



Data Analytics and Applications Demonstration Newsletter

An EPRI Update on the Multi-Year International Demonstrations on “Big Data”

July 2013

ABOUT THE NEWSLETTER

The EPRI *Data Analytics and Applications Demonstration* newsletter provides updates on EPRI’s “Big Data” 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 or questions.

If you or a colleague would like to be (added or removed) from the newsletter mail list please email one of the demonstration managers listed above.

EPRI Perspective

This newsletter comes at a key point in the evolution of implementations related to the Smart Grid. Worldwide, EPRI is witnessing a number of publicly and privately supported funding initiatives to jumpstart a diverse selection of installations (sensor and communication infrastructure) that translate to data and to corresponding opportunity.

The opportunities involve the ways that data can be utilized for planning, operations, and maintenance of the power system. This may be a game-changer in terms of both actionable visualizations of power system trends and patterns and for more engaging customer communications. 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. The 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

EPRI “Big Data” Survey Results

EPRI’s 2013 “Big Data” survey was designed to collect information about the state of the electric utility industry in terms of big data, data analytics, and supporting infrastructure related preparedness, challenges, and opportunities.

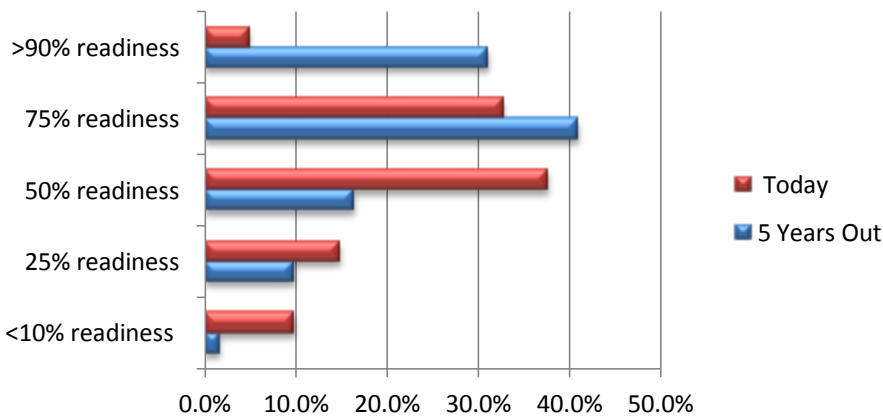
Ready or Not?

One of the key topics from the big data survey focused on preparedness in terms of both data and associated acquisition technology. Specifically, the (preparedness question set) focused on the ability to collect, manage, and take advantage of the opportunities afforded by new data sets. The questions were framed to understand the situation today versus the past (five years ago) and the future (five years from now). As it turns out, almost half of the survey respondents believed that Big Data and associated analytics were not on their radar screens or even in their plans five years ago. The state of the industry today with respect to the survey respondents is that Big Data is on their company’s radar, and the respondents are getting their collective arms around preparing for the opportunities afforded by advanced

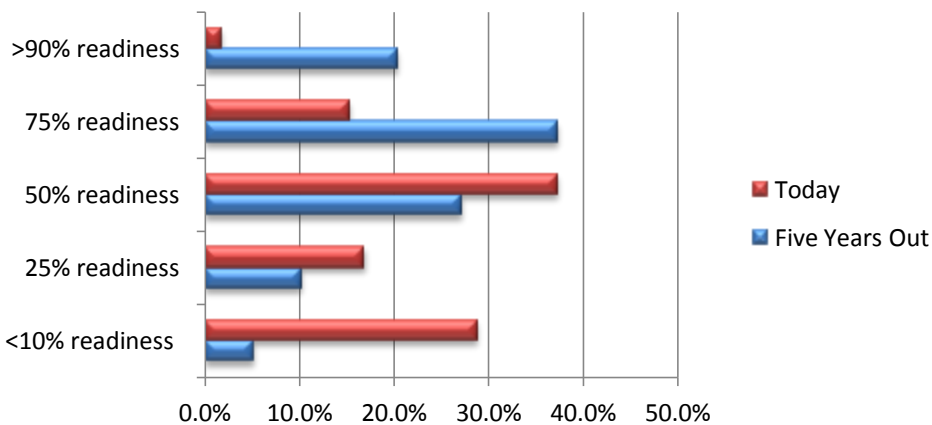
data analytics. Interestingly, even five years out, nearly one quarter of the survey respondents still believe they won't be positioned to take full advantage of data analytics opportunities.

The key takeaway from the preparedness question set is that a research initiative focusing on data analytics is not just timely but is also an important segue for electric service providers to collectively define best practices around data governance, data analytics, and data value quantification.

