Operational Intelligence

Bringing it All Together

Presented by **Dan Lopez**

Contact Information

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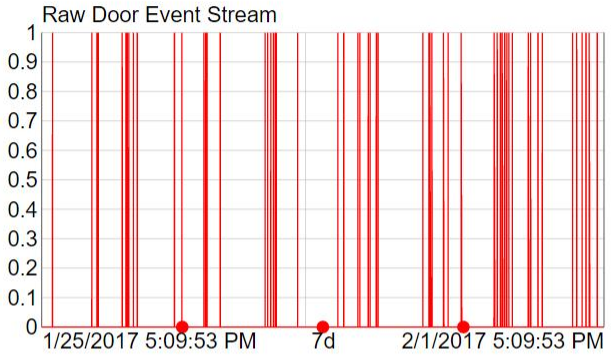
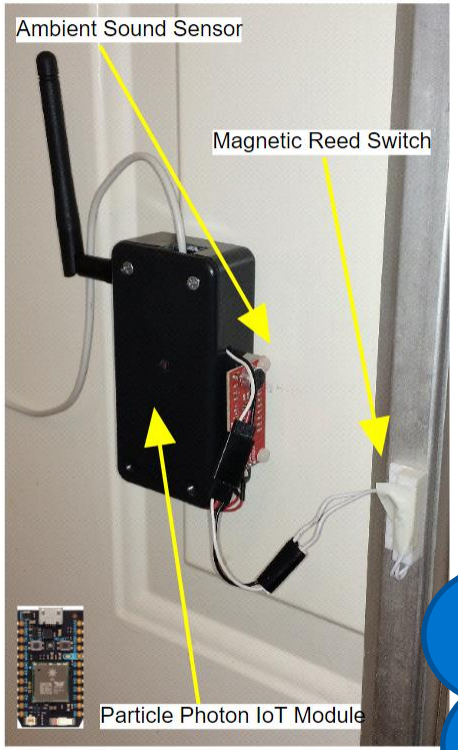
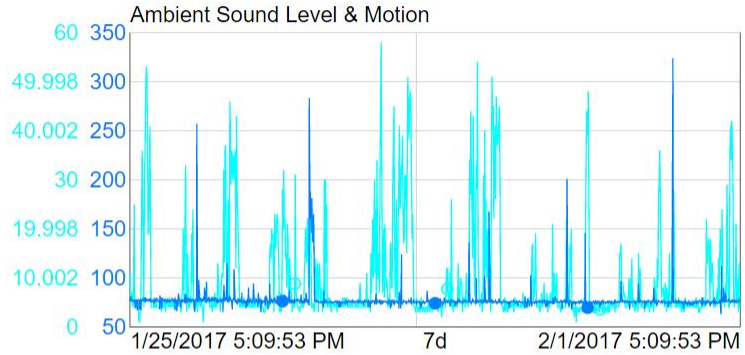
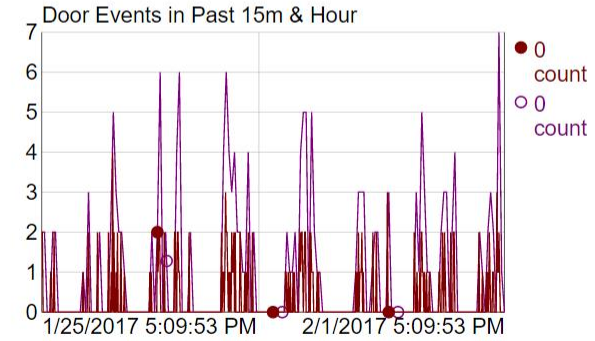
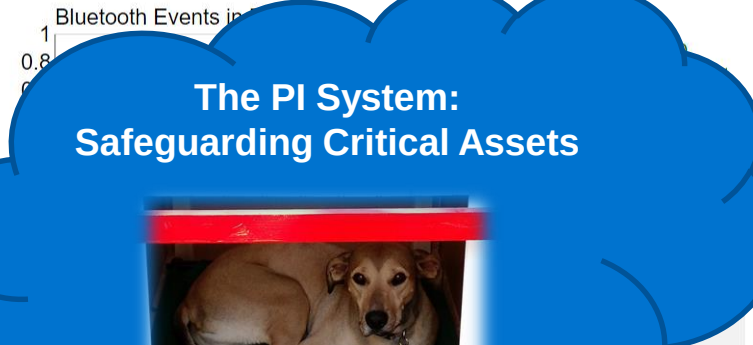
OSIsoft











The PI System:
Safeguarding Critical Assets

My Goal For The Next 30 Minutes

Show how the OSIsoft PI System **infrastructure**

can provide increased **Operational Intelligence**

across many **areas**, **technologies**, and **applications**

FILE TOOLS VIEW

Smart City San Leandro Operation View

PI Server Performance

PRIMARY
CPU 38.213 %
RAM 23.778 %
0 20 40 60 80 100

SECONDARY
CPU 2.6438 %
RAM 17.366 %
0 20 40 60 80 100

Room Statuses

7-day Average

Current Values

JS chart by amCharts

OSIsoft Headquarters|Rooms that are Cooling
OSIsoft Headquarters|Rooms that are Heating
OSIsoft Headquarters|Rooms that are Idle

Non-Critical HVAC Faults

5.00

(at City Hall, calculated via PI AF)

HQ Building Total Power T...

