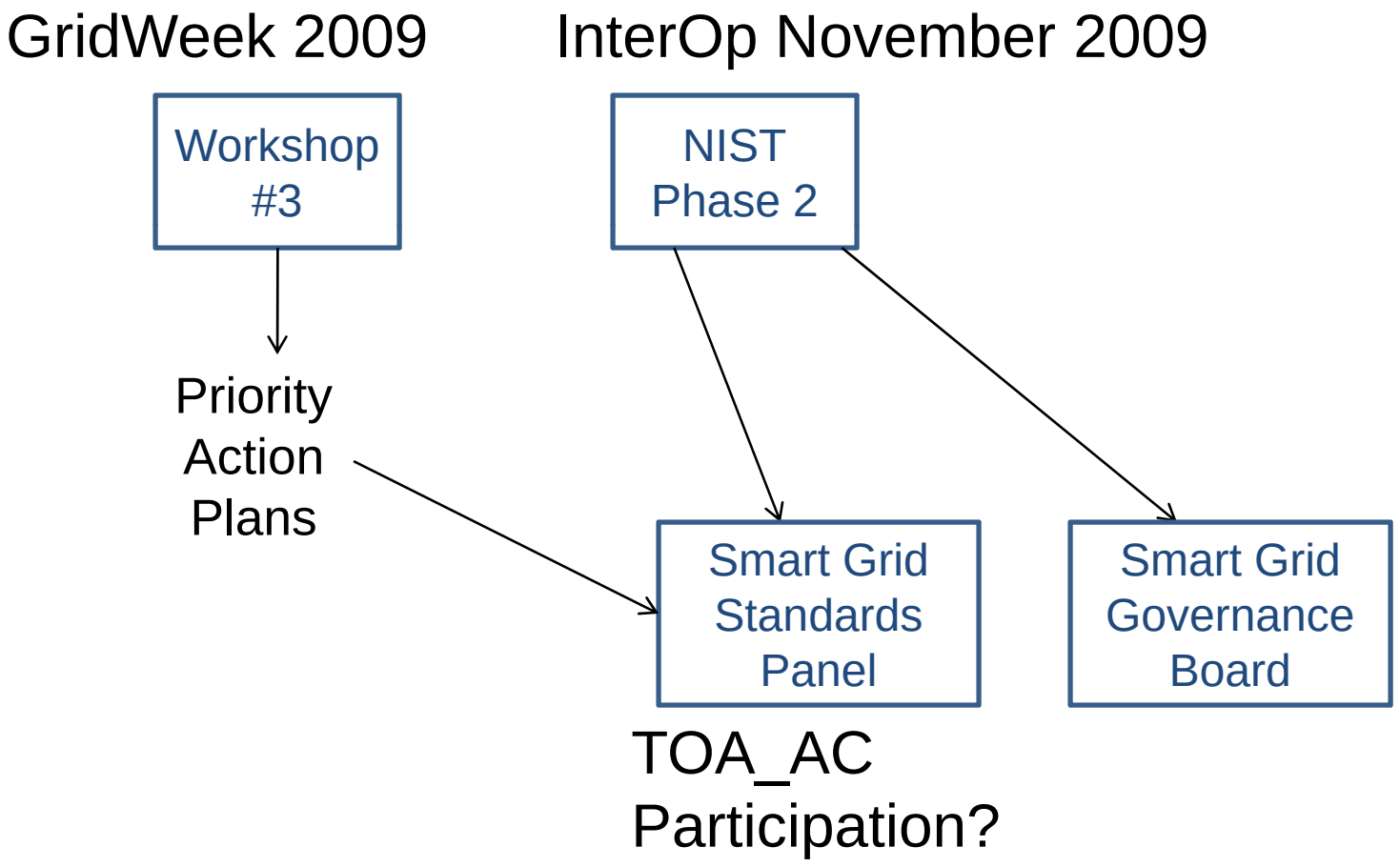
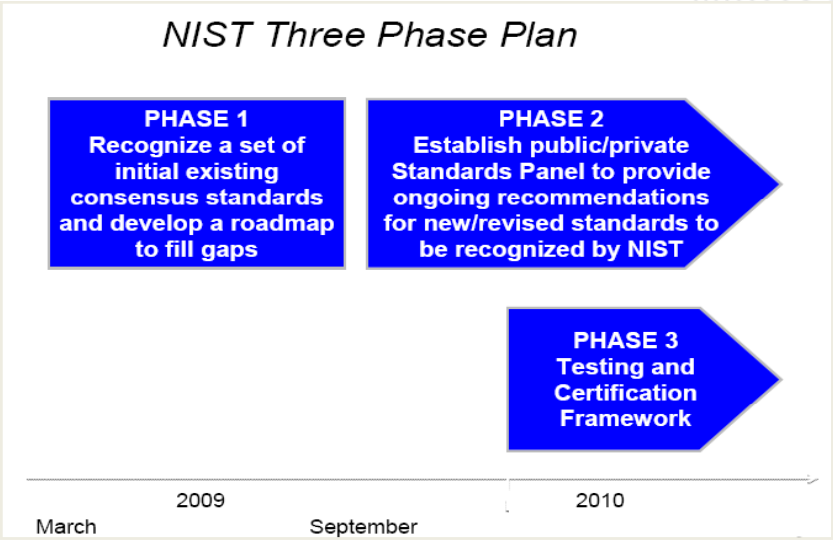
Transmission Owners Agreement –Administrative Committee (TOA-AC)

