NIMT

# Step by Step: NIMT's Experience

PRAYOON SHIOWATTANA
NATIONAL INSTITUTE OF METROLOGY (THAILAND)

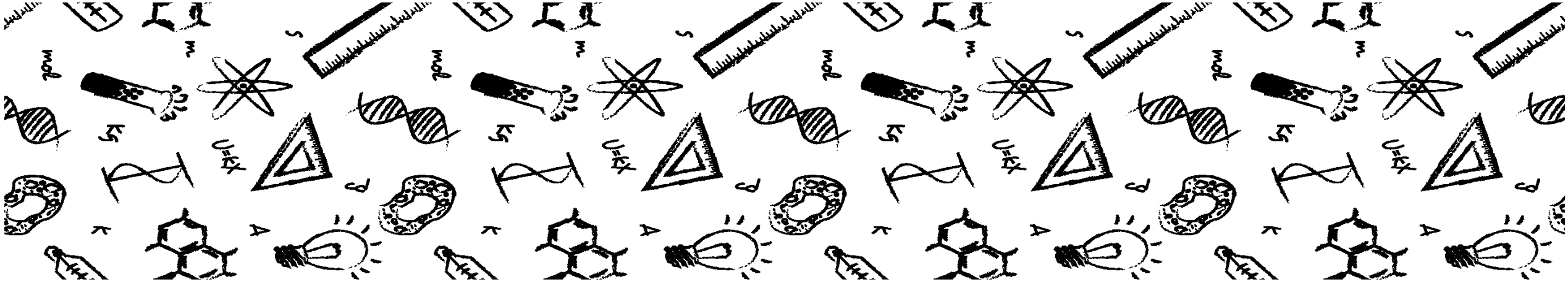
"I AM NIMT"

สถาบันมาตรวิทยาแห่งชาติ
National Institute of Metrology (Thailand)

# Table of Content

- Foundation
- Present status
- Some lessons learned
- Mode of Operation for Future challenges
- National Metrology Development Master Plan III (2017 – 2021)

"I AM NIMT"



# Foundation

"I AM NIMT"

# Metrology system in Thailand

## Scientific Metrology

**National Metrology System Development Act B.E. 2540 (1997)**

National Institute of Metrology (Thailand)

Ministry of Science and Technology

## Legal Metrology

**Weights and Measures Act B.E. 2466 (1823)**

Central Bureau of Weights and Measures

Ministry of Commerce

"I AM NIMT"

# NIMT: Legal basis

**National Metrology System Development Act B.E. 2540 (1997)**

**Autonomous institution** under Ministry of Science and Technology

Designated **national highest authority** in scientific metrology

"I AM NIMT"

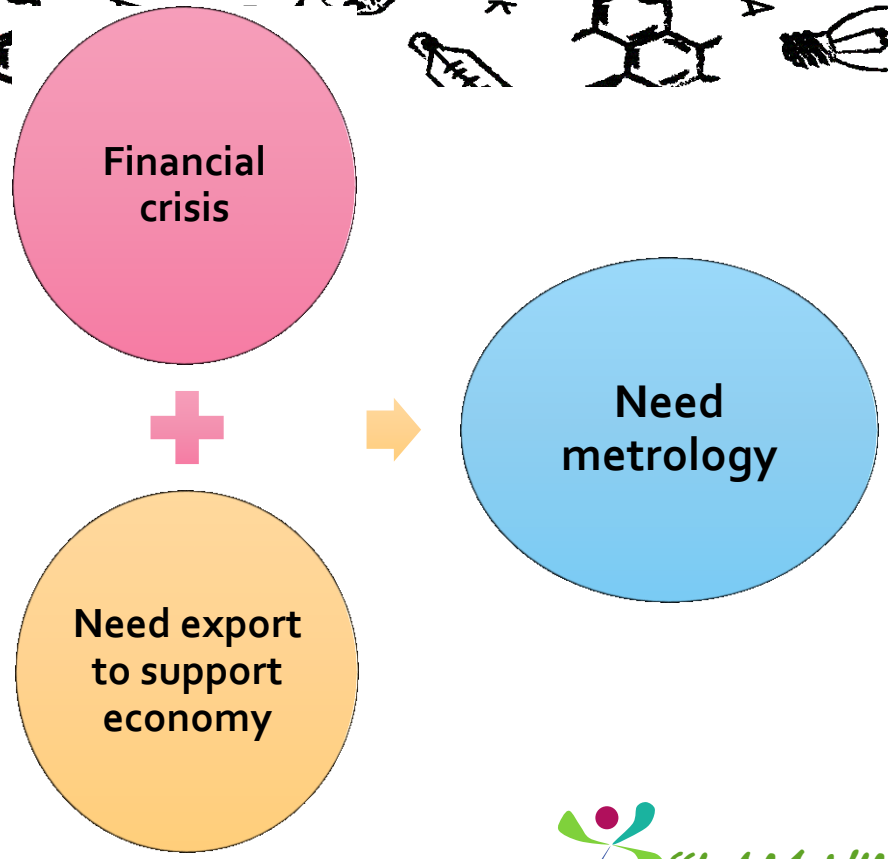
# Immediate Challenge

**1 July 1997**

Floating of THB started the Asia Economic Crisis

**1 June 1998**

NIMT was found




"I AM NIMT"

# Yen loan from Japanese Government

- JBIC Loan
  - 1st Loan: 29 September 1999
    722 Million JPY (~ 7 Million USD)
    for National Metrology System Development #1
  - 2nd Loan: 22 September 2000
    2,202 Million JPY (~ 22 Million USD)
    for National Metrology System Development #2
- Japan Technical Cooperation for the Project on Technical Strengthening of National Institute of Metrology (Thailand) 2 Phases
  - October 2002 – October 2004
  - October 2004 – October 2008