27.235 kW

Smart City San Leandro

Place or Address

San Leandro
Lake Chabot Regional Park
Chabot Park
Metropolitan Golf links
Oyster Bay
Bayfair Center
Ashland
Castro Valley
Marina Park
POWERED BY esri
ZOOM

Description

Thanks to the city's PI System infrastructure, now integrated with Esri's ArcGIS platform, you now have access to real-time building operations data, environmental readings and air quality measurements, server health and performance, and network latency data, which shows the fantastic power of the city's gigabit fiber network (shown as multicolored sections on the map). Earthquake fault locations and risk levels can also be viewed, and to assist with disaster response efforts, the map also shows live traffic data and local health and safety facilities. Feel free to tap, touch, analyze, and explore!

Air Temperature

(via PI Interface to NOAA)
58 °F

Air Quality

AQI	Ozone	Partic.
43	43	27

Power Demand versus Real-time Weather Feed

Temperature
58 °F
Forecasted Temperature
49 °F
Relative Humidity
56 %
Weather
Partly Cloudy and Breezy

017 12:00:00 AM
4d
4/14/2017 12:00:00 AM

4/10/2017 12:00:00 AM
4d
Now
4/14/2017 12:

Average Room Temp.

67.504 °F
3/31/2017 7:59:00 PM
(via PI AF Rollup of all rooms)

Avg. Temperature *

0 71.04 100
Threshold: 85

* Of selected HQ HVAC zones

using the "Select Features" ( ) Map Tool

Live Headquarters HVAC Zones

Filter

- Blue Marble Room
  Temperature: 71.53 F
- Break Room
  Temperature: 70.56 F
- Cafe Kitchens
  Temperature: 75.30 F
- Cafe Sitting Area 1
  Temperature: 72.20 F

Buildings

Filter

- OSIsoft Headquarters
  Square Footage: 22,660.00
  Building Type: Office Bui
  Building Occupan
- TriNet

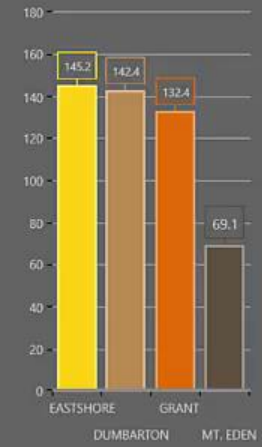
You too can do this!

Let’s begin with the transmission and distribution assets that support the area that we are concerned with

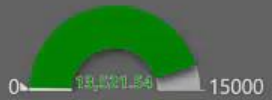
FILE TOOLS VIEW

California ISO (CAISO) T&D Dashboard

Substation Megawatts



Live Total Generation



Threshold: 100

Substation Selection (MW)

Threshold: 100

including only those sources that are currently selected on the map

Electric Utilities - Grid

Video Monitoring

Weekly CA ISO Demand vs. Resources vs. Predictions

4/6/2017 12:00:00 AM | 8d | Now | 4/14/2017 12:00:00 AM

Generation Sources

Filter

- SHASTA 628.18 MW
- WINDRIDGE, INC. 2.55 MW
- ENXCO I 4.76 MW
- DIABLO CANYON 5,731.85 MW
- ALTAMONT - 01W004 109.17 MW
- PINE FLAT 164.16 MW

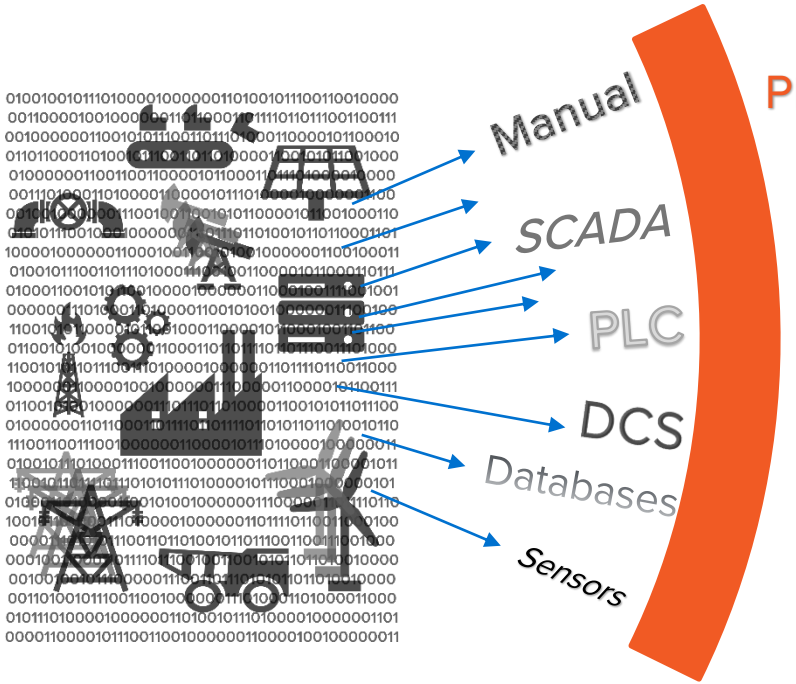
CAISO System Demand This Month

4/6/2017 10:01:29 PM | 7d | Now | 4/13/2017 10:01:29 PM

Operational Intellig... | Operations Dashbo... | Paused...

