

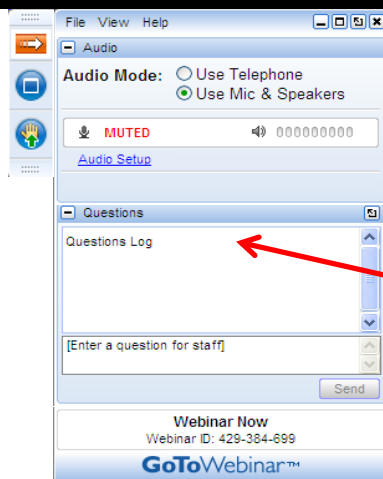


2018 INTELLIGENT WATER SYSTEMS CHALLENGE

LAUNCH EVENT

Tuesday, February 27, 2018

How to Participate Today



- **Audio Modes**
 - Listen using Mic & Speakers
 - Or, select "Use Telephone" and dial the conference (please remember long distance phone charges apply).
- **Submit your questions using the Questions pane.**
- **A recording will be available for replay shortly after this webcast.**

2018 LIFT INTELLIGENT WATER SYSTEMS CHALLENGE – www.werf.org/lift/IWSChallenge2018

LIFT IWS Focus Group

- Geared towards peer-to-peer information sharing
- Technology innovation focus
- Research project updates and involvement opportunities
- Quarterly online meetings
- 40+ Utility members involved
- Chair: Ting Lu

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Agenda

- Background and introduction
- IWS case studies
- Intelligent Water Challenge structure
- Judging criteria
- Registration
- Q&A

Supporting Organizations



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Diamond Sponsor



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Sponsorship

Diamond: \$50,000

Sponsor Benefits:

- Exclusive - Representative hands out winnings to grand prize winner
- Exclusive Logo slide during webinar for announcement
- Exclusive Logo slide during webinar pre WEFTEC
- Exclusive logo seal on all prize winners' envelopes
- Exclusive Slide presentation at WEF booth at ISA WWAC (August in Bethesda)
- Logo recognition on website
- Sign at Water Research Foundation Research Symposium
- Mention in press release announcement
- Sign at WEF specialty conferences: Odors, Collection Systems, Residuals & Biosolids, Nutrients
- Mention in presentation at AWWA ACE innovation pavilion
- Diamond listing on lobby banner and public meter boards at WEFTEC
- Logo on prize winner certificates and envelopes

Platinum: \$25,000

Sponsor Benefits:

- Logo recognition on website
- Sign at Water Research Foundation Research Symposium
- Mention in press release announcement
- Shared Platinum slide during webinar for announcement
- Shared Platinum slide during webinar pre WEFTEC
- Sign at WEF specialty conferences: Odors, Collection Systems, Residuals & Biosolids, Nutrients
- Logo in Digital representation at WEF booth at ISA WWAC (August in Bethesda)
- Mention in presentation at AWWA ACE innovation pavilion
- Platinum listing on lobby banner and public meter boards at WEFTEC
- Logo on runner up winner certificates and envelopes

Gold: \$10,000

Sponsor Benefits:

- Logo recognition on website
- Sign at Water Research Foundation Research Symposium
- Mention in press release announcement
- Shared Gold slide during webinar for announcement
- Shared Gold slide during webinar pre WEFTEC
- Sign at WEF specialty conferences: Odors, Collection Systems, Residuals & Biosolids, Nutrients
- Logo in Digital representation at WEF booth at ISA WWAC (August in Bethesda)
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WEF Point of Contact: Nick Christy nchristy@werf.org

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What is an Intelligent Water System?

“Intelligent Water Systems (IWS) emphasizes the opportunity the water sector has to take advantage of advanced technologies and dramatically shift management decision making.”

WEF, Intelligent Water Systems: The Path to a Smart Utility, 2017

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How Does IWS Fit Into the Water Sector?

- Analyzing historical and real-time data
- Delivering the integration of information required for high performance operations
- Enhancing the use of data by utility personnel
- Elevating levels of service
- Taking advantage of the Internet of Things

WEF, Intelligent Water Systems: The Path to a Smart Utility, 2017

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Intelligent Water Systems Challenge

- Hosted through LIFT Intelligent Water Systems Workgroup
- Discussion on challenges to adopt smart water technologies



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LIFT IWS Challenge Vision

- Focus on leveraging data using the best available tools to help utilities better understand the dynamics of complex systems for making better decisions.
- Give students, professionals and technology aficionados the opportunity to showcase their talents and innovation.

