

2012 Proceedings

Driving to Grid 2020



Irving, TX December 3-6, 2012

PNNL-SA-95852







Welcome to Grid-Interop 2012

On behalf of the GridWise® Architecture Council (GWAC), Smart Grid Interoperability Panel (SGIP), National Institute of Standards and Technology (NIST), and Department of Energy, we are excited to have your participation in this sixth annual Grid-Interop forum. A hearty thanks to the Planning, Program, and Plug-In committees as well as the presenters for the time and energy they have put into preparing for the event.

Grid-Interop 2012's theme of "Driving to Grid 2020" encourages you to interact with other leaders in the future of smart grid interoperability through four tracks of presentations and at the Interoperability Fair on Tuesday evening. The four tracks address issues covering Business and Policy, Cross-Cutting Elements, Information Interoperability and Architecture. Also, this year's special Plug-In event includes demonstrations from technology alliances on real-world applications of smart grid interoperability.

This Grid-Interop also marks a major milestone in the growth and maturity of the SGIP as it transitions to an independent, self-sustaining group. Join fellow SGIP members as we address transition issues and celebrate the changeover to this next phase of operations.

Grid-Interop is indebted its sponsors for their support. The sponsoring organizations recognize the importance of interoperability to the electric power system and demonstrate this through their support of this event. Please thank them and visit their displays.

Members of the GWAC and SGIP will be available throughout the meeting to answer your questions and discuss your involvement in the ongoing work. Your continued participation in these activities is critical to the success of this effort. Thank you for attending Grid-Interop and joining us in this work.

Sincerely,

Yenn Il

George Arnold

National Coordinator for Smart Grid Interoperability, NIST

Erich Gunther

GWAC Chair

Sich Sentos Kill Bonto

Ron Melton

GWAC Administrator



GridWise Architecture Council



Erich Gunther Chief Technology Officer, EnerNex Corporation



Ron Ambrosio

Global Research Leader, IBM Energy and Utilities Industry, IBM Thomas J. Watson Research Center



Robert Burke Principal Analyst, ISO New England



Tony Giroti Chairman & CEO, Bridge Energy Group, Inc.

Rik Drummond CEO and Chief Scientist, Drummond Group Inc.



Ward Camp Vice President, Landis+Gyr



Paul De Martini Managing Director, Newport Consulting Group



Alexander Levinson Information Systems Architect, Lockheed Martin



Mark Knight Executive Consultant, CGI



Tracy Markie President, Engenuity Systems



Bob Saint Principal Distribution Engineer, National Rural Electric Cooperative Association (NRECA)



Thomas Sloan State Representative, State of Kansas



Kenneth Wacks Consultant, Sensus Metering



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

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 socioeconomic 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.





2012 Committees

Planning

Anto Budiardjo President and CEO Clasma Events

Greg Obenchain Manager Edison Electric Institute

Paul Boynton Electrical Engineer, Smart Grid Team National Institute of Standards and Technology

Paul Molitor Transition Manager SGIP 2.0, Inc.

Paul De Martini Managing Director Newport Consulting Group, LLC

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Rudi Schubert Principal Consultant - Smart Grid Engineering EnerNex Corporation

Steve Widergren Senior Scientist Pacific Northwest National Laboratory

Stuart McCafferty Vice President EnerNex Corporation

Todd Halter Senior Scientist Pacific Northwest National Laboratory

Program

Anto Budiardjo President and CEO Clasma Events

David Hardin Senior Director EnerNOC, Inc.

James Mater Co-Founder & Director Quality Logic, Inc.

Ken Wacks President Home & Utility Systems

Mark Knight Director KEMA Robert Burke Principal Analyst ISO New England

Bob Saint Principal Distribution Engineer NRECA

Todd Halter Senior Scientist Pacific Northwest National Laboratory

Tracy Markie President & CEO Engenuity Systems, Inc.



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Thank You From the Team

Grid-Interop Participants and Interested Colleagues:

On behalf of the GridWise Architecture Council (GWAC), Smart Grid Interoperability Panel (SGIP), National Institute of Standards and Technology (NIST), and Department of Energy, we would like to thank those who attended, participated in, or sponsored the very successful 2012 Grid-Interop Forum. We are pleased to offer a record of the forum in the following proceedings material. The proceedings contain the compendium of papers produced for the event as well as the panel session abstracts, links to the presentation slides, and a brief wrap-up of the SGIP meetings.

This year's Grid-Interop brought together smart grid players and stakeholders to discuss what's working today and to map out a future vision for standards and interoperability in an industry-defining time—with the ultimate goal of getting beyond the fear, uncertainty and doubt brought forth by:

- The evolving focus of the interoperability community—including SGIP 2.0, GWAC's vision of Grid 2020, and more.
- Continuously evolving interoperability standards, even as utilities reach mass-deployment stages in smart grid rollouts.
- A gap in understanding about "what's next" for interoperability.

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 revitalizing our electric power systems and demonstrated this through their support of this event.

Sincerely,

Yonn Ill

George Arnold

National Coordinator for Smart Grid **GWAC** Chair Interoperability, NIST

Frich Gunther

Sich Sector Kill Bonto

Ron Melton **GWAC** Administrator



An Introduction to Grid-Interop Forum

Grid-Interop brings together a broad audience from both the government and the technical community, including key players from the energy utilities, software, cable, semiconductor, telecommunications and electricity consumer sectors. The birthplace of the Smart Grid Interoperability Panel, Grid-Interop continues to focus on smart grid interoperability standards and technologies—defining the interoperability framework necessary for smart grid to flourish.

With the guiding principle of implementing interoperability through collaboration, Grid-Interop brings together a true cross-section of industry stakeholders to ensure rapid development and implementation of smart grid interoperability standards.

Grid-Interop creates dialogue among the key stakeholders, shaping and driving the progress of standards development, including:

- standards development organizations
- businesses that use and implement these standards
- regulators that oversee the implementation of standards-based technologies
- product designers, system integrators, and consultants who put the standards to work in real-life applications

In addition to providing a clear snapshot of industry developments around interoperability standards to date, Grid-Interop provides a unique opportunity and forum to have your voice heard at this most critical time.

Utility & Power Companies

- define the interoperability framework necessary for smart grid to flourish
- cover the architectural framework and tools currently in deployment by vendors, system integrators, and utility companies across the U.S. and internationally
- highlight success stories from early utility implementers in all areas of smart grid, including customer-facing advanced metering infrastructure (AMI) deployments, building-to-grid technologies, and even electric vehicles
- determine best approaches for achieving interoperability—from substations to customer devices
- highlight the consumer side of interoperability, from smart grid consumer data management, to privacy and reliability, to long-term customer interoperability challenges and solutions
- dive deeply into the most technical aspects of information modeling for interoperability.

Standards Development Organizations

- define the interoperability framework necessary for smart grid to flourish
- cover the architectural framework and tools currently in deployment by vendors, system integrators, and utility companies
- highlight success stories from early utility implementers in all areas of smart grid, including customer-facing AMI deployments, building-to-grid technologies, and even electric vehicles
- determine best approaches for achieving interoperability—from substations to customer devices
- · dive deeply into the most technical aspects of information modeling for interoperability



Businesses and Vendors

- define the interoperability framework necessary for smart grid to flourish
- discuss how to manage—and uncover business opportunities from—customer data while balancing the need for privacy and reliability
- offer a critical venue for discovering direction and business opportunities within this tremendous smart grid opportunity
- provide an overview of current framework and tools being deployed by other vendors, system integrators, and utilities
- cover success stories from early utility implementers
- create networking opportunities from key players among utilities, software, cable, telecom, electricity consumers and government—providing the only technical conference with this breadth

Regulatory & Policy Community

- dives deeply into the consumer side of interoperability, from smart grid consumer data management, to privacy and reliability, to long-term customer interoperability challenges and solutions
- provides an overview of innovations in rate structures, regulatory policies, and tariffs to support a demand-responsive grid
- highlights success stories from early utility implementers in all areas of smart grid, including customer-facing AMI deployments, electric vehicle pilots, and more
- discusses cyber security, privacy, and information assurance and how those can be achieved through interoperable systems that are both flexible and secure

Product Designers, System Integrators & Consultants

- cover the architectural framework and tools currently in deployment by vendors, system integrators, and utility companies across the U.S. and internationally
- determine best approaches for achieving interoperability-from substations to customer devices
- dive deeply into the most technical aspects of information modeling for interoperability
- provide a critical venue for discovering direction within the tremendous smart grid opportunity

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



Highlights of Grid-Interop 2012

Driving to Grid 2020

Getting Beyond Fear, Uncertainty, and Doubt

A 10-year strategic plan for grid interoperability. A celebration of interoperability successes. A vision for two organizations driving interoperability as they shift their focus in 2013. And a visual display of interoperability in action—It all happened at Grid-Interop 2012.

Grid-Interop 2012, the sixth year of Grid-Interop, brought together smart grid players and stakeholders who discussed what's working today and mapped out a future vision for standards and interoperability during an industry-defining time. The GWAC forum's goal of getting beyond current fear, uncertainty and doubt was accomplished through four days of technical paper presentations, plenary speakers and roundtables, workshops and boot camps, Plug-In activities and a GWAC meeting.

This year's technical paper tracks focused on four areas of the GWAC Stack: Business and Policy, Architecture, Information Interoperability, and Cross-Cutting Issues. Over 50 presentations were given, with four being recognized as outstanding and given the GWAC Outstanding Paper awards for presenting papers that will help industry chart a clearer vision of smart grid interoperability.

• "Understanding Microgrids as the Essential Architecture of Smart Energy," Toby Considine, William Cox, Edward G. Cazalet





• "Testing and Certification for Green Button," Dr. Martin J. Burns



• "The Critical Next Step for Interoperability: Designing and Implementing Interfaces between Standards," Gary McNaughton, Linda Rankin, James Mater

Grid-Inte "Information Inter	e rop 2012 roperability" Track
Presen	ted to:
Gary McNaughton, Linda	Rankin and James Mater
for "The Critical Next St	tep for Interoperability:
Designing and Implementing I	nterfaces between Standards"
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• "Demand Response Providing Ancillary Services – A Comparison of Opportunities and Challenges in the US Wholesale Market," Jason MacDonald, Peter Cappers, Duncan Callaway, Sila Kiliccote



This year's plenary speakers and roundtables included opening comments from Jim Greer (Sr. Vice President and Chief Operating Officer, Oncor Electric Delivery), a utility roundtable lead by Chris Irwin focused on Looking Forward to Grid 2020, the GWAC Foundation Session that also focused on moving to grid 2020, dinner speaker Colin Harrison (IBM Distinguished Engineer, IBM), and the closing Standard Developing Organizations (SDO) Roundtable led by George Arnold.

As in Grid-Interop 2011, this year's boot camps and workshops focused on helping attendees to get a better understanding of the basic, yet very complicated, building blocks for creating an interoperable system. The 2012 boot camps include sessions on Architecture, Testing & Certification, Transactive Energy, and Cloud Computing, while the workshops focused on a Technology Adoption Roadmap, Information for Decision Makers, and the GWAC Information Interoperability Model. These sessions were well attended with an average of about 25 attendees per session.

The Grid-Interop 2012 Plug-In activity was slightly altered from the 2011 activity. This year we invited different associations to present interoperability within each association's domain. We were very pleased to have Z-wave, MultiSpeak, and OpenADR participate this year. The three associations were represented by eleven companies, and were able to demonstrate interoperability within the association and externally.

Given that Grid-Interop 2012 was held a few weeks after Hurricane Sandy, the GWAC meeting at the forum was able to focus on the outcome of that event and discuss grid resilience. The discussion was not to find fault with the utilities affected by the hurricane, but rather to consider how smart grid technology, microgrids, and attention to interoperability can be applied to rebuilding affected elements of the power system to achieve a more resilient system.



Get the Download

More than 100 speakers participated in 30+ panel discussions and dozens of SGIP Working Group and Priority Action Plan (PAP) meetings. You can now download all presentations from <u>www.Grid-Interop.com</u>. Just visit the <u>agenda page</u> or <u>speaker list</u> to navigate to the content you want.



Dinner Speaker Colin Harrison



Smart Grid Interoperability Panel at Grid-Interop 2012 Recap

Over 400 attendees, both in-person and remote, participated in our Winter Smart Grid Interoperability Panel (SGIP) Face-to-Face meeting and Grid-Interop. Held in partnership with NIST, Clasma, the GridWise Architecture Council and the Department of Energy, the conference sessions focused on what's working today and mapping out a future vision for standards and interoperability. For the second year, attendees viewed implementation and interoperability at work in the Plug-In, the industry's only crosstechnology showcase of interoperability standards.

The week began with the SGIP Governing Board Meeting on Sunday evening and concluded with SGIP 2.0 Chair John McDonald providing the highlights in the Closing Plenary session. While the goals and tasks of our working groups continued in individual breakouts, there were also new items on the agenda. Four plenary sessions were held to mark the important SGIP transition from 1.0 to 2.0. Other notable changes were the many SGIP 2.0 open committee meetings and a Board of Directors meeting.

This meeting also officially marked the "passing of the torch" from SGIP 1.0 to 2.0, including a Memorandum of Understanding (MOU) signing on Tuesday between NIST and SGIP 2.0, Inc., as well as a Transitional Plenary session that same afternoon to highlight accomplishments and recognize SGIP leadership.

SGIP 2.0 Specific Highlights

Grid-Interop 2012 hosted the first collection of public meetings for SGIP 2.0 and its five Board of Director Committees. John McDonald shared during the Closing Plenary session that he was "very pleased with the level of member interest and Involvement" for the week. More than a dozen SGIP membership applications were received during the week.

- The Executive Committee recently received several applications for the Executive Director position and will be reviewing those in the coming days. In addition, the group will soon issue a request for proposals seeking providers of various services.
- The Technical Committee is transitioning the Project Management Office function and finishing their prioritization of tasks.
- Marketing & Membership Committee is discussing membership outreach, the 2013 Communications Plan and a 2013 meeting strategy. Meeting plans for 2013 will be announced soon by SGIP 2.0.
- Nominating & Governance Committee held lengthy discussion on the definition of "Good Standing" in the new structure and the treatment of volunteers during the transition period.
- Audit Committee is focused on the selection of an auditor, a key step to maintaining the organization's 501(c) (3) status.



Foundational Session

Driving to Grid 2020

Paul De Martini Managing Director Newport Consulting Group, LLC

Ron Ambrosio Global Research Leader, IBM Energy and Utilities Industry IBM, Thomas J. Watson Research Center Ron Melton GridWise[®] Architecture Council Administrator Pacific Northwest National Laboratory

Erich Gunther Chief Technology Officer EnerNex

Tracy Markie President Engenuity Systems

Foundational Session discussed the evolution of the electric system in the context of the integration of distributed energy resources into markets and T&D grid operations while ensuring reliability. Specifically, GWAC presentations addressed:

- Transactive Energy Markets & Pricing/Rates

- Transactive Control Architecture

- Cyber-physical Architecture for Resiliency

Title	Presenter	Affiliation
Transactive Energy <u>Presentation</u>	Paul De Martini	Newport Consulting Group, LLC
Transactive Control Architecture <u>Presentation</u>	Ron Ambrosio	IBM T.J. Watson Research Center
Cyber-physical Architecture for Resiliency <u>Presentation</u>	Erich Gunther	EnerNex



Boot Camps & Workshops

Testing & Certification Workshop



Moderator: Rik Drummond, Drummond Group, Inc.

