

Asset Management

A Tool for Water Utilities

Prepared by



THE SHPIGLER GROUP
STRATEGY MANAGEMENT CONSULTING SERVICES

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The Shpigler Group is a strategy management consulting firm offering our clients a full range of services. We have designed our practice to add value to our clients' organizations, identifying suitable opportunities and optimal solutions. We deliver custom consulting services to four major industry groups:

- Energy
- Water
- Telecom
- Smart Cities

Our services include financial and operational analysis, business case development, and detailed studies that examine best practices. We listen to our clients and incorporate their input alongside our own industry knowledge, ability, and experience to develop a comprehensive plan that addresses client needs while providing viable options that add value.

The Shpigler Group offers services to clients in a wide range of areas:

- Developing feasibility studies for program implementation
- Performing benchmarking studies to support performance enhancement
- Conducting financial analysis of operations and detailing areas for improvement
- Supporting network design and construction management
- Performing technical research relating to projects or solutions designed
- Conducting management and operational audits
- Implementing go-to-market strategies
- Developing comprehensive and fact-based business plans
- Developing complete network designs and performing economic analysis of chosen models
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Executive Summary

Modernization of the water distribution system involving automation schemes enables an increase in asset effectiveness by consolidating multiple work and asset management solutions into a single platform and database. These approaches allow for distribution resources to be assessed on a real-time basis to enhance utilization and productivity.

Water utilities frequently struggle with balancing the need to invest in modern equipment and infrastructure for the benefit of service delivery with demands to minimize costs. One of the most effective ways to avoid substantial rate hikes is to maximize the lifetime value of every existing asset. Automated asset management tools enable utilities to blend forecasting and business intelligence with traditional enterprise asset management capabilities.

Interest in the field of asset management for water utilities has grown exponentially as more water utilities embark on AMI and smart water programs. With an increasing number of intelligent devices across the distribution system comes an opportunity to leverage the intelligence that comes from having a network-centric approach.

Concepts in Asset Management

The concept behind asset management is simple – using data from distribution operations should improve planning and decision-making efforts by leveraging intelligence rather than simple pre-set rules to determine asset strategies. Some common sources of benefits include:

- *Optimizing Maintenance Schedules* – Today, the vast majority of water utilities employ maintenance on fixed schedules or run equipment to failure. Utilizing data now helps to identify when asset life can be extended and deferral of capital investment is warranted based on distribution system conditions.
- *Assess Sources of Risk* – Asset management analytics provide data within the context of water operations. By analyzing historical and real-time data across the water distribution system, water utility operators now can decide when to invest capital to address trouble spots across the system.
- *Prioritize Investment* – Very few (if any) water utilities are flush with cash. Hard decisions need to be made regarding where investment is most needed. Asset management systems provide the tools to enable operations, maintenance and finance personnel to make smart decisions about infrastructure investments.
- *Develop Optimized Planning Approaches* – With access to real-time data, water utilities can better evaluate system operations and engage in enhanced planning activities.

Enterprise asset management represents a rapidly maturing field within the water industry that supports the ability of utilities to make better decisions and in turn, affect a diverse set of issues that include long term planning, asset replacement, capital investments, risk management, and system maintenance. The data and information systems contained within associated enterprise systems such as work management, operations data historians, and financial systems offer additional potential sources of efficiency gains. Each of these fields is supported by inherent advancements realized in the field of information technology.

The long term vision for the industry is one that calls for an integrated and automated solution for asset management that offers the potential to drive the entire process from data acquisition to system calculations to central reporting to customer engagement. That in turn offers significant gains in efficiency. The number of applications run by a utility is reduced, the demands for data collection are diminished, and the timeliness of information to decision makers is increased – all resulting in higher levels of service and lower costs to consumers.