"I AM NIMT"

# Details of technical support through JCA

Choosing quantity and range of measurement

3 months hand-on training with NMIJ researchers: 36 staff of NIMT involved in these trainings

Procure measurement system & equipment recommended by NMIJ researchers

Preparing calibration procedure

Calibration procedure and lab setting were checked by NMIJ researchers

"I AM NIMT"

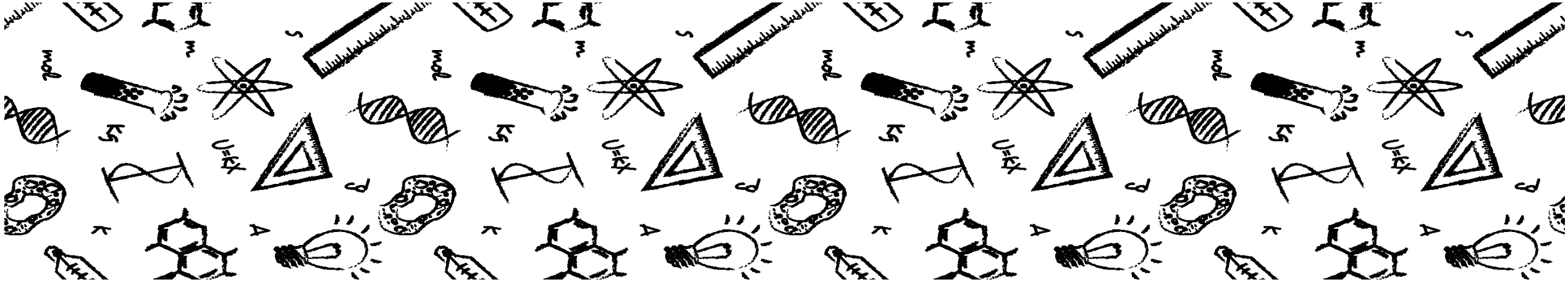
# Supports from friends

- **PTB:** Promotion of Thai Calibration Service Project

- **JICA & NMIJ/AIST:** Japanese Technical Cooperation for the Project on Technical Strengthening of National Institute of Metrology (Thailand)

- **NMIA** & **NIM, China** among the first helping hands

"I AM NIMT"



# Present status

"I AM NIMT"

# Labs & Offices

- 2 campuses:
  - one in Pathum thani
  - the other in Bangkok
- Organisation:
  - 7 Metrology Departments
  - 2 Administrative Departments
  - 1 MIS Center
- 47 labs with strictly controlled temperature and humidity
- Good vibration control
- Energy conservation (operated 24 h)
- Easy maintenance with less interruption
- Good working environment

"I AM NIMT"

# Staff & Budget

- Staff ~ 196
  - Metrologist: 127
    (Bachelor: 27, Master: 56, PhD: 41, Others: 3)
  - Supporting staff: 69
    (Bachelor: 40, Master: 20, PhD: 3, Others: 6)
- Budget

  ~ 220 Million THB from government

  ~ 40 Million THB from services

  ~ 2000 Million THB for upgrading national measurement standards and facilities, 2013 - 2017

"I AM NIMT"

# Measurement Capabilities & Services

## 2000

- 70 measurement capabilities
- 1100 services

## 2003

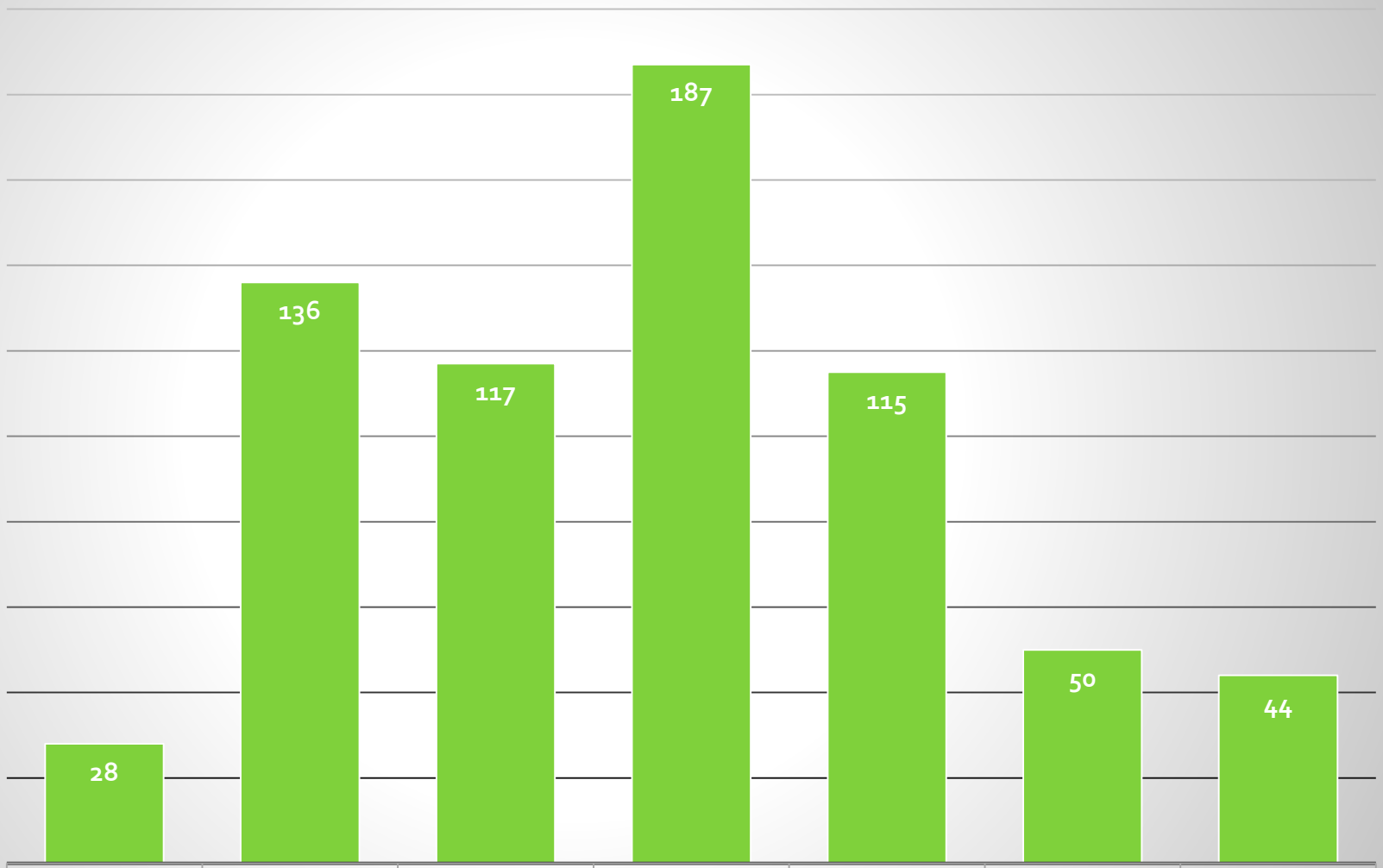
- 100 measurement capabilities
- 1400 services

