Workshop 1: Digital Transformation of the Water Sector and Role of Digital Twins
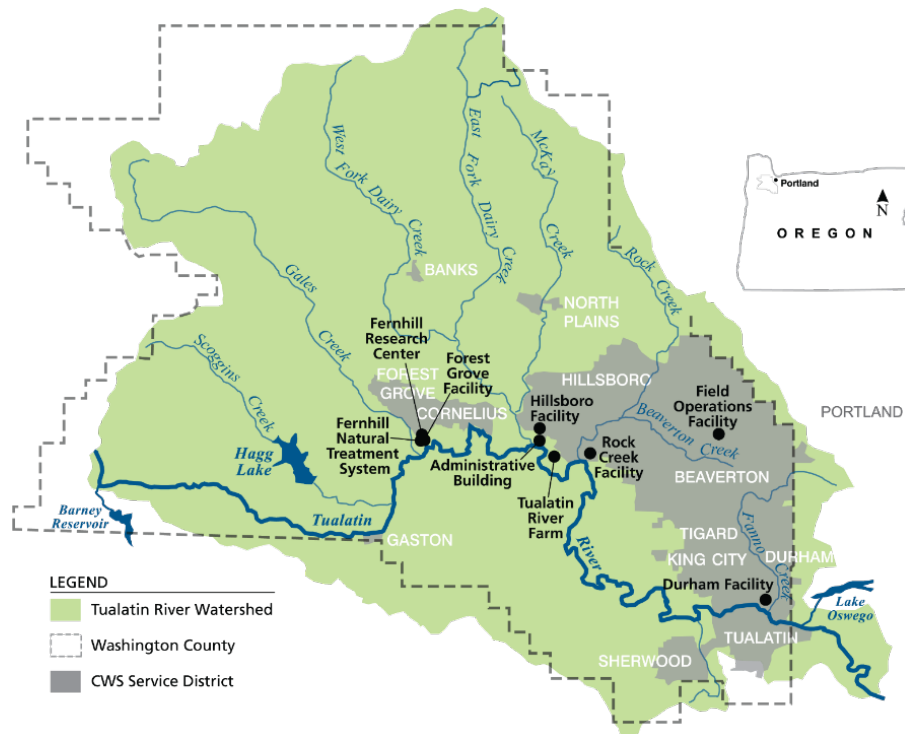
Digital Transformation Journey at Clean Water Services

By Ting Lu
Business Practice Leader, Digital Solutions
Singapore International Water Week
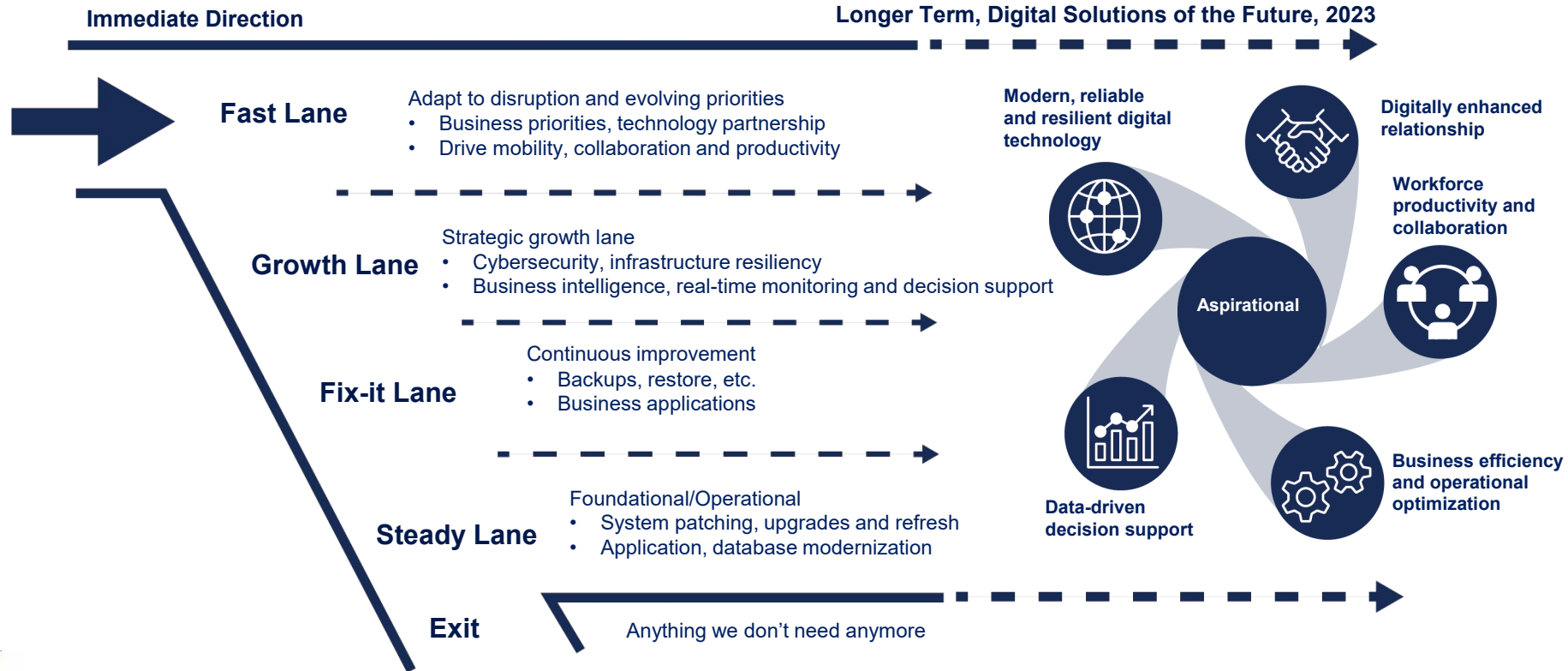
CleanWater Services

