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The next-generation technology for
AGING WATER INFRASTRUCTURE

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WEBINAR MODERATOR

Barb Martin

Director of Engineering and Technical Services

American Water Works Association

With over 20 years of water sector experience, Barbara Martin is currently Director of Engineering and Technical Services at the American Water Works Association, where she leads a team of more than 30 staff and thousands of volunteers in the development of technical resources and programs. Barbara has also worked for global water sector service providers, which included North American business development responsibility for a proprietary process treatment technology, as well as analytical instrumentation. Barbara has a BA in chemistry from Boston University, an MS in geochemistry from Colorado School of Mines, where her thesis research focused on disinfection by-product formation and fate, and an MBA from Colorado State University. She is a licensed drinking water treatment operator in the State of Colorado.

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WEBINAR SURVEY

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PANEL OF EXPERTS

Peter Kraft
Asset Management Practice Lead
Xylem Inc

Clifford Chan
General Manager
East Bay Municipal Utility District

Ryan Locicero, PhD, PE
Business Practice Leader – Research & Innovation Department
Clean Water Services

John Norton Jr, PhD, PE
Director – Energy, Research, and Innovation
Great Lakes Water Authority

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AGENDA

I.	Innovation at AWWA	Barb Martin
II.	COVID-19: A Reflection Point	Peter Kraft
III.	Innovation Roadmap for Utilities	Clifford Chan
IV.	Culture of Innovation	Ryan Locicero, PhD, PE
V.	Strategies for Improving Operational Efficiency	John Norton Jr, PhD, PE

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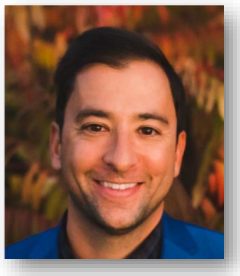
ASK THE EXPERTS

Peter Kraft
Xylem Inc

Clifford Chan
East Bay Municipal Utility District



Ryan Locicero, PhD, PE
Clean Water Services

John Norton Jr, PhD, PE
Great Lakes Water Authority

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INNOVATION AT AWWA

Barbara Martin
Director – Engineering & Technical Services
AWWA

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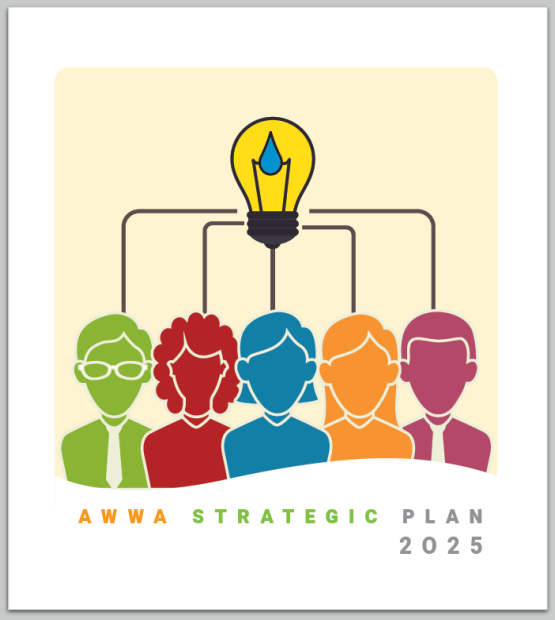
AWWA STRATEGIC PLAN: 2025

- Core Principles
  - Protect Public Health
  - Safeguard the Environment
  - Strengthen Public Trust
  - Advance Diversity and Inclusion
  - Share Best Practices
  - ***Inspire Innovation***
  - Advance Access to Safe Water Globally



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AWWA STATE OF THE WATER INDUSTRY SURVEY

Top water sector challenges identified by survey respondents (pre-COVID) will require innovation to address

Top 10 Water Sector Challenges (2020)
1. *Renewal and replacement of aging water and wastewater infrastructure (63% critical)*
2. *Financing for capital improvement projects*
3. *Long-term water supply availability*
4. *Public understanding of the value of water systems and services*
5. *Watershed/source water protection*
6. *Public understanding of the value of water resources*
7. *Aging workforce/anticipated retirements*
8. *Emergency preparedness*
9. *Compliance with current regulations*
10. *Groundwater management and overuse*

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ACE INNOVATION LOUNGE

Innovation is a key theme integrated throughout AWWA conference programming:

AWWA/SWAN International Smart Water Symposium, November 10-11

The ACE Innovation Lounge, powered by Isle, is a collaborative effort to provide ACE attendees with access to:

- Cutting-edge innovative technologies
- Programming featuring innovation thought leaders
- Networking opportunities

Looking forward to returning at ACE21 in San Diego!

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INNOVATION INITIATIVE

Volunteer driven effort to advance water sector innovation

Mission – To advance a culture and structure for innovation to address the challenges facing the water industry

American Water Works Association

INNOVATION INITIATIVE

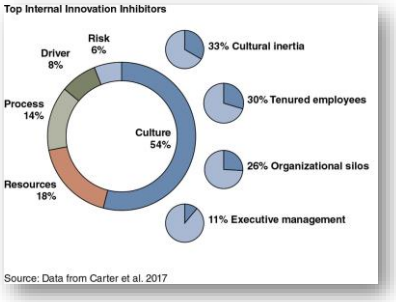
Inspiring innovative thinking and best practices

Development of Innovation Roadmap for utilities

Sharing best practices

Engagement opportunities

Awards & recognition



Journal AWWA, Volume: 109, Issue: 12, Pages: 32-39, First published: 01 December 2017, DOI: (10.5942/jawwa.2017.109.0153)

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COVID-19: AN OPPORTUNITY FOR INNOVATION?