Smart Grid Standards Activities

NIST Smart Grid Standards Activities



NIST Interoperability Efforts

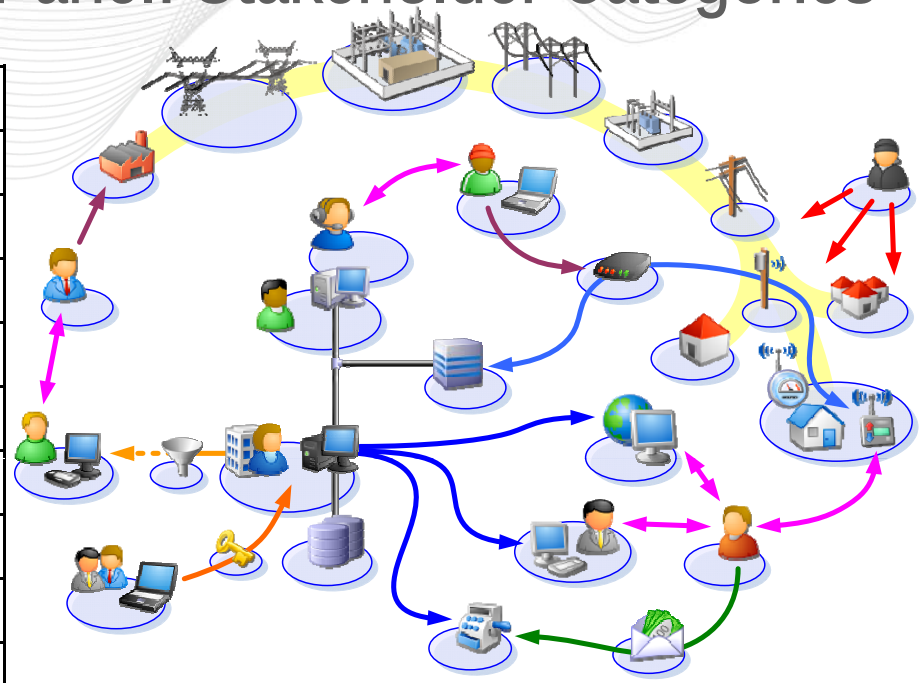


14 Priority Action Plans			
1.	IP for the Smart Grid	8.	CIM for Distribution Grid Management
2.	Wireless Communications for the Smart Grid	9.	Standard DR Signals
3.	Common Pricing Model	10.	Standard Energy Usage Information
4.	Common Scheduling Mechanism	11.	Common Object Models for Electric Transportation
5.	Standard Meter Data Profiles	12.	IEC 61850 Objects / DNP3 Mapping
6.	Common Semantic Model for Meter Data Tables	13.	Time Synchronization, IEC 61850 Objects / IEEE 37.118 Harmonization
7.	Electric Storage Interconnection Guidelines	14.	Transmission and Distribution Power Systems Model Mapping

