



Digital Technologies for Water, Wastewater & Stormwater

Save Money, Simplify Reporting & Enhance Compliance

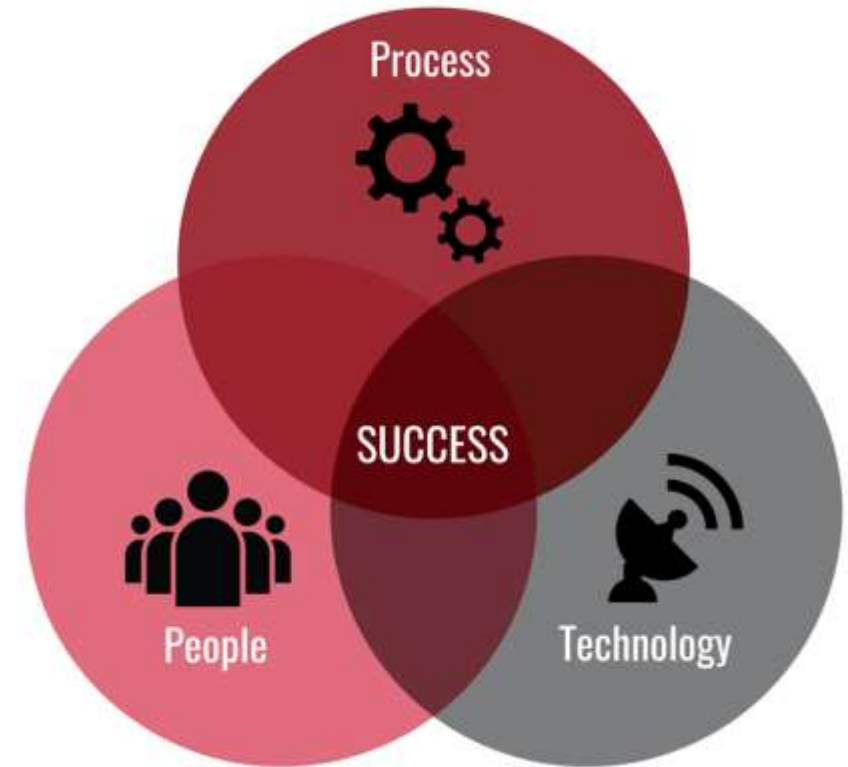
Tyler Marshall, PE, Env SP

September 24, 2024



Today's Discussion

1. Industrial environmental compliance challenges
2. Evolution of industrial environmental compliance
3. Digital transformation & technology landscape
4. Digital modernization
5. Case studies
6. Questions



About Us

Stanley Consultants, Inc. has been helping clients solve essential and complex infrastructure challenges for over 100 years, successfully completing more than 50,000 engagements in 110 countries and all 50 states and U.S. territories



110+
YEARS IN BUSINESS



100%
MEMBER OWNED



800+
MEMBERS IN UNITED STATES



70+
INTERNATIONAL MEMBERS



Water Solutions
FULL SERVICE

Challenges Facing Industrial Environmental Compliance Managers

- Ever-changing, complex regulatory landscape
- Workforce challenges – finding skilled workers and managing turnover
- Finding, implementing and maintaining compliance systems
- Extreme weather
- High performance, zero violations and constant uptime expected
- Public scrutiny and litigious culture



Kansas City Star

Kansas City's stormiest spring? Why so many thunderstorms, tornadoes are hitting lately

The National Weather Service Kansas City has issued 22 tornado warnings and 136 severe thunderstorm warnings across their service area.

May 1, 2024

BUSINESS

Micron would bring a new era of manufacturing to Central NY – and fears of new pollution

Updated: Apr. 23, 2024, 6:19 a.m. | Published: Apr. 23, 2024, 6:00 a.m.