CLEAN WATER SERVICES

- In Oregon's Tualatin River Watershed

- Our services:

  - Resource recovery

  - Water security & planning

  - Flow management

  - Surface water management and watershed protection

- Our promise: Beautiful clean water for today and tomorrow.

LEGEND

Tualatin River Watershed
Washington County
CWS Service District

DIGITAL SOLUTIONS STRATEGIC PRIORITIES, 2021-2023

Immediate Direction

Longer Term, Digital Solutions of the Future, 2023

Fast Lane

Adapt to disruption and evolving priorities
- Business priorities, technology partnership
- Drive mobility, collaboration and productivity

Growth Lane

Strategic growth lane
- Cybersecurity, infrastructure resiliency
- Business intelligence, real-time monitoring and decision support

Fix-it Lane

Continuous improvement
- Backups, restore, etc.
- Business applications

Steady Lane

Foundational/Operational
- System patching, upgrades and refresh
- Application, database modernization

Exit

Anything we don't need anymore

Modern, reliable and resilient digital technology

Digitally enhanced relationship

Workforce productivity and collaboration

Aspirational

Business efficiency and operational optimization

Data-driven decision support

# DEVELOPING ENVIRODIY OPEN SOURCE TECHNOLOGY

- Bring down costs and give us more control
  - Factor of ~ 10 for dataloggers

- Data loggers and supporting equipment
  - Currently using Mayflies

- Inexpensive sensors
  - Factor of ~3-5 for pH sensors

- Open source clouds for data storage
 - MonitorMyWatershed
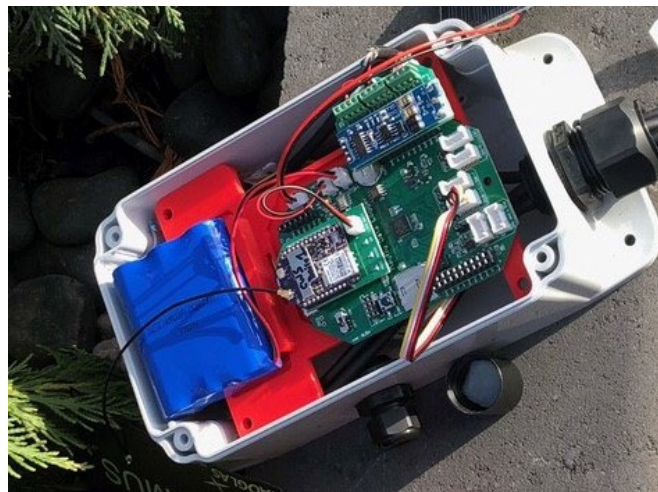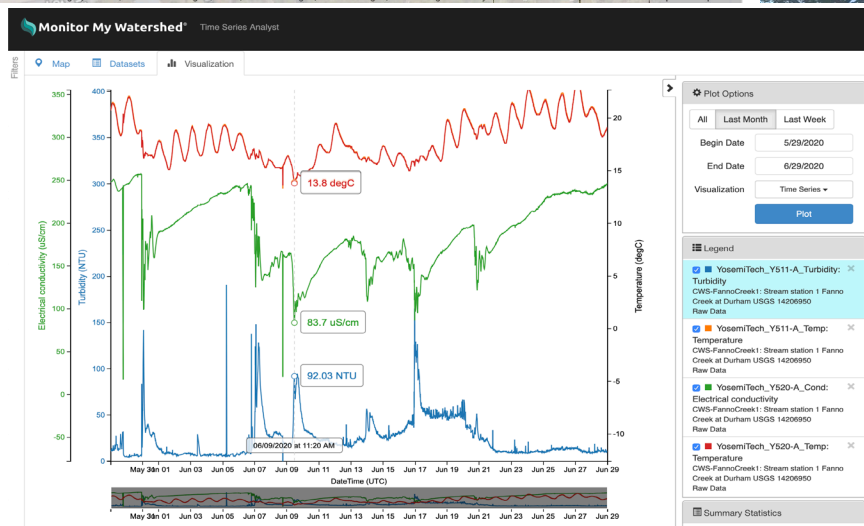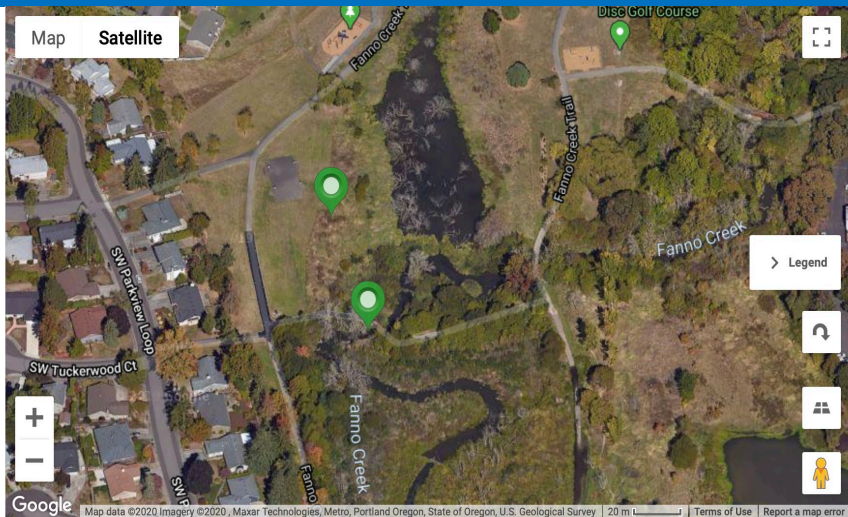
REAL TIME SEWER SENSOR NETWORK