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ASK THE EXPERTS

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Xylem Inc

Clifford Chan
East Bay Municipal Utility District

Ryan Locicero, PhD, PE
Clean Water Services

John Norton Jr, PhD, PE
Great Lakes Water Authority

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xylem
Let's Solve Water

COVID-19 A REFLECTION POINT

Peter Kraft
Asset Management Practice Lead
Xylem

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CLOSED DUE TO
COVID-19

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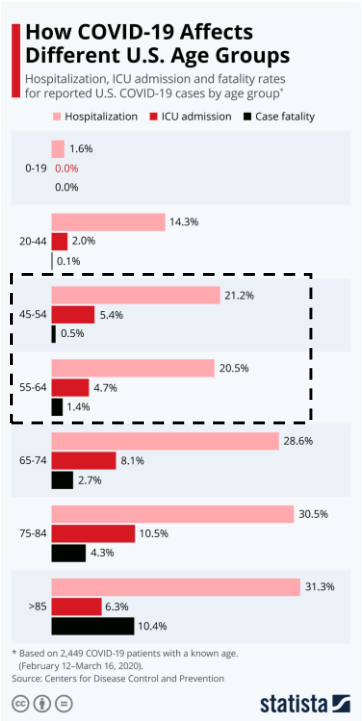
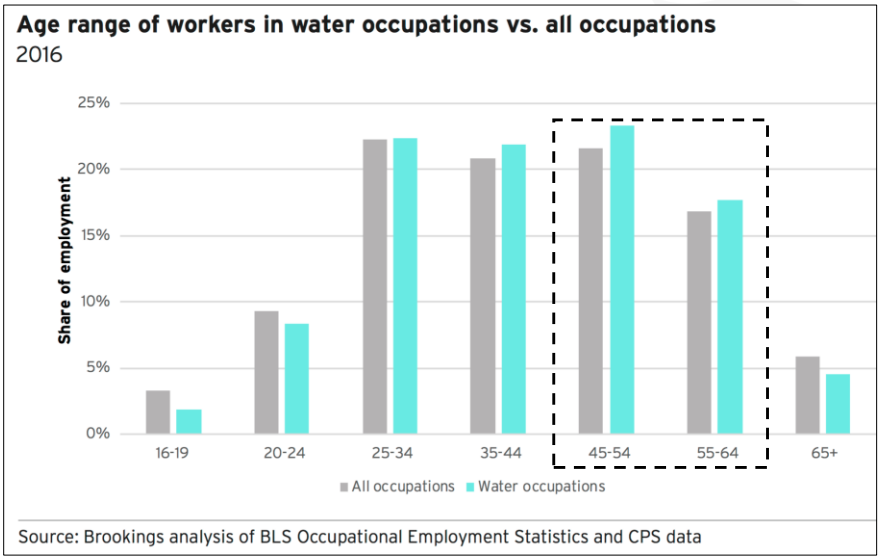

How COVID-19 Affects Different U.S. Age Groups
Hospitalization, ICU admission and fatality rates for reported U.S. COVID-19 cases by age group*
Hospitalization
ICU admission
Case fatality
0-19 1.6% 0.0% 0.0%
20-44 14.3% 2.0% 0.1%
45-54 21.2% 5.4% 0.5%
55-64 20.5% 4.7% 1.4%
65-74 28.6% 8.1% 2.7%
75-84 30.5% 10.5% 4.3%
>85 31.3% 6.3% 10.4%
* Based on 2,449 COVID-19 patients with a known age. (February 12–March 16, 2020).
Source: Centers for Disease Control and Prevention
statista


Age range of workers in water occupations vs. all occupations
2016
Share of employment
25%
20%
15%
10%
5%
0%
16-19
20-24
25-34
35-44
45-54
55-64
65+
All occupations
Water occupations
Source: Brookings analysis of BLS Occupational Employment Statistics and CPS data

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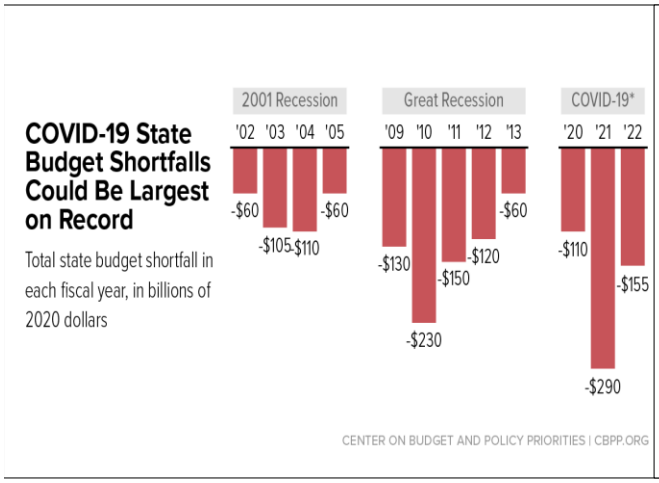

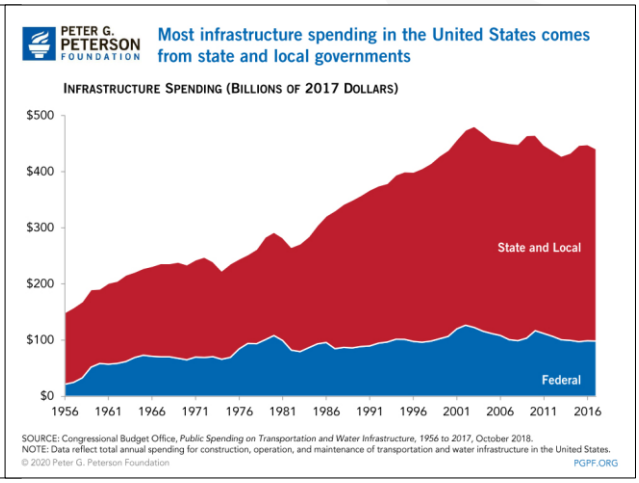

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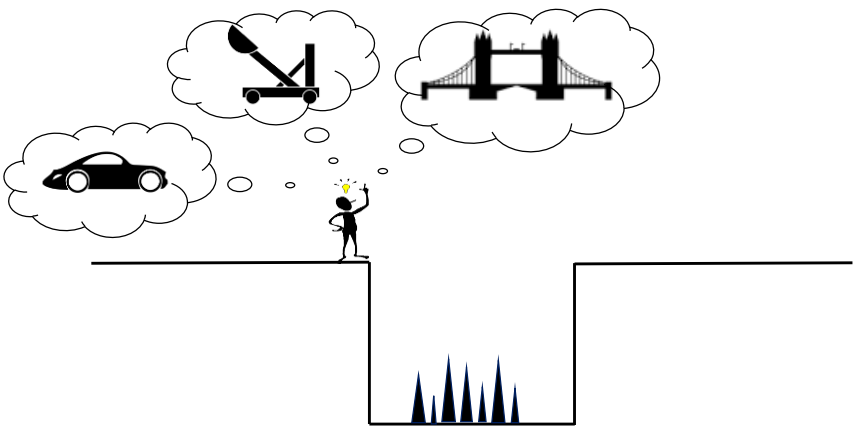
Innovation: a new idea, method, or device



Risk & Uncertainty

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ASK THE EXPERTS

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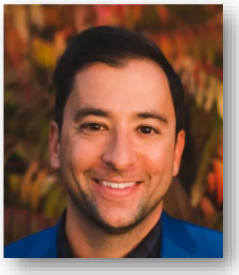
Xylem Inc

Clifford Chan
East Bay Municipal Utility District



Ryan Locicero, PhD, PE
Clean Water Services

John Norton Jr, PhD, PE
Great Lakes Water Authority

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INNOVATION ROADMAP FOR UTILITIES

Clifford Chan
General Manager
East Bay Municipal Utility District

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WHY INNOVATE?

