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About EMA

As an innovative management and technology consulting firm, EMA develops solutions in anticipation of changing market needs and brings new business concepts to its clients, which include utilities and government organizations.

With offices throughout North America, EMA is headquartered in St. Paul, MN, and has provided clients with solutions since 1975.

EMA publishes the *Communicator* several times a year. Your comments are always welcome. Please forward them to wwichelt@ema-inc.com.

Terry Brueck
..... President/CEO

Wendy Huber-Wichelt
.....Communications Editor

Kelly Meighan
..... Senior Creative Specialist

Linden Hickey
.....Senior BD Coordinator

EMA, Inc.
2355 Highway 36 West, Suite 200
St. Paul, MN 55113-3819
651.639.5600
651.639.5730 (fax)
info@ema-inc.com
www.ema-inc.com

A FEW Words

Navigating Next Steps

Tim Payne
Executive Vice President

All of us are navigating our next steps in one way or another. This has never been more true for our utilities and municipalities who face a wide range of challenges as they move forward in the most efficient and cost-effective manner possible.

In this issue of *Communicator*, we share stories of organizations navigating their next steps. We also provide insight into ways you can do so as well. Our Insight column (first of a three-part series) asks "where are you on the asset management path?" and details initial steps taken by one organization in its "Getting Started" process. Our Solutions story on Scottsdale Water Resources Division highlights the substantial optimization project under way at the utility, which is bringing all facets of Scottsdale operations under one holistic system with great success.

Finally, we discuss current industry research on best maintenance practices and bring you the Top 10 Cybersecurity Myths in the industry today – all in support of your next steps in the successful management of your organization.

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Contributors to This Issue

(Listed in order of article appearance)

Brian Schrantz
Practice Director

Larry Jentgen
Principal Consultant

Shiv Iyer
Practice Group Manager

Bob George
Principal Consultant

Rafael Alpízar
Principal Consultant

Where Are You on the Asset Management Path?

First in a three-part series

by Brian Schrantz

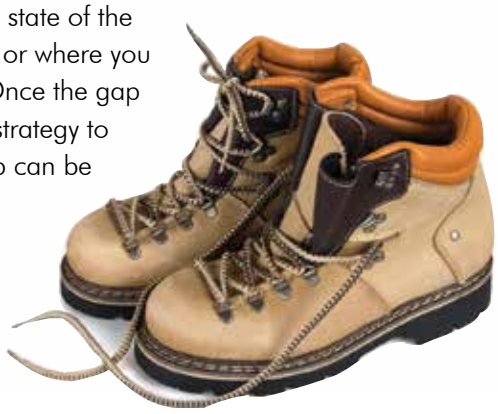
Organizations "Getting Started" on their asset management programs are at a very strategic point on the path and have a lot of opportunity to become more efficient.

You may already have implemented an enterprise asset management system. Or, perhaps your legacy system still needs to be replaced. Your asset data may be captured and work processes in place. Or, you recognize you need a better understanding of your assets and their present condition, as well as new processes to increase efficiency.

It's time to identify where you are on the path and determine your next steps …

Your goal is to find the quick wins and fixes that will net big returns to build momentum for your asset management program. You are establishing foundational components that will help you capitalize on and legitimize your program.

It's time to pinpoint where you are in your asset management program relative to where you want to go. This is often called "gap analysis." The "gap" is the distance between your current state of processes and practices and the desired future state of the organization, or where you want to be. Once the gap is defined, a strategy to close that gap can be developed.



Some of the questions to be asking include:

Do we have a plan? You need one. An implementation plan provides analysis on organizational capacity, resources, new practices, and technologies that support your goals.

How's our data? It's true. You're only as good as your data. You need to understand what you have and what you need. Do you know what you have? If so, what is the quality of your asset data? Is this data captured electronically? Is it in CMMS, GIS, or EAMS? Do you have the data you need to begin managing these assets and basing your planning and decision making around them?