- Mobilize field crew members for rapid response and pollution prevention
- Identify treatment plant disruptions and proactively optimize plant operations
- Conduct industrial compliance screening and sewer surveillance
- Data for calculations (e.g. local limits)
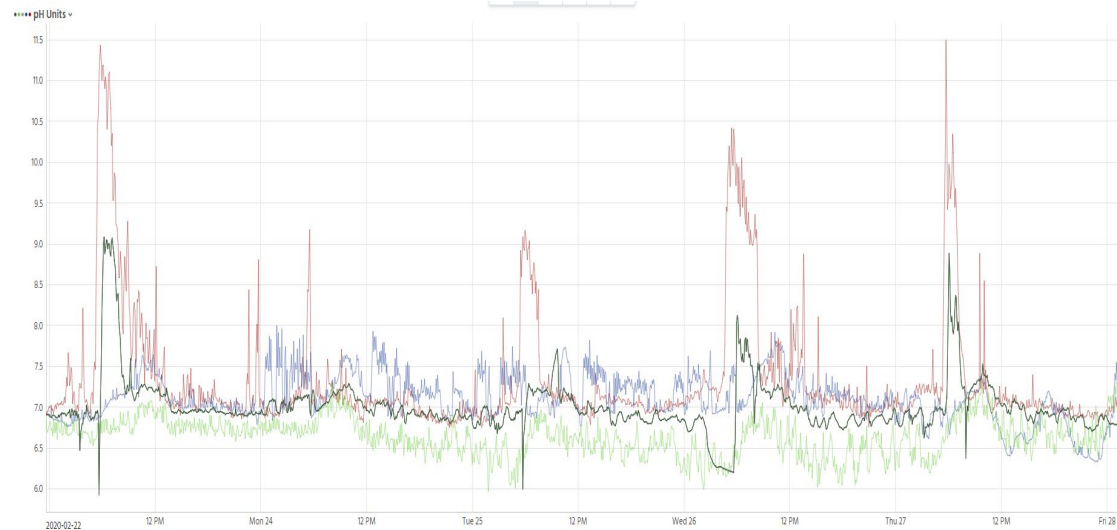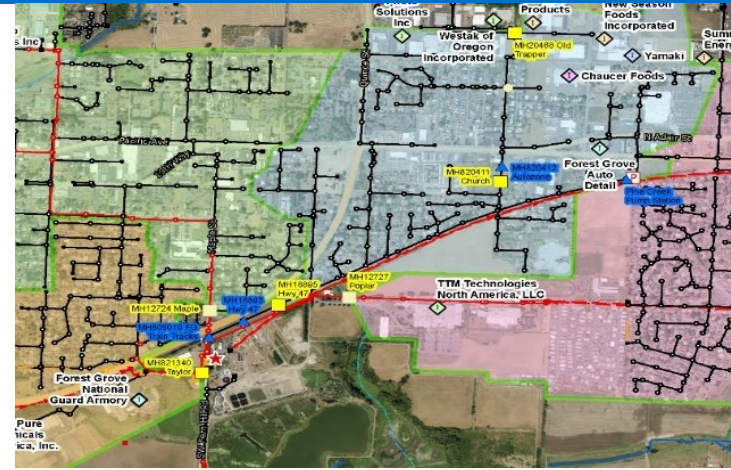
# DIGITAL TRANSFORMATION AT WATER RESOURCE RECOVERY FACILITIES
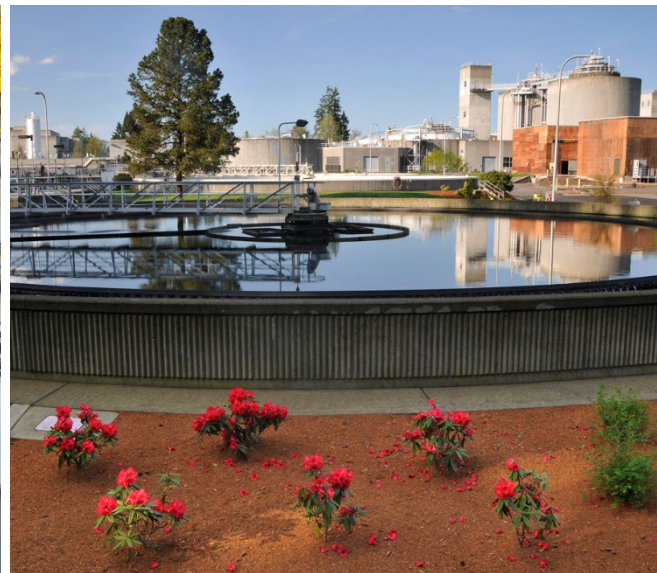
