The Voice of the Utility
American Water Works Association - ACE 2018

Booky Oren
Chairman & CEO, Booky Oren Global Water Technologies

June 13th
The water industry tends to make very little effort to listen to the voice of the customer.

Part of the problem is that many suppliers don’t know who their customers are: any number of independent sales reps, agents, distributors, systems integrators, engineers and contractors stand between them and the end-users of their products.

Companies trying to sell into the water market always complain that the sector is too risk-averse to take innovation seriously, and they complain about long sales cycles. Could the fact that they don’t really know who wants stuff be a bigger problem?
The “Un-invented Technologies” Sessions, 2016 - 2018

Already 20 utility leaders in 4 different events.
The next event will be the AWS in October, Philadelphia.
Connecting with Utilities

- THE VOICE OF THE UTILITY
  - Project targeted at identifying the specific needs of mid-size utilities
  - Utility characteristics
    - Population
    - Capability
    - Culture
Connecting with Utilities

THE VOICE OF THE UTILITY

- Engage 10 utilities in the process: 12/31/2017
- Meet with utilities & guide them to identify challenges: 2/28/2018
- Develop presentation for delivery in ACE18 forum: 6/14/2018
10 leading mid-size utilities from all around the country - The 10 ACEs
Key Outcomes:
THE VOICE OF THE UTILITY

• “Wish list” of mid-sized utility needs
• Forum allows solution providers to directly hear the voice of the utility
• Solutions implementation
• Ongoing, collaborative process
Booky Oren
Multidisciplinary Milestones Along the Water Stream
Creating “Bridges Over Troubled Waters”

The Global Water Partnership Hub is Active in Hundreds of Ventures Globally
Introduction to the 10 ACEs Participating in Today’s Session
What Makes Mid-Size Utilities Unique?

• May have limitations in
  – Funding
  – Staffing/workforce
  – Technical, managerial, and financial expertise

• Size may benefit
  – Options for funding
  – Flexibility, ability to embrace change
  – Less infrastructure to manage
Accumulative Size Can Benefit!
Few facts and Figures of Today’s Panelists

- >2,500 served customers
- >826 MGD of supplied water
- >8,400 mi of water pipeline
- >187 managed facilities
- >56,800 hydrants
- >200 MGD of treated wastewater
- >2,880 mi of sewer pipeline
- >680,000 water meters
Most of the Utility Challenges are Unique

<table>
<thead>
<tr>
<th># of water utilities who share the same challenges</th>
<th># of challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
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<tr>
<td>3</td>
<td>2</td>
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<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>32</td>
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<tr>
<td><strong>Total challenges</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

It is recommended to listen to the voice of the utility!
Focusing on the Utility Leaders
In Our Session Today (cont.)

Carrie Lewis
Maine

Jason Wen
California

Robert Pelham
Florida

Bill HagenBurger
Arkansas

Kara Boyles
Indiana

...The 10 ACEs
Voice of the Utility: “Unsolved Challenges”

Ted Corrigan
Chief Operating Officer
Des Moines Water Works

• Private water company formed in 1871
• Independent water utility since 1919
• Governed by Board of Trustees
• 3 treatment plants
• 1 infiltration gallery + 2 river intakes
• 3 ASR wells
• 1,400 miles of pipe
Des Moines Water Works

- Regional utility for 500,000 customers (one-sixth of Iowa’s population)
- Urban, suburban and rural customers
- 6 of the 10 fastest growing cities in Iowa
- Average day pumpage: 45 million gallons
- Peak day pumpage: 96 million gallons (July 2012)
- Total watershed area: 10,000 square miles
Source Water Nutrient Loading

Challenge:
- Rising nitrate concentrations
- Health effects
- Inability to regulate land use practices
- Limited removal capacity
- Growing waste stream discharge regulations

Solution: New technology needed to keep the nutrients on the landscape where they can satisfy their intended use
**Source Water Cyanotoxin Contamination**

**Challenge:**
- Emerging contaminant
- Significant health effects
- Limited removal capabilities
- Limited understanding of toxin concentration drivers

**Solution:** New technology needed to monitor for cyanotoxins (intracellular and extracellular) real time along with predictive models that will aide in source water selection and treatment planning.
Water Main Replacement

Challenge:
• Aging infrastructure
• Significant/increasing need due to condition/failure
• Limited capital funding for replacement

Solution: New technology needed to cost effectively rehabilitate cast iron pipe in residential areas
Prestressed Concrete Cylinder Pipe Assessment

Challenge:

- Existing facility with known corrosion issues
- Cost of replacing miles of transmission main
- Inability to identify hotspots excavation and destructive investigation
- Inability to assess extent of the problem

Solution: New technology needed to identify ongoing PCCP corrosion before pre-stressing wires break
Demand Forecasting

Challenge:

• Fastest growing metro
• Shrinking per capita demand
• Changing demographics
• Limited capital funding for expansion

Solution: New technology to accurately forecast long-term trends in both average day and maximum day demands
Thank you!

