standard methods that are universally accepted. (The ISO GUM).

Documents & document control

- Written & tested procedures used by all lab's.
- Version control so that everyone is using the ***same*** version.
- Standardised test records.
- Operator training in procedures & method.

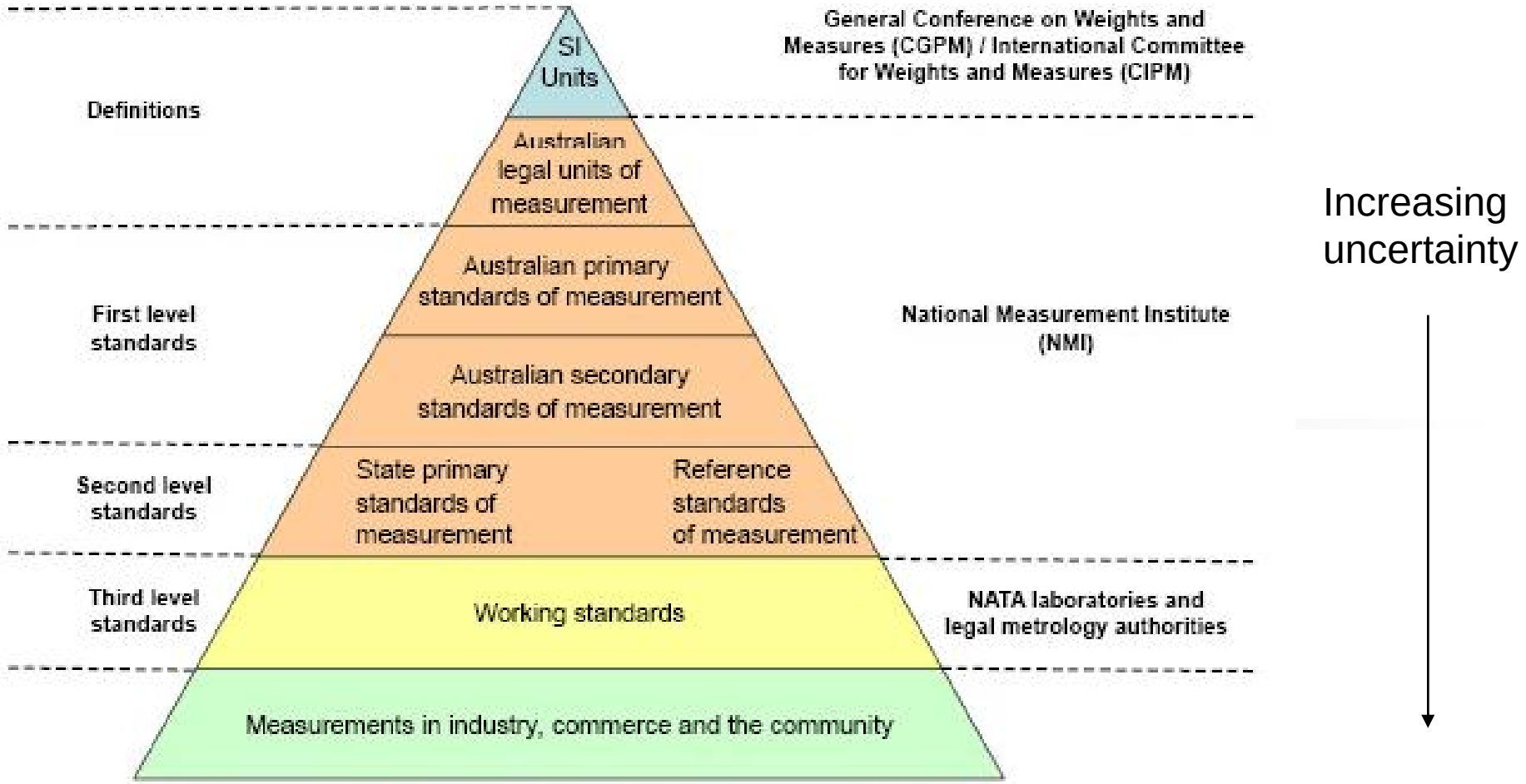
Selection of test/calibration methods

- Locally developed methods vs. methods based on international or national standards?
- How is method validated?
- This includes physical apparatus as well as any associated software.

Measurement Traceability

- *"The hierarchy of standards by which a physical measurement can be related back through the national metrological pyramid to the relevant SI unit is known as traceability"*.
- Measurement uncertainty decreases as the calibration gets closer to the primary standard.
- How will traceability be ensured if it is needed?
  - ***All*** inputs need to be traceable if the final result is to be traceable.

Traceability



http://www.measurement.gov.au/measurementsystem/Pages/HowAustraliasMeasurementSystemWorks.aspx

Compliance auditing

- Scary at first thought... but ensures consistency with required process.
- Gives confidence in processes.
- What happens if non-compliance is noted?
  - Corrective action?
- Needs to be done on a regular basis.
- Who will do it?

Competence testing

- Another scary thought...
- Inter-laboratory comparison.
- Testing of reference standards.
- Needs to be regular.

An interesting development...

From www.jas-anz.com.au

ISO 14065:2007 is an International Standard which sets out requirements for bodies that undertake Greenhouse Gas (GHG) validation or verification using ISO 14064-3 or other relevant standards or specifications. ISO 14065 provides to GHG programme administrators, regulators and accreditors, a basis for assessing and recognising the competence of validation or verification bodies (V/VB).

Speculation...

- Could be very important in the future of Ozflux:
  - If/when Carbon tax arrives.
  - For GHG policy input, information & verification.
  - Will be based upon quality calibrations ***especially if money/trade is involved***...

Conclusion

- A calibration process needs to be developed.
- Ideally, measurements will be traceable.
- If possible, should comply with standards
- Testing & compliance audit is necessary.
- Appears to be growing opportunity to inform and influence GHG issues...

Some Useful References

1. *Traceable Measurements*, Glenda Sandars[1]
2. *Uncertainty in Measurement: The ISO Guide*, Robin Bentley[1]
3. *Assessment of uncertainties of measurements for calibration & testing laboratories*, Ron Cook[2]

1 http://www.measurement.gov.au/Publications/Pages/Monographs.aspx

2 http://www.nata.asn.au/phocadownload/publications/Technical_publications/Uncertainity/MUbook_2002.pdf

Thank you

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