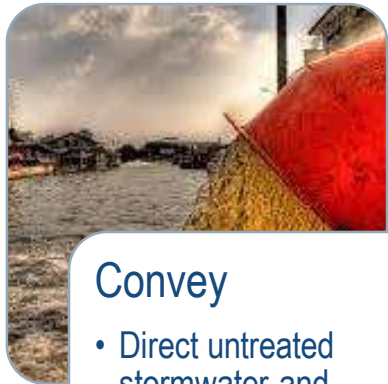
NEW REPORT EXAMINES BURNOUT IN THE ENVIRONMENTAL SECTOR

May 25, 2023 | Catalyst, Co-Funding, News

Tags: Health, Leadership

Sources: <https://www.syracuse.com/business/2024/04/micron-would-bring-a-new-era-of-manufacturing-to-central-ny-and-fears-of-new-pollution.html>; <https://rachelsnetwork.org/burnout/>; <https://www.kansascity.com/news/weather-news/article288195660.html>; <https://echo.epa.gov/detailed-facility-report?fid=KSR000380&sys=ICP>

Evolution of Environmental Compliance



Convey

- Direct untreated stormwater and wastewater to the nearest waterbody
- “Dilution is the solution”



Convey & Treat

- Discharge regulations
- Protect the environment from industrial water pollution
- Safety



Asset Management

- Address aging infrastructure



Resilience

- Extreme weather
- **Enabling Technologies**

Environmental Manager Responsibilities & Focus

- Pump, sewer and channel capacities

- Discharge regulations
- Establish, maintain and upgrade treatment systems
- Employee safety

- Condition assessment
- Rehab & replacement
- Capital reinvestment requirements

- Modifications for extreme precipitation events
- **Digital technology adoption**

What is Digital Transformation for Environmental Compliance

Current State

- Clipboard, binders & manual reads
- Data rich, information poor
- Calendared & reactive O&M
- Model-driven setpoints

Digital Utility

- Digital data entry & storage
- Informed Decision Making
- Data-driven maintenance
- Data Science-Optimized Setpoints



- Fully digitized compliance systems
- Using data to make more informed decisions, more quickly
- Increase efficiencies and resilience
- Mitigate risks



Example – Small Town Iowa

- Facing many of the same problems as large utilities and industry
- Crumbling infrastructure, increasing regulations, workforce turnover, tight budgets
- All new fully digitized RO water treatment and SBR wastewater treatment
- Increased user fees to support construction and operation
- Increased measurement and control of processes means regulatory compliance
- Full "remote control" reduces need for additional staffing
- Provides a career pathway and opportunity for young operators