Q&A after the next four speakers!
Andrew Jackson

Gilbert Arizona
Voice of the Utility
Andrew Jackson, Water Manager
Gilbert Arizona
About our system

- 2nd Safest city to live in the U.S.
- One of the fastest growing communities in the U.S.
- 76 square miles
- 240,000+ customers served
- 1,300+ miles of water main
- 37,000+ valves
- 12,000+ fire hydrants
- 84,000+ meter accounts
- 2 surface water treatment plants- 93 MGD
- 18 groundwater well sites-37 MGD
- 16 storage reservoirs- 43 MGD
- 4 pressure zones
- 102 employees
Challenges requiring technology

- Leak detection
- Water main replacement
- Asset management
- Water quality
- Smart city solutions
Leak detection

Challenge:
80% of our distribution system piping is PVC

Solution:
Cost-effective technology to allow us to assess and identify leaks
Main replacement

**Challenge:**
80% of all system piping is less than 20 years old

**Solution:**
Technology that would allow us to model replacement strategy based on useful life, risk based analysis and main break data
Asset management

Challenge:
Leveraging copious amounts of asset data to drive and improve long-range infrastructure planning

Solution:
Software solution capable of driving business decisions through asset analytics
Water quality

Challenge:
Ability to optimize treatment process for efficiency and water quality to address DBP’s

Solution:
Software solution capable of analyzing real-time raw water quality data to reduce chemical usage and improve water quality
Smart city solutions

Challenge:
Converting to a Smart City solution that will work for all city departments that aligns with the city’s strategic initiatives

Solution:
Finding a cost-effective Smart City solution with flexibility, adaptability and sustainability in mind
Thank you!

Q&A after the next three speakers!
Where the Only Bad Idea is the One You Don’t Share

AWWA Annual Conference and Exhibit
July 13, 2018
Las Vegas, Nevada

Michael E. Hooker, Executive Director
Onondaga County Water Authority
System Statistics:

5 CNY Counties, 34 Towns, 15 Villages, 4 Cities, 102,840 Accounts, 500,000 People

94,659 Residential - 6,678 Commercial
50 Industrial - 18 Municipal Wholesale

2 Water Treatment Plants (20 MGD & 60 MGD)
47 Pump Stations
61 Storage Tanks (.5 MG - 30 MG)

2,131 Miles of Main - 13,284 Hydrants

175 Employees
Create and Deploy a Meter Reading Hub For Use by All Utilities

Electric Utility

Natural Gas Utility

Water Utility

Third Party Data Collection and Dissemination for Billing Purposes
Virtual GIS

One stop (affordable) shop for all buried utilities for use in both design and maintenance. A step beyond what your utility has already developed and deployed.
Identifying Lead Services
Without Digging Up the Neighborhood

*Composition, Not Just Location!*
Real-Time Non-Destructive Utility Locating

- Mobile solution
- Cost effective
- Utilize handheld devices, mobile platforms (tablets, phones)
- Reduce reliance on multi-agency record mapping and improve records
- Reduce unknowns during design, and expedite excavation during work or emergencies.
- Eliminate need to have each utility marked out separately.
- Identify unmarked conflicts before digging
Pump Visualizer

- Suite of sensor that can be applied to a pump (Vibration, noise, electrical)
- Basic data input (pump curve, pressures, shaft speed, impeller type, etc)
- Analyze operation of the pump and produce graphical analysis of performance
- Identify deficiencies
Where the Only Bad Idea is the One You Don’t Share
Thank you!

Q&A after the next two speakers!
Joan M. Arthur

City of Tulsa
Tulsa Metropolitan Utilities Authority: 
*Innovation to Implementation*

Challenges facing a mid-sized water and sewer utility in Tulsa, Oklahoma.
• Located in Northeast Oklahoma on the Arkansas River
• Incorporated in 1898
• 47th largest city in the United States
• Over 200 square miles
• City population is about 400,000; Metro is approximately 950,000
• Mayor as City Manager, Nine Councilors, and City Auditor
• Lot’s of pride in our community
TMUA Water System Overview

- Tulsa owns two water supply dams
- Raw water conveyed from three lakes by four major transmission lines
- Tulsa operates two water treatment plants with a total design capacity of 210 MGD
- Over 2,300 miles of water mains and 15,000 fire hydrants
- Thirteen pump stations and sixteen tanks and reservoirs
- Serve more than 140,000 metered accounts and >600,000 customers
Wastewater System Overview

- Tulsa operates four wastewater treatment plans with a combined average daily flow of 103 MGD
- More than 1,900 miles of sewers
- 62 lift stations convey wastewater to the treatment facilities
- 3 laboratories, Compliance, Industrial Pretreatment, and Fat, Oils, and Grease program
- Invested over $500M in upgrades to meet requirements of EPA consent orders
Challenge - Cast Iron Water Lines

**Challenge**

- Tulsa’s distribution system expanded much faster than the national average in the 1940s and 1950s.
- The distribution system includes more than 1,200 miles of cast iron waterlines.
- Cast iron break rates exceed 0.3/mi/year due to clay soils and the wide variation in weather conditions.
- Planned replacements for the next ten years exceeds $140M.

