Digital Transformation:

Predictive Analytics @ City of Salem

Devin Doring, Technical Services Supervisor, @ City of Salem
Gary Wong, Principal, Global Water Industry @ OSIsoft

OSIsoft

AGENDA

- Digital Transformation
- City of Salem's Story
- Q&A

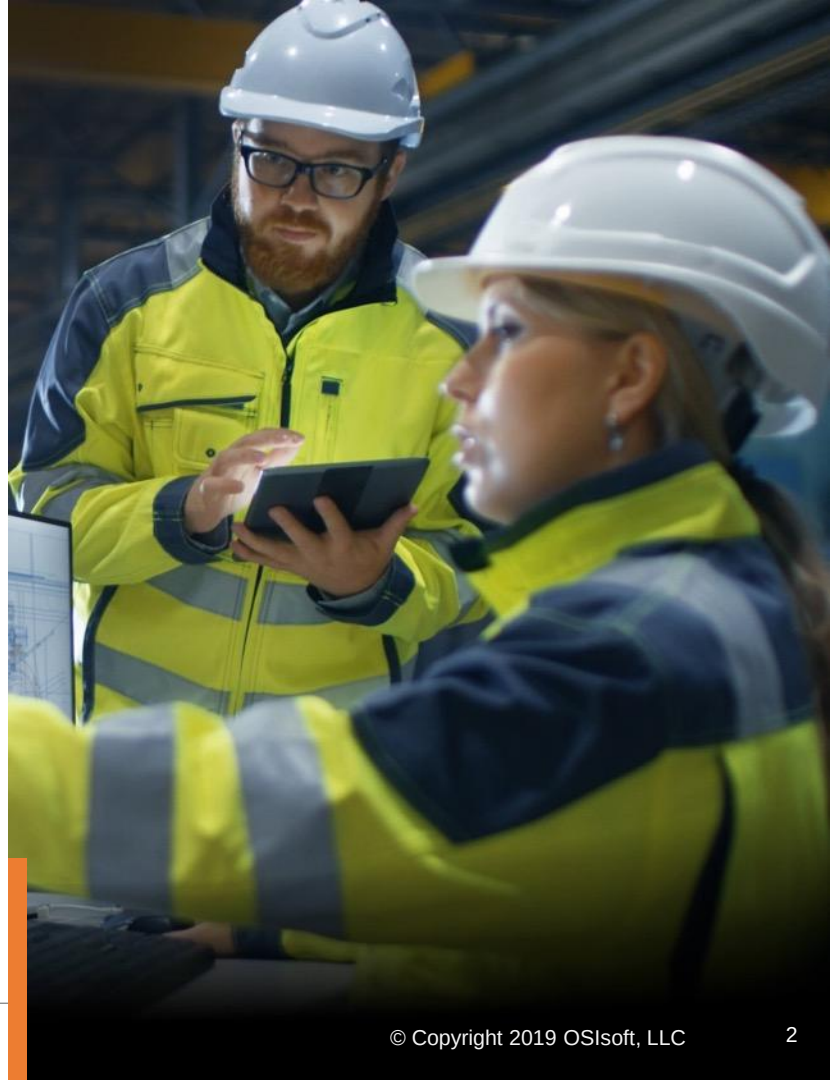

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Figure 10. Real-Time Data

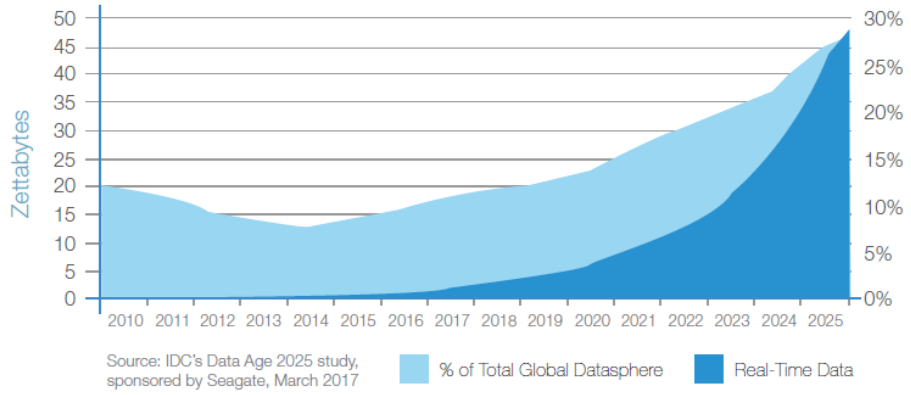
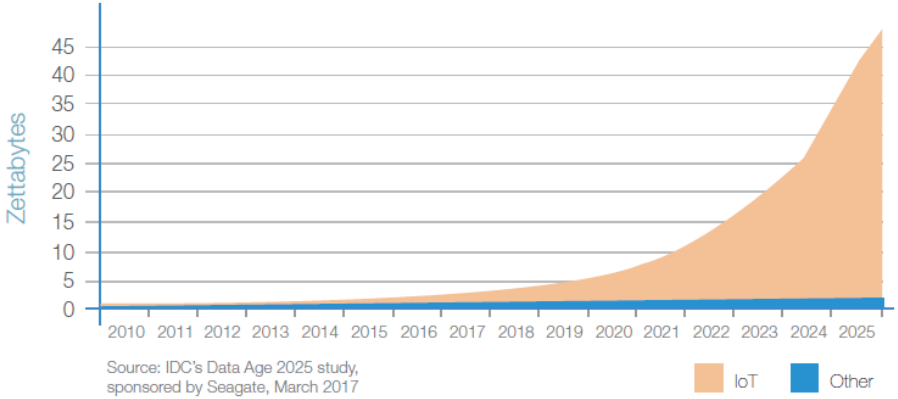


Figure 11. IoT Drives Real-Time Data



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Who is OSIsoft?