This workshop provided a broad overview of Smart Grid testing and certification considerations. The content was valuable to both those that are new to the topic, as well as those actively engaged in testing activities. Speakers discussed the value and importance of testing to help accelerate the availability and deployment of interoperable Smart Grid products; an overview of the SGIP testing initiatives and its Interoperability Process Reference Manual (IPRM); the roles and relationships between test programs Independent Testing and Certification Authorities (ITCAs), certification bodies, test laboratories, and accreditation organizations; and forward-looking needs to build new test programs for smart grid and drive the demand to integrate these test programs into end-user product evaluation processes.

Title	Presenter	Affiliation
Testing & Certification Workshop <u>Presentation</u>	Rudi Schubert	EnerNex

Transactive Energy 101 & Roadmap



Moderator: Ron Melton, Battelle/Pacific Northwest National Laboratory

This session provided basic background on "transactive energy." Transactive energy refers to techniques for managing the generation, consumption or flow of electric power within an electric power system through the use of economic or market based constructs while considering grid reliability constraints. The term "transactive" comes from decisions being made based on a value. These decisions may be analogous to or literally economic transactions (from the Proceedings of the 2012 Transactive Energy Workshop - PNNL-SA-90082).

The session included a presentation on Transactive Energy 101 with a summary of the history of work in this area, current activities and the draft roadmap prepared by a GWAC working group. The second presentation covered Markets 101 with a discussion of the role of markets in grid operations. Lastly, a discussion has held on interoperability and standards considerations for transactive energy.

Links: GWAC 2011 Transactive Energy Workshop Proceedings GWAC 2012 Transactive Energy Workshop Proceedings

Title	Presenter	Affiliation
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Panel Participant	Ron Ambrosio	IBM T.J. Watson Research Center
Interoperation of Transactive Energy and Other Smart Grid Standards <u>Presentation</u>	James Mater	Quality Logic, Inc.
Draft Transactive Energy US Roadmap <u>Presentation</u>	Ed Cazalet	TeMIX Inc.
Panel Participant	Ali Ipakchi	OATI – Open Access Technologies, Inc.

Decision Maker's Workshop



Moderator: Robert Burke, ISO New England

The GWAC has developed several tools that regulators can use in assessing smart grid projects. This toolkit is not a conceptual construct, but rather it is a set of real tools that can be used to ensure that smart grid projects deliver the intended benefits. These tools can help to avoid the pitfalls of significant customization and additional time and cost to deploy a complete smart grid project. The session participants worked in teams to explore applications of the toolkit and processes to evaluate proposed smart grid implementations. Using a pair of case studies, the workshop participants compared business-as-usual scenarios versus scenarios using the toolkit and discussed the perspectives of regulators, utilities, vendors, markets and consumers.

Decision Maker's Workshop Presentation

Architecture Boot Camp



Moderator: Stephan Amsbary, EnerNex

This session provided an overview on what architecture is and why it's important for evolving smart grid functions. The presentation discussed the key concepts of architecture, its primary artifacts and how it is used in an organization to guide implementation. This was an entry-level session for non-architects. It



was presented in two parts: an overview of the discipline of enterprise architecture itself followed by the current efforts by SGIP, the International Electrotechnical Commission (IEC) Working Group 19 and the European Union Smart Grid Reference Architecture.

Smart Grid (Enterprise) Architecture 101 Presentation

Technology Adoption Roadmap



Moderator: Paul De Martini, Newport Consulting Group, LLC

The session was a discussion of the technology development and adoption lifecycle considerations incorporating lessons learned from utilities, technology firms and testing-and-certification firms. It included four expert presentations and a panel Q&A session.

Future History of the Grid Presentation

Title	Presenter	Affiliation
A Utility Standards and Technology Adoption Framework <u>Presentation</u>	Don Von Dollen	Electric Power Research Institute (EPRI)
Technology Adoption and the Value of Industry Collaboration <u>Presentation</u>	William Cloutier	DTE Energy
From Catalog of Standards to Interoperable Deployments <u>Presentation</u>	Paul Duffy	Cisco Systems
Technology Adoption: From Standards to Products <u>Presentation</u>	James Mater	Quality Logic

Cloud Computing Boot Camp



Cloud computing is one of the most often used but misunderstood buzzwords of IT. This session dissipated the fog concerning this term by introducing the participants into the evolution of cloud computing, a description of the various cloud offerings, their impact upon an organization and the IT implication and guidance concerning their advantages and disadvantages.



<u>Cloud Computing 101 – Dissipating the Fog – Presentation</u>





Grid-Interop Forum Tracks

Implementing Interoperable Smart Grid Solutions

This year there were over 80 papers submitted for the forum. The paper presentations in the tracks address the <u>Call for Papers</u>.

Business and Policy



Transactive Energy



Moderator: Ron Melton, Battelle/Pacific Northwest National Laboratory

Under the regulated retail energy market, (once the energy leaves the bulk power system), the economic model for energy delivered to the end-use customer generally changes from a time-varying price to fixed prices or prices that vary over a limited number of blocks of hours. This economic model has evolved as local electric service providers consolidated to achieve economies of scale in both the delivery and generation of electricity with higher reliability. Local service providers generally operate as natural monopolies with oversight to avoid abuse of this role. Another approach extends the variable pricing model throughout the system—from generation through the bulk power transmission and finally the distribution to consumption. This model could extend the interplay between economic activity (transactions) and the technical operation of an electric power system from end to end, thus the term "transactive energy." This session explored various aspects of transactive energy.

These topics provided the opportunity for people involved in research and development of transactive energy techniques to share their approaches, discuss the nature of these approaches, and identify research and development needs.

Title	Presenter	Affiliation
Transactive Energy Session <u>Presentation</u>	Ron Melton	Battelle/Pacific Northwest National Laboratory
Business Models for Transactive Energy in the Wholesale Market <u>Presentation</u>	Robert Burke	ISO New England Inc.



Transactive Energy for Power System Economics and Reliability <u>Presentation</u>	Ali Ipakchi	OATI – Open Access Technologies, Inc.
Transactive Device Architecture and Opportunities <u>Presentation</u> <u>Paper</u>	Ed Cazalet	TeMIX Inc.
MicroMarkets and Transactive Energy – A Phased Approach <u>Presentation</u>	William Cox	Cox Software Architects, LLC

International Perspective on Distribution Process & Controls



Moderator: Paul De Martini, Newport Consulting Group, LLC

Distribution systems worldwide are evolving due to the integration of distributed energy resources, which are driving more dynamic operational and market considerations. This international session will address the business model, processes and distributed-control considerations and lessons learned in Africa, Asia, Australia, Europe and the Middle East.

Title	Presenter	Affiliation
Power Planning in a Smart Grid Environment – Case Study of South Africa <u>Paper</u>	Mobolaji Bello	Eskom Holdings Limited
Maintaining Interoperability By Open- Standards Design in The Power Distribution for Smarter Grid <u>Presentation</u> <u>Paper</u>	Khalid Darwish	Al Ain Distribution Company – United Arab Emirates



Measurement and Verification



Moderator: Robert Burke, ISO New England

Demand response is both passive and active. One can talk about the kilowatts saved, and in the case of replacing incandescent light bulbs with compact fluorescent lights (CFLs), the calculation of the energy saved in such cases is relatively straightforward. However, in a general sense, demand response is reducing energy consumption by taking an action and the resulting question is how much consumption was reduced. This computation is not as straightforward as the conversion to CFLs. There is no electric meter that can measure what level of energy would have been consumed. The measurement must use an estimate of what the energy consumption would have been "but for the reduction." The presentations at this session described analysis of baselines, demand response providing ancillary services, and drivers for energy-intensive industries.

Title	Presenter	Affiliation
Smart Grid as a Driver for Energy-Intensive Industries: A Data Center Case Study <u>Paper</u>	Venkata Ganti	Lawrence Berkeley National Laboratory
Demand Response M&V White Paper Recommendations <u>Presentation</u> "Towards Demand Response Measurment and Verification Standards" <u>Paper</u>	David Holmberg	NIST
Demand Response Providing Ancillary Services <u>Presentation</u> <u>Paper</u>	Jason MacDonald	Lawrence Berkeley National Laboratory

Price Responsive Demand



Moderator: Ward Camp, Landis+Gyr

Demand response is not new, and some retail energy suppliers offer their customers some form of time-varying energy prices, such as time-of-use energy pricing (TOU). Under the label of TOU, varying energy pricing retail rate structures can include critical peak pricing (CPP) and dynamic pricing among others. Price responsive demand, as the name implies, can encompass all of these retail pricing schemes and other similar retail rates. However, it can also encompass demand response participating in the wholesale energy market, and these demand response assets being dispatched on price similar to a supply-side resource. The session presented various views on implementing retail power markets, dynamic pricing, models for price responsive devices, and mobile loads.



Title	Presenter	Affiliation
Estimating Forward Prices & Their Use by Responsive Devices <u>Presentation</u> <u>Paper</u>	Chellury (Ram) Sastry	Samsung Telecommunications America, LLC
Mobile Loads as Price Responsible Demand <u>Presentation</u>	Robert Burke	ISO New England
Changing the Strategic Perspective on the Value of Demand Response (DR) <u>Presentation</u>	Ethan Cohen	BRIDGE Energy Group

Price Responsive Appliances



Moderator: Ken Wacks, Home and Utility Systems

The term "Prices to Devices" is a catchy phrase. However, is it really an appropriate solution to have the device respond to price or should some higher level manager analyze and provide instructions to particular devices in the home (for example a home energy management system instructing an electric vehicle to charge now, or a hot water heater to heat the water now)? How might such a system communicate with the energy consuming devices in the home? This session provided an examination of some emerging interoperability standards that might be applied to implement "prices to devices."

Title	Presenter	Affiliation
Price Responsive Appliances <u>Presentation</u>	Joann Donelon	ClimateTalk Alliance
In-Premise Devices and Grid Interoperability <u>Presentation</u>	Michael Kohanim	Universal Devices, INC
The Semantics of Price and Price-Responsive Nodes <u>Presentation</u> <u>Paper</u>	Chellury (Ram) Sastry	Samsung Telecommunications America, LLC



Information Interoperability



Track Leader: Tracie Markie, Engenuity Systems

Information is the backbone of smart grid technology, and Interoperability is the very platform upon which it is built. In today's highly evolved "information age," why would we expect anything else? Creating an effortless ebb and flow of data relating to usage, status and pricing has become a central focus of smart grid efforts. This session updated attendees with the current status of key developments surrounding the exchange and interoperability of data, including sessions about current standards as well as techniques and efforts to turn raw data into usable information.

End-to-End Information Exchange & Interoperability



Moderator: Tracie Markie, Engenuity Systems

Two-way flow of information, from generation to end-use, is a critical requirement for successful implementation of SmartGrid technologies. Hundreds of standards, thousands of vendors and millions of end-users must come together as part of the puzzle representing end-to-end information exchange. This session looked at various aspects and requirements of the daunting goal of system-wide interoperability and information exchange.

Title	Presenter	Affiliation
Using SPARQL/OWL for Validation of Smart Grid Standards <u>Presentation</u> <u>Paper</u>	Surbhi Dangi	Carnegie Mellon University
Interfacing Facility Management to the Transactive Grid <u>Presentation</u>	David Holmberg	NIST
Low Cost Telemetry Communication Technologies for Balancing the Electric Grid Using Non-generation Resources <u>Abstract</u>	Dave Watson	Lawrence Berkeley National Laboratory
The Challenges of Establishing A Common AMS View In Texas <u>Presentation</u>	Donny Helm	Oncor Electric Delivery



MultiSpeak and CIM



Moderator: Tracie Markie, Engenuity Systems

Standardization of communications, modeling of systems, and open tools are all important planks in the SmartGrid platform. This session explored the state of several standards and efforts to ensure seamless information exchange including MultiSpeak, Common Information Model (CIM) and related open-source tools.

Title	Presenter	Affiliation
CIM – MultiSpeak Harmonization Update <u>Presentation</u> <u>Paper</u>	Gerald Gray	EPRI
The Critical Next Step for Interoperability: Designing and Implementing Interfaces between Standards <u>Presentation</u> <u>Paper</u>	Gary McNaughton	Cornice Engineering, Inc.
Smart Metering Data Exchange Tools <u>Presentation</u>	Marty Burns	Hypertek, Inc.

OpenADR/ADR/AMI



Moderator: Tracy Markie, Engenuity Systems

Some of the most promising benefits of SmartGrid technology are the possibilities of implementing automation strategies surrounding demand-side management, meter reading and related business streamlining and energy reducing technologies. This session's presenters discussed several of the advancements in automated demand response, including Open Automated Demand Response (OpenADR), and automated meter infrastructure.

Title	Presenter	Affiliation
Deploying Systems Interoperability and Customer Choice within Smart Grid <u>Presentation</u> <u>Paper</u>	Rish Ghatikar	Lawrence Berkeley National Laboratory
Advanced Data Management and Analytics for Automated Demand Response (ADR) based on NoSQL <u>Presentation</u> <u>Paper</u>	Bert Taube	Versant Corporation



Title	Presenter	Affiliation
OpenADR 2.0 Big Picture <u>Presentation</u>	Jim Zuber	Quality Logic Inc.

IMM Workshop



Moderator: Steve Widergren, Pacific Northwest National Laboratory

Advancing interoperability involves reaching agreement on how things join at their interfaces. The quality of the agreements and the alignment of parties involved in the agreement present challenges that are best met with process improvement techniques. The GWAC uses concepts from capability maturity models used in the software industry to advance interoperability of smart grid technology. An interoperability maturity model (IMM) has been drafted and experience is being gained through trials on various types of projects and community efforts. See www.gridwiseac.org/about/imm.aspx.

This workshop explored the value streams from IMM methods and tools, and how such tools can best be applied. Attendees participated in facilitated discussions of questions concerning how they justify interoperability activities within their organizations, as well as common areas that could be good candidates for improving interoperability on smart grid system integration.

InteroperabilityMaturityModel - IMM Workshop - Presentation

Title	Author	Affiliation
	Ron Cunningham	American Electric Power (AEP)
Potential Areas where IMM Methods and Tools may be Applied Now to Help Reveal Valuable Areas that Deserve Attention and Justification to Decision-Makers <u>Presentation</u>	Mark Knight	CGI
	Austin Montgomery	Software Engineering Institute, Carnegie Mellon
	James Mater	Quality Logic, Inc.



Architecture



Track Leader: Dave Hardin, EnerNOC, Inc.

The architecture track focused on formal and informal architectures to support interoperability in the smart grid. Architecture encompasses the structure, organization and behavior of systems, including the components and interactions that make up the systems. Foundation work includes the GWAC Interoperability Framework and the associated "GWAC Stack." In addition, the SGIP Architecture Committee (SGAC) has been charged with producing a series of architectural templates for the smart grid. This track discussed smart grid architecture from multiple points of view.

Architecture: Why it is Important



Moderator: Ron Ambrosio, IBM T.J. Watson Research Center

Architecture, as applied to smart grid, is a complex topic that views the structure and behavior of a system-of-systems at different levels of abstraction. As such, it is often viewed as a very high-level concept that has little relevance to physical systems and devices—nice to have, but not necessary. This session described important architectural concepts and how they help define the critical backbone structure for large-scale, multi-vendor networked systems.

Title	Author	Affiliation
Reducing the Distance to Integrate: DTE Energy Use of CIM at the Electricty Supply Board (ESB) <u>Presentation</u> <u>Paper</u>	Gerald Gray	EPRI
Why is Architecture Important <u>Presentation</u>	Stephan Amsbary	EnerNex
Why Conceptual Architecture is Critical for Future-Proofing Interoperability <u>Paper</u>	Doug Houseman	EnerNex



Architecture: What's happening?