**Need**

- Improved construction efficiency and lower cost for water main replacement.
- Long-life products that are durable, corrosion resistance, and meet demanding City specifications.
- Real cost savings for customers.
Challenge - Assets Obsolete Too Soon

**Challenge**

- Life cycle of new assets, especially electrical and electronics equipment, are **TOO** short!
- Manufacturer’s discontinue support too quickly.
- OEM replacement parts cannot be purchased.
- After market parts are unavailable or unreliable.
- Staff recommends replacement of good equipment because they are afraid of a potential failure.

**Need**

- Better support from original equipment suppliers.
- Reliable dependable after-market replacement parts.
- Upgradable components that will allow new technology to be incorporated into existing equipment assets.
Challenge - Implementation of New Technology

**Challenge**

- Medium and small utilities prefer proven technologies with good track records.
- Smaller staff’s have less time and money to review, evaluate and pilot test new technologies.
- Need to integrate multiple devices, applications, clouds, websites, etc. with existing systems, some of which may be out of date.
- Suppliers tend to calculate ROI on best case scenario. All the risk is on the utility.
- Proprietary solutions limit implementation options and can have high maintenance fees.

**Need**

- Plug and Play devices.
- App Store for the Internet of Things.
Challenge

• The municipal utility workforce is getting older and losing experience to retirements.
• Hiring new employees with the necessary skills is an ongoing challenge.
• High vacancy rates plague many utilities.
• Smaller utilities have limited budgets for training and travel.
• Many utility employees are visual learners and need hands on training.

Need

• High quality cost-effective training for operation and maintenance personnel.
• National organizations partnered with local resources to provide hands on training to the utilities served.
Contact Information

Tulsa Metropolitan Utility Authority (TMUA)

City of Tulsa
Water & Sewer Department

Joan M. Arthur, PE
918-596-9798
Jarthur@cityoftulsa.org
Thank you!

Q&A after the next speaker!
### PUBLIC UTILITIES

#### Drinking Water
- **1st Mississippi River**
- **24 MGD**
- Lime Softening
- **300 mi of pipe**
- **5 Towers**

#### NEW Recovery
- **17 MGD**
- Full BNR
- Biofuel Generator
- Class A Solids
- **290 mi of pipe**
- **36 Lift stations**

#### Stormwater
- Mississippi River
- **200 mi of pipe**
- **212 Outfalls**

#### Electric
- **8.8 MW Hydro**
- **26M Solar**

#### Additional Information
- **9 Regulatory Agencies**
- **40 Square Miles**
- > **20,000 Utility Accounts**
- **$33M Operating Budget**
- **$31M Capital Budget**
## PROGRAMS

<table>
<thead>
<tr>
<th>Water Supply</th>
<th>SWP - Treatment</th>
<th>SWP - Distribution</th>
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<tbody>
<tr>
<td><img src="water_supply_icon.png" alt="Water Supply Icon" /></td>
<td><img src="swp_treatment_icon.png" alt="SWP Treatment Icon" /></td>
<td><img src="swp_distribution_icon.png" alt="SWP Distribution Icon" /></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Resource Recovery</th>
<th>CWP - Treatment</th>
<th>NBP Biosolids</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="resource_recovery_icon.png" alt="Resource Recovery Icon" /></td>
<td><img src="cwp_treatment_icon.png" alt="CWP Treatment Icon" /></td>
<td><img src="nbp_biosolids_icon.png" alt="NBP Biosolids Icon" /></td>
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</tbody>
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## COST OF SERVICE

<table>
<thead>
<tr>
<th>Background</th>
<th>Challenges</th>
<th>Technology Needs</th>
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</thead>
<tbody>
<tr>
<td>➢ Rates/policies not always established based on financial data or future needs.</td>
<td>➢ Explaining cost of service and gaining support from customer base and governing bodies for funding.</td>
<td>➢ Software that can communicate with financial systems to create a needs report.</td>
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<tr>
<td>➢ Difficult to communicate.</td>
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# WATER LOSS