PI Interfaces and PI Connectors Collected Live Data

With automatic data translation and buffering

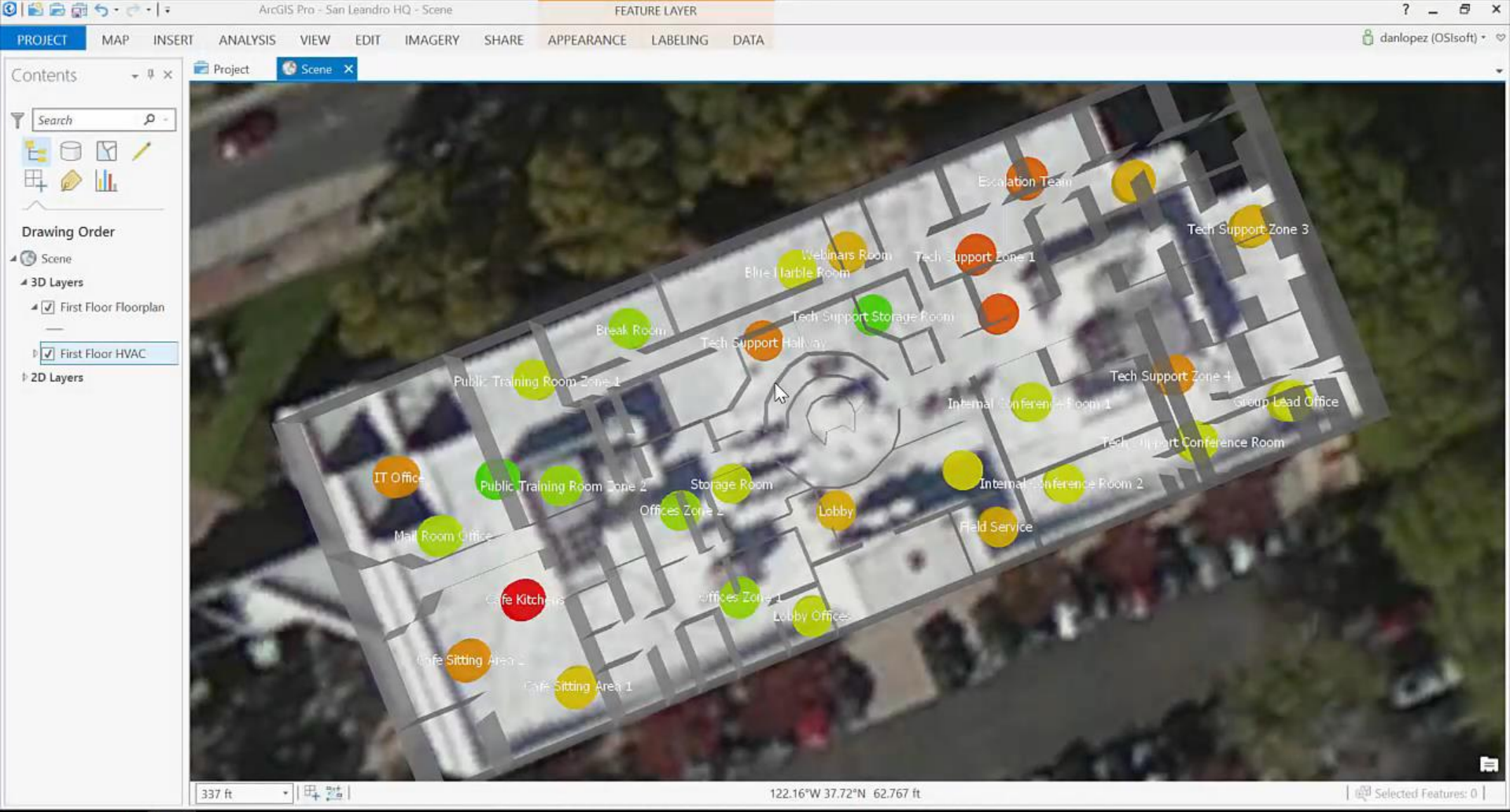


Software that word in just minutes to directly connect to more data sources than any other operational data collection system

Operational Intelligence Depends on Accurate Data

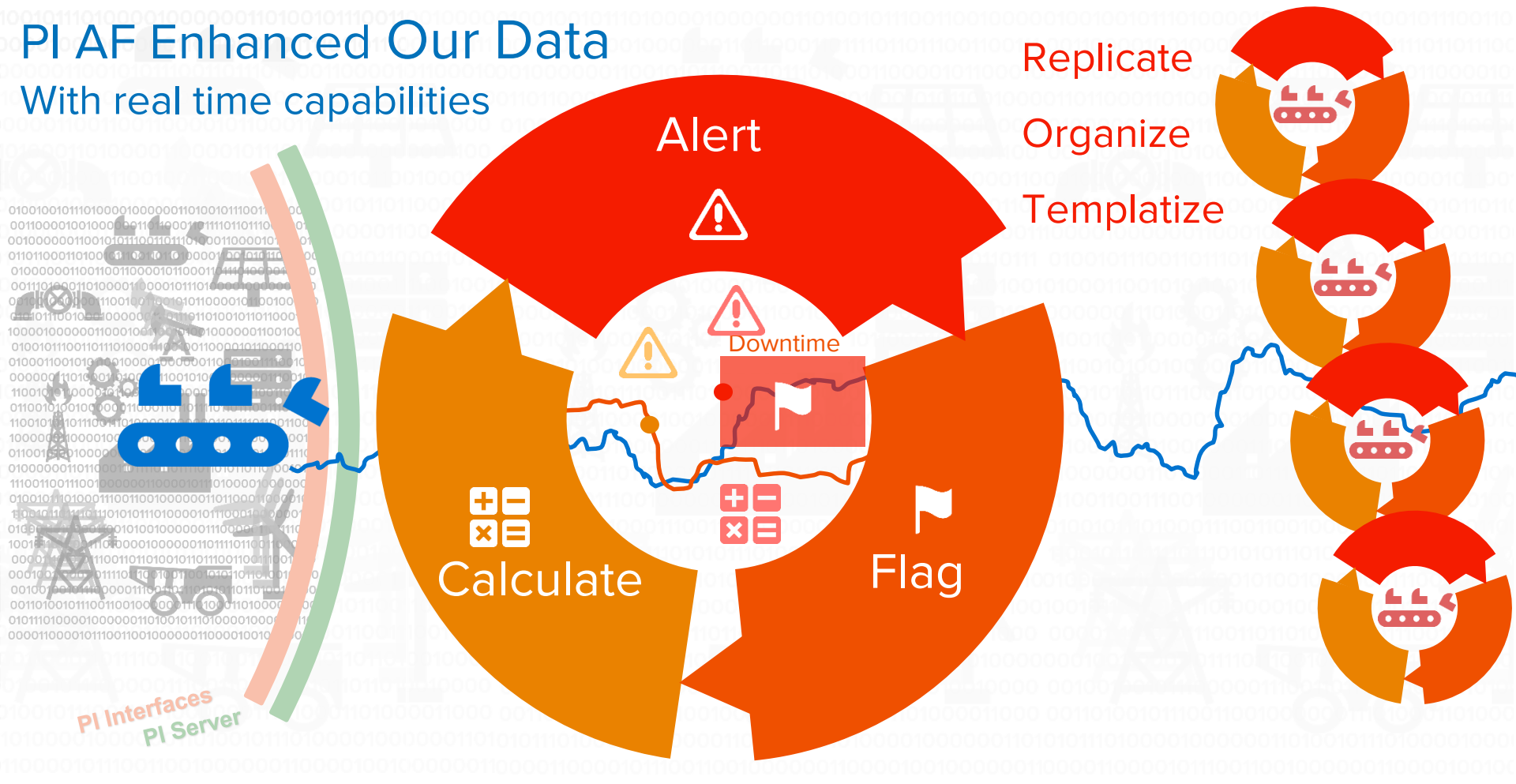
These are just a few examples of the diverse data collection capabilities of a PI System

