



An EPRI Update on the Multi-Year International Demonstrations on “Data Analytics” August 2014

ABOUT THE NEWSLETTER

The EPRI *Data Analytics and Applications Demonstration* newsletter provides updates on EPRI’s “Data Analytics” demonstrations—the Distribution Modernization Demonstration (DMD) and Transmission Modernization Demonstration (TMD). These initiatives identify and analyze data-oriented applications and support infrastructure through collaborative demonstrations around the world. Contact Doug Dorr (DMD) (ddorr@epri.com) or Alberto Del Rosso (TMD) (adelrosso@epri.com) with comments.

If you or a colleague would like to be added to or removed from the mail list, email lwarneke@epri.com

EPRI Perspective

Data and analytics are the new enablers for the smart grid. The utility industry is clearly in the midst of an evolution toward data-driven decision making. Some consider this a disruptive change, while others embrace the change as the evolution of the smart grid. There are dozens of areas where improved grid visibility achieved through data analytics are going to re-script the way electric utilities view and manage their end product. This newsletter is designed to provide updates into a selection of interesting and evolving topics associated with analytics of the electric power system.



TECHNOLOGY TRANSFER AND INDUSTRY COORDINATION

Inaugural DMD/TMD Advisory Meeting

The “Data Analytics for Transmission and Distribution Applications” Spring Advisory meeting was held on May 22 and 23, 2014 at the new EPRI Charlotte, North Carolina meeting facility. The general sessions included research and development updates, technology transfer presentations, utility demo project updates, and research prioritization.



The key theme of the workshop centered on the new normal, where electric service providers are managing tremendous volumes of data from emerging technologies and are challenged with more efficient ways to manage that information while continuing to preserve legacy systems in an environment where technology is changing rapidly. To recap some of the key takeaways from the various sessions:

- The Data-Driven Utility of the Future
 - The amount of data and connected devices has not yet peaked and will continue to grow.
 - Big data is less of an issue as compared to the many silo'd "little data" sets that eventually need to be integrated.
 - There is a challenge to enable innovation while not just dropping the value of existing systems and their informational outputs.
- EPRI Transmission Asset Sensor Suite, Algorithm and Visualization Development Update
 - Application-specific RF sensors are developed and widespread demonstration is required to increase reliability and confidence in these new data sources.
 - The new sensors will lead to insights from new algorithm development and verification.
 - Role-specific visualization/alarming may be a low hanging fruit.
- Computing Technology Advancements
 - Leverage from other industries is an essential technology enabler. The utility industry does not have the volume and scale needed to originate most technology advancements.
 - With advanced sensors and data integration, it's not about real-time data or faster answers—it's all about Right-Time Data and the value of having meaningful information when it is most useful.
 - The data technology landscape is evolving too fast to lock into any specific technology for a ten, twenty, or thirty-year use case.
- Application of Information Management Best Practices
 - Information management frameworks facilitate identifying gaps and building analytics roadmaps focused on leveraging what you have today and moving to new approaches.
 - The biggest challenges today tend to be organizational in terms of skill sets, process, governance, and alignment.
 - The industry must move beyond "successful silos," must leverage integration enabling standards (such as IEC CIM and W3C), and continually experiment with new database technologies.
- Distributed Analytics and the Integrated Grid
 - In this special topic session, Ed Carlsen with Southern Company (Georgia Power) presented a perspective around the time sensitive need for data and decision making for certain storage, load leveling and distributed controls associated with the integrated grid. Key takeaways included the observations that the industry needs a better understanding and delineation for applications where distributed instead of centralized computing and or control makes sense. Also, the closer the edge of the grid generation and storage are located, the more likely we are to require analytics and actions in a faster timeframe than what is currently available with centralized systems.
- Distribution Modernization
 - In the distribution modernization session, William Bell with CenterPoint Energy articulated the "Analytics as a Discipline[®]" perspective that the Houston based electric service provider aspires to in terms of information management and leading analytics practices. A few of the key takeaways: 1) It was important to initiate the (analytics as a discipline[®]) process with a well-defined value model; 2) Once the direction was established, the next step was to develop and build out the foundational analytics technology components; 3) With data and technology in place, the first wave of value driven applications was vetted with the customer base (users of the data).