How does our technology stand up? In order to move forward with a plan, you must understand whether your present technology has the functionality and capacity to accommodate not only your present needs but those plans you wish to implement down the path. Don't just focus on your enterprise asset management system. Think about mobile solutions, instrumentation, financial systems, etc.

Do our organizational structure and work processes support our goals? What you do and how you do it play a significant part in your overall asset management plan. Ask yourself: Are we staffed to support the success of our overall plan? Do we have the skills to perform the work that needs to be done? Are we operating as efficiently as we can?

The following are key steps to consider when "getting started":

- **Organizational assessment** – Are you using best industry practices to manage assets, and do you have the organizational capacity to support them long term?
- **Technology assessment** – Are your systems deployed to support your asset management goals? Are they current versions?
- **Identifying opportunities** – Where can you improve quickly with a big impact to start showing significant return on investment?
- **Developing your strategic plan** – Determine where you want your organization to go, and build a plan to get there. Remember, asset management is a journey, not a destination. The plan will evolve, and you need to think about very long-term objectives.
- **Establishing your data plan** – Data is the basis for supporting asset-based decisions. Make sure your data is complete, clean, and maintained.
- **Building your implementation plan** – This may be several plans, ultimately, which are project-specific that answer particular objectives of your strategic plan.

See next page for an example of a "Getting Started" organization.

Massachusetts Department of Transportation (MassDOT)

Highway Division

MassDOT implemented an electronic work and asset management system for its Highway Division using Maximo.

District offices throughout the state had disparate systems to manage planning and maintenance activities; no comprehensive electronic inventory was available for many asset classes. MassDOT required a system design/asset hierarchy that allowed for rapid and significant growth.

MassDOT partnered with EMA to implement its centralized asset management database system, replacing the paper-based systems used at Division districts.

With very limited electronic data available, data templates were created for various Maximo objects (assets, locations, signs, signalized intersection assets, personnel, etc.).

Asset and location hierarchies to support business processes were established in workshops with core team members; hierarchies were designed to ensure future data classes could be incorporated easily and maintenance costs would be visible at all levels (asset, depot, district, and division).

Standard work practices were established by building statewide consensus with districts to have one usable system. District-level training supported the seamless transition to the new system and reinforced use of new standard work practices.

Next steps: inventory management, mobile work management, bridge and tunnel work order management, additional asset and location data loading, and replacement of a legacy fleet management system with Maximo for Transportation.

Project Benefits

- Plans and schedules work in a centralized system for the first time
- Costs can be assigned to specific assets/locations, which provides MassDOT with the actual cost of performing maintenance activities
- True cost of ownership can be computed in the different districts for different asset types
- District directors have access to work being performed in the field
- Districts can forecast resource needs with their work order and preventive maintenance data, which has resulted in expanding the maintenance workforce in some districts
- Better maintenance practices support the long-term sustainability of the public's infrastructure and also enhance the public's perception of the Department

For more information, please contact Brian Schrantz at bschrantz@ema-inc.com.

Key at any point on the path

is recognizing three essential components to your program: Organization, Practices, as well as Technology (O-P-T). It's an approach we've followed for decades that acknowledges best work practices and organizational development as fundamental elements that help you fully leverage your technological capabilities and support the success of your overall plan.

City of Scottsdale Water Resources Division

Redefining Operations Through Optimization

by Larry Jentgen

In 2010, the City of Scottsdale, Arizona, Water Resources Division (Scottsdale) embarked on an operations optimization project to implement a new organizational structure, business processes, and technology to bring all utility operations – water, wastewater, reclaimed water, water quality, engineering, planning and scheduling, and others – together under one holistic system of operation.

"We've created a guide and framework for the future of this entire organization," said Dave Petty, Water Resources Administrator. "We've coordinated all of our efforts from our different groups to define how we operate as a Division for at least the next 10 years."

The project is ongoing with organization and process changes well established and technology now in place that enables Scottsdale to leverage its new capabilities.

