

# NASPI and the NIST Smart Grid Interoperability project



*presented to the  
NASPI - Performance and Standards Task Team*

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## Agenda

- Scope and expected outcomes from this phase of the NIST Smart Grid Interoperability project
- EnerNex's role and deliverables in this phase
- Phasor related tasks identified in this phase of the NIST project
- NIST definition of interoperability



## NIST Interoperability Framework – History

- 2007 **EISA gives NIST responsibility** for a Smart Grid **Framework**
- 2008 NIST forms **Domain Expert Working Groups**
  - T&D, Home-to-Grid, Building-to-Grid, Industry-to-Grid, PEV-to-Grid, Business and Policy, Cyber Security
- 2009 **ARRA accelerates** need for standards
  - EPRI selected as contractor
- 2009 NIST holds **large-scale workshops** to identify standards
  - Several hundred stakeholders from a variety of groups
  - April 28-29: Produced draft list of 16 standards: “low hanging fruit”
  - May 19-20: Analyzed use cases, requirements and standards
  - August 3-4: Developed Priority Action Plans with SDO representatives
- 2009 August **EPRI produces Roadmap Report** based on workshops
- 2009 September
  - **NIST Smart Grid Framework draft 1.0** released
  - EnerNex selected as contractor for next phases



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## NIST Smart Grid Framework – 1.0 Draft

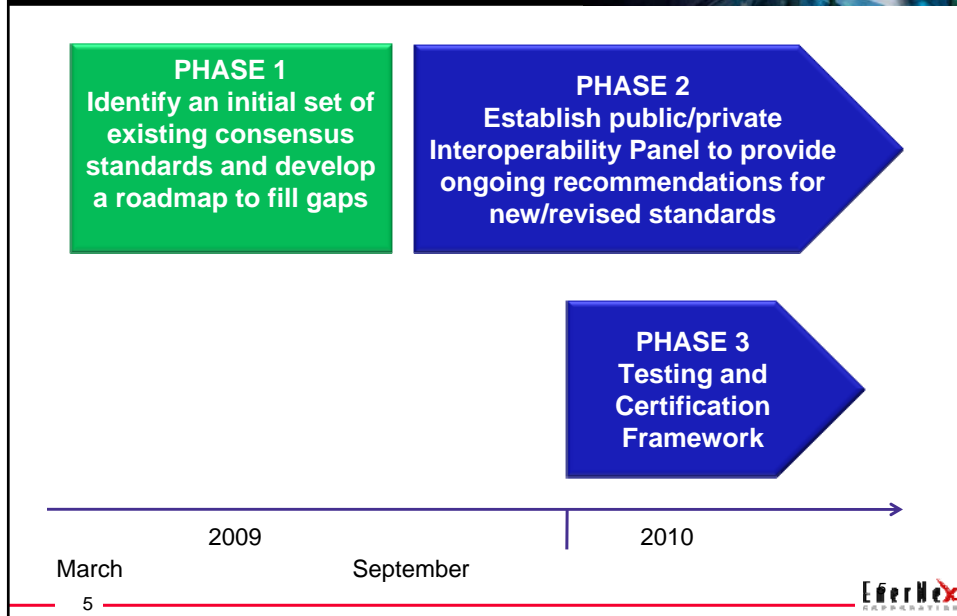
- **Smart Grid Vision**
  - Concepts, benefits
  - Importance to National Energy Policy
  - Key attributes
- **Conceptual Reference Model**
  - To be used for discussing uses, relationships, use cases
  - Consists of domains, actors, applications, networks, paths
- **Standards Identified for Implementation**
  - Original 16 from first workshop
  - Additional 21 in this document
  - Included 46 more “for consideration”
  - Asks for review of standards selection criteria
- **Priority Action Plans**
  - Gaps in existing standards, missing standards, harmonization
  - Agreed on in workshops with SDO representatives



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## NIST Three Phase Plan



## Scope & Expected Outcomes – Phase 2

- Smart Grid Interoperability Panel (SGIP)
  - Charter
  - Governance Plan and Body
  - Webinars (3) in October
  - Kick-off meeting @ GridInterop in Denver (Nov)
- EnerNex to function as SGIP administrator and liaison to NIST
- Refinement and maintenance of the NIST Framework document
- Smart Grid standards acceptance criteria
- Completion of the 15 Priority Action Plans
- SDO liaison