## 2016

- 677 measurement capabilities
- 4000 services

"I AM NIMT"

# NIMT's Calibration Capabilities




| | AUV | Chemical | Electrical | Dimensional | Mechanical | Photometry | Thermometry |
|---|---|---|---|---|---|---|---|
| No. of capability | 28 | 136 | 117 | 187 | 115 | 50 | 44 |

"I AM NIMT"

# CIPM-MRA and CMCs

## October 1999

- Became signatory to CIPM-MRA

## July 2003

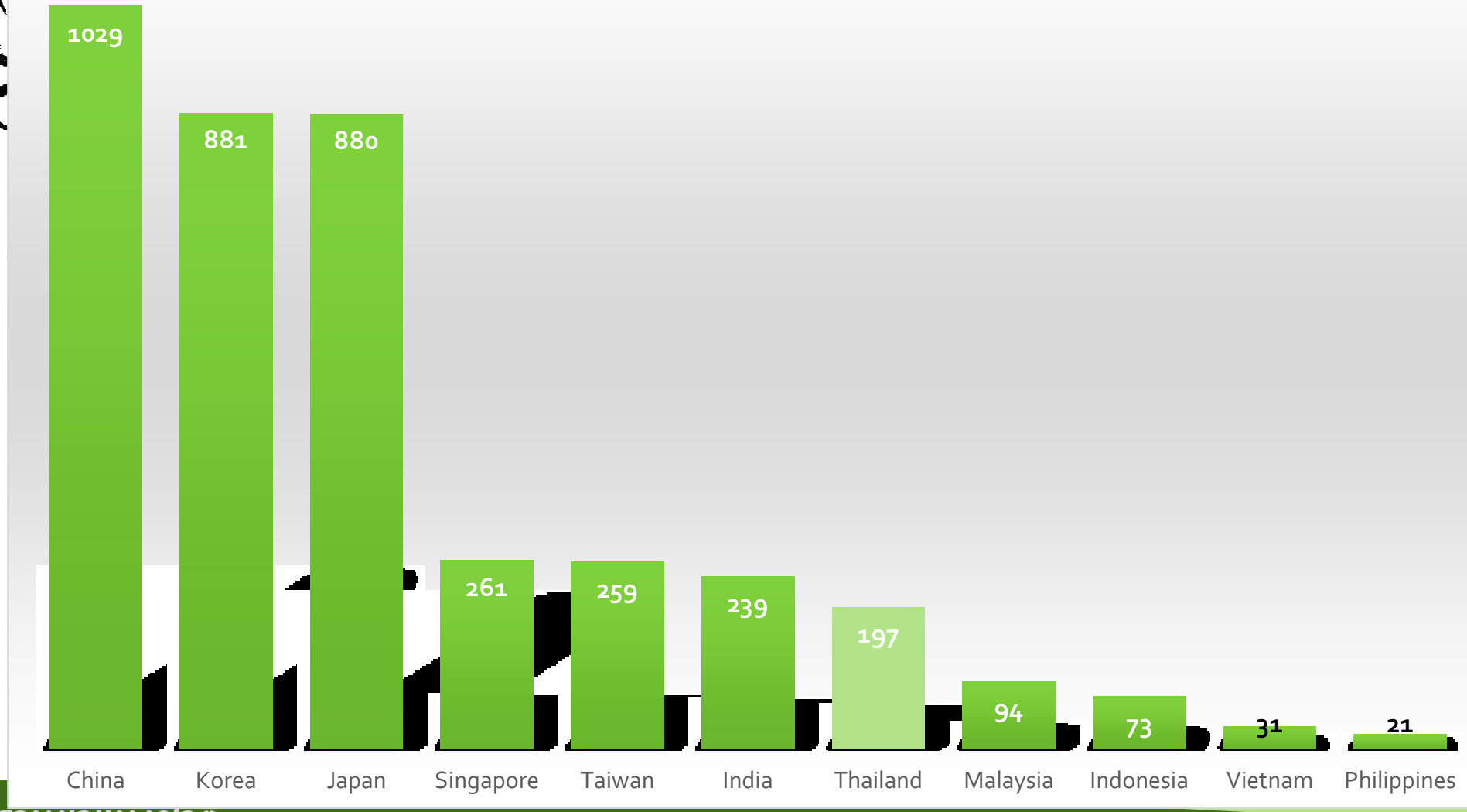
- First measurement capabilities entered Appendix C (CMCs in electrical metrology)

