2018 INTELLIGENT WATER SYSTEMS CHALLENGE

Information Webcast

April 11, 2018

Agenda

- Introduction (Ting Lu)
- WRF's Intelligent Water Systems Research Program (Walter Graf)
- Judging criteria (Tad Slawecki)
- Submittal guidance (Fidan Karimova)
- Un-partnered teams (Fidan Karimova)
- Q&A

Welcome

LIFT IWS Challenge Goals

- Help utilities better understand the dynamics of complex systems for making better decisions through IWS solutions
- Give students, professionals and technology aficionados the opportunity to showcase their talents and innovation

LIFT IWS Challenge Outcome

- Demonstrations of value of IWS and the transformation of data into information
- Advance the adoption of intelligent water system into utilities
- Foster a collaboration environment for innovation to solve problems

Timeline

- **April 23** Submit team's challenge plan
- **April 23 – Sept. 3** Challenge ongoing with two check-ins with steering committee members
- **September 4** Solutions submittal deadline
- **September 14** Judges' scoring completed
- **September 17** Finalists notified
- **October 1** Finalist presentations and award ceremony WEFTEC 2018

Suggested Challenge Categories

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

WRF's Intelligent Water Systems Research Program

- Identify and evaluate the application experience of advanced sensing technologies and networks used for compliance strategies and improved efficiency of collection and treatment operations and sewershed management.
- Develop and maximize the capacity to utilize the vast amount of data generated to support the transition to the utility of the future and to improve receiving water quality and ecosystem health.

  - Other industries can provide a wealth of knowledge that can be transferred to the water sector
  - The future workforce will rely on increased use of data, therefore, skills, positions, and organizational structure will be different.
  - Sewershed wide data networks will become more prevalent
  - Advances in "smart" linings for pipes

Workforce Skills of the Future

- Attributes and business requirements expected to be necessary from both personnel and asset perspectives for utilities in 15 to 25 years, globally
- Key workforce trends and future skills required in the water sector over a long-term horizon (20+ years) by identifying key global drivers for change and success, customer trends, future of work, and enablers for success
- What are the implications for strategic HR, management, leadership, culture, ways of working/ flexible working arrangements, operating models and structure, training, employee retention and attraction
  - Enabling more effective workforce plan
  - Building capacity for the sector
  - Maximizing the available workforce
  - Delivering on sector and service objectives

Leveraging Other Industries – Big Data Management

Objectives

- Ascertain the current state and future state of IoT technology and big data management and analytics
- Identify best practices in water sector utilities and other industries for managing and processing large data sets
- Create a roadmap for utilities to use for implementing big data analytics and visualization tools for processing large data sets

Approach

- Survey (prepared with the SWAN Forum) and industry interviews
- Analyze business drivers (technology, regulations, international trends, etc.) internal and external influences and their interaction etc.

Designing Sensor Networks and Locations on an Urban Sewershed Scale

Objectives were to identify:

- Key sewershed management issues that may be addressed through continuous data collection and analytics
- Current and future state of the use of advanced sensors in urban sewersheds
- Determine what evaluations and outcomes have taken place within the water industry.
- Reliable advanced sensing technologies and networks within sewersheds.
- Network implementation issues to allow utilities to understand costs and benefits associated with using sensing technologies.
- Opportunities to implement real-time sensor networks to guide decision-making for system operation and capital planning.

RFP: Designing Sensor Networks and Locations on an Urban Sewershed Scale with Big Data Management and Analytics

Using Phase I projects as basis for this project

- Conduct demonstration projects at multiple utilities to validate sensor-based, real-time monitoring/metering and models/decision support systems on sewershed/sub-sewershed scales, including the applying of analytics to solve sewershed network management issues
- Develop a framework for the development of sensor-based networks that incorporates new and emerging monitoring/metering technologies for real-time decision-making.

We are taking utilities expression of interest if they want to be a demo/pilot site as part of a proposal. (wgraf@waterrf.org)

Judging criteria

Intelligent Water Challenge Judging Sheet

TEAM NAME	(team name)
JUDGE	(judge name)
SCORE	**out of 140**

	Raw (0-10)	x Weight =	Score	
TEAM				
1 Team includes necessary skills and has appropriate utility input 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 salient 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 2.0 =		out of 20
8 The Solution meets utility expectations using appropriate tools.		x 2.0 =		out of 20
JUDGE'S IMPRESSIONS				
9 Recognition of alignment with IWC goals, scalability and sustainability, lessons learned, and more.		x 1.0 =		out of 10

COMMENTS

TEAM (10 points)

The team has appropriate utility representation or input, and includes necessary skills.*

- Is the team sponsored by a utility? (Wastewater, drinking water, stormwater or other?)*
- Do the team members cover all necessary skill sets needed to address the problem statement? (e.g. sensors, IT/data, QA/QC)
- Does the team include young professionals?
- Is a solution user part of the team? (i.e. a utility representative that is able to use the solution for improved knowledge/decision making)*
- Does the team represent diverse skill sets?
- How often and it what manner does the team meet for discussion and problem solving?

