Smart Water Summit 2019

A Digital 360 Summit Series
White Paper

By

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Smart Water Summit 2019 Addresses the Needs to Bring Infrastructure into the 21st Century

Beginning in the mid-1800s, the Industrial Revolution drove modern utility infrastructure into cities worldwide, installing wires, poles, transformers, lighting, water and wastewater pipes, pumps, tanks, and lift stations. By mid-20th century, the infrastructure surge peaked as the Interstate Highway System paved its way across America. Rural electrification and water systems expanded. A comfortable complacency settled in as infrastructure hummed along, cities grew, suburbs expanded, and devices inevitably aged with use.

The original infrastructure – electric grid, water and wastewater, gas, and roadways – laid the foundation for the Space Age, the Computer Age, and the still-evolving Information Age, which has morphed into the emerging Cloud-Analytics-Blockchain Age. Now in the early 21st century, much of the original infrastructure has exceeded its life expectancy.

The aging of America's infrastructure is well established. The American Society of Civil Engineers (ASCE) 2017 report gives US infrastructure a D+ grade. Water specifically gets a D in the report, with many pipes 100 years old still in use. Astonishingly, wooden water pipes have been unearthed and still in use in Pennsylvania, DC and Washington State. We exist in an exciting but challenging transitional age between aging and emerging technological paradigms characterized by IT/OT convergence.

Today, a new layer of intelligent, sensory infrastructure is being overlaid on and added to assess, monitor, and manage new and older physical infrastructure. Intelligence embedded in chips is becoming highly concentrated, pushing automated decision-making out to the edge of previously one-way, dumb infrastructure.

The rollout of digital, or virtual, infrastructure is evolving at such a feverish pace that once cutting-edge Advanced Meter Reading (AMR) is already being outpaced and overridden by Advanced Metering Infrastructure (AMI). Following a few years behind electric utilities' experimentation with and implementation of these technologies, the water-wastewater industry is now undergoing its own digital integration and transformation.

In August 2019, the 6th annual Smart Water Summit, hosted by Aroga Summits and CMG Consulting, convened with several hundred industry executives, managers and vendors in Scottsdale, Arizona. The summit sought to accelerate the drive to bring US water infrastructure into the 21st century.

With heavy emphasis on adding digital IoT sensors, cloud technology and analytics to water infrastructure, dozens of hardware and software vendors pitched their products and services in closed, 20-minute 'boardroom' sessions to industry executives and managers from ninety-one utilities across America.

Designed around real-world use cases, vendor pitches sought to inform and reassure normally risk-averse utilities that, like their equally cautious electric and gas brethren, the time has arrived to experiment with and implement new digital, intelligent hardware and software technologies. Just as smart phones and computer operating systems exhaust their usefulness and vendor support, so utilities will need to embrace new tech to stay current and relevant.

Informational Vendor Pitches to Raise Utility Awareness

Education is important because, as Dave Shpigler, Senior Consultant with CMG pointed out in his "State of the Market and SWS Utility Profile" keynote address, "many utilities come away from these conferences and say, 'we didn't know that was possible; we didn't realize that product was out there.'" Raising awareness of new products and services accelerates thinking and adoption of new technologies, Shpigler emphasized.

Conveying results of a recent CMG survey of industry executives and directors, Shpigler further advised vendors that, in their pitches to utilities, they would be wise to prepare to respond to statements and questions such as, "Your product sounds intriguing, but how are you going to get me there?" "How will this integrate with my existing or legacy system?" "How will I decide whether to retrofit or replace my current system or devices?" "We're a small utility, how can I fund this?" And lastly, "Are you going to be around after you install or implement your product or service?"

Flipping the question around, Shpigler asked utility attendees during a breakfast keynote presentation, "Who's driving the bus here, the vendors or you? He advised the utility audience that "Vendors love to be proven wrong; tell them what they're missing."