## Background
- 14% Water Loss.
- Leaks, Breaks, Theft.
- Accurate Metering.
- Inflow & Infiltration.

## Challenges
- Emergency expenses.
- Replacement schedules.
- Limited inspection resources.

## Technology Needs
- Smart metering.
- Leak detection programs.
- Technology that leads to a tighter system.
# DATA MANAGEMENT

<table>
<thead>
<tr>
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<th>Challenges</th>
<th>Technology Needs</th>
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</thead>
<tbody>
<tr>
<td>➤ Concerns for data quality, integrity and timely data interpretation.</td>
<td>➤ Getting software programs to communicate; SCADA, database, financial, CMMS, GIS information.</td>
<td>➤ Specific data analytical software to interpret data, recognize trends and predict water quality.</td>
</tr>
<tr>
<td>➤ Aggregate data sources.</td>
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</tbody>
</table>
## WORKFORCE

<table>
<thead>
<tr>
<th>Background</th>
<th>Challenges</th>
<th>Technology Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity is increasing. Staff needs training well beyond the basics of water quality &amp; treatment.</td>
<td>Staffing levels not adequate for optimization of existing systems, advanced treatment technologies.</td>
<td>Specialized training for staff.</td>
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<td></td>
<td>Understanding regulatory climate.</td>
</tr>
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</table>
## ONE MASTER PLAN

<table>
<thead>
<tr>
<th>Background</th>
<th>Challenges</th>
<th>Technology Needs</th>
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<tbody>
<tr>
<td>Seven existing Master Plans that do not overlap/build on each other.</td>
<td>Distribution, Collection, Stormwater, Pavement Assessment in one format to determine CIP projects and beyond.</td>
<td>Software(s) are mostly GIS Based but all different; WinnSLAMM, InfoWater, SCADA, InfoSWMM.</td>
</tr>
</tbody>
</table>
THANK YOU!

We welcome Q&A for the first five speakers!
Q & A

Clarification Questions from the Audience
Interim Summary
Initial Insights of How Addressing the Utility Challenges

- Technology Vendors
- Proven
- Development

The 10 ACEs' Specific Challenges

- Industry Proven Solution
- Other Utility Proven Innovation
- Partnership with Vendors
- Partnership with Other Utility

Utilities

Partnership with Other Utility

Booky Oren Global Water Technologies
Speakers After the Break

Carrie Lewis - Maine
Kara Boyles - Florida
Jason Wen - California
Robert Pelham - Arkansas
Bill HagenBurger - Idaho
Kara Boyles - Indiana
10 Minutes Break…
The Next Speakers

Carrie Lewis
Portland Water District
Maine

Jason Wen
CITY OF LAKEWOOD, WA

Robert Pelham
Toho Water Authority
Florida

Bill HagenBurger
Beaver Water District
Arkansas

Kara Boyles
City of South Bend
Indiana
PORTLAND WATER DISTRICT
PORTLAND, MAINE

CARRIE LEWIS
GENERAL MANAGER
Portland Water District

By The Numbers

Employees: 182
Customers: 54,800
Sebago Lake: 995 billion gallons
Watershed Area: 470 sq miles
Service Area: 140 sq miles
Water MGD: 21
Water Mains: 1,000 miles
Hydrants: 5,079
Wastewater Pipe: 105
Wastewater Pump Stations: 76
Wastewater Treatment Plants: 4
## UNFILTERED SUPPLY

<table>
<thead>
<tr>
<th>Maintain the pristine quality of the source in unfiltered drinking water supply.</th>
<th><strong>Challenge</strong></th>
<th><strong>Solution</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor land use and development</td>
<td>Capture parcel and development data</td>
<td></td>
</tr>
<tr>
<td>Identify changes in water quality of lake and tributaries in time and space</td>
<td>Comprehensive chemical, biological and physical water quality monitoring in watershed with data interpretation</td>
<td></td>
</tr>
<tr>
<td>Early warning of spills, especially hydrocarbons</td>
<td>Sensors for rapid detection and notification of contaminants in the aquatic environment</td>
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</tbody>
</table>
Affordably and reliably operate remote stations in a secure environment.

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence in controlling equipment at remote stations</td>
<td>Cyber-secure SCADA controls</td>
</tr>
<tr>
<td>Maintaining communication with remote stations</td>
<td>Robust communication system</td>
</tr>
<tr>
<td>Maintaining power to stations</td>
<td>Alternative power sources</td>
</tr>
</tbody>
</table>
Distribution system anomalies may go unrecognized, compromising system integrity and water quality.