Challenges in Implementing Utility Asset Management

One of the largest sources of concern within the utility asset management field involves the potential to translate conceptual value to actual value through proper operational design. When utilities have failed to achieve cohesive benefits, it is often due to improper design and integration approaches. A survey conducted by The Shpigler Group among utilities that have struggled with system integration yielded the following findings:

- The inability to develop a design of integrated systems in order to leverage the inherent benefits of asset management resulted in disparate design. As a result, these utilities wound up employing multiple systems with asset management capabilities in an attempt to tie together legacy programs from multiple operating systems.
- The lack of established Key Performance Indicators (KPIs) prior to system implementation ultimately led to suboptimal system design. When utilities deferred the process of designing process improvement into their asset management strategy it often resulted in processes that were better suited for legacy operations rather than current operations.
- Ensuring that the right system best suited to current operations is key during the procurement process. Too many utilities are finding that choosing the wrong system – that is, those that are not well suited to their operations – results in the need to invest additional funds in system upgrades. As a result, the maturity of decision support capability eventually becomes linked to the maturity of information technology.

In order to achieve success in this field, utilities must adopt a utility-centric approach to system implementation rather than a vendor-centric one. With smart water systems now increasing in adoption among water utilities, the time for system support that offers real efficiency is upon us. The systems needed allow newer components of the information and intelligence system to interoperate with each other and between advanced technologies that provide greater ability to manage the integration of new applications. These capabilities include visualization techniques that reduce large quantities of data into easily understood visual formats, software systems that provide multiple options when systems operator actions are required, and simulators for operational training and “what-if” analysis. Overall, the key function of these systems is to allow utilities to understand in real-time exactly what is occurring across the system and to provide system operators and executives with the information necessary to make important decisions. This is important because advanced sensing and measurement technologies generate enormous amounts of data which must be processed by legacy billing, customer care, and remote management systems.

Bridging the Gap

One of the challenges that water utilities often have involves the difficulty in accessing data to support operational planning. Asset management tools help to break down the silos within the organization in order to drive enhanced decision making. By connecting the sources of information to span software systems, data becomes more meaningful and far more actionable.

Given some of the challenges that exist within the industry, this is easier said than done. Rather than trying to solve the entire problem at once, utilities can benefit by establishing baseline capabilities to leverage the most vital aspects of information management. For example, a utility might consider the following steps in building asset management capabilities:

1. To start, water systems can establish a core asset management layer that captures field assets that are geocoded in an accompanying GIS system. This provides initial capabilities in providing an up-to-date and actionable inventory that most water distributors lack.
2. The next step could be activating modules that provide tactical support. These approaches include the capability to optimize maintenance schedules and operational efforts that often result in significant savings.
3. Finally, advanced analytics can be added to support the delivery of a fully integrated system of asset management that involves real-time capabilities.

To fully capture the benefits of asset management systems, utilities need to pursue a utility-centric model. This utility-centric model must be developed from a strategic perspective – this will allow utilities to configure systems around the needs of the future rather than building around yesterday's legacy systems. The key characteristics of this approach include:

- 100% Network Model Connectivity – providing a connectivity model of a complete system that includes as-built capabilities
- 100% Phase and Engineering Data – information that includes such elements as pipe size, flow rates, attributes of water mains, configuration and other information must be available in order to support the newer applications like leak detection
- Comprehensive Asset Register – containing not only the information needed to support technical maintenance and inspection but also data that is required to integrate with other asset systems
- Network and Maintenance Model for Smart Devices and Equipment – bridging the gap between existing systems so that new assets and programs can easily be integrated later
- Synchronized, Integrated Asset Information and Comprehensive Asset Performance Data – featuring the integration of high latency asset data with real-time data for condition-based monitoring and maintenance and asset analytics
- Synchronized Linkage to Temporal, Historical and Real-Time Data – featuring the ability to link assets in databases that support distribution operations to temporal, historical, and real-time data in the operational data store

- Consistently Sharing an As-Built Network Model across the Organization – assembling a complete and authoritative as-built water system model, and then sharing the model with consuming applications, such as a leak detection or smart pumping program that require a transformed, as-built network model as an input

Ultimately, the water utilities that follow this approach may consider new delivery systems that include the latest developments in IoT, machine learning, cloud computing, and managed services. In the process, the staid process of utility planning can utilize 21st century technology solutions to achieve gains through fact-based analysis based on real-time data driving changes in asset failure modeling and capital deployment planning.