Shpigler emphasized to both vendor and utility members that the biggest benefits of intelligent, digitized smart water technologies (IoT sensors, Cloud, AI, 5G/LTE, blockchain, etc.) include significant enhancements in the following infrastructure and processes:

- AMR to AMI transition
- Leak Detection
- Data acquisition and analysis
- Communication infrastructure
- Meter data management

What's Understood is Important; What's Not, Isn't

Citing further CMG utility survey results, Shpigler stressed a finding revealing that, when it comes to which technologies are considered important among utility executives and directors, "what's understood is important to them; what's not, isn't."

That is, to execs and managers, topics such as meter reading, aging infrastructure, and leak detection are considered important priorities. On the other hand, smart cities, IoT, Artificial Intelligence (AI) and Augmented Reality (AR) are not at present considered priorities. The implications of this finding effect where a utility may target budgets, research, and time, at the expense of emerging technologies that could prove highly beneficial to them over the longer haul.

Urging vendors to embrace these findings, Shpigler suggested they "translate vendor product features into dollars and cents, into the operational impact and language that the utility understands."

Reassurance to a Cautious Industry

If education is important, why the need to reassure utilities about trying new technologies?

Water utilities are usually tied to municipalities with their incumbent layers of bureaucratic red tape, budgetary constraints, and chain of command decision-making and approvals. Further, public utilities are traditionally focused on safety, reliability, and affordability. There's a lot on the line. Their job is to keep the lights on and the water flowing. Moving data and operations into the mysterious "cloud" is seen as risky.

Commenting on why water, like electric and gas utilities, resist change, Dr. Jason Wen, Director of Water Resources with the City of Lakewood, California, speculates that "Our number one job is reliability. We provide a basic service and, traditionally, don't want to take risks. Also, we don't have competition. Everybody's a monopoly. You have a fixed customer base, provide an important public service, and so have little incentive to take risks and potentially disrupt existing processes. This is the nature of this industry." In Texas, the mentality is often summed up with the phrase, "If it ain't broke, don't fix it."

Another major reason utilities hesitate to move data, much less operations, to the cloud is the fear of losing control over data and of potential hacking into systems. Many are aware of the 2015 Ukrainian electric grid hack and the Maroochy Shire online sabotage of sewage systems in Australia.

Vendors attempted to alleviate these concerns with assurances that utilities do in fact retain full control over their own data, especially when migrated to major cloud providers like Amazon Web Services or Microsoft Azure. These cloud service providers are heavily invested in data and network security. However, it was emphasized that utilities should air-gap their operations side for the foreseeable future.

Pitching Potential Utility-Vendor Partnerships

For two full days, in approximately 20-minute rotating shifts, vendors seeking to partner with utilities stood before small groups of industry professionals. These utility reps were sorting through the complex landscape of new innovations to find the right technologies to integrate into their unique work environments. Vendors delivered PowerPoint presentations and, in some cases, live demonstrations of their products and services. Q&A followed. Business cards were exchanged. Follow-up conversations and networking occurred over meals and happy hour beverages.

Vendors represented much of the water utility value chain. Products included acoustic sensors and correlating loggers for leak detection; non-revenue water loss reduction tools and strategies; LoRa-certified AMI smart meters; smart registers for data collection and logging; advanced pipe condition assessment tools; GIS software; intelligent valves and wireless fire hydrants; AI-based asset management software; CIS system software; water purification chemicals.

Services included cloud-based, analytic SCADA managed services; distribution management systems; broadband wireless and RF communication systems; pre-paid metering and hosted software billing systems; deployment and fields services; data analytics and optimization services; augmented reality (AR) training systems; planning & implementation consulting; AMR-to-AMI transition services.

One vendor observed that many utility representatives present were executives, managers and directors, who of course knew their business well, but not necessarily the technical aspects and capabilities of new digital technologies. He observed that usually an instrumentation automation engineer knows the software side. The vendor suggested utilities send or bring along IT staff to help sort through and assess product offerings.

Discovering this apparent disconnect, the vendor "quickly changed my presentation from highly technical to more general." He had intended on giving a technical talk about his product, but instead summarized his pitch into five different categories. Rather than technical details, he highlighted value propositions of specific interest to managers – cost, risk, security, integration, and comprehensiveness.