A Pioneer for Digital Transformation

39+ Years

140+ Countries

21,000 Sites

2B Data Streams

24/25 of our first customers are still with us

Bahrain*
Beijing*
Calgary
Cleveland
Dubai

Frykdek-Mistek*
Frankfurt*
Houston
Johnson City*
London*

Madrid*
Mexico City*
Montreal*
Moscow*
Paris*

Perth*
Philadelphia*
Phoenix
SAN LEANDRO*
Sao Paulo*

Seoul*
Shanghai*
Singapore*
Sydney*
Tokyo*

**Technical support available*

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OSIsoft Leads the Market in Critical Operations

Oil & Gas	Power & Utilities	Metals & Mining	Pharma & Life Science	Chemicals	Pulp & Paper
80% of the top companies globally	**1000+** utilities worldwide	**8** of the global Fortune top 10 companies	**24** of the top 25 pharmaceutical companies	**9** of the top 10 chemical companies rely on the PI System	**138.5M** meters per year of production monitored

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Water

150+ utilities serving over
250 million customers
rely on the PI System

United Utilities
Predicts water use 24 hours in advance with 98% accuracy ↗

Maynilad Water
Saved $1.7million in pipeline repairs by pinpointing the source of a major leak ↗

City of Calgary
Manages water reservoirs to avoid catastrophic seasonal flooding ↗

Veolia
Improved leak detection 7% in a single year and reduced energy costs by 6% ↗

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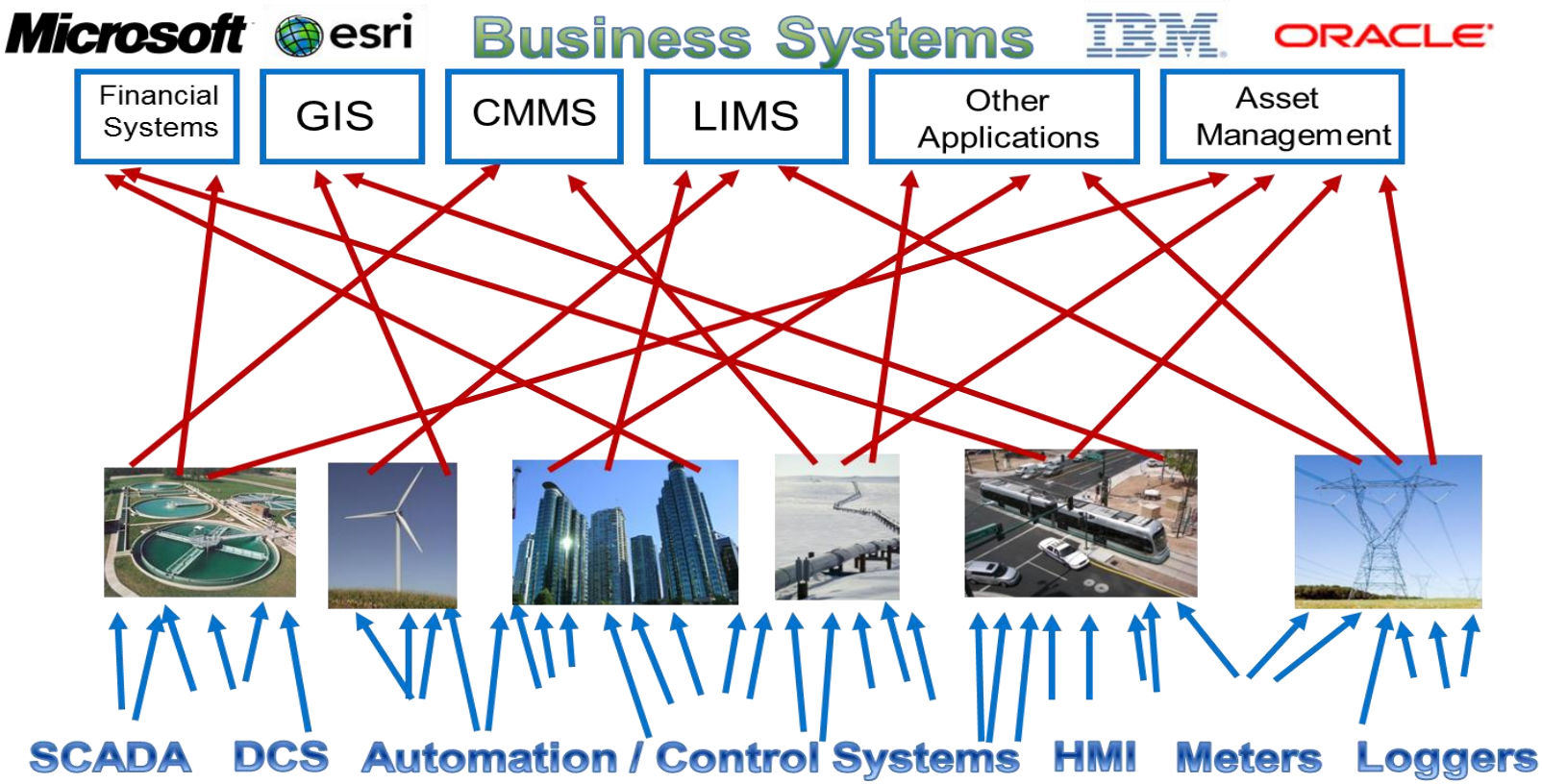
Data is an Opportunity, However Integration Nightmare