- Meet regulations
- Improve efficiency and effectiveness
- Reduce costs
- Meet workforce needs
- Attract future talent

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GOALS OF THE INNOVATION ROADMAP

- Easy to develop
- Usable by utilities of all sizes
- Scalable (program can grow over time)
- Standardized template and guidance

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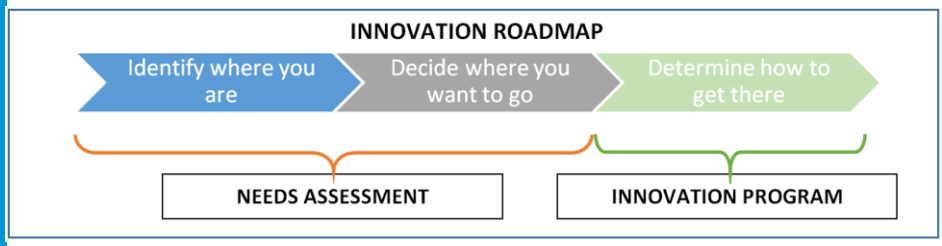
INNOVATION ROADMAP



- Needs Assessment
- Innovation Program

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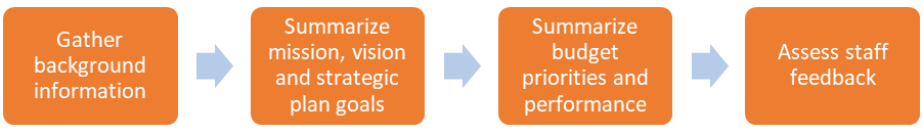
IDENTIFY WHERE YOU ARE



- Help determine the best path forward
- Focus innovations on greatest needs
- Use readily available documents
- Listen to staff

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DECIDE WHERE YOU WANT TO GO

Identify challenges and threats → Identify barriers to innovation → Perform gap analysis → Identify innovation needs

- Identify challenges, threats, and risks
- Identify barriers
- Compare against performance metrics and goals
- Get feedback from stakeholders and staff

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DETERMINE HOW TO GET THERE

Create Innovation Structure → Prioritize Needs Assessment and identify resources → Develop Action Plan → Finalize and implement Innovation Program

- Create the innovation culture
- Prioritize your needs
- Focus on a few innovations

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OPPORTUNITY TO INNOVATE

- COVID-19 – Risk and Resilience
- Manual of Practice
- Whatever you do, just start!

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ASK THE EXPERTS

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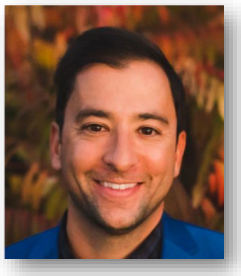
Xylem Inc

Clifford Chan
East Bay Municipal Utility District



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Clean Water Services

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Great Lakes Water Authority

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Clean Water Services

CULTURE OF INNOVATION

Ryan Locicero, PhD, PE
Business Practice Leader – Research & Innovation Department
Clean Water Services

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INNOVATION ROADMAP FOR UTILITIES

Innovation Roadmap

1. Identify Where You Are
2. Decide Where You Want to Go
3. Determine How to Get there

- Learn how CWS is innovating to reduce risk and become more resilient
  - Optimize operations
  - Develop and adopt new innovation technologies
  - Verify operational data from purchase or design of new technologies
  - Reduce risk of regulatory compliance

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CLEAN WATER SERVICES

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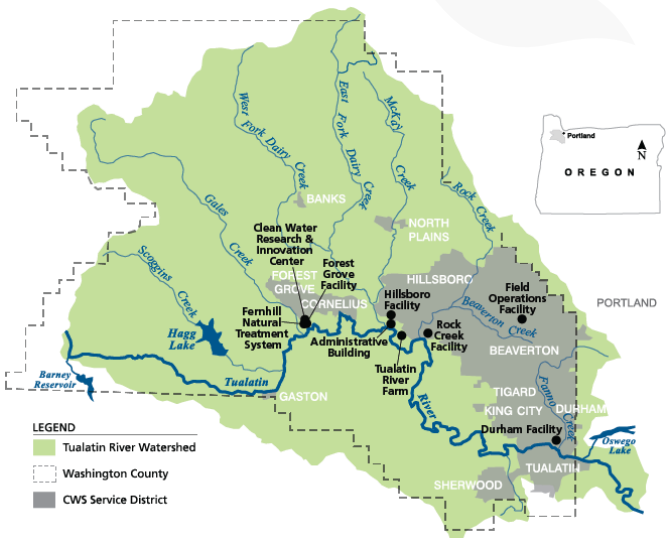
CLEAN WATER SERVICES – WASHINGTON COUNTY, OR

- Our River
  - Tualatin River
- Our Ratepayers
  - 600,000+ people, businesses and industries
  - 12 cities
- Our Assets
  - 4 water resource recovery facilities
  - 42 pump stations
  - 850 miles of sanitary sewer
  - 530 miles of storm sewer
  - 160+ river miles of restored riparian habitat
- Our County
  - County Service District – ORS 451
  - Share Board with Washington County
- Our People
  - 357 FTE



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1. IDENTIFY WHERE YOU ARE

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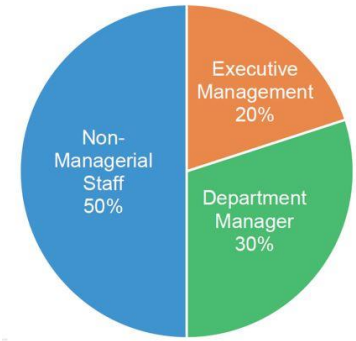
INNOVATION SURVEY

