# Testing & Certification Process: Conformance and Interoperability

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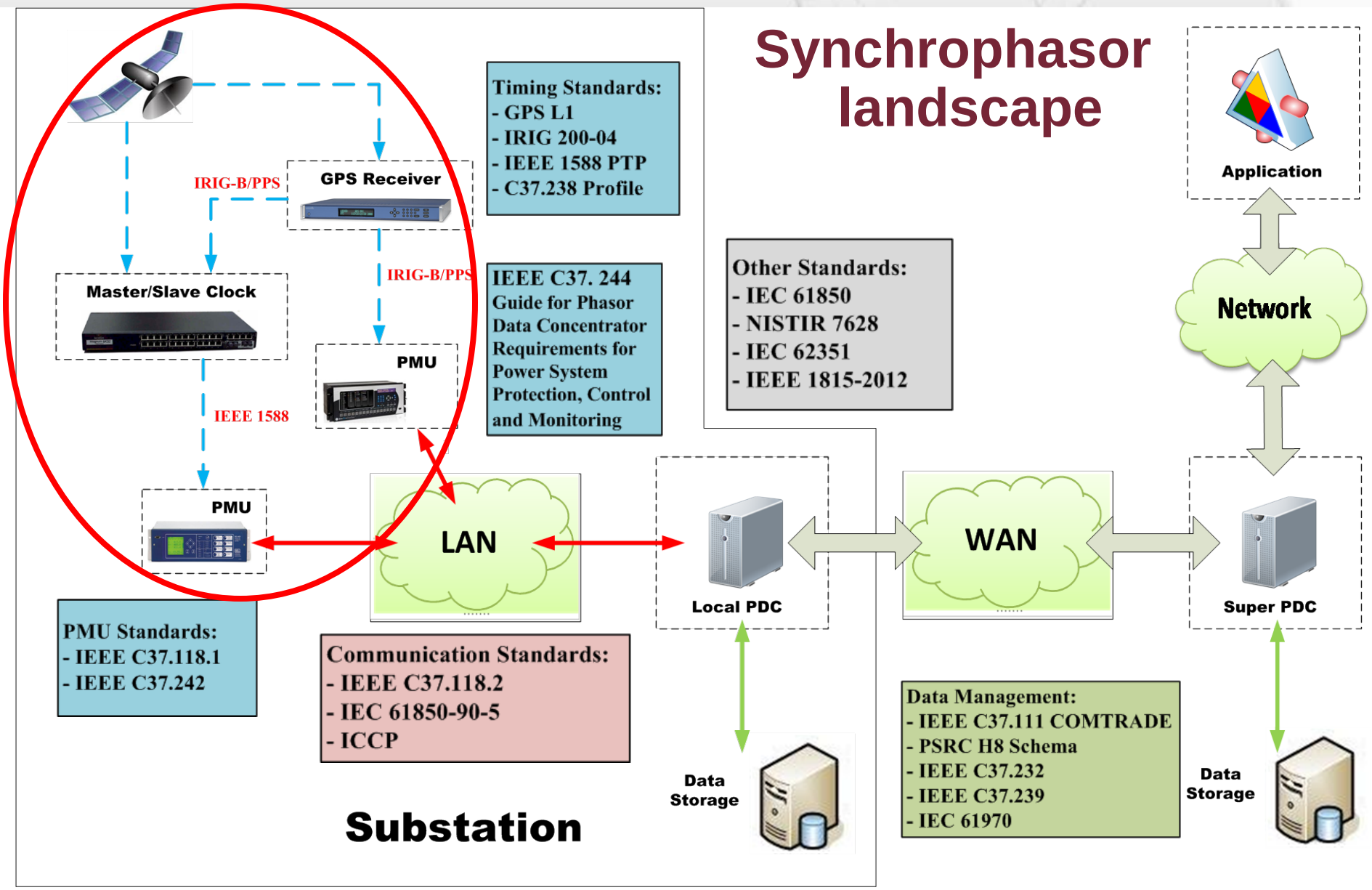
# Background

- TF assignment: Approved by NASPI Leadership Team
- TF Scope: Describe T&C **Process** and give recommendations
- TF duration: Dec, 2012-June 2013
- TF Members:
  - M. Kezunovic, Lead, XpertPower Associates
  - F. Galvan, Entergy
  - A. Goldstein, NIST
  - L. Green, IEEE
  - M. Parashar, Alstom Grid
  - M. Patel, PJM
  - R. Schubert, Enernex
  - D. Sobajic, NY ISO
  - H.  Zhenyu, PNNL

NASPI North American SynchroPhasor Initiative

# Synchrophasor landscape



# Outline

- **What** is T&C Focus?
- **Why** T&C matters?
- **When** to start T&C?
- **Who** should take action?
- **How** to proceed going forward?