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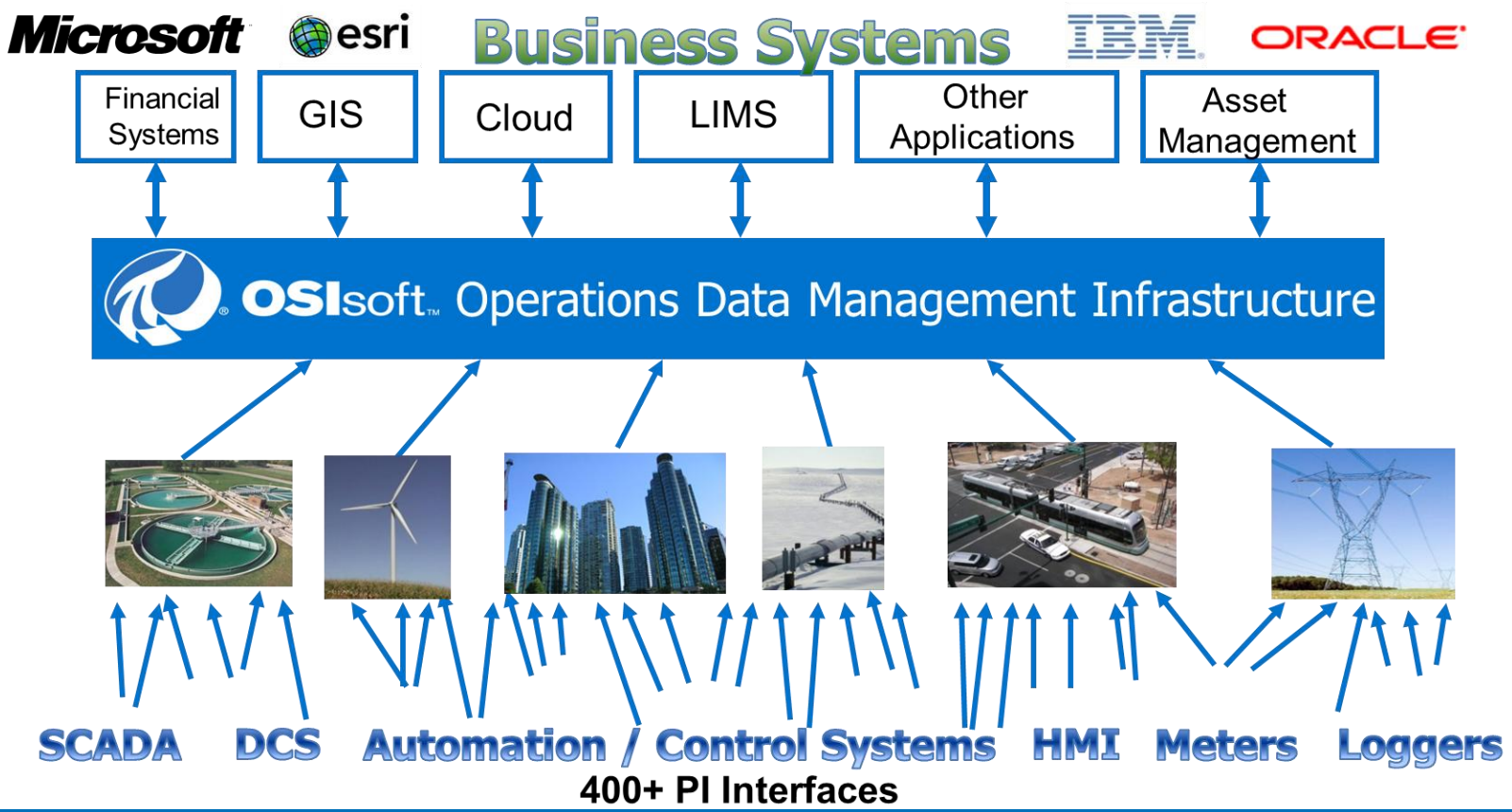
A Data Infrastructure Strategy



