National Metrology Development : Thailand

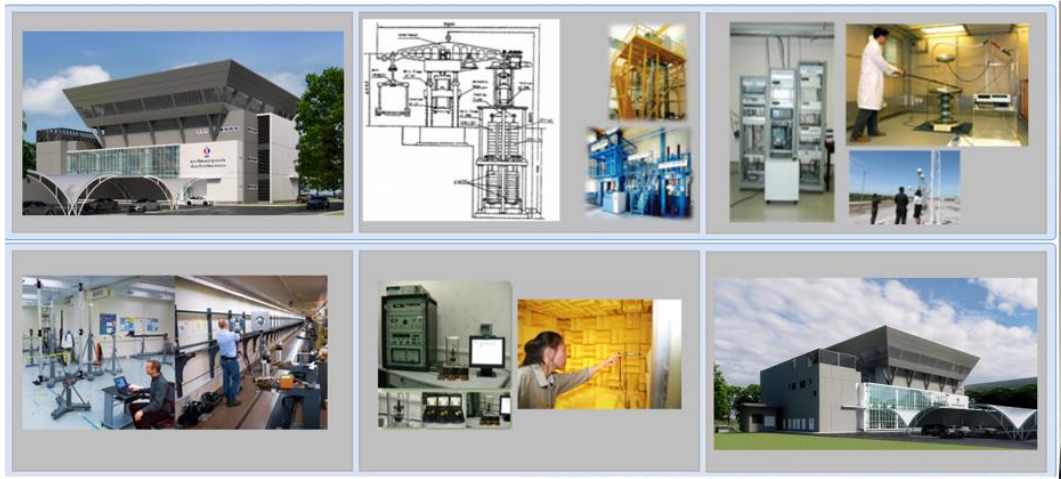
Ajchara Charoensook

National Metrology Development : Thailand

"National measurement system raise national competitiveness and enable sustainability development"

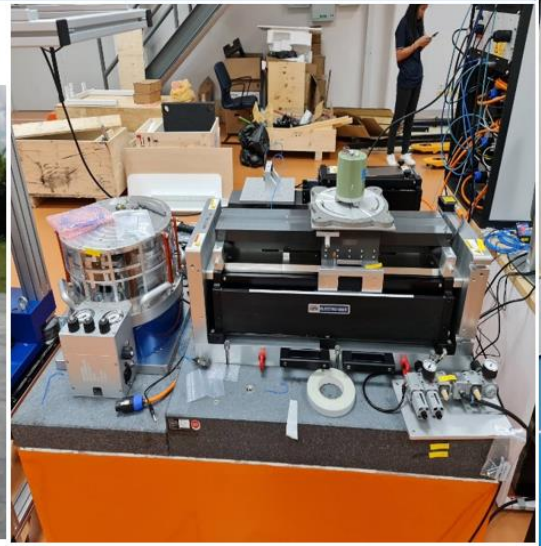
- National measurement standards support government's infrastructure development project
- Metrology for productivity improvement/raising competitiveness of industries
- Metrology for people's quality of life (good health ,well - being, safety and security)
- Metrology for Energy Efficiency
- Metrology for Digital and Green transformation

National measurement standards support Government's project on High speed train



Large scale Standard

Electromagnetic Compatibility (EMC)