Moderator: Kay Stefferud, EnerNex

Architecture, as applied to smart grid, is a complex topic that views the structure and behavior of a system-of-systems at different levels of abstraction. As such, it is often viewed as a very high-level concept that has little relevance to physical systems and devices. This session described important architectural concepts and how they help define the critical backbone structure for large-scale, multi-vendor networked systems.

Title	Author	Affiliation
From Energy to Services <u>Presentation</u>	Marc Peters	IBM
Ongoing Activities on Smart Grid Architecture <u>Presentation</u>	Stephan Amsbary	EnerNex
Use of a Unifed Modeling Language (UML) Model as a Database Repository for Use Cases <u>Presentation</u>	Marty Burns	Hypertek, Inc.

Demand Response Architecture



Moderator: Stephan Amsbary, EnerNex

Customer energy systems are valuable assets for helping maintain stable and reliable grid operations. Their impact on operations ranges from day-ahead energy needs down to real-time frequency regulation. A major challenge for utilities and service providers is to develop a systems network architecture that can harness these valuable customer assets in a synergistic solution that is mutually beneficial for both customers and energy service providers. This session explored architectural issues and solutions that aid in achieving this goal.

Title	Author	Affiliation
Impact of Scalable Performance on Demand Response Communication Architecture <u>Presentation</u> <u>Paper</u>	Dave Hardin	EnerNOC, Inc.
New Architectures for Interacting with Demand Side Resources in Ancillary Services Markets <u>Presentation</u> <u>Paper</u>	Ed Koch	Akuacom



Applying EI/ Energy Market Information Exchange (EMIX) to DR and Transactive Energy <u>Presentation</u>



NIST

Role of Smart Energy Systems



Moderator: Dave Hardin, EnerNOC, Inc.

Achieving the benefits of smart grid will require that smart energy applications and devices work together as a system-of-systems interoperating with each other. These systems will vary in size and complexity depending upon their context, structure and mission. This session explored architectural components of several smart energy systems and how they leverage interoperability.

Title	Author	Affiliation
Role of Smart Energy Systems <u>Presentation</u>	Tobin Richardson	ZigBee Alliance
Microgrids: the Essential Architecture for Smart Energy <u>Presentation</u> <u>Paper</u>	Toby Considine	TC9
Energy Ecologies – Models and Applications <u>Paper</u>	William Cox	Cox Software Architects LLC

Cross-Cutting



Track Leader: Mark Knight, CGI

The Cross-Cutting Track addresses issues that cut across multiple smart grid domains and topics—that is, they are important and relevant to almost every aspect of interoperability standards and smart grid systems and applications. Many of these issues are identified in the GWAC Context-Setting Framework (the GWAC Stack) but other issues are also included such as conformance and interoperability testing, risk management, safety and system reliability. The focus in this track was to further the community debate and understanding of how these issues impact interoperability goals.



Cyber Security



Moderator: Mark Knight, CGI

Complying with federal standards to guard against cyber-attack is becoming a significant cost for utilities but as security is embedded into designs, cost and resilience should improve. This session looked at cyber security issues and work that is being performed to provide improved cyber security. Panelists also explored interoperability impacts as a result of increased cyber security and methods to provide assessments of cyber security as it relates to big data and smart grid interoperability.

Title	Presenter	Affiliation
Cyber Security Cross-Cutting Issues <u>Presentation</u>	Mark Knight	CGI
Improving ROI on Big Data through Formal Security and Efficiency Rick Management for Interoperating OT and IT Systems <u>Presentation</u> <u>Paper</u>	Efran Ibrahim	The Bit Bazaar LLC
Cyber-Security Opportunities <u>Presentation</u>	Donny Helm	Oncor Electric Delivery
Advanced Technology with Smart Grid <u>Presentation</u>	Robert Frazier	Centerpoint Energy

SG-IMM and Maturity Models



Moderator: Mark Knight, CGI

Recent years have seen rapid evolutions in technology and its application in the electric power industry. So how can you tell if you are doing a good job of managing these changes and monitoring your progress on an ongoing basis? Maturity models serve to provide a benchmark and assess the evolution of a set of characteristics against that benchmark. Maturity models exist for many different areas; this session provided an overview of the topic with a more detailed focus on the GridWise Architecture Council's Interoperability Maturity Model.



Title	Presenter	Affiliation
	Steve Widergren	Pacific Northwest National Laboratory
Maturity Models 101 <u>Paper</u>	Mark Knight	CGI
Pacific Northwest Smart Grid Demonstration Project Smart Grid Interoperability Maturity Model Trial Application: Lessons Learned <u>Presentation</u>	James Mater	Quality Logic, Inc.
Electricity Subsector Cybersecurity Capability Maturity Model (ES-C2M2) <u>Presentation</u>	Fowad Muneer	ICF International

American Recovery and Reinvestment Act (ARRA) Grant Case Studies



Moderator: Mark Knight, CGI

This session provided an overview of smart grid demonstration projects and explored the progress, challenges, and successes of how existing and emerging smart grid concepts have been innovatively applied and integrated to prove technical, operational, and business-model feasibility.

Title	Presenter	Affiliation
ARRA Grant Case Studies <u>Presentation</u>	Mark Knight	CGI
NRECA/CRN Smart Grid Demonstration Project <u>Presentation</u>	Bob Saint	NRECA



ARRA Grant Case Studies SMUD's Smart Grid Program <u>Presentation</u>	Jim Parks	Sacramento Municipal Utility District
Pacific Northwest Smart Grid Demonstration <u>Presentation</u>	Ron Melton	Battelle/Pacific Northwest National Laboratory

Testing and Certification



Moderator: Mark Knight, CGI

Many technological innovations have occurred in the industry in recent years, with the ability to provide utility engineers, managers and customers alike with hitherto unavailable views into and controls over electricity use and system performance. Testing and certification are critical components of interoperability that seek to ensure predictable performance that complies with standards. This session explored some work that is moving the industry forward in these areas.

Title	Presenter	Affiliation
The Energy Systems Integration Facility (ESIF): A Smart Power Platform for Product Interoperability Development, Test, and Evaluation <u>Presentation</u> <u>Paper</u>	Tim Schoechle	International Center for Standards Research
Smart Grid Technology Selection - Putting Smart Grid to the Test <u>Presentation</u>	Rudi Schubert	EnerNex
Testing and Certification for Green Button – <u>Presentation</u> <u>Paper</u>	Marty Burns	Hypertek, Inc.
	Rik Drummond	Drummond Group Inc.



Appendix A. Agenda

			6:30 – 9:30
Sun Dec/2			NIST SGIP Governing Board Meeting

		9:00 – 11:30	11:45 – 2:15	2:30 - 4:00	4:15	- 5:45	5:45 - 7:00	
				PAP 19 (Wholesale DR) PAP 21	PAP 21 (Weather)		
				SGAC (Architecture)		EMIIWG (ElectroMagnetic Interoperability)		
				SGIP 2.0 MMC	C SGIP 2	SGIP 2.0 MMC		
Mon Dec/3		SGIP 2.0, Inc., Board of Directors Meeting	Lunch & SGIP Plenary	PAP 16 (Wind)		Transmission & Distribution (TnD) Domain Expert Working Group (DEWG)		
		meeting		Home to Grid (H2G) DEWG	Vehicle to	Vehicle to Grid (V2G) DEWG		
				SGIP 2.0 Audit Committee	t SGIP 2.0 Com	SGIP 2.0 Nom&Gov Committee		
				Testing & Certification Workshop	Transactive & Ro	Transactive Energy 101 & Roadmap		
	8:	30 - 10:00	10:30 - 12:00	12:00 - 1:30	1:30 - 3:00	3:30 - 5:00	5:00 - 7:00	
	PAI G	P 2 (Wireless buidelines)	SGIP PMO		PAP 9 (DR)			
	PAI	P 7 (Storage)	PAP 17 (Facilities)		PAP 15 (Power Line Carrier)			
	l (Trai Di	PAP 8/14 nsmission and istribution)	CSWG 7628 User Guide	Tuesday Lunch & SGIP/NIST	Appliance & DR		Plug-In Kick-off	
Tue Dec/4	CSWG (Cybersecurity)		y) ITF (International Task Force)	Signing	PAP 20 (Gree Button)	n Transition Plenary	Engagement Activity - You be the	
	CMEWG/MMC (SGIP Marketing)		Policy)/SGIMC (Implementatio Methods)	n New York	SGIP 2.0 MMC		Judge!	
	Build Grie	ing/Industry to d (B2G/I2G)	Open SGIP Session		Gas Technologies			

Irving, TX · December 3-6, 2012



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Sponsors' Hall Open & Plug-In											
		8:30 – 10:00	10:30 - 1	12:00	12:00 -	1:30	1	:30 - 3:00	(*)	3:30 - 5:00	5:30 - 8:00
Wet Dec/	d /5	Opening Keynotes Looking Forward to Grid 2020	Foundat Sessio	ional on	Lunch			SGTCC Testing and ertification) Fransactive Energy Session - Plug-In rchitecture: Why it is Important Cyber Security	() C In Pee I I I I I I I I I I I I I I I I I I	SGTCC Testing and ertification) International process & Controls End-to-end nformation Exchange & eroperability rchitecture: What's Happening? G-IMM and Maturity Models	Reception Dinner & Speaker
			10500	20	12.00	12:00 -			2.00 4.20		
	8	5:30 - 10:0	10	:30 -	12:00	1:00		1:00 - 2:30	U	3:00 - 4:30	
Thu Dec/4	N	BSPWG Aeasuremen and Verification MultiSpeal	WGSGIP 2.0 Boot Campement d ationPrice Responsive Demandpeak peakOpenADR/ADR/AMI		Lunch	1	Computing Boot Camp Price Responsive Appliances	p e s	SGIP 2.0 Closing GWAC Closing SDO	End of Grid- Interop 2012 Plan for Grid-Interop 2013	
Dech		and CIM Demand Response Architectur	Role o	of Sma Syste	art Energy ms g and	Lunch		Workshop Open - TBI Open - TBI	D	Koundtable	December 2013

Irving, TX · December 3-6, 2012



	Sp	onsors Hall Op	Closed					
SGIP Korean Workshop								
	$8:00 - 9:45 10:00 - 11:30 \frac{11:30 - 12:30}{12:30} 12:30 - 2:00 2:15 - 3:45 4:00 - 5:00$							
Fri Dec/7	Breakfast & Welcoming SG Framework & Architecture	Cybersecurity Testing & Certification	Lunch	SG User Applications	SG Technologies & Tools	Summary of Outcomes & Next Steps		



Appendix B: Forum Participants





Al Hefner, <u>NIST</u>

Allen R. Hefner Jr. is a member of the NIST Smart Grid Team and is specifically focused on advancing electrical interconnection standards and implementation guidelines to include smart grid functionality necessary to enable high penetration of renewable/clean energy sources, grid energy storage, and plug-in electric vehicles. Dr. Hefner received his B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Maryland, College Park, in 1983, 1985, and 1987, respectively. He joined NIST, Gaithersburg MD in 1983 and has held several positions including Group Leader for Semiconductor Devices, Project Leader for Power Devices and Thermal Measurements, Project Leader for Integrated Sensor Systemon-a-Chip, and Project Leader for Semiconductor Device Simulation and Technology Computer-Aided Design.

Dr. Hefner is the author of 75 publications, holds one U.S. patent, and has received a number of best paper and technical achievement awards. In 1993 he received a U.S. Department of Commerce Silver Medal Award for his pioneering work developing the theoretical in foundation and understanding used for device optimization and circuit utilization of the Insulated Gate Bipolar Transistor (IGBT). In 1996, he received the NIST Applied Research Award for development of the IGBT model provided within the most widely used power circuit simulation programs. Recently, in 2008 he received an appreciation award from the U.S. Department of Energy, Assistant Secretary of Fossil Energy for contributions to highmegawatt power conversion technology for Clean Energy Systems, and in 2009 he received a NIST Bronze Medal Award for technical leadership in development and application of the first highvoltage, high-frequency Silicon-Carbide switch mode power conversion devices.

Dr. Hefner was elected as a Fellow of the IEEE in 2001 where he has been active in the Power Electronics Society, the Industry Applications Society, the Electron Devices Society, and the Power and Energy Society. He has served on a number of Conference Technical and Committees including serving as the **TRANSACTIONS Review Chairman** for the IEEE Industry Applications Society Power Electronics Devices and Components Committee (1989-1997), and serving as the IEEE Electron Devices Society Standards Technical Committee Chairman (1996–2001). In 2005 he served as the the International Chairman of Device Semiconductor Research Symposium and he has served as a Steering Committee member for the Government Microcircuit Applications and Critical Technology Conference since 2006.

Dr. Hefner has served as the Chairman of the Interagency Advanced Power Group (IAPG), Electrical Systems Working Group (ESWG) since 2007 where he coordinates electrical power conditioning research activities among different federal government agencies. Dr. Hefner has also recently initiated and hosted several workshops at NIST on high-megawatt conditioning systems power the "High Megawatt including: Converter Workshop" held at NIST on January 24, 2007, the "High-Megawatt Converter Technology R&D Roadmap Workshop" held at NIST on April 8, 2008, the "NSF Workshop on Advanced Power Conditioning for Alternate Energy Systems" held at NIST on May 28-29, 2008, and the "Workshop on Future Large CO2 Compression Systems" held at NIST on March 30-31, 2009. on power systems applications and instrument diagnostics.



Ali Ipakchi, OATI

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 implementationdelivery 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, systems power 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.





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.

Mr. Budiardjo has held executivelevel marketing and product development positions with various controls companies where he was responsible for product development, management and marketing communications. His rare combination of marketing and technology practices has enabled him to fine tune and soften the challenging task of transitioning the product development process from an engineering-centric focus to a marketcentric focus.

Mr. Budiardjo's entrepreneurial and creative spirit has won him international business opportunities throughout Europe, Americas, and Asia/Pacific further enabling his global perspective on our market.

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 ConnectivityWeek. 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 AutomatedBuildings.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.



Austin Montgomery, Software Engineering Institute, Carnegie Mellon

Austin Montgomery is the smart grid program lead for the Software Engineering Institute (SEI) at Carnegie Mellon University. SEI collaborates with government and industry to address security, architecture, interoperability, process improvement and other software and systems engineering challenges of grid modernization.

Montgomery spent the first part of his career as an M&A attorney, investment banker and management consultant. Prior to joining the SEI, he was a founder and senior executive of several start-up companies developing innovative software and wireless communication technologies. He received a BA in Economics from Harvard University, JD from the University of California, Hastings College of the Law, and MBA from the Simon School of the University of Rochester and the Erasmus University in the Netherlands.



Group Barry Haaser, Lakeview

Barry Haaser has over 25 years of experience in high technology and energy industries. Barry is the President of the Lakeview Group, a company providing marketing and association management services to energy related trade associations. Haaser has extensive experience creating and managing industry alliances and trade associations, including the Digital Home Alliance, EIS Alliance, Home Lighting Control Alliance, LonMark International, Alliance, OpenADR SunSpec Alliance and the USNAP Alliance. Prior to starting his own company, Barry spent 15 years with Echelon Corporation (ELON) where he held a number of marketing and business development positions in the U.S. and Europe. Mr. Haaser was previously Vice President of Marketing at Alacritech, a data storage company,

and Director of Marketing at Saratoga Systems, an enterprise CRM company. Haaser holds a Bachelor of Science degree in Business Administration from San Jose State University.



