

**An Update on the Multi-Year DMD/TMD Demonstrations on “Data & Analytics”****August 2015**

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**ABOUT THE NEWSLETTER**

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The EPRI *Data Analytics and Applications Demonstration* newsletter provides updates on EPRI's data analytics demonstrations managed under 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](mailto:ddorr@epri.com)) or Alberto Del Rosso (TMD) ([adelrosso@epri.com](mailto:adelrosso@epri.com)) with comments.

*If you or a colleague would like to be added to or removed from the mail list, email Barbara Fields at [bfields@epri.com](mailto:bfields@epri.com)*

**EPRI Perspective**

Data and analytics are the new enablers for the smart grid. The electric power industry is progressing toward more diverse activities around 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 is going to re-script the way electric utilities view and manage their end product. This newsletter is designed to provide updates on a selection of interesting and evolving topics associated with analytics of the electric power system.

EPRI's DMD/TMD data analytics initiative is about getting more value from data and sharing the most beneficial examples. The work leverages EPRI and industry subject-matter experts and documents successful data-driven use cases. It also identifies new and innovative applications of data analytics and develops frameworks customized for leading practices in utility analytics. The benefits will include more value from datasets such as better decision making and coordinated demonstrations on many types of data sources and applications with less duplication of efforts.



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**TECHNOLOGY TRANSFER AND INDUSTRY COORDINATION**

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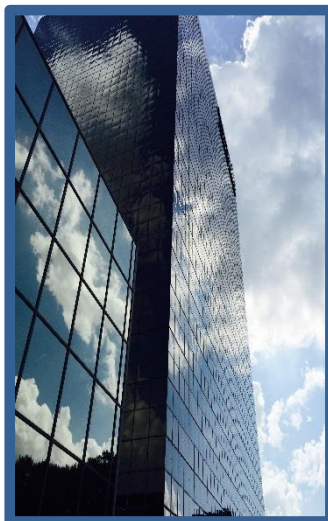
**DMD/TMD Spring Advisory Meeting**

The spring 2015 EPRI DMD/TMD advisory meeting was held on May 19<sup>th</sup> and 20<sup>th</sup> at the Georgia Power headquarters in Atlanta. We do appreciate our DMD/TMD members for spending their valuable time with us, providing thought leadership on data and analytics, and helping to direct the process of mapping research activities to those attributes associated with a smarter electric power grid. In all, we had over 50 members and staff in attendance, and we are grateful to Georgia Power and Southern Company for hosting us at the GPC facilities. Project members can download the presentation materials from the EPRI member center cockpit by going to the Program 180 cockpit, selecting Supplemental Projects,

Distribution Modernization Demonstration, meetings and webcasts. DMD and TMD members should mark their calendars for the fall meeting in Charlotte on October 26<sup>th</sup> and 27<sup>th</sup> 2015.

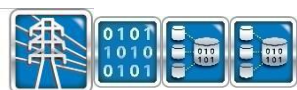
Below is a recap of a few of the key takeaways and presenter insights from the sessions:

- **A Smarter Grid** – As the grid becomes more “sensorized” (and smarter) over time, there are five smart grid attributes that will be impacted by information and communication technologies. The premise is that EPRI DMD/TMD research will support a future grid that is more automated, more flexible, more predictive, more interactive, and more intelligent.
- **Big Data Technologies** – The speed of technology change is eclipsing the industry’s ability to maintain legacy technologies and systems. A new paradigm for adopting and managing information technologies is emerging. In-memory data warehouses as well as cloud services are already forcing progress. Instead of viewing this as disruptive change, the opportunities should be piloted just like any new sensors or hardware.
- **Data Mining and Analytics Initiative** – The electric power industry has the opportunity to make significant strides in power industry “analytics and visualization” if we can come up with “innovator accessible” use cases and data sets. There is unquestionable value, but the finer details around data privacy, security, validity, and access need to be worked through to enable such an initiative to succeed and help us transcend traditional data silos.
- **Master Data Management** – The concept of a network model manager and data updater allows one single user input to update every data set of interest. These are applicable to transmission datasets and to many distribution datasets. The use cases for both T&D are expected to supply significant value and benefit for the DMD/TMD membership.
- **Decentralized Control** – Moving large amounts of data to centralized analytics and control engines may not be the best future paradigm. The real objective is moving the necessary information to the optimal action point, and this is going to be enabled with decentralized processing/control. This must be vetted by domain. For example, Markets, System Control, Local Control, and Devices have different requirement and interactions.
- **Analytics and Learnings from Other Industries** – Advanced analytics developed and implemented in other industries, including logistics, transportation, avionics, and manufacturing, appear to be very applicable to solving specific analytics challenges for electric systems. These other industries may provide some fast tracking opportunities that the DMD and TMD initiatives can identify, and EPRI can work with members to pilot them.