PREDICTION OF THE NEXT DAY'S INFLUENT WASTEWATER FLOWRATE TO MITIGATE RISK AND UNCERTAINTY

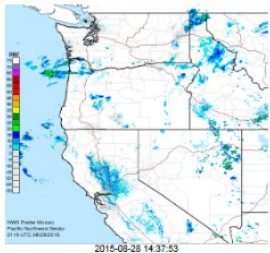WEF LIFT Intelligent Water System Challenge First Place Winner 2021
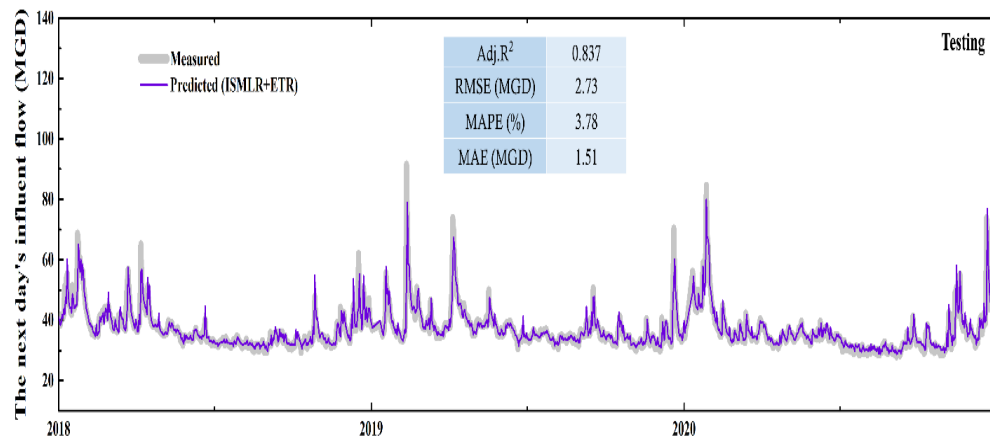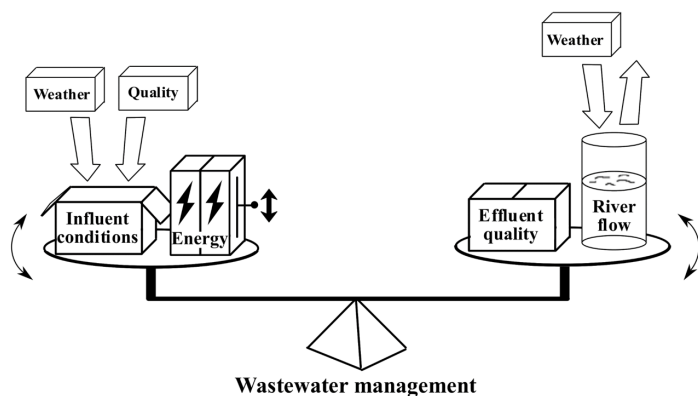
BRING ENGINEERING KNOWLEDGE, IT CAPABILITIES AND DATA SCIENTIST TOGETHER