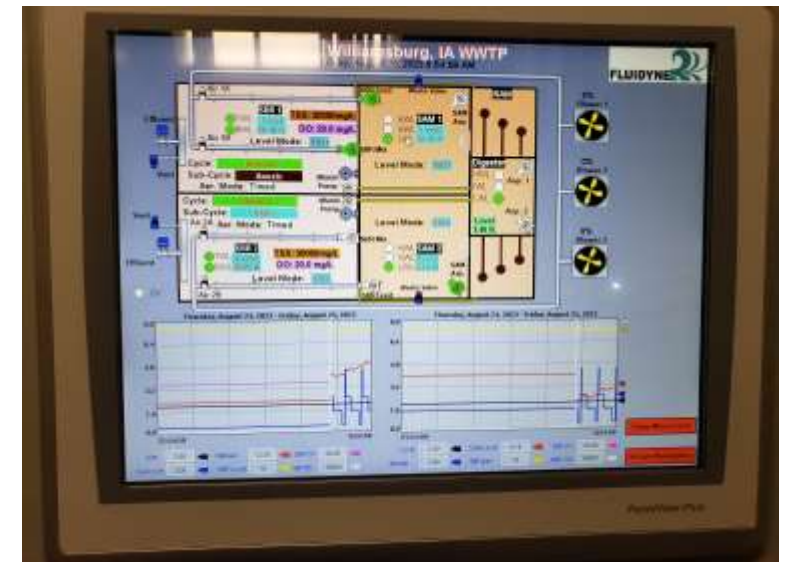
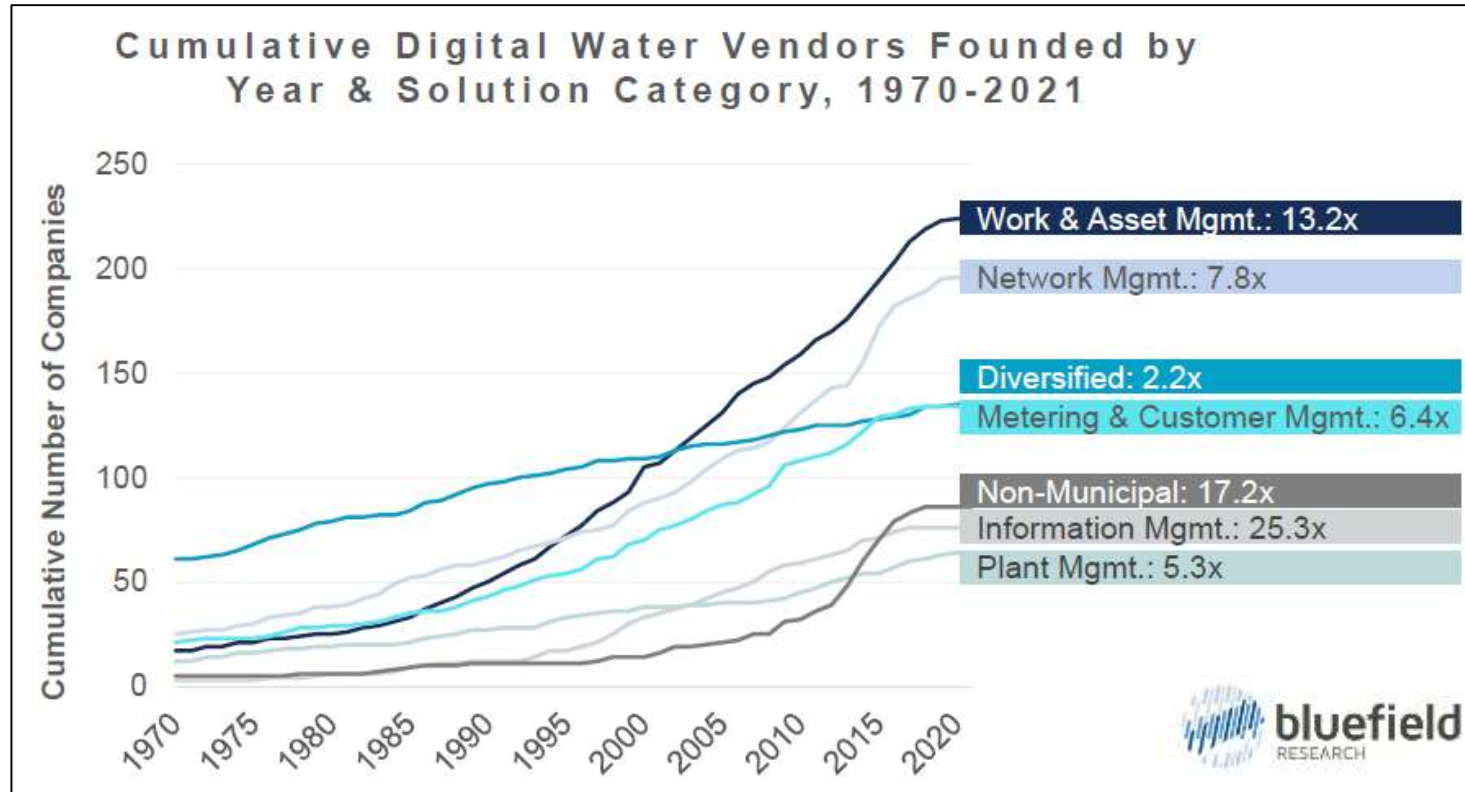


Photo source: HR Green, City of Williamsburg

Proliferation of Digital Water Technology Providers



- 52.6% of identified digital water technology vendors have been founded since 2000 and 30.5% founded since 2010
- 27.1% have been acquired by strategics or private equity firms

Source: *The Future of Water: Key Trends to Watch in 2023 and Beyond*, Bluefield Research, March 2023

Digital Technology Market Landscape

Off-the-Shelf (OTS) Products

Focused solution to a common need

Capabilities to customize (some)

