



Proceedings

Working Together For Interoperability



Chicago, IL
Nov 30 - Dec 3, 2010



THANK YOU FROM THE TEAM

January 12, 2011

Grid-Interop Participants and Interested Colleagues:

On behalf of the [GridWise® Architecture Council](#) (GWAC) and the [National Institute of Standards and Technology](#) (NIST), we are pleased to offer a record of the fourth Grid-Interop forum in the following proceedings material. The proceedings contain the compendium of papers produced for the event, as well as the panel session abstracts and links to the presentation slides.

Since last year's forum, the community has been very busy working with NIST and the Smart Grid Interoperability Panel (SGIP) to complete Priority Action Plans (PAPs) and to define and develop the standards that will help to implement an effective smart grid. We would like to thank all of you who participated in those efforts. The SGIP Governing Board as well as several of its important committees convened at this meeting. In addition, elections were held to fill several seats on the SGIP. Throughout the Grid-Interop meeting there were sessions during which the work of the SGIP took place, such as stakeholder meetings, PAP meetings and meetings on specific important topics including cyber security.

Your continued participation in these activities is critical to the success of this national effort! We would like to thank you for taking the time to attend this important meeting and most especially to thank the planning and program committees and the presenters for the time and energy they have put into preparing the event.

This meeting would not have been possible without the support of our sponsors. These organizations recognized the importance of interoperability in re-vitalizing our electric power systems and demonstrated this through their support of this event.



George Arnold
National Coordinator for Smart Grid
Interoperability, NIST



Ron Ambrosio
GWAC Chair



Ron Melton
GWAC Administrator

GridWise® Architecture Council



Erich Gunther

(May 2004 – Dec 2011)
Chief Technology Officer, EnerNex Corporation



Ron Ambrosio

(May 2004 – Dec 2011)
Global Research Leader, IBM Energy and Utilities Industry, IBM Thomas J. Watson Research Center



Robert Burke

(Mar 2009 – Dec 2012)
Principal Analyst, ISO New England



Richard Schomberg

(Jan 2006-Dec 2010)
VP Research, Électricité de France



Rik Drummond

(May 2004 – Dec 2011)
CEO and Chief Scientist, Drummond Group Inc.



David Hardin

(July 2006-Dec 2010)
Senior Director, SmartGrid Standards, EnerNOC, Inc



Amr Ibrahim

(Feb 2010 – Dec 2011)
Senior Regulatory Analyst, Office of the Ohio Consumer Counsel



Alexander Levinson

(Jan 2008 – Dec 2011)
Information Systems Architect, Lockheed Martin



Wayne Longcore

(Jan 2010 – Dec 2011)
Director, Enterprise Architecture & Standards, Consumers Energy



Tracy Markie

(Mar 2009 – Dec 2012)
President, Engenuity Systems



Bob Saint

(Mar 2009 – Dec 2012)
Principal Distribution Engineer, National Rural Electric Cooperative Association (NRECA)



Thomas Sloan

(Jan 2010 – Dec 2011)
State Representative, State of Kansas



Kenneth Wacks

(Jan 2007 – Dec 2011)
Consultant, Sensus Metering

The GridWise Vision

GridWise® is a vision of how advanced communications, information and controls technology can transform the nation's energy system—from customer loads through central generation—into a collaborative network whose participants exchange decision-making information as driven by market opportunities. The GridWise Architecture Council gathers a team of experts with diverse, relevant industry backgrounds to articulate the guiding principles that constitute the architecture of a future, intelligent, transactive, energy system and see that GridWise evolutionary directions remain true to these principles. This team is assembled by the Department of Energy Office of Electricity Delivery and Energy Reliability in cooperation with key stakeholders in the GridWise vision.

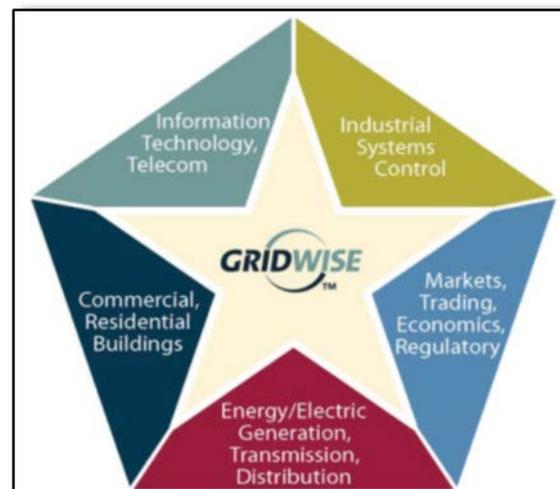
Council Mission

The mission of the Architecture Council is to establish broad industry consensus in support of the technical principles that enable the vast scale of interoperability necessary to transform electric power operations into a system that integrates markets and technology to enhance our socio-economic well-being and security.

The scope of the GridWise Architecture Council spans intelligent interactions across the component elements of the electric system, embracing distributed energy resources (end-use systems, distributed generation, and storage) with distribution, transmission, and bulk power generation.

Council Composition

The Architecture Council comprises recognized and respected practitioners and leaders with broad-based knowledge and expertise in power systems, information technology, telecommunications, markets and financial systems, buildings, industrial controls, and additional related sectors. Any group or organization may recommend candidates to the Architecture Council.



Ron Melton

Pacific Northwest National Laboratory
(PNNL Administrator, GridWise® Architecture Council)

2010 Planning Committee



Alex Levinson
Lockheed Martin



Paul Boynton
NIST



Ron Melton
PNNL



Anto Budiardjo
CLASMA Events Inc.



Paul Molitor
Nema



Stuart McCafferty
EnerNex



Chris Hickman
Energy Services



Robert Burke
ISO New England



Terry Mohn
Balance Energy



David Hardmin
Invensys



Ron Ambrosio
IBM



Tracy Markie
Engenuity



Erich Gunther
EnerNex Corporation



Robert Saint
NRECA



Terry Oliver
BPA



Gerald Fitzpatrick
NIST



Ron Jarnagin
PNNL



Rick Drummond
Drummond Group



Natalia Brock
PNNL



Table of Contents

Thank You From the Team	i
Introduction.....	5
Plenary Speakers	8
Foundational Session	9
Framing Interoperability.....	10
Business and Policy	11
Regulatory Policies and Rate Structures for a Demand Responsive Grid	11
Smart Grid Case Studies – Ongoing Work	12
The Value of Customer Data	12
Transactive Energy Management in Distribution Systems	13
Basic Connectivity	14
Flexible and Secure Interoperability.....	14
Substation Networks – Building Reliability and Redundancy	15
Customer Devices: Mass Market Connectivity for the Smart Grid.....	15
Interoperability and Communications Networks	16
Information Interoperability	17
An Introduction to Information Interoperability.....	17
What’s in a Word? – Semantics and Semantic Modeling	18
The Common Information Model Approach to Interoperability	18
Customer Interoperability Challenges.....	19
Architecture	20
Architecture Frameworks and Tools	20
Architecture Elements and Solutions	21
Integration Methods and Approaches	21
Cyber Security and Information Assurance.....	22
Interoperability Fair.....	23
Appendix A. Agenda.....	24
Appendix B: Forum Participants.....	26
Appendix C: Papers	41

INTRODUCTION

Held in partnership with the GridWise Architecture Council (GWAC) and U.S. National Institute of Standards and Technology (NIST), this fourth Grid-Interop event brought together a broad audience from both government and the technical community, including key players from the energy utilities as well as the software, cable, semiconductor, telecommunications and electricity consumer sectors. The birthplace of the Smart Grid Interoperability Panel (SGIP), Grid-Interop continues to focus on smart grid interoperability standards and technologies – defining the interoperability framework necessary for smart grid to flourish.

Overview/Welcoming Presentation Text

GWAC Chairman Ron Ambrosio and NIST National Coordinator for Smart Grid Interoperability George Arnold both provided a welcome to participants as well as an overview of the activities to be conducted during Grid-Interop 2010. Activities of the GWAC and SGIP were highlighted.

- [Agenda](#)
- [Speaker's Biographies](#)
- [Technical Sessions](#)
- [Technical Papers](#)

Keynote speaker Tom Evslin, recent Chief Technical Officer (CTO) of the state of Vermont, pioneered the use of the internet for phone calls. Applying what he learned from observing that shift in technology, he made the following predictions for smart grid:

1. The smart grid will enable Americans to use vastly more electrically-delivered energy in years to come; most of the increase will be to displace oil
2. The smart grid will unleash a torrent of innovation, just as the Internet did 15 years ago
3. Smart grid data volumes will exceed current predictions by several orders of magnitude within the decade
4. Data exchange with residential users will be largely on the public Internet
5. "Grid neutrality" will have more search engine citations than "net neutrality" within five years.

Mr. Evslin also discussed what could go wrong:

1. The smart grid could become the public switched telephone network of energy
2. Lack of standards
3. Unrealistic security requirements
4. Vendor-enforced vertical integration
5. Utility resistance to grid neutrality
6. Luddites.



Essential Topics

Grid-Interop continues to offer an opportunity to discuss new and innovative ways to improve smart grid interactions, to participate in actions that shape the future of interoperability, and advance the Smart Grid Interoperability Roadmap from concept to reality.

Grid-Interop 2010 addressed the following essential topics:

- Incenting mobile load management
- Authorizing customer data for third parties
- Incenting clean consumer generation
- Tools and policies for regulators
- Implementing innovative rate structures
- Enabling evolutionary information exchange
- Role of semantic modeling
- Integrating semantic models
- Information models for customer interactions
- Best practices for energy market transactions
- Semantic models for energy markets
- Modular approaches
- Information vs. end-use capabilities
- Commercial, industrial, and residential connectivity
- Basic utility distribution connectivity
- Physical connectivity vs. data exchange
- Renewable generation connectivity
- Wind farms vs. solar rooftops
- Transparency of consumer-owned assets
- Connectivity between Electric Vehicle and Photovoltaic
- Use of formal architecture methods
- Usefulness of a single architectural model
- Future of CIM models
- Smart grid architecture lessons learned
- Useful deliverables from the Smart Grid Architecture Committee
- Architecture case studies
- Tools for defining interoperable interfaces.

New to Grid-Interop 2010 was Face Time, a speaking opportunity designed to increase the number of topics and discussions. Held in conjunction with the Interoperability Fair, Face Time provided a high-visibility, yet intimate venue for presenting on topics relevant to the Grid-Interop audience.

Smart Grid Interoperability Panel (SGIP)

The SGIP was launched as part of NIST activities to facilitate the creation of interoperable smart grid standards and help NIST continue accelerated efforts to carry out responsibilities assigned to the agency by the Energy Independence and Security Act of 2007. The act calls on NIST to “coordinate the development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems.” Since the creation of the SGIP in November 2009, much progress has been made. Last year was marked by several highlights, including January’s release and publishing of the NIST Framework and Roadmap for Smart Grid Interoperability Standards, the first birthday of the SGIP charter being approved, and the fourth Grid-Interop meeting in Chicago. The four day meeting, themed “Charting the Path toward Interoperability,” brought together key stakeholders from utility and power companies, standard development organizations, product designers, vendors, and the regulatory community to discuss ways to improve collaboration, cooperation, and establish interoperability. The meeting had over 60 sessions and 80 presentations, including those from international guests who presented on smart grid interoperability efforts in Japan and Korea.

During Grid-Interop 2010, the SGIP and Governing Board held meetings to foster greater collaboration and integration with ongoing GridWise Architecture Council (GWAC) activities and to advance the work of the SGIP in developing smart grid standards, addressing gaps, and harmonizing standards to incorporate evolving technology.

A further achievement is the impending first draft of the Catalog of Standards, which is designed to collect all relevant standards to smart grid activity. This draft is being made possible by ANSI license agreements for access to standards which will allow floating licenses.

Some noteworthy accomplishments in 2011 were the completion of Priority Action Plans (PAPs) 01 and 2, dealing with Internet Protocol Suite and Wireless Guidelines, respectively.

The PAP 15 on Harmonization of Power Line Carrier (PLC) standards for appliance integration, the development of the Domain Expert Working Group (DEWG), work plans to improve the visibility of ongoing efforts, and engagement with international smart grid efforts are some of the key issues being currently worked on. Three face-to-face meetings have already been held and both the SGIP Governing Board and Plenary leadership were elected in 2011. All of these actions speak for an organization that has evolved from an idea on a sheet of paper to an organization of nearly 640 organizations and 1,750 individual members in less than two years.

Regardless of these great accomplishments, there is still much work to be done. Over the next decades, it is estimated that between \$1.5 and \$2 trillion will be spent upgrading the grid. About \$600 billion of which will be invested in transmission and distribution related to the smart grid. With so much at stake, SGIP must play an important role in helping to determine whether these tremendous investments will result in a hodgepodge of systems that don’t work well together or a set of interoperable systems that realize the smart grid vision. Judging by the past achievements, the organization is well-suited for this challenge.

PLENARY SPEAKERS

Chris Allen
Certified Biomimicry Professional

Biomimicry Guild

Ron Ambrosio
Chair
GridWise Architecture Council

George Arnold
National Coordinator for Smart Grid Interoperability
NIST

Tom Evslin
CTO
State of Vermont

Patrick Gallagher
Director
National Institute of Standards and Technology

Chris Irwin
Smart Grid Standards and Interoperability Coordinator
U.S. Department of Energy

Lynne Kiesling
Senior Lecturer
Northwestern University



FOUNDATIONAL SESSION

Moderated by Anto Budiardjo (Clasma Events), the Foundational Session discussed the value proposition of interoperability, and how we, the smart grid community at Grid-Interop, are tasked with communicating not only the technical merits and issues of interoperability, but its business and implementation benefits. For Grid-Interop, this is a foundational and critical task. Without proper communication strategies, key interoperability principles won't deploy widely, and building the smart grid securely and economically will be even more difficult.

Interoperability: a long word to say and a complicated one to understand. This technical term means much to those who realize that complex and disparate systems can only work together through interoperable standards. How do we – as practitioners of interoperability – explain its value and benefits to business, policy, strategic planners, consultants, and other stakeholder groups to ensure that all systems comprising the smart grid are designed and implemented with interoperability in mind?

FRAMING INTEROPERABILITY

Moderated by Steve Widergren, principal engineer at the Pacific Northwest National Laboratory (PNNL) and the founding administrator of the GWAC, this panel of respected SGIP contributors from the electric service provider, end-use systems, and regulatory policy domains, shared their thoughts about how to best communicate, or "frame," interoperability.

Topics Covered

- Tools and policies for regulators
- Enabling evolutionary information exchange
- Role of semantic modeling
- Modular approaches
- Use of formal architecture methods
- Tools for defining interoperable interfaces

Interoperability has many facets. It is discussed in abstract terms, similar to concepts like freedom, equality, and love. "Framing" something this ethereal is less about putting it in a square box, and more about portraying it in a perspective that reveals insight to those who yield their attention to look. Real world examples are classic tools that help frame interoperability and can ground it from floating away in conversation. Effectively communicating the importance of supporting interoperability initiatives – with solid reasons for the value returned – is critical for garnering stakeholder support and participation.

But different people with varying responsibilities see the concept of interoperability, and therefore its value, through different lenses. This panel underscored the importance of marketing interoperability, and its trappings in standards, guides, and agreements, to effectively communicate the value proposition to different stakeholder audiences.

Participants:

Steve Widergren

*Principle Engineer
PNNL*

Paul Centolella

*Commissioner
Public Utilities
Commission of Ohio*

Tariq Samad

*Corporate Fellow
Honeywell*

Erich Gunther

*Chief Technology
Officer
EnerNex Corp.*



BUSINESS AND POLICY

Track Leader: Robert Burke, ISO New England, GridWise® Architecture Council

Many smart grid benefits are based on technologies and applications that reduce consumer demand for electricity at specific times as well as on an overall basis. These solutions will require shifts in regulations and policies to fully exploit the consumer side of the smart grid equation. Changes in consumer behavior can be modulated by tariffs, incentive programs, and energy management campaigns, but most utilities have limited experience in these activities.

The sessions in this track explored policies and rate structures that drive desired behaviors, and focused on lessons learned in managing smart grid projects, consumer data, and information needs in a decentralized and distributed grid.

REGULATORY POLICIES AND RATE STRUCTURES FOR A DEMAND RESPONSIVE GRID

In this session, panelists discussed innovations in regulatory policies and tariffs to support and reward desired consumer behaviors.

An anticipated benefit of smart grid implementations is the ability to induce price responsive demand or energy use changes in residential, commercial, and industrial customers. That response can be triggered by price or cost information (such as critical peak pricing or some variation) and can help end use customers' deal effectively with energy supply fluctuations and system reliability. Developing appropriate rate or incentive structures to encourage this behavior is a significant challenge for utilities, regulators, and energy service providers.

Title	Presenter	Affiliation
Regulatory Policies and Rate Structures for a Demand Responsive Grid – Presentation	Erik Gilbert	Navigant
Energy Price Controlled Automated Demand Response (DR) Applied to The University of New Mexico Campus – Presentation	Donald Lincoln	DFL Associates Inc.
Regulatory Policies and Rate Structures for a Demand Responsive Grid – Presentation	Mark Knight	KEMA
Smart Grid and Rate Structures – Presentation	Robert Burke	ISO New England Inc.

SMART GRID CASE STUDIES – ONGOING WORK

While data and results for large-scale implementations of smart grid technology are in the initial reporting stages, there are many projects underway across the country and the world. This session presented several case studies of smart grid implementations covering electric vehicles (EVs), commercial building-to-grid (B2G) interconnections, and innovative energy storage technologies. Are there specific program or project management practices that are particularly applicable to smart grid deployments?

Presenters provided valuable information about how rates, cost information, and incentive structures are influencing their projects and preliminary lessons learned.

Title	Presenter	Affiliation
PEVs: The Smart Grid Killer App – Presentation	Chris Chen	San Diego Gas & Electric
Is the Commercial Buildings Sector Ready for the Smart Grid? – Presentation	Tracy Markie	Engenuity Systems, Inc.
Smart Storage Space and Water Heaters. Resources for Grid Management, Renewable Integration, and Conservation – Presentation	Paul Steffes	Steffes Corporation

THE VALUE OF CUSTOMER DATA

If smart grid-based solutions are going to live up to their potential, end use customers require energy consumption data that is more granular and actionable than the monthly kWh consumption presently received by most residential customers from their local utility. Utilities and technology providers recognize that granular energy consumption data will help residential, commercial, and industrial customers to better manage their energy use. There are also opportunities to leverage this data with variable or dynamic pricing and incentive programs.

Presenters discussed questions about how to appropriately share data to obtain the benefits of reduced demand and improved energy management while balancing a due regard for consumer data security and privacy.