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## EnerNex's role and deliverables

- Fulfill the scope and expected outcomes – for Phase 2 see previous slide
  - Total of 20 tasks identified
- Fulfill Phase 3 tasks:
  - Testing and certification framework
  - Work starts in January 2010

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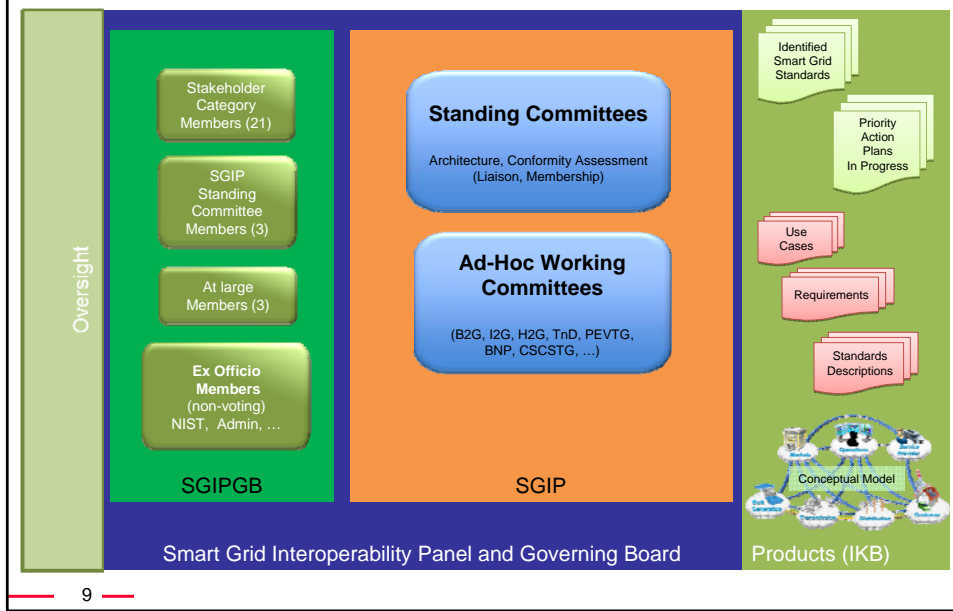
## Priority Action Plans (PAP)

- |  |   |
|--|---|
| 1. Use of IP                                 | 9. Standard DR Signals  |
| 2. Wireless Guidelines                       | 10. Energy Usage to Customer  |
| 3. Pricing Model                             | 11. Models for Electric Transportation                              |
| 4. Scheduling                                | 12. IEC 61850 to DNP3   |
| 5. Meter Profiles & Upgrade Std              | <b><u>13. Time Synch</u></b>  |
| 6. ANSI C12 to Common Info Model (CIM)       | 14. Integrate Transmission & Distribution Models and Relay Settings |
| 7. Storage Interconnect                      | 15. Cyber Security  |
| 8. CIM Distribution Models and Harmonization |   |