About Scottsdale

Scottsdale manages several complex water systems that include potable, reclaimed, and irrigation water treatment and tranmission, as well as wastewater reclamation. Historically, Scottsdale viewed and managed these systems separately but recently recognized the need to consider them as interrelated, as changes in one system affect the others.

The utility manages 87,000 accounts (more than 90% residential) within its 185 square mile service area. Their water supply is a combination of surface water, groundwater, and reclaimed water resources.

The reclamation system operates two treatment facilities and an Advanced Wastewater Treatment facility for additional treatment of reclaimed water before it is recharged. Scottsdale also sends reclaimed water via its designated distribution system to more than 20 local golf courses for irrigation.

Scottsdale partnered with EMA to build an operations optimization program to increase efficiency, reduce costs, enhance planning and resource management, and address succession planning needs. To date, the program also has enhanced water quality and improved system reliability, ensuring the best overall value for Scottsdale's customers.

Early Steps In Optimizing

As Scottsdale started its optimization project, it did not have a system operations center in place; the different systems had minimal interaction.

"Departments operated pretty much autonomously," said Scott Anderson, Engineering and Planning Project Manager. "There wasn't anybody looking to operate all the systems in the most efficient manner."

Planning was of critical importance in this project and set the stage for successful execution of its Deployment Plan. Scottsdale worked with EMA to form a team from all groups in the Division to participate in business modeling workshops that would define the utility's vision and conceptualize new ways to operate the water systems from a single, strategic system perspective.

Key Project Drivers

- **Effective management of complex water systems** to meet unique regulatory mandates, contractual requirements, regional commitments, and sustainability goals
- **Reliance on several raw water sources** that have substantially different cost structures, quality constraints, and sustainability impacts
- **Provision of secure, high-quality water service delivery** in a challenging service area with significant elevation changes
- **Rising energy costs** for treatment and delivery that drive up operational cost
- **Key staff retirements** that make knowledge retention and transfer critically important
- **Improved communication and collaboration** between Division groups as well as support functions to eliminate work siloes and help the utility operate more effectively

Development of a Vision Statement helped all staff understand the goals and direction of Operations optimization at Scottsdale. The statement reads: ***Optimization is innovative operations providing unmatched customer service at a best value while ensuring a sustainable, secure, high quality water supply with a collaborative professional workforce.***

"We had to identify our key processes and do a lot of reverse engineering," said Chris Hassert, Engineering and Planning Director. "Key people were at the table, walking through how our process works. This was needed because everyone had a different idea on how our process worked."

The team had to understand existing processes to determine what was not working and how to proceed with new processes that would satisfy the new vision. Strategies for these new ways of operating focused on five "priority categories":

- Institutional Knowledge
- Operating Strategies
- Interdepartmental Coordination
- Water Quality
- System Reliability and Customer Service

Strategies addressed three key aspects of the utility: Organization, Practices, and Technology.

New Ways to Work Together

Organization, process, and technology components of the project were mapped out based on business process modeling that occurred in team workshops. These early efforts helped to eliminate work siloes and adopt a more collaborative approach toward Operations. An important part of this new way of working together was the formation of the weekly Optimization Group meeting, which included representation from all functional areas of the Division. These meetings continue today.

"The group talks about what's going on in the system," said Suzanne Grendahl, Water Quality Director. "Every aspect of what we do is represented at that meeting, and everyone can speak to how things impact them. It's created a holistic team atmosphere."

New work processes were defined and positions were created to begin improved ways of operating. Key positions included Water System Analysts, who staff the new system Control Room, and the Water Systems Advisor, who oversees the entire optimized system and facilitates the use of new technologies. With these components in place, the utility began to operate under the new structure. It was significant, immediate change. The organization and process changes, which now have been in place for two years, set the foundation for the new technology that followed.

Technology's Role in Optimization

Scottsdale's goal was always to create a single program to manage operations proactively, making full, strategic use of operational data.

"Technology will help advance this program from the standpoint that any water system generates a phenomenal amount of data, especially one this large," said Steve Rot, Water Systems Advisor. "To be able to convert that data to usable information in order to better monitor, manage, and predict system operations and make them more efficient is what the project is all about."

