Speakers:
Elkin Hernandez
Manager – Process Control DC Water

Ting Lu
Principal Engineer – Clean Water Services

Ken Thompson
Senior Technology Fellow – CH2M
# Agenda

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SWAN North American Alliance – Annual Workshop
Register: goo.gl/2FG6tG

Modernizing North American Water Systems in the Digital Age

At UPTAKE
Chicago, November 6th 2017

Evening reception sponsored by:

Workshop Co-Hosts:
Smart Water at Blue Plain AWTP

Elkin Hernandez
Manager – Process Water, DC Water
Overview of Blue Plains AWTP

- 391 mgd average day capacity
- ~160 acres
- Serves DC, plus areas of MD and VA
- Advanced secondary treatment – filtration, N and P removal
- Discharges to Potomac River and Chesapeake Bay
Using Existing Data Multimedia Effluent Filters

Multi Media filters are being used as the last part of waste water treatment to remove small floating particles form the wastewater. Uses Multiple media, under drains, backwash waster and air.

Backwash process approximately once every 24 hours

Blown filter is described as an structural defect that would let the fluid pass media without being filtered (shortcut) and the media to be released and enter the backwash water during backwash. Caused by rupture of the underdrains.
Multimedia Effluent Filters

An opportunity to deploy analytics using historical data going back to 2009. One of the approaches was Matlab with the support of the University of Cincinnati.

DATA PREPARATION
- Perform Data Collection
- Identify Data Ranges and Failures
- Define Data Structure
- Perform Initial Analysis
- Perform Data Clean Up

Feature extraction
- Time-domain statistical parameters
- Frequency-domain features
- Time-Frequency domain

Analysis
- Feature Selection
- Failure Signature
- Health Assessment
Filter 1 south that was reported blown on Jan 17\textsuperscript{th} 2016. As the group comparison for head loss shows, the filter had an abrupt change in its behavior from early December causing CV values to drop. Backwash flow CV suggests similar behavior in the same time proximity. Using the final health metric for this filter, the warning and failure alarms would raise by Dec 5\textsuperscript{th} and 6\textsuperscript{th}, one 40 days before the failure was noticed.
Vertical Assets Applications

- Energy Management
- Asset Health monitoring
Data Leverage
## Conclusions and Lessons

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<th>Hard</th>
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For further information, contact:

Elkin Hernandez  Elkin.Hernandez@dcwater.com
Using Real Time Control and Data Management for Stormwater Management

Ting Lu, Ph.D, P.E.
Principle Engineer, Clean Water Services
Clean Water Services (CWS)

- Regional wastewater & stormwater district in cooperation with:
  - 12 member cities
  - Washington County
- Service population >560,000
- Operate 4 wastewater treatment facilities (WWTFs)
- Implement municipal stormwater program (MS4)
- River flow management and regional water supply planning
Using Innovation to Improve Watershed and Stream Health for Community Benefits

Pumps, pipes and plants

- Advanced Waste Water Treatment
- Stormwater Management
- Maintain Infrastructure

Watershed Health

- Water Re-Use
- Ecological Enhancement
- Flow Augmentation
- Resource Recovery
- Long-Term Water Supply
- Natural Treatment Systems

CleanWater Services
Integrated Water Platform

6. **Collaboration Processes**
   Knowledge center for coordinated actions, wiki

5. **Data Visibility and Visualization**
   Business intelligence, data cube

4. **Data Management and Display**
   SCADA, GIS, application software

3. **Collection and Communication**
   Remote terminal unit

2. **Sensing and Control**
   Meters, monitors, etc.

1. **Physical Infrastructure**
   Pipelines, pump stations, Fernhill, stream, lake

This reference model is based off the Internet of Things Reference Model levels by Cisco
Using Real Time Control to Actively Manage Stormwater Runoff

Optical Rain Gage

Camera

Control Panel

Battery Backup
On-Site Sensors and Water Control Systems

Weather Forecast and Other Web Data

Pond Outlet Water Level and Flowrate
Downstream of Valve
12hr | 24hr | 48hr | Link

05/14/2017 07:42 Water Surface Elevation
366.78 ft MSL
Estimated Discharge
0.95 cfs

05/11/2017 11:54
05/12/2017 11:54
05/13/2017 11:54
05/14/2017 11:54
05/15/2017 11:54
05/16/2017 11:54
05/17/2017 11:54

15
10
5
0

F R O S T & S U L L I V A N
Performance

- Mitigate multiple peak rainfall – run-off events
- Maintain a flat flow hydrograph in the receiving stream
- Provide protection of the receiving stream resource
Benefits of Smart Infrastructure

Support the overall mission and outcomes

• Utilize data and technology to maximize capacity and environmental outcomes

Controlled Spending and Leverage Partnership

• Reduce infrastructure footprint and cost

Flexible and Adaptive Management

• Built in with flexibility and adaptive management for stormwater management
System Integration

Watershed-scale metrics

↑

Watershed and facility data

↓

Stream gaging, precipitation, and/or other local data feeds

Distributed RTC facilities and sensors

Opti

Web Data
NOAA Forecast
USGS Streamflow

Site-scale control logic
Vision: Holistic Watershed Planning and Operation

- Aboveground infrastructure
- Underground conveyance system
- Water resource recovery facility
- Receiving streams
- Customers
Thank you!

• Dr. Ting Lu, P.E.
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  o Phone: 503.681.4469
SWAN Interactive Architecture Tool

Kenneth Thompson
CH2M
Choose a topic of interest to begin your smart water journey

**Evaluate your Smart Water Network**
Fill-out a brief questionnaire to learn your utility’s SWAN SMART SCORE, a high-level gauge of the current “intelligence” of your water distribution network.

**Identify your business drivers**
Choose from commonly identified business drivers that impact utility network operations and management strategies.

**Understand your challenge areas**
Based on your business driver responses, select from common challenges faced by utilities today.

**Explore technological solutions**
Navigate solution architecture diagrams; learn about technology functions, benefits, and system reqs.; review relevant case studies and benefit analyses.

**Find available providers**
Search available smart water solutions through a database of SWAN solution providers.
Utility Feedback

“A one stop shop.”
-Rick Scott, Deputy Director, Seattle Public Utilities, Seattle, USA

“The Tool gives a clear structure to the definition of what a smart network really means.”
--Mike Bishop, Head of Operational Services, Dŵr Cymru Welsh Water, UK

“The information provides invaluable outlines of systems and benefits which can be used in the presentation of business cases.”
-Adrian Bird, System Loss Engineer, Unitywater, Queensland, Australia
Wastewater Network Management

http://www.swan-tool.com/wastewater-network-management
Database

FUNCTION

The primary goal of a smart wastewater system database is to collect data from the different source data streams so that it can be converted, using advanced analytics, into actionable information. To accomplish this task requires a robust database to capture the data from the different streams and store it in a normalised fashion to allow for direct comparison.
Case Studies: Wastewater Network Management

Smart Sewer Collection Reduces CSO's in Cincinnati, Ohio (CH2M)

Optimising Sewer Maintenance in San Antonio, Texas (SmartCover Systems)

Long-Term Control Plan Optimisation in South Bend, Indiana (Optimatics)

Lift Station Control and Monitoring in Manitoba, Canada (Xylem)
Thank you!

To learn more, visit:
www.swan-forum.com
Questions & Answers?

Reminder to register: goo.gl/2FG6tG

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