Bert Taube, Versant

Corporation Bert Taube leads Versant's business development efforts to build advanced NoSQL data management and analytics solutions applicable to large and complex data challenges in the energy and smart grid sector. In this capacity, Mr. Taube is also the responsible advisor and manager of technology transfer for Versant's membership in the Electric Power Research Institute's (EPRI) smart grid program, research known as IntelliGrid.

Prior to Versant, Mr. Taube held a variety of senior management positions in energy & automation as well as in semiconductors for companies such as Siemens or Supertex. He developed intelligent project solutions (FACTS, HVDC) integrated in high-voltage power transmission networks operated by public and private utilities in North and Latin America. He also served as an advisor, investment & technology consultant for several energy and clean technology startups in Silicon Valley.

Mr. Taube acts as a mentor at the Environmental Business Cluster in San Jose. He founded and chairs two clean technology and energy groups for the Alumni Leadership Board SF Bay of the Kellogg Graduate School of Management and the Silicon Valley San Jose Chapter of CalCPA.

Mr. Taube holds a Ph.D. in electrical engineering from the University of Rostock and an MBA from the Kellogg Graduate School of Management at Northwestern University.





Bob has been with NRECA for over 10 years. His primary role is technical advisor for the T&D Engineering System Planning 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). He is also on the Governing Board of the Smart Grid Interoperability Panel (SGIP) and active in several other SGIP groups.



Carol Meyer, Landis &

Gyr

Chang-min Park, <u>Electronics</u> and <u>Telecommunications Research</u> <u>Institute</u>



 Chellury (Ram) Sastry,

 Samsun
 Telecommunications

 America, LLC

Dr. Chellury (Ram) Sastry is currently a Senior Manager at Samsung Telecommunications America LLC, focusing on various advanced R&D thrust areas including machine to machine communication, smart/connected home, and smart energy technologies including interoperability and standards.

Prior to joining Samsung, Ram was a Smart Grid Program Director with the Energy, Environment, and Material Sciences division at Battelle Memorial Institute, Columbus, OH. He was also with the Electricity Infrastructure Group in the Energy and Environment Directorate at Pacific National Northwest Laboratory (PNNL), Richland, WA managed and operated by Battelle. He was responsible for providing R&D, business development, and technical marketing leadership in various thrust areas including advanced smart grid enabled demand management to provide value-add services to residential and small commercial building customers, transmission/distribution modeling & simulation, and smart grid data analytics.

Prior to joining Battelle/PNNL, Ram was a Project Manager and Senior Research Scientist with Siemens Corporate Research (SCR), Princeton, NJ. One of the highlights of his tenure at SCR was an R&D program he was responsible for to enhance the product portfolio of various Siemens businesses (smart homes, remote health care, industrial automation etc.) based on radio frequency identification (RFID), wireless sensor networks, and embedded machine-tomachine technologies.

He has published several papers in refered journal and conference proceedings, and has been a plenary speaker at well-known conferences including Connectivity Week, Grid-Interop etc. He also has several patents against his name, and a number of provisional patent and patent applications under consideration.

Ram has a B.S. degree in electrical engineering from Indian Institute of Technology, Chennai, India, M.S. /Ph.D. degrees in electrical engineering and an M.A. degree in Mathematics from University of Pittsburgh.



Christine Wright, <u>Public</u> <u>Utility Commission of Texas</u>



Christopher Irwin, 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. Carev School of Business at Arizona State University.



Gas Technology Institute

Chris has 28 years of experience in the Natural Gas Industry. He has expertise in cathodic protection systems, instrumentation, analog design, digital signal processing,



embedded systems design, and low frequency RF design. Some of his current activities are the use of GPS and Smart Tagging technologies to improve locating, the use of injected current signals to determine the state of pipeline coatings, and wireless sensing for utility applications. Chris has a long association with efforts to bring standardized Automatic Meter Reading (AMR) and telemetry to the gas industry. He has participated in efforts to set standards for communication and security for utility data. He was also the technical lead on a pilot demonstration of a wireless enabled thermostat that allowed load control information he to communicated between the customer and the utility.



Chuck Adams, <u>IEEE</u>

Dr. Wilbert Charlton (Chuck) Adams, Jr. is the 2009-2010 Past-President of the IEEE Standards Association (IEEE-SA), serving as chair of the Standards Association Board of Governors (BOG), which has policy fiduciary responsibility for and standards within IEEE. Chuck also represented the Standards Association on the IEEE Board of Directors, and now serves as the IEEE Board of Directors Chair of Public Visibility. Chuck began his **IEEE-SA** engagement in January 2000, initially in the oversight of the standards process at the IEEE-SA Standards Board. He then served on the BOG, where he was the liaison to the IEEE Industry Standards and Technology Organization and Chair of the International Committee. During his BOG tenure, he was the first Chair of the IEEE-SA Corporate Advisory Group and played a pivotal role in the launching of the IEEE corporate standards program. Chuck has received several IEEE awards for his development of global programs, expanding the breadth and recognition IEEE of standards programs. Chuck retired from IBM in March 2009 after 41 years of service. In the last ten years he focused on standards management, with IBM corporate responsibility for worldwide standardization and intellectual property coordination, as well as

global open source software policy management. His overall experience with IBM included communications, networking, office automation, and software development, as well as business and strategic planning, transformation, strategic process finance, marketing. and Chuck's current responsibility is supporting Huawei Technologies as Distinguished Standards Strategist. He became a member of the Huawei corporate global industry standards team in June, 2011 Chuck received his Bachelor's and Master's degrees in Electrical Engineering from Lehigh University, a Master's degree in Management Science from Lehigh University, and a Doctorate in Business from George Washington University. He has taught courses in electrical engineering and operations research, is a life member of Eta Kappa Nu, the electrical and computer engineering honor society, and a 43-year member of IEEE.



Colin Harrison, <u>IBM</u>

Dr. Harrison is an IBM Distinguished Engineer and the inventor of IBM's Smarter City technical program. He was previously Director of Strategic Innovation in IBM Europe and Director of Global Services Research. He is an IBM Master Inventor and a Member of the IBM Academy of Technology. His current activities are focused on an alliance for developing resilience solutions for regions, cities, and industrial zones.

spent 1972-77 at CERN He developing the SPS accelerator and its distributed, real-time control system. In 1977 at EMI Central Research Laboratories he led development of the first clinical MRI system. At IBM since 1979, he has worked on micromagnetics, medical imaging, parallel computing, mobile computing, intelligent agents, knowledge telecommunications, management, and Smarter Cities. In 2011 he spent several months working in Tohoku, Japan on plans for the region's recovery from the 3/11 earthquake and tsunami and has increasingly focused on Resilient Cities.

He studied at Imperial College, London and the University of Munich, earning a PhD in Materials Science. He is Fellow of the Institution of Engineering and Technology, Senior Member of the Institution of Electronic and Electrical Engineers, and Founding Member of the Society for Magnetic Resonance in Medicine. He is an Expert Advisor to the Swiss Academy of Technical Sciences and has been a Visiting Scientist at MIT, Harvard Medical School, and Lawrence Berkeley National Laboratory. He has published some 60 articles and has been awarded some 30 patents. He speaks worldwide on Smarter Cities.

Passions include photography, writing, and mountain walking. He speaks English, French, and German and lives with his wife Lynn in the Connecticut forest by the Housatonic River.



Dave Hardin, <u>EnerNOC,</u>

Inc. Dave has more than 25 years of experience designing, integrating and managing industrial information management and control systems. He specializes in energy systems architecture and design. Dave holds a Bachelor of Electrical Engineering from the University of Delaware. He is a Registered Professional Engineer (DE/MD), an IEEE Certified Software Development Professional and a PMI Project Management Professional.



Berkeley National Laboratory

Dave Watson has been working at the interface of energy and smart systems for over 20 years.

He has designed and implemented very small embedded electronic devices and very large Internet and wireless systems, and architected secure, scalable software systems for managing and analyzing these



systems.

Dave focuses on Smart Grid, Advanced Metering Infrastructure (AMI), Automated Demand Response (OpenADR), energy management and control systems (EMCS), home area networks (HAN), including large scale deployments Europe, in Australia and the US.

Dave is an advisor to California Energy Commission (CEC), Department of Energy (DOE), CA utilities (PG&E, SCE & SDG&E) and public other and private organizations.

He has worked large companies (Honeywell, Echelon) and small (Coactive Networks, Grid-Net). Currently a researcher and program manager at the Lawrence Berkeley National Lab, he has been actively involved in OpenAMI, NIST SG, UCA, NAESB OASIS and other dynamic smart grid standards activities.

He is author and co-author of numerous technical research publications and funding proposals about the aforementioned subjects.

Previously, he designed process controls for NASA wind tunnels and biotech manufacturing. Mr. Watson graduated from California Polytechnic University, San Luis Obispo with a degree in Mechanical Engineering.



David Forfia, Electric **Reliability Council of Texas**

David Forfia is Director of Enterprise Architecture at the Electric Reliability Council of Texas, or ERCOT, where he is responsible for the IT architecture for the systems which maintain electric grid operations 24/7. During his tenure at ERCOT, he has served in many roles including Director of Infrastructure & Operations, Application Services and multiple roles on the Texas Nodal implementation. He has more than 25 years of experience in the industry, and began his career at Austin Energy in 1987. Forfia received his

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bachelor's from the University of Texas and MBA from St. Edward's University, both in Austin. Forfia is PMP certified and currently sits on the Board of the Smart Grid Interoperability Panel



David Holmberg, NIST

David Holmberg serves in the NIST Engineering Laboratory, Energy and Environment Division. His work focuses on building integration into the Smart Grid. David represents the buildings community on the NIST Smart Grid team, and leads the (B2G) Building-to-Grid domain expert working group. He is currently convener of the Smart Grid Working Group (SG-WG) of the ASHRAE BACnet committee, co-convener of the IEC PC118 Smart Grid User Interface WG2, and co-chair of the OASIS Energy Interoperation Technical Committee. He is NIST lead for PAP09 and PAP19.

David received his PhD from VA Tech, and joined NIST as a post-doc in 1997. 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, prior to actively working on Smart Grid standards. Dr. Holmberg is a member of ASHRAE.



Milenthal,

David is the founder of what is now Engauge, a marketing services firm owned by the private equity firm, Halyard Capital. Prior to selling his company to the investors, David built what became one of the largest independently owned ad agencies in America, all out of Columbus. Mr. Milenthal has helped spearhead efforts to develop brands for the nation's leading cruise line, Carnival; the nation's largest energy company, American Electric Power; one of the nation's top five health care giants, Anthem Blue Cross and Blue Shield;

David

and other national and regional companies.

Mr. Milenthal believes in using his marketing skills and that of his company to develop campaigns that positively impact important issues and programs in his local and national community. He is the first and only marketing CEO to ever chair the United Way campaign in Central Ohio, and he also served as Chair of the United Way from 1997-99. For the past several years he has served on the National Marketing Committee and the National Leadership Council of the United Way, as well as the Resource Development Committee of United Way of Central Ohio.



🚺 David Wollman, NIST

Dr. David Wollman is Deputy Director of the Smart Grid and Cyber-Physical Systems Program Office, and Manager of Smart Grid Standards and Research at the National Institute of Standards and Technology (NIST), the lead agency in the U.S. Federal Government responsible for coordinating and accelerating the private-sector development of smart grid standards (see www.nist.gov/smartgrid for additional information). He also leads NIST's effort in the White House's Green Button Initiative to enable consumers to securely download their energy usage information from their electric utilities in human- and machinereadable common electronic format, working in close coordination with the U.S. Department of Energy and the Office of Science and Technology Policy. Before joining the Smart Grid and Cyber-physical Systems Program in the NIST Engineering Laboratory, he managed efforts within the NIST Physical Measurement Laboratory to maintain and advance the Nation's electrical standards and metrology supporting the electric power industry. In addition, he has served in several other positions at NIST, including Scientific Advisor for the former Electronics and Electrical Engineering Laboratory, Program Analyst in NIST Director's Program Office, and bench-level scientist in Boulder, Colorado developing



advanced high-resolution x-rav detectors. Before joining NIST, Dr. Wollman received his Ph.D. from the University of Illinois at Urbana-Champaign the areas in of superconducting electronics and device micro/nanofabrication. He has given numerous invited talks at international conferences, and holds three U.S. patents. He has received many awards, including two U.S. Department of Commerce Gold Medals and the NIST Applied Research Award.



Don Von Dollen, <u>EPRI</u>

Don Von Dollen is the Program Manager for the Electric Power Research Institute (EPRI) IntelliGrid Program. The IntelliGrid Program is focused on accelerating the transformation of the power delivery infrastructure into the intelligent grid needed to support our future society through a unique collaboration of public and private stakeholders.

Don joined EPRI in 1991 and has held positions as Applications Manager for Power Delivery and Markets, Program Manager for Underground Transmission and Project Manager. Don has managed EPRI's superconductivity research program including wire and cable development, and research projects relating to transmission cable systems.

Before joining EPRI, he was a Research Engineer with the Pacific Gas & Electric Company.



Donny Helm, Oncor Electric Delivery

Mr. Helm has over nineteen years of experience in the electric utility industry including the areas of Distribution Engineering, Customer Service and Marketing, Transmission Operations, Transmission Performance Analysis and Technology. Of this time, sixteen years was associated with the management of Transmission-related

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activities.

Mr. Helm's primary field of experience has been in Transmission Operations, Transmission system event monitoring and coordination, Transmission system performance / statistics, Transmission work management processes and systems, Transmission outage management processes and systems, Transmission network communications standards, Transmission equipment condition monitoring systems and processes.

In his current position, Mr. Helm provides and manages technology support for all organizations within Oncor Electric Delivery with respect to systems, system integration technologies, network communication technologies and security.



Doug Houseman, EnerNex Doug Houseman is a 30 year veteran of the utility and consulting industries. He is a retired Naval Officer who has worked on 6 continents on issues related to electricity, water, and gas. He is recognized as an industry leader in demand management and smart energy.



Ed Cazalet, <u>TeMIX Inc.</u>

Ed is CEO and Founder of TeMIX Inc., a transactive energy services provider, and VP and Co-founder of MegaWatt Storage Farms, Inc., a storage advisory and project development firm.

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

Dr. Cazalet has over forty years of electric power and related experience as an executive, board member, consultant, and entrepreneur. 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 EnergyInterOp and WS-Calendar Technical Committees.



Ed Koch, Akuacom

Ed is currently a Senior Fellow at Honeywell and CTO/Co-Founder of Akuacom, a wholly owned subsidiary of Honeywell. Akuacom is dedicated developing technologies for to automating Demand Response programs. Ed was the leader of the workgroup at LBNL that drafted the OpenADR specification and currently sits on the Board of Directors of the OpenADR Alliance. Ed also is the cochair of the OpenADR Task Force within UCAIug and is actively involved in a number of Smart Grid standardization efforts including the NIST Building to Grid Domain Expert Working Group, the OASIS Energy Interoperation Technical Committee, and the NAESB Smart Standards Grid Taskforce.

Prior to Akuacom, Ed was Co-Founder and CTO of Coactive Networks where he led all of Coactive's engineering efforts and established architecture and technical directions. Before that, he managed the Automotive Systems Department of Navteq, where he led development of the first Automotive Navigation Systems, which are widely deployed today. He has 25 years of industry and authored experience has numerous patents and articles in the areas of Distributed Control. Automation, Vehicle Guidance, Robotics, Artificial Intelligence and Embedded Systems. Ed has both led and participated in standardization efforts for the Intelligent Vehicle



Highway Systems, Consumer Electronics Associations, and IEEE.