The thought behind the solution at Scottsdale was that strategic operations of the water, wastewater, and reuse water systems would require a single coordinating point that views the entire system – from potable water resources, wastewater treatment, and reuse processes to water quality, customers, and their needs.

The technologies required to implement this optimization system consist of a collection of individual business process functions and software programs integrated into a holistic system. (Figure 1)

Software components include the web-based Utility System Operating Plan, data repository, water consumption/wastewater generation forecasters, water quality analyzer, water production and water quality optimizer, water system simulators, maintenance and construction coordinator, and an Operations Wiki.

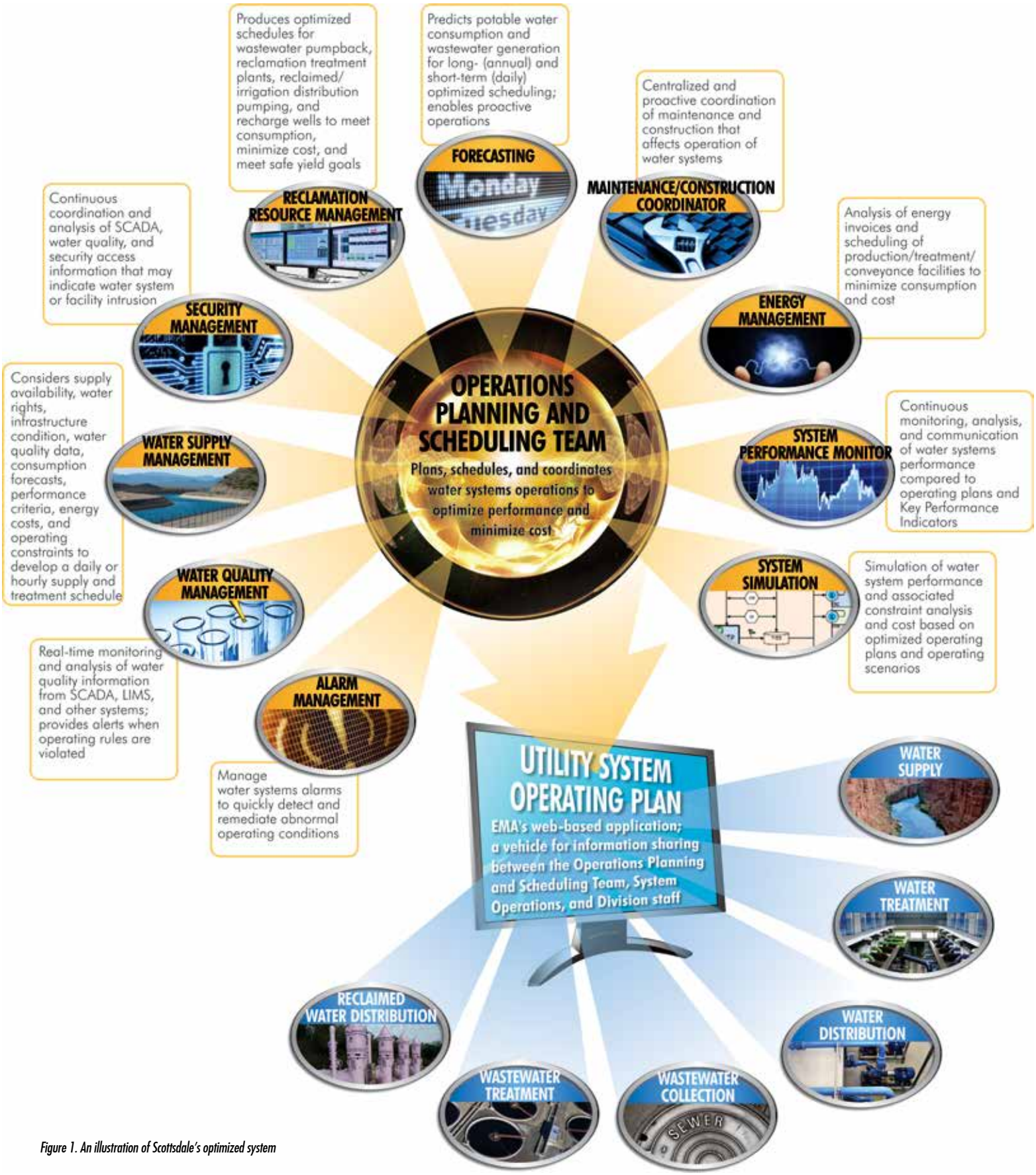


Figure 1. An illustration of Scottsdale's optimized system

Operations Planning and Scheduling

The central point where all the data comes together is the Operations Planning and Scheduling function. This is the heart of the system, consisting of both the Operations Planning and Scheduling Team and software programs, which process the data to develop an optimal Utility Systems Operating Plan on a daily, weekly, or even annual basis, for use by Operations staff.

Utility System Operating Plan

Scottsdale's Utility System Operating Plan is a web-based application for long- and short-term Operations planning, scheduling, and analysis. The Plan also enables sharing of system operations information between Operations Planning and Scheduling, Water System Analysts, and other Division staff.

"This web portal contains all the information and the plan," said Art Nunez, Wastewater System Director. "If somebody wonders about the potable water produced yesterday, there will be one simple place to go and look."

Plans are produced by the Operations Planning and Scheduling function with input from Division staff who help to synthesize the incoming data and the Water System Analysts, who staff Scottsdale's newly created System Control Room 24 hours a day, 365 days a year to monitor performance of the systems and make any needed adjustments to maintain secure and economically wise performance.

"The System Control Room is a big improvement," Nunez said. "While other cities have Control Room operators who kind of keep an eye on things, we established the Water System Analyst positions with a higher level of qualification and expectation so they understand the entire system and how all our sites work together. Our system is very reliant on that.