That last category, according to the vendor, means that products and services be bundled by one provider. Is everything included? How easily will the products be

integrated into the utility's existing systems? Will the vendor be around to provide support? This vendor maintains that utilities don't want and shouldn't be continually "nickeled and dimed for additional components and services."

The vendor demonstrated specific areas of innovation provided by his company's software. These included on-demand reporting, demand trending, and data analytics. To satisfy other attendees in the room, the vendor showed how the software works on a click-by-click basis, which is exactly what representatives from another utility with the City of Atlanta wanted to see; how this software works on a screen-by-screen, menu-by-menu, click-by-click basis.

Other vendors demonstrated Customer Information Systems (CIS) that automated billing, payments, complaints, and notifications. Utilities clearly want to see that any new technology introduced into their current staff and systems can be fairly easy to integrate into their existing systems and staff. Several utilities asked if vendors provided staff training.

Another SWS vendor pitch demonstrated software that tracks and displays flow rates and run times on demand, which could involve water, chlorine, pumps, from any point in the system into which the utility wants visibility.

For their part, several utility reps observed that they were at the summit drinking from the proverbial water hose, pardon the pun, simply learning what was out there and gathering information to take back to their supervisors and chains-of-command. Vendor-utility connections were clearly made at the summit. One large municipal Director of Water Services stated that he was pleased with products procured from previous SWSs.

Keynote Presentations

Along with David Shpigler's keynote presentations on the CMG utility survey, Dr. Massoud Amin, Professor of Electrical and Computer Engineering at the University of Minnesota, provided a thought-provoking dinnertime examination of utility security issues in his presentation "Continuity and Change: Assuring Proactive Security Among Automation and Digitization."

Amin emphasized the "interdependencies between critical infrastructure" and advocated for a mindful approach to digital deployment," stating that "we don't fully understand the ramifications of new technology implementations." Citing previous cyber-attacks on critical infrastructure, Amin urged a security-by-design approach to digital transformation that incorporates *principle component analysis* (PCA) and *chaordic leadership* into a "holistic solution" on which to build and deploy new critical system implementations.

Other keynote addresses were provided by industry experts on the following topics.

The Water Utility of the Future by Travis Smith, Director of Smart Water Strategy, Sensus

We Got Smart…Are We Any More Intelligent? by Ian MacLeod, VP Marketing, Master Meter

How to Build the AMI Business Case by Dave Shpigler, Sr. Consultant, CMG Consulting, LLC

Continuity and Accountability: Long Term Success of a CIS Implementation by Scott Van Dam, Business Development Executive, Vertex and Thomas Kuczyinski, VP of IT, DC Water

Conclusions

The state of the Water Utility Industry is still in the 20th century. The focus is still on AMI, asset management and leak detection. Moving at glacial speeds from AMR to AMI, only less than 1/3 of the 52,000 plus of them have done it. The lack of integrated asset management platforms/tools keep them hustling for drip, drip style improvements. And the fact that US water utilities waste the entire consumption of California annually make for a long and painful headache that asks why? And how much longer until we get serious about it? The annual water consumption from the State of California is around 37 million acre-feet. The losses come from main breaks across that nation.

Vendors selling technology solutions to water utilities are pushing hard to overcome a risk averse decision-making population that lacks the knowledge, understanding and comfort of digital transformations. The available solutions are superb, but water utilities lack imagination and courage to take the plunge. Those that have done it are seeing great results on their investments as they move more and more towards a full digital reality.

And while AMI, Asset management and leak detection are the current focus of hesitation and long planning cycles, the revolutionary new technologies like Artificial Intelligence, Machine Learning, Deep Learning, Blockchain, Augmented Reality and Virtual Reality are barely explored and understood.

The opportunities for water utilities to increase customer engagement and satisfaction while reducing water waste and water losses is around 40% of their capital and operating annual expenses over a 10 to 20-year depreciation period. The future looks bright for water utility management that embraces technical solutions and process innovation.

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