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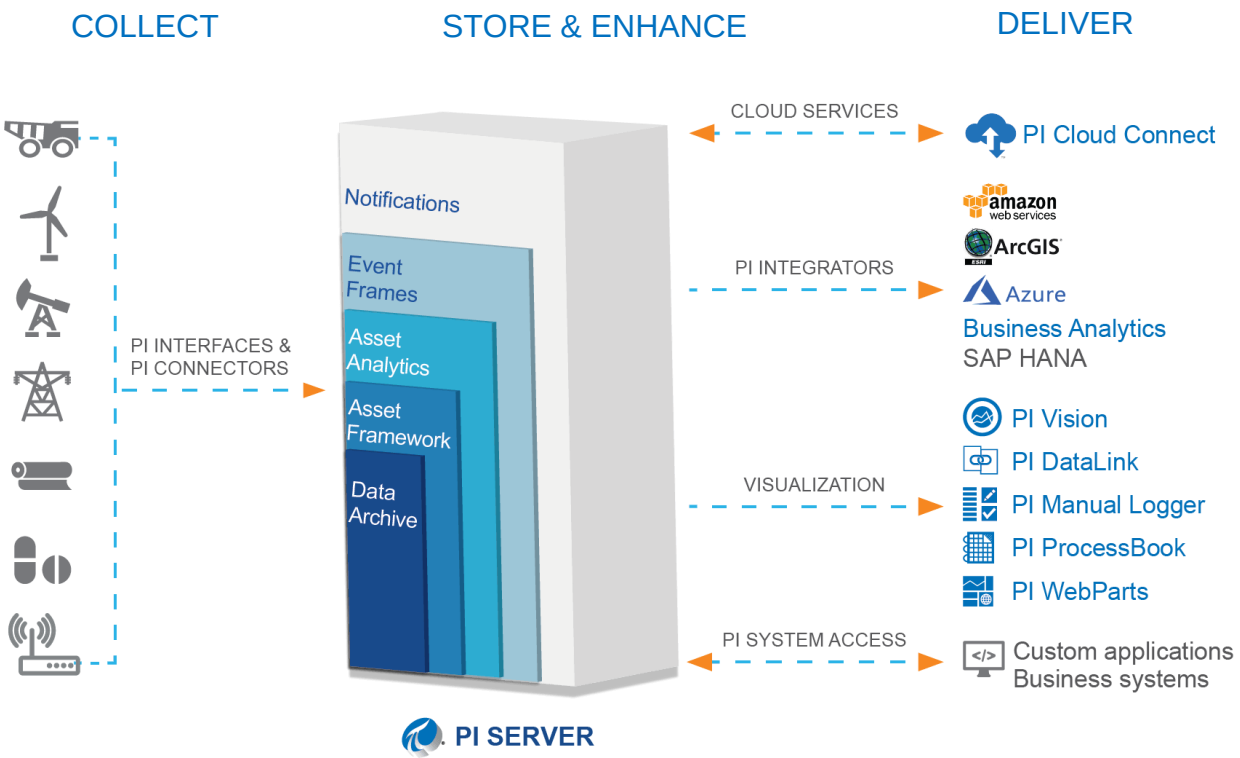
How Does the PI System Work?

Collect
- Complete Connectivity

Store
- High Fidelity Storage & Rapid Retrieval

Enhance
- Data with Context
- Automated Notifications
- Events in Data Streams

Deliver
- Self-Serve Visualization
- Integrations to Enterprise Systems



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Our Roadmap

Extending your infrastructure from edge to cloud

At the Edge
Collecting more data from more sources

In the Cloud
Enabling advanced analytics and new data-driven services

Sensors	Assets	Plant	Enterprise	Community
Millions of Smart Devices	Multiple Sensors	Multiple Assets	Multiple Plants	Multiple Enterprises

Pervasive Data Collection (PDC)

OSIsoft Cloud Services

PI System

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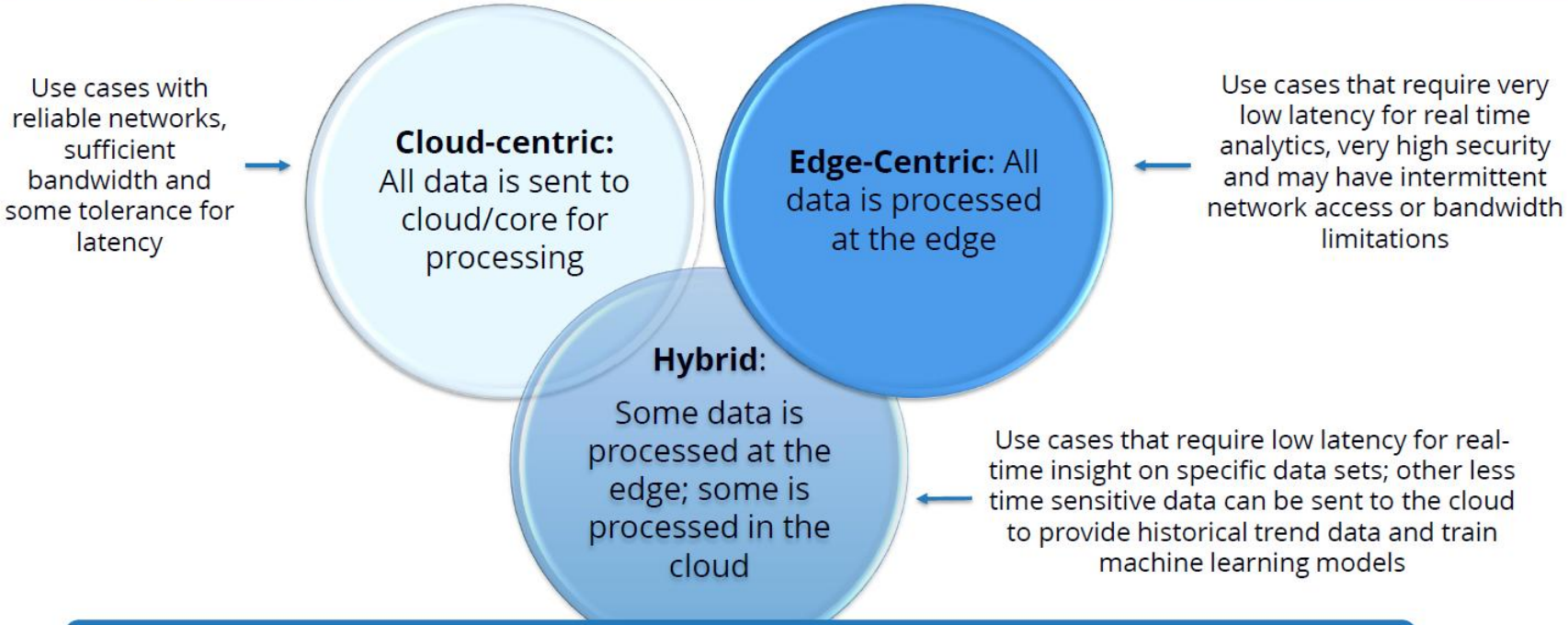
The Edge & IoT