Title	Presenter	Affiliation
Implementation Models for Sharing Consumer Usage and Billing Data – Presentation	Jian Zhang	GridX, Inc.
Dynamic Residential DR: How to keep the homeowner happy – Presentation	Scott Hublou	EcoFactor

Title	Presenter	Affiliation
What is an Internet of Energy and how do we get one? Standards, Disruption, Innovation, and Accelerating Paths to Market – Presentation	Toby Considine	TC9, Inc.
Demand Response in Commercial Buildings. Technology as an enabler for scaling up – Presentation	Kelly Smith	Johnson Controls
Interoperable Work Management – Presentation	Nada Reinprecht	IBM Global Business Services

TRANSACTIVE ENERGY MANAGEMENT IN DISTRIBUTION SYSTEMS

The smart grid will need coordinated management of numerous distributed resources. This coordination involves physical distribution system reliability and operational economics, market information, real-time asset status, and a robust communications network. How can utilities and policy makers help introduce the technologies and services that will support high penetrations of responsive demand and renewable energy resources? What types of information will be needed regarding distributed generation and storage, and what applications will enable integration of microgrids into the larger smart grid?

Presenters discussed these questions and solutions to the challenges of real-time management of the distribution system.

Title	Presenter	Affiliation
Transactive Energy Management in Distribution Systems – Presentation	Ali Ipakchi	OATI
Transactive Control in Electricity Delivery – Presentation	Ron Melton	Battelle, Pacific Northwest Division
TeMIX: A Foundation for Transactive Energy in a Smart Grid World – Presentation	Ed Cazalet	The Cazalet Group

BASIC CONNECTIVITY

Connectivity presents several interesting challenges to smart grid interoperability discussions because it cuts across all topics. For example, there are physical connectivity issues – will consumers have smart grid devices with standard, universally-used connectors (e.g., Universal Serial Bus (USB) connectors), or struggle with tangles of cables with specialized plugs? There are also data exchange issues and architectural issues. In addition, connecting more communicating devices to the electrical grid increases the potential of unauthorized access for malicious and criminal activities.

The sessions in this track examined connectivity, communications networks, and interoperability from a number of perspectives, including consumer to grid, utility to grid, and generation to grid.

FLEXIBLE AND SECURE INTEROPERABILITY

Smart grid interoperability has to balance the two extremes of flexibility and security in systems and subsystems. The most flexible systems are unsecure, and the most secure systems are inflexible. One aspect of the solution is to design systems to use integrated communications with common protocols and gateways. However, an integrated system that is easily accessible for system supervision and operation may also pose data security challenges.

During these presentations, presenters offered views on North American Electric Reliability Corporation (NERC) Critical Infrastructure Protection (CIP) standards, the importance of cyber secure shared communications networks, and managing secure supervisory control and data acquisition (SCADA) systems to balance flexibility with security.

Title	Presenter	Affiliation
Smart Grid vs. The NERC CIP – Presentation	Tobias Whitney	GE Smart Grid Center of Excellence
Secure Interoperability for Energy Surety – Presentation	Brian Lenane	SRA International, Inc.
Interoperability and Security for Converged Smart Grid Networks – Presentation	Andrew Wright	N-Dimension Solutions

SUBSTATION NETWORKS – BUILDING RELIABILITY AND REDUNDANCY

Transmission and distribution substations are critical components in the electricity supply chain and need to be upgraded to support smart grid requirements. Creating shared networks for intelligent electronic devices and legacy substation equipment calls for networks that deliver high reliability, redundancy, and fault tolerance. While the topologies may vary and protocols include physical layers like Ethernet or data layers like IP, the transport of SCADA messages relies on optimal network designs.

The presenters examined enhanced substation technologies and explained how these solutions enhance grid interoperability.

Title	Presenter	Affiliation
First Practical Experience with IEEE 1588 High Precision Time Synchronization in High Voltage Substation with IEC 61850 Process Bus – Presentation	Jim McGhee	RuggedCom Inc.
Interoperability in High Speed Seamless Redundancy (HSR) Communications Networks – Presentation	Richard Harada	RuggedCom Inc.
IP and Ethernet Communication Technologies for Substations Substation of the Future: Improve Network Reliability and Protocol Interaction – Presentation	Eruch Kapadia	Cisco
IP and Ethernet Communication Technologies for Substations Substation of the Future: Improve Network Reliability and Protocol Interaction – Presentation	Navindra Yadav	Cisco

CUSTOMER DEVICES: MASS MARKET CONNECTIVITY FOR THE SMART GRID

Some of the most significant changes enacted by smart grid technologies will impact consumers in residential and commercial settings. Devices with communications capabilities can report their energy use and offer options for local or remote control. These devices may be networked and managed by homeowners much like existing local area networks (LANs) have applications for their administration and maintenance.

There will be significant expectations for ease of use in connectivity set ups and plug-and-play interoperability of all devices.

In this session, the impact of increased device intelligence on appliances, energy storage systems, and LANs in homes and commercial spaces was examined and discussed.

Title	Presenter	Affiliation
Wi-Fi® Connectivity Options for Smart Grid – Presentation	Greg Ennis	Wi-Fi Alliance
Smart Appliance Benefits & Cost Analysis – Presentation	Chellury (Ram) Sastry	Pacific Northwest National Laboratory
Consumer Devices: Mass Market Devices for the Smart Grid – Presentation	Mark Thompson	Aclara

INTEROPERABILITY AND COMMUNICATIONS NETWORKS

The smart grid requires the bi-directional flow of information, so the dedicated and shared communication networks need to be reliable, robust, scalable, and fault-tolerant. Latency varies with the setting, and while phasor measurement units need fast connections and five nines reliability, your smart toaster's information transmission can probably afford some latency.

Wide area networks and LANs that support communications in the transmission and distribution systems have a range of requirements that have at least one aspect in common – interoperability. The communications network protocols chosen for these interconnections affect system performance and can enhance interoperability, as explained in these presentations.

Title	Presenter	Affiliation
Integration of IEC 61850 GSE and Sampled Value Services to Reduce Substation Wiring – Presentation	Mike Dood	Schweitzer Engineering Laboratories, Inc.
Power Tagging: Intelligence Within – Presentation	Steven Berens	Power Tagging
IPv6 Momentum and SmartGrids – Presentation	Phil Roberts	The Internet Society

INFORMATION INTEROPERABILITY

Future smart grids will evolve into a “system of systems” architecture dependent upon the reliable and secure exchange of data that must be recognized as meaningful information. For instance, dynamic price signals and demand response alerts will be sent from utilities and aggregators to customers for the purpose of taking action in near real-time. Market data will pass between energy traders and Independent System Operators (ISOs) and Regional Transmission Organizations to transact sales and schedule activities.

Information about customer premise device status and control must be exchanged and acted upon regardless of manufacturer make or model. These sessions reviewed information interoperability including necessary design tools and grid components along with challenges that need to be addressed.

AN INTRODUCTION TO INFORMATION INTEROPERABILITY

Interoperability between systems requires that information can be securely communicated, shared, and used without custom integrations or user intervention. The crash of the Mars Climate Orbiter in 1999 was a classic example of a lack of information interoperability between scientific metric and US English measurement units.

During this session, the panelists discussed tactics to ensure that successful information exchanges are achieved and also provided an overview and introduction to information integration that includes a definition of information interoperability, the reasons interoperability is critical to the success of the smart grid, and challenges to achieving true interoperability.

Title	Presenter	Affiliation
Introduction to Interoperability & Cost Benefit Analysis Case Study – Presentation	Tony Giroti	Bridge Energy Group
Necessary and Sufficient Conditions for Interoperability – Presentation	Rik Drummond	Drummond Group
Towards Interoperability Standards in Indian Power Sector – Presentation	Vinoos S. Warriar	Kalkitech Inc
The SGIP TCC Interoperability Assessment Maturity Model How do we know if a standard’s certification programs will work? – Presentation	James Mater	QualityLogic, Inc.
Structured Energy: A Topology of Microgrids – Presentation	William Cox	Cox Software Architects TC9, Inc

WHAT'S IN A WORD? – SEMANTICS AND SEMANTIC MODELING

Semantic understanding is a critical construct of information interoperability. Successful information integration requires that all parties interpret the meaning of exchanged information in the same way. This common interpretation is achieved through the use of semantic models which define the meaning of concepts and the relationships between them.

For instance, a color wheel is a semantic model that creates a shared understanding of what is blue and what is green. Semantics ensure that the context for data is the same for everyone so that the information derived from that data has a shared meaning. Presenters described semantic modeling and how semantic modeling can be applied to achieve information interoperability.

Title	Presenter	Affiliation
How can semantic models help integrate the smart grid? – Presentation	Steve Ray	Carnegie Mellon University Silicon Valley, TopQuadrant
Smart Grid Enterprise Applications Interoperability Needs Assessment and the MultiSpeak® Specification – Presentation	Gary McNaughton	Cornice Engineering, Inc.
“Demystifying” the CIM – Presentation	Greg Robinson	Xtensible Solutions
Developing a Semantic Framework for Smart Grid – Presentation	Jay Britton	AREVA

THE COMMON INFORMATION MODEL APPROACH TO INTEROPERABILITY

The CIM has emerged as a core semantic modeling tool for describing exchanges of data within utility electrical systems. This reference tool provides data names and definitions, database design, identification of the structure and vocabulary of message schemas, and a set of services to exchange data known as the Generic Interface Definition or GID.

In order to achieve smart grid interoperability, developers of new systems and devices will need to understand CIM and integrate their technologies with this tool. During this session, panelists discussed how to use the CIM in utility planning and harmonization activities with other information models such as Multi-Speak.

Title	Presenter	Affiliation
Overcoming Challenges Using the CIM as a Semantic Model for Energy Applications – Presentation	Andrew Crapo	GE Global Research
CIM for European Smartgrids – Presentation	Eric Lambert	EDF R&D
Approaches to integrating MultiSpeak® and CIM – Presentation	Evan Wallace	NIST

Title	Presenter	Affiliation
CIM and C12.19 – Presentation	Edward J. Beronet	Elster Solutions, LLC
Building a bridge between CIM and PLIB ontologies via IEC62656 on data parcels – Presentation	Hiroshi Murayama	TOSHIBA Corporate R&D Center

CUSTOMER INTEROPERABILITY CHALLENGES

Smart grids will enable the bi-directional flow of electricity and information between the grid and end-users. Without a doubt, this information flow is critical to achieving the smart grid objectives of reliability and optimization of resources. There are significant challenges to ensuring that the myriad of customer environments and devices work together.

Utilities face many hurdles to ensuring and enjoying interoperability, whether it is support for demand response signals to legacy electrical devices in a home or adding new electrical vehicles and their charging stations to the local distribution grid, vendors, energy service providers, presenters discussed how customer interoperability could be achieved as well as issues that must be addressed.

Title	Author	Affiliation
Open Automated DR Technologies for Dynamic Pricing and Smart Grid – Presentation	Rish Ghatikar	Lawrence Berkeley National Laboratory
Conceptual Discussion: Identity and Location separation based communication schemes for addressing business, security and communication scalability challenges of Smart Grid applications – Presentation	Eruch J. Kapadia	Cisco
Modular Power Manager & Gateway An approach to home-to-grid energy management and demand response – Presentation	Timothy Schoechle	International Center for Standards Research
OpenADR and the Future of Energy Interoperation – Presentation	William Cox	Cox Software Architects LLC

ARCHITECTURE

The architecture track focused on the formal and informal guiding principles needed to support interoperability in the smart grid. As the smart grid sector builds momentum, new technologies and solutions must work with legacy equipment, and our architecture work provides the reference material to encourage agreement on emerging or established standards. A commonly held architecture provides the philosophical structure to help ensure that disparate technologies will support interoperability.

Ongoing work with GWAC Interop Toolkit and the GWAC Stack illustrate the architectural tenets and attributes that will help to guide and enable smart grid implementations.

ARCHITECTURE FRAMEWORKS AND TOOLS

This session covers architecture development methodologies and tools presently being employed. These include the Interoperability Constitution, Interoperability Context-Setting Framework document, and the Decision-Maker's Interoperability Checklist, which help define appropriate architectures and approval criteria. Panelists discussed new tools and techniques under consideration in the NIST SGIP Architecture Committee as well as the initial feedback on interoperability tools employed by early implementing vendors, system integrators, and utilities.

Title	Author	Affiliation
Creative Architecture and Design Concept for Smart Grid Applications – Design and Run-time use of Common Semantic Models – Presentation	Stipe Fustar	Power Grid 360
Smart Grid Architecture Framework – Presentation	Claudio Lima	Sonoma Innovation
Digging into Architecture. NIST SGAC plan for a Generic Smart Grid Conceptual Architecture – Presentation	Stephan Amsbary	EnerNex Corp.
SG IMM: A Process Maturity Model for Measuring & Advancing Interoperability – Presentation	Steve Widergren	Pacific Northwest National Laboratory

ARCHITECTURE ELEMENTS AND SOLUTIONS

What are the tangible elements that actually constitute an interoperability architecture? One of the problems with this topic is that most discussions surrounding it are often densely abstract. Even the most accomplished architect experiences problems visualizing and mapping to specific solutions.

During this session, architectural principles and mapping at the conceptual level, identifying logical elements, and reviewing specific component-based implementations that solve specific interoperability problems were demystified.

Title	Author	Affiliation
Wireless InterOp Architecture and Design – Presentation	Robert Buchard	Arcadian Networks
Smart Grid Architecture Evolutions – Presentation	Jeff Gooding	Southern California Edison

INTEGRATION METHODS AND APPROACHES

Having an accepted architecture, well-defined logical elements, interfaces, and identified components are all important, but actually building and integrating the components into systems that are compliant with the architecture is still challenging. Many projects will have to accommodate legacy equipment with new assets, adding even more interoperability complications to complex deployments.

This session included presentations that discussed integration methodologies and approaches to achieving desired goals cost effectively and with documented performance metrics to validate success.

Title	Author	Affiliation
C12.22 in Context – Presentation	Ed Beronet	Elster Solutions, LLC
NZE and the SOB: Service not Process, Policy not Control – Presentation	Toby Considine	TC9, INC
Managing Legacy Device and System Integration – Presentation	Erich Gunther	EnerNex

CYBER SECURITY AND INFORMATION ASSURANCE

A well-defined architecture must include considerations for ensuring the integrity of the services presented and data flowing through it. Cyber security considerations must be incorporated from the beginning of any architecture development process and carried beyond implementation and into the governance of that architecture.

This session covered key concepts to ensure this tight coupling of cyber security and information assurance from conceptual architecture through deployment of interoperably-compliant systems.

Title	Author	Affiliation
Interoperable Security considerations from Architecture to deployment for Smart Grid Systems – Presentation	Sitaraman Lakshminarayanan	GE Energy
Architecting for security – A Case Study – Presentation	Claude Vigeant	OKIOK
Cyber Security Working Group – Presentation	Tanya Brewer	NIST

INTEROPERABILITY FAIR

New to Grid-Interop 2010 was the addition of Face Time, a speaking opportunity designed to increase the number of topics and discussions.

Title	Presenter	Affiliation
Why Semantic Technology Matters and What It Offers – Presentation	Andrew Crapo	GE Global Research
Barriers to Gas SCADA-Smart Grid Connectivity – Presentation	Chris Ziolkowski	Gas Technology Institute
Smart Grid Consumer Information RoadMaps for Regulators	Ben Boyd	EnerNex Corporation
Success of Smart Grid Ties to “Game Change” – Presentation	Jiyuan Fan	Digital Energy, GE Energy
New Communications Standards For Photovoltaic Energy Generation and Storage – Presentation	Grant Gilchrist Brian Seal	EnerNex EPRI
Advanced Persistent Threat – Presentation	Diane Ashley	Lockheed Martin
Collaborative NMS for Carrier Wireless Backhaul Networks – Presentation	David Gosch	IAP Solutions
Modular Power Manager & Gateway Home gateway and smart power manager integrate inverter, charger, and demand response – Presentation	Timothy Schoechle	
EPRI Smart Grid Demonstration Overview – Presentation	Matt Wakefield	EPRI
A Smart Grid Testbed for Multi-layer Information Management System Development – Presentation	Ning Lu, et al	PNNL
Introduction to IEEE 1588 v2 – Presentation	Jim McGhee	RuggedCom Inc.

APPENDIX A. AGENDA

Wednesday, December 1, 2010

Opening Session			
Foundational Session			
Framing Interoperability			
<u>Regulatory Policies and Rate Structures for a Demand Responsive Grid</u>	<u>An Introduction to Information Interoperability</u>	<u>Flexible and Secure Interoperability</u>	<u>Architecture Frameworks and Tools</u>
<u>PAP 9 Energy Interop</u>	<u>CSWG – Session 2 – Wednesday</u>	<u>PAP 8</u>	<u>PAP06</u>
<u>Interoperability Fair</u>			
<u>PAP 03, PAP 09, SEP 2.0</u>	<u>EMII WG</u>	<u>PAP 12</u>	<u>PAP 7</u>

Thursday, December 2, 2010

<u>Opening Remarks</u>					
<u>Smart Grid Case Studies – Ongoing Work</u>		<u>What’s in a Word? – Semantics and Semantic Modeling</u>		<u>Substation Networks – Building Reliability and Redundancy</u>	
<u>Architecture Elements and Solutions</u>					
<u>PAP 10</u>	<u>PAP15: PLC Standards for Home Communications</u>	<u>PAP11: Common Object Models for Electric Transportation</u>	<u>Catalog of Standards and ANSI Portal</u>	<u>PAP 13</u>	<u>Terminology WG</u>
<u>The Value of Customer Data</u>		<u>The Common Information Model (CIM) Approach to Interoperability</u>		<u>Customer Devices: Mass Market Connectivity for the Smart Grid</u>	
<u>Integration Methods and Approaches</u>					
<u>PAP 17</u>	<u>EMII WG</u>	<u>PAP 14 Modeling T&D Systems</u>	<u>I2G DEWG</u>	<u>PAP 16</u>	
<u>Dinner – “Biologizing” the Smart Grid</u>					

Friday, December 3, 2010

<u>Opening Remarks</u>				
<u>Transactive Energy Management in Distribution Systems</u>	<u>Customer Interoperability Challenges</u>	<u>Interoperability and Communications Networks</u>	<u>Cyber Security and Information Assurance</u>	
<u>TnD DEWG</u>	<u>B2G DEWG</u>	<u>V2G DEWG</u>	<u>BnP DEWG</u>	<u>H2G DEWG</u>
<u>PAP Reports</u> <u>SGIP Election Results</u> <u>Paper Recognitions</u> <u>Rapporteurs</u> <u>Call To Action</u>				
End of Grid-Interop 2010				

APPENDIX B: FORUM PARTICIPANTS



Afnan, Jamshid
VP Information Services, ISO New England, Inc.

Jamshid has been representing ISO New England at Information Technology Committee (ITC) of ISO/RTO Council (IRC) since its inception. He served as the chair of the ITC during 2006.