## February 2016

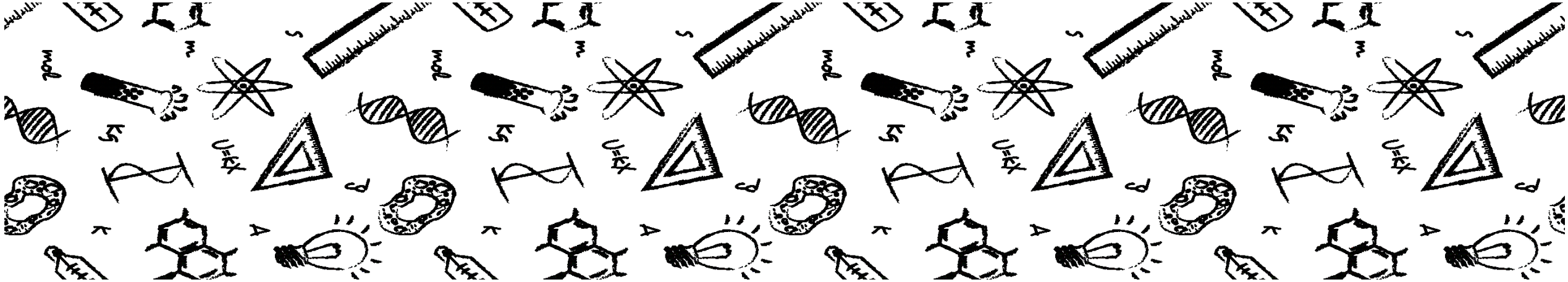
- 197 measurement capabilities registered in the Appendix C
  - 143 Physical
  - 54 Chemical

"I AM NIMT"

# Calibration and Measurement Capability (CMC) of APMP NMIs




"I AM NIMT"



# Some lessons learned from Thailand

"I AM NIMT"

# Influential factors

- Good understanding and strong support from decision makers

  “ The ASEAN governments would be encouraged to support the plan and roadmap to develop scientific metrology to strengthen the quality infrastructure in their respective countries ” (Decision of COST-69, Phuket, Thailand)

- Continuity
- Starting from practical level
- Demand pull: find partners and work with them
- Friends: support and guidance
- Delivery: keep one’s promise

“I AM NIMT”

