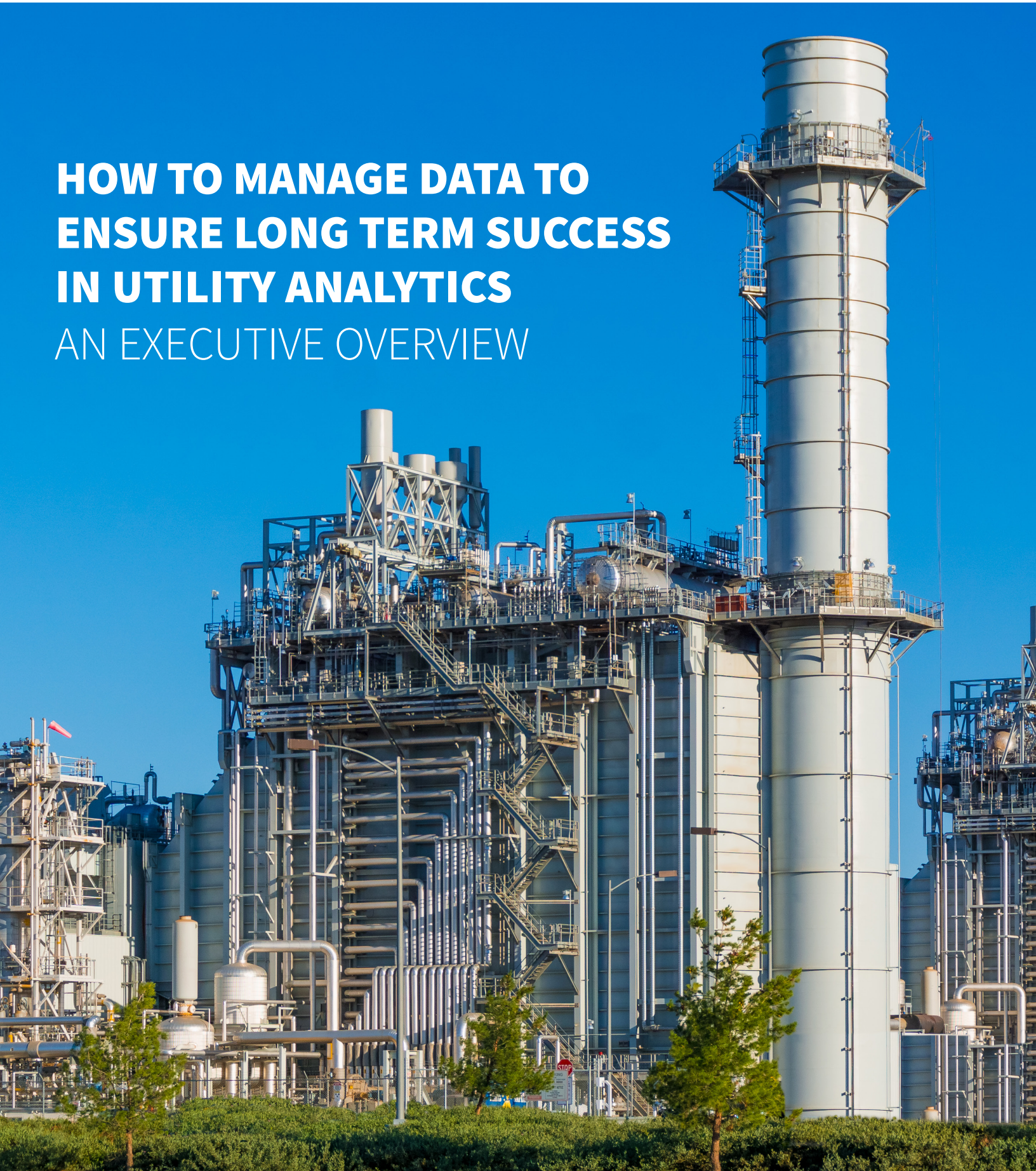
UtilityAnalytics INSTITUTE

OSIsoft

HOW TO MANAGE DATA TO ENSURE LONG TERM SUCCESS IN UTILITY ANALYTICS

AN EXECUTIVE OVERVIEW



Executive Summary

Most utility executives and upper level management cannot go a day without hearing from a vendor about how machine learning and artificial intelligence (AI) will revolutionize the utility industry. The truth is, these technologies are already revolutionizing operations and services at many power utilities. Utility personnel at all levels are eager to get access to the right data and tools to optimize their work and transform their businesses. This includes:

- ✔ Optimizing asset lifecycles, i.e., extending the life of the 45-plus year-old transformers that permeate many distribution networks.
- ✔ Reducing unplanned outages.
- ✔ Optimizing renewables and storage to manage intermittency challenges.
- ✔ Improving service to customers and adding new product offerings.
- ✔ Greater return on capital investments, i.e., optimizing DER performance.
- ✔ Better capacity planning, saving money and resources.