Jamshid is the Vice President of Information Services at ISO New England Inc. since May 1999. Where he is charged with responsibility for IT environments necessary to support the deregulation of bulk electric system in New England, and overall enterprise information systems, networks and communication services. His responsibilities include directing the information and data integrity of the enterprise, its groups and all IT functions, including data centers, technical services centers, physical and cyber security, production scheduling, software development, and systems operations. Jamshid has managed the IT functions of ISO New England Inc from inception as the first ISO in the United States in July 1997.

Previously he was employed by New England Power Pool as Senior Computer Scientist and Manager of Computer Support Services, supporting similar functions before deregulation, since September 1980.



Allen, Chris
Certified Biomimicry Professional, Biomimicry Guild

Chris serves on the management team for the expanded operations of the Biomimicry Guild and Institute. He is among the fifteen graduates of the first cohort of the Biomimicry Institute's two-year professional program.

Trained in International Business at the McCombs School of Business at the University of Texas (1985), Chris has over twenty years experience providing strategy and management consulting services related to sustainable development for a variety of private sector clients as well as the US Department of Energy, the National Center for Appropriate Technology, the Northwest Area Foundation, and the United Nations Man and Biosphere Program. His international experience includes work and studies in Europe, Southeast Asia, and Mexico and he serves on the Board of Directors of A World Institute for Sustainable Humanity.

Chris received an award in 2007 from the State of Texas, Department of Parks and Wildlife, for land stewardship achievements at Woodson Place, a conservation development project focused on ecological restoration and green building on his family's 112 year old family farm.



Ambrosio, Ron
Chairman, GridWise Architecture Council / IBM T.J. Watson Research Ctr

Ron Ambrosio oversees IBM's Energy & Utilities Industry activities in its eight world-wide Research Laboratories. Ron joined IBM in 1981 at the T.J. Watson Research Center, working in a variety of areas including embedded operating systems, distributed application frameworks, and pervasive computing environments, ultimately focusing on networked embedded computing with particular emphasis on what he coined "Internet-scale Control Systems" - the interoperability of sensor networks and control systems with enterprise systems and business processes. He helped establish IBM's activities in both Intelligent Utility Networks and Sensors & Actuators.

In 2000 Ron began working with the U.S. Department of Energy on the planning, collaboration and workshops that led to the establishment of the DoE GridWise initiative in late 2002, and then on the planning and launch of the GridWise Alliance industry consortium in 2003. In 2004 he was selected by the Department of Energy to sit on the 13-member DoE GridWise Architecture Council, and was elected Chairman of the Council in 2009.

Ron is active in ISO/IEC JTC 1/SC 25 Working Group 1, where he is the Editor of a new premises automation application interoperability standard (ISO/IEC 18012). He's also a member of the U.S. TAG for IEC TC 8 - System Aspects for Electrical Energy Supply, and various other groups involved in smart grid technology definition and development.



Amsbary, Stephan,
TOGAF Certified Architect
Director of Utility Enterprise Architecture, EnerNex

Stephan Amsbary has extensive experience architecting and implementing extremely large scale mission-critical integration infrastructures. Before joining EnerNex, Mr Amsbary worked for HP as a Chief Architect and Global SOA Lead. At EnerNex Mr Amsbary directs EnerNex's Enterprise Architecture Practice and leads several strategic Smart Grid projects. Mr Amsbary has over thirty years in IT, eight years in the energy and utility industry and has been involved in energy projects in more than ten countries. He is routinely invited to speak at international events in the industry.

Mr Amsbary is a member of IEEE PES and a TOGAF certified Architect.



Anderson, John
President & CEO, ELCON

Dr. John Anderson is the President & CEO of the Electricity Consumers Resource Council (ELCON). He joined ELCON in 1980. He was named Executive Director in 1984. He has presented papers and spoken extensively on a wide range of electricity issues of importance to large industrial firms. Dr. Anderson holds both M.S. and Ph.D. degrees from the University of Florida with concentration in public utility and industrial organization.

ELCON is the national association representing large industrial electricity consumers. ELCON's member companies come from virtually every sector of the manufacturing community. They own and operate facilities throughout the United States and in many foreign countries. The member companies of ELCON consume over 5 percent of all electricity in the United States. Many ELCON members cogenerate some of their electricity requirements.



Arnold, George
National Coordinator for Smart Grid Interoperability, NIST

George Arnold was appointed National Coordinator for Smart Grid Interoperability at the National Institute of Standards and Technology (NIST) in April 2009. He is responsible for leading the development of standards underpinning the nation's Smart Grid. Dr. Arnold joined NIST in September 2006 as Deputy Director, Technology Services, after a 33-year career in the telecommunications and information technology industry.

Dr. Arnold served as Chairman of the Board of the American National Standards Institute (ANSI), a

private, non-profit organization that coordinates the U.S. voluntary standardization and conformity assessment system, from 2003 to 2005. He served as President of the IEEE Standards Association in 2007-2008 and is currently Vice President-Policy for the International Organization for Standardization (ISO) where he is responsible for guiding ISO's strategic plan.

Dr. Arnold received a Doctor of Engineering Science degree in Electrical Engineering and Computer Science from Columbia University in 1978. He is a Senior Member of the IEEE.



Ashley, Diane,
Professional Engineer
Regional Account Executive, Lockheed Martin

Diane Ashley is responsible for the Energy and Cyber Services accounts in the central United States region for Lockheed Martin. She interacts with utility customers, statewide organizations, and regional entities to identify pervasive challenges in the expanding energy market and leverage Lockheed Martin solutions and technical capabilities to address those issues.

Diane is a registered professional engineer with 13 years of systems engineering and information technology integration experience supporting the Department of Defense, Intelligence Agencies, and energy utilities. As a core team member and weekly participant of the National System for Geospatial Intelligence (NSG) System Engineering Team, Diane coordinated with the Infrastructure Service Provider (ISP) Core Service Areas for the evaluation and integration of concepts, requirements, and projects. During her time on the team, the NSG moved to an Application Service Provider (ASP)/ISP model and away from their previous organization around projects and programs.

Diane graduated as a Distinguished Graduate with a Bachelor of Science in Engineering Management from the United States Military Academy at West Point, NY, and a Masters of Engineering in Space Operations from the University of Colorado at Colorado Springs.



Bacik, Sandy, CISSP, CISM, ISSMP, CGEIT
Principal Consultant, EnerNex

Sandy Bacik, EnerNex Principal Consultant, author and former CSO, has over 15 years direct development, implementation, and management information security experience in the areas of Audit Management, Disaster Recovery/Business continuity, Incident investigation, Physical security, Privacy, Regulatory compliance, Standard Operating Policies/Procedures, and Data Center Operations and Management.

Ms. Bacik is a regular presenter at MIS Training Institute security conferences. Ms. Bacik currently volunteers and co-chairs subgroups with NERC, NIST, and UCA in assisting in developing interoperability and security standards for the Smart Grid. Ms. Bacik is the author of Building an Effective Security Policy Architecture (2008) and a contributing author to the Information Security Management Handbook (2009, 2010, 2011).



Baker, Fred
Fellow, Cisco Systems

At Cisco Systems, I am a Cisco Fellow, which is to say that I am among a very small number of very senior engineers tasked with giving guidance to the technology and the products of a company that is among the best recognized names in Internet-

related products, and number 83 on the Fortune 100 list this year. This is comparable to an Apple Fellow, an AT&T Fellow, or an IBM Fellow the designation implies a very senior engineer who is a person of vision and integrity, that is turned to not only by his company but by his industry when guidance is needed, and who has a history of making important events and technologies happen. In short, it is a person who can honestly say "the world is different because I was involved".



Bamonti, Tony

VP of Business Development, Tendril

Tony is Vice President of Business Development with Tendril Networks. Tendril develops a network operating platform for building, deploying and managing ZigBee wireless sensor network applications. Tendril has been a leading contributor to the ZigBee standard and the AML application profile initiatives and has developed applications for managing the grid-to-home interface with special emphasis on residential Energy Management.



Berens, Steven

Chief Marketing Officer, Power Tagging

Mr. Berens is a skilled industry executive that brings more than 20 years of experience in strategy, marketing, sales and engineering to all his endeavors. Most recently he served as President & CEO of Privacy Networks. He has demonstrated the ability to deliver results for innovative companies looking to address customer requirements in new, emerging and mature markets. Mr. Berens' solid industry relationships, strategic insight and creativity have led to successful market launches that focus on anticipating market needs and bringing timely solutions. During his career, Mr. Berens has held key management positions in high technology start-ups and Fortune 500 companies including IBM, Benchmark Storage Innovations and Privacy Networks.

Mr. Berens holds a Bachelor of Science degree in Mechanical Engineering from the University of Arizona and an MBA from the University of Southern California.



Beroset, Ed

Director of Technology and Standards, Elster Solutions, LLC

Edward J. Beroset is the Director of Technology and Standards at Elster Solutions, LLC. Elster Solutions is part of the Elster Group, which is the world's leading manufacturer and supplier of highly accurate, high quality, integrated metering and tiltization solutions to the gas, electricity, and water industries. The group has over 8500 staff and operations in 38 countries. Elster Electricity's history in metering spans more than a century to its origins as part of the Westinghouse organization in 1894.



Bjelovuk, George

Managing Director - Enterprise Technology, AEP

George Bjelovuk, managing director, Enterprise Technology, is responsible for AEP's technology strategies related to application and infrastructure standards, IT investment planning, and business analytics and optimization.

Bjelovuk graduated from Youngstown State University with a bachelor's of engineering degree in electrical engineering. He has a master's of business administration from the Fisher College of Business at The Ohio State University.

Bjelovuk serves as board member for the Simon Kenton Council of the Boy Scouts of America, and has been board member and past president of the Association of Telecommunications Professionals. He is the Smart Grid Executive Committee Chair for the Electric Power Research Institute. He was elected to the governing board for the NIST Smart Grid Interoperability Panel, and serves as the Board's Secretary.



Boyd, Ben

Vice President, Regulatory/Policy, EnerNex Corporation

Ben Boyd joined EnerNex as the Vice President of Regulatory/Policy and manages the Smart Grid Engineering Regulatory/Policy Group. Ben is a multi-state and international electric industry hands-on take charge regulatory professional. He has fluent knowledge in broad business management functions including strategy, budgeting and resource allocation, with consulting engineering experience, as well as experience in interacting on regulatory and legislative filings and working with state and federal commissions and agencies. Ben specializes in organizing processes for written or oral products, and motivating assets necessary to achieving EnerNex objectives crisply, directly, timely and with resource efficiency. He is an analytical, decisive, objectively critical extrovert with expertise in relationship building, product presentation, industry intelligence gathering, public speaking, and regulatory process management.



Boynton, Paul A.

NIST



Brancaccio, Dan

Senior Technical Architect, BRIDGE Energy Group

Dan Brancaccio has 30 years experience in Systems Engineering and Integration, development, developer management, and project management.

In various roles he has developed large scale, mission critical, enterprise applications for energy utilities and corporate (Kodak and 3M) clients worked directly with customers or corporate departments to define reports, analyses and general requirements and used industry standard development practices for team management and development task organization with the focus on reusability, maintenance, and documentation.

Mr. Brancaccio has developed applications for the utility, medical, and manufacturing sectors to improve use of legacy data systems, leverage existing development, and organize in house development personal to be more effective. In addition he has developed systems used for asset risk assessment, power quality analysis, energy analysis, energy pricing, substation instrumentation, and protective relay testing.



Britton, Jay

Principal Architect, AREVA T&D Inc.

Jay Britton is a 1967 graduate of Princeton University. He was a founder of ESCA Corporation in 1979, and of Xtensible Solutions in 1997, and served on the Board of Directors of both of those enterprises. He is currently Principal Architect with AREVA T&D Corporation.

Mr. Britton is best known for his innovative work in computer applications for real-time power sys-

tem operations. This work spans such subtopics as network analysis, power system modeling, application development tools, and systems architecture. He has been a regular participant in engineering forums and standards-making groups.

In 1997, he was honored as a Fellow of the IEEE, "for contributions to software architectures and to applications in electric utility energy management systems."



Budiardjo, Anto

President & CEO, Clasma Events Inc.

Anto Budiardjo is a seasoned marketing and product development professional specializing in the energy, connectivity and IT disciplines. Mr. Budiardjo has more than three decades experience within these industries and has fashioned his expertise into an energetic, visionary, and dynamic approach to business.

As a founder of Clasma Events Inc. Mr. Budiardjo is responsible for organizing key conferences and events for the emerging intersection of energy and IT, including GridWeek and Connectivity-Week. These and other events specifically focus on Smart Grid and the role of smart connected devices in the future clean and renewable energy economy.

Mr. Budiardjo is a frequent speaker at industry events and is a contributing editor of Automated-Buildings.com. He lives in the Dallas Fort Worth area in Texas and was the recipient of the Frost & Sullivan 2005 Building Technologies CEO of the Year award.



Burke, Robert

Markets Development Principal Analyst, ISO New England

Mr. Burke is a Principal Analyst in Market Development with ISO New England (the Regional Transmission Organization "RTO" for the New England control area). He has thirty-five years of experience in the energy industry. Since joining ISO-NE, he has held various positions and been involved with the development and subsequent on-going improvement of the wholesale energy markets, and worked with market Participants regarding Demand Resource integration issues. In his present position, he works on development of market rule changes for all areas of the New England wholesale markets and their FERC filings.

Mr. Burke has a B.E. in heat and power from Stevens Institute of Technology, MBA and MS in Computer Science, both from Rensselaer Polytechnic Institute, and has completed all examination requirements in Connecticut for a CPA. He is a member of IEEE, and a member of the GridWise Architecture Council since 2009 working on smart grid interoperability. He has made presentations at over three-dozen panel discussions and technical seminars, and authored or coauthored more than a dozen technical papers.



Burns, Marty

President, Hypertek, Inc. (for EnerNex)

Dr. Martin (Marty) J. Burns as part of Hypertek, Inc. has been involved with metering and utility standards development and firmware implementations for the past 10 years, home and building automation for the past 25 years.

Hypertek, the company he founded, has strived to maintain a balance between commercial implementation and utility research and development in standards and related activities. This allows Hypertek a unique perspective increasing the depth and balance of our work.

Marty received his PhD in Chemical Engineering from University of Pennsylvania in 1977. He is currently engaged in the development of utility, military, building and home communications and automation technologies.



Caskey, John, CEM
Director, NEMA

Mr. Caskey has more than 30 years of experience in the energy field with a broad background in utility systems, consumer demand response, and electrical product manufacturing. His experience includes developing standards researching solar, wind and geothermal technologies implementing demand-side management programs and managing the energy programs for one of the largest counties in the nation.

Mr. Caskey is currently the Senior Director for the Power Equipment Division at the National Electrical Manufacturers Association (NEMA). He is also the Vice Chair of the Governing Board of the Smart Grid Interoperability Panel.

Mr. Caskey holds a BS in Physics from George Mason University and an MS in Energy Technology from George Washington University's School of Civil, Mechanical and Electrical Engineering. Mr. Caskey is a Certified Energy Manager and has completed GE's Lean Six Sigma Black Belt program.



Cazalet, Ed
CEO, The Cazalet Group

An internationally recognized electric industry expert, Dr. Cazalet is a leader in the analysis and design of markets for electricity and the analysis of transmission, generation and load management investments. For his industry contributions, *Public Utilities Fortnightly* magazine in 2000 named Dr. Cazalet "Innovator of the Year".

Ed is also VP and Co-founder of MegaWatt Storage Farms, Inc., a storage advisory and project development firm.

He formerly was a Governor of the California Independent System Operator, and founder and CEO of both Automated Power Exchange, Inc. (APX) and Decision Focus, Inc. (DFI).

He has a PhD from Stanford in Engineering-Economic Systems.

Dr. Cazalet is co-chair of the OASIS Energy Market Information Exchange (eMIX) Technical Committee, and a member of the OASIS EnergyIn-terOp and WS-Calendar Technical Committees.



Centolella, Paul
Commissioner, Public Utilities Commission of Ohio

Paul A. Centolella was appointed to the PUCO by Gov. Ted Strickland in 2007.

Commissioner Centolella currently serves as the Vice President of the Organization of PJM States and is a member of National Association of Regulatory Utility Commissioners (NARUC) Smart Grid Working Group, NARUC's Climate Change Task Force, the NARUC Energy Resources and Environment Committee, and the Federal Energy Regulatory Commission / NARUC Smart Response Collaborative. He also represents NARUC on the Electric Power Research Institute's Advisory Council and serves on the Advisory Council's Executive Committee.

Commissioner Centolella earned a bachelor's degree with honors in economics from Oberlin College and his J.D. from the University of Michigan Law School. Commissioner Centolella is a member of the Ohio State Bar Association, the

California Bar Association, the Washington State Bar Association, the American Economic Association, and the International Association for Energy Economics.



Cerf, Vint
VP and Chief Internet Evangelist, Google, Inc.

Vinton G. Cerf is vice president and Chief Internet Evangelist for Google. He is responsible for identifying new enabling technologies and applications on the Internet and other platforms for the company.

Widely known as a "Father of the Internet," Vint is the co-designer with Robert Kahn of TCP/IP protocols and basic architecture of the Internet. In 1997, President Clinton recognized their work with the U.S. National Medal of Technology. In 2005, Vint and Bob received the highest civilian honor bestowed in the U.S., the Presidential Medal of Freedom. It recognizes the fact that their work on the software code used to transmit data across the Internet has put them "at the forefront of a digital revolution that has transformed global commerce, communication, and entertainment."

Vint has received numerous awards and commendations in connection with his work on the Internet, including the Marconi Fellowship, Charles Stark Draper award of the National Academy of Engineering, the Prince of Asturias award for science and technology, the Alexander Graham Bell Award presented by the Alexander Graham Bell Association for the Deaf, the A.M. Turing Award from the Association for Computer Machinery, the Silver Medal of the International Telecommunications Union, and the IEEE Alexander Graham Bell Medal, among many others.

He holds a Ph.D. in Computer Science from UCLA and more than a dozen honorary degrees.



Chassin, Dave
Staff Scientist, PNNL

Dave Chassin is a staff scientist in Pacific Northwest National Laboratory Energy Science and Technology Division and holds a BS in Building Science from Rensselaer Polytechnic Institute. He has more than 20 years of experience leading the research and development of computer applications software for the architecture, engineering, and construction (AEC) industry. His research interest centers on non-linear system dynamics and high-performance simulation and modeling (including energy and HVAC systems, air-flow in buildings, control systems, and logistics systems); diagnostic systems (including decision trees, expert systems, statistical systems, genetic algorithms, neural networks, etc.); energy system modeling; image processing and data analysis (including cellular automata, and pipeline image processing). David led PNNL's complex adaptive systems research under the Energy Systems Transformation Initiative, identifying first-principles models of the emergent eco-physical behavior of large scale engineered infrastructure systems such as the U.S. electricity markets, and electricity transmission and distribution networks. He was the principal investigator responsible for the market design, operations, and results analysis for the GridWise Olympic Peninsula Testbed Demonstration project.