- State point analysis incorporated into Power BI dashboard

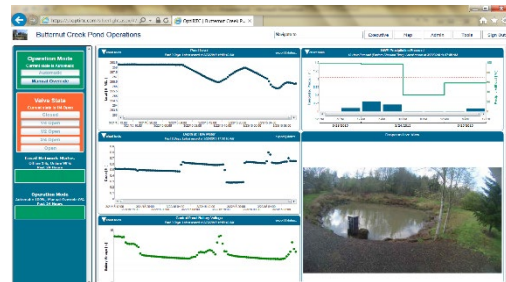- Dashboard includes tomorrow's predicted flow
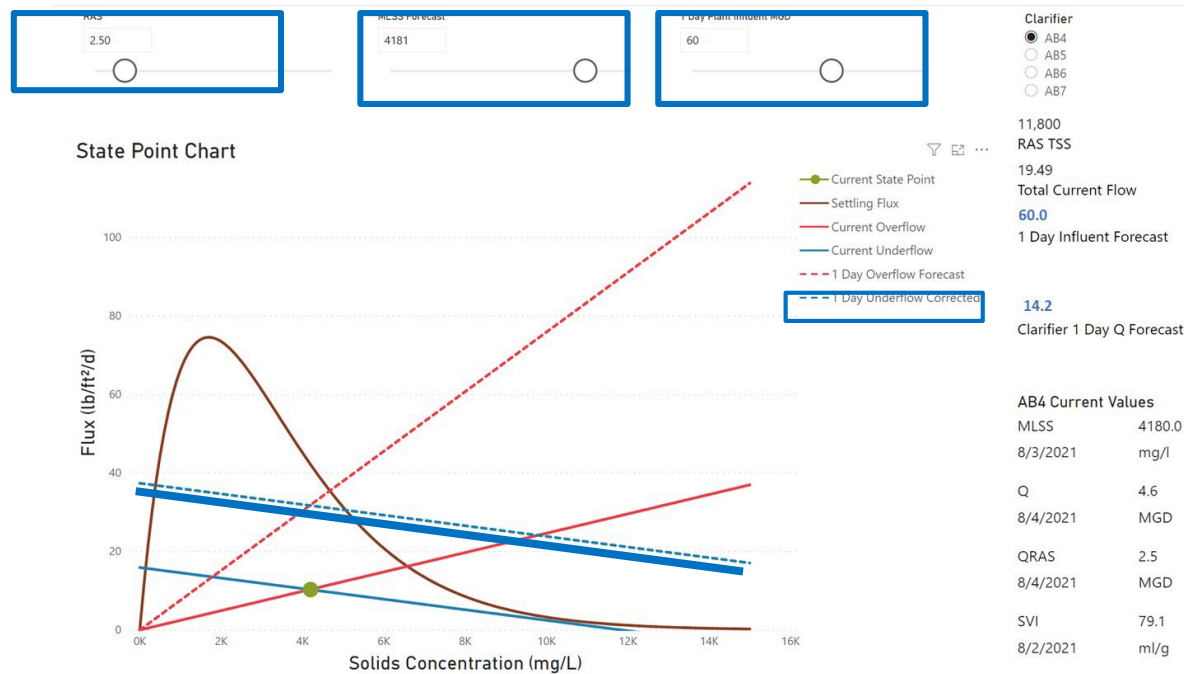
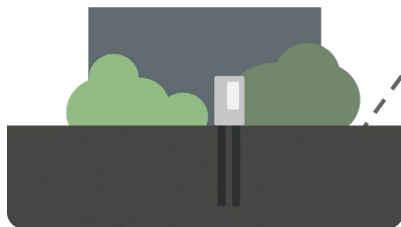# USING REAL-TIME CONTROL TO ACTIVELY MANAGE STORMWATER RUNOFF