Many utilities still struggle with the functional and strategic elements needed to succeed, even though they want to use data to improve the business.

Dealing with data at an enterprise level is one big obstacle that holds back even the most advanced companies. This whitepaper will provide a snapshot of some of the most common data issues facing utilities, with insights on how they can be avoided to ensure long-term success in analytics.

Data as a Focal Point for Analytics Success

Amidst the explosion of data and a heightened focus on digital transformation, utilities are at an inflection point where ideas are materializing into tangible business value. Data is the underlying force driving this transformation, as is the ability to turn it into action through analytics. But to do that effectively data must be managed, cultivated, and continually updated. Otherwise, that value will disappear—garbage in, garbage out.

Underlying the ability to execute a successful analytics strategy is the ability to manage and curate data to ensure quality, integration, accessibility and security. Data governance is the process by which these requirements are ensured across the many layers of analytics—the amount of risk involved in analytics increases significantly if any of these areas fall short.

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Data Quality and Integrity are the Foundation for Analytics

The need for accurate, high-quality data increases as analytics goals become more advanced. In utilities, poor data quality, such as a few meter identifiers or missing addresses here and there, is rarely an isolated issue. Most of the time, there are root causes that create widespread problems.

For example, in a scenario like theft detection, faulty meter data can lead to utilities suspecting fraudulent activities where they do not actually exist, and vice versa. Poor data quality can also trigger unnecessary alarms/maintenance, resulting in downtime. In addition, bad data can result in

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painful unplanned outages. When conducting diagnostics, utilities often discover that warning signs were flashing, but going unnoticed because of the way the data was managed and transmitted.

The criticality of quality data cannot be underestimated. It takes no time for these types of events to undermine trust in data and analytics altogether. Ensuring data quality is an ongoing process and cannot be treated as something to check off a list at the beginning of a project.

Integrated Data Creates Endless Possibilities

Having good data is not enough for success in the complex world of analytics. A utility company may have high-quality data, but if the utility can't easily access that data, little value will be extracted.

Well-integrated data provides endless possibilities. Many data sources already exist in utility companies, but due to the siloed nature of these businesses, these data sources are often not connected. To begin leveraging advanced analytics, utilities need to realign these data sources to provide a solid foundation of data that can be accessed throughout the company.

The process of data integration—making data accessible across the company—is not straight forward. As many utilities have found, dumping all company data into a big database or "data lake" does not necessarily ensure that users can still readily access or understand that data.

Technology and business processes involved with data integration are foundational for success. Filters for data need to be established so users can understand what they are accessing, and policies need to be implemented that require users to archive their queries so they can resolve data discrepancies when necessary.

People Need Access to Data to Create Value

Some people assume "analytics" means plugging inputs into an application and waiting for a result, but that is not the case—the human element of analytics is where much of the value comes from.

For example, an effort might begin with an operator looking at a trend line and determining how certain vibrations can indicate when equipment is near failure. In fact, many condition-based maintenance problems are solved by people looking at the data and informing models to reflect asset behavior.

That is why access to data is so important to enabling analytics. But many utility employees are not able to get access to good quality data in a timely fashion, having to submit tickets and wait on their IT department to deliver the data they need.

In this scenario, there are two common outcomes. The first is that ideas and projects get killed before they start because it takes too long for IT to deliver the data. Second, and more common, is that users adopt "go-around" strategies to get the data they need. In this scenario, there is no guarantee they are accessing quality data (in fact, it's extremely unlikely).

What amounts is a high level of risk around the data being used—risk that is multiplied when a variety of analytical tools and users come into play. For example, what if someone pulls data that is stored in a local data "pond" from an enterprise API, as well as an Excel spreadsheet they have on their computer, and import that data into an analytical tool to be analyzed? The chances of the outcome being accurate and useful decrease rapidly alongside the number of sources involved.

Data Security—Providing Safe and Compliant Data

Data security is a growing challenge within the realm of data governance. Utility data is often highly regulated to ensure the privacy of customers and security of the system. As infrastructure becomes more connected and more users request access to data, the risk of exposure to vulnerabilities increases. As access to customer data increases across the enterprise, data privacy violations also increase in likelihood.

> "The PI System, which enables the collection, storage and the visualization of enormous amounts of data, is an essential data management system for our solution."
>
> — Tadahiro, Nakazawa, Manager, Technology Development Group, Thermal Power Division, Kansai

Security and privacy issues dictate the extent and conditions to which the utility must adhere in their management and use of both customer and operational data—and these regulations will only become more rigid over time. It is critical for analytics data governance to understand who can access data, how data will be shared internally or externally, accountability processes, and any required documentation.