IDC believes the hybrid model becomes dominant over time.

IDC ANALYZE THE FUTURE

@CMacIoT
@SmartGridPro

OSIsoft.

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CITY OF Salem AT YOUR SERVICE
Public Works Department

Predictive Analytics of Harmful Algae Blooms

Devin Doring
Technical Services Supervisor
City of Salem Public Works

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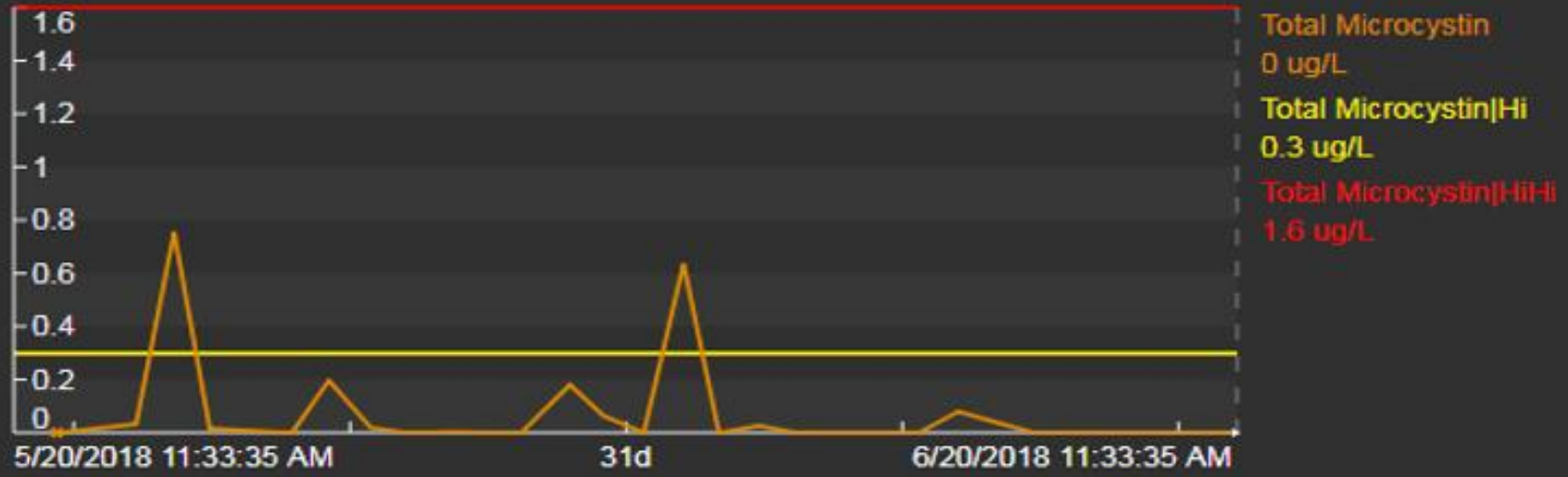
3,289 Active Commercial and Industrial Service Connections
Orchard Heights
47,113 Active Residential and Multifamily Connections
★ Salem
Mt. Jefferson
17 System Reservoirs
Suburban East Salem
4 Aquifer Storage and Recovery (ASR) Wells
Big Cliff Dam
Detroit Lake
Franzen Reservoir
Detroit Dam
North Santiam River
Turner
Three Fingered Jack
Willamette River
Stayton
Geren Island Water Treatment Facility
North Santiam River

CITY OF Salem
AT YOUR SERVICE
Willow Lake Laborato
LIMS#
Date 5-21-18
Time 1100
By
Sample ID BD
Analysis Nutrients
Preserve

Harmful Algae Blooms (HABs) will become more frequent and abundant in the future.