Cheema, Hari
KEMA



Chen, Chris
Market Development Manager, Sempra Utilities

Chris Chen is a Market Development Manager, working with Plug-in Electric Vehicles and Smart Grid issues, for Sempra Energy. He is also a Board director and technical consultant for Juice Technologies. He has two Smart Grid-related patents pending and is a frequent speaker at industry events.

He has a BA degree from the University of California, Irvine, with a major in Economics. His MBA is also from UCI, with an emphasis in Organizational Behavior. Chris was an adjunct professor of organizational behavior at California State University, Long Beach and has published four books and numerous articles on a variety of topics.



Cleveland, Frances
President, Xanthus Consulting International

Frances Cleveland is President & Principal Consultant for Xanthus Consulting International. Ms. Cleveland has managed and consulted on information and control system projects for electric power utilities for over 30 years, covering SCADA systems, distribution automation, substation automation, distributed energy resources, automated metering infrastructure, and energy market operations. She was a major contributor to EPRI's IntelliGrid Architecture, is the Convenor of IEC TC57 WG15 on cyber security standards, the Editor of the IEC 61850 data modeling standards for DER, the Chairperson of the IEEE PES Power System Communications Committee (PSCC), the Chairperson of the IEEE PSCC Wireless WG, and the Chairperson of the IEEE PSCC Security Subcommittee.



Considine, Toby
President, TC9

Toby Considine has 25 years of experience with enterprise applications and the integration of embedded control systems for 25 years. As an Infrastructure Analyst internal to Facilities Services at the University of North Carolina, Mr. Considine gained real world experience with the poor security, poor interoperability, and brittle integrations that characterize last-generation protocols and building systems. This experience drove him to Chair the oBIX Technical Committee, and informs his work integrating buildings with larger systems and each other using enterprise-grade protocols.

Toby Considine is a regular speaker at international forums on e-commerce initiatives in the energy sector and incorporating building systems into the business processes of enterprises. He is a graduate of the Entrepreneurship Program at Kenan-Flagler Business School. Through TC9, Mr. Considine provides business plan analysis and system development guidance to pre-funding and after stage-one companies at the interstices of building systems, enterprise processes, and energy use. Toby also offers services to accelerate standards development and adoption.



Cox, William
Principal, Cox Software Architects

Bill is a leader in commercial and open source software definition, specification, design, and develop-

ment. He has the business savvy and deep and practical understanding of software architecture and technologies such as XML, Web services, Service-oriented architectures, eBusiness, Networking and system software to build your own capabilities - no black box "I'll do it for you" consulting!

Bill is an elected member of the Organization for Structured Information Systems (OASIS) Technical Advisory Board, where he advises the Board and membership of the leading XML and Web services standards organization in the world.



Crapo, Andrew

Information Scientist, GE Global Research

Dr. Crapo has been a part of the GE Global Research staff for 30 years. While developing performance and diagnostic models of mechanical, chemical, and electrical systems he developed a particular interest in human-computer interfaces, decision support systems, machine reasoning and learning, and semantic representation and modeling. His work has included a graphical expert system language (GEN-X), a graphical environment for procedural programming (Fuselet Development Environment), and a model-driven user-interface for decision support systems (ACUITy). Most recently Andy has been active in developing the Semantic Application Design Language (SADL), enabling GE to leverage world-wide advances and emerging standards in semantic technology and bring them to bear on diverse problems from engineering and maintenance to information security.



De Martini, Paul

CTO & VP Strategy, Smart Grid, Cisco Systems

Paul De Martini has over 30 years experience in the energy industry in both competitive and regulated businesses across the value chain. Over the past 20 years, he has been actively involved in technology development and implementation for clients worldwide and internal development.

De Martini earned a master's in business administration from the University of Southern California and a bachelor's degree from the University of San Francisco. He also earned a certificate in technology management from the California Institute of Technology. De Martini is currently a Fellow of the Wharton School, University of Pennsylvania.



Dinges, Sharon

System Applications Engineer, Trane

Sharon E. Dinges, CEM, is a System Applications Engineer for Trane, an Ingersoll Rand Climate Solutions business. Sharon uses her 17 years of experience, particularly in controls and energy, to assist customers in the development of innovative solutions for Energy Savings Performance Contracts, integrated facility projects, and HVAC system applications.

Sharon is Ingersoll Rand's voting member for the SGIP, and is actively involved with Smart Grid applications and standards development, including: NAESB PAP10 Smart Grid Task Force, PAPS 03, 04, 09, 10, B2G and I2G DEWGs, and PAP-related OASIS technical committees. As a member of the EIS Alliance, she has been involved with the development of facility energy usage information use cases and systems requirements specification for industrial, commercial, and residential customers. Sharon is a voting member, and past Secretary, of the ASHRAE SSPC135, BACnet committee. And, her future work includes par-

ticipation in ASHRAE's newly-formed SPC 201: Facility Smart Grid Information Model

Past speaking engagements include: Building Automation & Sustainability Conference & Expo, Green Intelligent Buildings, as well as local chapter meetings for ASHRAE and The Association of Energy Engineers. Sharon holds a B.S. degree in Electrical Engineering from Indiana Institute of Technology.



Dolezilek, Dave

Technology Director, Schweitzer Engineering Laboratories, Inc.

David Dolezilek is an electrical engineer with management and development experience in electric power protection, integration and automation system, control system, SCADA and EMS design and implementation; project management, project engineering, communications protocol definition, implementation, testing and analysis, generation plant monitoring and control, marketing and customer service management, and research and development engineering management. He continues to research and write technical papers about innovative design and implementation affecting the electric power industry.

In his role as Technology Director, Dolezilek performs business development and technical sales and education, system solution research, system design and project management and acts as a liaison with other solution suppliers. Dolezilek is a strong contributor to several technical committees creating international standards for communication and automation of electric power systems. He is a key technical asset to several long-term customer alliances.

Author of 24 and co-author of several other technical papers as well as many application guides and training materials.



Drummond, Rik

CEO and Chief Scientist, Drummond Group Inc.

As Chief Executive Officer and Chief Scientist of Drummond Group Inc. (DGI), the trusted global interoperability certification authority, Rik Drummond has led the company's technical and research strategies while steering DGI to constant growth and innovation. He is a widely respected thought leader in the eBusiness industry with over 30 years of experience and a driving force in the technical standards bodies and vertical industry groups supporting B2B commerce.

In his two and a half years as the original chairman of the GridWise Architecture Council, Rik guided and shaped the Council as one of the primary advocacy bodies for a smart electric grid. He remains an instrumental member in advancing the benefits of improving the interoperability between automation systems needed to enable smart grid applications. Rik demonstrated the courage to rally the thirteen members of the Architecture Council around notions of interoperability and the need to develop a crosscutting electricity community of people and organizations representing industrial system, buildings automation, home automation, and economic and regulatory policy in addition to electric service providers.



Ennis, Greg

Technical Director, Wi-Fi Alliance

I am currently the Technical Director of the Wi-Fi Alliance, a position that I have held since the founding of the organization in 1999. Prior to this I served as editor of the original IEEE 802.11 standard, hav-

ing previously developed and presented a proposal for the wireless MAC protocol design which was subsequently adopted by the 802.11 Working Group as the foundation for the standard. My experience within IEEE goes back to the mid-80s when I served as the chair of the Broadband CSMA/CD subcommittee of the 802.3 "Ethernet" Working Group. I was awarded a "Certificate of Appreciation" from the IEEE for my contributions to the 802.11 standard.

I also have previous experience assisting the federal government in a critical high-technology transition program. In the early 1980s, management authority for the original Internet was transferred from DARPA to the Defense Communications Agency, in keeping with its transition from research project to operational status for DoD. I served in a contractor capacity to DCA helping to manage this transfer. My key responsibilities included participation in the Protocol Standards Technical Panel, which at the time was formulating protocol standards policies that ultimately led to the complete adoption of TCP/IP within the Internet.



Evslin, Tom

Author and Entrepreneur, Evslin Consulting

Tom Evslin's career has taken him from nerd to CEO to novelist and consultant with a brief stop as Vermont's Transportation Secretary in the early 1980s.

Recently Tom was volunteer Chief Technology Officer for the State of Vermont. Immediately prior to that he was Chief Recovery Officer for the State responsible for coordinating the state's use of federal stimulus funds and focusing them on the priorities of universal broadband penetration, a smart electrical grid, e-health, and e-education.

Tom's novel hackoff.com: an historic murder mystery set in the Internet bubble and rubble is available free online and for purchase from Amazon in hardcopy or Kindle form. A short story "The Interpreter's Tale" can be downloaded to Kindle. His personal blog Fractals of Change is at blog.tomevslin.com.

He conceived, launched, and ran AT&T's first ISP, AT&T WorldNet Service. WorldNet popularized all-you-can-eat flatrate monthly pricing for Internet access and forced the rest of the industry, including AOL and MSN, to follow suit. Tom has been blamed and praised for this ever since. He is unrepentant.

At Microsoft, Tom was responsible for the server products now in Microsoft BackOffice including Microsoft Exchange and for Exchange's predecessor Microsoft Mail.

For many years Tom was Policy Chairman of the Voice on the Net Coalition and a member of the organization's Board of Directors.



Fan, Jiyuan

Strategic Planning Leader, GE Energy/Digital Energy

Jiyuan Fan, Ph.D., IEEE Senior Member, He got his BS degree from Taiyuan Univ. of Tech., Taiyuan, China in 1979, MS degree from Chinese EPRI, Beijing, China, 1982 and Ph.D's degree from Clarkson University, New York, USA, 1989. He worked as a Post Doctorial Research Associate at Texas A&M University, 1989-1990. Since then, he has worked in the Power System Automation area, including SCADA/EMS/DMS/OMS with the companies of Advanced Control Systems, Inc. in Atlanta, Valmet Automation in Houston, Beijing Sifang Automation in China. He is currently with GE T&D as the Strategic Planning Leader responsible for technology and product planning.

Dr. Fan has authored/co-authored 20+ technical papers on Electric Power Automation, 10+ of them are IEEE PES transaction papers. He has an article on Advanced Distribution Management Systems in the 2009 March/April issue of IEEE Power & Energy magazine, whose theme is The Next Generation Grid.



Farquharson, Ron,
Senior Member IEEE
Principal Consultant, Smart Grid
Engineering Team, EnerNex
Corporation

Ron Farquharson is a Principal Consultant, Utility Automation on the Smart Grid Engineering team of EnerNex Corporation. He has almost 30 years experience in substation control, automation, and monitoring. Farquharson spent the bulk of his career at GE/GE Harris/Harris/Westronic, where he held numerous positions in product management/marketing and project management. Ron's primary areas of expertise and activity include substation and distribution automation, phasor measurement, equipment condition monitoring, communications and protocol technologies, business case development and product and project management. He has authored papers on topics related to substation automation, protocols, monitoring & diagnostics and communications. Ron is a Senior Member of the IEEE and serves on the Advisory Committee for DistribuTECH.

Folz, Frank

Managing Director, Smart Grids, Airspan Networks



Fustar, Stipe
President, CEO & CTO, Power Grid 360

Dr. Stipe Fustar has over twenty five years of experience in the electric utility industry including consulting, project/team management, development, data modeling, system design, IT Architecture, Web development, Enterprise Integration and Business Process Automation (BPA). He has a deep understanding of all aspects on electric utility industry with special expertise in the power system operation. He has worked on all phases of design, development and implementation of energy management, SCADA, distribution management, and similar software systems. His expertise includes a broad range of energy and distribution management services, addressing network calculations, optimization, outage management, AM/FM/GIS technology, data modeling, SCADA, and system integration and design. He has a working knowledge and deep understanding of EPRI CIM. He provides a unique blend of electric utility industry expertise and strong IT/Integration/Web Technologies background.

Tennessee Valley Authority: Lead Architect and EAI work stream Leader for power system optimization project that encompasses process design engineering, power system applications and enterprise application integration. Instrumental in creating a Conceptual Architecture for project IT infrastructure using Service Oriented Architecture and technologies such as ESB, EII, ETL and SM.



Gallagher, Patrick
Director, National Institute of
Standards and Technology

Nominated by President Obama on Sept. 10, 2009, Dr. Patrick Gallagher was confirmed by the Senate on Nov. 5, 2009, as the 14th director of the U.S. Department of Commerce's National Institute of Standards and

Technology (NIST). Gallagher provides high-level oversight and direction for NIST. The agency promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology. NIST's FY 2009 resources total \$1.6 billion and the agency employs about 2,900 scientists, engineers, technicians, support staff and administrative personnel at two main locations in Gaithersburg, Md., and Boulder, Colo. In addition to \$819 million in FY09 appropriations and \$125 million from other agencies, the American Recovery and Reinvestment Act of 2009 provides a total of \$610 million to NIST for building critically needed research facilities, expanding fellowships and research grants, and addressing important national priorities critical to the nation's future.



Ganson, Jay
Business Development Manager,
Ambient Corporation

Jay Ganson has been with Ambient Corporation for 5 years working on business development, public policy and capital raises. Jay is actively involved with lead industry groups such as the Gridwise Alliance, Demand Response and Smart Grid coalition and New England Clean Energy Council to promote clean energy and the smart grid industry. Jay has a masters in environmental management from the Harvard extension school, and an undergraduate degree in Russian from Dickinson College.



Ghatikar, Rish
Program Manager, Lawrence
Berkeley National Laboratory

Garish Ghatikar is a Program Manager with U.S. Department of Energy's Lawrence Berkeley National Laboratory overseeing Demand Response (DR) technologies and Open Auto-DR (OpenADR) standards, and U.S. and International Smart Grid and energy-related technology and business activities. Ghatikar's background and industry experiences are in key areas of information technology, standards, software programming, collaboration, technology transfer, and business and policies for Energy Efficiency, DR, Smart Grid, and Internet applications.

Over these years, Ghatikar has identified and executed new opportunities in key areas of applied research, program and financial management, and cost benefit analysis. Ghatikar serves on the Steering Committee for the "OASIS (Organization for Advancement of Structured Information Standards) Blue," other OASIS technical committees, and UCA (Utilities Communication Architecture) user groups to advance standards in energy- and Smart Grid-related areas.

Ghatikar holds Master degrees in Telecommunication Systems/ Computer Technologies and Infrastructure Planning/ Management.



Gilbert, Erik
Sr. Consultant, Summit Blue
Consulting

Erik Gilbert is a Senior Consultant who focuses on Smart Grid technology, strategy, costs-benefits assessment and helping clients with Smart Grid funding strategy. Mr. Gilbert has over twenty years of experience in development and management of networking products and protocols as well as experience in strategic business assessment for technology solutions. In his most recent role, Mr. Gilbert served as Director of Smart-Energy Products for residential energy management system vendor Tendril Networks, Inc., where he defined and executed their hardware roadmap, including in-

home energy displays, IP-to-HAN gateways, AMR/ERT-to-ZigBee bridges and other products.

Previously Mr. Gilbert held various management positions at Cisco Systems, Inc., where he built and launched a number of products. He created and drove the company's Managed Broadband Access program, enabling providers to offer billable services over common IP infrastructure. Mr. Gilbert's other experience includes associate work at the Bay Area venture capital firm Hummer Winblad Venture Partners and several years of technology strategy development with Ernst & Young Management Consulting. Mr. Gilbert holds a BS in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology and an MBA in Marketing from the University of California at Berkeley.



Gilchrist, Grant, P. Eng.
Principal Consultant, EnerNex
Corporation

Grant Gilchrist, P. Eng., is a Consulting Engineer and Systems Architect for utility data communications with EnerNex Corporation. He is a member of several utility data communications standards bodies including the IEC working groups for SCADA, substation automation, protocol security, and interoperability. He is a founding member of the Technical Committee for the Distributed Network Protocol (DNP3). Most recently he is helping to develop the IEC 62351-5 standard for security of the IEC 60870-5 protocol family and DNP3. He has facilitated the development of use cases and technical requirements for AMI at Southern California Edison, CMS Energy, and BC Hydro.

Before joining EnerNex, Grant spent a total of 17 years developing embedded data communications software for GE Energy and Nortel Networks. He has a Bachelor of Applied Science in Systems Engineering from the University of Regina, Saskatchewan, and is a registered Professional Engineer in the province of Alberta, Canada.



Giroti, Tony, CISA
Chairman and CEO, BRIDGE Energy
Group, Inc.

Tony Giroti is the Chairman and CEO of BRIDGE Energy Group which is focused on Grid Operation, Market Operation and Smart Grid. He has expertise in Enterprise Architecture, IT Transformation, Application Integration, Service Oriented Architecture and Business Intelligence. After completing his Bachelor of Engineering in Electrical Engineering, Tony trained at Crompton Greaves Ltd. in Power Systems division designing large transformers. Tony also holds a Master of Science in Electrical and Computer Engineering from The University of Massachusetts.

Tony had also started two venture capital-backed global companies in the areas of Data Warehouse and Unified Communication. He took the latter one public. He is currently the Executive director of an Australian public company, former Chairman of the IEEE, President of Power Engineering Society, Chairman ISACANE and former President, CEO and Chairman of two technology companies. Tony is CISA certified.

Gomes, João Batista



Gooding, Jeff

General Manager, Smart Grid Engineering, Southern California Edison (SCE)

Jeff Gooding is the IT- General Manager of Smart Grid Engineering supporting the Transmission and Distribution Business Unit's Advanced Technologies Department at Southern California Edison. He has served as the Lead Architect supporting SCE's Advanced Metering Infrastructure (AMI) Program. Prior to joining the AMI Program, Jeff supported SCE's development of power procurement and nuclear software applications for the Energy Supply & Marketing (ES&M) department and San Onofre Nuclear Generating Station (SONGS). Prior to joining SCE, Jeff was a Senior Manager at Cap Gemini Consulting (formerly Cap Gemini Ernst & Young) where he served in the Advanced Development & Integration division of the Utilities practice. As such, he served as an architect and technologist on projects at the California ISO, Ontario IMO, Portland General Electric and PG&E. Earlier, Jeff was a Partner at Rapid Access Systems (RAS) where he served as lead designer for a number of decision support applications. Jeff holds M.B.A. and B.S. degrees from California State Polytechnic University, Pomona.



Gosch, David

Business Development, IAP Solutions

David Gosch runs business development for IAPsolutions in North America, with predominant focus on integrated and highly-distributed Network and Infrastructure Management systems for emerging Smart Grid field networks. With an Electrical/Computer Engineering degree from the University of Wisconsin, he specializes in embedded electronics and real-time control.

Previously, David was VP of Professional Services for Starview Technology, a San Jose based Enterprise startup in the Event Processing space. In addition, David was VP Sales & Marketing at Tenta Technology (acquired by MKS Instruments), creating embedded computing solutions for Semiconductor processing systems.

IAPsolutions is a spin-off of the Telefonica R&D software group, based in Madrid, Spain. David resides in the Bay Area of Northern California.



