

# Redefinition of SI base units & Developing NMIs

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# Content

- Developing Economies & Metrology
- Developing NMIs & Redefinition of SI base units
- Comments & concerns



# DEVELOPING ECONOMIES & METROLOGY



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# What developing economies need

- Access to free market
  - For survival
  - For economic development
- Mutual recognition
  - In testing results
  - Equivalence in measurement value
- Metrological traceability
  - Easy access
  - Reasonable cost

# Developing NMIs' wishes

- Stability of national metrology system
  - Stable SI units
  - Stable metrological traceability chains
  - Long term use of measurement standards
- Expansion of measurement capabilities
  - Wider ranges → more applications
- Accessibility to measurement standards and calibration services

# Developing NMIs' wishes

- Improvement of measurement accuracy
  - Better medical diagnosis
  - Higher quality and safety
  - Better control and prevention
- Affordable metrological traceability to SI base units
  - Realisation of primary measurement standards
  - Realisation of SI base units

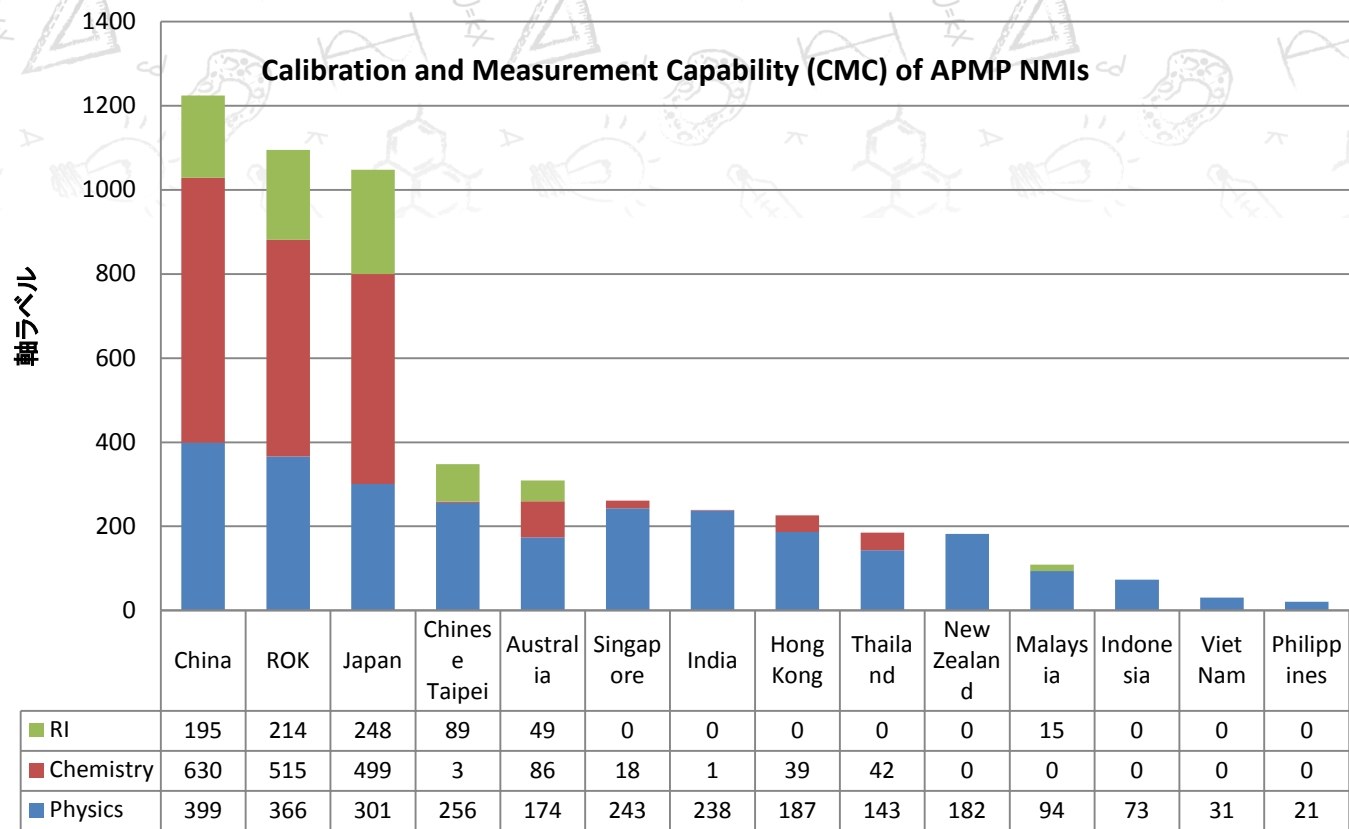
# NIMT in 2013



- 47 labs with strictly controlled temperature and humidity
- Good vibration control
- Energy conservation (operated 24 h)
- Easy maintenance with less interruption
- Good working environment

The TCTP on Strengthening of Measurement Standards  
Institutes of CLMV Countries towards ASEAN Integration





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Taking NIMT as an example of developing NMI

# DEVELOPING NMIS & REDEFINITION OF SI BASE UNITS

# Metrological Traceability: NIMT

- Mass metrology:
  - National Kilogram Prototype No. P80 (kg)
  - Mass standards classes E0 and E1
  - Vacuum mass comparator
- Thermometry:
  - Triple point of water (K)
  - Primary and secondary fixed point
  - Standard Platinum Resistance Thermometers

# Metrological Traceability: NIMT

- Electrical metrology:
  - Josephson voltage standard (V)
  - Quantum Hall resistance standard ( $\Omega$ )
  - Zener diodes & DMMs
  - Thomas One Ohm resistors & Bridges
- Chemical metrology:
  - Traceable to mol & kg

# Questions

- Will these **red** measurement standards be calibrated against new primary realisation of SI base units?
  - When will be first opportunities?
  - How expensive will they be?
  - How long will they take?
  - How good will their measurement uncertainty be?

# Questions

- Will developing NMIs ever be able to achieve primary realisation of the SI base units at home? (*Option only for rich and developed NMIs??*)
  - *NIMT has no solid plan to do this at the moment*
  - Will this affect research in metrology and HR development in developing economies?

# Questions

- How will Key Comparisons be affected by the new primary realisation of the SI base units?
  - Will future list of key comparisons be dominated by comparisons between these primary realisations?

# General comments & concerns

- New definitions will increase reproducibility and stability to the SI units
  - SI base units will be realised with higher accuracy
  - Lead to new technologies, applications and products
- National metrology system will be disturbed
  - National measurement standards need new metrological traceability to SI base units
- Measures to support developing NMIs
  - Ensure accessibility to metrological traceability to SI base units
  - Availabilities with acceptable cost for developing NMIs

*Thank you for your kind attention*

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