

NIST Workshop on Smart Grid Interoperability Testing and Certification

July 9, 2017 Washington, DC



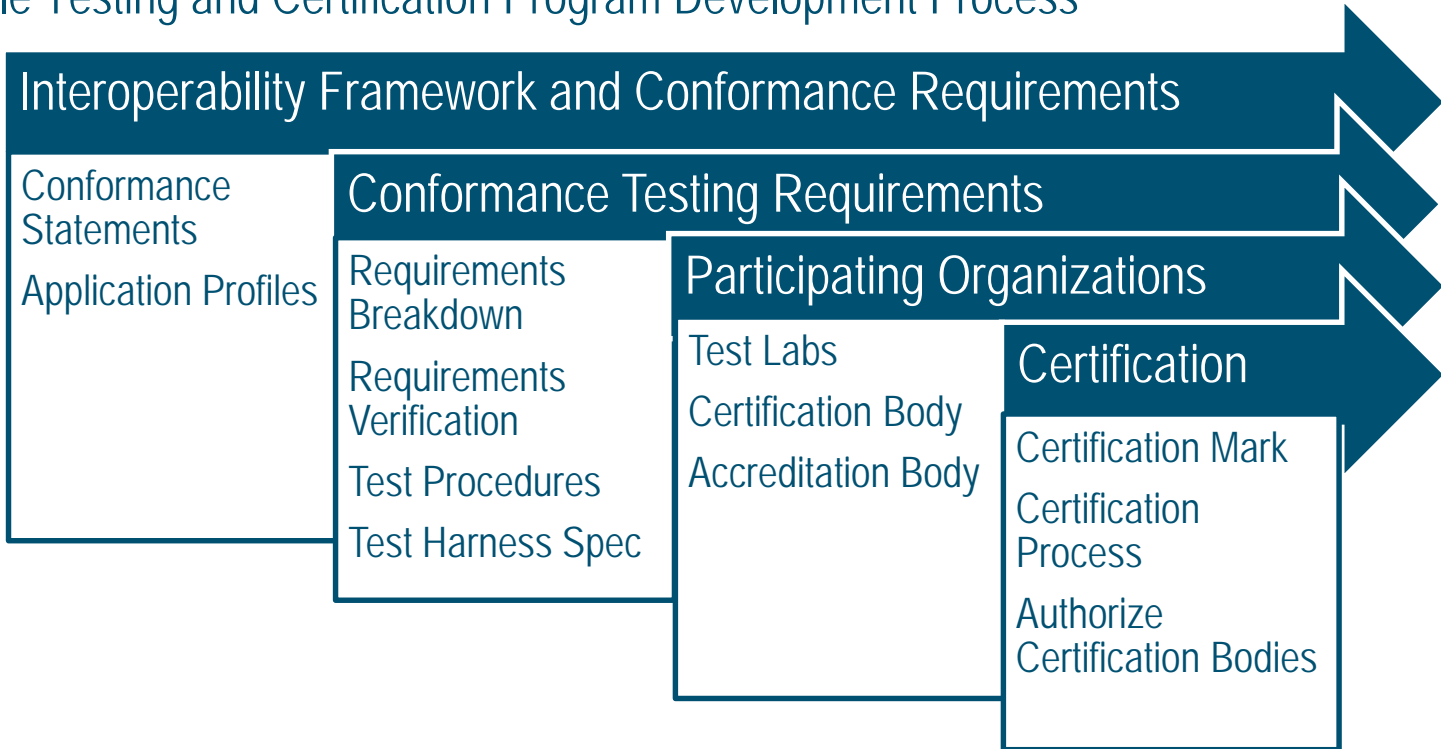
Utility service providers can simply deploy interoperable grid-edge operational systems by procuring and implementing certified commercial solutions from a variety of vendors, supported by an active users group.