Next, let’s look at one of our key facilities that depends on that transmission and distribution network


ArcGIS Pro - San Leandro HQ - Scene
FEATURE LAYER
PROJECT
MAP
INSERT
ANALYSIS
VIEW
EDIT
IMAGERY
SHARE
APPEARANCE
LABELING
DATA
danlopez (OSIsoft)
Contents
Search
Drawing Order
Scene
3D Layers
First Floor Floorplan
First Floor HVAC
2D Layers
Project
Scene
Escalation Team
Tech Support Zone 3
Webinars Room
Blue Marble Room
Tech Support Zone 1
Tech Support Storage Room
Break Room
Tech Support Hallway
Public Training Room Zone 1
Tech Support Zone 4
Internal Conference Room 1
Group Lead Office
Tech Support Conference Room
IT Office
Public Training Room Zone 2
Storage Room
Offices Zone 2
Lobby
Internal Conference Room 2
Field Service
Mail Room Office
Cafe Kitchen
Offices Zone 1
Lobby Offices
Cafe Sitting Area 2
Cafe Sitting Area 1
337 ft
122.16°W 37.72°N 62.767 ft
Selected Features: 0

PI AF Enhanced Our Data

With real time capabilities



PI Asset Framework Provides a Base for Reaching Your Goals!

San Diego International Airport

Regional efforts to develop an electric vehicles charging infrastructure

SAN DIEGO INTERNATIONAL AIRPORT

CHALLENGES

Costs: limited water supply (80% is imported from out of the region), 20% decrease in regional energy resources with San Onofre power plant closure

Regulations: greenhouse gas emissions (energy usage is 44% of airport CO2 footprint)