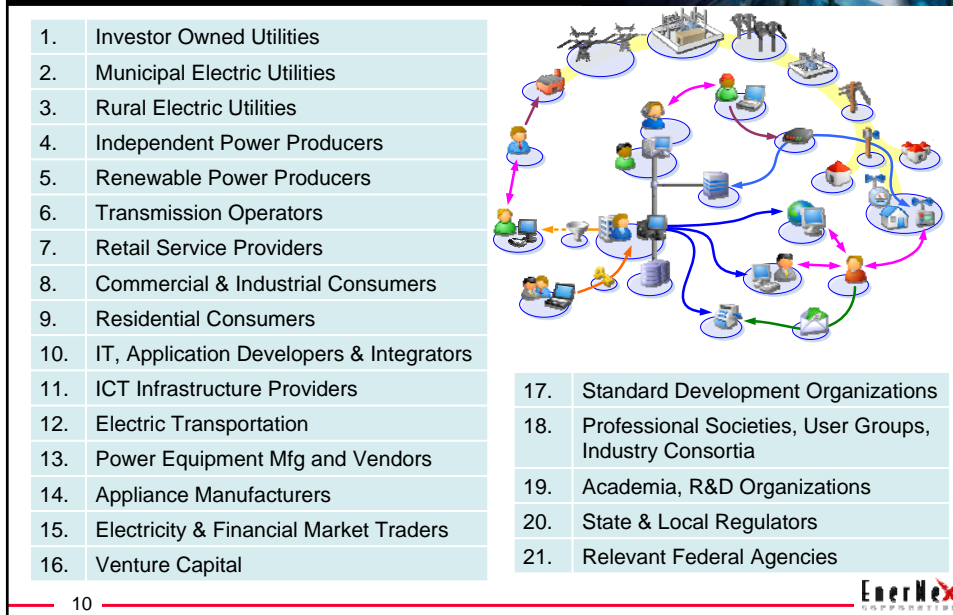
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# Next Steps: Smart Grid Interoperability Panel



# Stakeholder Categories - Draft



## Draft Standards Acceptance Criteria

- Enables Smart Grid characteristics as defined by EISA, DOE Smart Grid System Report
- Is applicable to one of the priority areas identified by FERC and NIST
- Enables the transition of the legacy power grid to the Smart Grid.
- Is an open, stable and mature industry-level standard developed in consensus processes from a **standards development organization**
- Is supported by an SDO or Users Group to ensure that it is regularly revised and improved to meet changing requirements and that there is strategy for continued relevance.
- Is openly available under fair, reasonable, and nondiscriminatory terms.
- Is developed and adopted **internationally**, wherever practical



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## Phasor related tasks identified in this phase

- Priority Action Plan (PAP) number 13 – Time Synch
- PAP 15 – Cyber Security (somewhat)
- Harmonization of IEC 61850 and IEEE C37.118
- Participate in the SGIP

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## First 16 NIST Framework Standards

		\$	PC	Lightbulb	Lightning	Hand	Home
1	AMI-SEC System Security Requirements	✓	✓	✓			✓
2	ANSI C12.19 End Device (Meter) Tables		✓	✓			✓
3	BACnet Building Automation & Control Net			✓	✓		✓
4	DNP3 – Distributed Network Protocol		✓		✓	✓	✓
5	IEC 60870-6 – Inter-Control Center		✓				
6	IEC 61850 – Comms Nets in Substations		✓		✓	✓	✓
7	IEC 61968/61970 – Common Info Model		✓	✓			
8	IEC 62351 – Data Comms Security		✓		✓	✓	✓
9	IEEE C37.118 - Synchrophasors		✓			✓	
10	IEEE 1547 – Distributed Resources		✓		✓	✓	✓
11	IEEE 1686 – IED Cyber Security				✓	✓	✓
12	NERC Critical Infrastructure Protection	✓	✓	✓	✓	✓	✓
13	NIST SP 800-53/82 Fed Info Sys Security	✓	✓	✓	✓	✓	✓
14	Open Automated Demand Response	✓	✓	✓			✓
15	Open Home Area Network Requirements						✓
16	ZigBee/HomePlug Smart Energy Profile						✓

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## NIST Definition - Interoperability

“The capability of two or more networks, systems, devices, applications or components to exchange and readily use information – securely, effectively and with little or no inconvenience to the user. The Smart Grid will be a system of interoperable systems. That is different systems will be able to exchange meaningful, actionable information. The systems will share a common meaning of the exchanged information, and this information will elicit agreed upon types of response. The reliability, fidelity and security of information exchanges between and among Smart Grid systems must achieve requisite performance levels”.

Note: This is the simplified version. See the Grid Wise Architecture Council’s (GWAC) Interoperability Framework for a more detailed version.