- CWS 2019 Data
  - Innovation is Critical – 93%
  - Innovative Utility – 93%



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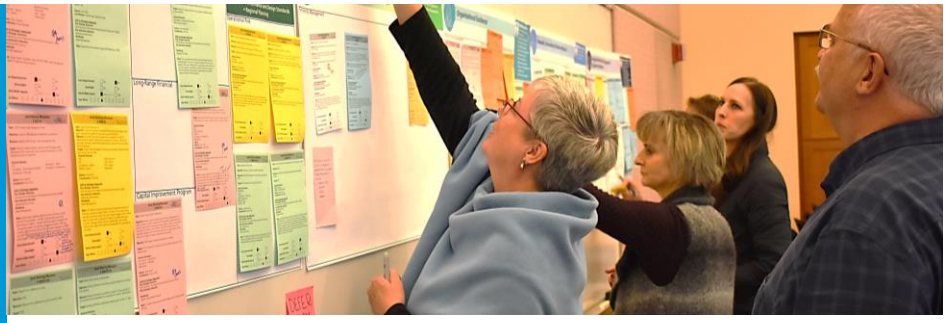
CWS MECHANISMS FOR INNOVATION

- Aligns with CWS Strategic Approach
- Pay for Performance
- Program Review & Evaluation Criteria
- External Audit Process
- Funding



- Goal Sharing Program – Annual (19-Years)
  - Promotes cost savings and service enhancement by encouraging both practical and innovative employee approaches and solutions.
  - Provides critical linkage between employee achievement of meeting targets, working together, and improving performance.
- Research Proposal Program – Annual to Multi-Year
  - Promote foundational, strategic, and aspirational research projects to improve processes, result in greater efficiency, lower costs, and improve safety.

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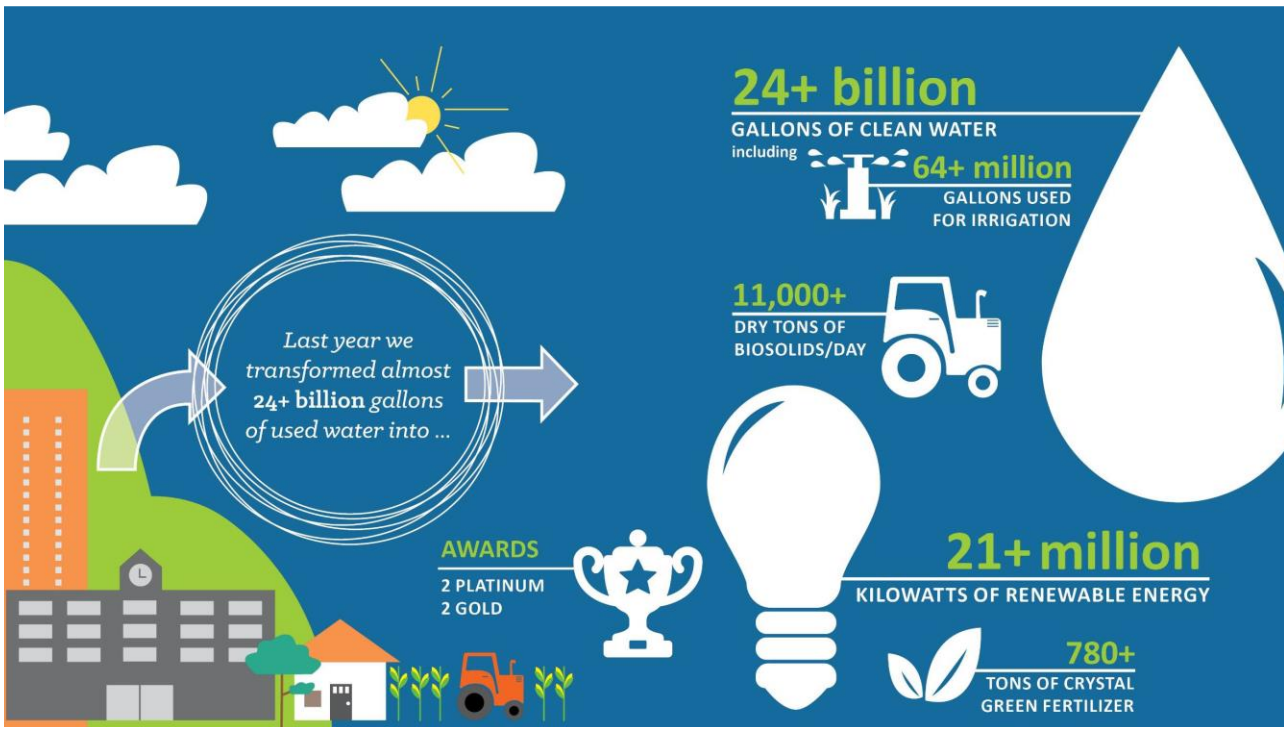

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CWS CULTURE OF INNOVATION

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CWS CULTURE OF INNOVATION

- Strategic Innovator
  - Identify and develop disruptive innovations
  - Innovation is part of the culture

- Innovation is driven by personal interest and curiosity which leads to more incremental innovation that is within the control of integrated teams.
  - CWS continuously searches for new and improved solutions to problems.
  - CWS supports continued education and training in new methods and approaches.
  - CWS employs people with a demonstrated record of engaging in innovation.
  - CWS employs many PhDs that have a disciplined way of conducting research.

