INFORMATION, COMMUNICATION & CYBER SECURITY NEWSLETTER

Merry Christmas from the ICCS Team!

December 2016

In this Newsletter

As we wrap up 2016, I wanted to take a moment and thank all of you for your engagements and insights which were critical in the successes we achieved this year.

I want to offer congratulations to our own Pat Brown, Principal Technical Leader, who received the prestigious 1906 Award from International Electrotechnical Commission (IEC) for her work on a family of communication standards for the common information model, or CIM, a system for open and consistent data exchange in the power industry. She is the only American to receive the award this year. The IEC is the leading global organization that publishes consensus-based International Standards and manages conformity assessment systems for electric and electronic products, systems and services, collectively known as electrotechnology. Great job Pat!

2016 marked the 30th anniversary of EPRI's Knoxville office. The **Knoxville Sentinel** published an article about EPRI and its contributions to the industry and region. Mike Howard was quoted as saying: "We touch not just every corner of the United States, but probably 40 different countries, and we have world experts right here, whether it is in energy storage, electric vehicles, or power electronics."

From all of EPRI, we wish you the happies of holidays, and we look forward to our continued efforts in 2017!

Sincerely,

Matt Wakefield
Director, Information, Communication and Cyber Security Research

ICT Team Industry Contributions and Collaborations

Electric Energy Online posted a commentary by Christine Hertzog and Tim Godfrey, *"From Research to Action | Developing a Strategic Architecture for Utility Telecommunications"*. The article talks about EPRI's research into dynamic telecom networks, devices that monitor and control the flow of electricity on high and low voltage grids.

Ed Beroset was quoted in the **E&E** article "N.Y.'s quest to turn daunting data into an 'energy internet'", about the continuous flow of data from digital meters and how that information can help make the grid more reliable. The article looked at an effort in New York State to turn the energy data into an "energy internet".

John Simmins contributed a commentary to **Electric Energy Online** on how EPRI is contributing to the development of standards to automate work flows for electric utility workers and developing the technology (such as augmented reality) to put some of those standards into action.

Public Utilities Fortnightly published a commentary by Karen George on building a durable architecture for the integrated grid, which makes the case that the future grid will need to take advantage of connected devices and systems. The article appears on Pages 52–54.

ICT / IntelliGrid (161) & Related Demonstration Deliverables

- IEC 61850 Working Group Activity 2016 Summary, Product ID:3002007477

  The purpose of this report is to document and report on the yearly progress of Technical Committee 57 Working Group 10 in support of the International Electrotechnical Commission (IEC) 61850 standard. There were three meetings held globally in 2016 and a wide variety of topics were discussed and advanced.
- 2016 Third Quarter CEA-2045 Field Demonstration Project Update, Product Id: 3002008853

  This report includes a summary and presentations from a meeting (referred to as a *CTA-2045 Summit*), hosted by Portland General Electric in fall 2016, in which utilities and technology providers had an opportunity to share knowledge gained through this project.

- Governance and Enterprise Architecture Debt, Product ID:3002007898

  This report reviews the concept of architectural debt, and how it may be applied by enterprise architects in the process of application portfolio management and in communicating with business colleagues about ways to reach invest-maintain-retire decisions. This paper was developed with EPRI Information Communication Technology (ICT) Enterprise Architecture Collaboration Group (EACG) members.

- Interoperability Assessment of Transformer Monitors Using IEC 61850, Product ID: 3002007476

  This report examines several transformer configurations, with emphasis on the impacts of asset modeling and data collection for a transformer monitoring system. The recently finalized Part 90-3 of the International Electrotechnical Commission (IEC) 61850 standard—which is tailored to condition monitoring diagnosis and analysis—has created an opportunity for advancements in transformer health monitoring through the use of dissolved gas analysis (DGA) measurements.

  The focus of this project was to determine the level of compliance from transformer monitors with DGA capabilities relative to the final version of the 61850-90-3 standard. Any gaps identified in the standard will be provided to IEC Technical Committee 57 Working Group 10 for future consideration.

- Results from Inverter Interoperability Assessment Using the SunSpec Specification: Summary of EPRI's Testing of Communications in Residential Solar, Product ID: 3002009462

  The report includes comprehensive results from two government projects focusing on development of residential smart inverters and interoperability testing. The results have been compiled from lab testing completed for the State of California as part of a California Solar Initiative project, entitled "Standard Communication Interface and Certification Test Program for Smart Inverters," and a Department of Energy (DOE) project for the National Renewable Energy Laboratory (NREL), entitled "Cohesive Application of Standards-Based Connected Devices to Enable Clean Energy Technologies." To enable interoperability assessments, members of the project teams independently developed two types/brands of residential smart inverters and two types/brands of communication systems. This resulted in four combinations (2x2) that could be tested.