SOLUTION

Integration of renewables and electric vehicles is monitored by a PI System

PI System for real time data collection and analysis

PI AF for organizing 16,000+ individual data streams

Process data is visualized geo-spatially in Esri ArcGIS

RESULTS

An energy management system with GRI (Global Reporting Initiative) indicators

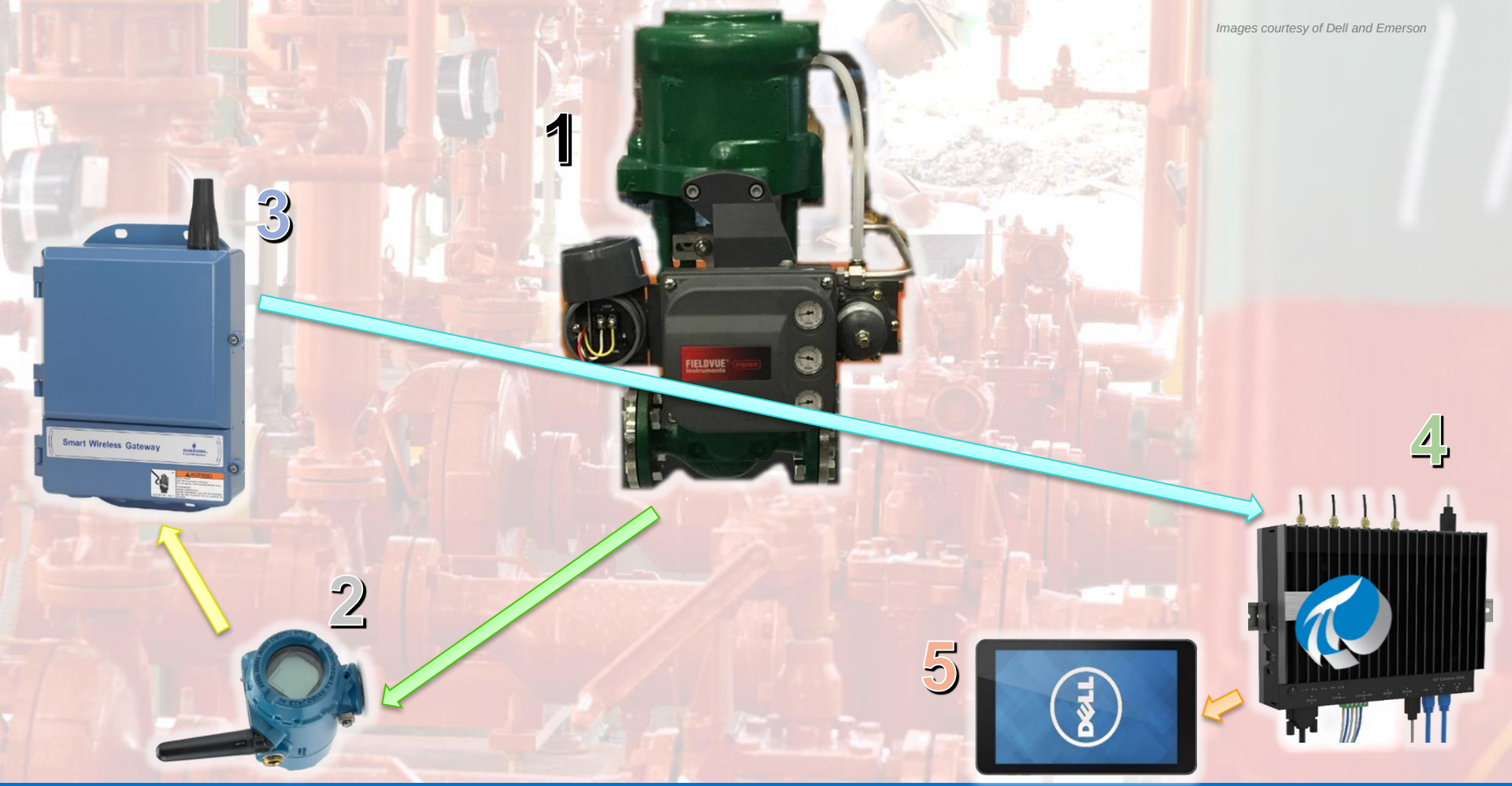
Situational awareness: online tracking of renewables production and electric vehicles usage

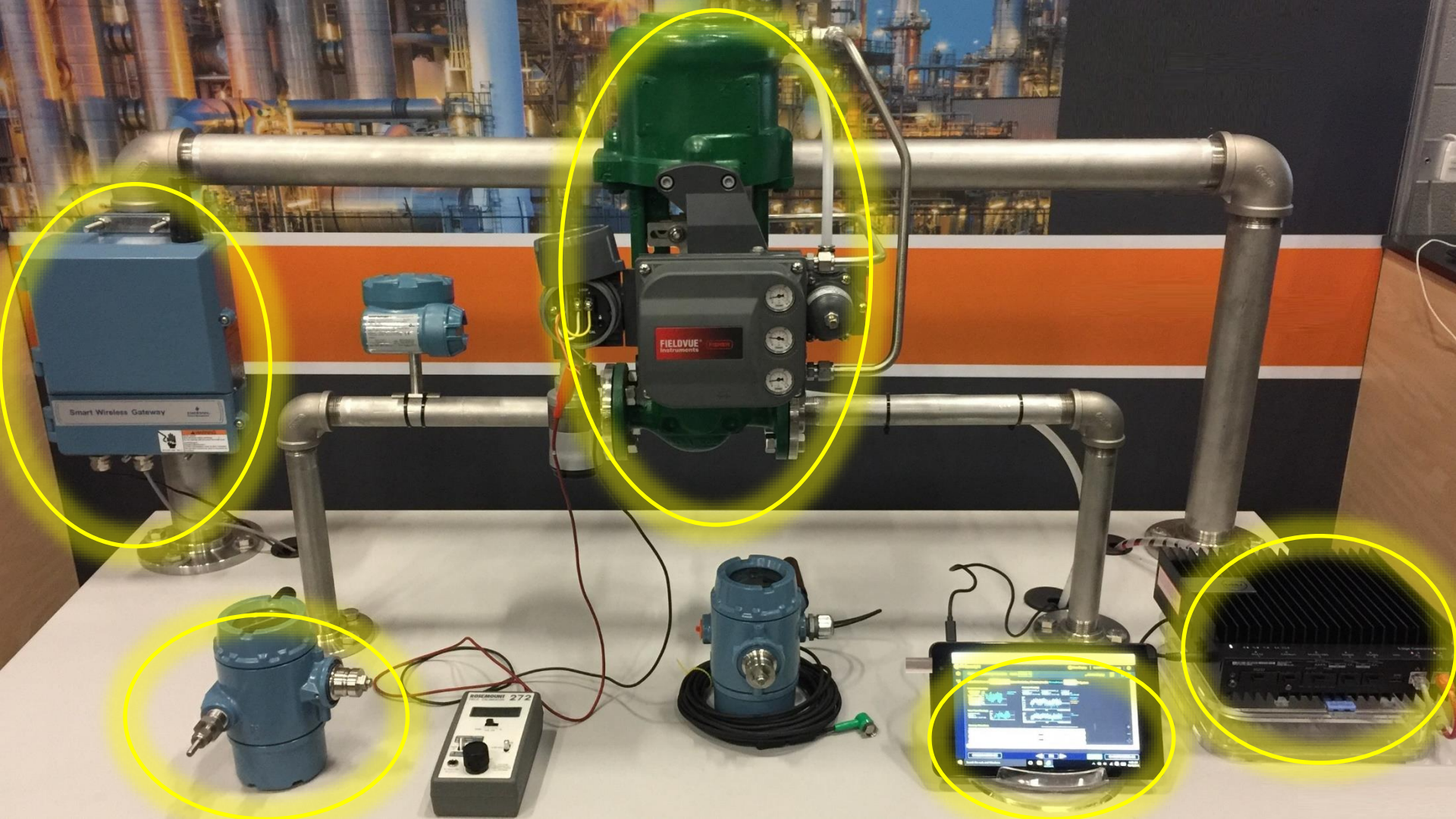
Monthly gas savings from electric vehicle charging