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize and pinpoint distribution system anomalies quickly (e.g., main breaks, leaks, loss of pressure, nitrification, changes in water quality, hydrants in danger of freezing)</td>
<td>Utilize infrastructure to gather real time data throughout system (e.g., pressure, flow, chlorine, turbidity, pH, wet hydrant barrels)</td>
</tr>
<tr>
<td>Quickly and effectively address anomalies</td>
<td>Synthesize data into meaningful information and alert Operators</td>
</tr>
</tbody>
</table>
# Effective Use of Capital Dollars for Water Main Replacements

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution</th>
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<tbody>
<tr>
<td>Prioritizing water main segments NOT in CSO separation/street reconstruction projects</td>
<td>Internal condition assessment of mains and connections (e.g., services, hydrant leads)</td>
</tr>
<tr>
<td>Identifying premature failures of water mains before they occur</td>
<td>External condition assessment of mains and environs (e.g., corrosive soils, stray currents)</td>
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</tbody>
</table>

CSO separation and street reconstruction projects initiated by others consume a large proportion of dollars available for water main replacements and renewals.
**OUR ASSET INFORMATION MANAGEMENT SYSTEM IS INTENDED TO BE A KNOWLEDGE CENTER/DECISION SUPPORT TOOL AVAILABLE TO EVERYONE.**

**Challenge:**
Seamless delivery of completely formed asset inventory for vertical and spatial asset addition projects in real time.

**Asset registry with complete attribute population**

**Linked record of installation and startup:** video record and manufacturer’s O&M and training

**X,Y,Z documentation of installation:** internal pipe inspection, 3D laser scan, updated schematics and facility plans

**Fully formed and scheduled maintenance including updates to any impacted maintenance on related equipment and facilities**
Thank you!

Q&A after the next five speakers!
City of Lakewood Department of Water Resources

- 180 miles of pipelines
- 20,300 AMI Meters
- 100% Groundwater from 10 Groundwater wells
- 3 Water Storage Facilities with approximately 13 million gallon capacity.
- 4 Emergency Connections
Challenges –
City of Lakewood Water Department

• Prioritizing Asset Replacement
• Leak Detection
• Asset Management
• Operational Efficiency
• Data Analytics Tools
Prioritizing Asset Replacement

• **Challenges**
  - 180 miles of 50+ year old Cast Iron, AC, Steel, Ductile Iron, and CCP. (20% of mains have been replaced with PVC)
  - High cost and time to replace mains in residential area.
  - Key question: WHEN and WHERE the old pipes to be replaced or rehabbed

• **Solution Needed**
  - Cost effective way to inspect and monitor the conditions of pipes and only replace the ones that need it.
  - Type of pipeline selection
Leak Detection

• Challenges
  • With aging mains, a small leak can quickly lead to catastrophic failure
  • How to identify the possible cause of leaks and corresponding solutions

• Solution Needed
  • Sensors to detect and monitor leaks, especially minor leak at initial stage
  • Tools can timely, accurately locate the leak, especially deep pipelines
  • Advanced technology to perform data analytics to predict the potential leak
Asset Management

• Challenges
  • Keeping up with the maintenance of the equipment with limited staff and budget.
  • Identify and realize values of preventive asset maintenance
  • Balance the resources to perform maximum and minimum maintenance

• Solution Needed
  • A software that will aid with the maintenance and replacement schedule of equipment and corresponding costs comparison to help decision making
Operational Efficiency

• Challenges
  • The power cost to run the pumps is one of our largest operational cost
  • How to improve pumping efficiency dynamically

• Solution Needed
  • Software program that tracks real time operation and recommends the most efficient pump to operate at any given time.
  • System pressure control and its impact
Data Analytic Tools

• Challenge
  • With the new AMI meters and new SCADA, thousands of data points are being generated daily
  • Balance additional resources to deal with the data and other normal tasks

• Solution Needed
  • How to effectively convert data to info, then to knowledge to guide the system operation and CIP schedule
  • How to use the data to enhance customer services
  • Data analytic tools to harness and produce useful data/report
Thank you!

Q&A after the next four speakers!
Robert Pelham

Toho Water Authority
AMERICAN WATERWORKS ASSOCIATION
ANNUAL CONFERENCE AND EXHIBITION
“VOICE OF THE UTILITY”
JUNE 13, 2018

ROBERT PELHAM, DIRECTOR OF ENGINEERING

Toho Water Authority

bringing you life’s most precious resource
TOHO WATER AUTHORITY

• TOHO WATER AUTHORITY SERVES MOST OF THE URBAN GROWTH AREA OF OSCEOLA COUNTY AND PARTS OF ORANGE AND POLK COUNTIES
• OSCEOLA COUNTY HAS ONE OF THE HIGHEST GROWTH RATES IN THE COUNTRY
• LOCATED ADJACENT TO WALT DISNEY WORLD THEME PARK AND RESORT
• TOHO WATER AUTHORITY FORMED FROM CITY OF KISSIMMEE UTILITY SYSTEM AND ACQUISITION OF OVER 17 PRIVATE SYSTEMS
• CURRENT GROUNDWATER SUPPLY APPROACHING CAPACITY AND UNABLE TO MEET FUTURE DEMANDS
TOHO WATER AUTHORITY

