



# *Lean Water Operations:*

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*Control the Cost and Pricing of Water While Improving  
Efficiency*

June 13, 2011

## **Introduction**

In today's economy, finding ways to "do more with less" extends to virtually every business, government and education institution. Plain and simple, the days of "business as usual" are a thing of the past as economic and social pressures mandate more efficiency, accountability and performance. The water and wastewater industry has greatly improved its own performance and the value delivered to communities by adopting lean principles – by leveraging new technology and processes to modernize the industry. This paper outlines four Lean Operation principles that water and wastewater facilities can incorporate in their daily operations to "do more with less" in the face of ever-changing regulations and tight budget constraints.

The following are actionable tips on how water and wastewater operators can leverage Lean Operations:

- Taking a holistic approach to operations
- Creating a lean culture
- Automating manual processes
- Achieving Lean sustainability

## **Taking a Lean Approach**

The Lean Institute points out: "Lean applies in every business and every process. It is not a tactic or a cost reduction program, but a way of thinking and acting for an entire organization." The fundamental concept is to systematically identify and eliminate wasteful elements in processes until an organization is executing its purpose at the highest level possible. When that happens, greater value is created for the customer, the processes within the organization are optimized and the people running the processes are aligned with actions that enable them to continually deliver what's most important.

Looking specifically at the water and wastewater industry there are a litany of challenges and opportunities for lean thinking to have a positive impact on operations. Not surprising, budget constraints, with a public that is highly resistant to rate increases and facilities increasingly expected to do more with less, is a big concern. Adapting to the ever-changing regulations poses the risk of fines, citizen complaints, reputation, or worse, environmental impact or public health. Within the workplace, knowledge retention is a main concern as an aging workforce prepares to

retire, while information overload, with facilities receiving more data and employees being asked to move from collectors and reporters to analysts and knowledge workers, is not an easy transition.

Given the challenges that the water/wastewater industry is facing – chief among these, as stated previously, the concept of “doing more with less” – a new approach is emerging: Lean Operations for water and wastewater facilities.

The need to achieve higher efficiencies and reduce operational inaccuracies is driving positive changes in how water and wastewater treatment utilities operate. Embracing lean and supporting lean thinking with new technologies and methods is helping facilities meet these goals and cope with the many challenges that they face. The fundamental concept of Lean Operations is to systematically identify inefficiencies and put more focus on improving the overall value of the system.

### **The Case for Lean Operations**

There are numerous ongoing issues that impact water and wastewater utilities but, according to AWWA’s State of the Industry Report 2010, business issues are the most pressing challenges that they face. Simply stated – the cost of operations continues to increase while rates remain flat. Meanwhile, capital investment into rehabilitation and new infrastructure is not keeping pace with current and projected demands.

In addition, complying with increasing federal and state regulations is financially burdensome. The legacy approaches taken to monitor and document the treatment processes can be inefficient and inaccurate. Relying on labor-intensive, manual data logging contributes to violations, subsequent fines and expensive-to-implement process changes. Compounding the costs associated with compliance is the increasing public awareness of drinking water quality issues, ranging from upstream discharge from wastewater facilities into pristine waterways to the chance of pharmaceuticals and metals seeping into water supplies, which of course leads to more requirements and the added burden of addressing them.

*Aging systems discharge billions of gallons of untreated wastewater into U.S. surface waters each year. The Environmental Protection Agency estimates that the nation must invest \$390 billion over the next 20 years to update or replace existing systems and build new ones to meet increasing demand.*

*American Society of Civil Engineers 2009  
Infrastructure Fact Sheet*

The near collapse of the economy, and its slow recovery, has influenced another industry issue, the “brain drain” that is looming as long-time employees, who constitute the bulk of the workforce, near retirement. It is estimated that the number of employees currently active, yet at retirement age, is close to 200,000. While this large group of seasoned professionals is currently delaying their departure from the workplace, because retirement funds have been reduced and the economy is unstable, a positive shift in the economy will compel them to eventually move into retirement. When that happens, the challenge of replacing them and preserving the knowledge they possess and need to pass on will swell.

To meet these challenges, water and wastewater utilities need to look for efficiencies in treatment processes and business management. Lean principles, even if already in practice to a degree, need to be further embedded in treatment facility operations. As in other industries, lean principles and technologies that help optimize and automate the business can be integrated to create a platform for dealing with constant change.

### **Becoming a Lean Operation**

What does the water/wastewater utility customer want? The Lean Operations process starts with realizing that water and wastewater customers want the highest quality product at the lowest prices. For this industry it is relatively easy to define: provide total customer and community value – which in Lean terms is the *purpose* – while overcoming the challenges previously described. Therein lies the difficulty as well as the opportunity water and wastewater utilities have, by following these four principles of Lean Operations.

#### ***1. Taking a holistic approach to operations***

In a Lean Operation every person, resource and process within the plant is dependent upon one another and should be managed in unison. Achieving Lean Operations calls for identifying each point in the process, assessing it to determine if it is necessary and then deciding what action needs to be taken to optimize that point for maximum value at the lowest cost. Identifying all the steps in the value stream and eliminating unnecessary steps that do not create value is part of looking at the processes with a lean perspective.