## Expanding International Collaboration on Data and Analytics at CIGRE

A new joint CIGRE working group (WG) on Advanced Utility Data Management and Analytics for Improved Situational Awareness of Electric Power Utility Operations has been formed under the auspices of the study committees D2 Information Systems and Telecommunications, and C2 System Operation and Control. The objective of the WG is to survey and examine current practices, industry trends, and new research on the use of various data sources and applications to enhance situational awareness, as well as the data integration and management technologies to facilitate effective implementation in the control room. The scope includes, but is not limited to, data-intensive applications to enhance operation security, assess conditions and risks, analyze faults and other events, detect abnormal conditions, and develop critical factors for controlling the power grid under a variety of normal and contingency operating conditions. It also includes approaches for data management and data ingestion from multiple sources to enable the implementation and effective use of data-intensive applications. Currently, the WG has 18 members from 10 different countries. The objectives of this WG are very well aligned with the DMD/TMD initiative, and as such, we believe it is an appropriate and convenient avenue to enrich and expand our work with diverse international experiences and practices. The Terms of Reference can be found in the following link [TOR-JWG D2/C2.41](#). For further information, please contact the WG Convener, Alberto Del Rosso, at [adelrosso@epri.com](mailto:adelrosso@epri.com).



### DISTRIBUTION MODERNIZATION UPDATES

## Welcome New DMD Members

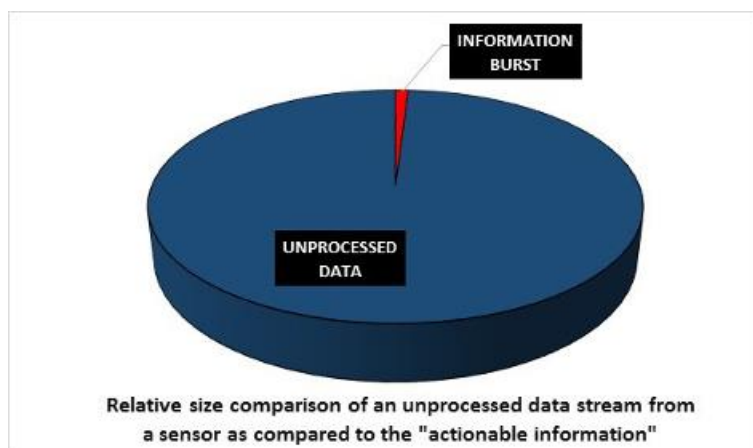
Welcome to our two newest members joining the DMD project: Consumers Energy and City Public Service San Antonio. This brings the overall membership in the project to 20 members. We expect this to result in an even more diverse selection of data-driven use cases and have already identified some useful asset analytics and opportunities to demonstrate the management of data models with our newest two members.

## DMD Application Highlight

### *Leveraging Message Bursts for Improved Situational Awareness and Action*

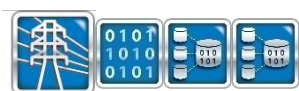
As more and more of the electric power grid becomes rich with sensors and communication systems, electricity providers are faced with challenges related to managing and leveraging an unprecedented flood of data. The most conspicuous of the new data sources is the smart meter. However, nearly all modern utility assets—including voltage regulators, transformers, switching devices, and even the modest wooden pole—have or will have options, or add-ons, for monitoring electricity and various operational status parameters.

Consider the trend of increasing sensor deployment and the abundance of external data feeds such as video, weather, social media, and communication-enabled customer devices. The challenge is clear. How will electric service providers manage and integrate all of that data? Existing approaches to transfer, warehouse, and analyze such a torrent of data may prove inadequate to the challenge.



One of the DMD project advisory teams has created a concept paper suggesting that it is not necessary to transmit more and more data in order to achieve the desired levels of system visibility and situational awareness. Instead of more data, the goal should be only the necessary data. Think of this as a way to leverage power system data just like we do the instrument panel in our automobile dashboard. Can you imagine having to download a bunch of data to a repository and running queries to get your speed, fuel level, temperature, and alarms?

The method proposed is one of moving just the right messages—or information bursts—to the appropriate points where that information can be leveraged most efficiently. There are already a number of Internet-scale technologies employed by “big data” companies like Google and Twitter that do similar things with texts and tweets, and this could end up as the next indispensable technology for the electric utility industry.

