The promise of enterprise-wide data management in the power utility sector

Our power and utilities experts explain why data management is the key for power utility companies to increase profit while meeting the new COP21 accords.

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INTRODUCTION

On December 13, 2015, when France's Foreign Minister, Laurent Fabius, stood in front of a cheerful crowd to celebrate the landmark COP21 accord, he knew the hardest part of the journey to curb climate change was ahead[1]. A day before, nearly 200 nations agreed to implement policies and regulations with the objective to hold the increase in the global average temperature to below 2°C above pre-industrial levels.

After the historic COP21 accords, PG&E's CEO Tony Earley said, "Utilities like PG&E are uniquely positioned to help deploy low-carbon technologies on the scale that's needed to make a real difference to combat climate change."[2]

New technologies and a strong political will are making it possible to curb climate change. However, what will be difficult for all countries, whether developed or developing, is the execution of the policies and regulations that come with COP21 accords—because they come at a cost.

To implement COP21 accords, power utilities will need to find ways to keep costs low while complying with emerging rules and regulations. This involves the entire electricity and gas supply chain—from generation to transmission to distribution. When power utilities need to choose among several power

1 Financial Times, COP 21: Laurent Fabius lauded for successful conclusion, December 13, 2015: http://www.ft.com/cms/s/0/8dc56938-a1a0-11e5-8d70-42b68cfae6e4.html#axzz3uhWlQ4GW

2 PG&E Currents, PG&E Declares Support for Landmark Global Climate Agreement in Paris, December 15, 2015: http://www.pgecurrents.com/2015/12/15/pge-declares-support-for-landmark-global-climate-agreement-in-paris/

generation options and make cost comparisons between alternative power-generating technologies (which differ significantly in terms of tax rules and subsidies), they use the levelized cost of electricity (LCOE) measure. Power utilities do not control tax rules and subsidies. The components of LCOE that are in their span of control are variable and fixed operating costs to run coal, natural gas, oil, or renewable energy plants.

In this paper, we'll examine the strong correlation between operations and maintenance (O&M) costs, and asset, grid, and customer data. We'll use this information to prove that effective enterprise-wide data management can help power utilities save on O&M costs and generate new revenue while meeting the COP21 accords.

Fractured data management

Over the last few years, utilities have implemented multiple systems, databases, and business processes supporting separate business needs. These waves of investments resulted in a collection of siloed systems such as geographic information system (GIS) or meter data management (MDM). The introduction of distributed generation (DG) amplifies the challenge of siloed data with distributed generators (large wind farms, rooftop solar PV, etc.) being connected to distribution feeders at an accelerating rate. The increase in operational complexity is coupled with a lack of alignment and understanding between IT and business teams. This causes delayed access to data, duplication of data, and redundancy between systems.

In addition, with the advent of the smart grid and smart meters, utilities are faced with a deluge of data and need to adopt appropriate enterprise-wide data management practices.

The holistic approach to data management

Asset data management

Over 100 years ago, utilities made a major capital investment to build a power grid infrastructure that would transmit and distribute power. Today, the majority of the grid assets are nearing the end of their lives, and utilities are addressing these issues through a combination of maintenance (operating expenditure) and asset replacement or refurbishment (capital

expenditure) to ensure service reliability, meet regulatory obligations, and improve customer satisfaction. However, continued pressure to cut costs in an environment where overall revenue is stagnant is forcing utilities to do more with less and be more agile. Central to this agility is the ability to obtain more intelligence and value from asset data that is collected to support condition-based asset maintenance and replacement. This results in wise targeted investments on infrastructure.

However, most utilities fail to implement a holistic approach to data management, not fully capturing and analyzing the information they need to improve asset defect forecasts.

Some of the major challenges in asset data management include:

1. **Poor data quality**—Unstructured data is captured in the field, and structured data is captured by smart devices, creating conflicting information and bad analysis.
2. **Unorganized data storage**—Islands of repositories are created with duplicate information, increasing storage cost and impacting process efficiency.
3. **Unintegrated data**—Key systems such as EAM, SCADA, and GIS often work in silos, limiting the ability to combine key datasets to perform asset condition analysis.

All asset and work data aspects cannot be considered in silos. Figure 1 shows the lifecycle of asset and work data—and how they're all related. In parallel, systems used to manage asset and work data should be integrated, and the different teams involved throughout this lifecycle should collaborate regularly. Such practices are what constitute a consistent enterprise-wide data management discipline.

Grid data management

Enterprise-wide data management not only includes data from static assets but also data on dynamic flows circulating through the grid. Grid data provides information on the state of electricity that flows through static assets, such as electric transmission, distribution lines, and substations.