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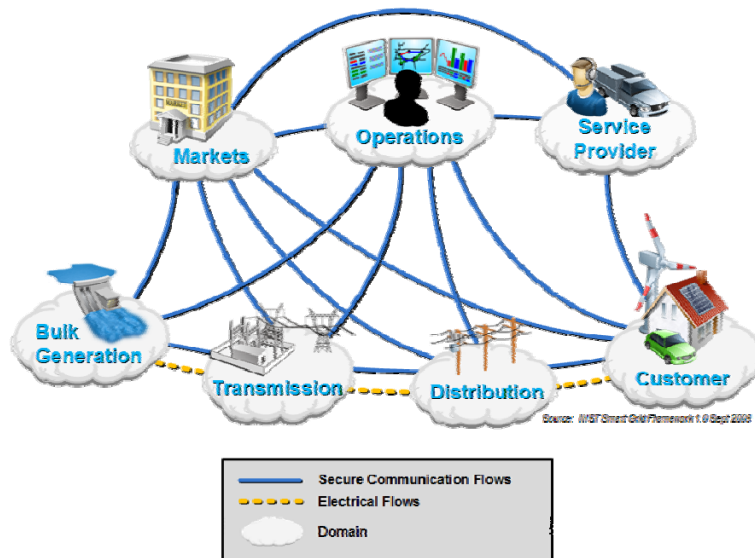
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# Back up Material

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# Conceptual Model High Level View

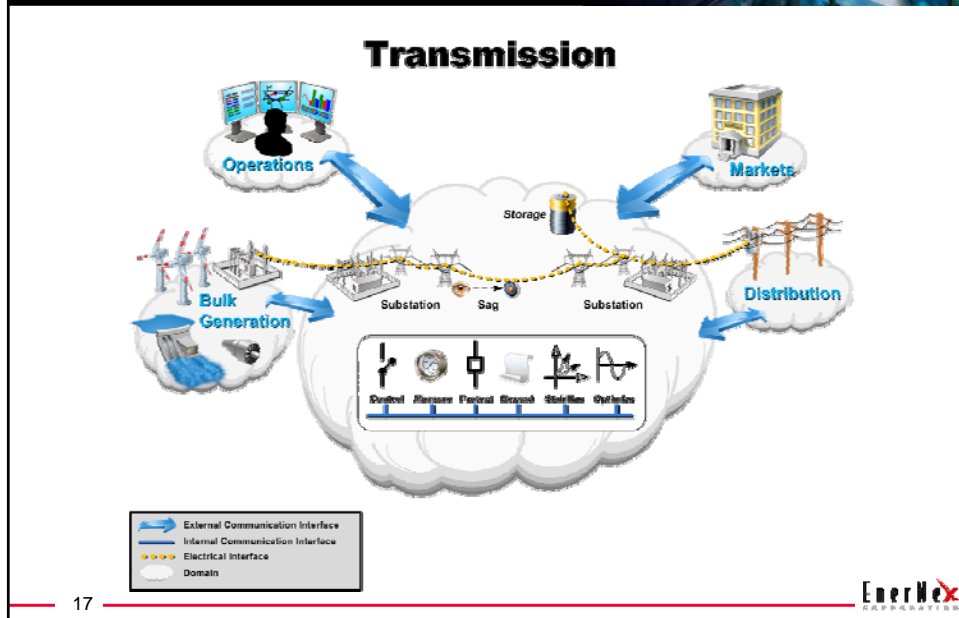


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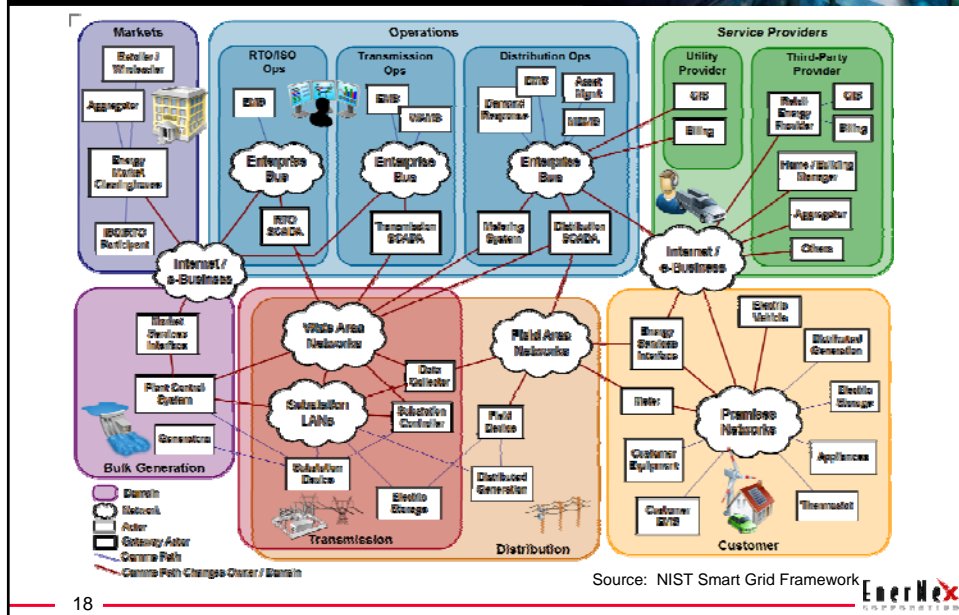