# Development of NIMT's mass measurement capabilities

**2015**

- Vacuum mass comparators, silicon sphere

**2007**

- Mass comparators: Mettler AX64004,  up to 64 kg, resolution 0.1 mg

**2004**

- E2: 1mg - 20 kg - Accredited

**1998**

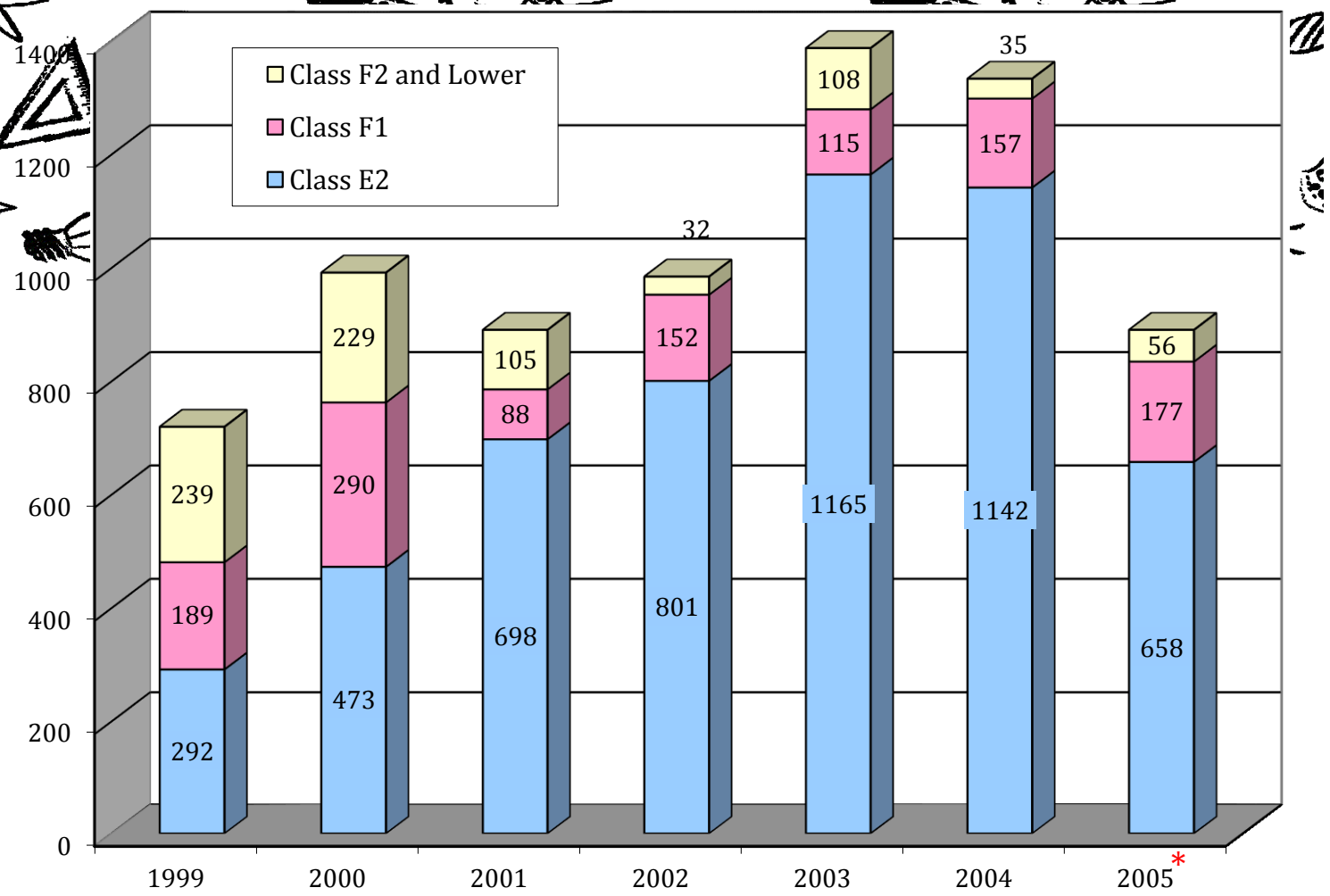
- Weight class E1 & E2

First customers: weight classes F2 & lower, F1, E2

"I AM NIMT"

# Development of NIMT mass calibration services

1999 - 2005




*2005: Moving NIMT labs to Pathum thani campus*

"I AM NIMT"

# Development of NIMT's Electrical measurement capabilities

**2005++**

- Josephson Voltage Standard & Quantum Hall Resistance Standard

**2001**

- Zener 732 & Thomas 1-ohm, GL 9975 & etc.

**2000**

- DMM 3458, Calibrator 5700s, 5790 & etc.

**1998**

- Calibrator 5500s

**First customers: meter 3 ½ & 4 ½ digits**

"I AM NIMT"

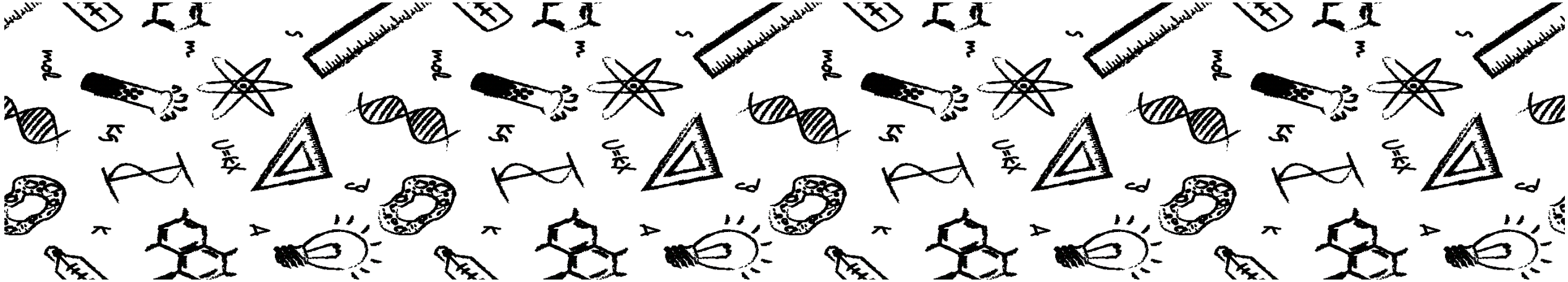
# NIMT in 2015

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

# NIMT in 2015

| | |
|---|---|
| • **Staff: 195** | • **Metrologist: 130**<br>**(Bachelor: 31, Master: 57, PhD: 41, Others: 1)**<br>• **Supporting staff: 65**<br>**(Bachelor: 35, Master: 22, PhD: 1, Others: 7)** |
| • Organisation | • Metrology Departments: 7<br>• Laboratories: 47<br>• Administrative departments: 3<br>• MIS Center: 1 |
| • Budget | • ~220 Million THB from government<br>• ~30 Million THB from services |