Weather Forecast and Other Web Data

Independent Tech Company

Web Interface

On-Site Sensors & Water Control Systems

Pond Outlet Water Level and Flowrate
Downstream of Valve

12hr | 24hr | 48hr | 1wk

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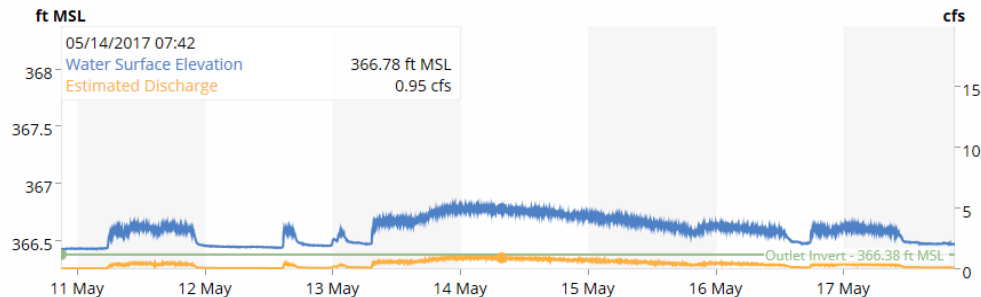
PERMIT TRACKING DASHBOARD

- Dashboard tool for tracking permit compliance and monitoring
- Visual communication of data for quick and easy review of monitoring status
- Automated notifications

Overview of Monitoring Progress - Active Requirements
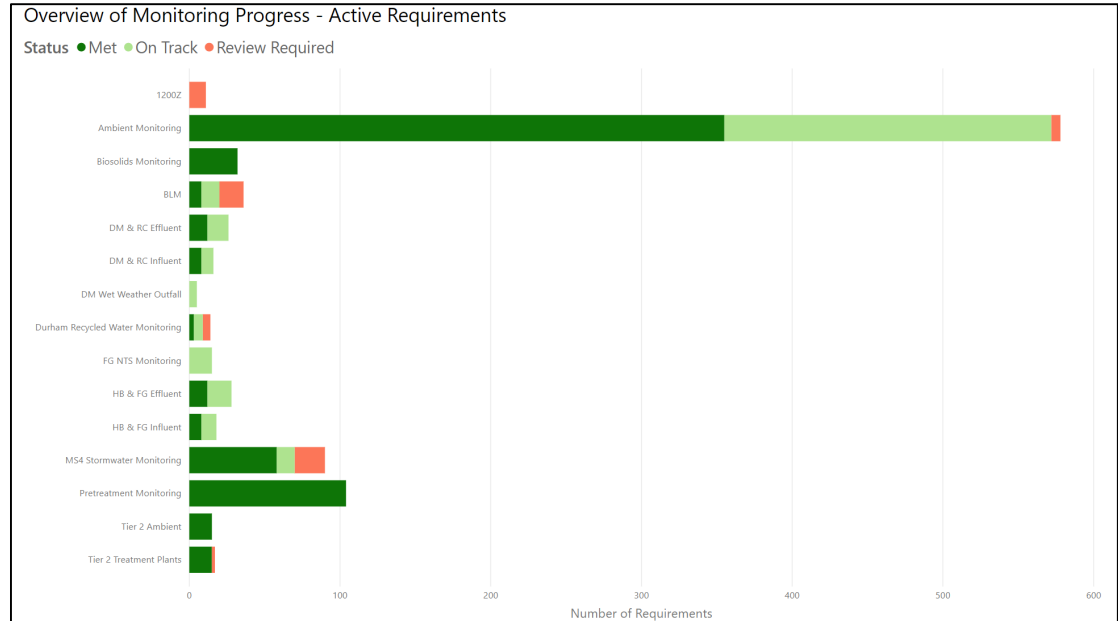
BIOSOLIDS ANNUAL REPORT

State of Oregon
Department of Environmental Quality
700 NE Multnomah St. Suite 600, Portland, OR 97232

DEQ
State of Oregon
Department of
Environmental
Quality

Wastewater Solids and Biosolids Annual Report
Part I: Wastewater solids production and disposition

Part I: Must be completed by all domestic wastewater facilities.