# NIST Transmission Domain



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# Conceptual Reference Model



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# The “GWAC Stack” Underneath



**Organizational:** Policy, Business Objectives, Business Procedures

**Informational:** Business Context, Semantic Understanding

**Technical:** Syntactic Interoperability, Network Interoperability, Basic Connectivity

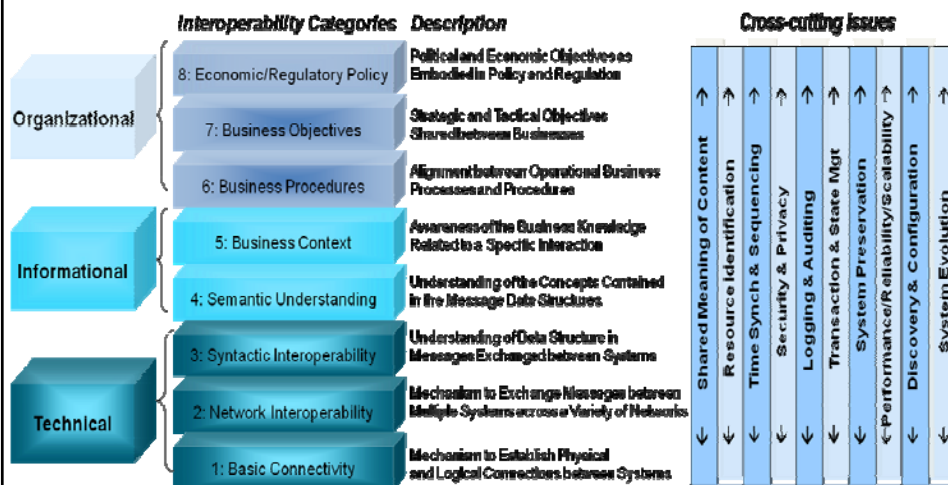
**Cross-Cutting Issues:** Security, Resource Identification, Time Synch, etc.

Source: EnerNex

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# GWAC Stack – Levels of Interoperability



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## References

NIST Smart Grid Site	<a href="http://www.nist.gov/smartgrid/">http://www.nist.gov/smartgrid/</a>
EPRI Roadmap Report	<a href="http://www.nist.gov/smartgrid/Report%20to%20NISTIAugust10%20(2).pdf">http://www.nist.gov/smartgrid/Report%20to%20NISTIAugust10%20(2).pdf</a>
Framework 1.0 Draft	<a href="http://www.nist.gov/public_affairs/releases/smartgrid_interoperability.pdf">http://www.nist.gov/public_affairs/releases/smartgrid_interoperability.pdf</a>
NIST Collaboration Site	<a href="http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/WebHome">http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/WebHome</a>
IEC Smart Grid Stds	<a href="http://www.iec.ch/zone/smartgrid/grid_relevantstds.htm">http://www.iec.ch/zone/smartgrid/grid_relevantstds.htm</a>
Grid-Interop Conference	<a href="http://www.grid-interop.com/2009/">http://www.grid-interop.com/2009/</a>
DOE System Report	<a href="http://www.oe.energy.gov/DocumentsandMedia/final-smart-grid-report.pdf">http://www.oe.energy.gov/DocumentsandMedia/final-smart-grid-report.pdf</a>