Interestingly, best practices around data were one of the key requirements used in the EPRI Smart Grid maturity assessments from the past decade. However, for a number of reasons—such as financial constraints, technology dynamics, workforce readiness, and increased cyber security focus —many utilities have taken a slower-than-projected approach to changing their business models with respect to data and associated analytics. This is not necessarily a bad thing, because the utility industry will benefit from following in the footsteps of some of the other industries at the forefront of the Big Data inundation. However, it is important to recognize that data is an asset, and until this asset is managed and prioritized properly, the utility industry will never realize the full benefits of a communications enabled Smart Grid.



Communications and IT Infrastructure – Preparedness Today versus Five Years Out



Data Management – Preparedness Today versus Five Years Out

Big Data Insight

Reframing the Box Surrounding the Use of Social Media

The running total for data-oriented applications identified under the EPRI Big Data Analytics initiative has gone over the 100 mark in terms of unique topics. One of the more simple and effective applications that we have heard of for customer communication, places a new spin on the use of social media.

The application is a simple use of social media to give customers impacted by outages a little more information about their outage in addition to an estimated restoration time. The concept is that for certain outages, such as an automobile hitting a pole or a tree down across the lines, the responding line crew would take a few photos of the offending tree or accident, and these impactful visuals can then be placed on the information and social media website to supplement the estimated the time to restore.

Psychologically, it is believed that giving the customer just a bit more information on the outage and some visuals during the restoration is paramount to customer patience, tolerance, and even compassion for what the repair crew is dealing with. The end result in some cases can be customers who view the line crews and the utility as an ally and partner in getting things back to normal.

The more commonly discussed applications around the use of social media involve a customer texting the photos to the utility. This reversal of roles shows how unique pockets of innovation at individual companies and simple collaboration gets these ideas and concepts vetted and promoted throughout the industry to make a difference. In this case, the difference is a metric related to customer satisfaction, and in some situations, this can be just as important as the financial metrics.

As another example of the inundation related to social media data, one of the utility presentations at the June 2013 Data Management and Analytics for Utilities Conference, detailed the utilities active maintenance of a Twitter account with over 18,000 followers and high customer engagement. It was reported that utilizing this social media tool has been very valuable during planned outages. Customers can understand the impact that a fallen tree has in a blackout situation but may not appreciate the necessity of planned outage situations. A compelling example was detailed during the conference on how in 140 characters or less, the utility was able to change a customer's perspective after receiving a complaint about a planned outage. In that case, a swift response helped the customer understand the need for a planned outage. The individual customer appreciated the information, and the positive interaction was publicly documented for the utilities Twitter community to see.



DISTRIBUTION MODERNIZATION

2013 DMD Activities and Deliverables

Big Data Immersions

EPRI continues to schedule and conduct a Big Data immersion workshop with each of the DMD and TMD project sponsors. The objectives of these workshops are to:

1. Identify those unique data-oriented applications and kernels of knowledge that are useful and insightful but have not yet become commonplace within the utility industry as a whole.
2. Establish a baseline for each project member to use as their relative metric in terms of how prepared they are (or will be in a few years) to take advantage of the data analytics applications.
3. Identify the best in class and best practices for managing data as an asset and document the state-of-the-art related to data analytics and visualization.

The scheduling of these workshops will continue through the remainder of 2013 and into the first quarter of 2014. Once all workshops have been completed, the data-related demonstrations phase of the DMD and TMD projects will commence.

One interesting workshop topic that is beginning to emerge is the difference in data governance at various utilities. This area of data management is emerging as a major opportunity for standardization in terms of industry-wide best practices. The overall topic of data governance is broad, but one subset under the heading (Managing Data as an Asset) will be the first in a series of Big Data white papers deliverables for the DMD TMD 2013 efforts.

DMD Application Highlights

Focusing on Improved Metrics

Today's metrics for the performance of the electric power distribution system at the regulatory reporting level involve providing the annual numbers for either the frequency (System Average Interruption Frequency Indices, or SAIFI) or for the duration (SAIDI) of the interruptions. Some utilities collect variation data for voltage sag events and harmonic trending, but this data is for internal analytics purposes and is not necessarily for regulatory reporting. The SAIDI and SAIFI numbers do tend to be a repeatable and consistent practice for targeting worst-performing circuits over time. However, bulk numbers do not really help customers concerned with reducing process and system downtime when they experience power fluctuations that don't count toward SAIFI. Furthermore, the interruption metrics do not help with predictive analytics and they don't help direct trouble crews on where to go or what to look for when the truck rolls. This is where the opportunity for more insightful data analytics and the corresponding metrics can play a major role in the grid of the future.

