

NAVIGATING DATA COLLECTION CHALLENGES IN UTILITY OPERATIONS

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Technological advances in data analytics have transformed the way businesses operate. From platforms like Power BI and Tableau to cutting-edge developments in artificial intelligence, organizations are continuously finding new ways to harness data for smarter decision-making. However, the effectiveness of these analytical tools hinges on the quality of the data itself, driven by consistency, completeness, and accuracy in the data collection process.

In legacy industries such as gas and electric utilities, where field operations have remained largely unchanged for decades, collecting high-quality data presents unique challenges. For utility operators, jobsite data plays a critical role in documenting asset details and work history, information essential for sound asset management and operational oversight. Yet, ensuring that this data is reliable and actionable requires thoughtful strategies tailored to the realities of fieldwork.

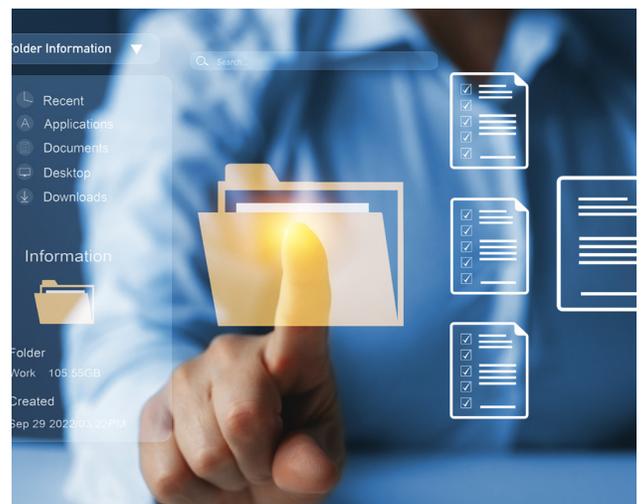
As efforts to modernize data collection continue, utility operators often face critical questions: What factors should be considered when determining how to capture the data? How is the quality of the data collected assessed? And ultimately, who is best equipped to gather this information? In this article, we'll explore these questions, along with other key considerations that influence the ability to collect high-quality data essential for enabling advanced business analytics in utility operations.

UNDERSTANDING UTILITY DATA COMPLEXITY

Utility data is often deeply rooted in the unique history of how each organization was formed and operated. Adding to the complexity, the highly regulated nature of the industry means work and asset data requirements are constantly evolving. Operators must find a way to bridge historical data with data collected today for any given asset. Some regulations require certain assets to have data kept for the life of the asset and sometimes even after the asset has been retired.

To manage this, utilities rely on a mix of systems, typically including a work and asset management system, GIS (Geographic Information System), and a customer information system. Many also use ancillary tools to model performance, assess asset risk, or maintain legacy records like sketches and maps.

The wide range of methods used by field employees to capture the data used in these systems contributes to the difficulty of establishing structured industry standards. Some utility operators still rely heavily on paper-based processes in the field, which are converted to digital data in the back office. Others mimic back-office tasks in the field through the deployment of ruggedized laptops. Mobile devices with applications specifically designed for field data capture are also in use. Each approach has its pros and cons, including ease of use, accuracy of information, and required data formatting and post-processing. Because no two utilities are alike and the approaches to data capture can vary so widely, creating a consistent approach to data collection and maintenance remains a significant challenge.



ESTABLISHING A DATA FOUNDATION

To better understand field data collection needs, utilities must first grasp how data is used and shared across their many systems. A helpful starting point is consolidating this information into a data dictionary, which defines the data and documents details (or attributes) like source, format, business rules, and supported processes.

This analysis often reveals duplicate data across systems, critical data that's poorly managed or is unqualified, and legacy data tied to outdated processes. It may also uncover new data requirements driven by evolving regulations and integrity management needs.

By reviewing and organizing this information, operators can identify what's truly essential for effective operations and begin shaping how that data will be collected, managed, and used going forward.

DESIGNING THE DATA CAPTURE PROCESS

Once data requirements are defined, operators can shift focus to how the data will be captured. While paper data collection is still used from time to time, the utility industry in general is migrating to the use of electronic field data collection. The data requirements associated with this approach are largely determined by the specific application. For form-based entries, key considerations include whether data is required, conditionally required, or optional, and whether collection can be streamlined using dropdowns or radio buttons to reduce freeform input. Timing also matters, as assets may become inaccessible as work progresses. Operators should also assess whether data must be collected in the field or if it can be sourced from existing asset data through system integrations.