Broader customer reach and/or SaaS model can drive continuous improvement

Difficult for utility to compare and select among multiple products for best ROI

Limited project & change management support

Lack of integrated engineering services

Missing Need

The Why
-People
-Processes
-Technology
Success

Customized Systems

Experienced in change management delivery

Integrated engineering capabilities

Risk of sunseting and/or poor support

Upgrades may be tied to hourly fees

Small customer count or non-SaaS model may limit continuous improvement

Best Practices for Adopting Digital Technologies

Technology Products

Difficult for utility to compare and select for best ROI

Limited project & change management experience

Lack of integrated engineering services

Collaborative Solution Delivery

Most impactful technology selection tailored to the why

Integrated engineering capabilities

Digital change management & project delivery expertise

Selection of best-in-class technology

Broad customer reach driving continuous improvement

Custom Systems

Risk of sunseting and/or poor support

Upgrades may be tied to hourly fees

Small customer count limits continuous improvement

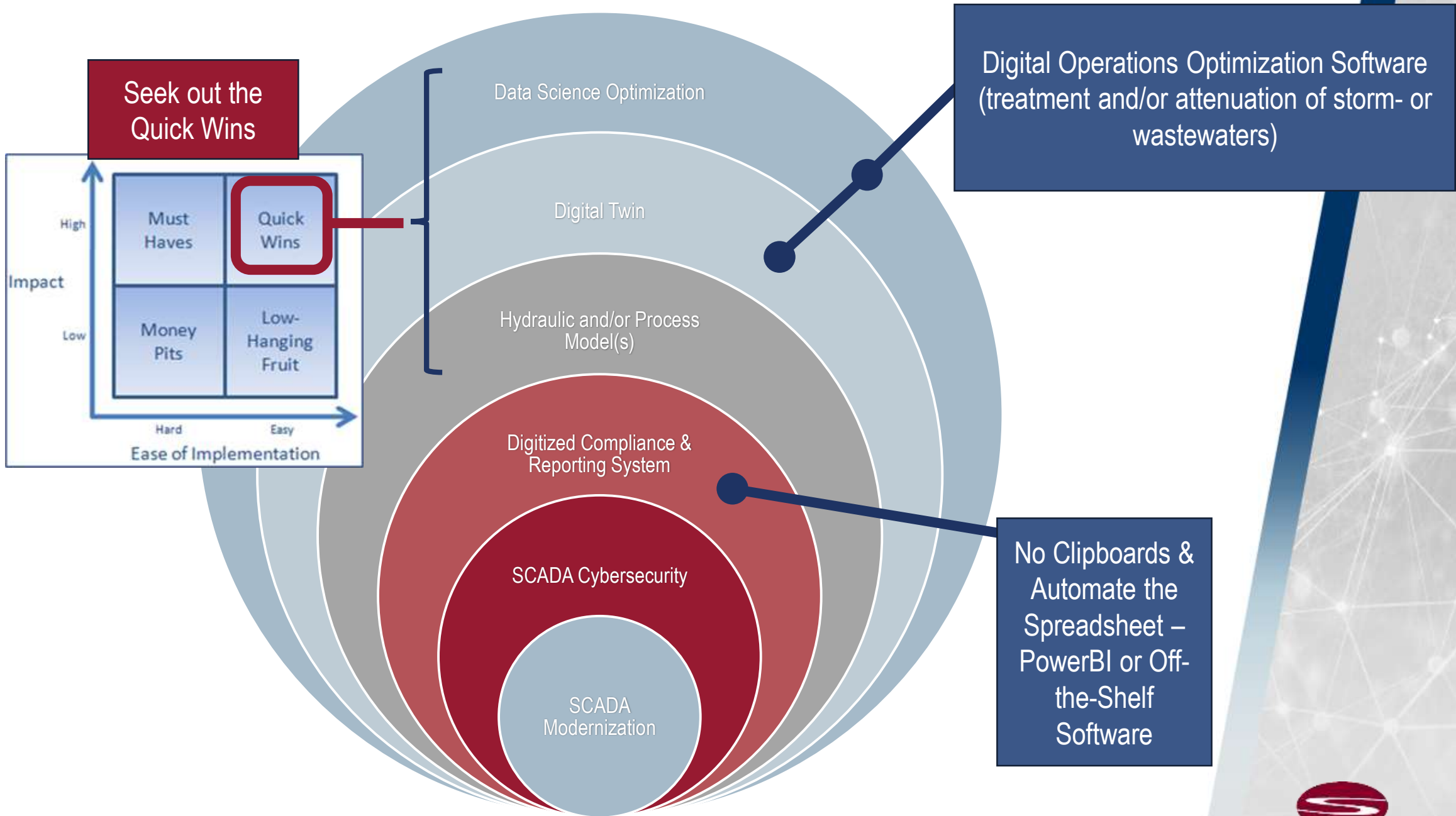
Source: Stanley Consultants

Improvements in Realtime Water Quality Data

- Rapidly growing field
 - Multi-peak fluorescence -especially useful in detecting organics commonly present in sanitary waste or industrial runoff
 - Full spectrum absorbance – nitrates, dissolved organic carbon, turbidity
 - In-situ spectroscopy – limited by data analytics
 - Light scattering and surface reflectance
- Advances in LED technology and miniaturization are drivers in availability
- More pollutants, more applications



Source: Hach, Inc.



Case Study 1: Major Industry Prioritizes Capital Upgrade with a Stormwater Hydraulic Model

- Begins with compliance problems due to aging facility (pre-CWA), tightening regulations, and lack of useful data.
- Created a "uni-tasker" digital twin of facility wastewater, stormwater, and process flows