Figure 1: Lifecycle of asset and work data

Challenges related to grid data are similar to those of asset data. A large number of sensors have been deployed over the years across the power grid for separate purposes resulting in siloed systems. To make timely decisions based on grid conditions, grid data must be processed in real-time. The large amount of collected data is a significant challenge, and smart data analytics is the solution. An enterprise-wide data management discipline delivers the rest of the solution and the promise to turn big data challenges into opportunities.

Similarly, when utilities can't effectively control and store grid data, chaos emerges. It's crucial that data warehouses are fed in a consistent fashion

with the latest and most accurate data. It's also critical for utilities to have multiple resources, entry points, and system integrations that update the data. Without a gatekeeper and data governance, data will continue to be updated without any controls. Data management consistency and governance help utilities increase grid reliability, improve outage detection and response, manage loads, and isolate faults. They also help utilities realize significant cost savings and increase customer satisfaction.

Customer data management

Historically, utilities have had a lack of relationships with their customers mostly due to their monopoly status—they didn't have to compete to acquire and retain customers. Their only communication was the monthly bill. In turn, customers never asked for a closer relationship as long as they could keep the lights on and get a relatively low bill at the end of each month.

However, during the last few years, this has started to change. Due to the increase in electricity prices (largely caused by significant investments to upgrade the grid infrastructure), de-regulation of energy retail (customers can now choose which retailer they're buying power from), and the global rise of consumers' expectations, customers are becoming more knowledgeable on their energy consumption and concerned about how much they're spending on their monthly energy bills. Customers no longer just expect a reliable power supply at a reasonable price. Their service expectations—like communication on their account information, billing, energy consumption, and outages—are rising.

In response, utilities are starting to focus on improving and redefining customer relationships, finding new ways to engage with customers through targeted marketing campaigns and communications. Thanks to data—largely driven by the deployment of advanced metering infrastructure (AMI)—utilities can now gain deeper, crucial insights into customers' behaviors and consumptions. This provides an opportunity for better performance and service—and new revenue streams.

Successful utilities are becoming more customer-centric by investing in new capabilities and technologies that boost customer satisfaction and deliver bottom-line improvement. Most utilities are investing in customer relationship management (CRM) to break down siloed and disparate customer data. CRM

systems are mature technologies used extensively in the service-oriented industries to capture and store enterprise-wide customer information. In the power utility sector, these technologies help gather important customer data: billing information, contact history, consumption, financial information, home infrastructure, preferences, and energy performance.

However, many utilities struggle to realize the full benefits from CRM system implementations, failing to address the most essential component: accurate customer information. Bad data is the biggest factor for CRM implementation failure—utilities cannot turn raw data from multiple sources into actionable insights. And without actionable insights, they can't enhance billing management, call center support, demand response, outage management, or safety—things that would improve the customer experience.

Recently, commercial entities have started breaking away from utilities, opting to purchase power directly on the wholesale market[3] or entering into complex Power Purchase Agreements (PPA's or VPPA's).[4] Some individual customers are installing solar panels or wind turbines, therefore becoming self-sufficient. These growing trends are a direct result of utilities being detached from customers' needs.

Customer information is key for utilities to think beyond commodities—beyond the meter—and initiate engagement and loyalty with customers.

Regulatory compliance considerations

COP21 confirmed that climate change is top of mind for all power utilities leaders, and smart grid technology is enabling the implementation of solutions to tackle it.

For example, distributed generation (DG)—which enables the connection of non-carbon emitting generation sources to the grid—is gaining momentum due to the accessibility of data analytics. In California—a state leading the fight against climate change—DG is increasing at a rapid pace in support

3 Las Vegas Review Journal, MGM Resorts to leave Nevada Power, pay $86.9M exit fee, May 19, 2016: http://www.reviewjournal.com/business/energy/mgm-resorts-leave-nevada-power-pay-869m-exit-fee

4 EDF Renewable Energy, EDF Renewable Energy Signs Agreement to Supply 24 MW of Wind Power from Salt Fork Wind Project, January 25, 2016: http://finance.yahoo.com/news/edf-renewable-energy-signs-agreement-170000108.html

of achieving 2020 and 2050 greenhouse gas reduction goals. Section 769 of California's public utilities code deals with "distributed resources." The law was enacted in 2013 with the primary goal of reducing carbon emissions and modernizing the electric distribution system to accommodate two-way flows of energy while giving the customer more options to choose from.

To implement such regulations, the California Public Utilities Commission (CPUC) requires utilities to provide a certain set of information regarding their DG plans. This is to enable third-party energy providers to bid into the wholesale market. Therefore, utilities have to make grid condition data available to external parties. This requires a certain data discipline that was not required in the past before the advent of the smart grid.

Along with grid data, asset data is also coming under scrutiny since electric facilities are considered critical infrastructure. Utilities are consequently under increased regulatory oversight with emerging NERC and FERC regulations. When data required for these regulatory requests is stored across multiple systems in multiple types of formats or versions, regulatory compliance becomes a challenge. Delays or issues encountered in compliance efforts are an additional cost to consider as part of LCOE.