# What is T&C Focus

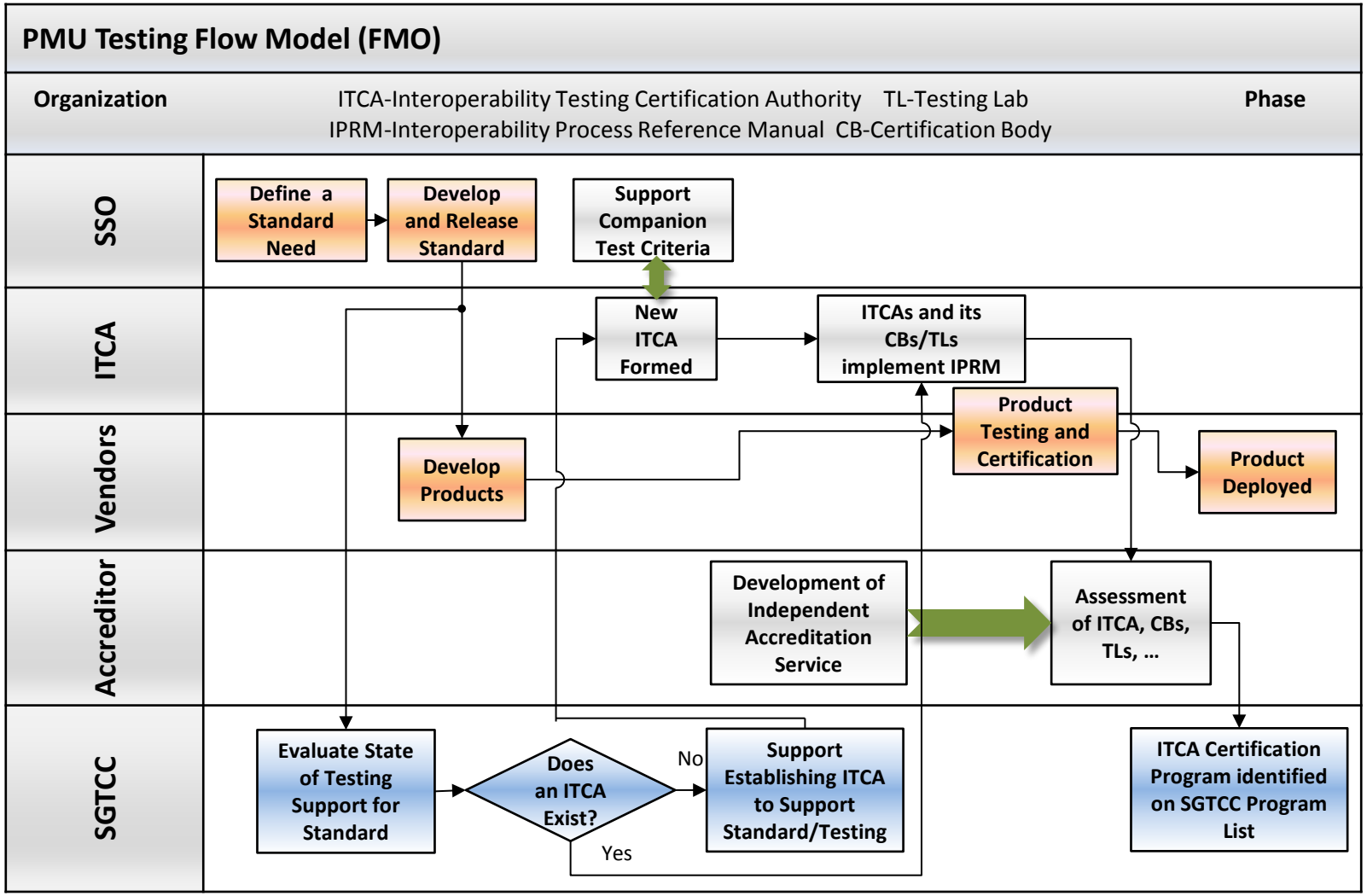
**Testing is a Procedure**

- The object of testing:
  - device, standard
- Test objective:
  - Conformance
  - Interoperability
- Test Lab:
  - Equipment
  - Test plan
- Test results:
  - yes/no
  - % deviation

**Certification is a Process**

- Identify Interoperability Testing & Certification Authority (ITCA), ISO 17065
- Accredit labs (equipment) and test plan, ISO 17025
- Define process and certification body for issuance of certificate
- Propose business model: how the process works and who pays?