Vibration Measurement Standard

10 MN Force Standard

Ultrasonic Measurement Standard

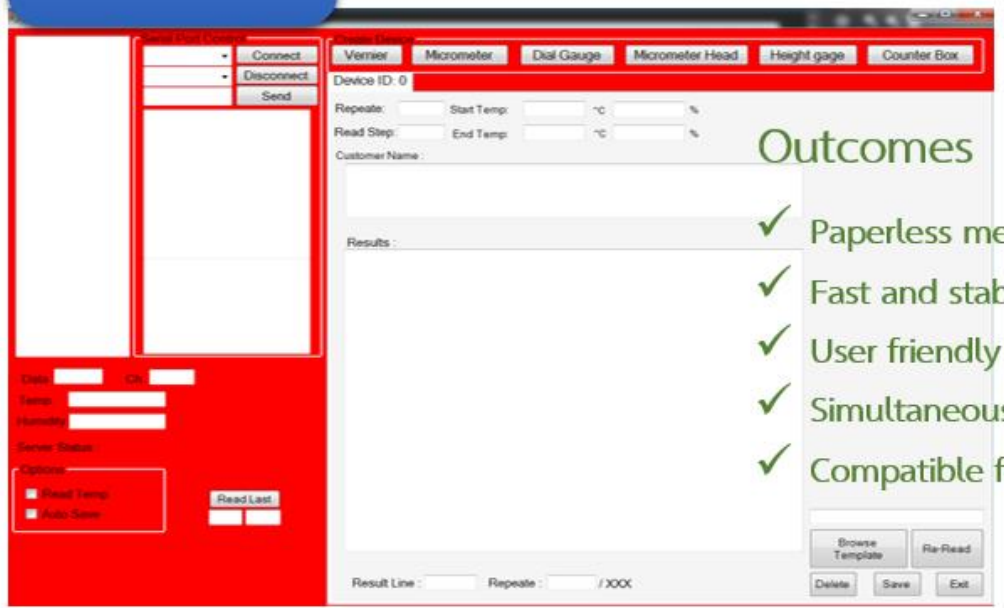
Sound Measurement Standard

Raising competitiveness of Industries (SMEs)

PRODUCTIVITY IMPROVEMENT

Quality Control Problems

- Human error - Handwriting
- Take time to analyze data
- Error can be detected not in-time
- Cost ineffective (one brand, one software)
- Complex geometry – require many equipment for a single part



Outcomes

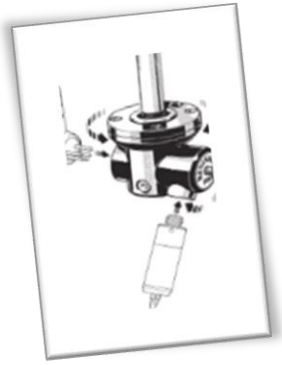
- ✓ Paperless measurement
- ✓ Fast and stable data transfer
- ✓ User friendly interface
- ✓ Simultaneously data analysis
- ✓ Compatible for all manufacturers

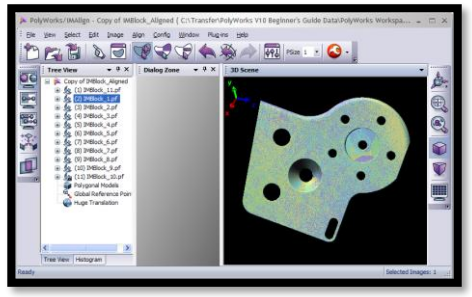
METROLOGY FOR PRODUCTIVITY IMPROVEMENT

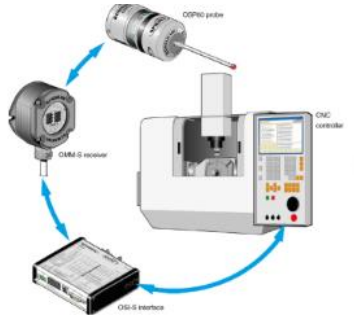
Increasing productivity by
- **30% saving production time**
- **Cost reduction**
- **More accurate (better than 20 µm.)**

Traditional worker → Smart worker

CNC Machine







Smart CNC Machine

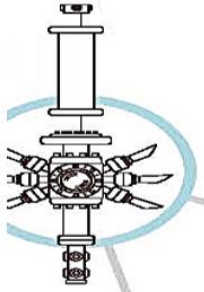
"On Machine Verification (OMV)"

NIMT has developed method to attach the rotary encoder which is directly connected to a personnel computer, this method can help measure and monitor process parts in real time.

Metrology for people's quality of life

METROLOGY FOR SOCIETY

Research and Development for high technology
Quantum metrology
Optical clock



National security
GNSS
FM/RDS

Energy
High voltage insulator
Pyranometer (Solar cell)
Energy efficiency (furnace, cold chamber/…)

Environment
PM 2.5
TRM (for environmental testing i.e., emission testing: CO, CO_2, CH_4,…)

Software
Smart environmental monitoring
Data-Link

Food Safety
TRM (for food testing/halal testing)

Future industry
Industrial robot, electric vehicle, electronics, smart agricultural
TRM for material testing