- Identified weak points for current noncompliance
- Maximize ROI of capital improvements
- Model calibration was very important
- Final product both addressed current noncompliance, but provided a tool for future facility modification and resiliency



Image: army.mil

Case Study 2: Industrial Environmental Site Compliance Digitization



Source: Stanley Consultants, Mapistry, Graniterock

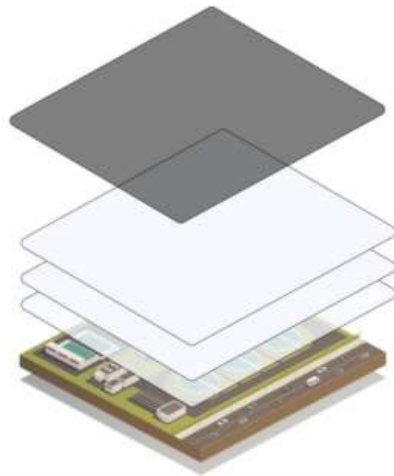
Analog:

- Aggregate and building materials supplier
- 18 locations, each with 20 methods of internal compliance recordkeeping in physical (paper) binders
- Up to 10 external inspections from 3rd parties per site per year
- Division environmental managers had to physically visit branch sites to assess issues and address needs
- If paper was missing it was too late to correct

Digital:

- Digital inputs
- Centralizing software
- Visibility to all stakeholders remotely
- Trust, accountability and collaboration

Case Study 3: Membrane Treatment Plant Optimization (66 MGD)



Process intelligence and optimization layer

Status Quo:

- SCADA
- PLCs
- Instrumentation
- Physical infrastructure

Software System Optimization Approach:

- Assessed fouling conditions based on chemical models
- Estimated energy consumption utilizing data science (AI)
- Predicted when and what rack to clean based on cost model

Results:

- Additional usage of anti-scalants: \$440k
- Resulting savings in energy consumption: \$700k
- Net: **reduced OpEx of \$260k/year**

Software System Fault Detection & Diagnosis Approach:

- Multi-signal processing and advanced analytics
- Identified irregular readings from an ORP sensor for an RO train
- Existing PLC/SCADA boundary conditions did not detect this
- Sensor was inspected and replaced

Results:

- Avoided excess cleanings: \$60k
- Avoided damage to RO membranes: \$680k
- Avoided higher energy usage: \$100k
- **Total avoided costs: \$840k**

Source: Stanley Consultants, Pani Energy



Stanley Consultants

Thank You!

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