- Held a series of cross-industry workshops
- Focus on identifying “low hanging” standards for Smart Grid and developing Priority Action Plans (PAPs)
- Initial 16 Standards extended to 31 (with 46 additional under review)
- NIST identified 14 PAPs key to the development of the Smart Grid
- Includes Cyber Security
- Announced the formation of a Smart Grid Interoperability Panel – First Meeting is November 16, Denver, CO

Moving Forward…
SG Interoperability Panel: Stakeholder Categories

1.	Investor Owned Utilities
2.	Municipal Electric Utilities
3.	Retail Energy Providers
4.	Independent Power Producers
5.	Renewable Power Producers
6.	Transmission Operators
7.	Retail Service Providers
8.	Commercial & Industrial Consumers
9.	Residential Consumers
10.	IT, Application Developers & Integrators
11.	ICT Infrastructure Providers
12.	Electric Transportation
13.	Power Equipment Manufacturers and Vendors
14.	Appliance Manufacturers
15.	Electricity & Financial Market Traders
16.	Venture Capital



17.	Standard Development Organizations
18.	Professional Societies, User Groups, Industry Consortia
19.	Academia, R&D Organizations
20.	State & Local Regulators
21.	Relevant Federal Agencies

It is proposed that each Stakeholder Category only gets ONE vote

NIST Workshop #3 -- Priority Action Plans
Opportunity for TOA-AC Participation and Influence

1. IP √
2. Wireless
3. Pricing
4. Scheduling
5. Std Meter Data Profiles
6. Meter data table
7. Electric Storage Interconnect
8. CIM for DGM
9. DR
10. Std Energy Usage
11. Transportation
12. DNP3/61850
13. Time Sync
14. T&D Model Mapping
15. Security

Areas for potential engagement and influence of standards by TOA-AC

- Minimal utility participation to date
- Limited resources for covering all areas
- Single TOA-AC lead resource for each of the PAPs of interest
- Get involved with future SGIP efforts

Backup

PAP #1 -- Role of IP in the Smart Grid

For interoperable networks it is important to study the suitability of Internet networking technologies for smart grid applications. This work area investigates the capabilities of protocols and technologies in the Internet Protocol Suite by working with key SDO committees to determine the characteristics of each protocol for smart grid application areas and types.

PAP #2 – Wireless Communications

This work area investigates the strengths, weaknesses, capabilities, and constraints of existing and emerging standards-based physical media for wireless communications. The approach is to work with the appropriate standard development organizations (SDOs) to determine the characteristics of each technology for Smart Grid application areas and types. Results are used to assess the appropriateness of wireless communications technologies for meeting Smart Grid applications.

PAP #3 – Common Pricing Model

Price is more than a number. Price is a number associated with product characteristics. Already identified product characteristics include delivery schedule, quality, environmental characteristics, and regulatory characteristics. A common specification for price is a precursor to new market developments, to demand response, to distributed energy resources, to understanding meter information, and to every other hand-off between domains.

PAP #4 -- Common Scheduling Mechanism

The coordination of supply and demand is already of critical importance on the grid; tomorrow, with the increase of distributed energy resources, this coordination becomes more critical. The coordination must involve more than electromechanical coordination; it also involves enterprise activities, home operations and family schedules, and market operations. A common specification, developed for other domains as well as in smart grid, would better support interactions with those other domains and get broader adoption.

PAP #5 -- Standard Meter Data Profiles

NIST should work with National Electric Manufactures Association (NEMA) to utilize ANSI C12.19-2008 data models to represent one or more meter profiles with distinct information locations and formats to simplify client access to commonly shared information

PAP #6 -- Demonstrate Common Semantic Model Translations for End Device Data

NIST should work with NEMA to translate the ANSI C12.19 End Device (meter) data model into a common form that will allow the semantics of this and End Device models in other standards to be more readily harmonized. The objective is to allow the lossless translation from the common form to the various syntactic representations prevalent in each Domain. Details will include the representation of the Decade/Table/Element model, as well as, the Table-independent representation of key measurements of a revenue meter

PAP #7 -- Energy Storage Interconnection Guidelines

Energy storage is expected to play an increasingly important role in the evolution of the power grid particularly to accommodate increasing penetration of intermittent renewable energy resources and to improve electrical power system (EPS) performance. Coordinated, consistent, interconnection standards, communication standards, and implementation guidelines are required for energy storage devices (ES), power electronics connected distributed energy resources (DER), hybrid generation-storage systems (ES-DER), and plug-in electric vehicles (PEV).