Enterprise-wide data management—where a single source of truth is available for asset, grid, and customer data—is the enabler for cost-efficient and effective regulatory compliance.

Power utilities enterprise data management maturity model (PUED3M)

Today, utilities are finding that the traditional cost-of-service business model enabled by a one-way grid is on its way out. The integrated grid, which includes an increasing number of disruptive technologies, is forcing the power and utilities sector to re-examine its business model and get its house in order to be ready for potential future business models.[5] The speed at which utilities will be forced to change depends on:

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5 California Public Utilities Commission Policy & Planning Division, Electric Utility Business and Regulatory Models, June 8, 2015: http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPDElectricUtilityBusinessModels.pdf

1. **External parameters**—Local policies and regulations, the level of penetration of disruptive technologies in the service area covered by the utility

2. **Internal parameters**—The size of the utility, the grid maturity in the area covered by the utility, and the maturity of enterprise data management practices

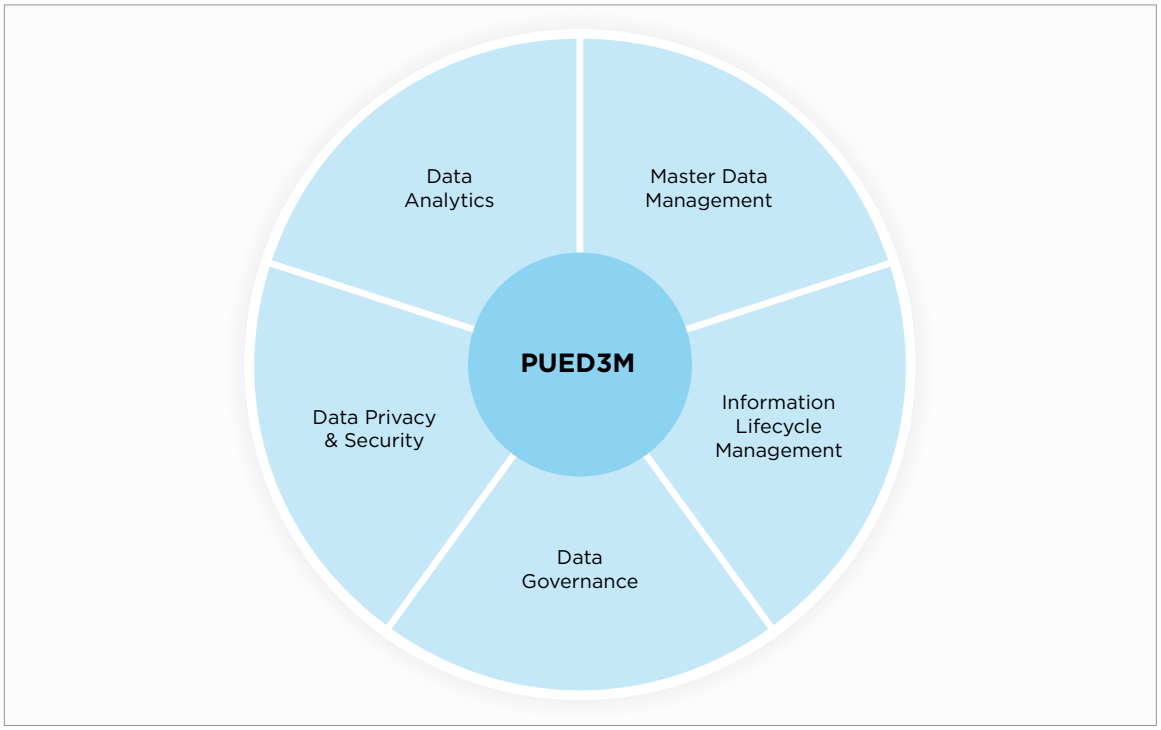

Figure 2: Power utility enterprise data management maturity model categories

Slalom has developed a Data Management Maturity Model for the power and utilities sector (PUED3M). It's important for utilities to determine what level of maturity they're on in the PUED3M so they can devise the right digital journey strategy and be ready for upcoming industry changes.

Figure 3: PUED3M five-step process

How to use the PUED3M

To obtain the most value from the PUED3M, utilities should follow the five-step process in Figure 3.

This helps utilities define a customized strategy and execution approach to solidify their data management foundations and be ready for the upcoming business model earthquake in the power utility sector.