• SPECIAL INDEPENDENT DISTRICT FORMED BY THREE LOCAL GOVERNMENTS – OSCEOLA COUNTY, POLK COUNTY, AND THE CITY OF KISSIMMEE

• APPOINTED FIVE MEMBER BOARD OF SUPERVISORS

• 100,000 CUSTOMERS + TRANSIENT POPULATION OF 30,000 TO 60,000

• PROVIDES WATER, WASTEWATER, AND RECLAIMED WATER SERVICE

• 13 WATER PLANTS PROVIDING 36MGD

• 8 WATER RECLAMATION FACILITIES PROVIDING 30 MGD OF RECLAIMED WATER

1339 MILES OF WATER LINES
319 MILES OF FORCE MAIN
402 SEWAGE LIFT STATIONS

875 MILES OF SEWER LINES
345 MILES OF RECLAIMED WATER LINES
### TREATMENT AND DISPOSAL OF MEMBRANE CONCENTRATE

#### CHALLENGE
- EXISTING WATER SUPPLY UNABLE TO MEET FUTURE DEMANDS
- AVAILABLE ALTERNATIVE WATER RESOURCES ARE BRACKISH GROUNDWATER, POOR QUALITY SURFACE WATER, AND REUSE WATER
- MEMBRANE TREATMENT Produces WASTE CONCENTRATE FOR DISPOSAL
- DISPOSAL OPTIONS FOR INLAND UTILITIES LIMITED TO DEEP WELL INJECTION WHICH IS COSTLY AND SOMETIMES PROBLEMATIC

#### SOLUTION
- **NO. 1:** COST EFFECTIVE ZERO LIQUID DISCHARGE TREATMENT OF MEMBRANED WASTE CONCENTRATE
- POTENTIAL FOR MINERAL RECOVERY FROM CONCENTRATE FOR POTENTIAL PARTIAL COST OFFSET
- **NO. 2:** LOW ENERGY MEMBRANE PROCESS
## INTEGRATION OF PROCESS CONTROLS WITH REAL TIME MONITORING FOR POTABLE REUSE

### CHALLENGE

- POTABLE REUSE CAN BE A FUTURE ALTERNATIVE WATER SUPPLY SOURCE
- POTABLE REUSE REQUIRES MULTIPLE TREATMENT BARRIERS TO CONTROL MICROBIAL AND CHEMICAL CONSTITUENTS
- HIGH DEGREE OF RELIABILITY REQUIRED TO MAINTAIN CUSTOMER CONFIDENCE FOR PROTECTING PUBLIC HEALTH

### SOLUTION

- POTABLE REUSE MULTIPLE BARRIER TREATMENTS HAVE MULTIPLE CRITICAL CONTROL POINTS
- ROBUST AND RELIABLE REAL TIME MONITORING OF CRITICAL PARAMETERS INTEGRATED WITH PROCESS CONTROLS WOULD INCREASE SYSTEM RELIABILITY AND CONFIDENCE
### IN SITU CONDITION ASSESSMENT OF BURIED ASSETS

#### CHALLENGE

- ASSET MANAGEMENT
- AGING INFRASTRUCTURE + INITIAL POOR QUALITY INFRASTRUCTURE FROM PRIVATE UTILITIES
- SIGNIFICANT ANNUAL ADDITIONS TO ASSET INVENTORY FROM GROWTH
- NEED ABILITY TO ASSESS BURIED ASSET CONDITION AND PREDICT FAILURE

#### SOLUTION

- NO. 1: IN SITU CONDITION ASSESSMENT WITH CAPACITY TO PROVIDE DATA FOR PREDICTION OF FAILURE
- SENSOR TECHNOLOGY TO INCORPORATE INTO NEW AND EXISTING BURIED ASSETS
- NO. 2: ABILITY TO ASSESS THE CONDITION OVER TIME OF NON-METALLIC BURIED ASSETS
IN SYSTEM DISINFECTION BY-PRODUCT MONITORING AND TREATMENT

CHALLENGE

• FORMATION OF DBPS IN EXTREME PARTS OF DISTRIBUTION SYSTEM DUE TO TOC AND WATER AGE

• DBP FORMATION CAN BE TEMPERATURE DEPENDENT

• CAN RESULT IN CUSTOMER NOTIFICATION AND MODIFICATION OF TREATMENT SYSTEM TO ACHIEVE COMPLIANCE FOR SMALL % OF CUSTOMERS