Pulling the Pieces Together–Quality, Integration, Accessibility and Security

Data governance and management of data quality, integration, accessibility and security is an ongoing process that must be nurtured. The lack of integrity in one area will inevitably bleed across the others, creating disastrous effects for analytics initiatives. As utilities develop capabilities in one area of data governance, it is essential to consider how that might affect the other areas. If not, all the value that can be absorbed from data will go unrecognized.

Utilities need to invest in establishing the ability to monitor and check the quality of their data. A platform that ensures data quality, integration and accessibility can go a long way in preventing these scenarios from occurring. This includes the capability of vetting the quality of data as it is digested from multiple sources and systems, refreshing that data regularly, and allowing users to search and access the data they need based on the right security and privacy protocols.

PI System–the Foundation for Analytics

The PI System is a data infrastructure for operational utility data which can enable as many people as possible within an organization to access that data and conduct self-service analytics. We serve as a decision-making platform, as well as a platform for prepping data for third-party analytics. As a senior level director at a utility once said, "I knew if I could put end-to-end visibility of electrical operations in the hands of everyone at the Utility, we would drive innovation."

Case Studies

Case Study: PJM Interconnection

PJM Interconnection is responsible for maintaining grid reliability and running energy markets across 13 states and the Washington DC area. To improve its operators' situational awareness, especially during conditions that disrupt grid reliability, PJM developed the Dispatch Interactive Map Application (DIMA), which brings together real-time grid, weather and spatial data using ESRI ArcGIS and the PI System from OSIsoft.

Weather has a significant impact on reliability in the PJM's region, so integrating that data was an important early stage of the project. DIMA can now overlay real-time radar, as well as other warnings and watches, on specific transmission line locations. Future steps include a full integration of all SCADA data into the application.

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Case Study: Duke Energy

In 2009 Duke Energy began investing in commercial renewable assets, and a favorable market led to continued investments in the years following. Today, the company owns approximately 2,500 MW of wind and 600 MW of solar across 13 states. After a downturn in market conditions, Duke opted to shift its focus from new investments to optimizing performance of existing investments.

Duke previously had enterprise agreements with OSIsoft across both its regulated and commercial wind, solar and battery storage businesses. Between 2016 and 2018, Duke and OSIsoft implemented the PI Asset Framework (PI AF), established detailed performance monitoring capabilities and distributed calculations, and optimized its analytics architecture.

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Case Studies

Case Study: Peak Reliability

The Western Interconnection is a transmission network that links 24 transmission operators (TOPs), providing power to over 80 million people over 1.8 million square miles stretching from Canada to Baja Mexico. In August 2016, the Blue Cut Fire erupted in Southern California's San Bernardino County, short-circuiting a 500-kV transmission line. The analytics available to the operators lacked the necessary geographic context, and they were forced to re-dispatch power generation at a premium to bypass the damaged facilities.

To help TOPs more easily spot and resolve problems, Peak Reliability first entered into an Enterprise Agreement with OSIsoft in 2013 that allowed it to harmonize and consolidate device data. Peak then developed a system called the Peak Visualization Platform (PVP) that monitors and visualizes sensor and equipment data geographically. PVP was made with off-the-shelf technologies from OSIsoft and Esri that required little to no customer coding. Today, Peak collects 440,000 data streams, many updated every 10 seconds.

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PEAKRELIABILITY
assuring the wide-area view

Case Study: DTE

In 2014, DTE embarked on a multi-year effort to improve outage performance with the help of IoT sensors and analytics. The utility chose to install sensors across the grid in order avoid costly SCADA investments, however data from these sensors was transmitted and stored across different systems and applications outside of the utility's traditional OT database (SCADA/EMS/GIS).

DTE implemented the full OSIsoft technology stack, including the PI Interface for DNP3, PI Server, and PI Notifications to integrate sensor data into its OT database. DTE completed a proof of concept 95 locations in 2014 and has since fully deployed and integrated sensors to 3,000 locations across its distribution network. Visualization of sensor status on circuit map now allows crews to divide circuit into segments and narrow search for faults, which will eliminate an estimated 6.6 million customer outage minutes annually. To date, DTE avoided spending $25 million for equivalent SCADA solutions.

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DTE Energy

For over 37 years, we have been dedicated to helping people transform their world through data. Some of the world's largest organizations, including over 1,000 leading utilities, rely on our software to get the most out of their businesses. Our business is to help you turn your operational data into rich, real-time insights for reducing costs, increasing productivity and improving asset performance.

Learn more here.