A. REPORTING PERIOD
1. This report is for biosolids produced during the calendar year: 2020

B. PERMIT INFORMATION	
1. Permit Type (select one): ■ NPDES or ☐ WPCF	DEQ File No.: 90735
DEQ Permit No.: 1011441	EPA Permit No.: OR-002811-8

C. FACILITY INFORMATION		
1. Legal name of facility: Clean Water Services Durham Advanced Wastewater Treatment Facility		
2. **Physical address**		
Street Address: 16580 SW 85th Avenue		
City: Tigard	State: Oregon	Zip code: 97224
3. **Mailing address** ☐ Same as physical address.		
Mailing Address: 2550 SW Hillsboro Highway		
City: Hillsboro	State: Oregon	Zip code: 97123
4. **Facility Type (check all that apply)**		
■ Major or Tier 1 facility (design flow of 1 mgd or greater, or serving a population of 10,000 or greater)		
☐ Minor or Tier 2 facility (design flow less than 1 mgd or serving a population less than 10,000)		
☐ Class I wastewater treatment facility (i.e., facility with a pre-treatment program)		

Section N: Process to Significantly Reduce Pathogens Data For Rock Creek Digesters

2020		Digester #1*	Digester #3**	Digester #4	Digester #5	Digester #6
January	DT Low	21.3	23.9	23.7	21.2	21.8
	DT High	38.4	35.6	36.0	26.0	26.4
	Temp Low	96.5	95.3	95.6	96.6	96.5
	Temp High	96.5	96.3	96.3	96.6	96.6
February	DT Low	24.9	27.2	25.0	22.1	23.6
	DT High	58.3	30.5	29.2	25.4	29.9
	Temp Low	96.3	96.3	95.7	96.6	96.5
	Temp High	96.5	96.6	96.1	96.6	96.6
March	DT Low	26.6	24.4	24.7	19.7	20.0
	DT High	44.8	28.2	30.2	22.1	24.5
	Temp Low	93.9	95.6	95.5	96.5	96.5