Erfan Ibrahim, The Bit Bazaar LLC

Dr. Erfan Ibrahim is the Founder and CEO of The Bit Bazaar LLC (TBB), a full service IT and business consulting firm, offering services since 2001 to clients in the High Tech, Financial Services, Healthcare, and Energy sectors.

Dr. Ibrahim is currently the Principal Consultant for the Energy Sector Practice at Scitor Corporation. Scitor is a large privately held integrator with a 33 year history serving the US defense department and intelligence community. The company has close to 1400 employees and generates over \$600 million in annual revenue. Scitor's core expertise is in data integration, cybersecurity, situational awareness, asset tracking and program management services.

As the Principal Consultant, Dr. Ibrahim is helping build the energy sector practice for Scitor and developing an educational program for workforce development for the utility sector called Scitor Energy Academy. This forum will provide 1day and 2-day onsite workshops to utility staff, regulators, trade association members and product vendors in a hands-on curriculum for effective workforce training.

He is also hosting the monthly Smart Grid Educational Series webinar as a free public service from TBB to bridge the knowledge gap in the industry and the monthly Smart Grid Educational Series Seminar at Foothill College in Los Altos Hills CA, to provide a tangible forum for discussion on Smart Grid, Energy Efficiency and Clean Tech as well as a networking resource for job placement workforce and development.

During March 2008 - November 2011 Erfan Ibrahim was serving as a Technical Executive in the Intelligrid program area of the Power Delivery & Utilization Sector of EPRI. He led

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the research that focuses on the communications, systems management and cyber security infrastructure for the utility Smart Grid with particular emphasis on Home Area Networks (HAN), Advanced Metering Infrastructure (AMI) and Internet based Wide Area Networking.

Prior to establishing The Bit Bazaar LLC, Dr. Ibrahim's career included the following positions: VP of Sales & Marketing at Jyra Research, Product Manager for Network Management at Pacific Bell Network Integration (now AT&T), Science and Math Lecturer at National University, Nuclear Fusion Research Engineer at UCLA and Plasma Physicist at Lawrence Livermore National Lab.

Dr. Ibrahim received a Ph. D. in Nuclear Engineering from University of California Berkeley, an M.S. in Mechanical Engineering from the University of Texas Austin, and a B.S. Honors in Physics from Syracuse University (Suma Cum Laude).

Dr. Ibrahim is a Phi Beta Kappa, a Tau Beta Pi, Who's Who Amongst American Colleges & Universities and Who's Who Amongst IT professionals.

Specialties include communications, cyber security, network management, standards development, product management, business development, and entrepreneurship.



Erich Gunther, EnerNex

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 30 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, IEEE PES Intelligent Grid Coordinating Committee and the Utility Communications Architecture International Users Group as the chairman of those organizations. He is presently serving as the administrator for the NIST SGIP effort and is with several working utilities developing their smart grid development roadmaps.

Erich received his Masters of Engineering degree in electric power from Rennsaelaer Polytechnic Institute in 1984. He is a registered professional engineer in Tennessee and speaks geek in multiple languages including power systems engineering, computer science. enterprise architecture, and communications technology. Presently he is applying his skills in promoting the application of systems engineering principles to smart grid development, and is information actively facilitating exchange among the many organizations and institutions working on smart grid development.



Ethan Cohen, BRIDGE Energy Group

Mr. Cohen is Practice Leader, in BRIDGE Energy Group's Smart Grid services business and has responsibility for professional services strategy and Smart Grid thought leadership. He is focused on the development and commercialization of BRIDGE Energy Group's Smart Grid services.

Mr. Cohen is a recognized utility and energy industry consultant with more than fourteen years of experience providing strategy, operations, and technology advisory. His expertise spans transmission and distribution utility and Smart Grid business strategy, transformation planning and design, solution design, build, test and deployment for information technology and operations technology programs. Currently, Mr. Cohen is



engaged in a number of client initiatives supporting enterprise transformation, Smart Grid analytics, and "the living grid." Mr. Cohen is sought for his track record of driving performance, catalyzing innovation, and his ability to deliver outcomes.

Prior to joining BRIDGE Energy Group, Mr. Cohen was a Client Principal at Hewlett-Packard Enterprise Services helping energy companies, utilities and manufacturers develop and execute technology- rooted strategies and programs for high value outcomes. Mr. Cohen has also held leadership and management roles at UtiliPoint International, Blue Ridge Partners, Aberdeen Group, and the Yankee Group.

Mr. Cohen earned his MBA from Boston University, Master of Arts in Comparative History from Brandeis University and Bachelors of Arts degree with Subject Matter Honors in Political Science from Vassar College.



Fowad Muneer, <u>IFC</u> International



Gary McNaughton, 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 electricG&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 national Rural Electric the Cooperative Association, Enterprise-Wide Data Integration in а 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.



George Arnold, <u>NIST</u>

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 and also co-chairs the White House National Science and Technology Council's Smart Grid policy subcommittee. 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 Vice President-Policy for the International Organization for Standardization (ISO) in 2006-2009.

Dr. Arnold previously served as a Vice-President at Lucent Technologies Bell Laboratories where he directed the company's global standards efforts. His organization played a leading role in the international development of standards for Intelligent Networks and IP-based Next Generation Networks. In previous assignments at AT&T Bell Laboratories. he had responsibilities in network planning, systems engineering, and application

of information technology to automate operations and maintenance of the nationwide telecommunications network.

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 and has delivered or authored over 100 talks and publications.



George Bjelovuk, <u>AEP</u>

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.

Prior to this role, Bjelovuk had been leading AEP's gridSMART initiative, a program of technology investments and customer programs directed at modernizing AEP's distribution business. He was responsible for developing and marketing programs for emerging customer offerings in AEP's utility business and for providing oversight to the company's research & development efforts.

Bjelovuk has been with AEP for 27 years, and has held a variety of leadership positions in technology and customer services functions.

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 Association the of Telecommunications Professionals. He has chaired EPRI's Smart Grid Executive Committee, and is active in its Intelligrid program. He was elected the Investor-Owned Utility as representative to the governing board for the NIST Smart Grid



Interoperability Panel, and serves as the Board's Secretary.



Gerald Gray, <u>EPRI</u>

Gerald R. Gray is an Enterprise Architect and Senior Project Manager focusing on Enterprise Architecture & Integration research at the Electric Power Research Institute (EPRI).

Dr. Gray participates in the development of numerous industry standards as a member of IEC TC57 and MultiSpeak, currently the technical editor of IEC 61968-14 CIM-MultiSpeak Harmonization. He has also been a contributing author to OpenAMI-ENT, OpenADE, OpenADR, and OpenHAN within the UCAIUG OpenSG user group, as well as contributing to the development of OASIS Energy Market the Information Exchange (EMIX) and Energy-Interop committee specifications. He is currently the chair of OpenSG's SG-Enterprise Task Force.

Dr. Gray has a BS in Management/Computer Information Systems from Park University, a Masters of Administrative Sciences in Managing Information Systems from the University of Montana and a Doctor of Philosophy in Organization and Management with a specialization in Information Technology from Capella University.



Glenn Platt, <u>CSIRO</u> Energy Technology

Glenn Platt leads a project within CSIRO's Energy Transformed Flagship investigating ways of improving world energy usage. Fundamentally, this project aims to apply the latest state of the art technologies - from disciplines such as computer science, electrical engineering and telecommunications to improving the intelligence of our energy systems by introducing autonomous, adaptive technologies that can help us manage our energy consumption.

Glenn holds a PhD, and electrical engineering degree, both from Newcastle University Australia. Prior to CSIRO, Glenn worked in Denmark as a Research Engineer with Nokia Mobile Phones, working on the standardization and application of cutting-edge mobile communications technology. Before his time in Denmark, Glenn was employed in a project engineering capacity for an Australian engineering consultancy, working on industrial automation and control projects.



Bonneville Power Administration

Gordon is a thirty-two year veteran of the electric utility industry, with twelve years at the Georgia Power Research Center (now NEETRAC), followed by now twenty years with the Bonneville Power Administration, currently assigned as a General Engineer to the Technology Innovation Office.

A graduate of the Georgia Institute of Technology (BSME), Gordon served as a project manager, section chief of the BPA mechanical and civil laboratories, and enjoyed assignments throughout the BPA, including the Transmission, Power, and Corporate Services business lines.



Edison Electric Institute

As the Manager of Distribution Operations & Standards, he has responsibility for the Distribution Committee, Metering Committee, Electric Utility Representatives Coordinating (EURC) Task Force, and the Electric Light & Power (EL&P) National Electric Code (NEC) Task Force as well as distribution standards activity including the National Electric Safety Code (NESC), NEC, Reliability Survey, RestorePower, Mutual Assistance activities, Pole Attachment activities, Metering and Smart Grid issues. He is an active participant in many industry activities including the

Institute of Electrical and Electronics Engineers (IEEE), National Society of Professional Engineers (NSPE), National Fire Protection Association the Smart Grid (NFPA), and Interoperability Panel (SGIP). He participates in the development of industry policy utilizing his experience technical and understanding of utility issues working with others to facilitate an industry consensus position on the various issues.

Prior to his position at EEI, Gregory has worked for the Department of Navy, an Electric Cooperative and two Investor Owned Utilities. In the course of his duties he has performed work in distribution engineering, system engineering and operations departments in various activities including line design, project cost estimating, project bid preparation, distribution standards, evaluation of overhead line hardware (both transmission & distribution), preparation of standard operating procedures (SOP), system planning (both modeling & forecasting), coordination of storm restorations activities, forensic investigation of storm damage, customer relations (both commercial & residential), and worked on several transmission projects as both the project engineer and/or project manager.

He is a graduate of The George Washington University with a Masters of Engineering Management degree focused on technology and Systems Engineering. He received his Bachelor of Science in Electrical Engineering from Old Dominion University and is a registered Professional Engineer in the state of Virginia.



Hiroshi Kuniyoshi, New Energy and Industrial Technology Development Organization (NEDO) Hiroshi Kuniyoshi, who has a Ph.D. in energy science, joined the Ministry of International Trade and Industry in 1984. He has held various positions in governmental bodies, including the Agency of Natural Resources and Energy. He has also worked at the



United Nations Industrial Development Organization in Vienna, and from 2006 to 2009 he was a professor at the Tokyo Institute of Technology.

Since September 2012, Dr. Kuniyoshi has served as an executive director of the New Energy and Industrial Technology Development Organization (NEDO), where he is in charge of the Smart Community Department and the International Affairs Department

Concurrently, he serves as Secretary General of the Japan Smart Community Alliance (JSCA). JSCA was established in April 2010 to strengthen collaboration among industry, the public sector and academia and to address challenges in promoting the introduction of smart communities that utilize smart grid and advanced heat energy and transportation systems.



Huiwoo Lee, Samsung SDI



Ilwoo Lee, ETRI



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, merged with Genoa which

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.



💋 Jason MacDonald,

Lawrence Berkeley National Lab Jason has spent the majority of his career in distributed energy resources. He began as a system engineer for a photovoltaic integrator in Southern California, then moved to plug-in electric vehicles (PEVs) working on systems integration on the Chevy Volt. He obtained graduate degrees in Mechanical Engineering and Sustainable Systems from the University of Michigan's Engineering Sustainable Systems dual degree program. As a student researcher, electricity Jason examined the consumption profile, fleet marginal electricity demand and environmental impacts of PEVs.

As a member of the Grid Integration Group in the Environmental Energy Technologies Division of Lawrence Berkeley National Lab, Jason studies fast, automated demand response for bidding into bulk power system ancillary service markets. This work includes analyses of market and policy barriers to DR's market entry into ISO/RTO markets, and pilots to test control paradigms for resource aggregation of thermostatically controlled loads and PEVs for AS participation.



Jee-Sik Park, KATS

Jee-Sik Park was appointed National Coordinator for Smart Grid Standardization at Korean Agency for Technology and Standards (KATS), which is a government organization of Ministry of Knowledge Economy (MKE), in May 2012 after a 32-year career in the electricity, telecommunication and information technology field. He is responsible for leading the development of standards underpinning the nation's Smart Grid in Republic of Korea.

Dr. Park served as research professor at Korea Polytechnic University from 2004 to 2012 and was interested in the field of fusion technologies such as Energy-IT and Power-IT.

Dr. Park previously served as a leader of power conversion team at Samsung Electro-Mechanics Co. where he directed the R & D projects in the fields of power electronics, power semiconductor and modules, and power line communication technology.

Dr. Park received Doctor of Philosophy degree in Electrical Engineering from Seoul National University in 1989 and Master of Engineering degree in the field of Information and Communication from the Ajou University in 2005.



Jeremy Laundergan is EnerNex's Director of Utility Services Consulting and assists EnerNex's utility clients implement smart grid initiatives to realize the expected benefits utilizing the standards that EnerNex has helped develop as the Administrator of the National Standards Institutes of and Technology (NIST) Smart Grid Interoperability Panel (SGIP). Jeremy brings over 15 years of management leading cross-functional teams on successful process improvement, systems development, business case development, technology and engineering design projects.

Prior to joining EnerNex, Jeremy was a Senior Project Manager with Southern California Edison (SCE) where he worked on emerging markets and technologies for Demand Response (DR), including pilots to integrate DR into California Independent System Operator's (CAISO) Market Redesign and Technology Upgrade (MRTU)



wholesale electricity market. Jeremy joined SCE in 2005 as a Project Manager during the early stages of the Edison SmartConnect[™] Advanced Metering Infrastructure (AMI) program, where he worked on the strategy and feasibility of next generation advanced metering technology resulting in the industry benchmark SCE AMI use cases which were developed with EnerNex.

Jeremy has a diverse background, including rocket science, computer network operations, consulting, yacht design, and was adjunct faculty in Whittier College's Business Administration Department. Jeremy is a Project Management Institute (PMI) award winner and a certified Project Management Professional (PMP). Jeremy also holds certificates in Information Technology Infrastructure Library (ITIL) and Engineering Management.



Jerry FitzPatrick, <u>NIST</u>

Jerry FitzPatrick is a member of the NIST Smart Grid Team supporting NIST efforts to fulfill its mandate given by the 2007 Energy Independence and Security Act (EISA) for the Smart Grid. He received a B.S. degree in Physics from Rutgers University in 1979, a M.S.E.E. from the New Jersey Institute of Technology in 1984, and a Ph.D. degree in Electrical Engineering from the State University of New York at Buffalo in 1988. The AEM Group he formerly led continues a legacy begun by NIST's predecessor, the National Bureau of Standards (NBS), which had supported the electric power industry from practically its inception. The Group conducts research in precision measurement of electric power and energy, maintains the national standards, and provides measurement services for standard meters. In recent years, a synchrometrology testbed was established in collaboration with the Department of Energy to develop protocols and standards for testing of phasor measurement units (PMUs). Since the passage of the 2007 EISA, the AEM Group has led the NIST efforts to meet the EISA mandate of

coordinating the development of an interoperability framework for the Smart Grid. Prior to leading the AEM Group, Dr. FitzPatrick led a project in Electric Power Metrology, and conducted research in the precision measurement of high voltage impulses that supported standards development for testing of electrical insulation and power equipment. He began his career with Exxon Research and Engineering Company where from 1979 to 1984 he was part of a team that conducted electro-optic studies of failure mechanisms in liquid insulators.



Jim Greer, <u>Oncor Electric</u>

Utility Jim Greer joined the Texas Utilities Company system in 1984 after completing his BS Electrical Engineering degree at the University of Texas at Arlington in 1984. In 1990, he obtained his MBA from Texas Christian University. He completed the Harvard Business School's Advanced Management Program in 2007.