For GPS data, both quantity and precision are critical to accurately represent asset installations. In addition to asset locations, many operators collect GPS points for surrounding land features to ensure GIS dimensions reflect real-world conditions. While GPS provides absolute positioning, it's often insufficient for field navigation without referential dimensions tied to visible landmarks. Referencing land features enhances field clarity, but establishing accurate references can be difficult if those features are not properly aligned with asset GPS data.

These are just a few of the factors that utilities must consider when designing a data capture strategy, many of which depend on who is collecting the data and how it will be used.



MATCHING EMPLOYEE SKILL SETS WITH THE DATA REQUIREMENTS

When considering who should collect future utility data, many operators default to those already handling form and as-built documentation. Some rely on specialized inspectors, while others task craft employees with recording completed work. While this may suffice for basic data entry, it often falls short for complex asset data or high-accuracy GPS collection. There's no one-size-fits-all solution.

CRAFT EMPLOYEE DATA COLLECTION

While assigning new data requirements to existing resources may appear like the most cost-effective approach, it often requires significant change management to ensure data quality and completeness meet expectations.



Asset data entry and GPS coordinates are critical components of modern datasets and are best captured at the time of installation to ensure accurate, sub-foot-level location data is linked to the correct assets. Once an asset is elevated 30 feet in the air or buried underground, access becomes limited, and data entry becomes significantly more difficult.

This challenge contributes to the perception among many field employees that data collection is intrusive, a hindrance to completing their tasks, and a distraction from their core responsibilities. Utility crews often consist of seasoned professionals with decades of experience, accustomed to working within tight windows between mobilization and demobilization, and deferring paperwork until they return to their vehicles or offices. Introducing new data collection processes disrupts these established routines.

As a result, employees may become frustrated, unable to see the immediate value of the data they're capturing, especially when it disappears into a system they don't interact with or benefit from directly. While effective change management can help address these concerns, the underlying reality remains: these workers are experts in execution, not necessarily in the complexities of modern data systems. Bridging this gap requires thoughtful planning, clear communication, targeted training, and ongoing support.

DATA COLLECTION THROUGH DATA SPECIALISTS

An alternative approach to data collection involves hiring specialists trained in database and GIS methodologies to follow utility construction crews and document the work as it occurs. This model echoes historical utility practices, prior to industry-wide shifts toward cost-cutting and efficiency that reassigned legacy data collection responsibilities. These specialists are trained to capture complex datasets, including hundreds of GPS points with detailed attribution. Their understanding of the value of high-quality data drives a level of motivation and attention to detail that typically exceeds what can be expected from craft employees.

However, to ensure complete and accurate asset and location data, these specialists must closely shadow installation crews throughout the construction process. While some features can be captured from street level at any time, much of the critical data must be recorded in real-time, before assets are buried or become inaccessible. This requirement implies a near 1:1 ratio of specialists to installation crews, which is both cost-prohibitive and operationally inefficient. As a result, despite its advantages, this approach is frequently dismissed in favor of more scalable solutions.

A HYBRID DATA COLLECTION APPROACH

A third data collection approach that is gaining traction among some utilities is a hybrid model that combines field-based and specialist-led data collection. In this model, field crews are responsible for capturing a streamlined set of essential asset and location data at the time of installation, while specialists handle the remaining, more complex data requirements.



Although some challenges associated with craft employee data collection persist, the reduced scope makes these issues more manageable through targeted change management efforts. This approach also significantly lowers the demand for specialists, allowing for a more budget-friendly crew ratio that aligns better with operational constraints.

In addition to collecting supplemental data, specialists can perform quality control checks on the information gathered by field crews, ensuring it meets organizational standards before submission. As these teams collaborate, the ongoing interaction fosters a culture of shared responsibility and reinforces best practices, effectively extending the reach of change management through peer influence and continuous learning.

IN SUMMARY

Ultimately, a utility's approach to modernizing data collection will be shaped by its current data environment, available field resources, and long-term operational vision. This is a critical undertaking, as the resulting information will form the backbone of future operational management and innovation.

Each utility's path will be unique, with different starting points and goals. Modernization is an ongoing process, driven by ever-evolving data requirements. By thoughtfully addressing the challenges outlined above and laying a solid foundation now, utilities can unlock a more agile, future-ready approach to data enhancement.



ABOUT THE AUTHOR

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Robert previously served as Manager of Reliability Programs and Capacity Planning, and as a gas engineer with expertise in pipe safety management systems, integrity management, gas design, capacity planning, and mapping. His deep industry knowledge enables a distinctive approach to solving complex challenges, delivering innovative solutions grounded in vision, strategy, and execution.