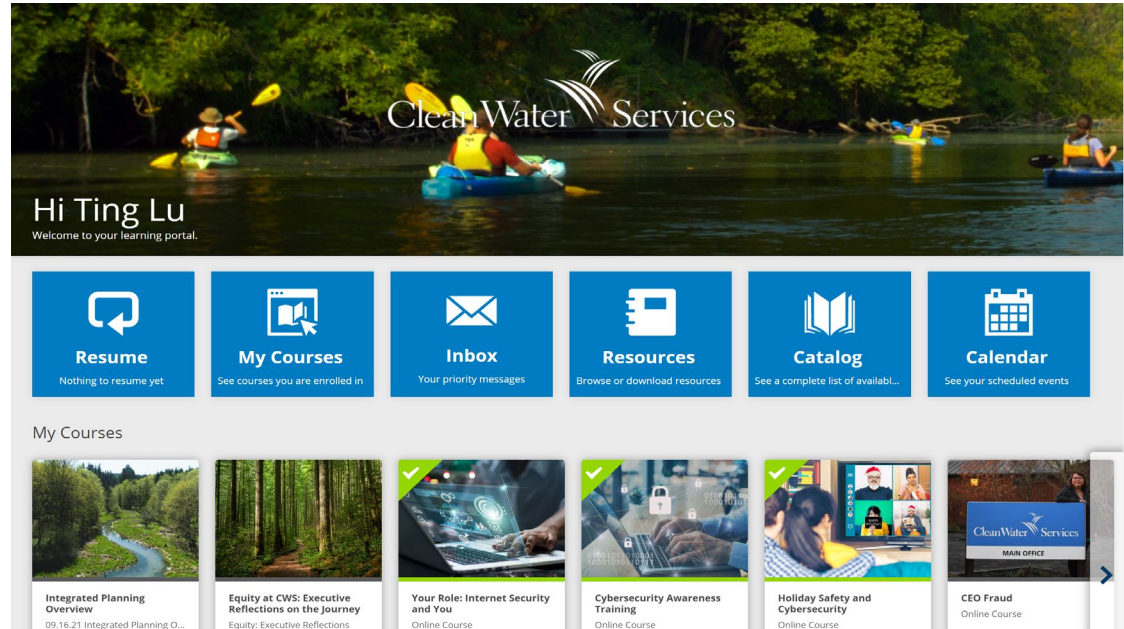# DIGITAL TRANSOFRMATION SKILLSETS REQUIREMENT AND TRAINING

LEVERAGE IT, OT, ET AND DATA SCIENTIST TOGETHER
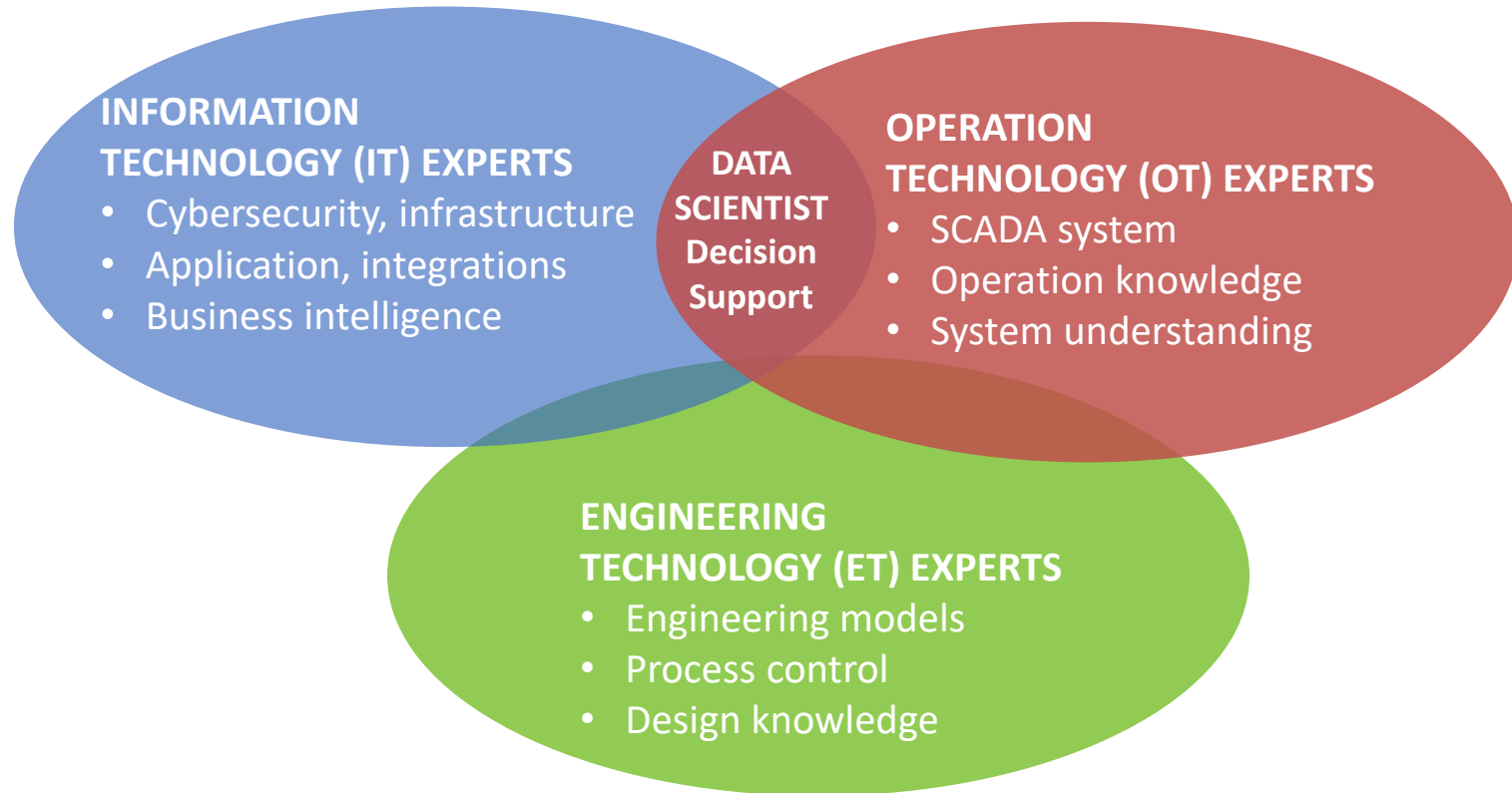
DIGITAL SKILLSETS TRAINING

- Power BI and business analysis training

- Pilot new technologies to learn together

- Clean Water Learning portal

DIGITAL TRANSFORMATION IS ONGOING…LESSONS LEARNED

- Affordable, available and sustainable technological solutions are demonstrated to improve decision makings

- Data integration is crucial to break data silos

- Gamification is a fun way to bring people on board

- Build a network of leaders with fusion teams and identify opportunities to bridge digital skill gaps

QUESTIONS?

Ting Lu, Ph.D., P.E.,
Business Practice Leader, Digital Solutions
Clean Water Services
lut@cleanwaterservices.org