"The city is 38 miles long," he added. "We can move water and wastewater throughout. It's very helpful to have someone on hand around the clock who understands how it all works."

This is critical when working with key customers, such as the more than 20 area golf courses who require reclaimed water on a nearly continual basis. These clients communicate with the System Control Room several times a day to place orders for water.

"It's a pretty massive system just for reclaimed water distribution," Nunez said. "It's a 14-mile pipeline going out to these courses, moving water uphill about 1,500 feet and at 150 psi. If there are any issues, the golf course superintendents – our customers who pay for the service – have the phone number to the Control Room where there's a person looking at the screen who knows the system and can answer their questions."

Benefits Realized and Anticipated

As Scottsdale continues to leverage all the capabilities of the Utility System Operating Plan web portal, they already have realized many tangible benefits from the project. (See sidebar "Realizing Big Project Benefits")

"It's no longer just about how we can operate the system to produce enough water to meet customers' needs but how we can produce water that improves quality throughout the entire system," Rot said. "A good example is our constant monitoring of DBPs (disinfection bi-products). That was done before, but now we're managing it as an entire system."

The entire system already has improved customer service, helping to hold down rate increases for customers through cost savings, maintaining high water quality, and effectively meeting the needs of the area golf courses.

"These are high-end, exclusive golf courses that are the economic engine of the City," Petty explained. "Providing them with a reliable, almost guaranteed, uninterrupted supply of water and having them understand when we do have to take down the system, we are going to give them plenty of notice through

Realizing BIG Project Benefits

Saving Money, Holding Down Rates

"Within the first year, just working with one vendor, we were able to generate a $300,000 savings. That's real money, and it goes a long way toward helping us avoid rate increases. That's very meaningful to our customers. We also know that organization-wide, we've had considerable savings in overtime, but we haven't been able to fully quantify that yet."

– Dave Petty, Water Resources Administrator

Enhanced Water Quality

"We're much better at looking at things globally. If you do this over here, but it has a spin-off effect over there, we're talking about that ahead of time and planning it out, and we've been able to steer away from some water quality impacts before they happen.