Jim has held a number of management and leadership positions at Oncor and its predecessor companies, spanning such areas as engineering, operations and governmental relations.

Jim is currently serving as Senior Vice President and Chief Operating Officer for Oncor Electric Delivery. In this role, Jim oversees all distribution and transmission engineering construction, maintenance and operations, as well system operations as and measurement activities.

Jim is a registered Professional Engineer in the State of Texas, and serves on the Texas Board of Professional Engineers. Jim is a member of the Institute of Electrical and Electronic Engineers, and was the 2010 recipient of the IEEE's national Leadership in Power award. He is also a member of the Texas Society of Professional Engineers, and a past president of the Fort Worth Chapter of TSPE.



Jim Parks currently oversees the "Deep Dive" smart grid project for the Sacramento Municipal Utility District (SMUD). This project will evaluate the integration of over 20 individual smart grid projects that are currently underway at SMUD. Over the 4-year implementation period, the projects will be individually and collectively evaluated to determine the true impacts of the smart grid on utility operations and to optimize future smart grid investments. He also oversees smart grid initiatives focused on commercial customers.

Prior to working on smart grid, Parks directed SMUD's Energy Efficiency Research and Customer and Development group and was responsible for demonstrating smart grid technologies, reviewing and pilot testing emerging energy efficiency and transportation technologies, and working with regulatory agencies to promote efficiency through codes, standards and legislation.

Parks has a degree in electrical engineering and has worked in the utility industry for over 20 years.



Inc.

Jim Zuber, Quality Logic

Jinyong Kim, KTL



Joann Donelon, <u>ClimateTalk Alliance / Emerson</u> <u>Climate Technologies</u>

Joann Donelon is the Product Manager for Communicating Systems at White-Rodgers, a division of Emerson Climate Technologies. She is also serving as the Marketing



Director of the ClimateTalk Alliance and is working with over 20 companies to help create game changing standards for the HVAC industry.

As a team member of the ClimateTalk Alliance, Joann has helped create the vision for developing open standards for protocol agnostic applications for HVAC and Smart Energy devices. As Marketing Director she is helping build an open foundation to provide comfort, control and choice in Smart HVAC systems that optimize energy efficiency and customer satisfaction.

Her previous experience includes driving new product development strategies for Emerson Corporate Division. She won the "People Who Make a Difference" Award for her leadership managing in cross functional programs as a Product Manager at Schneider Electric. She began her career at General Electric as part of the Edison Engineering Program where she quickly contributed in the areas of Advanced Product Engineering and Process Management.

Joann has a BS in Mechanical Engineering from Washington University and an MS in Engineering Management from the University of South Florida. She resides in St. Louis, MO with her husband and 4 yr. old son. In addition to being a working mother, Joann volunteers her time on the United Way Economic Advisorv Panel working with sponsored agencies that provide high quality, affordable options for early child care.



John Caskey, 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 SCADA)/Energy Management System (EMS) and SCADA/Distribution Management System (DMS) applications,

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. Recently, he led a diverse team of utilities and meter manufacturers to develop the first "start from scratch" Smart Grid standard (NEMA SG-AMI 1 Requirements for Smart Meter Upgradeability) in less than 90 days. This effort was recognized by the Secretary of Commerce, Director of NIST and National Coordinator for Smart Grid Interoperability as the new "best practice" in standards development. Mr. Caskey also has direct standards development experience with IEEE (Power and Energy Society and the Standards Association) and ANSI, and serves as chair of the IEEE Surge Protective Devices Committee Smart Grid task force.

Prior to NEMA, Mr. Caskey was Vice President of Sales and Marketing for a small UPS manufacturing company specializing in uninterruptible power supplies for military and homeland security applications. In addition, Mr. Caskey was responsible for Dominion Virginia Power's 200 MW commercial, industrial, and governmental demand-side management programs, including real-time pricing, curtailable services and standby generation. He was also responsible for developing and marketing Dominion's cool storage program, and for promoting the use of electric vehicles and geothermal systems. heating/cooling Prior to joining Dominion, Mr. Caskey was responsible for managing the nation's largest direct load control program at Pacific Gas and Electric Company. Mr. Caskey was also instrumental in implementing PG&E's Cool Storage and Real Time Pricing programs. He was recognized developed distribution automation load management and systems, managed SCADA/EMS and SCADA/ DMS projects, and assisted

by the Electric Power Research Institute (EPRI) for his work in demand-side management. Mr. Caskey also served as the chair of a group of California utilities that developed a common specification for time-of-use (TOU) meters that significantly reduced the cost of meters, making TOU rates affordable for lower-income households.

Mr. Caskey holds a BS in Physics from George Mason University and a 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.



🥢 John McDonald, <u>GE</u>

John D. McDonald, P.E., is Director, Technical Strategy and Policy Development for GE Digital Energy. In his 37 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, SCADA/EMS managed and SCADA/DMS projects, and assisted Intelligent Electronic Device (IED) suppliers in the automation of their IEDs.

John received his B.S.E.E. and M.S.E.E. (Power Engineering) degrees from Purdue University, and an M.B.A. (Finance) degree from the University of California-Berkeley. John is a member of Eta Kappa Nu (Electrical Engineering Honorary) and Tau Beta Pi (Engineering Honorary), is a Fellow of IEEE, and was awarded the IEEE Millennium Medal in 2000, the IEEE PES Excellence in Power Distribution Engineering Award in

Intelligent Electronic Device (IED) suppliers in the automation of their IEDs.



John received his B.S.E.E. and M.S.E.E. (Power Engineering) degrees from Purdue University, and an M.B.A. (Finance) degree from the University of California-Berkeley. John is a member of Eta Kappa Nu (Electrical Engineering Honorary) and Tau Beta Pi (Engineering Honorary), is a Fellow of IEEE, and was awarded the IEEE Millennium Medal in 2000, the IEEE PES Excellence in Power Distribution Engineering Award in 2002, and the IEEE PES Substations Committee Distinguished Service Award in 2003.

In his twenty-four years of Working Group and Subcommittee leadership with the IEEE Power & Energy Society (PES) Substations Committee, John led seven Working Groups and Task Forces who published Standards/Tutorials in the distribution areas of SCADA, master/remote terminal unit (RTU) and **RTU/IED** communications protocols. John was elected to the Board of Governors of the IEEE-SA (Standards Association) for 2010-2011, focusing on long term IEEE Smart Grid standards strategy. John was elected to Chair the NIST Smart Grid Interoperability Panel (SGIP) Governing Board for 2010-2011.

John is Past President of the IEEE PES, is a member of the IEEE Public Visibility Committee, is a member of the IEEE Medal of Honor Committee, a member of the IEEE PES Region 3 Scholarship Committee, is the VP for Technical Activities for the US National Committee (USNC) of CIGRE, and is the Past Chair of the IEEE PES Substations Committee. John was the IEEE Division VII Director in 2008-2009. John is a member of the Advisory Committee DistribuTECH for the annual Conference, and is a member of NEMA's Smart Grid Council. John received the 2009 Outstanding Electrical and Computer Engineer Award from Purdue University.

John teaches a SCADA/EMS/DMS course at the Georgia Institute of Technology, a Smart Grid course for GE, and substation automation, distribution SCADA and communications courses for various IEEE PES local chapters as an IEEE

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PES Distinguished Lecturer. John has published thirty-four papers and articles in the areas of SCADA, SCADA/EMS, SCADA/DMS and communications, and is a registered Professional Engineer (Electrical) in California, Pennsylvania and Georgia.

John is co-author of the book Automating а 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 Second Edition, Engineering, published by Taylor & Francis/CRC Press in 2007.





Jungtaek Seo, The Attached Institute of ETRI



Kay Stefferud, EnerNex

Kay Stefferud is currently the Director of Renewable Projects at EnerNex where she is working with multiple utilities and industry groups defining system requirements, developing cost benefit analyses, preparing studies, and writing Smart Grid system engineering design and implementation plans.

Stefferud product Ms. has development, system engineering, program management, software development, proposal and management experience for software applications, R&D programs, commercial network devices, and advanced cyber security systems. Ms. Stefferud specializes in transitioning new technology from the R&D phase into innovative products. She has successfully produced new technology products for commercial, electrical and foreign markets.

Ms. Stefferud is currently the team lead and co-chair of the Open Smart Grid effort to developing a consistent set of Smart Grid use cases and functional requirements. She leads a team of energy SMEs in defining and documenting local, national and international requirements compatible with IEC standard 61850 using Enterprise Architect (EA) UML modeling. Current use cases for Demand Response are published at Open Smart Grid AMI-ENT web site and on SmartGridipedia.



Ken Wacks, <u>Home &</u> <u>Utility Systems</u>

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.

The Consumer Electronics Association chose Dr. Wacks to chair the international committee (ISO/IEC) establishing world standards for home and building automation. In addition, he has written American National Standards



in home automation. He contributed to the development of standards for networking home appliances under the auspices of the Association of Home Appliance Manufacturers (AHAM).

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



Kent Donohue, Underwriter Laboratories



Khalid Darwish, <u>Al Ain</u> <u>Distribution Company-UAE</u>

Khalid Darwish received his B.Sc. degree in Electro- mechanical Systems Engineering from Al Balqa' Applied University, Amman, Jordan in 2002, and his M.Sc. degree in Mechatronics Engineering from the American University of Sharjah, UAE in 2006. He is currently Sr. SCADA Instrument & Telecom Engineer at Al Ain Distribution Company, the electricity and water distributer in Al Ain City, UAE. He is also certified as Incorporated Engineer from the UK Engineering Council and member in the IET. His research interests are distributed control, smart grid and SCADA and telemetry. He published papers on SCADA and smart Grid and contributed in several conferences in smart electricity and smart grid.



Marc Peters, IBM

Marc Peters is the Industry Technical Leader for Energy & Utilities in Europe.

He is an IBM Executive Architect working in the Energy & Utilities industry for more than 9 years now

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and working as an IT Architect for more than 19 years. Marc brings in extensive thought leadership and new ideas for addressing business issues within his customer set. He is leading innovative solution design and projects around smarter energy and is also an active member of the IBM Softwaregroup Architecture Board and the IBM global Energy & Utilities architecture council.

Before working more intensively within the E&U industry he also worked in projects for Telco and Media & Entertainment. Marc joined IBM in 2001 in Global Business Services moving to SWG in 2003. He used to work for Oracle and Siemens in Belgium, Switzerland and Germany before joining IBM in 2001. In addition, he acquired broad international project experience.

Marc is a Distinguished Certified IT Architect (The Open Group), an associate member of the IBM Software Group Architecture Board, a certified SOA solution designer and an IBM certified Business Analyst.

He is a frequent speaker on internal and external events and recognized as an industry expert and technical leader by his peers and beyond Software Group.



Marianne Swanson, 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 Cvber 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 Publications, including NIST foundational computer security documents used throughout industry,

and in state, local, and foreign governments.

Swanson received the Ms. Department of Commerce Gold Medal Award in 2010 for designing, developing and disseminating the Risk Management Framework and again in 2011, for her work in Smart Grid. Ms. Swanson is a Federal 100 Award recipient for her work in the CIO Council developing Assessment Framework. In March of 2000 and 2001 she received the Technology Leadership FedCIO Award. In 1996, Ms. Swanson received the Industry Advisory Council Leadership and Achievement Award for developing the Federal Computer Incident Response Capability (FedCIRC) now called US-Cert 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.



Mark Armentrout, <u>Texas</u> Technology Partners

Mark Armentrout is President and CEO of Texas Technology Partners, with 30 years' experience in electricity, information technology, oil and gas, renewables, and banking.

Mr. Armentrout is a Managing Director of the Texas Institute, an independent nonprofit institute for technology research, located at the University of Texas at Dallas. See www.texasinstitute.org.

From 2005 through 2008, Mr. Armentrout served as Board Chair of ERCOT, the Electric Reliability Council of Texas. ERCOT manages the electric flow to 85 percent of the state's electric load, with 23 million



customers, 550 generating units, and over 40,000 miles of transmission. Mark was a member of the board from 2003 through 2009.

From 2000 through 2006, he was an information technology executive vice president for MBNA, the world's largest independent credit card company, which is now part of Bank of America. Prior to joining MBNA, Mr. Armentrout spent 24 years with Atlantic Richfield Company, the nation's sixth largest integrated oil and gas company that was acquired by British Petroleum in 2000. In his last position with ARCO, he managed information technology services for exploration and production, responsible for staff in the Americas, Europe, Asia and Africa.

Mr. Armentrout also serves the community on a number of boards, including Big Brothers Big Sisters of North Texas, the UTD Erik Jonsson Engineering School Industrial Advisory Board, the TCU Science and Engineering Department, the UNT Information Technology and Decision Sciences Advisory Board. He is also an Advisory Board member for Serenity High School. While in Alaska in the 1990s, Mr. Armentrout was instrumental in working with the Governor's office. native and industrial groups to bring the Internet to schools in the Alaskan bush. He is a member of IEEE.

He holds a bachelor's degree in computer science, summa cum laude, and a master's degree in political science with a major in philosophy from Texas A&M University at Commerce.



Mark Ellison, <u>DTE</u>

Mark Ellison is a Principal Analyst in the in the Security Infrastructure Group at DTE Energy. He has been participating in the development of industry Smart Grid Cyber Security Standards and leveraging those standards within his organization. Mark also works in the nuclear cyber security compliance space. Mark has a degree in computer science and has a CISSP certification.



Mark Klerer, <u>Qualcomm</u>

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 Master's degree in Systems Engineering for Stanford University and a Master's degree in Business Administration from Pace University.



📕 Mark Knight, <mark>CGI</mark>

Mark Knight is an Executive Consultant in CGI's USEM IP & Onshore Delivery Solutions Business Unit where he works with Utilities to enhance operations and business practices. Mr. Knight draws upon 25 years of experience to deliver business solutions that leverage the integration of people, business (processes, systems, data), and

technology to support innovative, effective, and practical solutions for CGI's clients.

Mr. Knight's background includes 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, deregulation, interoperability, asset management, and risk management.

Mr. Knight is a graduate of Imperial College, London and is also a member of the GridWise Architecture Council, a group formed by the U.S. Department of Energy to promote and enable interoperability among the many entities that interact with the nation's electric power system. The GWAC has broad, balanced representation among its 13 members selected to represent the full spectrum of industry and academia.



Alliance Mark Walters, <u>Z-Wave</u>

Mark has over 20 years experience in all aspects of electronic product solutions. He has a vast background in product design and development having served as V.P. of Engineering for products as diverse as high-end and sound reinforcement audio, vehicular sensing and controls, premise wiring solutions and automated building controls. He has spent the last 10 years of his career focused on short range wireless communications and the interface of the residence to the Internet cloud. Currently, Mark serves as the Chairman of the Z-Wave Alliance, an open consortium of leading global companies dedicated to establishing Z-Wave as the standard in wireless controls. Mark holds bachelor's degrees in Biology and Chemistry from the University of California at Santa Cruz and a MBA from City University, Seattle





Inc.

Marty Burns, Hypertek,

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 15 years, home and building automation for the past 30 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.



Michel Kohanim, Universal Devices, Inc.

Michel Kohanim holds a BS in Computer Science from USC and a MS in Artificial Intelligence from SCA.

He worked for IBM from 1996 to 2007 and in a variety of roles including developer and all the way up to Enterprise Architect and Strategist.

He joined Universal Devices in 2007 because he found the vision of the company matching his own: development intelligent, of autonomous, and low cost products that facilitate and orchestrate interactions between devices, agents, systems, and human beings. Energy management and SmartGrid is just one facet of these interactions which Universal Devices" products address natively and autonomously.