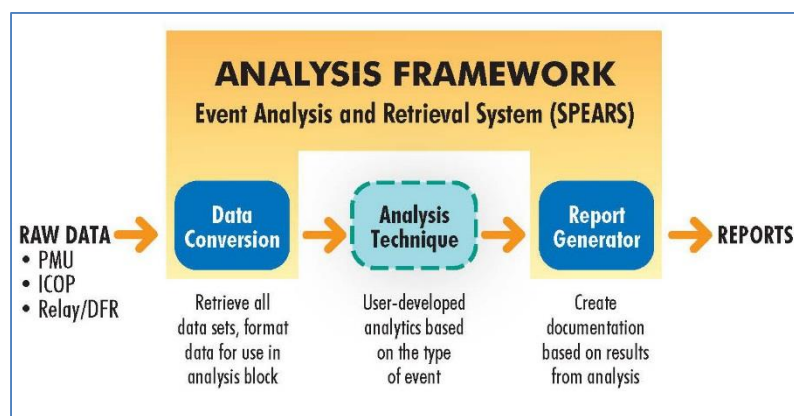


## TRANSMISSION MODERNIZATION UPDATES

### TMD Application Highlight

#### *Synchrophasor Event Analysis and Retrieval System (SPEARS)*

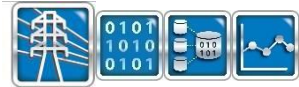
The Bonneville Power Administration is developing a centralized application to retrieve logs from synchrophasor-based event detection tools, analyze and store raw data from events, and generate automated event reports. The emergence of synchrophasor technology has initiated an array of advancements in power system event detection and analysis.



The wide area time synchronization of phasor measurement units (PMUs), as well as their streaming capability at high data rates, provides data users with insights into the power grid that were previously unavailable. With this expansion of technology, vendors and researchers have developed cutting-edge applications to optimize the value from synchrophasor data. Many of those applications have specific functions built-in to detect events in the grid. Each application provides event-detection results in the form of a log entry or display notification. This requires constant user monitoring and interaction to observe abnormal behavior. Additionally, users must manually determine the relevant files to retrieve from the archive, copy them directly, and analyze the data using separate event-analysis tools.

The proposed SPEARS streamlines this process, automatically reading the log entries from the event-detection applications, retrieving the appropriate datasets, and performing the correct analysis techniques, producing a report with all the relevant information from the event. The proposed system will include a graphical user interface that will enable users to manually perform analysis on detected events, as well as create new events that may have gone undetected by the applications. The user will also have the capability to compare similar events from different periods of time to assess trends in system performance and response to disturbances. The code is in MATLAB programming language, and software releases will be in the form of standalone executables using the MATLAB runtime environment.

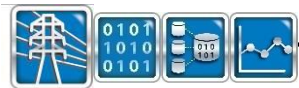
TMD members will have the opportunity to incorporate their event detection and/or analysis techniques into the established framework or install the application locally on their own synchrophasor system. The proposed software release schedule will allow members to provide suggestions on the development of the software to achieve maximum benefit and create a more universal tool.



## DMD/TMD DELIVERABLES UPDATE

### DMD/TMD Deliverables Summary

To date, twenty documents have been developed to articulate progress within the DMD and TMD projects. All deliverables are available to project members from the EPRI website by going to the **Program 180 Cockpits tab** and selecting Supplemental Projects. The newsletters and other public documents can be found on the Research tab under Data Analytics Initiatives for Transmission and Distribution at <http://smartgrid.epri.com>. For project member assistance with downloading, please contact [askepri@epri.com](mailto:askepri@epri.com).



## KEY DATES

**Fall 2015 Data Analytics for Distribution and Transmission Modernization Advisory Meeting, October 26<sup>th</sup> and 27<sup>th</sup>, EPRI, Charlotte, NC** – Click on “Main Calendar” under the “Events” tab at [epri.com](http://epri.com) for details.

| Annual DMD and TMD Project Meetings and Webcasts – 2015 Calendar |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                                                  | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| DMD Update                                                       |     | ●   |     | ●   |     |     |     | ●   |     |     |     | ●   |
| TMD Update                                                       | ●   |     | ●   |     |     |     | ●   |     | ●   |     | ●   |     |
| DMD/TMD Member Face-to-Face Meeting                              |     |     |     |     | ●   |     |     |     |     | ●   |     |     |

### Utility Analytics Week

**On October 29<sup>th</sup> 2015 in New Orleans, LA**, EPRI will host a one-hour session titled:

#### **Information Bursts - A New Paradigm for Information Management**

Experts agree that in the near future, the majority of the electric power grid will have vast, integrated communication networks and intelligent monitoring and sensing capabilities. This EPRI-facilitated session will consider a new paradigm using “information bursts” to visualize and to manage massive amounts of system status messages. More detail on the concept can be found on page 2 of this newsletter.