- Grid Integration with High PV Penetration: The State of the Industry with High PV Penetration, Product ID: 3002009261

  Utilities and other organizations around the world are faced with the challenge of integrating renewable resources in three key areas: 1) Bulk-system integration of renewable resources and use of curtailment when necessary; 2) The specification, design, and use of smart inverters.; 3) Development of communication architectures, standards, and cybersecurity for distributed resources.

  To address the three key research questions, this report combines:

  - Surveys of current research and literature.
  - Compilation of key or unique elements of international standards and grid codes.
  - EPRI's analysis of fundamental themes, challenges, or potential concerns.
  - Third-party perspectives from a combination of reporting and direct interviews.

- Integrated Grid Pilot Projects Quarterly Update: Q3 2016, Product ID: 3002008351

This newsletter is the third edition of the *Integrated Grid Pilot Projects Quarterly Update.* In this issue, you will find the latest information about project milestones, key learnings, and gaps identified in the pilot projects. We'll review the schedule of projects underway, and highlight one completed with the California Solar Initiative RD&D program, Southern California Energy, and Meritage Homes to build the first advanced energy community in California. You'll also get the scoop on available resources and upcoming events.

- Application Portfolio Management for Aligning Information Technology and Operational Technology: Challenge and Opportunity for Utilities, Product ID: 3002007877

  It is unlikely that stakeholders from a utility's Information Technology (IT) organization and from its Operational Technology (OT) business units share a common view of the key characteristics and value provided by any particular application. This can result in a perception of bias or arbitrariness in the development of the future plans for an application. In such situations, a transparent, objective system for characterizing and assessing each application may play a crucial role in avoiding conflict and driving to a consensus regarding the appropriate disposition for an application. The shared engagement of IT and OT in a methodical, holistic APM process that accounts for critical system interdependencies is critical to both optimizing the return on a utility's application portfolio investment, and to advancing the level of understanding and trust between the IT and OT functions.

- Information and Communication Technology (ICT) Innovators Forum Gap Analysis and Utility Needs and Wants: 2016, Product ID: 3002009473

  Designed to increase the alignment of research priorities between electric utilities and industry solution providers, EPRI's Information and Communications Technology (ICT) Innovators Forum consists of solution providers working to accelerate the commercialization of standards-based integration technology solutions. This second annual Forum Gap Analysis report is based on the research, including a survey, which was performed for the purpose of developing the 2016 Information, Communication, and Cyber Security (ICCS) Roadmap. It describes and analyzes 72 gaps between currently-available ICT capabilities and those ICT capabilities that will be desired by utilities over the next three to five years.

- Advanced Metering Infrastructure Resource Center (AMI Status DB), Version 2.0, Product ID: 3002008944

  This software is being developed to enable EPRI to capture and track the industry status regarding smart meter/AMI deployments. The data that will be collected through this software will be kept in a database that will be the source of a wide range of reports for our members and the public in this regard.

- Wholesale Electricity Market Design Initiatives in the United States: Survey and Research Needs, Product ID: 3002009273

  This report provides an in-depth review of the current design of four auction product categories: energy markets, ancillary service markets, financial transmission rights (FTRs), and capacity markets.

  Synchrophasor Data Management Assessment: Status Report, Product ID: 3002007473

  The focus of this research effort and this report are to summarize the work of the 2014 and 2015 EPRI reports and to develop and conduct a detailed Case Study of two selected utilities. The Case Study addressed a wide range of topics related to synchrophasor data management such as data types stored, data archiving, retention and destruction policy, data performance

metrics, data quality issues and application roadmaps. Additional topics were insights, learnings, trends and future plans.

- Integration of Internal and External Data Sources for Informed Decisions: Data Simulation, Product ID# 3002007475

  The main objective was to evaluate the types of decisions that operations, planning, and maintenance personnel wish they could make with a higher degree of confidence, or identify insights that are currently not possible due to insufficient data during extreme weather events. The purpose of the exercise was two-fold: to provide example data combinations that can be considered, and also to outline a process for identifying these insights.

Meeting Materials Available

- Interoperability Webcast - Outage Data Standard
- Technology Transfer Webcast - Top Ten Indicators of Architecture Maturity
- Technology Transfer Webcast: Reliability and Communications Requirements for Distribution Applications
- Technology Transfer Webcast/Distributed Intelligence: Current Industry Landscape and Next Steps
- 2016 AMI Research Projects Update
- EPRI ICT & Security Architecture for DER Integration Webcast
- Distribution GIS and Grid Model Data Management Special Project Introduction Webcast
- Technology Transfer Webcast: Precision Time: Issues, Concerns and Future Needs

Cyber Security (183) and Related Demonstration Deliverables

Substation Security Architecture Reference Diagrams Version 1.0, Product ID: 3002009519

Another component of the cyber security strategy is a cyber security architecture. Currently, utilities have enterprise architecture diagrams, but they have not typically developed a cyber security architecture. This technical update includes transmission and distribution reference cyber security architecture diagrams for legacy, transition, and future configurations. This report is a companion document to EPRI's *Cyber Security Architecture Methodology for the Electric Sector, Version 2.0* (3002007887).