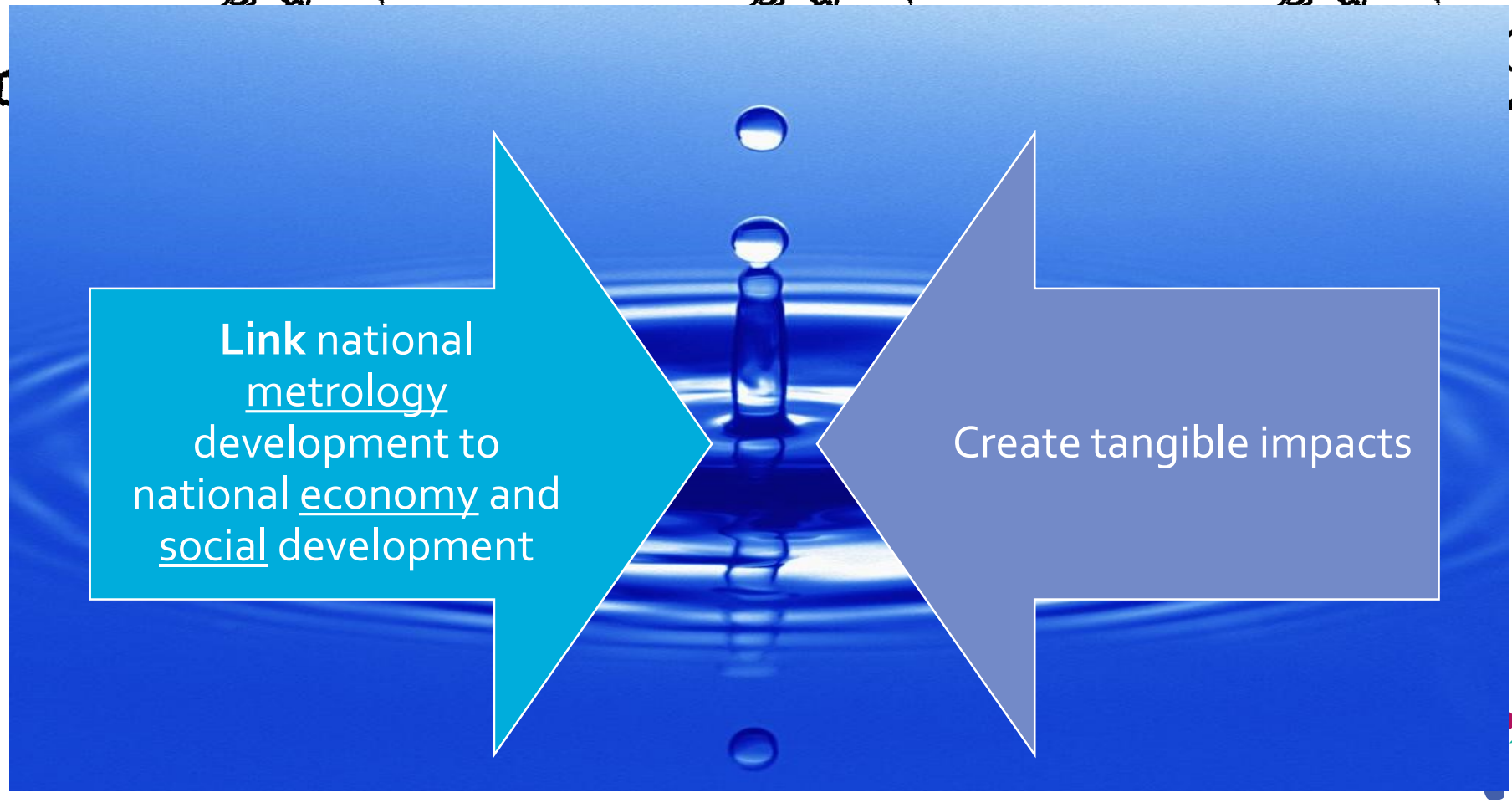
*"I AM NIMT"*



# Mode of Operation for Future challenges

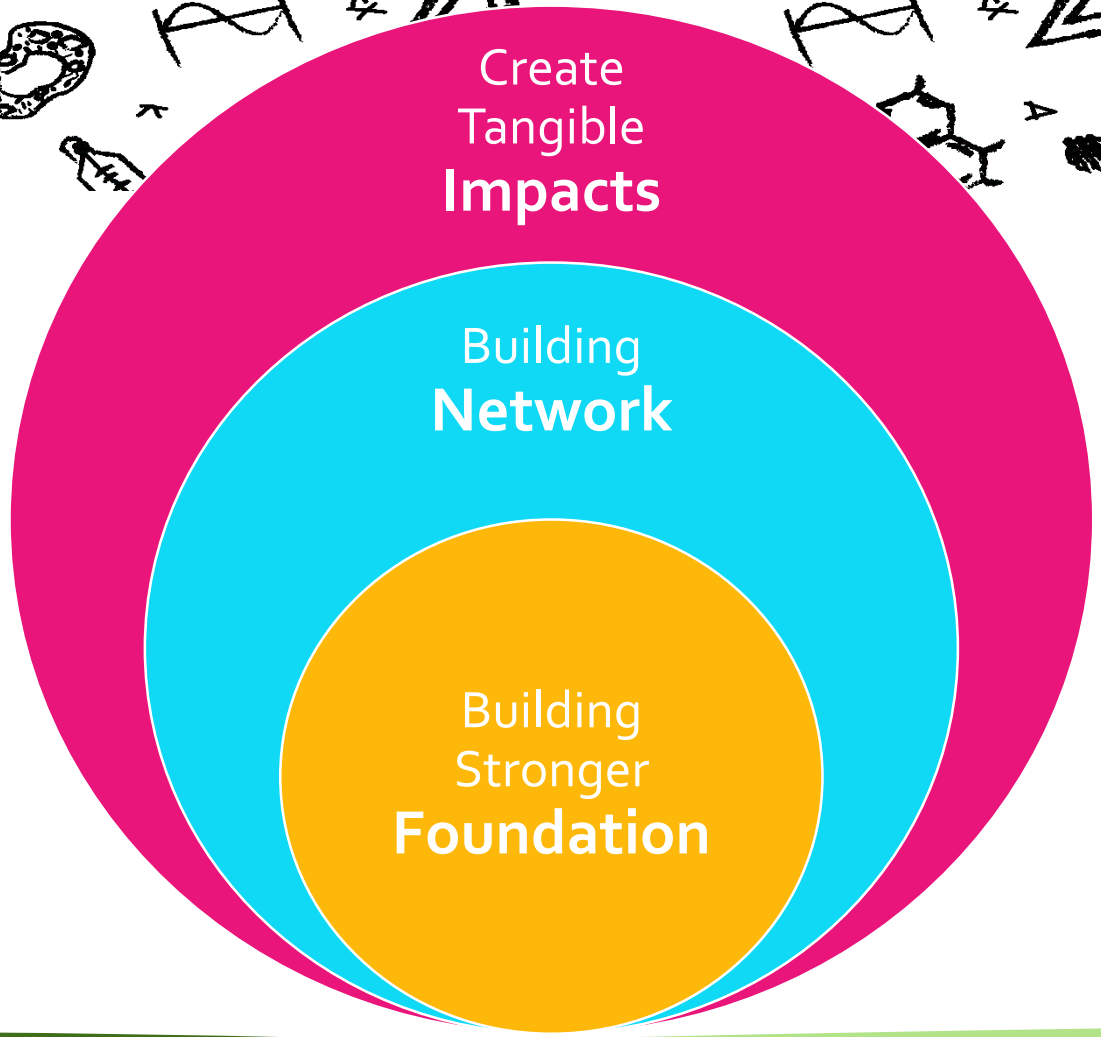
"I AM NIMT"