- Bob Hay with EPB (Chattanooga, TN) described the initiative they are pursuing as part of the DMD research effort related to event analytics and replay capability. The concept is to be able to quickly and efficiently (with just a few mouse clicks) supply engineers, system operators and management with answers to “what just happened, why did it happen, and did the system perform as designed.” With visuals and layering on top of (maps with time based replay capability), this kind of tool will save significant engineering effort in the future.

Special thanks to all of our presenters and advisors for a very successful and insightful workshop. We look forward to seeing all of you again at the Fall Advisory Meeting on October 30 and 31, where we will review the progress on the first round of demonstrations and iterate on the second round of demos and planned analytics activities.

EPRI Data Analytics Workshop at UA Summit

Because new technologies promise to create even larger data sets for integration and management, the entire emergency management sequence of activities constitute a series of data driven activities that range from pre-planning for the storm, to assessment of the storm impact, and on to system normalization, as well as the post forensics to determine what we can do better the next time. If we consider this full sequence of events associated with a major to moderate outage producing storm, the various information driven activities may be characterized as a potential data Tsunami.

To that end, on April 11, 2014 EPRI hosted a Storm Analytics panel session at the 3rd Annual Utility Analytics Summit in Raleigh, North Carolina. This is an annual conference produced by the Utility Analytics Institute, addressing issues and complexities utility professionals encounter from grid analytics, customer analytics, and analytics infrastructure initiatives. The panel session included representatives from EPRI, Con Edison, Southern Company, and Arizona Public Services—each with their own unique insights related to storm events and the sequence of activities associated with prediction, situational awareness and service restoration; as well as the financial and public relations impacts on optimizing these data driven activities. The session gave the panelists an opportunity to vet the changes in store for today’s and tomorrow’s utilities, discuss how analytics can help utilities adapt to those changes, and even embrace them.

The panelists prioritized a number of new data sources that promise innovation, potential for reduced time for certain storm related task activities; and of course, “lots more data to deal with.” To summarize the key topics that data objectives and requirements should be defined around, they include:

- Computer vision (object class detection) for damage assessment
- Innovative use of Virtualization (Augmented Reality) applied to images
- Improved information structure (leveraging a Common Information Model - CIM) for inputs from fire and police department responders and the public
- The future of ground and aerial imagery
- Time-based sequence of events analytics and visualization

Special thanks to the session participants:

Moderator: Doug Dorr – EPRI

Panelists: Ed Carlsen – Georgia Power, Jared Green – EPRI, Frank Doherty – Consolidated Edison, Jasdeep Singh – Arizona Public Service Mike Trongone – Consolidated Edison



2014 DMD Activities and Deliverables

As the distribution modernization (data and analytics) research initiative moves into its second full year, members are selecting their demonstration projects and working through the research charters that describe the scope of work to be accomplished and documented. While the types of projects are diverse within the categories of outage awareness, asset optimization, system awareness, practice/technology, and load/AMI analytics; in general, each demonstration has three commonly important criteria:

1. The demonstration involves multiple data sources and defines the methodology applied toward integration of these sources.
2. The demonstration is of sufficient scale that it can be extrapolated to a full system deployment (and value assessment).
3. The demonstration is suitable for creation of a use case and a replicable methodology.

The initial selection of demonstrations for the distribution modernization initiative are shown in the Table below. In follow-on newsletters, we will begin a deep dive each of these demos with the project members to attain their perspectives on the (what's and the why's) in terms of data analytics challenges and opportunities associated with their select projects.