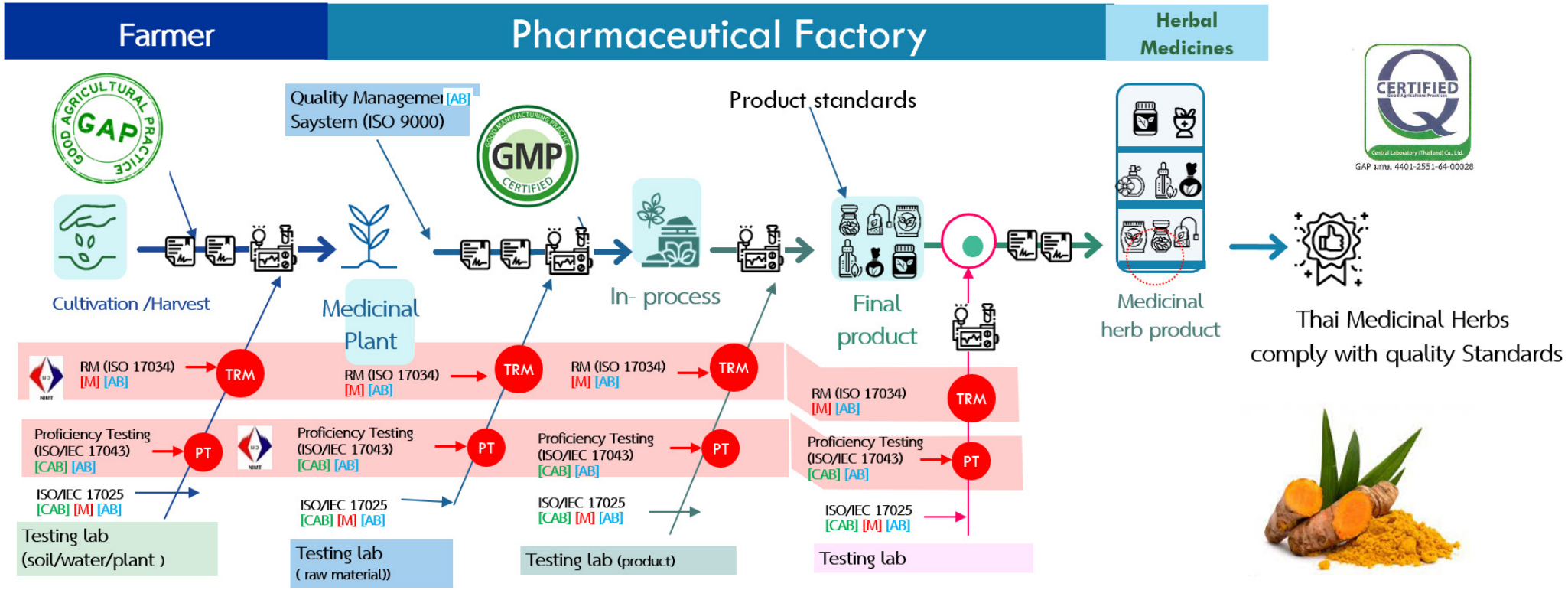
Medical and public health
UV robot, UV bulb
Ventilator tester
#Thermometer
PPE suits
#TRM (for clinical testing i.e., glucose, cholesterol,…)
Guideline for testing of medical devices

Fair treatments
Speed camera, smoke opacity meter, noise testing
#Breath alcohol testing

Consumer protection
TRM (for contaminant testing, organic or inorganic contaminant in food products, food labeling)

Safety and efficacy of herbal medicines

Consumer confidence in green products



Thai Medicinal Herbs comply with quality Standards

NIMT: Provide Reference material for contamination testing
Establish Proficiency Program for testing laboratories
Provide training – Farmers/Pharmaceutical Factories/Testing laboratories

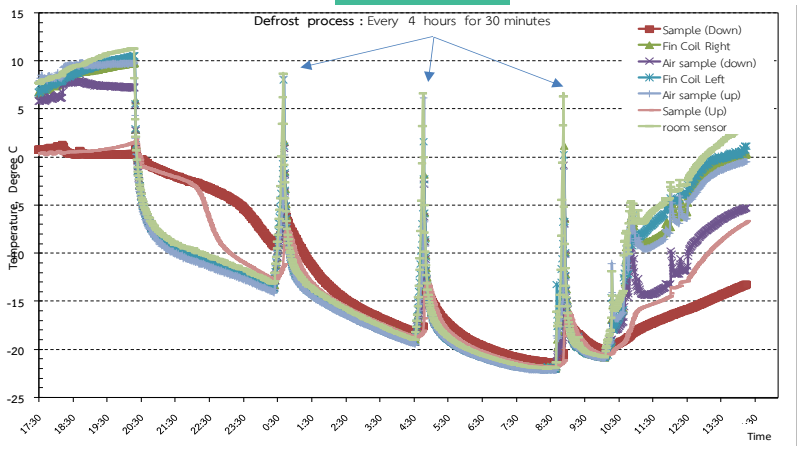
Accurate and reliable measurements for Energy Efficiency

1. Frozen Fruits and vegetables export company

Problem : High investment in freezing process

Room size : 3 m x4.5 m x 2.7 m
Power used for cooling system : 22.4 kW
Power consumption for defrosting : 30.6 Kw
Temperature setting : **-35 °C**