In everything the Division does there's a water quality component. A lot of care was taken to understand what we needed. All data will pass through the Water Quality Analyzer, where parameters are set to look for any anomalies or anything that may hit in excess of what we set. So it will flag us. Every 24 hours all our data is going to get analyzed."

– Suzanne Grendahl, Water Quality Director

Reducing Overtime and Callouts

"Since starting the Control Room, we've seen about a 33% drop in overtime callouts. Instead of staff getting paged in the middle of the night, coming in, driving out to a site, finding a pump failed, and turning on another one, the Water System Analysts can do that remotely. The goal is to be more proactive and predictive. Technology feeds the Water System Analysts more information and allows us to make better predictions about what the demand is, what the needs are going to be, and how the system will react. There's a lot more coordination of system operations, and that's created less opportunity for error, less impact to customers, and greater system reliability."

- Steve Rot, Water Systems Advisor

Improved Communication, Fewer Surprises

"If we're working on a capital project and are able to communicate with the Optimization Group and know how a project can affect part of the service area, they can make adjustments. Everyone knows what's going on ahead of time. There are fewer surprises."

– Chris Hassert, Engineering and Planning Director

Data-Driven Planning

"Looking at the forecast and historical information, based on current status and on projected demands, I will have a good idea of how much water the golf courses are going to need for a given day. That helps me in my planning and how I run the system."

– Art Nunez, Wastewater Services Director

More Collaboration

"The departments are more collaborative. Now when we make changes in the system, they're more deliberate with the idea of how it's going to affect the system as a whole. We couldn't do that without everyone at the table talking about the most efficient way to do this."

– Scott Anderson, Engineering & Planning Project Manager

the planning process – it's invaluable. Every day for them is critical for water on the grass. They're a big stakeholder of ours, and they've seen benefit out of this process."

Additionally, increased communication between Division groups has led to a more collaborative approach toward Operations where, according to staff, "all heads are now at the table" having discussions that offer a variety of solutions to challenges, improving overall Operations, and creating "a great team atmosphere."

It is also anticipated that the new, optimized system of operation will help recruiting efforts, according to Petty. "We're hoping we're going to be the employer of choice," he said.

Positive Culture Change

As Scottsdale staff continue to learn how to fully leverage their new, optimized system, many readily admit the changes now in place have transformed the utility's operating culture.

"We knew we had siloes and had to take down the walls and integrate our groups to really operate efficiently," Petty said. "Formation of the Operations Planning and Scheduling Team is what accomplished this goal. This is a huge improvement in how we operate. And our new operating system has given us the ability to maximize the use of our resources. That will help us realize big benefits both for the Division and our customers."

For more information, please contact Larry Jentgen at ljentgen@ema-inc.com or Brad Callihan at bcallihan@ema-inc.com.

See You at ACE14!

June 8 - 12, 2014

Join our experts at AWWA's Annual Conference in Boston, where they will participate in the following presentations:

Professional Program:

MON02: ***Achieving Resilience - How to Make It Happen***

Room 204B

2:00 PM - .01 Action Plan for Security Process Control Systems

Kevin Morley, AWWA
Bob George, EMA, Inc.

TUE03: ***Best Practices in Customer Service***

Room 204B

10:30 AM - .04 Building for World Class at Detroit Water and Sewerage Department

Sue McCormick, Detroit Water and Sewerage Department
Brian Hurding, EMA, Inc.

WED18: ***Visioning and Planning for the Future: Tools to Help Develop and Leverage Your Business Strategy***

Room 258B

2:30 PM - .02 Leveraging Business Strategy for Leadership Transition at Minneapolis Water

Glen Gerads, Minneapolis Water
Terrance Brueck, EMA, Inc.