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CWS COVID RESPONSE SEWERSHED SURVEILLANCE

- National Science Foundation
  - NSF 2027679: RAPID: Tracking the Coronavirus in Municipal Wastewater
- CWS / Washington County Sewershed Surveillance
- TRACE (Team-based Rapid Assessment of Community-level Coronavirus Epidemic) partnership in Newport, OR
- Oregon Health Authority Statewide Surveillance

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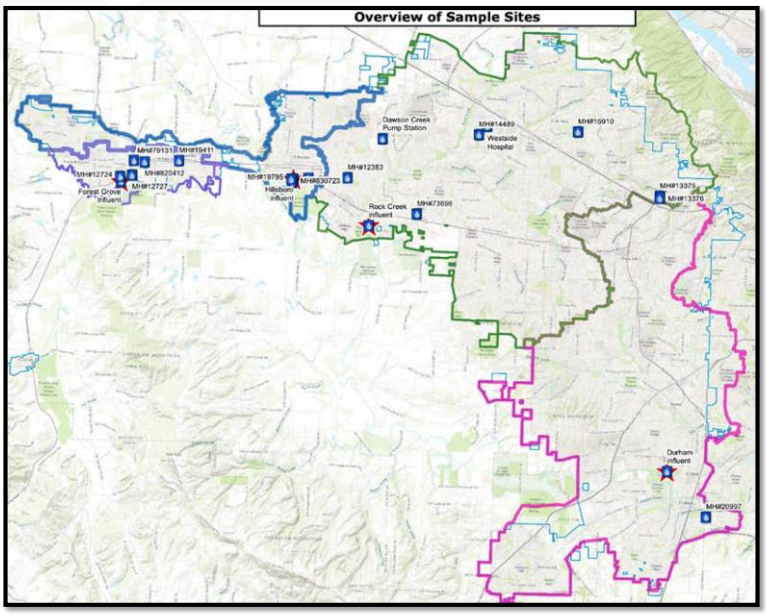
CWS SEWERSHED SURVEILLANCE PROGRAM

- Washington County, OR
- SARS-CoV-2 Sample Locations
  - 4 Advanced Resource Recovery Facility Influent
  - 19 Manholes
- Weekly Monitoring
- April 2020-Present



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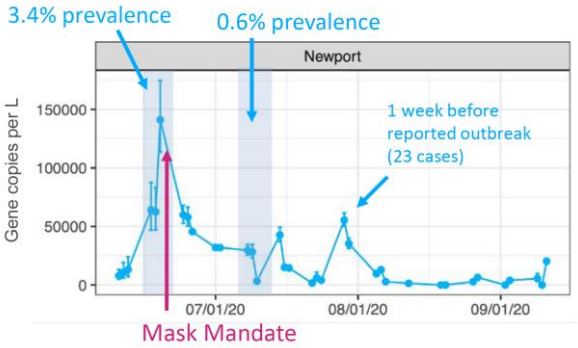
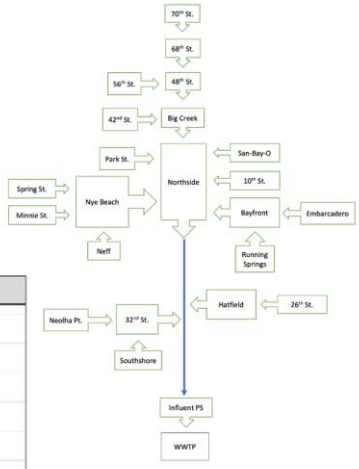
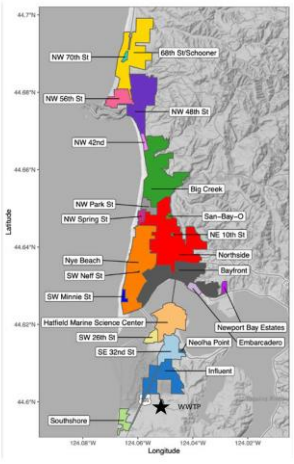
CWS SEWERSHED SURVEILLANCE PROGRAM

- TRACE Newport Study







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CWS SEWERSHED SURVEILLANCE PROGRAM

- Oregon Health Authority Statewide Study
- 43 Wastewater Treatment Plants
- Weekly monitoring beginning early September
- 2.5 year duration
- Reporting to state level health authority

CleanWater Services 1970-2020

Oregon Health Authority

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CWS COVID RESPONSE

EMPLOYEE COMMUNICATIONS & ENGAGEMENT

- Emergency Operations Center
- Incident Command
- De-escalation Unit

- Innovation in internal communications and engagement
  - Virtual Visits with the CEO
  - Online Drop-in Sessions
  - COVID-19 Employee Report Line
  - Employee Wellness Kits
  - Let's Keep Our Distance Brand
  - All Supervisors Emails
  - Updates from the EOC
  - EOC Employee Announcements & COVID-19 FAQ
  - In-Person Communications

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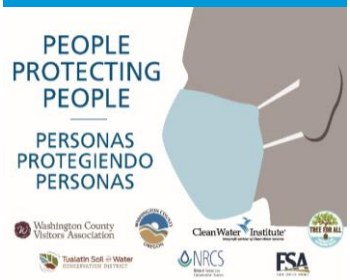
CWS COVID RESPONSE

PEOPLE PROTECTING PEOPLE

- Partnerships By The Numbers



- **30-40k** Masks distributed bi-weekly from distribution hub
  - **150,000** + for Agricultural workers
  - **120,000** + for Community-based Organizations
  - **110,000** + for COVID Business Recovery Centers
  - **100,000** + in one day for the Agricultural distribution event
  - **5,000** + migrant workers/families served
  - **800** + Washington County Meals on Wheels participants
  - **200** + Vendors at All 10 Washington County Farmers Markets
  - **31** vineyards in preparation for grape harvest
  - **9** Washington County Chamber of Commerce
- **17,000** bottles of hand sanitizer distributed from distribution hub

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2. DECIDE WHERE YOU WANT TO GO

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CWS STRATEGIC APPROACH

- Key Strategic Outcome
  - Research, Innovation & Resource Recovery

Performance Excellence

Performance Excellence at Clean Water Services is an integrated systems approach to organization performance. We're building a diverse workforce that is committed to business process improvement, learning and growth, and to being part of a transformational and innovative clean water organization. The Performance Excellence framework focuses on people, process, planning, dialogue and implementation to help us deliver timely, responsive services and products for our customers and stakeholders — and help us deliver on the region's values. We will submit our Performance Excellence profile to the regional system, Performance Excellence Northwest, in January 2021 and prepare for a formal site visit in March 2021.

Key Strategic Outcomes

Key Strategic Outcomes are our organization's areas of greatest expertise; those strategically important, specialized capabilities that are central to fulfilling our mission and that provide an advantage in our region and to the people we serve.

Organizational Excellence: CWS is a highly effective and transformative organization that maximizes the capabilities, talent and effectiveness of our employees to provide services and products that deliver on the values of the region we serve.

Integrated Water Resource Management & Resilient Watershed: In partnership with others, CWS creates resilient watersheds by optimizing and integrating the management of water resources for the benefit of the public and the environment.