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Suggested Challenge Categories

- Collection Systems
- Wastewater Treatment Systems
- Drinking Water Treatment Systems
- Source Water/Watershed
- Distribution Networks
- Other

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Challenge Goal

- The goal of this Challenge is to identify the best demonstrations of how IWS and the transformation of data into information can improve a utility's knowledge and decisions, by solving a specific problem
 - Teams will have to demonstrate the use of IWS to solve their problem statement
 - Explain why and how IWS provides value to this solution (e.g. what is it that you couldn't do before, that you can do with IWS)
 - Quantify/qualify the unique value add that an IWS solution provided compared to status quo to solve the specific problem, as defined by the team in the problem statement

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Challenge Solutions

- Solutions should highlight:
 - What is the specific problem that the utility needs to be solved? What are the metrics to determine success?
 - How will IWS provide value to this solution as opposed to status quo?
 - Proposed plan to solve problem and data streams to be used
 - Implemented solution, including data analytics

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District of Columbia
Water and Sewer Authority

Smart Water at Blue Plains AWTP

February, 2018

Elkin Hernandez, DC Water

Overview of Blue Plains AWTP

- Serves Washington DC, plus areas of MD and VA
- 391 MGD average daily capacity
- Covers ~160 acres
- Advanced secondary treatment – filtration, N and P removal
- Discharges to Potomac River, which flows into Chesapeake Bay



Multimedia Effluent Filters

An opportunity to deploy analytics using historical data going back to 2009. One approach used MATLAB with support from the University of Cincinnati.

1

DATA PREPARATION

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

2

Feature extraction

- Time-domain statistical parameters
- Frequency-domain features
- Time-Frequency domain

3

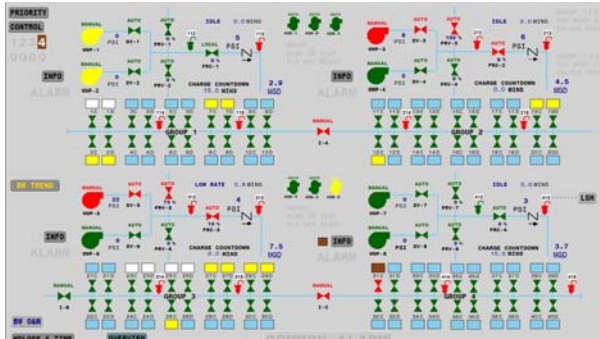
Analysis

- Feature Selection
- Failure Signature
- Health Assessment



Using Existing Data Multimedia Effluent Filters

Multimedia filters are being used as the last wastewater treatment step to remove small floating particles from the wastewater using multiple media, underdrains, backwash water and air. The backwash process occurs approximately once daily.

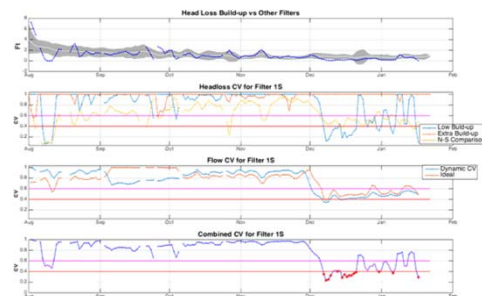


A **blown filter** is described as a structural defect that would let the fluid pass media without being filtered (shortcut) and the media to be released and enter the backwash water during backwash. Blown filters are caused by rupture of the underdrains



Multimedia Effluent Filters

Filter 1-South was reported blown on Jan 17th 2016. As the group comparison for head loss shows, the filter had an abrupt change in its behavior starting in early December, causing CV values to drop. Backwash flow CV suggests similar behavior in the same time frame. Using the final health metric for this filter, warning and failure alarms could have been raised by Dec 5th 6th, 40 days before the failure was reported.



Vertical Assets Applications

Asset Health monitoring

Energy Management

Grit Pumps

Implementation of low cost sensors & comms & cloud based monitoring

- Current
- Flow
- Position
- Vibration

Conclusions and Lessons

Easy		Hard	Algorithms and technical stuff
Easy		Hard	Strategic overview
Easy		Hard	Practical stuff
Easy		Hard	Commitment



District of Columbia
Water and Sewer Authority



For further information, contact:

Elkin Hernandez Elkin.Hernandez@dcwater.com

Benefit to Utility Participation

- Design your own challenge problems
- Using real world data (if you like to use your own data, that will be ideal)
- Work with the team members to identify solutions based on smart technologies and IoT
- Receive innovative solutions to solve your problems
- Learn more about state of the art in intelligent water technologies
- Opportunity for different staff to become engaged in IWS

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Benefits for Young Professional & Student