Aldersgate|Site Code

Microcystin



8:29
Tuesday, May 29
EMERGENCY ALERTS
now
Emergency Alert
Civil Emergency in this area until 11:28PM PDT
Prepare for Action OEM,1,OR

Coors
LIGHT
Coors
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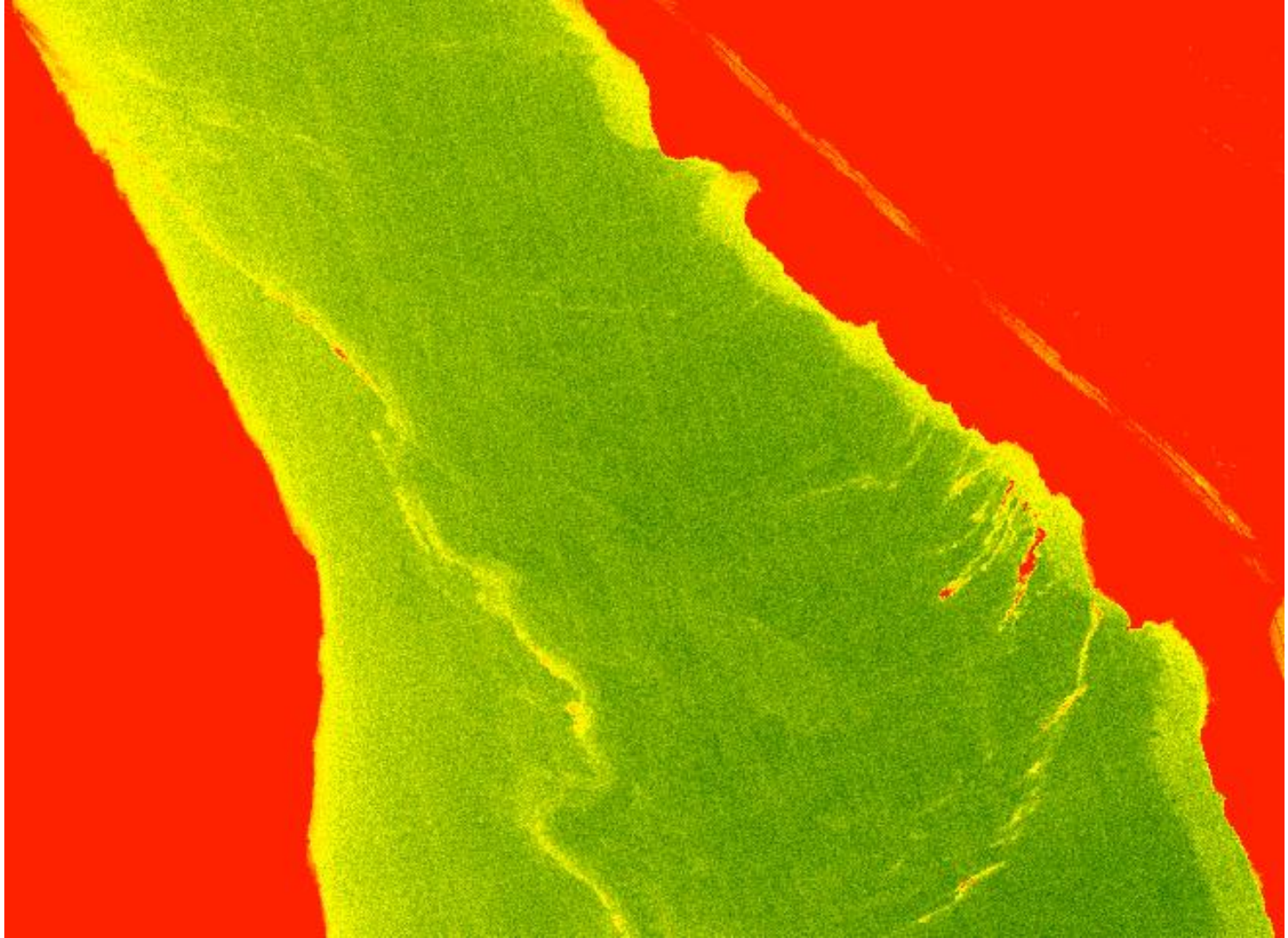


Unregulated Contaminate Monitoring Rule – UCMR4

- Intent is to provide baseline occurrence data that the EPA can combine with toxicological research to make decisions about potential future drinking water regulations

- 10 out of 30 identified contaminates are cyanotoxins

Almost certainly Cyanotoxins will be a regulated contaminate in the future for water systems.

Motivators for Prediction

- Traditional sampling and lab time take about 24 hours
- Lab kits are very expensive
- Ability to adjust treatment processes before toxins arrive
- Finally Feasible
- Root Cause Analysis
- Good Stewardship

The Prediction Lab & The City of Salem

Detroit Lake Predictions

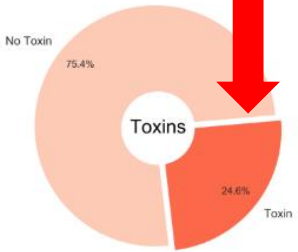
An initiative to care for our water source