Research, Innovation & Resource Recovery: CWS provides services and products that deliver practical and pragmatic water solutions for our region to recover resources and to optimize our operations through innovation that is shared globally.

Catalyzing Transformational Partnerships: CWS goes beyond organizational boundaries to create and sustain strategic partnerships in the region to accomplish more than any one organization can alone.

Contributing to the Region's Environmental & Economic Vitality: CWS' sound planning, investment and stewardship in regional assets is essential to the region's Washington County's continued appeal as a place to invest, live, work and play.

Roadmaps

A roadmap defines the specific strategies that we will implement as an organization to reach our Key Strategic Outcomes. Each roadmap will have an action plan that defines the resources and the time needed for implementation.

Key Outcome Indicators

Key Outcome Indicators quantify the input, output and performance dimensions of our organization's performance. Our Key Outcome Indicators will allow our employees, ratepayers, Board of Directors and our region to know how well we are performing.

Updated December 2019

Research, Innovation & Resource Recovery

CWS provides services and products that deliver practical and pragmatic water solutions for our region to recover resources and to optimize our operations through innovation that is shared globally.

CWS is recognized as a leader in delivering quality, cost-effective services that contribute to the well-being of the region. Through research, innovation and resource recovery, we create the products of clean water, fertilizer and renewable energy; discover new ideas and solutions; diversify revenue; and implement business opportunities to generate additional value for our customers, partners, stakeholders and the environment.

CWS is home to North America's first municipal nutrient recovery facility, Oregon's largest water reuse program, a leading renewable energy program and a first-of-its-kind natural treatment system. We hold the patent to a technology known as WASSTRIP, which increases fertilizer production by approximately 50%. We provide more than 200 million gallons of clean irrigation water a year, and through Pure Water Brew we use a small amount of recycled water to make a big impact on the national conversation about water reuse. We produce nearly 40% of the energy needed to operate our treatment facilities. At Fernhill Natural Treatment Systems, we're expertly blending science and nature to save millions of ratepayer dollars while improving water quality and protecting valuable ecosystems.

CWS integrates information technology, operational technology and engineering technology, most notably through sensors to optimize water resource recovery operations and to guide smart stormwater systems. CWS is one of the region's first utilities to use real-time weather forecasts and sensor data to predict overall systems performance and control the flow and treatment of stormwater. This approach allows CWS to do more with less — increasing watershed resiliency, storage and treatment capacity, while reducing the region's flooding risk and improving water quality. CWS serves as a technology incubator, helping to move ideas from proof of concept to implementation and replication.

CWS conducts research at scale, with an eye toward how the results can be put to practical use. We collaborate with universities to develop sophisticated solutions to today's most pressing environmental challenges. Looking ahead, CWS is investing in a Research and Innovation Center where our staff will develop utility-inspired technologies to create regenerative solutions to apply to natural systems, resource recovery and integrated watershed approaches. We anticipate opening the center in 2023.

Roadmaps: Our Plan
- Research & Innovation Management
- Product Development

Key Outcome Indicators: How We Measure Our Progress
- Research & Innovation
- Resource Recovery

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CONTROLLING OUR DESTINY

- Attract next generation of water entrepreneurs
  - Organizational Excellence
  - Employer of choice

- CWS is transitioning from a culture where innovation was primarily sought from outside consultants toward a greater dependence on internal expertise.
- Developing CWS Roadmaps for building and implementing a district-wide Innovation Strategy.
- Our workforce is defining the specific objectives, initiatives, and action plans that they need to execute strategy.
- Develop long-term innovation approach and key performance measurement.
- Communicate our culture of innovation across the organization.
- Engage teams across departments and manage multidisciplinary approach to problem solving.
- Communicate value of non-technological innovation.
- Move beyond incremental technology solutions as well as engage in holistic-thinking.

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3. DETERMINE HOW TO GET THERE

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RESEARCH INNOVATION PARTNERS LABS

- Attract next generation of water entrepreneurs
  - Organizational Excellence
  - Employer of choice

ripl
RESEARCH • INNOVATION • PARTNERS • LABS
at Clean Water Services

- Umbrella for people, place and activities that conduct research, monitor current water quality and plan for future solutions to the world's changing water needs and challenges.
- ripl is a movement – where every action has a cumulative impact
- Objectives
  - World Class Laboratories
  - Pilot Research Facility
  - Entrepreneurial Labs
  - Pathogens Lab
  - Training, Workshops, & Conferences

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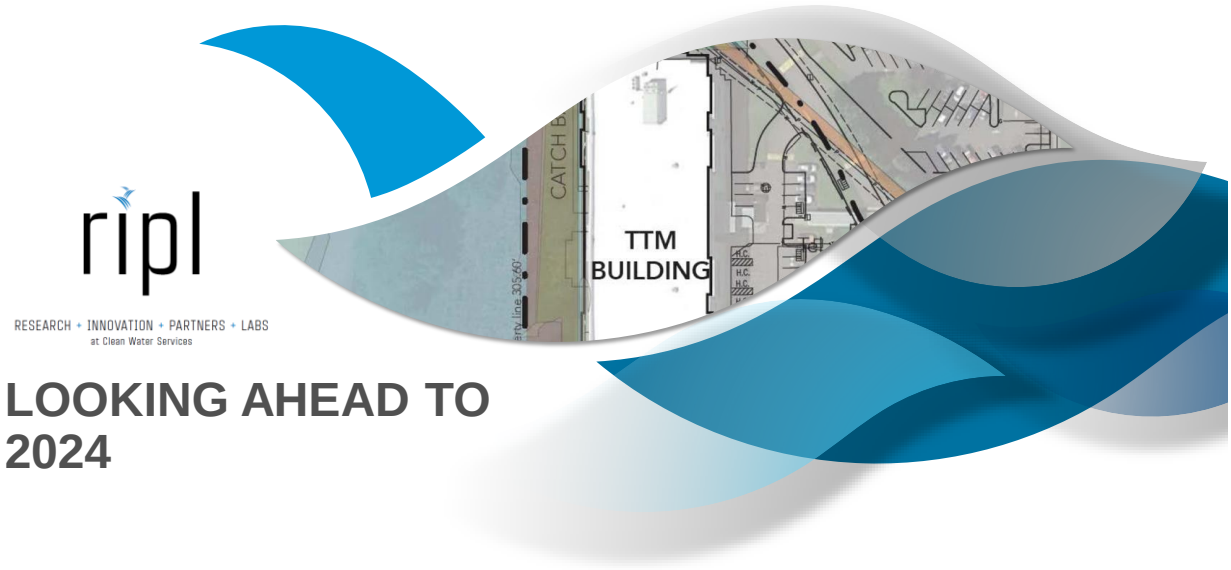