PAP #8 -- CIM for Distribution Grid Management

This work defines strategies for integrating standards for distribution operations across different environments. Strategies call for defining key applications and evaluating the available standards for meeting the applications. Field equipment can supply the raw data for objects and measured parameters used across the enterprise.

PAP #9 -- Standard DR Signals

Develop or adopt standard DR and DER signals – NIST shall organize a meeting with IEC TC57, OASIS, NAESB, and AMI-ENT to specify a process for developing a common semantic model for standard DR signals. The effort shall ensure DR signal standards support load control, supply control, and environmental signals.

PAP #10 -- Standard Energy Usage Information

Customers will benefit from energy usage information that enables them to make better decisions about energy use and take other actions consistent with the goals of Section 1301 of EISA. In particular, consumers could make better decisions about emerging energy conservation/efficiency applications, including whether to change DR plans, or to take specific actions now in anticipation of future DR events. Distributed energy resources (DER), including energy storage, make timely information more important; bidirectional energy flows will make it critical. Unfortunately, today there is limited provision to share energy (electricity and gas) usage information directly with the residential, commercial, and industrial consumer. There are two dimensions to energy usage that include information/data and the dialogue/interaction where all interactions are based on the same representation of data. There are two different audiences for the data, which include humans and machines. The data is limited to energy consumption and does not include firmware configuration management. Additionally, there are no provisions that would make it possible for consumers to delegate access to their meter information to third parties for value-added services. Energy sales and purchases, including the non-price attributes of that energy, are the basic components of transactional aspects of the Smart Grid. A common, shared understanding of each transaction is essential to realizing he anticipated benefits of the Smart Grid. This information is fundamental to innovation in the use and management of energy in the industrial, commercial building, and residential sectors. This PAP addresses the definition and standardization of this information.

PAP #11 -- common object models for electric transportation

The introduction of mobile Plug-in Electric Vehicles (PEVs) to the grid creates some interoperability challenges around exchanging price, Demand Response (DR), and settlement information. The impact of PEVs on the grid is expected to be significant, and the ability to control the charging profiles through price or direct control, the possibility of allowing customers to sell PEV electricity back into the grid, and complexity of providing fair settlement to everyone in the value chain when vehicles charge away from their home base, requires common object models to manage all these aspects of mobile bi-directional charging devices.

PAP #12 -- IEC 61850 Objects/DNP3 Mapping

DNP3 is the de facto communication protocol used at the distribution and transmission level. However, DNP3 does not possess all of the desirable attributes for use in the Smart Grid. A means must be found to enable transport of Smart Grid management functions over these legacy DNP3 networks.

PAP #13 -- Time Synchronization, IEC 61850 Objects/IEEE C37.118 Harmonization

IEC 61850 has been substantially developed for substations but is seen as a key standard for all field equipment operating under both real-time and non-real time applications. It shall be possible in the future to use IEC 61850 as well to transmit Phasor Measurement Unit data and information according to IEEE C37.118 standard. Common time synchronization will be a key for many Smart Grid applications. Guidelines on how to achieve that synchronization and addressing different issues related to that synchronization are required. The IEEE 1588 standard will be a key element to achieve that synchronization.

PAP #14 -- Transmission and Distribution Power Systems Model Mapping

This work defines strategies for integrating standards across different environments to support different real-time and back-office applications. Strategies call for defining key applications and evaluating the available standards for meeting the requirements of such applications. Modeling of the electric power system, multifunctional IEDs, and definition of standard methods for reporting events and exchanging relay settings will meet the requirements for improvements of the efficiency of many protection, control, engineering, commissioning and analysis tasks. Field equipment can supply the raw data for objects and measured parameters used across the enterprise based on the standard models and file formats defined.

PAP #15 -- CyberSecurity Coordination Task Group

Scope:

Address the cyber security aspects of the Smart Grid Interoperability Framework.

Goals:

The primary objective is to assess standards for applicability and interoperability across the domains of the Smart Grid, rather than develop a single set of cyber security requirements that are applicable to all elements of the Smart Grid. These standards will be assessed within an overall risk management framework that focuses on cyber security within the Smart Grid.To achieve this goal, problems that don't currently have solutions will need to be identified. This may require a "bottom-up" approach of analysis.