Gunther, Erich, P.E.

Chief Technology Officer, EnerNex Corporation

Erich Gunther is the Chairman and Chief Technology Officer for EnerNex Corporation in Knoxville Tennessee where he helps EnerNex clients define their strategic direction in basic R&D, technology, and product development. Mr. Gunther has over 20 years of experience in design and development of innovative solutions to a wide array of power system problems, most notably ways to take advantage of communications networks and technology to improve the efficiency, operating practices, and security of the electric power system. Erich has a leadership role in many of the key grid modernization groups and standards organizations including the GridWise Architecture Council, UtilityAMI, IEEE PES Intelligent Grid Coordinating Committee, and many others. Erich also serves on the board of directors for the Utility Communications Architecture International Users Group. He is presently consulting with the California

Energy Commission and Southern California Edison on matters related to the development of a widely deployed advanced metering and demand responsive infrastructure in California, and is working with several utilities developing their smart grid development roadmaps.

Harada, Richard, BaSC, Computer Science

Product Manager, RuggedCom



Hardin, Dave, PE, PMP, CSDP

Technology Officer, Invensys

Dave has more than 25 years of comprehensive experience designing, constructing, integrating and managing automation and information systems for industrial manufacturing. He specializes in software architecture and design focused on manufacturing systems integration and interoperability spanning from intelligent devices to enterprise business systems. Dave is a member of the OPC Foundation's Unified Architecture Working Group and holds a Bachelor of Electrical Engineering from the University of Delaware. He is a Registered Professional Engineer (DE/JMD), an IEEE Certified Software Development Professional, a PMI Project Management Professional and a Microsoft Certified Application Developer.



Harrison, Becky

Director, Distribution Services, Progress Energy

Becky Harrison is the Director of Distribution Services for Progress Energy Carolinas. She has over 20 years experience in the electric utility business in distribution and information technology. Her current responsibilities include distribution technology, process improvement, project management, craft and technical training, human performance, safety, joint use and locates. Becky and her organization are intimately involved in Progress Energy's SmartGrid initiatives and future strategies. She led a recent effort to develop the Progress Energy SmartGrid Roadmap.



Henderson, Debbie

Solutions Architect, Trilliant

Debbie Henderson is Trilliant's Solution Architect focused on Smart Grid communication solutions. She is a 29-year veteran of the energy industry. Debra's employment experience includes PG&E Corporation, CellNet Data Systems, Silicon Energy, Itron and OSIsoft. She holds a degree in electrical engineering from California Polytechnic University, San Luis Obispo and an MBA from California State University, East Bay. She is a registered electrical engineer in California.

Herbst, Thomas

Silver Spring Networks



Hodges, Brent

Director, Smart Energy Partnerships, Reliant Energy

Brent is Director of Smart Energy Partnerships at Reliant Energy. In this role, he works on Reliant's Smart Energy vision, strategy and execution with vendors, channel partners and technology standard organizations. Prior to Reliant, Brent was the Vice President of Marketing and Business Development for the ZigBee Alliance. There, he drove Alliance member activities in establishing ZigBee as the standard

for low power wireless sensor networks. He started his work in wireless networking at a venture backed start-up in Boston, Ember Corporation, which was an early pioneer in wireless mesh networking technology. Prior to his involvement with wireless, Brent spent several years in manufacturing with a specialty plastics company, where he led various production operations and lean manufacturing initiatives.

Brent holds a BS in Industrial Engineering from Texas A&M University, an MS in Industrial Engineering from Purdue University and an MBA from Harvard Business School.



Holmberg, David

Building and Fire Research Laboratory, NIST

David Holmberg serves in the NIST Building and Fire Research Laboratory. His work focuses on building integration into the Smart Grid and, more generally, communication of building-system data to outside partners. David serves as the representative for the buildings community on the NIST Smart Grid team, and leads the Building-to-Grid (B2G) domain expert working group. He is currently convener of the Smart Grid Working Group (SG-WG) of the ASHRAE BACnet (Building Automation Control network protocol) committee, with work focused on advancing the control of commercial buildings and participation in the Smart Grid. David also co-chairs the OASIS Energy Interoperation Technical Committee which is focused initially on the NIST DR and DER Priority Action Plan, and more broadly on signaling standards that enable end-node participation in maintaining grid stability.

David received his PhD from VA Tech, and joined NIST as a post-doc in 1997, studying issues related to accurate measurement of heat flux in a mixed-mode (radiation, convection, and conduction) heat transfer environment. Since joining the Mechanical Systems and Controls group, David has worked on BACnet network security, utility interaction, and communication of building data to emergency responders. Dr. Holmberg is a member of ASME and ASHRAE.



Hublou, Scott

SVP of Products, Co-Founder, EcoFactor

Scott has established himself as a leading voice in the clean tech and energy industries, through his consumer advocacy in the residential energy efficiency space. He is a frequent speaker on emerging smart grid technologies and the important role that smart homes play in creating a truly efficient energy system. Scott has been a featured speaker at VentureBeat's GreenBeat conference and was a regular guest lecturer at both Stanford and the University of California at Berkeley business schools, sharing his knowledge and expertise on business intelligence and SaaS platforms.

Prior to EcoFactor, Scott's has a long history of building successful software solutions that leverage SaaS platform and was the CMO of Sapria Design and Technology Group, as well as the CEO of Asimba. Scott has also held product development and marketing roles at SAP, PeopleSoft and HP.



Hughes, Joe

Senior Technical Manager, EPRI

Joe Hughes is a Sr. Technical Manager for Power Delivery System Technologies in the Power Delivery Science and Technology Development Division at EPRI in Palo Alto, California. He has over 25 years experience in the utility industry including

20 years in utility research and development. Prior to joining the Electric Power Research Institute (EPRI) in 2001, Joe worked for over 19 years at Pacific Gas and Electric where he managed a portfolio of R&D projects ranging from advanced communications and distributed computing in addition to advanced energy efficiency and end use technologies. Mr. Hughes is current manager of several projects to develop key open technical standards for advanced automation for transmission, substations, distribution operations as well as customer communications. Mr. Hughes initiated and managed EPRI's IntelliGrid™ Architecture Projects and is active in energy industry technical standards committees.



Ipakchi, Ali

VP, Smart Grid and Green Power, OATI (Open Access Technologies, Inc.)

Dr. Ipakchi has over 30 years of experience in the application of information technology to power systems and electric utility operations. As the VP of Smart Grid and Green Power at OATI, he is responsible for growth of the business in these emerging areas. Prior to OATI, he was Vice President of Integration Services at KEMA, assisting utility clients with roadmaps, specifications, business and implementation strategies for automation and technology projects. Prior to KEMA, Dr. Ipakchi held various senior management positions at leading vendors supporting power application development and system solutions delivery to the power industry. He has led new business-line and organizational development initiatives, and has managed product development and delivery teams. His areas of experience include Smart Grid, utility automation, power systems operations, enterprise and operational IT systems, systems for ISOs/energy markets, utility control centers, trading floors, power generation, distribution operations, and advanced metering. He holds a PhD from University of California at Berkeley, and is co-holder of three US patents on power systems applications and instrument diagnostics.



Irwin, Christopher

Smart Grid Standards and Interoperability Coordinator, U.S. Department of Energy

Christopher Irwin has spent over 17 years in a diverse spectrum of high technology fields from HVAC to III-V semiconductor manufacturing, and most recently in communication networks for advanced metering (AMI) and Smart Grid infrastructure. He is a member of the Department of Energy team administering the Smart Grid Investment Grants, and is responsible for standards and interoperability activities, including participation in the NIST-led Smart Grid Interoperability Framework.

Prior to joining the Department of Energy, he served as Director of Products at an AMI communications vendor, also participating in Technology Discovery and Business Development. In that role, he gained a full market perspective on the electric energy sector, as well as natural gas and water infrastructure. This experience, combined with his semiconductor and satellite communications background, contributes to a unique perspective on the US energy business under transformation. Chris holds a B.S. in Mechanical Engineering from the University of Maryland, College Park, and an M.B.A. from the W.P. Carey School of Business at Arizona State University.

Janca, Tom

Intelligent Utility Network Architect, IBM Global Technology Services



Jarnagin, Ron

Staff Scientist, Pacific Northwest National Laboratory (PNNL)

Mr. Jarnagin has been involved in energy-related research and development activities for over 30 years. His background is diverse, including work in the areas of fluid flow, power plants, automotive and transportation systems, HVAC systems, energy use in buildings, and energy standards development. Mr. Jarnagin has served on numerous utility, government and business advisory boards, lending his expertise to solving their respective energy problems. He served on the faculty in the Department of Mechanical Engineering at the University of Florida for 10 years, and has been with Pacific Northwest National Laboratory for nearly 20 years.

Mr. Jarnagin is active in standards development activities, both nationally and internationally. He chaired ASHRAE's Standard 90.1 committee, providing the leadership to successfully complete a comprehensive revision to that standard in 1999. In addition, he chaired the International Standards Organization (ISO) TC 205, Building Environment Design. He chaired a multi-disciplinary team of members from four organizations that produced the first in a series of Advanced Energy Design Guides that garnered 3 national awards from sustainability organizations in the U.S. Mr. Jarnagin is active in ASHRAE, having served on the Board of Directors as a Director-at-Large and an ASHRAE Vice President. He also served as Chairman of ASHRAE's Technology Council, which has stewardship for all of ASHRAE's research, standards, and technical committees.

Kapadia, Eruch

Sr. Solutions Architect, Cisco Systems Inc.



Kezunovic, Mladen

Professor, Texas A&M University

Mladen Kezunovic received the Dipl. Ing., M.S. and Ph.D. degrees in electrical engineering in 1974, 1977 and 1980, respectively. He has been with Texas A&M University for 23 years. Currently, he is the Eugene E. Webb Professor and Site Director of the Power Engineering Research Center (PSerc), an NSF Industry/University Cooperative Research Center with 13 university and 40 company members. He worked for Westinghouse Electric Corporation, Pittsburgh, PA, 1979-1980 and Energoinvest Company, in Europe 1980-1986. His main research interests are monitoring, control, and protection of power systems and the 21st century grid developments with innovations in engineering, technology, policy, economic, and societal and environmental issues. He has published over 350 papers, given over 100 seminars, invited lectures and short courses, managed over 80 R&D projects, and consulted for close to 50 major companies in the utility business worldwide. Dr. Kezunovic is a Fellow of the IEEE, an IEEE Distinguished Lecturer, a member of CIGRE and Registered Professional Engineer in Texas.



Kiesling, Lynne, Ph.D.

Senior Lecturer, Northwestern University

Lynne Kiesling is a Senior Lecturer in the Department of Economics at Northwestern University, and in the Social Enterprise at Kellogg (SEEK) program in the Kel-

logg Graduate School of Management at Northwestern University. At Northwestern she is also a Faculty Member in the Northwestern Institute on Complex Systems (NICO) and a Faculty Affiliate in the Center for the Study of Industrial Organization (CSIO). Lynne is the author or co-author of many academic journal articles, book chapters, policy studies, and public interest comments, most of which analyze electricity policy and market design issues. Her specialization is experimental economics and organizational economics. She also teaches undergraduate courses in energy economics, environmental economics, and history of economic thought, and writes about economics as the editor/owner at the website Knowledge Problem.

Lynne has a Ph.D. in Economics from Northwestern University and a B.S. in Economics from Miami University, Oxford, Ohio. Her previous appointments include Assistant Professor, College of William and Mary, Manager, Price Waterhouse/PricewaterhouseCoopers LLP, Director of Economic Policy, Reason Foundation, and Research Scholar, Interdisciplinary Center for Economic Science at George Mason University.



Klerer, Mark

Senior Director - Technology, Qualcomm

Mark Klerer is currently a Senior Director of Technology at Qualcomm where he shares in the responsibilities of the standardization of wireless technologies. He is also currently chair of IEEE 802.20 and a member of the 802 Executive Committee. Mark has work experience both in power systems engineering and in communications systems engineering. Mark has extensive experience in leading and managing standards activities. Mark has served on the Boards of several successful industry standards forums (the OIF, NMF and MSF) and he has chaired numerous standards committees in the ITU-T, ITU-R, ISO, ATIS, MESA and IEEE. Mark was involved in the development and negotiation of organizational charters as well as in the development of the actual specifications his skills in facilitating consensus in the presence of diverging interests have been an asset in keeping the groups productive. Mark is dedicated to bringing these skills to the SGIPB and to devoting his energies to the success of the SGIP.

Mark has a BS degree in Electrical Engineering from the City College of New York, a Masters degree in Systems Engineering for Stanford University and a Masters degree in Business Administration from Pace University.



Klouda, Raymond

Vice President, Elite Electronic Engineering Inc

Mr. Klouda has been active in the related fields of electromagnetic compatibility (EMC) and RF shielding design since 1979. He is proficient with military and commercial EMC specification, including Mil-Std- 461, RTCA-DO160, FCC rules, Canadian Regulations, CE Marking and International compliance including CISPR and IEC/ISO specifications. As a technical reviewer, he reviews and approves radio devices under the Telecommunication Certification Body program. In addition, he leads the team responsible for the administration of Elite's ISO 17025 quality system and ISO Guide 65 certification systems. He is an iNARTE Certified EMC Engineer and a licensed professional engineer in the State of Illinois. He is an active member of the IEEE EMC Society. Mr. Klouda received his electrical engineering degree from the University of Illinois at Champaign-Urbana B.S.E.E. (1981) and graduated with honors (Tau Beta Pi and Eta Kappa Nu Honor Societies). Ray

lives in Lisle, IL with his three children Lauren, Stacey and Dave. He enjoys gardening and traveling.



Knight, Mark

Director, Grid Applications, KEMA

Mark Knight is Director of Grid Applications at KEMA. Mark's background, spanning 24 years, has included a mix of information technology work and business process work both as a consultant and as a utility employee in the UK and the US and has spanned several areas including distribution, transmission, metering, systems integration, and deregulation. In his role at KEMA he is responsible for developing vision and requirements for Meter Data Management and other applications that can mine the data from smart meters and other intelligent devices. He is focused on the integration with and impact on utility processes and applications required to support information sharing for enterprise users' needs and to prioritize areas that will benefit directly from this data in order to define the value propositions for the new uses of data and to enhance interoperability.



Koepke, Galen

NIST, US Dept of Commerce

Galen Koepke has been an electrical engineer with the Electromagnetics Division of NIST in Boulder, Colorado for over 30 years. His primary research activities are radiated electromagnetic field measurements and standards, including electromagnetic interference and compatibility applications. He is a member of IEEE EMC Society and a NARTE certified EMC engineer. He has served on various EMI/EMC standards committees including IEEE, IEC/CISPR, and SAE. Currently he is the Project Leader for the Field Parameters and EMC Applications project and is responsible for developing the electromagnetic disturbance section of the NIST Smart Grid standards framework.

Kotha, Suresh

SMUD

Lakshminarayanan, Sitaraman

Lead Systems Engineer - Smart Grid Security, GE Energy



Lambert, Eric

Project Manager, EDF

Eric Lambert began his career on Power System Controls at HydroQuv@bec from 1988 and entered EDF R&D in 1994. He was in charge of the Distribution Scada migration and architecture design.

He was project Manager from 2003 to 2008, promoting standards usage in EDF Distribution and Transmission subsidiaries.

He is member of CIM user group executive committee, IEEE Power Engineering Society. In IEC TC57 WG14 he leads the standard part 61968-13 (CDPSM). He is member of IEC TC57 wg13, wg19, and CIM user group executive committee.

Since 2008, he supports the migration process of European TSO to CIM, and he is involved in 2 European projects: ADDRESS and DERri.

Eric is graduated in Computer Science and has a master in robotics from Ecole des Mines de Douai and an MBA from IAE Paris and was member of Quebec Engineering Society.

Lekan, Paul

Vice President, Industry Marketing, Aclara

Paul Lekan is Vice President of Industry Marketing for the Aclara®-branded companies. Aclara serves electric, water, and gas utilities with the industry proven solutions for Utility WAN Communications, Advanced Metering Infrastructure, Meter Data Management and Consumer Connectivity.

Paul has 18 years of experience in the sales and marketing of power distribution and control systems as well as factory and home-area networking/automation. Paul is a team-oriented manager and has a proven record of leading and developing new product and technology launch strategies. Before becoming Vice President of Industry Marketing for Aclara, he held sales, product management, marketing, and operations positions at Parker Hannifin Corporation and Eaton Corporation.



Lenane, Brian

Senior Principal, SRA International

Brian Lenane has more than 25 years of experience in all aspects of software development, SaaS solutions, data center consolidation, information security managed services and information systems management, with a proven track record of building and leading highly motivated, results-driven teams. His background includes executive-level information services at leading software firms known for driving innovation and delivering both top-line growth and bottom-line performance.

Mr. Lenane has received an MBA from the Wharton Graduate School of Business, a BA in Biology from Franklin & Marshall College, and earned a CAGS from Harvard University.



Levinson, Alex

Lockheed Martin Senior Fellow, Lockheed Martin

Alexander (Alex) R. Levinson is a Lockheed Martin Fellow with Integrated Systems and Global Solutions (IS&GS) in Valley Forge, PA.

With 30+ years of practical experience, Alex is well versed in strategies for designing large-scale Information System architectures and their associated technology infrastructures.

Mr. Levinson served as Principal Architect with Honeywell, Inc. where he was responsible for overall software architecture design and delivery of TDC-2000 Process Control System - a large scale network-based distributed real-time industrial control system for the power generation and petrochemical industries

Mr. Levinson is a member of the GridWise Architecture Council.

Alex has a Master of Science degree in Electrical Engineering from State Polytechnic University of St. Petersburg, Russia and is currently serving as Adjunct Associate Professor of Math and Computer Science with Drexel University in Philadelphia, PA.



Lima, Claudio

Vice Chair of IEEE P2030 Smart Grid Architecture Standards WG, Sonoma

Claudio Lima is the Vice-Chair of the IEEE P2030/TF3 Smart Grid Architecture work group and serves as a member of the NIST Cybersecurity Smart Grid Architecture, IEEE P2030 Smart Grid Standards Committee and the IEEE Smart Grid Steering Committee. He's actively involved with the NIST Smart Grid Interoperability Standards, defining the role of IP

in Smart Grid and the development of an End-to-End Smart Grid Communications Architecture Framework. He is also actively involved with the Open Smart Grid/UCAlug and the Smart Network Council-UTC organizations. He's is the Managing Director of Sonoma Innovation, a Silicon Valley-based Smart Grid Consulting Firm specialized in Smart Grid Communications Strategy, Next Generation Smart Grid Architectures and Advanced Smart Grid Technologies.



Lincoln, Donald, PhD, PE

Principal, DFL ASSOCIATES INC

Dr. Donald F. Lincoln is a Principal with DFL Associates Inc. responsible for consulting with the Department of Energy and the commercial power industry. He has over 30 years of broad experience in the electric utility industry and related fields. This experience includes generation engineering and operations, strategic planning, and management consulting. He recently completed a PhD in Engineering at the University of New Mexico with his dissertation focusing on demand response. Dr. Lincoln is a registered professional engineer in Nebraska and Ohio.