Table 1. Initial Distribution Modernization Initiative Demo Set

Member	Category	Project Innovation
Chattanooga EPB TVA TVPPA	System Awareness	Data Integration for System Event Replay/Diagnostics (with System Visualization)
Southern Co	Practice & Technology	Providing reference data sets to vendors for data mining and analytics activities
Arizona Public Service	Load and DER Awareness	Dynamic solar generation forecasts using AMI
Salt River Project	Systems Awareness	Data mining with voltage and current information from multiple sensors
Ameren	Outage Management	Developing faster and more accurate storm damage prediction forecasts
Hydro Quebec IREQ	Practice & Technology	Foundational infrastructure for data analytics related assessments and deployments
SRP and APS	AMI Analytics	Data mining for better insights using smart meter data sets
Alabama Power	Asset Optimization	Performance based asset management of oil circuit reclosers



2014 TMD Activities and Deliverables

Transmission Monitoring, Diagnostics, and Visualization (TMDV) with Southern Company:

TMDV is intended to develop the requirements and an implementation roadmap for a tool to facilitate enhanced transmission system performance. This robust tool should accommodate data from a wide variety of sources and provide actionable information. Identification of the prototype focus areas has been completed and includes: using meter data to identify problems from pattern recognition for large industrial customers; fault location; abnormal situation database; SF6 breaker low gas alarms management; line switch health and malfunction identification; and use of digital fault recorder data to detect anomalies in transformers. The prototype will be implemented in a reduced system area comprised of three major substations.

EPRI Current Research Addresses the Need for Improved Alarm Management Tools

Many utilities and ISOs recognize that grid operators suffer from information overload coming from a very large volume of alarm messages. The consequence is a pressing need for improved alarm management tools that provide operators the ability to assess relevant actionable information from alarm messages, quickly identify the root causes of the events, and implement the appropriate corrective measures. Alarm Management is the practice of presenting a smaller set of relevant information to the operator in order for him or her to take effective action.

EPRI, in collaboration with its Grid Operations utility members, is addressing this issue. A research project under Program 39 (System Operations) aimed at understanding how ISOs/RTOs, utilities, and vendors can ensure that system operators have access to enhanced tools for Alarm Management, and how those tools can enable operators to efficiently mitigate reliability risks is underway. The new learnings from this project are expected to include: 1) an understanding of system operator perspectives on Alarm Management needs; 2) identification and categorization of existing and new tools to provide decision support; 3) an understanding of capabilities of the most promising new Alarm Management tools; and 4) identification of key gaps and recommendation for future tool advancement and integration.

Several user needs and technology gaps have been identified in this research, including the need for advanced filtering, grouping, and root cause analysis; fast and flexible user navigation and reconfiguration features; and improved prioritization and faster processing of complex events. An apparent disconnect between vendor tool capabilities and user needs has also been identified in this work, which indicates opportunities for collaborative demonstrations to resolve these differences.

EPRI expects to continue this effort in order to help address the identified gaps and to conduct demonstrations on existing or prototype solutions to assess their abilities to match many user needs, validate their functionality, advance technology readiness, and accelerate adoption. Most of the TMD funders have prioritized advanced alarm management as one of the main topics of interest, and as a preferred candidate for demonstration. Hence, it is expected that one or more demonstration projects will be performed on this area.

For further information on the alarm management project and potential demonstration, contact Robert Entriken (rentriken@epri.com) or Alberto Del Rosso (adelrosso@epri.com), Manager of TMD.



DMD-TMD Deliverables Updates

Two new deliverables are scheduled out this month for DMD-TMD member access. These are:

- The Electric Utility Industry's Cautious Move to the Cloud: An In-Depth Look at the Benefits and Risks - 3002003959
- IREQ Approach to Organizing Smart Grid Data - Case Study of Its Smart Meter Data Organization Process - 3002004085

Overall Deliverables Summary

All deliverables are available from the EPRI website by going to the Program Cockpits tab, selecting P180, then scrolling to the bottom of the list under Supplemental Project DMD/TMD.

The following Table describes the full set of DMD TMD deliverables for the respective research programs to date. For more information on any of them, click on the hyperlink for the orderable ID where the abstract and ordering information may be viewed. For project member assistance with downloading, please contact askepri@epri.com.

