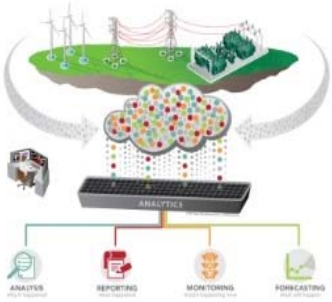
Data Analytics and Applications Newsletter for EPRI's DMD/TMD Demo



An Update on the Multi-Year DMD/TMD Demonstrations on "Data & Analytics" **December 2015**

ABOUT THE NEWSLETTER

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 or Alberto Del Rosso (TMD) adelrosso@epri.com with comments.

If you or a colleague would like to be added to or removed from this mailing list, email Laura Abbott at labbott@epri.com.

EPRI Perspective

Data and analytics are the new enablers for an integrated 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. 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. DMD/TMD 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.

TECHNOLOGY TRANSFER AND INDUSTRY COORDINATION

DMD/TMD Fall Advisory Meeting

On October 26-27, 2015, the DMD/TMD advisors convened at the EPRI facilities in Charlotte, North Carolina. The theme for the fall meeting was the utility industry's desire to move to more predictive analytics. The plenary session included a selection of presentations supporting that objective. More than 40 members and staff attended. Thank you to all DMD/TMD members who took the time to join us and provide valuable collaborative input.

Project members can download the presentation materials from the EPRI member center cockpit by going to the Program 180 cockpit, selecting Supplemental Projects, "Cockpit" to the right of "Distribution Modernization Demonstration,", and finally "View All Meetings & Webcasts." Click on the link titled "Distribution Modernization Demonstration and Transmission Modernization Demonstration Fall Advisory Meeting 2015."

Sample presentation titles from the sessions included:

- Failure Prediction with PMU Data Analytics
- An EPRI Nuclear Sector Use Case for Predictive Analytics
- Member Roundtable: Top Predictive Opportunities for the Electric Power Industry
- Ameren/SLU Predictive Storm Impacts Update
- Overview from the Center for Advanced Analytics
- Advanced Analytics Techniques for Power System Operation Support
- 360 Imaging and Opportunities and Demo
- Applications of Machine Learning to Big Data

DMD and TMD members, please save the date for the spring DMD/TMD advisory meeting to be held on May 11th and 12th 2016 in Chattanooga, Tennessee, hosted by EPB and co-sponsors TVA and TVPPA.

Economics of Data Analytics

There are many ways that data analytics can help solve real problems, but the economic question for any data-analytics proposal is whether its benefits outweigh its costs. With any proposed project, the costs and performance lie in the future and must be estimated, but with analytics, the uncertainties can be daunting. How much will it cost to gather and manage the data? Will it be of sufficient quality for the analytical need? Will it produce measurable impacts? Finally, what are the impacts worth in dollars and cents?

For smart-grid devices, EPRI's Cost Benefit Analysis (CBA) methodology (EPRI Product ID 3002006694) describes methods for designing scientific experiments for measuring impacts. In the context of smart-grid devices, impacts are defined as physical changes in the power system or in the utility's business practices that result from application of the device. Impacts may be monetized into net costs and benefits. This seems simple in comparison to questions of applying data analysis, where the first question may be whether the right data is available and accessible for the particular problem to be addressed. The demonstration is the efficacy of the algorithm to solve the problem; the impact is the changes in the power system or the utility's business practices that result from the solution to the problem. Fortunately, such impacts can be analyzed in advance to find out the value of solving the problem—that is, to determine how much can be saved under ideal circumstances. And this suggests a different order of analysis of the economics: What is the cost of the problem? What are the potential savings? As initial hurdles, these questions can separate meaningful projects from those that are merely interesting to solve. Outcomes from the DMD and TMD projects are focused on the ultimate value of the application, and the cost/benefit analysis methodology developed for smart-grid demos will provide the framework for this effort.