Cyber Security Risk Management Database Overview: Security, Cyber, Risk Assessment Methodology Database (SCRAM) Version 2.0, Product ID: 3002007888

EPRI has developed several guidance documents to provide a framework and mapping of existing guidance to assist cyber security practitioners in addressing cyber security for both legacy and next generation technologies. To better correlate the information in these documents, EPRI has developed the Security, Cyber, Risk Assessment Methodology (SCRAM) database. Information from the various documents is included in this database. The format and capabilities of the database will allow users to perform searches as they determine how to apply the various guidance documents.

Cyber Security Compliance Database Overview Version 2.0, Product ID: 3002007892

The Compliance Tools Database is an online resource that displays a matrix of CIP v5 standards requirements and tools. The matrix is designed to display the tools that can assist in complying with different requirements. This mapping between tools and requirements is kept up to date from vendor website information, research, and user reviews.

Implementing Intrusion Detection/Prevention Systems for Power Delivery Systems, Product ID: 3002009369

The Electric Power Research Institute (EPRI) assessed the configuration, placement, usage, and gaps involved with deploying Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS) at substations. This research will help asset owners comply with Critical Infrastructure Protection (CIP), specifically CIP-005-5 requirements for detecting known or suspected malicious communication for both inbound and outbound communications, and CIP-007-6 requirements for malicious code prevention. This project included a technical design, testbed development, testing scenario development, and technical testing. Overall, EPRI reviewed twenty-two IDS/IPS solutions to determine their suitability for testing, IT, OT, and physical security monitoring requirements. Out of these, EPRI identified five potential solutions that best meet the requirements. These solutions were evaluated to determine their ideal placement and tested for their effectiveness at detecting and preventing attacks.

Distributed Network Protocol (DNP3) Security Evolution 2016, Product ID: 3002009370

This report describes the latest progress in promoting the adoption of the Secure Authentication features of the Distributed Network Protocol (DNP3-SA) within the power industry. It describes the analysis of security vulnerabilities and interoperability issues identified during the 2015 multivendor workshop hosted at the EPRI Cyber Security Research Lab in Knoxville, TN, and the development of short-term solutions for these issues. It also describes the revision of the DNP3 Key Management Protocol (DKMP) and the DNP Test Procedures to address comments developed at that workshop.

Cyber Security Industry Updates: 2016 Edition, Product ID: 3002007701

The EPRI Cyber Security Program provides monthly updates to utilities on cyber security activities and events that are impacting the electric sector. The goal is to cover the activities of industry groups, government organizations, regulatory bodies, and research groups from around the world. This document provides highlights from these monthly updates.

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This report provides an in-depth review of the current design of four auction product categories: energy markets, ancillary service markets, financial transmission rights (FTRs), and capacity markets. Overall, more than 150 initiatives are captured across the regions covered in this report, with additional research concepts surveyed as well. The report should provide a foundational review of the complexity of electricity market design and ever-growing need for research in this topical area.

Meeting Materials Available

- EPRI ICT & Security Architecture for DER Integration Webcast

DMD/TMD Program Demonstration Deliverables

Transmission Fault Location Using openXDA Software: Technical Evaluation, Product ID: 3002009382

Meeting Materials Available

EPRI Distribution and Transmission Modernization Demonstration 2016 Fall Advisory

DMD/TMD Program Demonstration Deliverables

Field Area Network Demo – April 2016 Advisors Meeting: Presentations and Minutes (Great River Energy)

UPCOMING EVENTS	Dates
DistribuTECH 2017 – EPRI booth 1736, San Diego, CA	Jan. 31-Feb 2
2017 Winter PDU Advisory / ICCS Sector Council Meeting Huntington Beach, CA	Feb. 13-16

EPRI Telecommunications Initiative Advisory Meeting, ConEdison, New York, NY	April 3-5
2017 European EPRI PDU Advisory Meeting, London	May 17-18
EPRI Grid Analytics and Power Quality 2017 Conference and Exhibition, Sacramento, CA	June 20-22
2017 Fall PDU Advisory / ICCS Sector Council Meeting, Denver, CO	Sep. 11-14

Together...Shaping the Future of Electricity

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