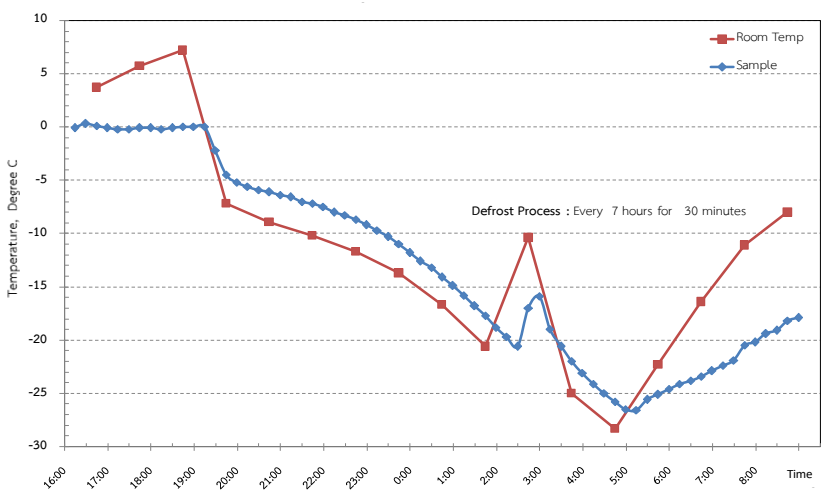
Before



- **Operation time of cooling system : 14 Hrs.**
- **Defrost cycle : 30 mins. / 4 Hrs.**
- **Power consumption : 378 Units**
- **Amount of frozen products : 1350 kg**
- **Cost average : 1.18 THB / 1 kg**

After

Power consumption reduced 27%



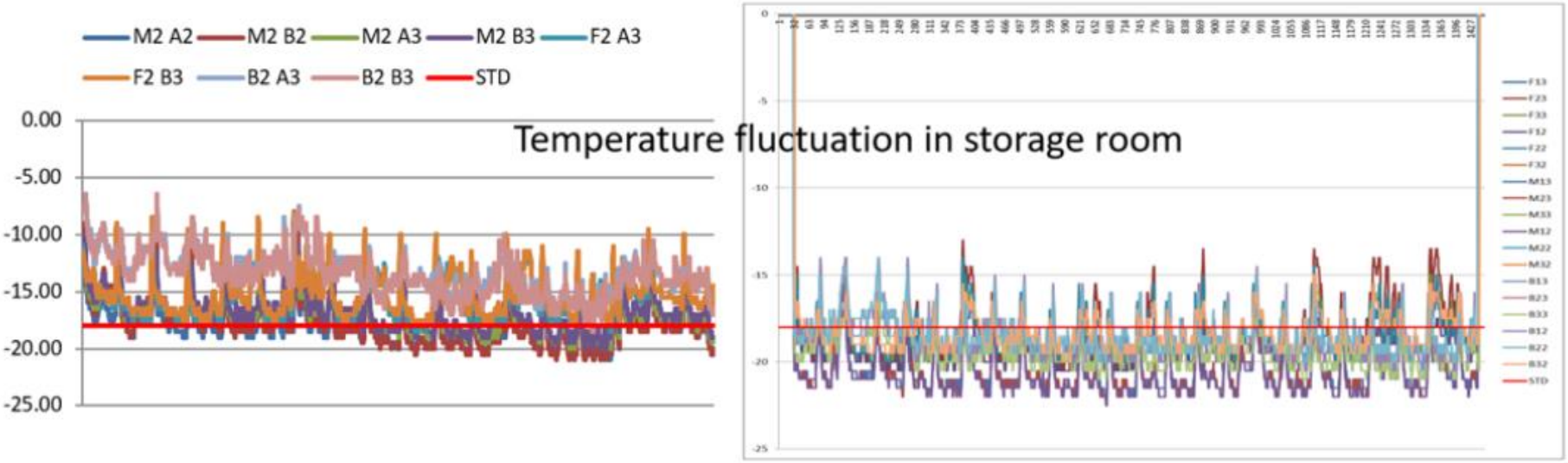
- **Operation time of cooling system : 10 Hrs.**
- **Defrost cycle : 30 mins. / 7 Hrs.**
- **Power consumption : 286 Units**
- **Amount of frozen products : 1100 kg**
- **Cost average : 1.0 THB / 1 kg**

Accurate and reliable measurements for Energy Efficiency

2. Individually Quick Frozen (IQF) of chicken meat

Before

After



Power consumption reduced 10 %

Preparing NIMT for Digital Transformation

Digitalization

Digitalization of Administrative Processes

Digital services platform
E- Documents
E-Budgeting
E- Purchasing
E-HR
E-Signature