Testing & Certification Roles

- **ITCA** – Interoperability Testing and Certification Authority
 - Program management organization providing oversight for testing and certification activities associated with one or more standards or specifications
 - Posts and maintains certifications, markets the certification program, and is a resource for Accreditation Bodies
- **SDO** – Standards Development Organization
 - Develops, maintains, and owns standard specification
- **TL** - Test Lab
 - Performs certification test against requirements
- **CB** - Certification Body:
 - Manages certification process, reviews test lab reports, issues and maintains compliance certificates
- **AB** - Accreditation Body
 - Accredits certification bodies and test labs

Example Testing & Certification Process: OpenFMB

Example Testing and Certification Program Development Process



Open Source implementations may be available as a resource

Benefits of Certification

- Provides a level of certainty in the market for customers, implementers, and product vendors
- Increases value by establishing thresholds
- Gives implementers confidence of interoperability with other implementations

Putting the Pieces Together

- Objective
 - Accelerate the availability of test programs to support Smart Grid standards
- Progress has been slow
 - The Smart Grid Interoperability Panel introduced a Testing and Certification Committee back in 2013
 - While a good amount of work has been done to identify the gaps within the Testing and Certification framework, there still needs to be more effort put towards this effort
 - Getting utilities, vendors, standards bodies, and others to coalesce around this topic has been difficult



■ Interoperability

- **NIST Definition:** The capability of two or more networks, systems, devices, applications, or components to work together, and to exchange and readily use information—securely, effectively, and with little or no inconvenience to the user. The modern grid will be a system of interoperable systems; that is, different systems will be able to exchange meaningful, actionable information in support of the safe, secure, efficient, and reliable operations of electric systems. The systems will share a common meaning of the exchanged information, and this information will elicit agreed-upon types of response.
- Need to understand the difference in compliance and conformance
- End goal is to reduce integration costs and provide a robust architecture foundation supporting future development
- Puts us on the path to interchangeability



Testing and Certification

- Supply Chain

- Critical aspect in all of the testing and certification processes
- Identification of a standard set of requirements are needed for each device type
- These requirements will set minimum performance levels
- These requirements must be written into all of the outgoing RFP's



- Standardization

- Prevents one-off designs and solutions in functionality that has reached commodity status
- Building on standards yields more robust solutions and leads to more complex standardization {building blocks to future designs and solutions}
- Reduces the need for expensive back office integrations of systems {reduce wasted data translation steps}



Testing and Certification

- Safety
 - Conformance to industry standards ensures the proper vetting of equipment has occurred to reduce the potential number of incidents
 - Critical infrastructure components have been tested to avoid potential failures in the field (OSHA NRTL safety programs)
- Reliability
 - Testing and Certification standards should contain enough details into device design to ensure the final products ability to provide reliable service throughout its service life



Testing and Certification

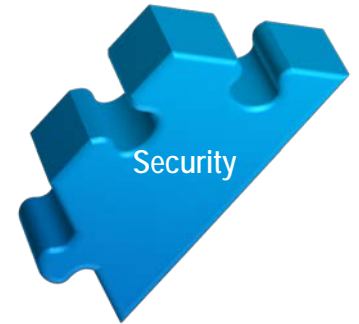
- Communications

- This is the backbone of any Smart Grid program
- Reliable, Fast communications are necessary
- Precision Time Synchronization is done differently if all parties are not implementing IEEE 1588
- Allows for time stamping of data