# New Challenges




"I AM NIMT"

# Approach & Mode of Operation




"I AM NIMT"

# Building Foundation

## Chemical Metrology & Biometry

- New lab building
- New equipment

## Physical Metrology

- Upgrade measurement standards
- New quantities, ranges & techniques

## International recognition

- Participate in Key Comparisons
- Research & publish peer reviewed articles

"I AM NIMT"

# Building Network

## Domestic Network

- Metrology Club
- Chemical Metrology Laboratory Network

## Regional Network

- ASEAN Experts Group on Metrology
- APMP, APMP-DEC

## International Network

- Bilateral collaboration e.g. NMIJ, NICT, PTB, NIM, KRISS
- Participation in international forum: BIPM, IMEKO

"I AM NIMT"

# Create tangible impacts

## New transfer measurement standard

| SME and Industry | Quality of Life | Consumer Protection & Fair Trade |
|---|---|---|

"I AM NIMT"

# Strengthen NQI

- Collaboration with Abs
  - MOU on Promotion and Development of Thailand RMs
  - Partners: TISI, DSS, DMSc & NIMT



"I AM NIMT"

# Improve productivity through skill improvement: Geometric Dimensioning and Tolerancing (GD&T)


"I AM NIMT"

# Fair trade: sweetness RM

## Cane and sugar Industry of Thailand

1. One of the biggest sugar exporter, about 7 million tons, worth approx 30,000 million baht
2. Internal consumption 3 metric tons, worth approx. 20,000 million baht
3. Involved more than 1,000,000 farmers

Office of The Cane and Sugar Board (OCSB)

"Promotion of metrology system for the quality of cane and sugar"

- Reference Material for Brix measurement
- Calibration of refractometer
- Proficiency Testing scheme for brix determination of the sugar industry
- Awareness seminars

Calibrated weighing machine: Fairness of weighing


Calibrated refractometer: Fairness of trading by CCS measurement

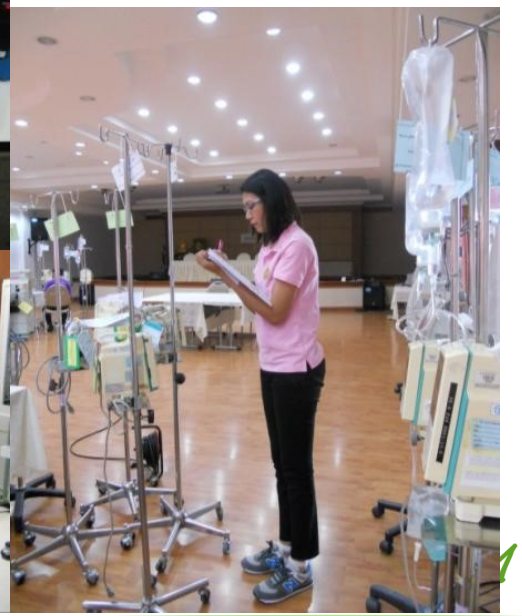
"I AM NIMT"

# Quality of medical services:

## Guide for measuring device verification





*NIMT"*

# Quality of environment

## Pollution monitoring & control

Collaboration with Pollution Control Department

"I AM NIMT"

# National Metrology System Development Master Plan III (2017 – 2021)

APPROVED IN PRINCIPLE BY THE NATIONAL METROLOGY COMMITTEE

"I AM NIMT"

# Structure of Strategic Intentions

- **SI-1: Demand-pulled Measurement Capabilities & Innovations**
- **SI-2: Coherently and effectively Functioning NQI**
- **SI-3: Productive & Innovative Economy**
- **SI-4: Sustainable Society with Quality Culture**
- **SI-5: Capable and Respectable NMI**

"I AM NIMT"

# Structure of Strategic Intentions

**COMPETITIVE THAILAND**

**STRATEGIC INTENTION 3**
**Productive & Innovative Economy**

**STRATEGIC INTENTION 2**
**Coherently Functioning NQI**

**STRATEGIC INTENTION 4**
**Sustainable Society with Quality Culture**

**STRATEGIC INTENTION 1**
**Demand-pulled Measurement Capabilities & Innovations**

**STRATEGIC INTENTION 5**
**Capable and Respectable NMI**

*I AM NIMT"*

# Expectations following the completion of Master Plan #3

## Social

- ✓Public health
- ✓Road safety
- ✓Consumer protection
- ✓Sustainable society with Quality Culture