SOLUTION

• NO. 1: CONTINUOUS REAL TIME WATER QUALITY MONITORING IN DISTRIBUTION SYSTEM FOR DBP’S

• ALLOW FOR INTERVENTION WITHIN IMPACTED AREAS – REDUCE WATER AGE

• NO. 2: IN-PIPE OR SIDE STREAM, DECENTRALIZED TREATMENT OF DBP’S FOR LOCALIZED IMPACTED AREAS
BIOSOLIDS AS A RENEWABLE ENERGY SOURCE

• CHALLENGE
  • OVER 52,000 TONS OF BIOSOLIDS/YEAR
  • PRESENT DISPOSAL IS STABILIZATION AND LAND APPLICATION AT A COST OF $2.2 MILLION PER YEAR
  • LAND APPLICATION BECOMING UNFAVORABLE AND ALTERNATIVE DISPOSAL OPTIONS LIMITED
  • BIOSOLIDS ARE POTENTIAL RENEWABLE ENERGY SOURCE
  • TECHNOLOGIES FOR BIOSOLIDS AS AN ENERGY SOURCE HAVE NOT BEEN COST EFFECTIVE FOR SMALL TO MEDIUM SIZE FACILITIES

• SOLUTION
  • DEVELOPMENT OF TECHNOLOGIES FOR UTILIZATION OF BIOSOLIDS AS AN ENERGY SOURCE THAT CAN BE WIDELY UTILIZED
  • APPLICATION OF BIOSOLIDS TO ENERGY WILL OFFSET ENERGY COSTS OF TREATMENT AND MOVE FACILITIES TOWARD NET ZERO ENERGY
  • TECHNOLOGY WOULD PROVIDE RENEWABLE ENERGY SOURCE AND REDUCE ENVIRONMENTAL CONCERN RELATED TO DISPOSAL
THANK YOU!

Q&A AFTER THE NEXT THREE SPEAKERS!
Bill HagenBurger

Beaver Water District
About Beaver Water District

• Wholesale Supplier of Potable Water
• Four Customer Cities in Northwest Arkansas
• Supplies Water to over 300,000 people
• 140 MGD Treatment Capacity
• Two Raw Water Intakes on Beaver Lake
About Northwest Arkansas

• Home to Three Fortune 500 Companies – Walmart, Tyson & JB Hunt
• Growth Rate Faster Than 94 of Top 100 MSAs
• 27 New Residents a Day Since 2010
• 5th Highest Projected Rate of Economic Growth US Conf. of Mayors
• Taste and Odor
• Raw Water Consistency
• Watershed Development
Taste & Odor Challenges

- Deep surface water source
  - Lake turn over late summer
  - Algae blooms and die off late summer
  - Intensity varies year to year

- Strategy?
  - Source water - limit phosphorus
  - Public relations – Education & Press Releases
  - Expensive capital improvements – Costly
# Information Systems Integration

## Background
- Multiple Data Sources including:
  - EAMS
  - DCS
  - GIS
  - ERP
  - LIMS
  - Spreadsheets
  - Etc.

## Challenges
- Disparate Systems
- Cybersecurity
  - System reliability vs connectivity
  - The people part
- Maintenance of legacy systems
  - Vendor dependency

## Technology Needs
- Real-time analytics aggregated from different data sources
- Decision support
Financial Challenges

• Enterprise Asset Management
  – Have need for software – CMMS, Financial act.
  – Still too small for expensive Enterprise system
  – Integrate in house?

• Stabilizing Rates & Managing Reserves
  – Small incremental vs Fewer Large rate increases
  – Operating Reserves
  – Replacement & Refurbishment Reserves
  – Expansion Reserves
Employee knowledge conservation

• Want to foster innovation yet retain valuable knowledge
  – Old vs: new, young vs: old

• Format in which to preserve knowledge
  – Paper?
  – Digital?
  – Tacit knowledge?

• Small staff = limited time to spend with seasoned employees
Thank you!

Q&A after the next two speakers!
South Bend Water

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THE PROBLEM

- Renewal and replacement of water infrastructure
- Limited budget, specifically for well fields
- Need failure probability model for projects, given variance in construction date, materials, and other contributing factors

CURRENT STRATEGIES

- Use of Tax Incremental Financing for Water Works projects
- Prioritization based on known issues and ensuring redundancy in pressure zones

BOTTOM LINE

Need a better system to understand probability of failure and to prioritize the replacement of assets within water system.
WATER QUALITY & INTERNAL PLUMBING

THE PROBLEM

• Lead is located in many of the older service lines and plumbing components within customers’ homes where the City has no jurisdiction
• Limited funding for replacement of lead service lines
• Limited ability to control or mitigate private source contamination