- Share unique, out of the box ideas on collaborative teams
- Network with innovative water professionals
- Learn through ideation, planning and implementation of Intelligent Water Systems
- Gain valuable experience working with early adopters of Intelligent Water Systems
- Apply your education to real-world data and problems
- Insider insights into utility management

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Benefits for Technology Provider

- Understand utility challenges
- Get real-world data from utilities
- Work with the utilities to identify solutions through smart technologies and IoT
- Showcase your innovative solutions applied to real problems
- Quantify and qualify the value provided through IWS solutions

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How to Participate

- 2 Different Team Formats
 - Partnered Team
 - Regular Team
- Academics, consultants, students, tech provider or utility
- Teams will consist of up to 6 individuals
- Learning opportunity for staff to get involved in Intelligent Water
- Interested participants without a team will be matched

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Utility Participation

- Utilities interested in the 'hands off' approach may submit problem statements and data sets to be solved by Regular Teams by **March 23**
- Utilities interested in actively participating on teams and in the solving process will submit their problem statements at the 1st deadline – Challenge Plan Submission, **April 23**

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Challenge Format

- Utility-Partnered Teams will submit their problem statement
- Regular Teams will be matched with a problem statement and data set
- Teams will be matched with Steering Committee members for progress check-ins throughout the Challenge
- 2 Submission Deadlines: Challenge Plan and Final Solution
- Top teams will present at WEFTEC for judging and awards ceremony

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Challenge Structure

- February 23: Registration Opening
- February 27: Challenge Webinar
- April 6: Registration Deadline
- April 9 – September 3: Challenge in Progress
- September 3: Submission Deadline
- October 1: Final Presentation & Awards at *WEFTEC 2018, New Orleans, LA*

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April 6: Registration Deadline

Register at
<http://www.werf.org/lift/IWSChallenge2018>

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Challenge in Progress

- April 9 – September 3:
 - April 23: Challenge Plan Submission Deadline
 - April 23 – May 4: Discussion with assigned steering committee members
 - June 18 – June 22: Discussion with assigned steering committee members
 - September 3: Final solution submission

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April 23: Challenge Plan Submission

- Challenge Plans should include:
 - Problem Statement
 - Desired Outcomes
 - Methodology
 - Data Set Description
 - Proposed Implementation Plan

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September 3: Submission Deadline

- Submission Package will be submitted via e-mail
- Submission Packages should include:
 - Team
 - Problem Statement
 - Characterization of Intelligent Water System
 - The Plan
 - Data
 - Analysis & Interpretation
 - Communication & Use
 - The Solution

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What You'll Do – and We'll Evaluate

- Form a **Team**;
- Make a **Plan**:
 - Define the problem, understand the system, and lay out a plan;
- **Implement** your Solution:
 - Manage the data, do the analysis, communicate actionable results, and solve the problem;
- **Impress the Judges!**

Intelligent Water Systems Challenge Judging Sheet

TEAM NAME	[Team name]	
JUDGE	[Judge name]	
SCORE	[Score] out of 140	
Raw (0-10) x Weight = Score		
TEAM		
1 Team includes necessary skills and has appropriate utility lead or (partnered teams only) representation.	x 1.0 =	[] out of 10
PLAN		
2 Problem Statement that shows understanding of how analytics can address utilities' challenges in utilities' terms (partnered teams only).	x 2.0 =	[] out of 20
3 Characterization of the Intelligent Water System by describing the existing system or its subset parts.	x 1.0 =	[] out of 10
4 Plan that lays out a realistic timeline and approach for achieving the intended solution.	x 1.0 =	[] out of 10
IMPLEMENT		
5 Data streams are clearly identified and QA/QC appropriately discussed.	x 2.0 =	[] out of 20
6 Analysis & Interpretation deliver results that clearly support the intended solution.	x 2.0 =	[] out of 20
7 Communication & Use provide actionable results supporting decisions.	x 1.0 =	[] out of 10
8 The Solution meets utility expectations using appropriate tools.	x 2.0 =	[] out of 20
JUDGE'S IMPRESSIONS		
9 Recognition of alignment with IWSC goals, scalability and sustainability, lessons learned, and more.	x 1.0 =	[] out of 10
COMMENTS	[]	

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Awards

Opportunity of a Max. \$25,000 Award
to Top Team!

\$10,000 Best Overall Solution

\$15,000 1st Place Solution (Partnered Team)

\$15,000 1st Place Solution (Regular Team)

Other prizes to be announced

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Q&A

www.werf.org/lift/IWSChallenge2018

Additional Questions can be directed to:

WEF: Lisa McFadden, lmcfadden@wef.org:

WRF: Fidan Karimova, fkarimova@werf.org

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