Thanks to the **Asset Framework**

Next, let’s look at critical assets within one of our key facilities

Images courtesy of Dell and Emerson




Smart Wireless Gateway
FIELDVUE
Instruments
ROSEMOUNT 272

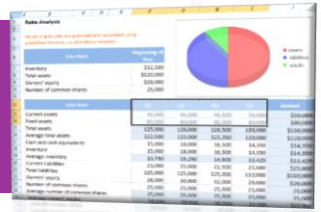
We Relied on the PI Visualization Suite

To Deliver Data to People Exactly Where and How They Needed It

PI DataLink

Access data from Excel

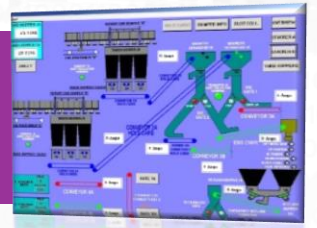
Video: What is PI DataLink



PI ProcessBook

Visualize process in real time

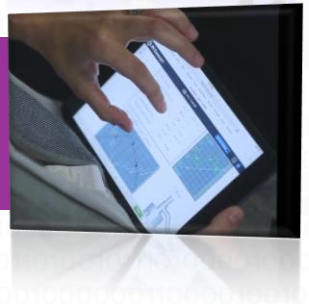
Video: What is PI ProcessBook



PI Vision

Explore anywhere, anytime

Video: What is PI Vision

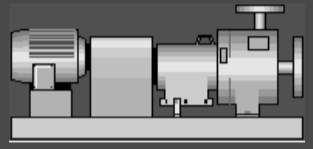


This display lets you detect a critical pump failure in real-time

to map

Back to WWTP

Langara Influent Pump1



Pump Summary

Status:

Name	Value	Units
Influent Pump1|Code	P18-01	
Influent Pump1|Impeller Diameter	4.53	m
Influent Pump1|Model	SD-236	
Influent Pump1|Last Service Date	12/6/2010 4:00:00 PM	

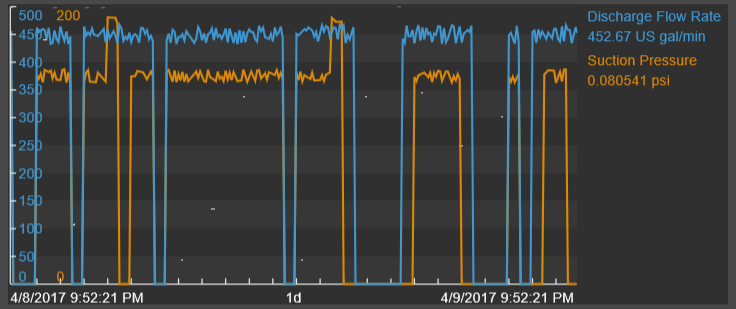
Pump Efficiency

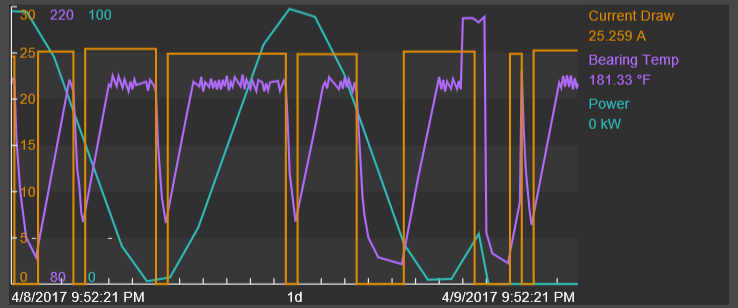
46.583 %

Daily Runtime

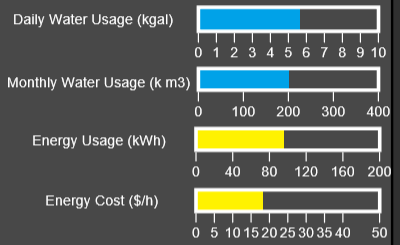
20.286 h

Operational Data





Utilities



Flow Rate

6,707.1 gpm

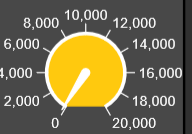
Pressure

0.080541 psi

Motor Speed

137.64 rpm

Bearing Temp



181.33 °F

This display let you see into a control system of critical operations

Chemical Wash

CIP SKID

Chemical Used
ACID

Recipe
SOP_WFICIP_MediumTank_CIP_

Operation
OP_PI_CIPSKID_FINALRINSE:1

Phase
CIP_SKID_PI_EPDRAIN:1-1

Flow Rate

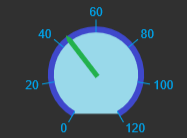
Name	Value	Units
EPWASH|PAR_ACID_LOW_FLO_SP_Parameter	1	L/h
EPWASH|PAR_ACID_PUMP_HIGH_SPD_Parameter	70	L/h
EPWASH|PAR_ACID_PUMP_NORM_SPD_Parameter	35	L/h
EPWASH|PAR_ALKALI_LOW_FLO_SP_Parameter	1	L/h
EPWASH|PAR_ALKALI_PUMP_HIGH_SPD_Parameter	70	L/h
EPWASH|PAR_ALKALI_PUMP_NORM_SPD_Parameter	35	L/h