WaterRF Research

Web Tool Changes Will Enable More Sharing of Best Maintenance Practices

by Shiv Iyer

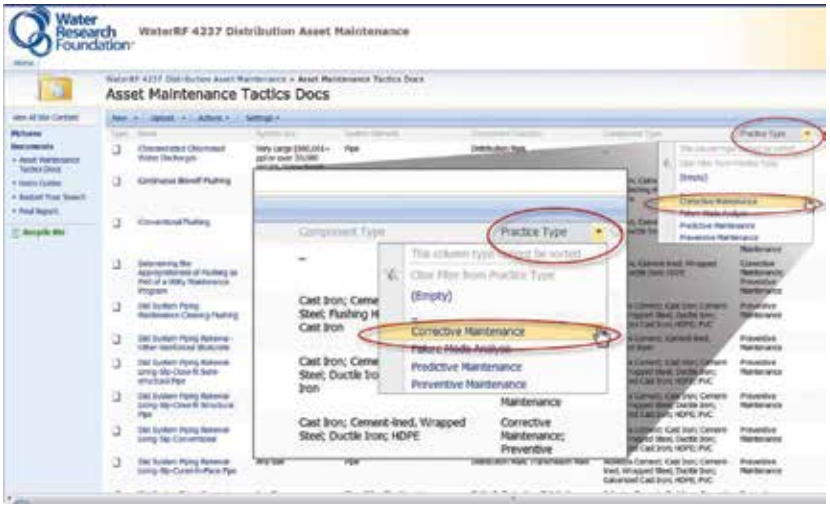
Work is under way on Phase 2 of the Water Research Foundation (WaterRF) and Environmental Protection Agency project "Best Management Practices for the Maintenance of Water Distribution Assets" (Project 4237). Research, led by EMA, will enhance the best maintenance practices web tool developed in Phase 1 of the project, giving users greater flexibility and more opportunity to interact with the Best Maintenance Practices (BMP) web tool.

Project Background

In 2010, WaterRF commissioned EMA to conduct a study to address the need within the industry for a comprehensive evaluation of maintenance practices for water distribution systems. The project was designed to help the water industry improve reliability, efficiency, productivity, product quality, cost-effectiveness and service to its customers. During Phase 1, a single reference point was created to consolidate BMPs to support utilities in their efforts to reach desired levels of customer expectations in service, reliability, and water quality.

Research results were to fill the void present in the industry and provide utilities with "how to" tools and reference materials regarding BMPs they could use within their organizations. The study also promoted a forum for ongoing sharing of BMPs.

EMA developed a website using SharePoint, which contains consolidated BMPs identified and vetted by utility study participants, expert panel members, and project team members. Each BMP contains an area to describe how maintenance strategies and practices relate to risk, criticality, life cycle costs, condition assessment, capital reinvestment, and related aspects of asset management central to the BMP identification and selection process.



Example of WaterRF's best maintenance practices web tool

Phase 2 work began in April and focuses on web tool enhancements to enable select users to update existing BMPs and submit their own BMPs for review and inclusion on the project site. The Phase 1 report and individual BMPs will be available for all to use in Fall 2014. More details on Phase 2 to follow.

If your organization has best maintenance practices to share or for more information, please contact Shiv Iyer at siyer@ema-inc.com.

Project Objectives

1. Build on recent information about asset management, maintenance, and optimization of operations to consolidate BMPs for maintenance of water distribution system assets in a single document called the BMP Guide
2. Identify BMPs from utilities and literature for achieving improved levels of service
3. Discuss how maintenance strategies and practices relate to risk, criticality, life cycle costs, condition assessment, capital reinvestment, and related aspects of asset management
4. Create a website where water industry professionals can review and comment on the practices and apply practices to their organizations

Cybersecurity Myths

by Bob George and Rafael Alpízar

MYTH 1: *I don't go to dangerous sites, and I check my links, so I'm safe.*

Reality: Your browser is the biggest vulnerability. Most recent attacks take advantage of weaknesses in browser-related technologies to compromise your system. Simply visiting a compromised website may be sufficient to allow an attacker to gain control of your system. As if this

weren't bad enough, many legitimate sites are compromised and become sources of infection. Avoid accessing the web from protected systems behind your firewall.