Mladen Kezunovic, 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), NSF an 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.

His past and current roles include a researcher and research manager, educator, utility industry consultant, innovator and active contributor to the standards development efforts within the IEEE. As a researcher, he was the Systems Engineer for the first alldigital substation development in the world in the late '70s, which defined early substation automation systems requirements that eventually were addressed with the development of the IEC61850. As an educator, he has not only advised close to 50 graduate students, several of them becoming leaders in the current standardization efforts but he has also taught short courses and gave seminars and invited lectures on the topics of the Smart Grid developments and importance of standardization for hundreds of engineers world-wide. His consulting activity world-wide as the Principal Consultant of Test Laboratories

International, Inc. for 17 years gave him a unique perspective of the standardization efforts in Europe, China, Korea, Japan and more than 25 other regions and countries that consider standardization a driver for the utility business development. He is also an innovator who developed the concept of automated analysis of substation IED data requiring enhanced data models from IEC61850 and 61970 leading to commercial products deployments at several utilities in the USA and abroad. He has also played active role in development of COMTRADE standard (IEEE C37.111-1999, Fault Location Guide (IEEE C37.144-2004), and Recommended Practice for Naming Time Sequence Data (IEEE.C37.232-2007).

His most recent contribution to the standards coordination efforts is the development of the NIST grade calibrator for testing, verification and certification of the PMU products and solutions. He is currently developing interoperability test requirements for PMU-based applications. His official role as the coordinator of the Smart Grid efforts within PSerc allows him to communicate findings from research that impact the standardization gaps assessment.

Dr. Kezunovic is well known for his leadership role in many Smart grid initiatives undertaken by diverse groups of stakeholders: The Smart Energy Campus Initiative at Texas A&M University, The Center for the Commercialization of Electrical Technologies in Texas, Electric Power Research institute, National Science Foundation, Department of Energy, North American Synchrophasor Initiative, Natural Since Foundation of China, etc. In his 35 years of professional engagement he participated in the team work and consensus building efforts in close to hundred working groups.







Patrick Gallagher, <u>National Institute of Standards and</u> 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 (NIST). Gallagher Technology provides high-level oversight and direction for NIST. The agency promotes U.S. innovation and by industrial competitiveness 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.

Gallagher had served as NIST Deputy Director since 2008. Previously, he served for four years as Director of the NIST Center for Neutron Research (NCNR), a national user facility for neutron scattering on the NIST Gaithersburg campus. The NCNR provides a broad range of neutron diffraction and spectroscopy capability with thermal and cold neutron beams and is presently the nation's most used facility of this type. Gallagher received his Ph.D. in Physics at the University of Pittsburgh in 1991. His research interests include neutron and X-ray instrumentation and studies of soft condensed matter systems such as liquids, polymers and gels. In 2000, Gallagher was a NIST agency representative at the National Science and Technology Council. He has been active in the area of U.S. policy for scientific user facilities and was chair of the Interagency Working Group on neutron and light source facilities

under the Office of Science and No. Technology Policy.



Paul De Martini, <u>Newport</u> Consulting Group LLC

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.



Paul Duffy, Cisco Systems

NO BIO



Inc.

Paul Molitor, SGIP 2.0,

Paul Molitor is the AVP of Strategic Initiatives for the National Electrical Manufacturers Association in Rosslyn, VA. On behalf of the member companies of NEMA, Paul is responsible for monitoring the national Smart Grid effort and interfacing with electric utilities, manufacturers, international standards bodies, federal agencies, and the United States Congress on Smart Grid issues.

Currently he is serving as the Transition Manager for SGIP 2.0, Inc.



🔊 Paul A. Boynton, NIST

NO BIO



Ralph Navarrete, Navarretye Consulting, LLC

Ralph Navarrete, PE, PMP® Principal, Navarrete Consulting L.L.C. Consultant to EnerNex Corporation 2010-Present Education:

Bachelor of Engineering (Ch.E.), Manhattan College, 1971 Master of Engineering (Ch.E.), Manhattan College, 1972 MBA, Fairleigh Dickinson University, 1987

Relevant Experience:

• Ralph has over 25 years of experience in project management, project deployment, systems personnel engineering, and management in software and other technical areas. He has extensive experience in project management methodologies and quality systems (ISO, CMM/SEI, etc.) and in managing technical project personnel both in the United States and internationally. Ralph is experienced in Software Development Life Cycle processes, and has worked on Windows, Linux, and UNIX systems.

• Ralph is a certified Project Management Professional (PMP®) from the Project Management Institute (PMI).

• Since January 2010, Ralph has worked on the NIST SGIP project through the EnerNex Corporation as Deputy Project Manager, primarily working on developing new processes and on the implementation and optimization of new and existing processes, as well as on tracking progress in the various activities.

• From mid-1998 through January 2010. Ralph worked as Program/Project Manager for SAIC on a number of large projects. This work was primarily broken into two areas: software development and testing, and data integration activities. Ralph led large software development/testing projects for

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supply chain management activities, Veterans US Benefit the Administration, and for telecommunication companies. The second area consisted of data archiving, management, and integration activities, primarily in the pharmaceutical industry where large amounts of data needed to be integrated as a result of merger & acquisition activities.

• Prior to joining SAIC, Ralph was a District Manager in AT&T and previous to that worked for consulting and operating companies in various technical capacities.



A Ravikumar Gelli, <u>Indian</u> <u>Institute of Technology Bombay</u>

Gelli Ravikumar (SM'2010) is currently working towards Ph.D. degree in Department of Electrical Engineering at Indian Institute of Technology Bombay, India. His research include business process models, bpmn, architectures for CIM based SCADA / EMS systems, CIM oriented database design, EMS applications integration with CIM database, CIM network model creation and topology processing, design and development of Power System Graphics Model. He is an active member of CIM panel under Bureau of Indian Standards (LITD-10). He is a graduate student member of the IEEE Mumbai section.



Drummond Group Inc.

As Chief Executive Officer and Chief Scientist of Drummond Group Inc. global trusted (DGI), the 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 is 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 interoperation 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.

The concept for a "constitution" of interoperability principles, the interview process to engage a larger community and the GridWise Constitutional Convention originated with Rik. This work has been captured the GWAC in Constitution Interoperability Whitepaper. Rik was also part of the GWAC team which created their Interoperability Context-Setting Framework (v1.1) document and their Interoperability Path Forward whitepaper. Through his efforts with the GWAC, Rik was awarded the Smart Grid Award for "Outstanding Leadership in the Advancement of a Smart Grid."

In his work with Drummond Group, Rik has a front seat view of enabling software/firmware vendors to develop and work together in the goal of interoperability, his hands on knowledge is immensely valuable.

Drummond Group today provides interoperability certification for machine to machine (M2M) or business-to-business (B2B) standards which are used for the Fortune 500 financial information backbone. representing billions of dollars exchanged per year. Cyber security of data interoperability and transfer is critically tested. And his company also provides world-wide interoperability certification for other

organizations such as Liberty Alliance for Identity information exchange for the US government and the global leaders in identity.

Major supply chains in retail, financial services, pharmaceutical, consumer product goods, automotive and petroleum industries rely on the Drummond Certified program to provide a wide selection of software tested for compliance and interoperability.

Rik was the chair of the IETF WG which produced the AS2 standard (RFC 4130) that allowed the transmission of EDI (Electronic Data Interchange) to move from VANs (Value Added Networks) to the Internet, saving companies millions of dollars in transmission fees. Today, AS2 is the workhorse for the Fortune 500 Internet Messaging and is one of the most widely implemented messaging standards around the globe.

Rik also chaired the initial version of the ebXML Messaging Service (ebMS) work group. ebMS is widely used B2B standard in the US, Europe and Asia.



EXAMPLE 1 Rish Ghatikar, <u>Lawrence</u> Berkeley National Laboratory

Girish Ghatikar is a Program Manager with U.S. Department of Energy's National Lawrence Berkeley 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 the 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.



England Robert Burke, <u>ISO New</u>

Mr. Burke is a Principal Analyst in Market Development department with ISO New England (the Regional Transmission Organization "RTO" for the New England control area). He has over 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 fillings.

Mr. Burke has been directly involved in the New England Demand Response programs since the 2000 summer program. As ISO-NE implemented Standard Market Design (SMD) on March 1, 2003, Mr. Burke worked on the melding of all the existing load response programs into New England's SMD. Since that time, Mr. Burke has been involved in the development and implementation of new Demand Response programs and ISO-NE's Internet based demand response dispatch open solution (IBCS-OS). He has been directly involved in the development of the dispatch methodology new implemented by ISO-NE for June 1, 2010.

Mr. Burke has a B.E. in heat and power from Stevens Institute of

Technology, MBA and MS in Science, Computer both from Rensselaer Polytechnic Institute, and has completed all examination requirements in Connecticut for a CPA. He has been a member of the GridWise Architecture Council since 2009 and a member of IEEE. The GridWise Architecture Council works to foster smart grid interoperability. He has made presentations on more than three-dozen panel discussions and technical seminars, and authored or coauthored more than a dozen technical papers.



Centerpoint Energy

Robert Frazier has 34 years of IT management experience in operations, PC and LAN deployment, security, application development, audit and executive consulting. His work at CenterPoint focused on utility customer systems including CIS and other call center applications, as well as experience with field service reps, billing, bill print, receivables and reporting. He spent the past three years working part time on Advanced Meter Infrastructure (AMI) and Intelligent Smart Grid including regulatory filing and settlement negotiations. Robert is a member of the Texas statewide Advance Meter portal specification team, the portal design and vendor selection team, and is the CenterPoint management representative on the multi-company portal governance committee and member of the CNP Intelligent Grid specification and vendor selection team.



Rolf Bienert is the Technical Director of the OpenADR Alliance. In this capacity, Rolf oversees the technical developments and the currently forming certification program of the Alliance. Most recently Rolf was the Technical Manager for Telecom and the Global Competence Center for

emerging communication protocols at

TUV Rheinland. In this role at TUV, Rolf was involved in many international standardization efforts and guided the company's efforts in these areas. Rolf has been an active member of the NIST SGTCC, OpenADR Alliance, USNAP Alliance, SunSpec Alliance, ZigBee Alliance, and other organizations driving the development of new technologies with a specific focus on certification and interoperability.



Watson Research Center

Ron Ambrosio oversees IBM's Energy & Utilities Industry activities in its twelve 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 led that 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.





NO BIO



Battelle/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.



Name Rudi Schubert, <u>EnerNex</u>

Rudi Schubert is the program coordinator for the SGTCC. He is a Principal Engineer with EnerNex Corporation and a technical expert in conformance and interoperability programs. Rudi has a 20+ year record of leading, developing and implementing industry test programs, assuring expectations for functional performance; compatibility; product robustness and safety are achieved.

He began his career as a nuclear power plant design analyst, and then moved to a test engineering position in the telecommunications industry with Telcordia Technologies, establishing technical criteria and test methodologies that would eventually become a mandated compliance and certification standard used by US telecom carriers in assessing product and system suitability for deployment. His responsibilities at Telcordia expanded to leadership of its Network and Product Integrity organization, providing comprehensive management of the consulting and laboratory technical services delivered to enhance the integrity of its client's communications network infrastructures. His teams consisted of up to 50 technical experts providing services spanning switching, signaling and VoIP technologies, broadband access and optical transport technologies, fiber optic connectivity products, communication facility operations issues including energy efficiency, electrical/mechanical robustness, and network infrastructure integrity testing. Testing programs included the delivery of certification services for major telecom service providers, as well as major network equipment suppliers.

Significantly, his team played an instrumental role in Verizon's ground breaking fiber optic network deployment (FiOS) providing the product functional and robustness criteria, detailed laboratory and field testing methodologies, and product conformance evaluations required by the carrier to assure that their investment in this first of its kind delivered customer network expectations for high performance and reliability, as well as providing an infrastructure prepared for future demand.

Laboratories under his direction achieved accreditation by the American Association of Laboratory Accreditation (A2LA) through adherence to ISO 17025 lab quality standards. He has been an active participant in national and international standards activities, and has participated in the ANSI Conformity Assessment Policy committee.

Rudi developed the IEEE Conformity Assessment Program (ICAP), focused on supporting development of conformity and certification programs related to IEEE standards, helping accelerate market adoption of new technologies, including the IEEE 1588 Conformity Alliance launched in 2010.



Sang-Hui Park, Korea Smart Grid Standardization Forum



Energy, an NRG Energy company

Scott Burns is the Director of Product Management at Reliant Energy, where he is responsible for creating the product and service strategy for one of the industry's leading Smart Energy deployments. He has been focused on consumer-facing energy product strategy since he joined Reliant in 2008 as a Smart Energy Product Manager and helped launch multiple products including energy emails, web portals, mobile applications, time-of-use pricing, and prepay electricity. He was a key contributor on the application that led to Reliant's selection as a Department of Energy (DOE) Smart Grid Stimulus Grant recipient. He also spent a year at Direct Energy where he led Smart Energy product strategy and interfaced with British Gas and their Smart Homes team.

Mr. Burns previously spent eight years in a variety of marketing and product line manager roles at Corning, a leader in fiber optics and telecommunications equipment. He led development of a number of key products used in the country's first large Fiber-to-the-Home deployments.

Prior to his time at Corning, Mr. Burns spent over nine years as a military officer and pilot in the U.S. Air Force. He received his Bachelor of Science degree from the U.S. Air Force Academy and has his MBA.



Stephan Amsbary, <u>EnerNex</u>

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 EnerNex's Enterprise directs 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 TOGAF Certified Architect, and member of both IEEE Power & Energy and Computer Societies.



Northwest National Laboratory (PNNL)

Steve Widergren contributes to 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 engineer at Pacific Northwest National Laboratory and is the 2012/2013 Plenary Chair for the Smart Grid Interoperability Panel, a group established by NIST to advance interoperability of smart grid devices and system through the coordination of standards and best practices. He was the founding administrator for the GridWise Architecture Council - a formed group to enable interoperability of automated systems related to the electric system. Prior to joining the Laboratory, Steve worked for PG&E, AEP, and ALSTOM where he engineered and managed energy management systems products for electric power operations and supported power system computer applications. Application areas include information modeling, SCADA systems, and power system reliability assessment tools. Steve received his BS and MS degrees in electrical engineering from the University of California, Berkeley. He is actively involved in the IEEE

Power & Energy Society and participates in standards efforts that bridge power engineering with information technology.



EnerNex

Stuart McCafferty, PMP® Vice President, EnerNex Corporation 2008-Present Education

B.S., US Air Force Academy, 1984 Relevant Experience: Stuart is a business leader executive, program manager and system engineer professional with over 25 years of experience, with specialized expertise in building and growing business, Smart Grid technologies, managing complex technical projects, including system architecture design, software development and implementation. real-time data acquisition, Program Management Offices (PMOs), and Smart Grid technology efforts. He is a certified Project Management Professional (PMP®) from the Project Management Institute (PMI). Stuart's recent projects include: • NIST Phase II National Smart Grid Standards Acceleration Program. Since August, 2009, Stuart has been the EnerNex Program Manager assisting NIST to accelerate the development and harmonization of Smart Grid standards. He leads the Smart Grid Interoperability Panel (SGIP) PMO, overseeing the various Priority Action Plans, Smart Grid Testing and Certification projects, Cyber Security projects, and Smart Grid architecture projects. In addition, he leads the Administrator team for the SGIP, which is a volunteer organization of approximately 2,000 individuals committed to identifying and accelerating the standards needed to support а Smart Grid. · National Institute of Standards and Technology (NIST) Plug-in Electric Vehicle (PEV) common object models Priority Action Plan (PAP). Stuart was co-lead for developing a common interoperable model for price. DR events, and energy characteristics for dynamic pricing across markets, signals for

distributed curtailment, and that allow generation resources information supporting these uses to flow through the smart grid. NIST Phase I Smart Grid Interoperability Roadmap. Stuart led the EnerNex team as the primary subcontractor in supporting EPRI with stakeholder assessments, roadmap development, workshop facilitation, priority action plans, use case identification and extension, and the development of the Smart Grid conceptual model.