CURRENT STRATEGIES

• Outreach and education through information brochures

BOTTOM LINE

Need funding mechanism for the replacement or treatment of non-City owned lead service lines and plumbing parts

AWWA Exposition 2018
PUBLIC ASSISTANCE FOR THE POOR

THE PROBLEM

- Increasing need for public assistance due to rising costs for water and other utility services for the poor and distressed

CURRENT STRATEGIES

- No current solutions outside of the City led poverty alleviation efforts

BOTTOM LINE

Need a public assistance and water efficiency program or a rate-based solution for low income residents
PUBLIC PERCEPTION OF VALUE

THE PROBLEM

• Insufficient public understanding of the value of water and water-related services
• Limited direct or educational outreach between water services and customers

CURRENT STRATEGIES

• Water Works outreach and educational events
• Increased public relations and marketing

BOTTOM LINE

Need a better program to communicate the importance and value of water resources to the public
SUSTAINABLE REVENUE

THE PROBLEM

• Difficult to maintain adequate rates and charges for water
• Rate increases are not linked to inflation or price increases for system maintenance
• Water efficiency and water revenue programs are in conflict
• Long, cumbersome, and political process to get rates increased

CURRENT STRATEGIES

• Recent rate increase

BOTTOM LINE

Would benefit from a programmatic analysis and long term strategy for adequate revenue sources
OPERATION IMPROVEMENTS

THE PROBLEM

• Limited ability to perform predictive maintenance
• Low energy efficiency with the treatment and distribution system
• Limited capacity to perform hydraulic modeling and analysis of system

CURRENT STRATEGIES

• Prioritizing maintenance and replacement needs based on redundancy and the most likely vulnerabilities within system

BOTTOM LINE

Would benefit from more time- and cost-efficient means to conduct hydraulic modeling of system, paired with program for increased energy efficiency and predictive maintenance

AWWA Exposition 2018
Thank you!

We welcome Q&A after moderator’s interim summary!
Initial Insights from “The Voice of the Utility”
Most of the Utility Challenges are Unique

It is recommended to listen to the voice of the utility!

<table>
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<th># of challenges</th>
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<td>Total challenges</td>
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The Opportunity: Various Domains with Insufficient Solutions

- Source water protection (2)
- Smart city / Infrastructures (2)
- Leak detection (3)
- Pipes inspection and condition assessment (2)
- Software for driving business decisions through asset analytics (4)

- Source water protection (2)
- Smart city / Infrastructures (2)
- Leak detection (3)
- Pipes inspection and condition assessment (2)
- Software for driving business decisions through asset analytics (4)

- Control of high nutrient levels in water sources
- Water quality monitoring
- Forecast long-term water demand
- Real-time analytics aggregated from different data sources (2)
- Workforce training (3)
- Cyber secure SCADA control
- Support of suppliers for replacement parts
- Monitor of cyanotoxins in water sources
- Cast iron pipes rehabilitation
- Long-life durable pipelines
- Underground utilities localization
- Master plans' integration
- Identifying ongoing PCCP corrosion before pre-stressing wires break
- Identifying ongoing PCCP corrosion before pre-stressing wires break
- Plug & play technologies that ease their implementation
- Cast iron pipes rehabilitation
- Monitor of cyanotoxins in water sources
- Long-life durable pipelines
- Underground utilities localization
- Master plans' integration
- Source water protection (2)
- Smart city / Infrastructures (2)
- Leak detection (3)
- Pipes inspection and condition assessment (2)
- Software for driving business decisions through asset analytics (4)
Recommended Roadmap to Address the Utility Challenges

- Technology Vendors
- Utilities
- Proven
- Development

The 10 ACEs’ Specific Challenges

- Industry Proven Solution
- Other Utility Proven Innovation
- Partnership with Vendors
- Partnership with Other Utility

Partnership with Other Utility

Booky Oren Global Water Technologies
Innovation To implementation “i2i” Process
A Proven Mechanism for the Water Sector Worldwide

1. Identification and Prioritization of Challenges Faced by Water Agencies
2. Global Scouting for Solutions
3. Receiving Relevant Proposals
4. Internal Validation Processes
5. Implementation Leads to Improvement

Ongoing Support of Internal Processes
Q & A

Clarification Questions from the Audience
Wrap-up Comments by The 10 ACEs
The 10 ACEs

Ted Corrigan - Iowa
Andrew Jackson - Arizona
Michael E. Hooker - New York
Patrick Shea - Minnesota
Carrie Lewis - Maine
Jason Wen - California
Robert Pelham - Florida
Bill HagenBurger - Arkansas
Kara Boyles - Indiana
Kara Boyles - Indiana
“I don’t need to know everything, I just need to know where to find it, when I need it”

(Albert Einstein)
Thank You!

To be continued…

Booky@bookyoren.com