Analytics to the Utilities’ Rescue

7 areas where it can deliver impact

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Abstract

There is mounting pressure on utilities from regulators, consumers and stakeholders to reduce the impact of outages, improve customer service, lower the cost of operations, and be gentler on the environment. Strategies around leveraging data can deliver the much wanted multi-pronged solution by helping utilities optimize efficiency, reduce operational costs, enhance customer management and predict demands. While utilities have immense data at their disposal the real challenge lies around applying analytics to this data for meaningful business intelligence that can deliver ROI.

On the business front it is increasing customer and regulatory interest in demand side management, declining cost of distributed generation, falling prices of natural gas but increasing prices of electricity and water. There is a massive slowing down of the economy and a growing political interest in supporting select technologies and deregulation. On the safety front too, there is a need to reduce emissions and mitigate the impact of natural disasters and unusual weather patterns. Additionally, the existing legacy systems and the relevant skills have reached a certain level of maturity.

A storm resulting in a power outage in the UK during the Christmas of 2013 affected 750,000 homes for several days. The effect was so severe that it became a parliamentary issue. Embarrassed energy bosses were questioned by MPs. Energy companies lost public trust and regulators tightened their noose. It is estimated that energy companies could end up paying £4 million in compensation to those affected.

In another instance at some other geographical location, a storm in the US resulted in power outages in 16 states and the District of Columbia. Utilities were caught completely unprepared. An estimated 625,000 utility customers up and down the East Coast were affected. About 6,500 flights were cancelled due to a combination of snow, ice and the lack of power.

One estimate of the US Department of Energy put the average cost of system constraints and outages to American business at $100 Bn a year. Additionally, an estimated two-thirds of natural gas pipeline in the US are prone to potentially catastrophic faults. Compounding these complex developments is the concern of utilities that about 50% of the experienced industry workforce will be lost to retirement over the next few years.

Changes in the Utility Landscape: Opportunity with Complexity

A host of recent economic, regulatory, technological and customer-related changes in utilities has given rise to disruptive changes and uncertainties that utilities are grappling with.
The change with the widespread availability of data has created an opportunity for utilities to leverage technology platforms and respond to shifting consumer demand, align with regulatory needs and remain competitive.

Though the utility industry has traditionally been data focused to manage generation needs, it has a history of stockpiling data in silos within multiple divisions necessitating the need for integrating data. But what has truly changed to set off the alarm bells?

**Data to the Rescue: Co-relation between Data Management & High-growth**

New technologies are resulting in a massive increase in the volume and velocity of temporal, spatial, transactional, streaming, structured and unstructured real-time data (see Figure 1: Evolution of Analytics). Utilities are able to harvest data from a host of edge devices, metering infrastructure, synchrophasors, smart appliances, remote asset monitoring systems, consumer transactions, social interactions, weather forecasts, enterprise data, market data, microgrids, etc. With the adoption of Smart Grids on the rise, the magnitude of data to be managed in real-time is growing exponentially, overwhelming utilities.

To make matters worse, some of the data has a “short shelf life”. Existing data processing systems are unable to come to terms with this data deluge. In addition, the efforts of utilities to leverage data are frustrated by their inability to decide which data is useful and which is not. As a consequence, the quality, speed and precision of decision-making suffer.

A study of data usage commissioned by Wipro and conducted by The Economist Intelligence Unit (EIU) called The Data Directive showed a high co-relation between high-growth companies and the use of data. High-growth companies reported improved decision making on the back of being more data driven (60% versus 38%) while no-growth companies were more worried about the quality of decision-making being impaired by information overload (45% versus 31%).

**Evolution of Analytics in Utilities**

The utilities industry is evolving in the way it generates and consumes data. New sources of real-time device, sensor and machine data (GIS, GPS, Smart Meters, networks, servers, etc.) in addition to the new forms of structured and unstructured data (social, video, etc.) are combining with enterprise data (emails, CRM, ERP, SCM, etc.). New cloud and mobile technologies are enabling utilities to leverage this for real-time decision support. As a consequence, utilities are increasingly moving away from being reactive to being predictive.

![Figure 1: The uptake in analytics: the biggest adoption wave is about to come](image)
The real threat to utilities is not from the lack of data. Of that, there is a surplus. The threat is from inaction, from not putting the data under the lens of real-time analytics. The Utilities Analytics Institute (UAI) points out that 33% of utilities have still to move forward with analytics as an initiative (see Table 1: Analytics for Business Processes in Utilities).

These utilities have been citing the lack of knowledge and the lack of budgets as a reason. However, there is no dodging the adoption of analytics. Globally, utilities are reaching tipping point and the biggest investments in analytics can be expected over the next five years.

### New Technologies add to Complexity, but Improve Decision Making

The impact of these investments will be significant. Although rich in data, historically, utilities have been unable to distribute the data effectively and reliably across the enterprise. Data access has largely been limited to a few users within the organization.

The advent of mobile technologies, cheap tablets and quick roll out of applications is leading to information democracy in the utilities business. Streaming events, operations and customer information is forcing them to shift from a traditional BI approach (store, analyze and report) to a near-real-time Complex Event Processing (CEP) environment.

Several decisions (related to trading, distribution management, asset maintenance, event avoidance, customer management, etc.) that were taken centrally, and would sometimes prove costly because of delays, can now be taken practically by anyone, anywhere, at any time. Actionable information to consumers about energy, gas and water will become a key component of future utility offerings.