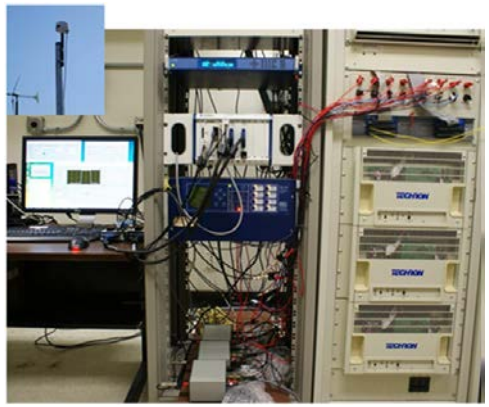
# What is T&C Focus

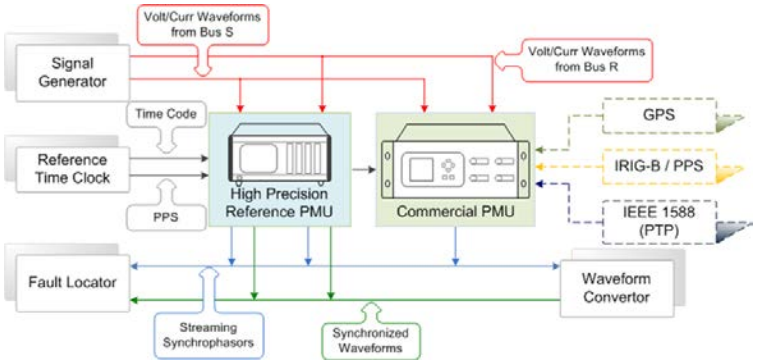



Credit: SGIP TCC IPRM

# Why T&C Matters

## **Procedure**: how to test?






| PMU | Class | Dynamic State Test | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Measurement Bandwidth | | | Frequency Ramp | | | Step Change | | |
| | | TVE | FE | RFE | TVE | FE | RFE | RT | DT | MO |
| A | P | S | F | S | S | F | F | F | F | F |
| | M | S | F | S | F | F | F | S | F | F |
| A-1* | P | S | F | S | S | F | F | F | S | F |
| | M | S | F | S | S | F | F | S | S | F |
| B | P | S | F | S | S | F | F | S | F | S |
| | M | F | F | S | F | F | F | S | F | S |
| C | P | S | F | S | S | F | F | S | S | S |
| | M | S | S | S | F | F | F | S | S | S |
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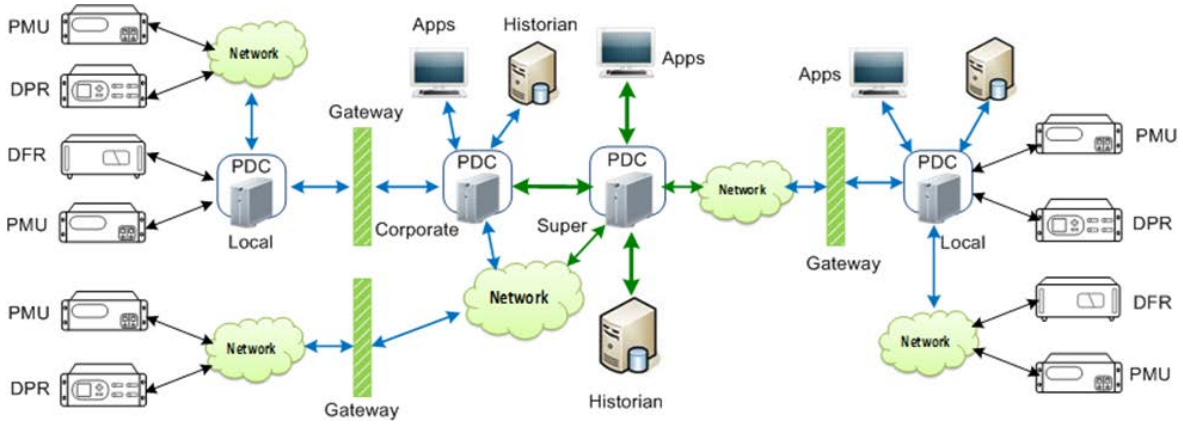
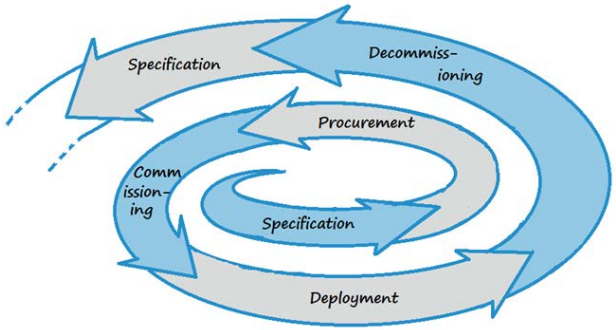
| G | P | S | F | S | S | F | F | F | S | F |
| | M | S | F | S | S | F | F | S | S | F |
| H | P | S | S | S | S | F | F | S | S | S |
| | M | S | S | S | S | F | F | S | S | S |