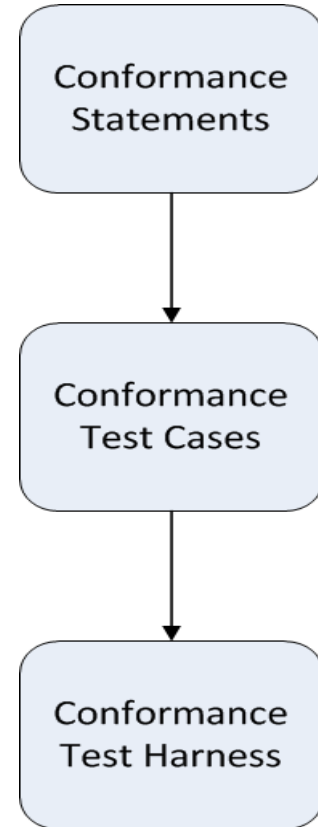
- Security

- Threat vectors are constantly changing {especially with more and more DG and DER coming on-line}
- The lack of cybersecurity standards in the IoT and IIoT space impedes the development of standardized solutions



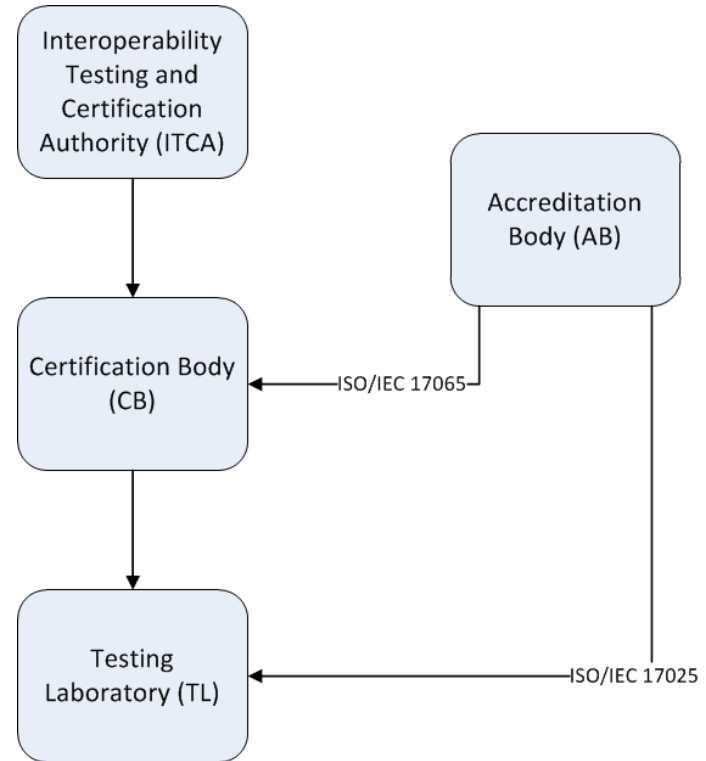
Example ITCA Conformance Process: UCAlug OpenFMB

- The starting point is conformance statements from the OpenFMB NAESB RMQ.26 standard
- Success (proper behavior) and failure (improper behavior) test cases are developed from the conformance statements
- A test harness is created to implement and report the results of the test cases



Example Testing and Certification Structure

- ITCA – Interoperability Testing Certification Authority maintains certification program
- CB - Certification Body reviews testing laboratory reports and issues certificates
- TL - Testing Laboratory performs test cases against product to be tested
- AB - Accreditation Body accredits certification bodies and testing laboratories



Example Organizations: Proposed for OpenFMB

- **Users Group: UCAIug**
 - Governs Open-source code (UML, adapters, etc)
 - Coordinates with NAESB, IEC, and other SDOs
 - Provides training courses, boot camps, & marketing
 - Facilitates user meetings, peer support, & plug-fests
- **SDO: NAESB/IEC/IEEE**
 - Manages task force meetings to develop and extend framework
 - Conformance Statements in standard (e.g. NAESB RMO.26)
- **ITCA: UCAIug**
 - Uses ANSI/NEMA Interoperability Smart Grid Process Reference Manual
 - Coordinates with Test Labs (ISO 17025)
 - Coordinates with Accreditation & Certification bodies (ISO 17065)
 - Vendor provides proof of purchase of standard prior to conformance testing
- **Accredited Test Labs: TBD**
 - Implements test harness for validating conformance statements