PLAN: DEFINE Problem Statement (20)

The problem statement demonstrates understanding of how data will address utilities' challenges in utilities' terms.

- Does the problem statement effectively explain the challenge faced by a utility?
- Does the problem as explained warrant the need for sensor data? Could it be solved by better data, rather than higher frequency data?
- Did the utility provide target metrics?*

PLAN: FRAME The Existing System (10)

The existing Intelligent Water System or its salient parts are well-described.

- Is the current system well-defined and described in a concise manner? (e.g. data source, sensors, networking, system architecture, data storage, power, O&M)
- Are there modifications needed for improved operations and/or to achieve the solution?

PLAN: DEVELOP a Plan (10)

The proposed solution lays out a realistic timeline and approach for solving the problem statement.

- Does the proposed solution adequately address the problem statement?
- Is an approach defined to achieve the intended solution? Is it feasible?
- Is a graphic or graphics illustrating the solution concept included?
- Is the proposed timeline realistic?

IMPLEMENT: Data and QA/QC (20)

Data used in the solution are clearly identified, and quality assurance and control are appropriately discussed.

- Are the data streams being used in the solution identified?
- Is an appropriate level of quality assurance described and applied for data streams?
- If automated quality control methods are proposed, are they justified?

IMPLEMENT: Analysis & Interpretation (20)

Analytics and results clearly support the intended solution.

- Are the analytics suitable for the anticipated use?
- Do the analytics provide insight and support use of the results?

IMPLEMENT: Communication & Use (20)

Results are provided for decision-makers in a clear, easily understood, and actionable format.

- How is data being communicated and visualized?
- How is the result communicated/provided to the decision-makers?
- Were decisions able to be made using the data and analytics results provided? If so, what?*

IMPLEMENT: The Solution (20)*

The proposed solution was implemented effectively in a manner consistent with utilities' expectations and needs using appropriate COTS, open-source, or custom tools.

- Was the proposal effectively executed? Was the pilot/testing completed?*
- Is the value quantified and/or qualified using metrics provided by the utility? (e.g. financial, water quality or quantity, asset management, regulatory)*
- Did the solution address the problem?*
- Is the solution sustainable for the utility to continue implementing? (e.g. staffing, expertise needed to execute, associated costs)*
- Were open source tools considered and/or used?*

JUDGES' OVERALL IMPRESSION (10)

Alignment of the submittal with goals, anticipated scalability and sustainability of the approach, communication of lessons learned, expression of IWS or water sector value or insight, and other factors may be recognized here.

- Did the proposal and solution demonstrate credible understanding of intelligent water systems and Challenge goals?
- Is the solution scalable? Can it be repeated within the utility at other facilities? Can it be reproduced at other utilities facing a similar problem?
- Did the solution demonstrate the value of intelligent water systems?
- Did the proposal and solution leverage data using the best available tools to better understand and make decisions?
- If the solution demonstration wasn't successful or yet complete, is the proposal and progress impressive?
- Are any additional lessons learned or merits captured for the water sector?
- Does the solution provide an innovative water sector insight or value add?

Submittal Guidance – Challenge Plan

- Challenge plan document due 4/23: should be no longer than three pages.
- The team:
  - Highlight if it is a partnered team or regular team
  - Names, titles, organizations, and e-mails.
  - Description of each team member's role should be included.
- Plan:
  - The problem statement in brief
  - Challenges to the utility
    - Desired outcome from the IWC effort
    - Details of the IWS system*
    - Outline of proposed problem solution and timeline

*****If previous work has been done on the proposed problem, please clearly articulate the existing work and the intended scope of work to be done under this Challenge period

Submittal Guidance – Final Solution

- Final Solution document due 9/4: should be no longer than seven pages. Appendices will not count toward the maximum page count.
- The team:
  - Highlight if it is a partnered team or regular team
  - Names, titles, organizations, and e-mails.
  - Description of each team members role should be included.
- Problem statement that is being addressed in the challenge (2 page max).
- Problem solution description (5 page max):
  - Data streams are clearly identified and QA/QC appropriately discussed.
  - Analysis and interpretation support the solution.
  - The intelligent water systems technology is clearly explained.
  - Plan to scale is described.
  - Financial support is outlined.
  - Next steps are outlined and a timeline is provided.
    - Current status and progress to date.
    - Milestones for next 6-12 months.
- Risk Assessment – description of any challenges and how to mitigate them.

Q&A