Technology can be leveraged in the overall assessment of operations, to complement the knowledge that operators have and the observations that they make. Teams may want to gather and analyze data across the utility, from operations and field data to lab results. Consider including third-party back-office systems associated with accounting, GIS, weather service, pretreatment and CMMS software to complete the picture. This centralized view of enterprise-wide data is a central element to increased collaboration across departments and functions, and helps facilitate a collective mindset and decision-making process that leads to the elimination of wasteful practices and promotes a leaner, more efficient operation.

A related component of lean thinking is: *Make the value-creating steps occur in tight sequence so the product will flow smoothly toward the customer.* It's important to keep in mind that what the service utilities provide is a product. And, ensuring that the product is available as needed, with the right quality and at the lowest cost possible, is realized through continual monitoring of the processes and equipment. When operators know what is happening throughout the plant, they can use diagnostics to keep assets functional, anticipate problems, schedule preventive maintenance, eliminate downtime and look for opportunities to optimize operations. What's new here is the ability to see the big picture; that perspective creates the ability to more proactively marshal operations.

Applying a Lean, holistic approach does not need to be a big-bang transformation. Water and wastewater utilities can start small by having facility, operations, managers and back-office staffers attend meetings associated with business, operations and resource allocation. Have managers rotate through facility, maintenance and operations departments to experience day-to-day practices that are either working or not working. Provide reports with operational, workflow, asset allocation and field and lab data in dashboard-view in a central meeting area. And, provide visibility and the opportunity to share suggestions and ideas that will lead to continuous improvement. These steps will help establish a culture of lean, where effective problem solving and continuous improvement can take root.

## ***2. Creating a Culture of Lean***

Improving processes and harnessing the power of technology is only part of the Lean Operations equation. Much of the success of lean comes from cultural changes that encourage openness, the freedom to question the status quo and a willingness to reflect on the past as a means of instituting new ideas that will improve future performance. The goal of Lean is to open up the work process and abolish the usual hierarchies, thereby empowering each and every team member, regardless of “rank,” to have input on issues large and small.

A key principle of lean is to “speak with data.” Therefore, technology that enhances data collection and communication must be used to transform the disparate data points into useable and impactful information that can drive sound decisions. The days in which years of operator experience traditionally was requisite to performing the job needs to morph into a science-based process. A utility can use the data to prove to those resistant to change that eliminating wasteful steps in a process or making other changes will ultimately benefit the organization and, consequently, them.

### ***3. Automating manual processes***

Supplanting manual data collection in the field and the facility with computer-based data gathering, communication and analysis is a prime example of how automation can improve technician productivity and business management. Equipment suppliers, software vendors and even the EPA are all moving to integrate and automate the data gathering, reporting and sharing lifecycle. Water and wastewater operators should take it upon themselves to learn, reach and become an active participant in the development and adoption of new technologies that replace and enhance tried and true manual process that worked for years, but are no longer viable.

Today, utilities can gather and show visibility into the entire system, and feed data back into operations, asset management, supply purchasing and equipment maintenance operations. Superior data collection and communication drastically cuts time lost by operators – letting them focus on running the plant. Utilizing automation afforded through technology provides actionable data that can help quickly create regulatory and business reports, and improve operational efficiencies.

### ***4. Achieving Lean sustainability***

Constant change is part of lean, just as it is part of the water/wastewater treatment industry. Lean Operations calls for its own form of sustainability – by revisiting lean processes again and again, and improving them on an ongoing basis. This concept mirrors the philosophy that is inspiring industry leaders to implement lean approaches and to create an organizational culture that embraces the notion of change and is committed to continuous improvement. Combining lean thinking with the advantages of automation, visibility, accuracy, improved analytics and the ability to realize a holistic approach to operations is helping utilities provide the highest quality of community service while improving efficiencies and fiscal performance.

Wringing more efficiency out of already well-functioning operations depends on having access to and leveraging reports, visual graphs, dashboards and other resources as a means of establishing a data-driven decision making process. New technology is available to allow for the visual management of metrics, and business intelligence solutions are emerging for improved visibility, both at the high level and down to a focus on a single device, making it possible to more effectively extend lean principles across the organization.

Managing water, as well as the resources and facilities that treat it throughout both the water and wastewater lifecycle, makes “sustainability” a crucial component of the overall Lean Operations mix.

## **Conclusion**

The progress made at both the managerial and operational level within our industry is significant and continues to advance. The concepts within Lean Operations build upon that progress, and provide an outline for revisiting and adjusting the improvement processes continuously, and to use automation technology to drive holistic improvements throughout the organization. Lean Operations for water and wastewater is intended to help utilities drive even more efficiencies from day-to-day operations, while creating the “lean sustainability” to deliver the highest level of service over the long haul. Its central concern is minimizing inefficient efforts and resources, and to leverage new technology and processes to modernize the industry.