MYTH 2: *All my virus detection software is up to date, so I'm safe.*

Reality: Currently, virus detection software only detects known virus signatures. Any new or self-mutating virus would escape detection from most current virus scanners. Researchers estimate that 30% or more of virus signatures in the wild are currently not detectable by most commercial scanners. But in addition to threats by a virus, computer users face other malware types like worms, root-kits, denial of service, social engineering attacks, etc.

MYTH 3: *Infected computers display nasty messages and are very slow.*

Reality: The most dangerous hacker is not the one who wants to put a joke or a skull on your screen; it's the one who stealthily works to take control of your computer and cause damage to your equipment or steal information they can use for their profit. This type of hacker works to ensure that their activities are not noticed by you.

MYTH 4: *Our systems are proprietary, so hackers don't know the communication protocols.*

Reality: The protocols used in SCADA and process control, even proprietary ones, are well understood, and information about them – including vulnerabilities – is widely disseminated. "Security through obscurity" doesn't work. Sensitive systems must be protected.

MYTH 5: *We have a firewall. We're in good shape.*

Reality: A well-designed firewall can provide significant protection from external threats and block access to known malicious sites. However, most cyber-security assessments indicate that the greatest cyber threats are associated with the behavior of people and systems within the firewall. "Authorized" users doing legitimate work are often the biggest vulnerability.

MYTH 6: Our systems are totally disconnected from the Internet, so we don't have any risk.

Reality: Internal threats post the largest threat. Users working inside your firewall with laptops, USB drives, and removable media that have been exposed to malware are a huge threat.

MYTH 7: Hackers are not interested in water and wastewater systems.

Reality: One of the goals of some foreign cyber terrorists is creating a lack of confidence and sense of vulnerability in the infrastructure systems in the United States. Affecting the operation of either water and wastewater systems (or even creating the appearance that the operations have been compromised) is a tangible means to achieve those goals. To make matters worse, spammers may simply want access to your systems in order to send bulk email. Botnet operators want to use your machines to attack others. Even if they don't know or care about SCADA or PCS, attackers are after your systems.

MYTH 8: We trust our vendors and integrators to implement safe systems.

Reality: The hardware and software components necessary to protect computer systems adequately are fairly costly and take significant effort to implement. Unless your purchasing documents specify these items, the contractor will not normally provide them, especially in a cost-competitive environment. As with most things in life, you get what you pay for.

MYTH 9: Our cybersecurity is handled by our IT department. It's too complicated for management to get involved.

Reality: Setting up the proper technology tools to provide cybersecurity protection represents only the fundamental aspects of an effective cybersecurity program. Formal policies and procedures, such as a written cybersecurity plan, are necessary to ensure that the executive team sets the risk level that is appropriate in physical and operational areas of the organization and that management and staff adopt and extend these policies to establish a unified security posture. A key part of this posture is to ensure that staff is trained and aware of security risks. Additionally, management must actively support the cybersecurity program in a visible manner. Generally, people only do the things that are important to the boss.

MYTH 10: We don't have the money to implement a cybersecurity program.

Reality: Cybersecurity can be implemented in a cost-effective manner. And, as the saying goes, "an ounce of prevention is worth a pound of cure." Executive teams should be aware that the absence of cybersecurity exposes their organization to significant risk. Mitigation, transference, or avoidance of risk via a security program is a cost-effective way to manage the organization's risk.

So what's the answer?

Every utility should develop a comprehensive cybersecurity program that addresses not only the necessary technology-related aspects, but also the policies and procedures required to protect their infrastructure in a sustainable manner. A sound first step in setting up or revitalizing your security program is to use the AWWA Cybersecurity Guidance Tool, which EMA helped to develop. This tool will provide your utility with a prioritized list of recommended cybersecurity controls.

The tool is available on AWWA's website at www.awwa.org/cybersecurity.

For more information about the AWWA Cybersecurity Guidance Tool or cybersecurity in general, email us at info@ema-inc.com.

EMA, Inc.
2355 Highway 36 West, Suite 200
St. Paul, MN 55113-3819

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