# Why T&C Matters

**Process**: how to certify?




| | PMU A | PMU A* | PMU B | PMU C | PMU D | PMU E | PMU F | PMU G | PMU H |
|---|---|---|---|---|---|---|---|---|---|
| PDC A | S | S | S | S | S | S | S | S | S |
| PDC B** | F | F | F | S | S | S | N | S | S |
| PDC C*** | S | S | S | F | F | F | F | F | F |

# Why T&C Matters

- It assures solution/product under tests conforms to relevant standards:
  - Synchrophasor measurement standards
  - Timing synchronization standards
  - Communication and data management standards
  - Cybersecurity standards
- It assesses whether the solution/product is interoperable
  - PMUs and PMU-enabled IEDs with time-synchronization devices
  - PMUs with PDCs, and PDCs with PDCs
  - PDCs with data analytics and visualization analytics
- It provides confidence that an application is not adversely impacted by the solution/product used to supply data
  - State estimation by measurements of states and contacts
  - Voltage instability detection by measurement of voltage
  - Frequency tracking by measurement of frequency

# When to start the process?

- When large-scale system deployments are underway and solutions/products from multiple vendors are being integrated
- When industry offers competitive and diverse set of solutions/products
- When standardizations efforts have strong professional support (IEEE ICAP, NIST, SGIP-TCC, Test labs)
- When huge organizational expectations (internal and external), as well as regulatory focus are mounting

# Who should take action?

Some action is already taken

- IEEE: developed synchrophasor standards and engaged in further revisions and gap analysis
- IEC: started an international effort utilizing experiences and “products” from IEEE and others
- IEEE Conformance and Assessment Program (ICAP) is defining a T&C process based on input from SCASC assessing it’s role as the “Certification Authority”
- ICAP Synchrophasor Assessment Steering Committee (SCASC): initiated stakeholder forum for defining the testing procedure
- NIST: engaged in comparison of laboratory test results and test plans/processes

Some action is yet to be taken:

- Interoperability Testing and Certification Authority: not yet identified, however, ICAP is investigating this
- Certification body and certification process: not yet established
- Test labs: not yet certified

# How to proceed going forward?

- Establish facts: existing testing practice does NOT meet T&C requirements and T&C process does NOT exists as defined by ISO 17065 and 17025
- Recognize that standards and products are CHANGING and hence T&C procedures and processes are needed to consistently verify outcomes
- Assess the role of NIST, IEEE, Test labs, SGIP TCC and broader stakeholder community in establishing T&C process and procedures

# How to proceed going forward?

- Reduce the scope (focus on PMU and associated timing solutions ONLY)
- Focus on defining ITCA and certification body for conformity assessment while helping test labs to perform self assessment
- Engage SGIP TCC to draw expertize and achieve industry-wide visibility
- Support ICAP in defining its role and objectives

# Recommended Reading

- **ISO 17065**-Conformity Assessment-Requirements for bodies certifying products, processes and services
- **ISO 17025**-General requirements for the competence of testing and calibration laboratories
- **SGIP TCC**- Interoperability Process Reference manual, 2012
- **SGIP TCC**- Interoperability Testing and Certification Authorities (ITCA) Development Guide, 2012

# Thank you!

# Questions?

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