Longcore, Wayne

Dir Arch & Stds CE, SGIP GB, GWAC, UCAlug BoD, Consumers Energy, GWAC, SGIP GB, UCAlug

Wayne Longcore is the Director of Enterprise Architecture & Standards and Chief Architect for Consumers Energy Smart Grid Program. He is also a Board of Directors member of the UCAlug, a Governance Board member of the NIST Smart Grid Interoperability Panel (SGIP), and a GridWise Architecture Council (GWAC) board member.

Wayne has been a member of the UCAlug Board of Directors member since 2007, a member of the SGIP Governance Board since it's inception, and a GWAC member since 2010. He joined Consumers Energy in 1995 from IBM, where he worked as a network and large systems architect working in the US and Europe for 13 years.



Lu, Ning

Senior Research Engineer, Pacific Northwest National Laboratory

Dr. Ning Lu received her B.S.E.E. from Harbin Institute of Technology, Harbin, China, in 1993, and her M.S. and Ph.D. degrees in electric power engineering from Rensselaer Polytechnic Institute, Troy, New York, in 1999 and 2002, respectively. Dr. Lu is a senior research engineer with the Energy and Environment Directorate, Pacific Northwest National Laboratory, Richland, WA. Her research interests are in smart grid technology development, modeling climate impacts on power grids, wind integration studies, and wide area energy storage system modeling. Dr. Lu is a senior member of the IEEE.



Ludwig, Lisa

VP, Smart Grid Markets and Applications, Ambient Corporation

Lisa leads Ambient's smart grid marketing and business development organizations. She has a solid track record growing business in Fortune 500s and startups. Prior experience encompasses telecommunications, smart grid, security, and storage market segments. At ERICSSON, Lisa served as Head of Worldwide Marketing for the IP networking and telecommunications division. At SEPATON, a VTL storage company, she led product management and marketing targeted at utility, tele-

communications and financial markets. On the founding management team of biometric startup Animetrics, Lisa served as Vice President of Marketing and Business Development.



Makoui, Zahra

*Supervisor - Smart Grid
Communication Standards, Pacific
Gas and Electric Company*

Zahra Makoui is the Supervisor leading the emerging Smart Grid communication standards activities at Pacific Gas and Electric Company. As part of PG&E's Strategic Planning & Architecture Technology Innovation Center, Zahra is responsible for developing Smart Grid standards strategy as well as driving industry standards to completion in order to meet customers' needs and associated deployment schedules.

Zahra and her team have been actively involved in driving execution for many key standards in the UCA International Users Group, the ZigBee Alliance, the HomePlug Alliance, and several international standards development organizations. Zahra is also a member of the SGIP Testing and Certification Committee.

Zahra has a BS in Engineering, Mathematics and Statistics from UC Berkeley's College of Engineering.



Markie, Tracy

President/CEO, Engenuity Systems

Tracy Markie has more than 25 years of experience in the control systems and energy markets and is co-founder and President/CEO of Engenuity Systems, Inc., a leading distributor and value-added reseller of products used to implement Open System networks and solutions. Engenuity's product offering includes controllers and network infrastructure products, as well as sensors, actuators, and peripheral products used to integrate and implement solutions for HVAC, lighting, security, and energy management. The company currently represents more than 100 companies from around the world and is growing rapidly.

Mr. Markie participates in a number of industry groups. He is currently serving as an elected member for the GridWise Architecture Council, a group sponsored by the U.S. Department of Energy. Mr. Markie and his company was one of the founding members of the LONMARK Association where he now serves as Chairman on the Board of Directors for both LonMark International and LonMark Americas.

Mr. Markie received his B.S. in Electrical Engineering Technology from the University of Maine and his MBA from the University of Connecticut, specializing in marketing, finance and management information systems. He has held various technical and managerial positions at National Semiconductor, Norden Systems/United Technologies, Intel Corporation, and Tronix Corporation.



Markwalter, Brian

*VP Technology and Standards,
Consumer Electronics Association*

Brian Markwalter, P.E., is Vice President of Technology and Standards for the Consumer Electronics Association (CEA), a trade association with more than 2200 members representing the \$173 billion U.S. consumer technology industry. Mr. Markwalter is responsible for overseeing CEA's ANSI-accredited standards development operation and provides key engineering support to the association and its membership groups. CEA is actively engaged in creating ANSI standards for home networking

and energy efficiency, two fields that are critical to the success of smart grid for consumers.

Mr. Markwalter has an extensive history working on "home-to-grid," long before it took on this moniker, having helped found the HomePlug Alliance to create an industry standard and market for powerline communications. Mr. Markwalter holds five patents related to HomePlug technology stemming from his time as a Director at Intellon Corporation. Prior to Intellon, Mr. Markwalter worked extensively on home automation standards, including CEBus, and with the utility industry on advanced metering standards. This period of work on home electronic systems and utility communications laid the foundation for today's home-to-grid discussion and allowed Mr. Markwalter to develop strong relationships with many of the leaders in the field today.



Martinek, Kerri

*Director of Marketing, Bridge Energy
Group*

Kerri Martinek leads the marketing and communication initiatives for BRIDGE Energy Group's Smart Grid Integration and Utility Solutions services. In her role, Ms. Martinek supports the organization as a technology advocate for the advancement of open standards for interoperability across Smart Grid initiatives.

Ms. Martinek has a solid track record in marketing high-tech solutions across several industries including utilities, mobile telecommunications and financial services. She has helped to build the marketing strategies for several startup companies, including the Corporate Communications Broadcast Network, now a Thomson Reuters company.

Ms. Martinek is a member of the Public Relations Group for OASIS (Organization for the Advancement of Structured Information Standards). She received a BS from the University of New Hampshire and a Masters in Business Administration from Babson College, F.W. Olin School of Business.

Martinez, Ralph

GLOBAL NETWORKING SYSTEMS



Mater, James

*Co-Founder and Director,
QualityLogic, Inc*

James Mater co-founded and has held several executive positions at QualityLogic from June 1994 to present. He is currently Co-Founder and Director working on QualityLogic's Smart Grid strategy, including work with GWAC, the Pacific North West Smart Grid Demonstration Project, the SGIP Test and Certification Committee, and UCA's OpenSG Conformity Work Group, as well as giving papers and presentations on interoperability. From 2001 to October, 2008, James oversaw QualityLogic as President and CEO. From 1994 to 1999, he founded and built Revision Labs, which merged with Genoa Technologies to become QualityLogic. Prior to QualityLogic, James held Product Management roles at Tektronix, Floating Point Systems, Sidereal and Solar Division of International Harvester. Mater holds a bachelor's degree in physics from Reed College, Portland, OR and an MBA from the Wharton School, University of Pennsylvania.



May, Ed

*Director of Product Marketing, AMI,
Itron*

Ed May, Director of Product Marketing, is responsible for building market awareness and strategic alliances for Itron advance metering infrastructure (AMI) solutions and leads Itron's Smart Grid strategies. Ed joined Itron in 1986. For the last 24 years his duties and responsibilities, including systems engineering, marketing and sales, have been focused on optimizing utility business practices, encompassing field workforce automation, distribution automation and AMR. Ed is a member of the GridWise™ Alliance, NEMA Smart Grid Council, and a board member of the ZigBee® Alliance.



McCafferty, Stuart

*Vice President, Government
Programs, EnerNex Corporation*

Stuart is an IT professional with 20 years of experience, with specialized expertise in managing complex systems integration projects, standards development efforts, system architecture design, software development and implementation, real-time data acquisition, business process change, and secure online collaboration. He is known for innovative and out-of-the-box uses of current technology. He is a certified Project Management Professional (PMP®) from the Project Management Institute (PMI).

Prior to joining EnerNex Corporation, Stuart was a Managing Consultant at SAIC for nearly nine years. As part of the leadership team, he provided project management support for large IT-related projects across multiple vertical industries. He was division manager and performed program management for SAIC's Collaborative Business Solutions Division, performing business development, leading division strategy, and managing programs, projects, and personnel for commercial and government efforts. Vertical markets supported include energy, health care and pharmaceutical, and government (Army and NASA). He managed as many as 50 people in distributed virtual teams.



McDonald, John, P.E.

*Director, Technical Strategy and
Policy Development, GE*

John D. McDonald, P.E., is Director, Technical Strategy and Policy Development for GE Digital Energy. In his 36 years of experience in the electric utility industry, John has developed power application software for both Supervisory Control and Data Acquisition (SCADA)/Energy Management System (EMS) and SCADA/Distribution Management System (DMS) applications, developed distribution automation and load management systems, managed SCADA/EMS and SCADA/DMS projects, and assisted Intelligent Electronic Device (IED) suppliers in the automation of their IEDs.

John is co-author of the book Automating a Distribution Cooperative, from A to Z, published by the National Rural Electric Cooperative Association Cooperative Research Network (CRN) in 1999. John was Editor of the Substations Chapter, and a co-author, for the book The Electric Power Engineering Handbook, co-sponsored by the IEEE PES and published by the CRC Press in 2000. John is Editor-in-Chief, and Substation Integration and Automation Chapter author, for the book Electric Power Substations Engineering, Second Edition, published by Taylor & Francis/CRC Press in 2007.



McGhee, Jim, BSc
Utility Market Manager, RuggedCom Inc.

Jim McGhee recently joined RuggedCom, Inc. and holds the position of Utility Market Manager, responsible for utility market development, North America and Asia Pacific regions.

Jim has over 20 years experience in the utility market. Jim started his utility career in GE Energy's Calgary IED organization in 1987. Highlights of Jim's early career are that he led the DNP 1.0 and DNP 2.0 development team, which has evolved into the DNP3 protocol. Jim was the Software Architect of the industry leading D20 product. Jim was involved in the first MMS standards discussions which lead to the UCA and eventually IEC 61850 standards.

In 2004 as VP, Software for Subnet Solutions, Inc. Jim led the team to the first commercial release of the SubstationSERVER.NET product.

Jim rejoined GE in 2005 and his most recent position was Marketing Program Manager of Substation Solutions, where he was involved in many market development activities including GE / AEP GridSmart workouts.

Jim holds a BSc in Computer Science for the University of Calgary, Calgary, Alberta, Canada.



McGranaghan, Mark
Director, Smart Grid and Distribution Research, EPRI

Mark McGranaghan is a Director in the EPRI Power Delivery and Utilization (PDU) Sector. His research area responsibilities include overall coordination of EPRI research for smart grid development as well as the overall distribution research program. Mark is a member of the Smart Grid Interoperability Panel (SGIP) Governing Board and is active in numerous IEEE, IEC, CIGRE, and CIRED activities related to the smart grid and distribution infrastructure development and management. Research priorities include developing the technologies, application guidelines, interoperability approaches, and standards for implementing the smart grid infrastructure that will be the basis of automation, higher efficiency, improved reliability, and integration of distributed resources and demand response. He is also responsible for EPRI's extensive smart grid demonstration initiative (5 year effort) to help coordinate the industry approach for distributed resource integration with the operation of the grid.

Mr. McGranaghan has BSEE and MSEE degrees from the University of Toledo and an MBA from the University of Pittsburgh.



McNaughton, Gary, BSEE, MSEE, P.E.
Vice President, Cornice Engineering, Inc.

Mr. Gary McNaughton has extensive experience in electric power system planning and operations. He has earned BSEE and MSEE degrees, specializing in electric power engineering. He is a registered Professional Engineer.

Mr. McNaughton served for three years as a Planning Engineer for Colorado-Ute Electric Association, an electric G & T.

Mr. McNaughton subsequently served ten years at La Plata Electric Association, as Staff Engineer, Chief Engineer and Assistant General Manager.

Mr. McNaughton is the author of two groundbreaking research reports for the Cooperative

Research Network of the national Rural Electric Cooperative Association, Enterprise-Wide Data Integration in a Distribution Cooperative and Deployment of Mapping Systems in Distribution Cooperatives. He is also the Project Technical Coordinator for NRECA's MultiSpeak Initiative.

Mr. McNaughton presently serves as Vice President and Principal Engineer for Cornice Engineering, Inc.

Melcher, Jerry
EnerNex Corporation



Melton, Ron
Administrator, GridWise Architecture Council, Pacific Northwest National Laboratory

Ron Melton is the administrator of the GridWise Architecture Council (GWAC) and a senior power systems engineer at Pacific Northwest National Laboratory.

He is also Project Director for the Pacific Northwest Smart Grid Demonstration Project managed by the Pacific Northwest Division of Battelle.

Dr. Melton has over 25 years of experience in systems engineering applied to interdisciplinary problems. He received his BSEE from University of Washington and his MS and PhD in Engineering Science from the California Institute of Technology.



Meyers, Jeff
Smart Grid Executive, Telvent

Jeff Meyers is a second-generation electrical engineer, and former president of Telvent Miner & Miner. In his 30-year utility career, Meyers has designed electric substations and transmission lines, and developed system planning and protection studies. Since 1987, he has worked on more than 50 GIS development projects for a variety of gas, electric and other utilities, based on the developing and evolving technology of ESRI and Telvent. In 2008, he relinquished his role as head of Telvent M&M to focus exclusively on Smart Grid technology.

Meyers has a Bachelor of Science in Chemical Engineering from South Dakota School of Mines & Technology and a Master of Science in Electrical Engineering from the University of Colorado.

He is active in the following professional organizations: Institute of Electrical and Electronics Engineers, National Society of Professional Engineers

International Electrotechnical Commission, TC57, WG14 GITA, International Who's Who of Professionals, and a Professional engineer in Colorado, California, Arizona, Montana and Minnesota.



Michalek, Peter
oX framework project

Peter Michalek helps companies in Silicon Valley define product architectures and implement them.

His technical background includes applications security, Internet protocols, SOA in the context of highly scalable distributed software architectures and efficient use of XML technologies.



Mohn, Terry
President, General MicroGrid

Terry Mohn a founder and Chief Innovation Officer of General MicroGrids and the Balance Energy brand, located in San Diego. He is responsible for ensuring clean and renewable electric generation can reliably meet the demands of utilities, municipalities and communities. This includes advancing the company's technology portfolio and capabilities towards emerging integrated microgrids and sustainable community solutions. Terry was previously chief technology strategist for the Semptra Energy utilities, with emphasis on smart grid. He specializes in the clean energy and the improvement of the electric grid by using modern technology.

NIST named Terry to its newly formed Smart Grid Advisory Committee. The new committee will advise NIST on the direction of its smart grid-related programs and activities as the institute leads a nationwide effort to expedite the development of interoperability standards for the smart grid.



Molitor, Paul
Sr. Industry Director, Smart Grid, National Electrical Manufacturers Association (NEMA)

Paul A. Molitor serves as the Senior Industry Director of Smart Grid and Strategic Initiatives for the National Electrical Manufacturers Association in Rosslyn, VA. On behalf of the 450 member companies of NEMA, Paul is responsible for monitoring the national Smart Grid effort and interfacing with electric utilities, manufacturers, federal agencies, and the U.S. Congress on Smart Grid issues. He also provides information, direction, and support to the NEMA Government Relations, Technical Services, and Industry Operations groups who manage policy and technical issues related to standards and protocols for U.S. and International Smart Grid activities.

Mr. Molitor is the Plenary Secretary of the NIST Smart Grid Interoperability Panel (SGIP), and is active in the NIST cybersecurity coordinating task group and the International Electrotechnical Commission Strategy Group 3 (IEC SG3) on Smart Grid. He is also a member of the IEEE Power & Energy Society and the IEEE Standards Association, and is a standards development representative to the Canadian Task Force on Smart Grid Technologies and Standards (TF-SGTS). Paul has had several Smart Grid articles published in U.S. and International publications, is a core member of the Gridweek and Grid-Interop Organizing Committees, and is a member of the editorial board for ElectroIndustry Magazine.



Moncrief, Bill, PE, CPQ
Principal Consultant, EnerNex
W. A. (Bill) Moncrief, P.E.
Consulting Engineer

Bill Moncrief joined EnerNex in the winter of 2008 as a Consulting Engineer. His experience in utility operations and at EPRI makes him an asset to the EnerNex family. He's a registered Professional Engineer in Georgia and Florida.

Bill worked at Georgia Power for 22 years and was a project manager for EPRI. He worked with utilities in Bangkok, Taipei, Mumbai (Bombay), Warsaw, and Manila.

Bill's degrees are from Georgia Tech with minors in computer science and nuclear engineering with post graduate work in nuclear engineering. He is active in IEEE, serving as the chair of the Power Engineering Society's harmonics working group, the chair of the IEEE Standards Coordi-

nating Committee on power quality and serves on the US National Committee/IEC TC77A.



Morgan, Rick

Commissioner, District of Columbia Public Service Commission

Richard E. (Rick) Morgan began a second four-year term on the District of Columbia Public Service Commission in July 2007. Mr. Morgan serves as leader of the Task Force on Climate Policy of the National Association of Regulatory Utility Commissioners (NARUC). He is a member of NARUC's Energy Resources and Environment Committee, its Smart Grid Collaborative, and he serves on the Association's Board of Directors. Mr. Morgan currently serves as co-chair of the Electricity Committee of the Mid-Atlantic Conference of Regulatory Utility Commissioners (MACRUC) and has previously chaired the steering committee of the Mid-Atlantic Distributed Resources Initiative (MADRI). Before joining the PSC as a commissioner, he spent 12 years with the U.S. Environmental Protection Agency, where he focused on climate policy and emissions trading. Previously, Mr. Morgan spent five years on the staff of the Public Service Commission, where he helped to develop Commission policies on energy conservation and resource planning. During his more than 35 years in the field of energy policy and utilities, Mr. Morgan has authored numerous publications on electric power. He holds a Master of Public Policy degree from the University of Maryland and a B.A. in economics from Antioch College.



Muchlinski, Stephen

City of Tacoma

Murayama, Hiroshi

Chief Research Scientist, TOSHIBA Corporation

Mr. Hiroshi MURAYAMA is a chief research scientist at Toshiba corporate research center. He is also serving as chairman of IEC SC3D, a horizontal subcommittee of IEC, in charge of development and maintenance of technical standards for product properties and classes and their identification, for all electro-technical domains. He has led the development of several international standards as project leader in both ISO and IEC communities over a decade. Besides, he is one of the principal authors of ISO/IEC guide 77, that recommends the use of ISO13584-IEC61360 common dictionary model for electro-technical ontologies in general.

Nelson, Thomas

Electrical Eng., NIST



Nunneley, John, MSCS

Executive Director, SunSpec Alliance

John Nunneley is a founder and Executive Director of the SunSpec Alliance (sunspec.org), an industry alliance to standardize data interfaces for the Renewable Energy market. As a recognized expert in interoperability and data monitoring for solar plants, he was elected to the NIST Smart Grid Interoperability Panel (SGIP) Governing Board where he works to identify and prioritize new and emerging standards for the Smart Grid.