• California Energy Commission: demand Statewide response deployment. Stuart is managing a project and the principal investigator in developing the requirements and reference architecture for the California Demand Response Analysis and Control System (DRACS).

• West Virginia Smart Grid Strategy: Stuart co-invented and developed the Modern Grid Maturity Model and self-scoring survey application which performs As-Is and Future State assessments of a utility's smart grid maturity level.

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 performing Division, 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.

He supported utility industry Predictive initiatives around Analytics. Advanced Metering Infrastructure (AMI), Modern/Smart Grid initiatives, and Utility of the Future (UoF) pilot programs. He led SAIC's AMI Community of Practice and had articles published on that subject. Stuart led an SAIC Research and Development (R&D) project for real time data management, advanced



predictive analytics, and knowledge management. He supported the National Energy Technology Laboratory's (NETL) Modern Grid Initiative as manager and chief architect for simulation. Professional Affiliations:

•Certified Project Management Professional (PMP®) from Project Management Institute.



Mellon University

Surbhi Dangi is a Researcher at Carnegie Mellon University Silicon Valley, where she is exploring the use current web-based voting of technologies (audio-only and multimedia voting machines and webbased support of vote-by-mail ballots) to improve the voting experience for individuals with disabilities. In her research information on interoperability, Miss Dangi was responsible for the development of a web-based tool to achieve the highlevel goal of ensuring interoperability amongst the various smart grid standards. Miss Dangi holds a Master's in degree Software Engineering from Carnegie Mellon University Silicon Valley and specialized in application development on the Siebel eCRM platform for AT&T at IBM for 2 years prior to Carnegie Mellon.



Tanya Brewer<u>, NIST</u>

Ms. Tanya Brewer is an analyst for the National Institute of Standards and Technology's Computer Security Division. She has been with NIST for 9 years, during which she has covered a wide range of topics. She began her federal career as a Presidential Management Fellow, and served as a Congressional Fellow to US Sen. Ron Wyden.

Before joining the federal government, she worked for the University of Memphis and Mississippi State University. Ms. Brewer holds an MPA degree and a BSc degree.



Tim Schoechle, <u>Evolution</u> 7 Labs

Dr. Schoechle is an international consultant in computer and communications engineering and in technical standards development. He presently serves as Secretary of ISO/IEC SC25 Working Group 1, the international standards committee for Home Electronic System and is a technical co-editor of several new international standards related to the smart grid. He also serves as Secretariat of ISO/IEC SC32 Data Management and Interchange, and he currently participates in a range of national and international standards bodies related to smart grid technology and policy issues. As an entrepreneur, he has engineered the development of electric utility gateways and energy management systems for over 25 years and has played a role in the development of standards for home networks and for advanced metering infrastructure (AMI). He is a former faculty member of the University of Colorado College of Engineering and Applied Science. He is considered an expert on the international standards system, the topic of his 2009 book. Standardization and Digital Enclosure. Dr. Schoechle was a cofounder of BI Incorporated, a pioneer developer of RFID technology. He holds an M.S. in telecommunications engineering (1995) and a Ph.D. in communication policy (2004) from the University of Colorado, Boulder.



Tobin Richardson, ZigBee Alliance

As ZigBee's Director for Smart Energy, Tobin focuses on driving adoption of ZigBee in key smart energy markets. Tobin has more than 15 years experience in strategic management and marketing for technology firms and organizations. In 2008, he directed PG&E's smart meter upgrade RFP, following three

years with the California utility working with the executive team on the company's transformation process, managing stakeholder and regulatory relationships and initiatives. Prior to PG&E, Tobin directed business and led stakeholder development and management for a broad spectrum of technology and large-scale companies, including Affiliated Computer Services (ACS), numerous U.S. federal agencies, CenterBeam, Pandesic and Georgetown University. He led the turnaround of a key unit of Georgetown business University, helped drive an interagency initiative for the U.S. Customs Service and led new business development and strategic partnerships for an IT outsourcing firm based in Silicon Valley. Tobin has managed strategic partnerships with multiple technology industry leaders, including Microsoft, Intel, Dell, and SAP in technology and marketing initiatives. Tobin currently serves as Secretary for the U.S. Smart Grid Interoperability Panel's Testing and Certification Committee, and participates actively on NEMA's Smart Grid Task Force and the CEA'S Smart Grid Working Group. Tobin holds a masters from Georgetown University and а bachelor's degree from the University of California, Davis.



Toby Considine, <u>TC9</u>

Toby Considine has 25 years of with enterprise experience applications and the integration of embedded control systems. 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 BIX Technical Committee, and encompasses 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.



Tracy Markie, <u>Engenuity</u> Systems

Tracy Markie has more than 25 years of experience in the control systems and energy markets. He is President/CEO of Engenuity Systems, Inc., a leading distributor and valueadded-reseller of energy solutions and building automation products.

Mr. Markie participates in a number of industry groups. He is currently serving on the GridWise Architecture Council, a group sponsored by the U.S. Department of Energy. Mr. Markie also serves on the boards of LonMark International, as Chairman, LonMark Americas and the SunSpec Alliance, an association dedicated to bring interoperability standards to the solar industry.

A published author and presenter, Mr. Markie's articles on the subjects of automation and energy management using networked solutions have appeared in more than a dozen national publications. He often participates at local and national industry and business events as an invited speaker.

Mr. Markie is a Certified Energy Manager and a Certified LonWorks Professional. He 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

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Technologies, Intel Corporation, and Tronix Corporation.



Venkata Ganti, <u>Lawrence</u> Berkeley National Laboratory

Venkata Vish Ganti is a Senior Research Associate at LBNL. His research areas include Residential, Commercial and Energy Intensive industries such as Data Centers, Demand Response and their links to Smart Grid. Mr. Ganti has also been carrying out research on demand response in International markets such as India.

Mr. Ganti worked as an energy consultant focusing on energy efficiency and demand response program implementation and evaluation. Prior to his consulting experience, he worked at the Industrial Assessment Center (IAC) at San Francisco State University, where he conducted several energy audits for small and efficiency medium industrial facilities.

Mr.Ganti holds a masters in Electrical Engineering from SFSU and a Bachelors in Engineering from India.



Victoria Yan Pillitteri, NIST

Ms. Pillitteri (formerly Yan) is an IT Security Specialist in the Computer Security Division at the National Institute of Standards and Technology (NIST). She was a lead in the development of the NIST Interagency Report (IR) 7628, Guidelines for Smart Grid Cyber Security, and continues to be an active participant and leader within the Smart Grid Interoperability Panel Cyber Security Working Group (SGIP-CSWG) and other collaborative electric industry efforts. She is a co-author of the Draft Electricity Sector Risk Management Process Guideline published by Department of Energy and the Guide Assessing the High-Level to Requirements in NISTIR 7628. She brings experience with the end-to-end development and implementation of cybersecurity Smart Grid

requirements to fulfill the needs of both federal agencies and the private sector.

Previously, she was a Senior Information Assurance Engineer with Booz Allen Hamilton, providing strategic & technical consultation and project management support that has enabled development and growth of trusted relationships with senior executive decision makers in both the federal and commercial Smart Grid space.

Ms. Pillitteri holds a B.S. in Electrical Engineering from the University of Maryland and is pursuing a M.S in Computer Science, with a concentration in Information Assurance, from George Washington University.



Ward Camp, <u>Landis+Gyr</u>

A thirty year veteran of the energy and utility industry, Camp is VP, Regulatory and Environmental Policy for Landis +Gyr Energy Management Solutions N.A. He is current board member of the GridWise Architecture Council, Co-Chair of the SGIP Business and Policy, Domain Expert Working Group and the Demand Response and Smart Grid coalition (DRSG). He is also a member of the GridWise Alliance and the Association for Demand Response & Smart Grid (ADS). Previously, he served in executive roles as part of the Senior Management of DCSI (now USPowerSolutions Aclara), and Avistar, a Public Service Company of New Mexico subsidiary. Camp has worked extensively with utilities and public utility commissions throughout the United States. He spent the first 17 years of his career as an attorney with a focus in energy and utilities. Mr. Camp obtained his Juris Doctor from the University of Oklahoma.



Energy William Cloutier, <u>DTE</u>

Bill is currently Manager of Smart Grid Interoperability Standards at



DTE Energy located in Detroit, Michigan. His responsibilities include leading the coordination of Smart Grid Standards development and compliance for DTE Energy. Prior to his current role, Bill lead all technical aspects of the AMI project team, including technology selection, pilot implementation and testing.

Bill has 30 years of broad based electric utility experience with DTE Energy. He has held several engineering and leadership positions in Customer Service, Distribution Operations, Information Technology, Distribution Engineering and Nuclear Generation. He has also managed several key business projects related to advanced metering, electric deregulation, billing/metering information systems, distribution improvement reliability and substation design.

Bill holds a Bachelor's degree in Electrical Engineering from Wayne State University and is a certified Lean-Six Sigma Black Belt. He has also completed several technical and leadership related professional training programs. Bill serves as Chairman of the Itron User Advisory Board, Co-Chairman of the Codes and Standards Committee of the Michigan Public Service Commission's Smart Grid Collaborative, Detroit Edison voting member on the Smart Grid Interoperability Panel and is a member of the UCAIug OpenSG Technical Committee. Bill is also a member of EEI, IEEE PES, IEEE SA, EPRI Intelligrid program, Utilimetrics, AMI MDM collaborative, and the Engineering Society of Detroit.



Software Architects LLC

Bill is a leader in commercial and open source software definition, specification, design, and development. His work combines business experience with his deep and practical understanding of software technologies architecture and Web services, including XML, Service-oriented architectures, eBusiness, Networking and system software to lead standards and project definition and execution.

Bill is past Chair and elected member

of the Organization for Structured Information Systems (OASIS) Technical Advisory Board, the leading XML and Web services standards organization in the world. He has completed major standards projects in OASIS, the Object Management Group, and IEEE.

He chairs the OASIS Energy Interoperation Technical Committee which is producing the interoperation standard for the smart grid and facilities (including OpenADR 2.0), and the OASIS Energy Market Information Exchange Technical Committee which has completed version 1.0 of information models for energy market communications (completing SGIP Priority Action Plan 3). He is a member of the OASIS WS-Calendar TC which has delivered Common Calendar the and Scheduling Model 1.0 for the Smart Grid (completing SGIP Priority Action Plan 4).

Bill is a member of the Smart Grid Architecture Committee, and participates in ASHRAE SPC201P for facility information models for energy usage and load.



Appendix C: Grid-Interop Paper Awards

Toby Considine, William Cox, and Edward G. Cazalet - "Understanding Microgrids as the Essential Architecture of Smart Energy" (PDF 392KB) http://www.gridwiseac.org/pdfs/forum_papers12/considine_paper_gi12.pdf

Martin J. Burns - "Testing and Certification for Green Button" (PDF 358KB) <u>http://www.gridwiseac.org/pdfs/forum_papers12/burns_paper_gi12.pdf</u>

Gary McNaughton, Linda Rankin, and James Mater - "The Critical Next Step for Interoperability: Designing and Implementing Interfaces between Standards" (PDF 419KB) <u>http://www.gridwiseac.org/pdfs/forum_papers12/mcnaughton_paper_gi12.pdf</u>

Jason MacDonald, Peter Cappers, Duncan Callaway, and Sila Kiliccote - "Demand Response Providing Ancillary Services – A Comparison of Opportunities and Challenges in the US Wholesale Market" (PDF 295KB) http://www.gridwiseac.org/pdfs/forum papers12/macdonald paper gi12.pdf



Appendix D: Papers

- Bert Taube, Rolf Bienert <u>Advanced Data Management and Analytics for Automated</u> <u>Demand Response (ADR) based on NoSQL</u>
- Chellury Ram Sastry, William Cox, Toby Considine <u>Benchmarks and Models—Price-</u> <u>Responsive Devices with Forward Prices *Looking Forward and Looking Back*</u>
- Dr. Gerald R. Gray <u>CIM-MultiSpeak Harmonization: Practical Guidance for</u> <u>System Integration</u>
- Jason MacDonald, Peter Cappers, Duncan Callaway <u>Demand Response Providing</u> <u>Ancillary Services - A Comparison of Opportunities and Challenges in the US</u> <u>Wholesale Markets</u>
- Girish Ghatikar, Ed Koch <u>Deploying Systems Interoperability and Customer Choice</u> <u>within Smart Grid</u>
- William Cox, Toby Considine, David Holmberg <u>Energy Ecologies</u>—<u>Models and</u> <u>Applications</u>
- Dave Hardin, Scott Neumann <u>Impact of Secure, Scalable Performance on Demand</u> <u>Response Communication Architecture</u>
- Partha Datta Ray, Christopher Reed, Jeff Gray, Atul Agarwal, Suresh Seth <u>Improving</u> <u>ROI on Big Data through Formal Security and Efficiency Risk Management for</u> <u>Interoperating OT and IT systems</u>
- Khalid Walid Darwish <u>Maintaining Interoperability by Open-Standards Design in</u> <u>The Power Distribution for Smarter Grid</u>
- Richard Caralli, Mark Knight, Austin Montgomery <u>Maturity Models 101: A Primer</u> <u>for Applying Maturity Models to Smart Grid Security, Resilience, and</u> <u>Interoperability</u>
- Ed Koch, Sirajul Chowdhury, John Hernandez <u>New Architectures for Interacting</u> with Demand Side Resources in Ancillary Services Markets
- Mobolaji Bello, Clinton Carter Brown, Riaan Smit, Innocent E. Davidson <u>Power</u> <u>Planning in a Smart Grid Environment - Case Study of South Africa</u>
- Venkata Ganti, Girish Ghatikar <u>Smart Grid as a Driver for Energy-Intensive</u> <u>Industries: A Data Center Case Study</u>
- Gary McNaughton, Linda Rankin, James Mater <u>The Critical Next Step for</u> <u>Interoperability: Designing and Implementing Interfaces between Standards</u>
- Dave Cohen, Tim Schoelche, Ben Kroposki The Energy Systems Integration Facility



(ESIF): A Smart Power Platform for Product Interoperability Development, Test, and Evaluation

- Chellury Ram Sastry, William Cox, Toby Considine <u>The Semantics of Price and of</u> <u>Price-Responsive Nodes</u>
- David Holmberg, Dave Hardin, Ed Koch <u>Towards Demand Response Measurement</u> and Verification Standards
- Edward G Cazalet, Chellury Ram Sastry Transactive Device Architecture and Opportunities
- Dr. Martin J. Burns Testing and Certification for Green Button
- Toby Considine, William Cox, Edward G. Cazalet <u>Understanding Microgrids as the</u> <u>Essential Architecture of Smart Energy</u>
- Surbhi Dangi, Steven Ray, Ralph Hodgson, Gokhan Soydan, Ankur Oberai <u>Using</u>
 <u>SPARQL/OWL for Validation of Smart Grid Standards Semantic Harmonization</u>
 <u>of Smart Grid Concepts</u>
- Doug Houseman <u>Why Conceptual Architecture is Critical for Future-Proofing</u> <u>Interoperability</u>

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