85% accurate

Experimental

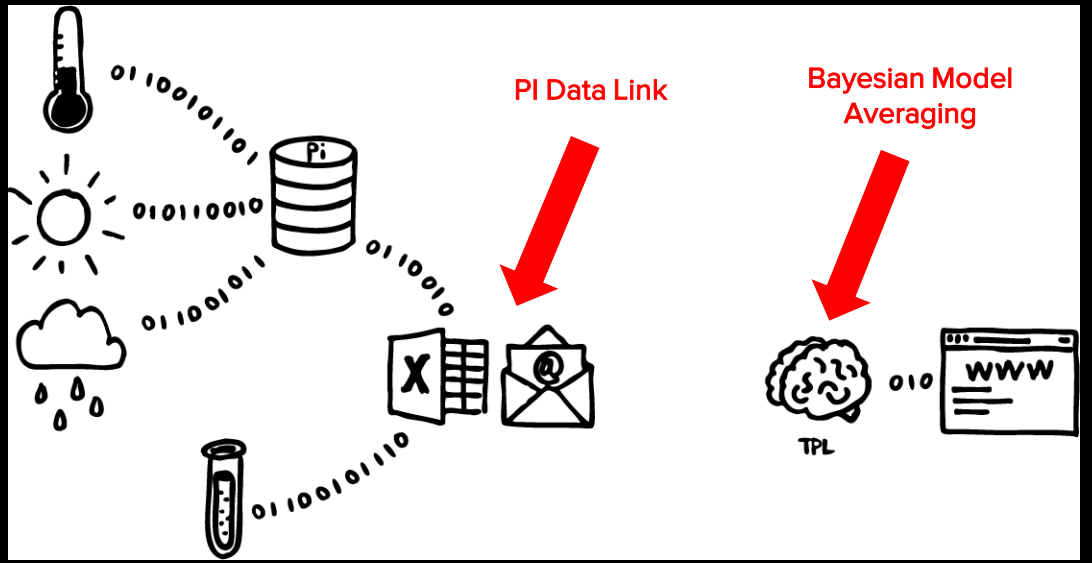
Bloom Forecast July [illegible] July 16

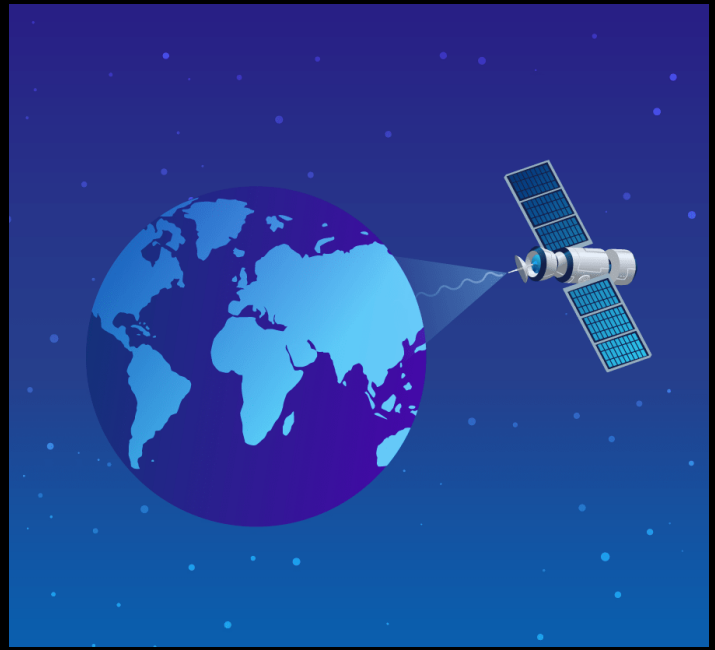
Our models suggest that blooms are sti[illegible]y likely at Detroit Lake, and that there remains a[illegible]nce that toxins will occur.