In the first step of the process, utilities usually find that there's a strong correlation between the maturity of the grid (in the area they cover) and the maturity of their enterprise data management practices—see Fig. 4. In fact, a utility can mature its grid only if data management capabilities mature—otherwise all acquired and installed modern grid devices remain gadgets that cannot be used to their fullest capacity. Enterprise data management

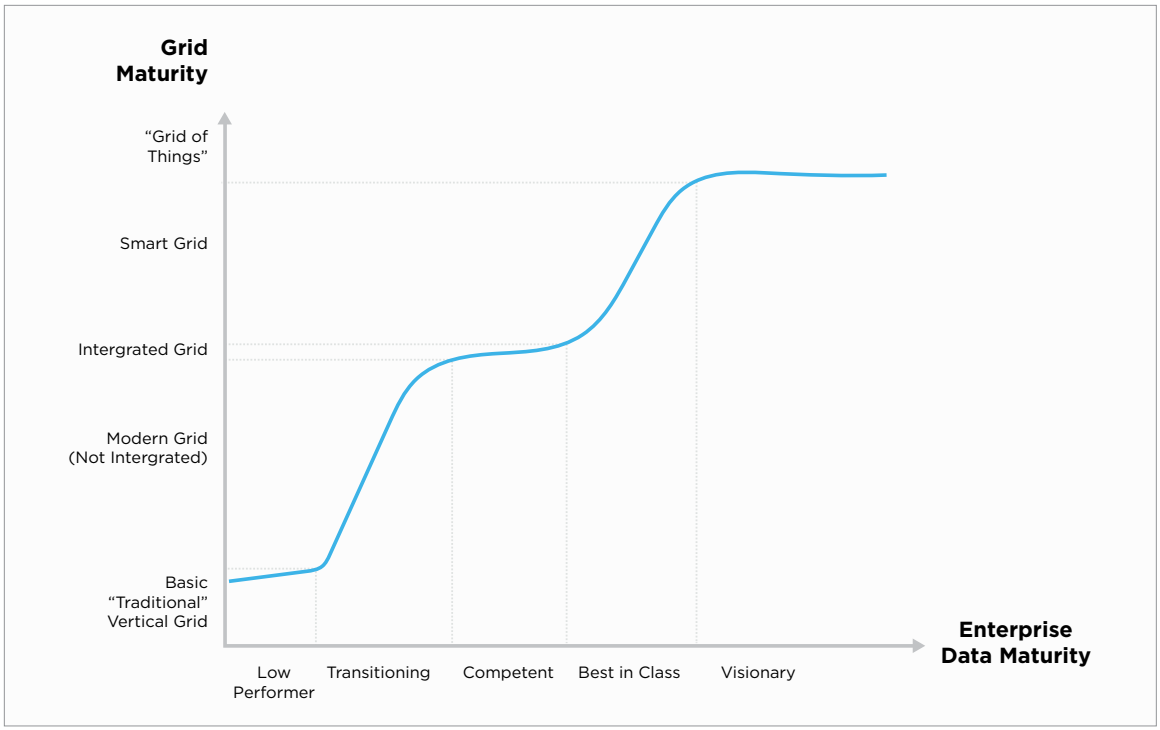

Figure 4: Correlation between grid maturity and enterprise data management maturity

initiatives take time to implement. There's also a lag between the end of a successful implementation of any digitization initiative and the time a utility can start reaping fruits on the grid ecosystem.

Conclusion

Grid maturity has a direct impact on utilities' business models. For example, a utility with a basic, traditional grid cannot aspire to DG. In contrast, a utility that massively invested in upgrading its data management capabilities and grid assets—and which ultimately achieved smart grid level—will not return to the old cost-of-service model because its O&M costs are under control and profits are increasing.

An enterprise-wide data management discipline is crucial for power utilities to realize O&M cost reductions, find new sources for revenue streams, and create a business model that will be successful in the future as the utility industry shifts.

About Slalom

Slalom is a leading consulting firm that helps companies solve business problems and build for the future, with solutions spanning business advisory, customer experience, technology, and analytics. Slalom is passionate about helping its clients succeed, collaborating every step of the way to deliver amazing results—together. Founded in 2001 and headquartered in Seattle, WA, the company has organically grown to nearly 4,000 employees and has offices in 25 metropolitan cities near you, including London and Toronto.

Slalom's vision for the power and utilities sector is to not only better manage electric and gas operations but to also enable distributed generation to create an internet of energy. It works closely with power and utilities clients to offer data management and security, data analytics, performance advisory, strategic advisory, experience design, delivery leadership, and organizational effectiveness. Learn more about Slalom and its power and utilities offerings at slalom.com.

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Anirudh Rao is an accomplished consultant with extensive experience in delivering business and technical solutions to clients in Energy & Utilities industries. Anirudh brings 9+ years of experience helping industry-leading and Fortune 500 clients successfully define, develop, and implement business process and technical solutions aimed at minimizing cost while maximizing operational efficiency. Anirudh has extensive experience in Advanced Metering Infrastructure (AMI), Smart Grid and Enterprise Asset Management areas and has worked on transformation engagements in the areas of process consulting, package evaluation and designing solutions for large Utilities.

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