Digitalization of Measurement Processes

- IOT for remote control calibration system
- Automation of calibration processes – Electrical, Time and Frequency/Dimension/Temperature/ Mass/Flow
- Monitoring system for Environmental conditions in laboratory

E - certificate for internal calibration

E – certificate with digital signature

Customers

IT Infrastructure

- Upgrading
- Ensuring
  - Capabilities of IT and software
  - Integrity and security of data

Staff

- Awareness raising/ Self motivation
- Preparing staff for the adoption of new technology in their daily routines
- Knowledge transfer on Digital Platforms
- Basic understanding of DCC
- Building Capabilities
  - Learning from experienced NMIs
  - Collaboration with other NMIs
  - Members of DXFG
  - Working with Academia/Industry

Digital Transformation

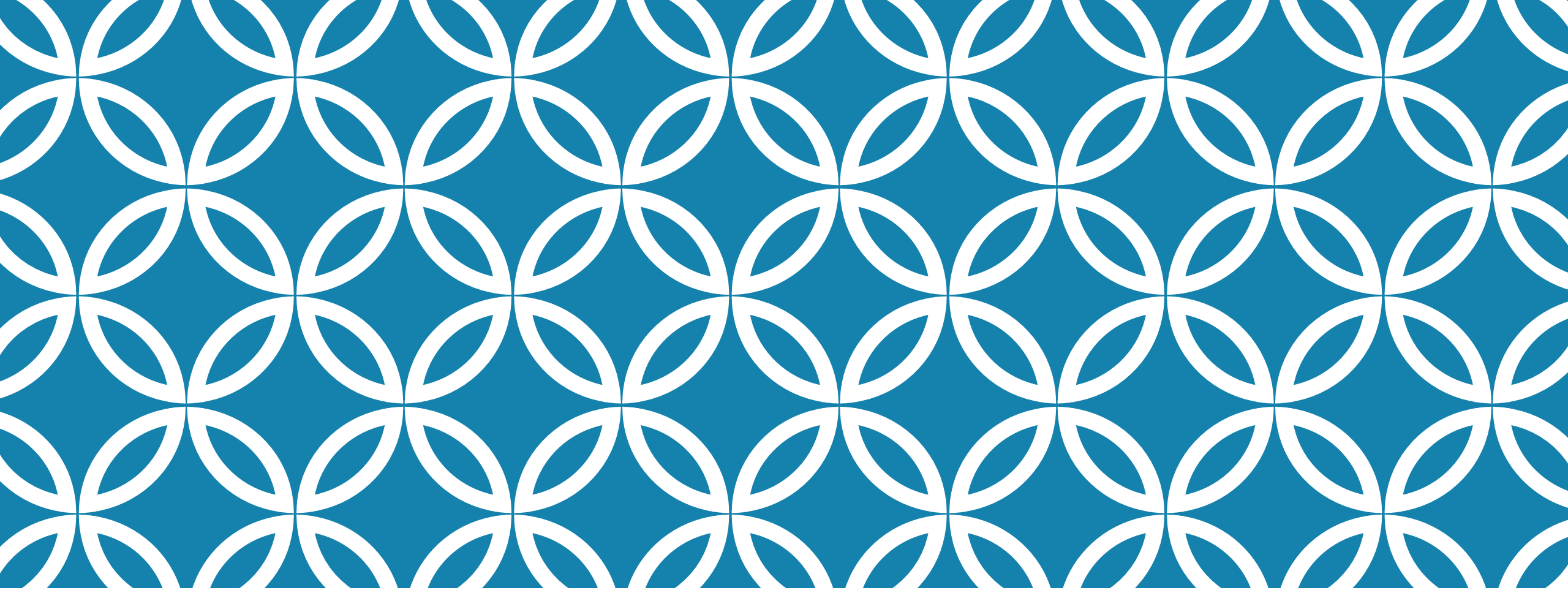
New Metrological Services
- On line calibration
- DCC

End of 2022
- ✓ Review capabilities
- ✓ Identify which field of measurement
- ✓ Roadmap to go
- ✓ Engage with stakeholders in relevant areas

Challenges !!
- ❑ Need special skills related to digital transformation, Machine learning, AI , data analysis, hardware &software development
- ❑ Engagement with Stakeholders(QI Bodies, Cal Labs, Industries) if project is established (Understanding, Recognition and ready for new services /Any further Development Needs?)

2023 - 2027

C. Ajchara



Thank you for your kind attention