Deliverable Title	Member Program	Orderable ID
The Electric Utility Industry's Cautious Move to the Cloud: An In-Depth Look at the Benefits and Risks	DMD and TMD	3002003959
IREQ Approach to Organizing Smart Grid Data – Case Study of Its AMI Data Organization Process	DMD	3002004085
Risk Assessment Methodology Applied to Data Analytics for Distribution and Transmission	DMD and TMD	3002003171
Data Governance and Utility Analytics Best Practices	DMD and TMD	3002003006
Application Readiness Guide: Assessment of AMI Applications with High Value	DMD	3002003173
Third-Party Applications for Data-Analytics Activities: Resources for Distribution Analytics	DMD	3002002279
Data – The Most Valuable Asset an Electric Service Provider Owns	DMD and TMD	3002002820
Catalog of Data Oriented Transmission Applications	TMD	3002002236
Big Data Survey Summary Report 2013	DMD and TMD	3002002275

KEY DATES

DMD and TMD (Member Advisor Committee) Webcasts

The schedule for DMD and TMD member steering committee webcasts is finalized for 2014. These interactive sessions are generally held every other month. Content and agenda material will be supplied to each of the DMD and TMD technical contacts for dissemination to their respective teams.

A new series of advisory committee / interest group webcasts has also been structured for the five DMD analytics categories around: Outage Awareness, Asset Awareness, System Optimization, Load-DER-AMI analytics, and Practice/Technology. The advisors meet for an hour on the third week of each month and the interest group webcast follows the advisor discussion on months when a relevant topic and presenters are identified. To be added to interest group webcast invitation lists, contact lwarneke@epri.com.

Meeting/Webcast - 2014												
	J	F	M	A	M	J	J	A	S	O	N	D
DMD Member Update Webcast	●		●				●			●		●
DMD Advisory/Interest Group Webcasts								●	●		●	
TMD Member Update Webcast			●					●		●		●
DMD/TMD Member Face-to-Face Meeting					●					●		

DMD Hosted Session at Utility Analytics Week – Newport Beach, CA – October 23 and 24, 2014

Join us in Newport Beach, California at the [Utility Analytics Week](#) Annual Conference. The EPRI hosted session on the afternoon of October 23 will include two invited presentations from DMD members. This session will look at two examples from utilities that are realizing data from two very distinct approaches. In one, a utility's leadership has developed some innovative partnerships with solution providers to help clarify the value proposition from the beginning of an implementation through its completion and beyond. In the other example, a utility has deployed an extensive sensor network, which of course is generating a lot of data, but the value is not in the data itself; rather, it is in how analytics from that data is providing more granular and accurate insights.

The Smart Grid Experience: Applying Results, Reaching Beyond – Charlotte, NC – October 27 - 29, 2014

This final meeting of the Smart Grid Demonstration Initiative will present the collective results from both the EPRI Smart Grid Demonstration Initiative and the U.S. Department of Energy (DOE) American Recovery and Reinvestment Act (ARRA) Smart Grid Programs.

DMD-TMD Fall Advisory Meeting – Charlotte, NC – October 30 and 31, 2014

Once again, we will host the Data Analytics advisory meeting at the EPRI offices in Charlotte, North Carolina. The Advisory Council reviews the progress of ongoing research and demonstrations within this collaborative research area, identifies emerging areas of interest, and prioritizes the research efforts to meet the needs of the electric power industry related to data and data analytics. The meeting also provides an excellent opportunity to exchange information and experiences with your industry peers and to identify opportunities for your company related to analytics and data.

The general sessions will include program research and development updates, technology transfer presentations, utility project updates, prioritization discussions, and presentations on project focus areas. DMD and TMD project members are strongly encouraged to attend. This meeting is open to all EPRI members, DMD, and TMD project members. Non-members with interests in data analytics are encouraged to attend, but meeting space may be limited. Agenda and registration information can be found at epri.com (click on the “Event” menu).

Additional Smart Grid Related Calendar Activities

For a comprehensive list of smart grid related calendar items visit www.smartgrid.epri.com

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EPRI | 3420 HILLVIEW AVENUE | PALO ALTO, CA 94304 | WWW.EPRI.COM

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