## Environment

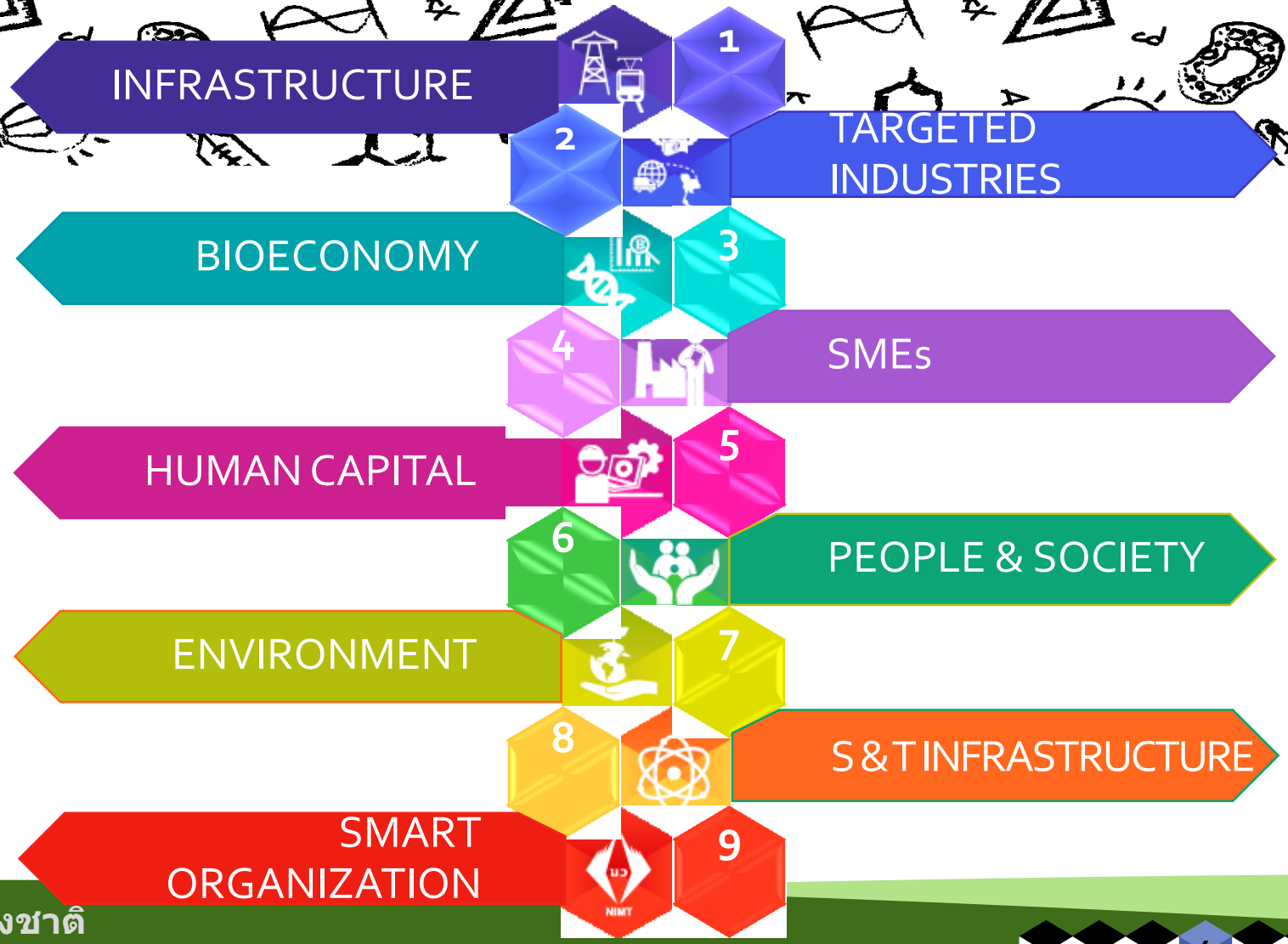
- ✓Waste reduction
- ✓Pollution control
- ✓Increase Green energy
- ✓Natural Disaster management
- ✓Carbon footprints reduction

## Economy

- ✓Efficient manufacturing process
- ✓Efficient energy consumption for manufacturers
- ✓Increase productivity for industry
- ✓Cost-saving from importing fc know-how

VIMT"

# Work Plans to deploy the strategies

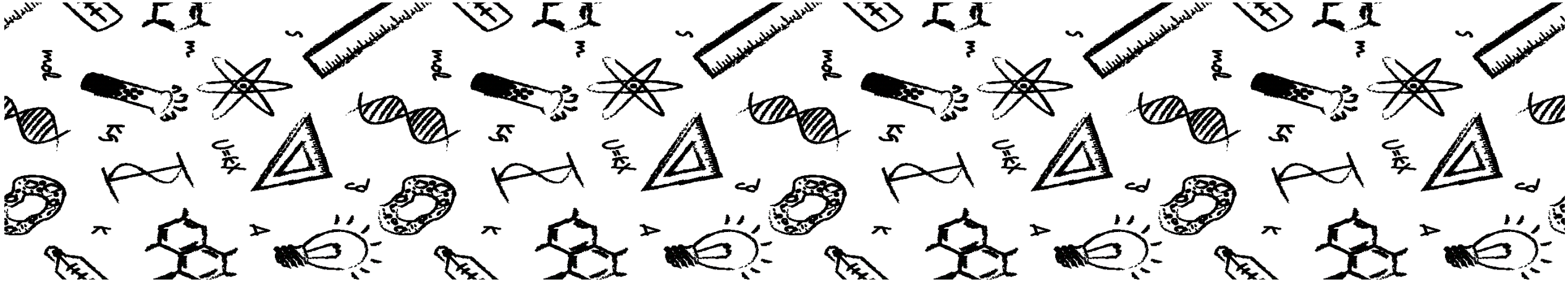



"I AM NIMT"

# New Chemistry Lab


**Strengthening metrology infrastructure**

- Construction 727 Million THB ( ~ 24 Million USD)
- Equipment 484 Million THB ( ~ 16 Million USD)
- Area 12,000 $m^2$
- 7 floors, 5 groups of laboratories



**International Relations**
National Institute of Metrology (Thailand)
3/4-5 Moo 3, Klong 5, Klong-luang,
Pathum Thani 12120, Thailand

P: +66 (0)2 577 5100 Ext. 1252 F: +66 (0)2 577 3658
Email: sivinee@nimt.or.th, iro@nimt.or.th

# Thank you for your kind attention!

"I AM NIMT"