Temperature

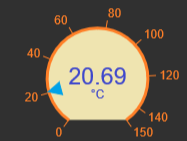
Name ▼	Value	Units
EPWASH|CIP Supply Temperature Low	70	°C
EPWASH|CIP Supply Temperature High	85	°C

Volume

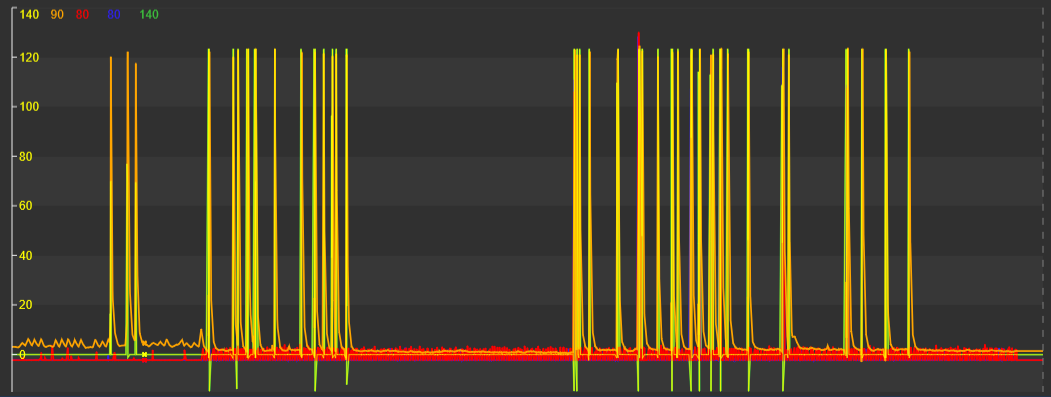
Name ▲	Value	Units
EPWASH|CIP Supply Volume Actual	150.27	L
EPWASH|CIP Supply Volume Setpoint	150	L



CIP Flow Rate
45 L/min



CIP Supply Temperature



EPWASH|CIP Conductivity
-0.056927 ms /cm
EPWASH|CIP Supply Tempe
20.69 °C
CIP_123_SKID|ACID SUPPL
-0.039589 L/h
CIP_123_SKID|ALKALI SUPI
-0.043518 L/h
CIP_123_SKID|CIP SUPPLY
-0.056927 LPM

3/29/2017 9:54:44 PM | 15d | Now | 4/13/2017 9:54:44 PM

Search in Onsite Power Plant

- Home
- ChemiCo
- Onsite Power Plant
  - Condenser
  - Electric Generators
  - Gas Turbine 1
  - Gas Turbine 2
  - Heat Recovery Steam Generator 1
  - Heat Recovery Steam Generator 2
  - Pumps
  - Steam Turbine

Attributes

- Onsite Power Plant
  - Environment
    - Ambient Humidity
    - Ambient Temperature
  - KPIs
    - Capacity Factor
    - Daily Grid Purchases
    - Daily Power Production Total
    - Realtime Supply vs Demand
  - Power
    - Measured Net Power Produced
    - Percentage of Maximum Capacity
    - Rated Total Power

This display lets you monitor critical heavy equipment

Houston Facility | Ad Hoc Display | OSI\DLopez

Overview

Production Line Information

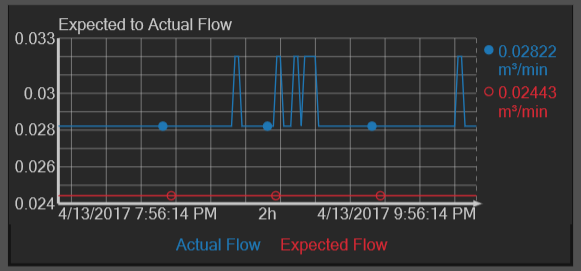
Running

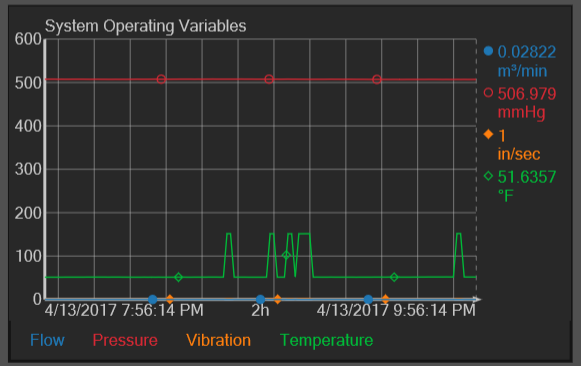
Current

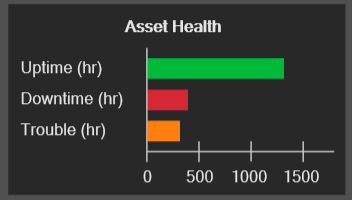
Flow	0.02822 m³/min
Pressure	506.979 mmHg
Vibration	0.51636 in/sec
Temperature	51.6357 °F