The Value Proposition

Water distribution utilities are constantly seeking ways to enable them to better serve customers and to become more operationally efficient. To a large extent, an integrated asset management program serves as the foundation for the delivery of a non-stop, on-demand, re-design journey of the business models, business processes, technologies, organizational structures, and applied human capital to seamlessly leverage existing and new trends into a more profitable, faster growing, and more customer-driven utility reality. Proactive water systems that are following this plan fundamentally believe that:

- Asset management delivers success by committing to pervasive performance management, which helps streamline processes by creating a smart, agile and aligned utility
- Asset management enables the close monitoring of performance, flexible integrated planning, and re-establishes and/or enhances trust with stakeholders
- Asset management drives insight in investments and offers techniques that help in rethinking strategies and managing innovation as a competitive advantage

With a dynamic asset management program in place, water utilities now have the ability to benefit from a complete view of risks that span the entire distribution system. This yields the ability to make real-time decisions for water distribution operations. For largely legacy systems that lack a high degree of automation, this can be largely beneficial in creating operating efficiencies. For utilities that have embarked on other “smart water” programs, including acoustic leak detection, smart pumping, pressure modulation, and automated water quality monitoring, the benefit can be even greater. Effectively, a properly designed asset management effort can serve as a force multiplier when coupled with a Meter Data Management System by providing a unifying source of data analytics to enhance all automation use cases.

For example, an asset management platform can be extremely helpful when aligned with an automated acoustic leak detection program. Where deployed, sensors gather information about the source of leaks that a water utility can immediately act upon. However, blanketing an entire service territory with acoustic sensors would undoubtedly be cost prohibitive. So, water utilities need to decide on the optimal placement of sensors to determine where to locate sensors in addition to the overall scope of the leak detection coverage area. Asset management effectively picks up where the leak detection program leaves off and provides additional analytics about the cost effectiveness of filling in the gaps. Furthermore, as leak data is migrated back into the asset management platform, this enables the modeling capabilities to be enhanced with added data.

Summary

Aging infrastructure can place challenges for any water utility, especially as systems are built over long spans of time. Consider a utility that has built a portion of its water distribution system a hundred years ago that needs to be replaced. In addition, another portion of the system features clay pipes from the 1960s and 1970s that is resulting in leaks. Plastic pipes built in a newer part of town in the 1980s is now resulting in low pressure to a block of customers. What should this utility do, especially given the likely scenario of limited resources available to address all of these problems at once?

The answer may well be tied to the development of a robust asset management program. According to the EPA,

“Asset management is a process water and wastewater utilities can use to make sure that planned maintenance can be conducted and capital assets (pumps, motors, pipes, etc.) can be repaired, replaced, or upgraded on time and that there is enough money to pay for it.

Asset management is the practice of managing infrastructure capital assets to minimize the total cost of owning and operating these assets while delivering the desired service levels. Many utilities use asset management to pursue and achieve sustainable infrastructure. A high-performing asset management program includes detailed asset inventories, operation and maintenance tasks, and long-range financial planning.

Each utility is responsible for making sure that its system stays in good working order, regardless of the age of its components or the availability of additional funds. Asset management programs with good data—including asset attributes (e.g., age, condition, and criticality), life-cycle costing, proactive operations and maintenance, and capital replacement plans based on cost-benefit analyses—can be the most efficient method of meeting this challenge.”¹

In the end, water utilities must address a number of issues as they consider their asset management strategies:

- What is the state of the current assets?
- What level of service is demanded?
- What assets are most critical to service delivery?
- What are the full life cycle costs associated with assets?
- What is the funding strategy?

Asset management involves an approach that any water utility, regardless of size, can implement. Ultimately, the opportunity to develop a process to manage distribution assets with long-term planning capabilities offers the best way to support affordable and superior ongoing service delivery.

¹ “Asset Management for Water and Wastewater Utilities”. United States Environmental Protection Agency.