Energy commodity products as we know them today will need to be enhanced with live and historical information content.

### 7 Areas where Analytics can Deliver Impact

Broadly, data and analytics can deliver high impact on the following areas in the utilities value chain:

<table>
<thead>
<tr>
<th>Process Area</th>
<th>Why leverage data and analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Consumption</td>
<td>Energy usage data in consumer-friendly formats can be leveraged by customers to make informed energy decisions</td>
</tr>
<tr>
<td>Consumer Information Systems (CIS)</td>
<td>Next-generation CIS can combine and cope with a variety of data ranging from consumption patterns, social sentiment, OT data, data from Advanced Metering Infrastructure (AMI) proving more value to customers and the utility.</td>
</tr>
<tr>
<td>Grid Operations</td>
<td>Grids can be balanced using customer consumption pattern analytics. Based on real-time analytics, customers can be made offers that shape demand more accurately and ensure optimized demand management.</td>
</tr>
<tr>
<td>Geospatial Intelligence</td>
<td>Like other asset driven industries, GIS technology is critical to utilities across the life cycle of their assets. Utilities would do well to integrate their GIS and BI platforms.</td>
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</table>

### Table 1: Leveraging Analytics for Business Process Improvement in Utilities

It is important that utilities focus on acquiring real-time data. Analysis of the data in real-time will guide utilities through asset failure predictions that reduce downtime, moving the organization from being reactive to a planned maintenance mode. The long-term benefit of such a shift in predicting asset behavior and planned mitigation will be noticeable in the extended lifetime of assets, optimized inventory of spares, optimized workforce management, precise decisions related to asset replacement and enhanced risk management.
Real-time data and analytics will become crucial in empowering customers to change their consumption patterns. By enabling demand based variable pricing, customers can make better decisions on when to use power and how to reduce costs through community buying measures. Not only does this help utilities improve product quality, but provides a major boost to customer satisfaction levels. Utilities can leverage control system data (SCADA) for optimizing transmission and distribution.

A recent study called Center Forward published by Utility Week and Wipro that surveys senior decision-makers in regulated water, gas and electricity companies in the UK shows that customer centricity will be the single biggest focus in 2014-15. We believe this is a reflection of a larger global trend. Utilities are being forced to address customer centricity – something that is relatively alien to their infrastructure intensive activity. To be successful, they will need to integrate their customer data, call center data, etc. for better insights into customer needs and thereby align their products with market demands and develop better pricing plans. The data will assist utilities in accurately segmenting customers and in using that information for targeted – and successful – communication aimed at improving sales and motivating the adoption of environment-friendly usage. More importantly, integrated customer data will help forecast demand, reduce the cost of spot-market purchases and address fraud management.

Accurate, complete and clean data is crucial to demand response management. It can directly assist energy companies reduce peak demand without impacting business operations, comfort or product quality through relevant price signals and incentives to consumers. Efficient Demand Response Management results in cost savings and has an additional cascading effect within the utility, helping optimize call center operations and workforce schedules.

Historic customer data is increasingly being leveraged by utilities to generate forecasts. More importantly, the data can be used to insulate and alert customers against security breaches, leading to enhanced lifetime customer value management.

Data can help identify and predict unusual or suspicious consumption patterns for targeted investigations reducing cost of investigation as well as reducing power, gas and water thefts. Data is also being leveraged to predict cyber threats in real-time, protecting utilities from network intrusions, virus attacks, and from business and customer data being stolen or compromised.

Using data in conjunction with business rules ensures better decision-making to improve compliance. In addition, real-time analytics can help flag breaches in compliance, provide mitigation strategies and reduce the management cost of breaches. Generating and validating compliance reports can be a laborious task, prone to errors. But data and analytical technologies automate the process, ensuring accurate and timely submissions of compliance reports.

Utilities are deeply invested in Operational Technologies (OT). Their enterprise IT investments typically span ERP, CRM, SCM and billing. The challenge before utilities to fully realize the benefits of data is to integrate the OT and IT data, bringing different types of data together in a holistic manner. The questions utilities need to ask is: How do we unify such large volumes of data? What is the architecture necessary to analyze this data in real-time? How do we stream it across the enterprise network? What are the redundancies required to make the system dependable? How, once integrated, can this data be turned into real-time insights that can aid quicker business decisions?

It is early days for analytics in utilities. But it is inevitable that they embrace analytics to extract value from their operations, their investments and their manpower resources in order to improve efficiency, stay competitive and ensure growing shareholder value.
About the Author

Prasad Shyam - General Manager

Prasad Shyam is the General Manager & Business Head for the ‘Business Capacity Services’ group within the Advanced Technologies & Solutions (ATS) business unit focusing on driving business growth in Staff Augmentation and Co-managed customer engagement across all industry verticals globally. He carries P&L responsibility, strategy and operations of this unit globally. The business unit ATS, helps its clients derive business value by covering cutting edge new technologies in Social, Mobile, Analytics & Cloud.

Prasad has 18+ years of experience in IT industry, and has been strategic advisor to many Fortune 500 organizations focusing on analytics and information management. He is one of the founding members of Business Intelligence and Data warehouse practice in Wipro.

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