He is currently employed by Gridata, a leading edge provider of Smart Grid data management solutions, as a Sr. Standards Architect. Gridata is deeply involved in the Smart Grid standards efforts and participates and contributes regularly

to the NIST SGIP, UCAlug OpenSG, EPRI, and other related efforts.

John holds BSEE and MSCS degrees from Santa Clara University and has spent his career in the Silicon Valley developing communication protocols and working with standards groups and industry consortium.



Paetz, Alexandra-Gwyn

Senior Researcher, Karlsruhe Institute of Technology (KIT)

Since Oct/2009 Karlsruhe Institute of Technology, Karlsruhe, Germany
Senior Researcher at the Chair of Energy Economics, Research Group Transport and Energy.

May 2008 - Sept 2009 Homburg & Partner, Munich, Germany (=Management Consulting) Consultant at the competence centers Energy/Utilities and Transport/Logistics.

Oct 2002 - Sept 2007 Ludwig-Maximilians-University, Munich, Germany Graduation as Diplom-Kauffrau at Munich School of Management (Master-level degree in Business Administration).



Pederson, Perry

Security Specialist (Cyber), U.S. Nuclear Regulatory Commission (NRC)

Mr. Perry A. Pederson began his Government service as a motion picture photographer for the U.S. Army. While the path from that to his current position with the Nuclear Regulatory Commission (NRC) has had a few twists and turns, this varied background also provides unique insights into the challenges presented by the SmartGrid.

Mr. Pederson is currently enrolled in a program leading to a Doctorate in Information Assurance and he holds a Masters of Science, Information Security Analysis, from the University of Fairfax. In addition, he holds Bachelor's of Science, Business Information Systems, from the University of Phoenix and is a graduate of the Army Management Staff College.



Pinkerton, Scott

Cyber Security Principal Investigator, Argonne National Laboratory

Scott Pinkerton has been active in the Information Technology space for the last twenty- seven years – working on networking, telephony, and cyber security issues. He is currently working on the development of cyber security systems serving the DOE community.

Prior to joining ANL, Scott was a Staff Engineer at Martin Marietta Denver Astronautics where he worked extensively with ring-laser gyro based inertial navigation systems for Expendable Launch Vehicles like the Titan IV, and Upper Stages like the Transfer Orbit Stage (TOS) that flew the Mars Observer mission.

Scott holds a BS Mathematics & BS Computer Science from Bowling Green State University, and a MS Computer Science from University of Colorado.



Pistorese, Todd

Managing Director, OS/soft, LLC

Todd Pistorese spent the first 17 years of his career working for Puget Sound Energy in Bellevue, Washington. During his tenure at PSE Todd worked in a variety of departments including:

Power Planning, T&D Operations
Capital Budget Planning & Management
GIS & Work Management Project Management

Subsidiary Executive Management



Rasweiler, Jake, MSEE, MBA, PE, PMP

Vice President - Engineering and Network Operations, Arcadian Networks, Inc.

John "Jake" Rasweiler, Vice President of Engineering and Network Operations, John's telecommunications career includes work at CellularOne, AT&T Wireless Services and most recently Sprint Nextel where he held positions including Senior Director RF Engineering and Market Director. His background and experience include fixed and wireless network design, site development, field and network operations, and construction. In addition, John presented at international conferences on the topics of machine-to-machine communications, the digital oil field, microcell and urban network design. He holds BA, MSEE and MBA degrees as well as two patents, is a licensed professional engineer (P.E.) and a project management professional (PMP).



Ray, Steve

Distinguished Research Fellow, Carnegie Mellon University

Dr. Steven Ray offers information integration consulting services and is a Distinguished Research Fellow at Carnegie Mellon Silicon Valley, where he researches information interoperability and standards in application domains including the smart electrical grid, disaster management, electronic business, supply chains, and manufacturing. He has a twenty-seven year track record of initiating and leading system integration and other technical R&D projects at the National Institute of Standards and Technology in Gaithersburg, Maryland. For the past decade, he was responsible for the management of a \$10-13M division of 60 staff and visiting researchers dedicated to the solution of national problems related to measurements and standards supporting systems interoperability in the manufacturing sector. In addition to his consulting support for local technology companies, Dr. Ray's current activities include the establishment of new research programs at Carnegie Mellon Silicon Valley in smart grid interoperability and in disaster management, chairmanship of the Ontology Summit and chairmanship of the OASIS Quantities and Units of Measure Ontology Standard (QUOMOS) TC. He has a B.Sc. in Physics (honors) from the University of Bristol, England, a Ph.D. in Mechanical and Aerospace Engineering from Princeton University, and is a member of ASME and SME.



Reinprecht, Nada

IT Architect, IBM Global Business Services



Roberts, Phil

Technology Program Manager, Internet Society

Phil Roberts joined the Internet Society's Standards & Technology Department in April 2008. As Technology Program Manager, organizes and leads aspects of the Internet Society's work in advancing the development and deployment of open standards and promoting the Internet's collaborative development and operational management model.

Phil has been active in the IETF for over a decade, with roles including working group chair, nominating committee chair, and executive director of the

Internet Architecture Board (IAB). During that time, his technical focus has been integrating Internet technologies into cellular telecommunications systems. He has promoted the use of IETF-standardized mobile networking technologies for delivery of data across cellular networks, which is now becoming the basis of networking technology for all cellular applications.

His background ranges from core development in software, operating systems, and management systems research in platforms and networks for cellular networks to business development and marketing. His research experience includes both AT&T Bell Laboratories and Motorola Laboratories and he held the position of Director of Network Architecture for Megisto Systems, Inc.



Robinson, Greg

President & CEO, Xtensible Solutions

Greg Robinson is the general manager of Xtensible Solutions, an ESCO Technologies company. Xtensible provides enterprise information management and integration services to utilities. Greg is a member of NIST Smart Grid Interoperability Panel (SGIP) and is on its Architectural Committee. He is the international convener of IEC TC57 Working Group 14, which is extending the industry standard Common Information Model (CIM) for utility enterprise-wide messaging. Greg continues to be a member IEEE Power Engineering Society, where he once served as chairman of Substations C0 - Data Acquisition, Processing and Control Subcommittee. He is the e Co-Chair of the OpenSG's Smart Grid Systems Working Group, is on the leadership team of the ZigBee and HomePlug Alliance that is developing Smart Energy Profile (SEP) 2, and is a member of the DistribuTECH Advisory Committee. Participating in these organizations enables Greg to help companies leverage and drive industry standards to their benefit while simultaneously aiding the standards development process. Greg has a BSEE from Georgia Tech and a MBA from the Florida Institute of Technology.

Robinson, Mike

Midwest ISO

Rolling, David

Cooper Industries



Rose, William

Principal, WJR Consulting Inc.

Bill Rose is the president and founder of WJR Consulting Inc. advising companies on product and business development, market strategies, technology, and standards relating to consumer electronics, home entertainment and control networks, and the Smart Grid.

Prior to founding WJR Consulting, Bill was vice president of Electronic Engineering at Leviton Director of Electronic Product Development at Hubbell Co-founder and VP of Engineering and Operations for InfraVision, a video datacasting startup Director of Advanced R&D for Coleco, creators of the Adam computer and ColecoVision and Systems Design Engineer at Grumman developing fly-by-wire control systems for military aircraft.

Bill has spoken at over 30 conferences including CES, National Association of Broadcasters (NAB), Society of Motion Pictures and Television Engineers (SMPTE), CEA Forum, Jupiter Digital Rights Strategies, Kagan Digital Home Summit, NIST, International Conference on Consumer Electronics (ICCE), UPnP Forum, WIFI Planet, Connections, CEDIA and many others. He has

also developed over 100 products and holds 17 patents.



Rytting, Todd

President & CEO, Panasonic Electric Works Laboratory of America

Mr. Rytting has built his career of nearly 30 years upon the principles of enabling effective teamwork among exceptional professionals. He is currently the President and CEO of Panasonic Electric Works Laboratory of America, Inc. and directs Research and Development laboratories in the USA for Panasonic Electric Works.

Mr. Rytting's engineering degree is from the University of Utah and his subsequent 29 years of experience cover a broad range of technology including simulation, analysis, testing, robotics, software development and technical management. For the past 12 years he has been engaged in the device networking industry with a focus on smart home initiatives and connected consumer electronics. Mr. Rytting is presently involved in Panasonic's global initiatives in the Smart Grid, Smart Appliance, and Home Energy Management Systems. He participates in the Smart Grid task forces or working groups of AHAM, NEMA, and TechAmerica, and has participated in the NIST Smart Grid Architecture workshops and meetings. Mr. Rytting was also an author of the AHAM Connected Home Appliances-Object Modeling Standard (ANSI/AHAM CHA-1-2003).



Saint, Bob

Principal Distribution Engineer, Member-GridWise Architecture Council, NRECA

Bob has been with NRECA for over 9 years. His primary role is technical advisor for the T&D Engineering Committee. He works with the System Planning Subcommittee and the soon to be formed Smart Grid Subcommittee. He is also the Program Manager for the MultiSpeak® Software Integration Initiative.

Bob graduated from Wichita State University in Wichita, Kansas, with a BS degree in Electrical Engineering.

He has worked for rural electric co-ops, primarily distribution cooperatives for over 20 years in Colorado before coming to NRECA.

He is a Professional Engineer in Texas and Virginia and a senior member of IEEE. He is chairman of the IEEE P1547.7 (Draft Guide to Conducting Distribution Impact Studies for Distributed Resource Interconnection) Working Group and IEEE PES Distributed Resources Integration Working Group. He is active in other IEEE working groups in the Power and Energy Society (PES) and SCC21, including P2030 - Task Force 2. Bob is a member of the GridWise Architecture Council (GWAC) and on the Governing Board of the NIST Smart Grid Interoperability Panel (SGIP).



Samad, Tariq

Corporate Fellow, Honeywell

Dr. Tariq Samad is a Corporate Fellow in Honeywell's Automation and Control Solutions business group, which services the automation needs of over 5 million buildings, 100 million homes, and 30,000 process-related industries including power plants and manufacturing facilities. Dr. Samad has been with Honeywell for 24 years and has led initiatives in areas related to smart grids, process automation, intelligent buildings, automotive engine control, and clean coal technology. His interests relate broadly to automation, intelligence, and autonomy for complex engineering systems.

Dr. Samad is a Fellow of the IEEE and the recipient of several awards including the 2008 IEEE CSS Control Systems Technology Award. Dr. Samad served as the President of IEEE Control Systems Society in 2009. He was the editor-in-chief of IEEE Control Systems Magazine from 1998 to 2003. Dr. Samad holds 15 patents and has authored or coauthored over 100 publications. He is on the editorial boards of IEEE Press, Control Engineering Practice, and the Journal of Mind Theory. He represents Honeywell on the Global Carbon Capture and Storage Institute and he is a member of the Governing Board of the U.S. Smart Grid Interoperability Panel. Dr. Samad received a B.S. degree in Engineering and Applied Science from Yale University and M.S. and Ph.D. degrees in Electrical and Computer Engineering from Carnegie Mellon University.



Sastry, Chellury (Ram)

Pacific Northwest National Laboratory

Dr. Chellury Ram Sastry is currently a senior engineer with the electricity infrastructure group in the energy and environment directorate at Pacific Northwest National Laboratory (PNNL), Richland, WA. His focus and interests are in various smart grid (particularly home to grid (H2G) and buildings to grid (B2G)) and wind integration related problems and challenges.

Prior to joining PNNL, Ram was with Siemens Corporate Research, Princeton, NJ, where he was responsible for application-level R&D, leading sponsored research efforts with universities, and managing projects across various engineering disciplines and vertical market segments (industrial & building automation, power transmission & distribution, multimedia communications including wireless sensor and machine-to-machine (M2M) networks, and healthcare).



Schoechle, Tim, PhD

Principal, International Center for Standards Research

Timothy Schoechle, Ph.D. has been engaged in the field of computer and communication engineering, including their standardization, for over 30 years, and has been involved in communication policy for over a decade. As an entrepreneur, he was an early pioneer in key technologies including microprocessors, UPC bar codes, RFID tags, VoIP, PLC (power-line carrier), CEBus networking, broadband access, and residential gateways. He has written and lectured on such topics as electronic privacy, network architectures, Internet telephony, higher education, distance learning, technical standards, patents, innovation, and intellectual property.

He holds a B.S. in Administrative Science from Pepperdine University, and an M.S. in Telecommunications (engineering) and Ph.D. in Communication Policy from the University of Colorado. His 2009 book, "Standardization and Digital Enclosure: The Privatization of Standards, Knowledge and Policy in the Age of Global Information Technology" focuses on the development of the international standardization system and on its current issues and dynamics.



Scholer, Rich

Systems Engineer, Ford Motor Company

Chair the SAE J2836™/J2847 Task Force for communication between Plug-In Vehicles and the Utility Grid.

Ford Motor Company Systems Engineer for plug-in, hybrid & fuel cell vehicles.

Elected to the NIST Governing Board for Category 4 (Electric Transportation Industry) and member of PAP 11 & 15.

Shih, Chuck
Edge Holdings



Simmins, John
Senior Project Manager - Smart Grid, EPRI

Dr. John J. Simmins is Senior Project Manager for the Smart Grid Demonstration Projects at the Electric Power Research Institute (EPRI). His current responsibilities focus on developing robust system architecture in the EPRI Smart Grid Demonstration projects and bringing thought leadership in the area of integrating diverse applications such as Advanced Meter Infrastructure, Meter Data Management Systems, Distribution Management Systems, Customer Information Systems, Geospatial Information Systems and Outage Management Systems. Dr. Simmins brings over 15 years of implementing highly integrated systems which span the latest technology to mature legacy systems. Dr. Simmins spent six years at Southern Maryland Electric Cooperative as IT Applications Manager. Prior to that, he had eight years consulting in project management, application integrations and supply chain automation. He also has six years as a manager of research in the field of magnetic materials for millimeter and microwave communication.

Dr. Simmins is a member of the SOA Institute, the Business Process Modeling Institute and the Project Management Institute. He received his B.S. in Ceramic Science from Alfred University in 1984 and his Ph.D. in Ceramic Science from Alfred University in 1990. Dr. Simmins has 25 published papers in the fields of science and technology, 27 presentations, two books and one patent.



Simmon, Eric
NIST

Eric Simmon is an electrical engineer in the Electronic Information Group at the National Institute of Standards and Technology. He graduated magna cum laude from Worcester Polytechnic Institute (Worcester, MA) in 1989 and joined National Institute of Standards and Technology, Gaithersburg, MD working in the area of precision measurement for high voltage and high current until he joined the Electronic Information Group at NIST in 2003.

He now works on work on systems modeling and information exchange for the electronics industry and the power industry.

Mr. Simmon is a member of the NIST smart grid infrastructure task force and leads the Plug-in Electric Vehicle Task Group and PEV priority action team.

In addition to his smart grid activities Mr. Simmon is involved a number of other information management activities, including chairing the iN-EMI Product Lifecycle Information Management Technology Working Group, the IPC 2-18 Supplier Declaration Sub-Committee, and leading the data format sub-team in the IEC TC111 Material Declaration working group.



Simpson, Robby
System Architect - Meters, GE

Charles Robert "Robby" Simpson, Jr., PhD, is System Architect, Meters for GE Energy T&D. In his role as System Architect, Robby is responsible for the end-to-end architecture of GE metering systems from the utility backoffice interface through the

AMI network to the meter and the interface to in-home devices. As such, Robby divides his time between designing and evaluating GE Meter's architectures with particular attention to scalability, security, and interoperability and standards bodies activities. Robby has been active in the Smart Grid industry for a number of years, particularly in the areas of AMI and metering. Prior to joining the Smart Grid effort, Robby worked on satellite communications at MIT's Lincoln Labs.

Robby is active in the UCA, ANSI, IEC, NIST DEWGs, ZigBee Alliance (Robby has chaired the Smart Energy working group throughout most of the development of the ZigBee Smart Energy Profile and previously sat on the Board of Directors), HomePlug Powerline Alliance (Robby sits on the Board of Directors), and the joint effort between the ZigBee and HomePlug alliances to develop the Smart Energy Profile 2.0.

In his spare time, Robby enjoys horseback riding, traveling, and spending time with his family.

Singhal, Rajiv
Senior Solutions Architect, Cisco

Rajiv is a Senior Solutions Architect with Cisco's Prosumer Business Unit and is leading the end-to-end definition of Cisco's Home Energy Management solution, technology partner integration, and solution delivery to utility customers. Rajiv has a 20 year broad-based technology background ranging from medical imaging, internet-working, B2B integration, and IT systems architecture to wireless technologies including RFID, 802.11 and 802.15.4. He holds an MS in Electrical and Biomedical Engineering from the University of Utah, Salt Lake City.



Singletary, Bradley
CISSP
Senior Consultant, EnerNex Corporation

Bradley Singletary works at EnerNex Corporation as a Senior Consultant. Brad consults for major electric utilities on Smart Grid topics like home area networking and security for AMI deployments. Brad is currently focused on helping utilities build convergent, standards-based, home area network deployment architectures that leverage value from the utility AMI deployment. Brad actively participates in home area network organizations of current interest to utilities such as the Zigbee and HomePlug Alliances, IEEE P1901, IEEE P2030 and OpenHAN. Brad actively helps utilities test interoperability and requirements conformance for various types of HAN devices and applications. Brad is an embedded systems and DSP engineer at heart, but has significant experience in software and systems architecture development applied to large artificial intelligence based systems for the aerospace and defense industry. Brad holds an M.S. in computer science from the Georgia Institute of Technology and is a Certified Information Systems Security Professional.



Smith, Kelly
Johnson Controls

Kelly Smith supports energy and sustainability efforts across the global Building Efficiency business of Johnson Controls. As part of the Institute for Building Efficiency, he conducts original research and collaborates with leading thinkers on how the built environment can become more efficient and sustainable. His areas of interest include managing greenhouse gas emissions across large portfolios, integration of energy efficiency, renewable energy and demand response and the role of technology and information in optimizing

buildings. In addition to his work with the Institute, Kelly provides research and analysis for strategy, business development, and new product design efforts at Johnson Controls.

Prior to joining Johnson Controls, Kelly provided consulting services in the fields of energy efficiency and demand response. He has contributed to several key papers analyzing the potential for meeting electricity challenges with solutions on the customer side of the meter, and has assisted utilities across the United States in developing programs to reduce energy use and peak demand among their customers.

Kelly received an MS in Nuclear Science from Massachusetts Institute of Technology and a BS in Physics from Brigham Young University.