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RESEARCH • INNOVATION • PARTNERS • LABS
at Clean Water Services

LOOKING AHEAD TO 2024

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American Water Works Association
Dedicated to the World's Most Important Resource®

CleanWater Services 1970-2020

THANK YOU

CleanWater Services


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Personal Website: ryanlocicero.com
LinkedIn: In/RyanLocicero
Email: lociceror@cleanwaterservices.org

Fun Fact

Ryan was the recipient of the 2013 WEF Canham Graduate Studies Scholarship

Ryan Locicero, PhD, PE

Business Practice Leader – Strategy, Performance, & Innovation
Clean Water Services – Research & Innovation Department
Hillsboro, Oregon

Bio

Ryan Locicero, PhD, P.E., is a Business Practice Leader at Clean Water Services in charge of Business Strategy, Performance and Innovation. In his previous role, Ryan was awarded the American Association for the Advancement of Science (AAAS) Science and Technology (S&T) Policy Fellowship at The National Science Foundation (NSF) in the Directorate for Computer and Information Science and Engineering's (CISE) Office of the Assistant Director (OAD). Ryan contributed to CISE research and education activities, including cross-cutting initiatives such as Smart and Connected Communities (NSF 16-610 and NSF 18-520), Cyber-Physical Systems (NSF 17-529 and NSF 18-538), Innovations at the Nexus of Food Energy Water (NSF 17-530 and NSF 18-545), and Signals in the Soil (NSF 18-047).

Dr. Locicero received a Ph.D. in Environmental Engineering, M.E. in Environmental Engineering Sciences, and B.S. in Civil Engineering from the University of South Florida (USF), University of Florida, and USF respectively. Ryan is also a registered Professional Engineer in the State of Florida and the State of Oregon and has worked for several years as a private consultant on public infrastructure projects.

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ASK THE EXPERTS

Peter Kraft
Xylem Inc

Clifford Chan
East Bay Municipal Utility District

Ryan Locicero, PhD, PE
Clean Water Services

John Norton Jr, PhD, PE
Great Lakes Water Authority

Enter your **question** into the **question pane** on the right-hand side of the screen.

Please specify to whom you are addressing the question.

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GLWA Great Lakes Water Authority

STRATEGIES FOR IMPROVING OPERATIONAL EFFICIENCY

John W. Norton, Jr, PhD, PE
Director – Energy, Research, and Innovation
GLWA

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GLWA – WATER AND WASTEWATER TREATMENT

Water System

- Provides nearly 40% of Michigan's population with drinking water
- Vast water supply system consisting of:
  - 3 intake facilities
  - 5 water treatment plants
  - 19 booster pumping stations
  - 32 water storage reservoirs

Sewer System

- Provides sewer services to nearly 30% of Michigan
- Single site wastewater treatment plant
  - 3 major Interceptors
  - 5 pump stations
  - 8 CSO facilities, including 5 retention treatment basins and 3 flow-through type facilities
  - Conveyance system with 181 miles of trunk sewers and interceptors

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CAUTIONARY NOTE AND FINE PRINT

- We are already doing a bunch (but not all) of what you are about to see…
- The overall program has not yet been approved
  - It will change
  - We are charging ahead anyway without a complete plan
- That is all I wanted to say with this slide

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SOME CONFLICTS AND OBSERVATIONS

- Must have the resources and authority to ask questions and get answers
- Must be collaborative – and that's still not enough
- Water/wastewater treatment is very procedural – how to develop a safe place to fail?
- "Innovation" can be just a checkmark like "sustainable" or "resilient"
- Everyone has their own opinion regarding what "innovation" means
  - "You just go over there and innovate while we do all the real work."
- Must have thick skin, the patience of a saint, and the persistence of a **wolverine**.

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TWO INITIAL STRATEGIES

1. Internal innovation program
   - engages and enhances employee creativity

2. External technology screening and trialing program
   - evaluate and screen technologies to meet GLWA and member partner needs

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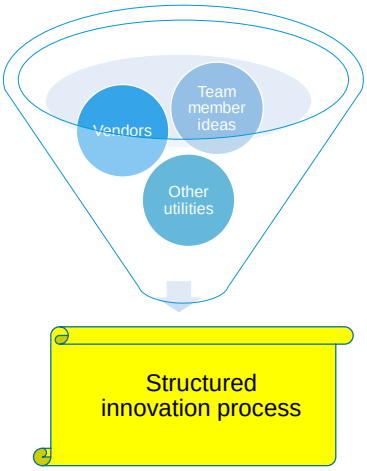
DRIVERS FOR AN INNOVATION PROGRAM

- GLWA Team members
  - Employee engagement
  - Improve efficiencies, reduce risks, improve resiliency
- Member partners
  - Improve understanding and collaboration
  - Provide resources/support
- Vendors
  - Improve efficiency of evaluations
  - Reduce staff “time sinks”
- Overall
  - Centralized repository for evaluating, tracking, feedback of assessment efforts
  - Mechanism for review, feasibility assessment, and trials.



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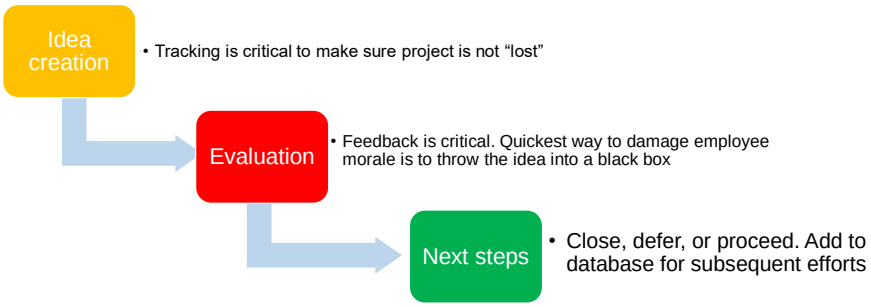
STRUCTURED APPROACH FOR ASSESSING IDEAS