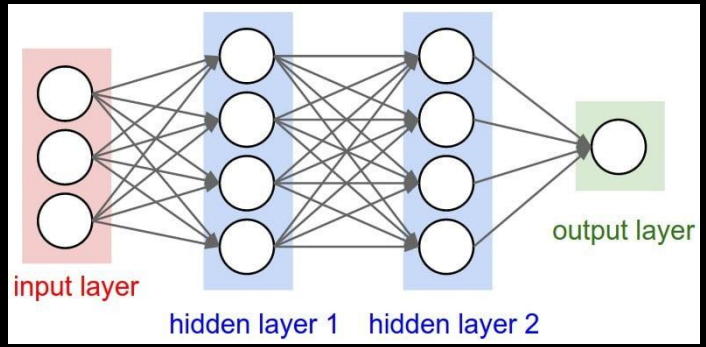


Proof of concept - Summer of 2019

https://thepredictionlabllc.github.io/detroit-lake-predictions/



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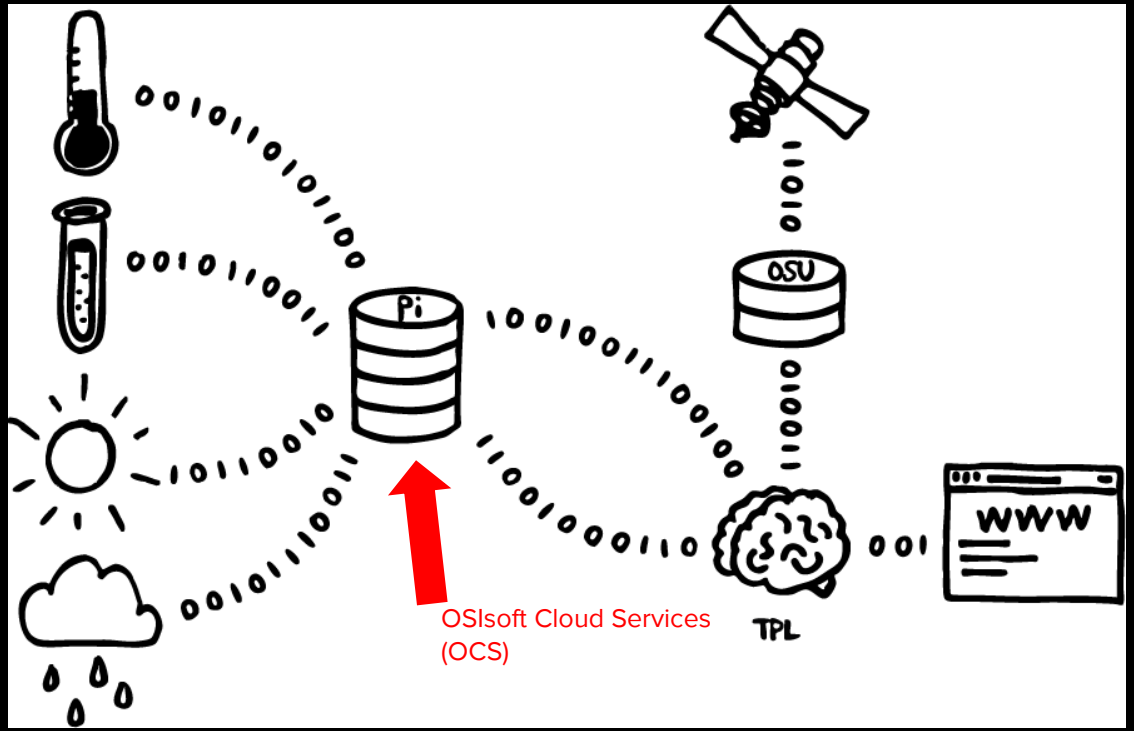
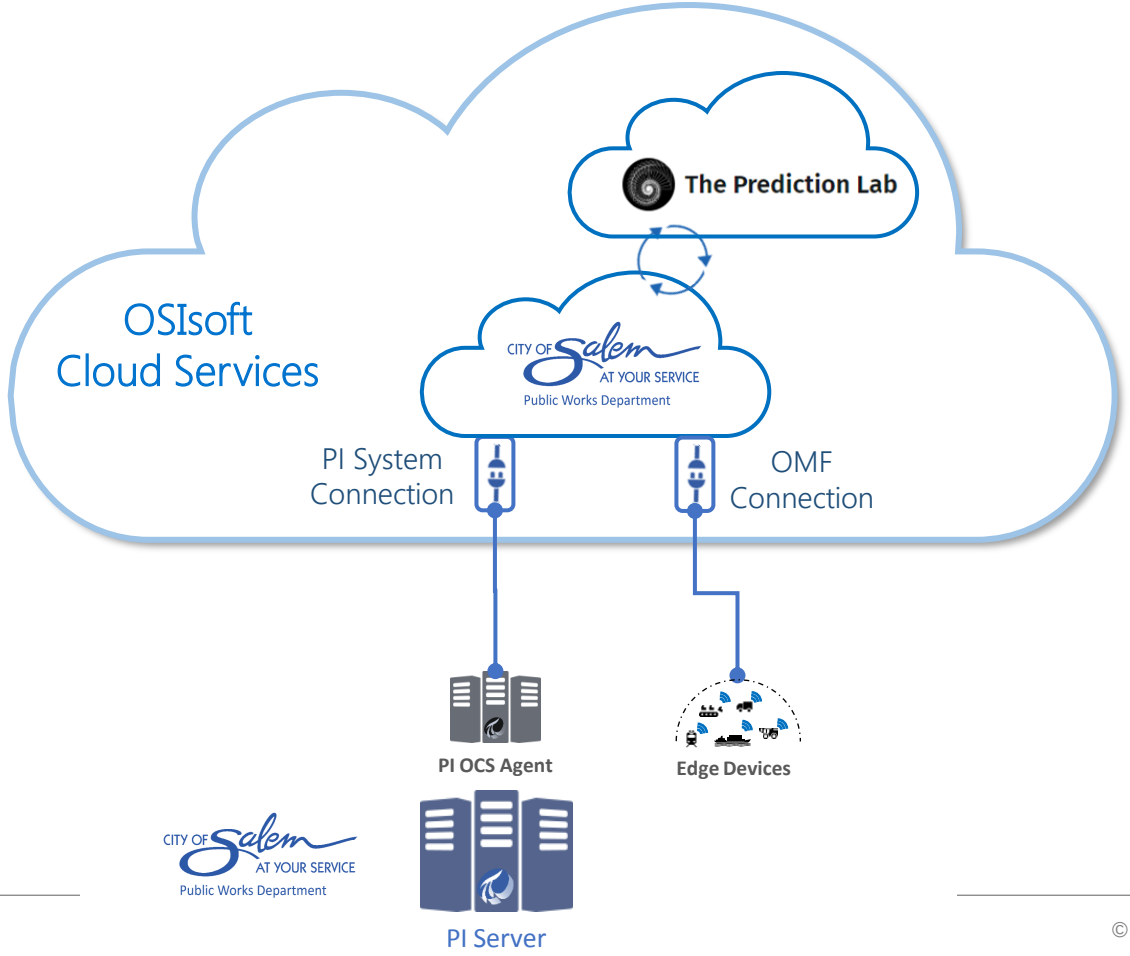

Pi
OSIsoft Cloud Services
(OCS)
OSU
TPL
WWW



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QUESTIONS?

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THANK YOU