EPRI is looking at a number of these indicators that turn out to be very data-intensive but relatively simple once the algorithms are defined and the data sources and analytics engine for the user is structured to deliver automated or on-demand information. Some example metrics include the following:

1. Customer Load Interrupted or CLI Metrics – Looking at load currents to answer the question: Did that last voltage sag event (the one that won't even count as an interruption for SAIFI) just knock off 5 MW of petrochemical load?
2. Dynamic SAIFI and SAIDI – Instead of waiting to the end of the quarter or the end of the year to evaluate the worst circuits, why not do it every day? Or even every hour with AMI data?
3. Dynamic CEMI or Customers Experiencing Multiple Interruptions – Another AMI data opportunity to proactively communicate with customers that just exceeded that “last straw” interruption.

These three data-intensive metrics are examples to be explored in the DMD and TMD research and represent just a few of the hundred plus data-oriented applications and algorithms identified by the projects thus far.



TMD Application Highlights

Catalog of Data-Oriented Applications

On the transmission side of data analytics, the EPRI team is developing a repository of existing and emerging data-oriented applications for transmission operations, planning, and asset management. The repository will articulate the value proposition of the most relevant Big Data related applications for transmission systems that are identified as potentially beneficial and quantifiable in terms of economic benefits. The catalog will include applications and associated technologies in different states of development to include operations, planning, asset management, as well as the information and communication technology to support those areas. Examples of the applications considered so far include: different uses of synchrophasor data, use of intelligent electronic devices (IEDs) to support operation and assets condition assessment, asset condition integration into control centers, dynamic thermal rating, forecasting weather impact on electric systems, and multidimensional multiscale visualization.

A standard analytic application sheet is completed for each application to include a description of the technology and its physical capabilities, implementation considerations, level of maturity, data sources and systems, data and system integration requirements, impacts, and expected cost and benefits. The first version of the data analytics and applications catalog will be completed and available to TMD member companies in December 2013.

Survey on PMU Current Uses and Applications – Identifying the State of the Art and Further Development Requirements

Across North America, many transmission owners and system operators have been awarded grants to deploy phasor measurement units or PMUs throughout their respective service areas –along with the related communications and IT infrastructure. The availability of this new infrastructure enables the implementation and value assessment of new tools that utilize time-synchronized dynamic measurements to support planning and operation processes. While the actual measurement technology is well-established and supported, most applications are still in the early stages of development with a need for more testing, validation, and verification to move the technology to production ready status. EPRI is coordinating between various research programs including the TMD program, the Intelligrid program (P161B), and the System Operation program (P39), to launch an industry survey on different aspects of PMU technology and applications. The purpose is to gain a baseline understanding of the status of implementations in terms of mature uses of synchrophasor technology, data management and storage issues, the implementation and deployment challenges, as well as the value and benefits of different applications. If you or your organization would like to participate in this survey and receive a copy of the results, please contact the TMD manager adelrosso@epri.com.

KEY DATES

DMD Member Steering Committee Webcast

The next EPRI DMD member steering committee webcast will be held from 1 to 3 PM Eastern Time on August 8, 2013. Content and agenda material will be supplied to each of the DMD technical contacts for dissemination to their respective teams.

Utility Analytics Week

EPRI will be a Silver Sponsor for Energy Central's annual Utility Analytics Week in Atlanta, Georgia. During the event EPRI will host a strategy road-mapping session on September 23, as well as an application value case session on September 25. Both of these sessions are designed to provide DMD/TMD members and other interested parties with the opportunity to insure that their input and guidance is considered as EPRI maps out the research efforts to be covered in the DMD/TMD five-year program. For more information, go to: <http://utilityanalyticsweek.com/>

EPRI Data Analytics Workshop

EPRI will host a Data Analytics Workshop immediately following the second Grid of the Future Symposium on October 23, 2013, in Boston, Massachusetts. This workshop is open to utility personnel only. There is no registration fee for this one-day workshop, but seating is limited, so early registration is encouraged. Agenda and registration information can be found at:

<http://www.cvent.com/events/epri-data-analytics-workshop/event-summary-06605a5aec1d415ab5f353ed7414cd0b.aspx>

The overall workshop objectives are to:

- Learn from utility peers and EPRI on progress made to-date from EPRI's "Big Data" research results.
- Understand opportunities and challenges for data analytics for transmission and distribution applications.
- Learn about industry efforts to advance the industry including EPRI's five-year TMD/DMD Demonstrations.

The Grid of the Future symposium is sponsored by the CIGRE US National Committee (USNC) October 20–22, 2013, with the theme "Technological Solutions to Regulatory Challenges." For more on this CIGRE/EPRI-sponsored event, please visit:

http://cigre-usnc.tamu.edu/grid_of_the_future.html

CaFFEET'13 – How Can Big Data Boost Society's Resilience?

CaFFEET – the California France Forum on Energy Efficiency Technologies is hosting their annual workshop with this year's theme on How Can Big Data Boost Society's Resilience? The forum will be held on November 21–22, 2013, at Stanford University. EPRI is participating and contributing with Matt Wakefield, Director of Information Communication Technology, as one of the presenters. More information can be found here: <http://caffeeet.org/conference-synopsis>

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