- Idea creation: Track the progression
- Evaluation: **Feedback** to idea initiator
- Next steps: Record in database for future use



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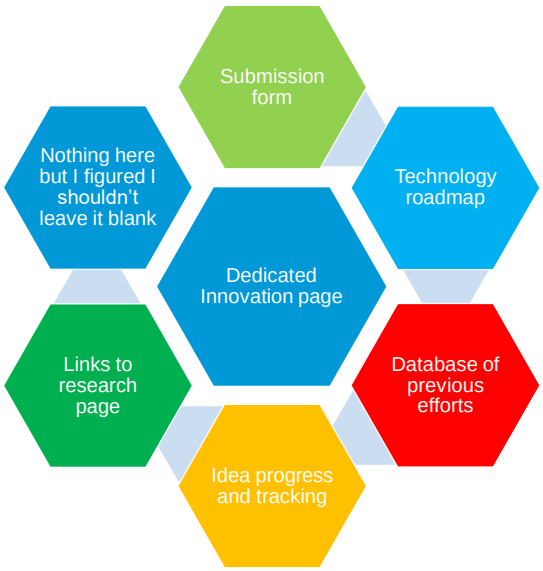
DEVELOPING AN INTERNAL STRUCTURE

- NEEDS:
  - Dedicated page
  - Submissions link
  - Links to:
    - Technology database
    - Previous submissions
    - Information resources
- Software currently undergoing an evaluation and assessment process



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DEVELOPING AN EXTERNAL CULTURE

- We hired a service provider (Isle Utilities) to provide a "curated" innovation framework
- Goals were
  - enhanced communication
  - staff involvement
  - partnering/sharing with other utilities

The Isle Utility Technology Approval Group (TAG) brings water end users together to evaluate emerging technologies, identify pilot opportunities, and engage in collaborative research or deployments.

Technology Search
Isle searches the globe for technologies to address Member Partner needs. We consider all types of technologies, from treatment to asset management to business practices.

Technology Selection
Isle will select technologies qualified to meet Member Partner needs.

TAG Workshop
Each featured solution providers gives a technical presentation followed by Q&A and discussion. Participants provide feedback and evaluate alignment with their operational requirements.

Follow Up
TAG consists of a continuous, on-going activities such as tracking trials and pilots. Isle will connect end users to solutions of interest.

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US TAG ECOSYSTEM

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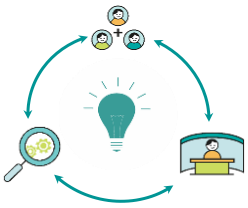
TECHNOLOGY NEEDS ASSESSMENT (VIA ISLE UTILITIES)

Survey distributed to GLWA and Utility Member Partners

Captures challenges & technology needs, interest areas, major projects, regulatory changes

Informs Isle's technology identification process; identifies collaboration opportunities across regional partners and abroad; engages staff and allows for input across enterprise; and tracks relevant projects and trials



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HOW TO ACHIEVE ALL THIS?

With effort and persistence

"*We shall go on to the end, we shall fight in France, we shall fight on the seas and oceans, we shall fight with growing confidence and growing strength in the air, we shall defend our Island, whatever the cost may be, we shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and in the streets, we shall fight in the hills; we shall never surrender*."

- Sir Winston Churchill
June 4, 1940
British House of Commons

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ANY QUESTIONS?

GLWA
Great Lakes Water Authority

John W. Norton, Jr, PhD., PE
Director

Energy, Research, and Innovation

E: *john.norton@glwater.org*

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Peter Kraft
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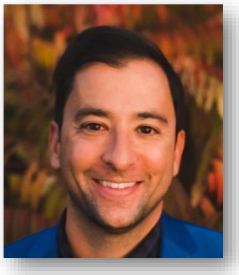
East Bay Municipal Utility District



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UPCOMING WEBINARS

Oct 16 - Getting the Lead Out: Legal Issues in EPA's Lead & Copper Rule: An AWWA Legal Community Virtual Roundtable Dialogue

Oct 20 - New AWWA Water Audit Software

Oct 21 - Watershed Protection and Military Installations

Register for a 2020 Webinar Bundle

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THANK YOU FOR JOINING TODAY'S WEBINAR

- As part of your registration, you are entitled to an additional 30-day archive access of today's program.
- Until next time, keep the water safe and secure.

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PRESENTER BIOGRAPHY INFORMATION

Mr. Kraft is the Asset Managament Practice Lead for Xlyem Inc. He also serves as a Co-Chair for AWWA's Innovation Committee. Peter has worked intimately within the water utility and technology space for over 15 years and is passionate about helping utilities transform their business practices through the use of innovative strategies and solutions.

Clifford Chan is the General Manager for the East Bay Municipal Utility District. He most recently served as the Director of Operations and Maintenance for the District. Previously he served as the Manager of Maintenance and Construction and the Manager of Water Treatment and Distribution. Mr. Chan has been at the District for 23 years and has worked in both the Engineering and Operations and Maintenance departments. Prior to joining the District, he was a consulting engineer and worked on a variety of environmental and geotechnical projects. Mr. Chan received his undergraduate and graduate degrees in civil engineering from the University of California at Berkeley and is a registered Professional Engineer in the state of California.

Ryan Locicero, PhD, P.E., is a Business Practice Leader at Clean Water Services in charge of Business Strategy, Performance and Innovation. In his previous role, Ryan was awarded the American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellowship at The National Science Foundation (NSF) in the Directorate for Computer and Information Science and Engineering's (CISE) Office of the Assistant Director (OAD). Dr. Locicero received a Ph.D. in Environmental Engineering, M.E. in Environmental Engineering Sciences, and B.S. in Civil Engineering from the University of South Florida (USF), University of Florida, and USF respectively. Ryan is a registered Professional Engineer in the State of Florida and the State of Oregon and has worked for several years as a private consultant on public infrastructure projects.

Dr. John Norton is Director of Energy, Research, and Innovation (ERI) for the Great Lakes Water Authority (GLWA), a combined water/wastewater utility in Southeast Michigan. GLWA provides 40% of the water for the state of Michigan and treat 30% of the wastewater for the state of Michigan. His efforts are focused on helping optimize the value of GLWA's capital and operational investments. In previous roles he has worked on water, wastewater, and energy systems in 46 countries and on every continent, including the largest utilities respectively, in North America, Europe, and Asia.

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