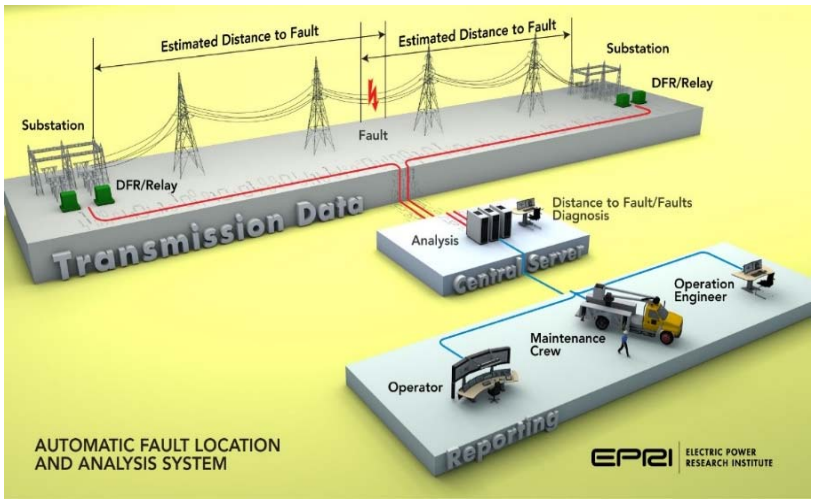
DISTRIBUTION MODERNIZATION UPDATES

Data Mining Initiative Update

The Data Mining Initiative is creating an industry-wide repository for potential use cases that can be solved with power system sensors and supporting datasets. Any DMD member can contribute datasets. Research partners (primarily vendors and universities) will demonstrate their analytics capabilities leveraging the data repository as the test cases. Each vendor will be provided an opportunity to share their findings during webcast events. At present, twenty research partners have signed up and are interested in working on the data challenges. Twenty-five use cases have been drafted, and six member utilities have committed to providing datasets ranging in content from one month of AMI data plus supporting system information to two years of AMI and DSCADA for more than 100,000 customers. The bulk of this effort with occur in 2016. For more information on the Data Mining Initiative and progress to date, please visit http://smartgrid.epri.com/DMD-DMI.aspx.

TRANSMISSION MODERNIZATION UPDATES

Fault Location Analysis Discussions from the Fall 2015 TMD Advisory Meeting



Fast and accurate fault locating on transmission lines is an important objective for system operators. The objective is to assist operators, as well as protection and maintenance crews, to pinpoint where the fault has occurred to promptly initiate the repair and restoration process of the affected transmission line. Over the years, utilities have developed and used a number different fault-location approaches. In most of the cases, the overall process involved steps whereby manual intervention by the protection engineer is required, including: retrieving and compiling data from measuring devices, updating the short-circuit model based on the pre-fault network configuration, calculating the distance to the fault, and communicating the results to appropriate staff. Even though a great deal of investigation has been devoted to the development of automatic fault-location systems that use data from intelligent electronic devices (such as digital fault recorders and digital relays), the practical use of such techniques is limited to certain areas of the grid where the measurement devices and the communication system are available. There is an industry-wide need to streamline the analysis of a fault by automating the entire process through dedicated software applications. The expectation is that by automating the analysis, the time previously required to locate a protection engineer, provide the engineer with the needed information, and perform the analysis would be greatly reduced. An automatic fault-location system would expedite the process to repair a fault, enhance staff productivity through reduction of analysis time, improve reliability due to better assessment of faults and disturbances, and increase return on investment of recording equipment.

During the TMD breakout session at the DMD/TMD fall 2015 advisory meeting, TMD members—including First Energy, Louisville Gas & Electric and Kentucky Utilities, Southern Company, and AEP—shared their current fault-location practices and their vision on how an automatic fault-location system could address their specific requirements. Currently, three demonstrations on automatic fault location are underway. Although the demos differ to some extent because of unique requirements from each host utility, the overall approach is similar and focuses on important synergies and knowledge sharing, which significantly increases the value of the collaboration.

DMD/TMD DELIVERABLES UPDATE

DMD/TMD Deliverables Summary

Project members can download reports and deliverable materials from the EPRI member center cockpit by going to the Program 180 cockpit, selecting Supplemental Projects, "Cockpit" to the right of "Distribution Modernization Demonstration,", and finally "View All Meetings & Webcasts." Click on the link titled "Distribution Modernization Demonstration and Transmission Modernization Demonstration Fall Advisory Meeting 2015."

Publicly available documents can be found on the Research tab under Data Analytics Initiatives for Transmission and Distribution at http://smartgrid.epri.com. To date, approximately 30 documents have been developed to articulate progress within the DMD and TMD projects. A few of the most recently published documents include:

- *Analytics Opportunities and Leading Practices for Detection of Energy Theft* **3002006892**
- *Improving Power System Situational Awareness – Leveraging Information Bursts* **3002006985**
- *Application Readiness Guide for AMI Data Analytics* **3002006992**
- *Application Readiness Guide for DSCADA Analytics* **3002007029**
- *Ameren Missouri Tackles Storm Forecasting to Anticipate System Damage* **3002006638**
- *Overcoming Barriers to Data Interoperability: Silos, Semantics, and Schemas* **3002006631**

KEY DATES

Save the Date: Spring DMD/TMD Advisory May 11-12, Chattanooga, TN Hosts: EPB, TVA, & TVPPA

Annual DMD and TMD Project Meetings and Webcasts – 2016 Calendar

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DMD Webcast		●		●				●				●
TMD Webcast	●		●				●		●		●	
Member Face-to-Face Meeting					●					●		