Snyder, Aaron, EIT
Principal Consultant, EnerNex Corporation

Aaron obtained his education from Virginia Tech in Blacksburg, Virginia, and the Institut National Polytechnique de Grenoble (INPG) in Grenoble, France. He is currently a Principal Consultant for EnerNex Corporation in Knoxville, Tennessee, and actively participates in smart grid and advanced metering infrastructure organizations. He serves on numerous metering standards development committees at national (ANSI) and international (IEC, IEEE, OIML) levels. He is a Senior Member of IEEE.



Steffes, Paul, PE
CEO, Steffes Corporation

Paul Steffes P.E. is the Chief Executive Officer and Chairman for Steffes Corporation, based in Dickinson, North Dakota. Steffes Corporation is a North American manufacturer of Electric Thermal Storage (ETS) off-peak heating solutions. Paul has worked closely with power companies from across North America for the past 25 years, which has led to the development, refinement, and application of load and demand management products that power companies have successfully applied inside of their demand response programs. Paul's most recent work has focused on applying ETS systems as a "thermal battery" to fully utilize America's renewable energy resources and for Smart Grid integration. His work and expertise in this arena has placed Paul as a speaker or panelist at many national Smart Grid, renewable energy, and power generation conferences.

Paul is known for his innovative and entrepreneurial spirit, which has won him many local and national awards. Paul is a highly respected leader in his community and an inspiration to his family, peers, and employees.



Swanson, Marianne
Senior advisor for information system security, NIST

Marianne Swanson is a senior advisor for information technology security management in the Computer Security Division at the National Institute of Standards and Technology (NIST). She is the Chair of the Smart Grid Interoperability Panel - Cyber Security Work Group, the Co-Chair of the Working Group on Lifecycle and Standards established under Comprehensive National Cyber Initiative 11, "Develop Multi-Pronged Approach for Global Supply Chain Risk Management," and has been Chair of the Federal Computer Security Program Managers' Forum for more than a decade. She has authored or co-authored over twenty NIST Publications, including foundational computer se-

curity documents used throughout industry, and in state, local, and foreign governments.

This year, Ms. Swanson received the Department of Commerce Gold Medal Award for designing, developing and disseminating the Risk Management Framework. Ms. Swanson is a Federal 100 Award recipient for her work in developing the CIO Council Assessment Framework. In March of 2000 and 2001 she received the FedCIO Technology Leadership Award. In 1996, Ms. Swanson received the Industry Advisory Council Leadership and Achievement Award for developing the Federal Computer Incident Response Capability (FedCIRC) and promoting support mechanisms for government wide security initiatives. Also in 1996, she received the Department of Commerce Bronze Medal Award for successful establishment and management of the Forum of Incident Response and Security Teams (FIRST). Ms. Swanson has over twenty-five years of computer security experience. Prior to joining NIST, she worked as a Systems Security Specialist with the Nuclear Regulatory Commission and as a Program Analyst with the Internal Revenue Service.



Tang, Le

Vice President and Head of US Corporate Research Center, ABB Inc

Dr. Le Tang joined ABB Inc. 1995. From 2003, Le has been a Vice President responsible for ABB's corporate research activities in the United States.

From 1995 to 2002, Le had worked as an Advisory Engineer, a Group Leader, Power Systems Center manager, Utility Business Solution Program manager, Power Technology Department manager. In the past twelve years, Le has proposed, participated, led and organized many of ABB's technology development projects involving power system component design, apparatus applications, power systems planning, operation and control. Prior to joining ABB, Le was a Senior Consultant at Electrotek Concepts Inc., Knoxville, TN, where he was responsible for many types of research and application studies in the fields of power systems and power quality. Prior to joining Electrotek, Dr. Tang worked for MAGSOFT Corporation, Troy, New York, where Le was responsible for developing a finite element analysis package and conducting electrical-magnetic field analysis for improved design of advanced electrical machinery.

Le earned his BS in Electrical Engineering from Xian Jiaotong University (Xian, China) and his Masters and Doctoral degrees in Power Engineering from Rensselaer Polytechnic Institute, Troy, New York.

In the early stage of Le's career, he also worked as a technician for eight years at Qinghai Electric Power Company.



Theall, Matthew

President and Chairman of the Board of Directors, HomeGrid Forum

Matt Theall is a member of NIST SGIP Governing Board and is also President of the HomeGrid Forum (www.homegridforum.org), a global non-profit industry alliance that promotes the International Telecommunication Union's G.hn standardization efforts for home networking, Smart Grid and electric vehicle applications. In addition to these roles, Matt is also currently a Technology Strategist in Intel's Digital Home Group.

Matt has held various industry leadership roles driving technology initiatives and managing silicon businesses over the years. Immediately prior to his current role as President of the HomeGrid Forum, Matt was President of the HomePlug Powerline Alliance (www.homeplug.org)

from 2005-2008 during which time membership grew from 40 to over 80 members and volumes shipped grew from 3M to over 16M.

Matt holds a BSME from Northeastern University and an MBA from Rivier College.



Thomas, Chris

Policy Director, Illinois Citizens Utility Board

Chris Thomas is the Policy Director for the Illinois Citizens Utility Board (CUB), which has been referred to as the "gold standard" of consumer groups nationwide by The St. Louis Post Dispatch. Mr. Thomas holds an advanced degree in economics and finance and regularly testifies as an expert witness on various electric, natural gas, and telecom regulatory issues. In addition, Mr. Thomas has worked to promote dynamic pricing and demand response programs for Illinois residential electric customers.

Mr. Thomas' goals will be realized when there is a full, seamless integration of energy efficiency, demand response, and other demand side resources into the Illinois' utility default service programs.



Ungerer, Scott

EnerTech Capital



Van Meter, Ken

General Manager, Energy & Cyber Services, Lockheed Martin

Ken serves as Principal, Energy Solutions, for Lockheed Martin Company, where he helps lead efforts to extend the value of existing and new Lockheed Martin technologies, services and skilled professionals into the energy industry, particularly cyber security and the SmartGrid.

Ken previously held a number of senior leadership positions, including SVP Operations and CTO at Prenova, Inc. CEO and President of Celerity Systems, Inc. COO of Tele-TV Systems, Inc. President of Bell Atlantic Video Services Group VP/GM for National Data Corp. and Director/GM for Sprint. Ken also held management positions in sales, engineering and operations with AT&T and Pfizer, and served in the US Air Force as an F106 pilot.

Ken received his BS degree in Chemistry from West Virginia University, and his MBA from the University of Georgia.



Vigéant, Claude, Eng.

President, OKIOK

Claude Vigéant graduated from McGill University as an engineer, and in 1982, he began his professional activities at OKIOK, an IT security specialized firm located in Quebec, Canada. A true visionary, Mr. Vigéant became president of OKIOK in 2003 and positioned the firm as a Quebec leader and pioneer in terms of consulting services and research and development in the field of IT security. Mr. Vigéant is a founder of the Centre for Innovation and Excellence in Identity and Access Management (CIEIAM) created in 2008. He is also responsible for many security solutions: full disk encryption, enterprise single sign-on, identity and access management solutions, etc.



Wacks, Kenneth

President, Home & Utility Systems

Dr. Wacks has been a pioneer in establishing the home systems industry and a management advisor to more than 100 clients worldwide, ranging from startups to the Fortune 500. His business focus includes home and building systems, utility customer services, and digital entertainment networks. Corporate managers depend on Dr. Wacks to identify business opportunities in emerging markets with clear and practical advice relevant for product development and market positioning.

Dr. Wacks was appointed to the United States Department of Energy 'GridWise Architecture Council' to develop a smart electric grid for reliable, cost-effective, and efficient distribution of energy. For electric and gas utilities, he has defined and demonstrated new customer services by linking utility communications with home automation to deliver demand response and value-added services.

Dr. Wacks chairs the Editorial Advisory Board of the CABA magazine 'iHomes & Buildings' (available at www.caba.org) and is a featured contributor under the byline 'Ken Wacks Perspectives.' Dr. Wacks received his Ph.D. from MIT as a Hertel Fellow and studied at the MIT Sloan School of Management. Please visit www.kenwacks.com for additional information.



Wakefield, Matt

Program Manager, Smart Grid Demonstrations, Electric Power Research Institute

Matthew P. Wakefield (Matt) is Program Manager, Smart Grid Demonstrations at the Electric Power Research Institute (EPRI) managing EPRI's smart grid demonstration initiative. He has over 22 years of energy industry experience and prior to joining EPRI, was the Manager of Applied Technology for Integrys Energy Group focused on developing and applying information and communication technologies related to real-time energy information transfer between control centers, generators, markets and consumers. This team developed a number of innovative solutions including DENet® and eMiner® that utilized open source software and low-cost embedded hardware while leveraging customer owned Internet communications for smart grid applications in both regulated and deregulated energy markets. He received his BS degree in Technology Management from the University of Maryland University College.



Wallace, Evan

Electronic Engineer, NIST

Evan Wallace has been at NIST for 26 years, primarily working to develop standards and technologies for integration of systems for manufacturing. This work has supported the spectrum of the product realization process from shop floor protocols and architectures

through plant to business integration (Manufacturing Execution Systems to ERP systems) to supply chain logistics message specification. Mr. Wallace worked on manufacturing standards developed in ISA and ISO,

and was the champion of the original Data Access for Industrial Systems (DAIS) specification developed at the Object Management Group (now superseded by OPC UA Part 8 - Data Access).

Within the past two years, Mr. Wallace has been applying his expertise to modeling and integration efforts needed for the NIST Framework and

Roadmap for Smart Grid Interoperability. This has included working on the Energy Usage Information model developed by NAESB as well as the Facility Smart Grid Information Model under development in ASHRAE in SPC201P. He has also been investigating using OMG modeling technologies and/or ontological approaches to formally document the overlap among specifications included in the framework.



Warrior, Vinoo S

*Director of Product Management,
Kalkitech Inc*

Vinoo S Warrior serves as the Director of Product Management at Kalkitech Inc., a wholly owned subsidiary of Kalki Communication Technologies Ltd., India. In this role he oversees the product management functions for Kalkitech's communication products.

His interests are design and implementations of communication protocols in the Energy/Power Sector and participation in International Open standards bodies related to this domain. Vinoo is a member of the DLMS-UA Working Group for protocol standards maintenance and Secretary of the WG1-Interoperability Working Group under the Bureau of Indian Standards, Sectional Committee LITD10.



Whitney, Tobias, MBA

Senior Architect, GE Energy

Tobias is responsible for leading security architecture and design efforts for

GE's Systems Engineering projects, participation in industry standards organizations, and security planning for Smart Grid Systems.

Tobias joins GE after seven years of leading the cybersecurity practice at Burns & McDonnell Engineering in Missouri and smart grid security related efforts at Structure Consulting.

In addition, Tobias has over 12 years of industry experience in design and security architecture for Distribution Automation, Meter Data Management, Demand Response, Customer Web Portals, Wireless Networks, GIS and related Smart Grid components. He has successfully delivered over 25 NERC CIP compliance programs and is currently an active member of the Smart Grid Interoperability Panel and NERC's Control System Security Working Group. He has been an active participant at NERC CIPC and subcommittee meetings since 2004.

Tobias holds a B.S. in Business and Public Administration from University of Missouri, and an MBA from the Washington University Olin School of Business in Saint Louis.



Widergren, Steve

Principal Engineer, Pacific Northwest National Laboratory (PNNL)

Steve Widergren contributes to the research and development of new solutions for reliable operation of electric power systems. Common throughout his career is the application of information technology to power engineering problems including, simulation, control, and system integration. He is a principal investigator at Pacific Northwest National Laboratory where he leads the smart grid architecture and standards effort. He is the current NIST Smart Grid Interoperability Panel Plenary Chair, the founding administrator of the GridWise Architecture Council, and has served as DOE's point of contact on smart grid interoperability and standards concerns. The smart grid vision embraces the trends in low-cost computer processing and sensors, wide accessibility to communications, and market-driven services, and shapes them

into a vision of a transformed electric power system: smarter, more agile, and cost effective. In this environment, power consuming equipment, distributed generation, and storage systems collaborate as full participants in system operation.

Prior to joining Pacific Northwest National Laboratory, he engineered and managed energy management systems (EMS) products for electric power utilities. Application areas included energy trading, supervisory control and data acquisition (SCADA) systems, and power system security assessment tools. Mr. Widergren received M.S. and B.S. degrees in electrical engineering from the University of California, Berkeley. He is actively involved in the IEEE Power Engineering Society and has participated in IEEE and IEC standards efforts that bridge power engineering with information technology.



Wollman, David

Manager, Electrical Metrology Groups, NIST

Dr. David A. Wollman is one of NIST's team leads for its smart grid project, and is a manager in the Quantum Electrical Metrology Division, including of programs to maintain and advance the Nation's electrical standards and metrology supporting the electric power industry. Before joining the Division, he served in several positions at NIST, including Scientific Advisor in the Electronics and Electrical Engineering Laboratory, Program Analyst in the NIST Director's Program Office, and bench-level scientist in Boulder, Colorado developing advanced high-resolution microcalorimeter x-ray detectors for microanalysis and astronomy applications. Before joining NIST, Dr. Wollman received his Ph.D. from the University of Illinois at Urbana-Champaign in the areas of superconducting electronics and device micro/nanofabrication. He has given numerous invited talks at international conferences, has published over 50 articles and book chapters, and holds three U.S. patents. He has received many awards, including the U.S. Department of Commerce Gold Medal and the NIST Applied Research Award.



Wright, Andrew

CTO, N-Dimension Solutions

Andrew has 19 years of experience in industrial research and

development, holds a Ph.D. in Computer Science from Rice University, and has published over 20 technical papers. He guides N-Dimension's technical strategy for development of cyber security products for the electric power sector. He is currently engaged with several cyber security standards efforts, including NIST's Cyber Security Working Group to develop interoperable security solutions for the smart grid.



Yadav, Navindra

Principal Engineer, Cisco

Navindra Yadav is a Principal Engineer in the Smart Grid Business Unit at Cisco, working to define the smart grid communication architecture and products for Cisco's Smart Grid solutions. He is an expert in Ethernet switching and bridging, IPv4 and IPv6 routing, MPLS, and network security / secure communications. Navindra has been the chief architect of the Cisco Catalyst 3K and Catalyst 2K series of hardware switches, which have been one of the most successful product lines in the networking industry. Navindra holds six issued patents and has 17 additional patents pending with the US patent office. He has an Adv. MS from Johns Hopkins University, an MS from Lehigh University, and a BTech in Computer Science and Engineering from MANIT (India). He is

a member of the IEEE Computer Society, Communications Society, and PES.

Zhang, Jian

CEO, GridX, Inc.

Jian Zhang is the founder and CEO of GridX, Inc., a technology startup developing financial infrastructure for Smart Grid applications. In that capacity, Jian is responsible for GridX's overall strategy and execution. Prior to founding GridX, Jian had spent more than a decade developing and delivering billing and financial clearing technologies for ISPs, telecom carriers, and digital media companies. As founder and CEO of Tradescape, Jian led a team of technologists pioneering a financial clearing and settlement technology for digital media applications. Jian led the startup from inception through profitability with a combination of vision and execution. Prior to Tradescape, Jian headed the New Network Services product group at Portal Software and was responsible for a line of billing product offerings for telecom carriers and online media companies. Jian worked closely with Portal's online media and content customers to better monetize online media and content. Jian holds a Ph.D. in electrical and computer engineering from the University of Illinois at Urbana-Champaign and an MBA degree from the University of Chicago.

Ziolkowski, Christopher

R&D Manager Sensor and Automation, Gas Technology Institute

APPENDIX C: PAPERS

Business & Policy Track

- ***Regulatory Policies and Rate Structures for a Demand Responsive Grid***

Donald Lincoln, Andrea Mammoli, Anthony Menicucci – [Energy Price Controlled Automated Demand Response Applied to the University of New Mexico Campus](#)

Mark Knight, Nora Brownell - [How Does Smart Grid Impact the Natural Monopoly Paradigm of Electricity Supply?](#)

- ***The Value of Customer Data***

Kelly Smith, – [Scaling Demand Response through Interoperability in Commercial Buildings](#)

Jian Zhang -[Implementation Models for Sharing Consumer Energy Usage and Billing Data](#)

- ***Transactive Energy Management in Distribution Systems***

Edward G. Cazalet – [TeMIX: A Foundation for Transactive Energy in a Smart Grid World](#)

Basic Connectivity Track

- ***Flexible and Secure Interoperability***

Andrew K. Wright, Paul Kalv, Rodrick Sibery – [Interoperability and Security for Converged Smart Grid Networks](#)

Brian P. Lenane – [Cyber Security for Federal Smart Grids](#)

- ***Substation Networks – Building Reliability and Redundancy***

Richard Harada – [Importance of Interoperability in High Speed Seamless Redundancy \(HSR\) Communication Networks](#)

- ***Customer Devices: Mass Market Connectivity for the Smart Grid***

Chellury Ram Sastry, Rob Pratt – [Use of Residential Smart Appliances for Peak Load Shifting & Spinning Reserves: Cost Benefit Analysis](#)

Basic Connectivity Track

- ***Interoperability and Communications Networks***

David Dolezilek, David Whitehead, and Veselin Skendzic – [Integration of IEC 61850 GSE and Sampled Value Services to Reduce Substation Wiring](#)

Phil Roberts – [IPv6 Momentum and the SmartGrid](#)

APPENDIX C: PAPERS

Information Interoperability

- ***An Introduction to Information Interoperability***

Yemula Pradeep Kumar, C.N. Raghupathi, Vinoo S Warriar, S.A.Khparde – [Towards Interoperability Standards in Indian Power Sector](#)

- ***What's in a Word? – Semantics and Semantic Modeling***

Gary A. McNaughton, P.E., Warren P. McNaughton, P.E., Robert Saint, P.E. – [Smart Grid Enterprise Application Interoperability Needs Assessment and the MultiSpeak® Specification](#)

- ***The Common Information Model (CIM) Approach to Interoperability***

Andrew Crapo, Katrina Griffith, Ankesh Khandelwal, John Lizzi, Abha Moitra – [Overcoming Challenges Using the CIM as a Semantic Model for Energy Applications](#)

Hiroshi Murayama, Lan Wang, Akira Hosokawa – [Building a bridge between CIM and PLIB ontologies via IEC62656 on data parcels](#)

Edward J. Berozet – [ANSI C12.19/IEEE 1377 to IEC 61968-9 Mapping](#)

- ***Customer Interoperability Challenges***

Girish Ghatikar, Johanna L. Mathieu, Mary Ann Piette, and Sila Kiliccote – [Open Automated Demand Response Technologies for Dynamic Pricing and Smart Grid](#)

Timothy Schoechle – [Modular power manager and gateway: an approach to home-to-grid energy management and demand response](#)

Architecture

- ***Architecture Elements and Solutions***

K. Mani Chandy, Jeff Gooding, Jeremy McDonald – [Smart Grid System of Systems Architectures. Systems Evolution to Guide Strategic Investments in Modernizing the Electric Grid](#)

- ***Integration Methods and Approaches***

Edward J. Berozet – [ANSI C12.22 in Context](#)