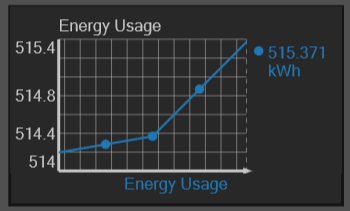
Current

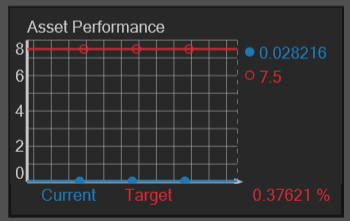
Flow
Pressure
Vibration
Temperature

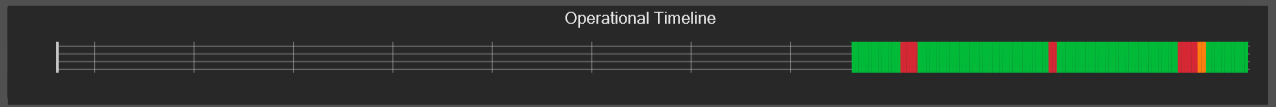












Line 1 | Line 2 | Line 3 | Line 4 | Line 5 | Line 6

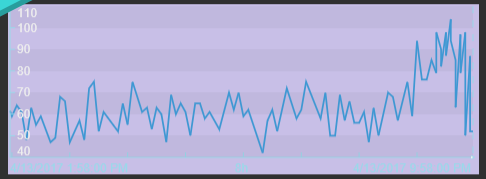
4/13/2017 7:56:14 PM | 2h | Now | 4/13/2017 9:56:14 PM

This display lets you manage energy usage across a region

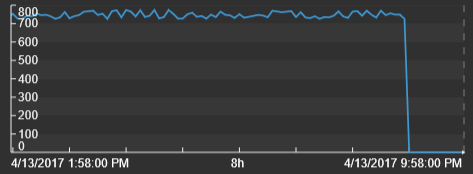
New Display | OSI\DLopez

Ad Hoc Display

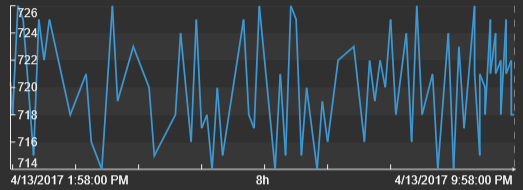
Energy Management

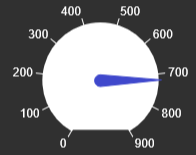


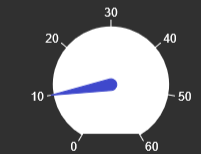
1,582.8	kWh Daily Total
10,766	kWh Weekly Total
47,676	kWh Monthly Total
5.6289+E05	kWh Yearly Total



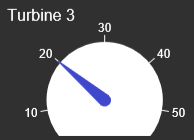
9,798.4	kWh Daily Total
68,452	kWh Weekly Total
3.0892E+05	kWh Monthly Total
3.6473E+05	kWh Yearly Total

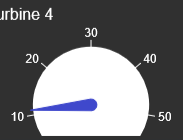






OUTPUT





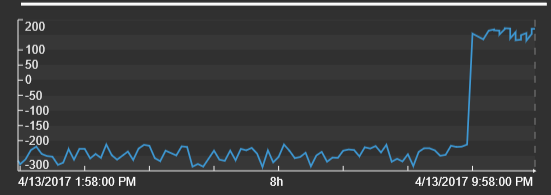
Current Power Consumption	-252.75	kW
Current Power Production	1,525.9	kW
Year To Date Power Production	1.0696E+07	kWh
Year to Date Power Consumption	36,606	kWh
Since inception - Solar Porduced Power	1.4474E+06	kWh
Since inception - Wind Turbine Produced Power	1.5298E+07	kWh

Wind and Solar

Estimated Savings Year to Date

$ 55,664

17,281	kWh Daily Total	5,3569E+05	kWh Monthly Total
1.2096E+05	kWh Weekly Total	6.4246E+06	kWh Yearly Total



-9.0894	kWh Daily Total	113.22	kWh Monthly Total
14.751	kWh Weekly Total	1,525.2	kWh Yearly Total

4/13/2017 1:58:00 PM | 8h | Now | 4/13/2017 9:58:00 PM

This display lets you compare historical, **current, and predicted future data**

Display: CA ISO Web-Scr… sset: California ISO+ ▼ Ad Hoc Display

Day-Ah…

Actual demand
37,323 MW

Available resources
47,817 MW

Forecasted Peak
37,534 MW

Tomorrow Peak Forecast
37,826 MW

	Name	Value	Units	Time	Trend	Average	Minimum	Maximum	StdDev	Range	pStdDev
…Generation\Transmission and D	California ISO|Day-Ahead Hourly Demand Forec	37,733	MW	8/22/2016 6:14:52		31,963	22,425	45,384	6,164.7	22,959	6,164.7
…\Power Generation\Transmission and D	California ISO|Actual demand	37,323	MW	8/22/2016 6:05:0(		31,523	22,957	43,225	5,631.8	20,268	5,631.8
\\DFPIAF\Power Generation\Transmission and D	California ISO|Available resources	47,817	MW	8/22/2016 6:05:0(		45,409	37,033	55,099	4,393.8	18,066	4,393.8
\\DFPIAF\Power Generation\Transmission and D	California ISO|Forecasted peak demand today	37,534	MW	8/22/2016 6:05:0(		38,730	33,687	43,750	3,065	10,063	3,065
\\DFPIAF\Power Generation\Transmission and D	California ISO|Forecasted peak demand tomorrc	37,826	MW	8/22/2016 6:05:0(		38,887	34,573	45,384	3,030.2	10,811	3,030.2

60,000 55,000 50,000 45,000 40,000 35,000 30,000 25,000 20,000

8/16/2016 12:00:00 AM — 7d — 8/23/2016 12:00:00 AM

Day-Ahead Hourly De
37,733 MW
Actual demand
37,323 MW
Available resources
47,817 MW
Forecasted peak dem
37,534 MW
Forecasted peak dem
37,826 MW
Hour-Ahead Hourly D
35,845 MW

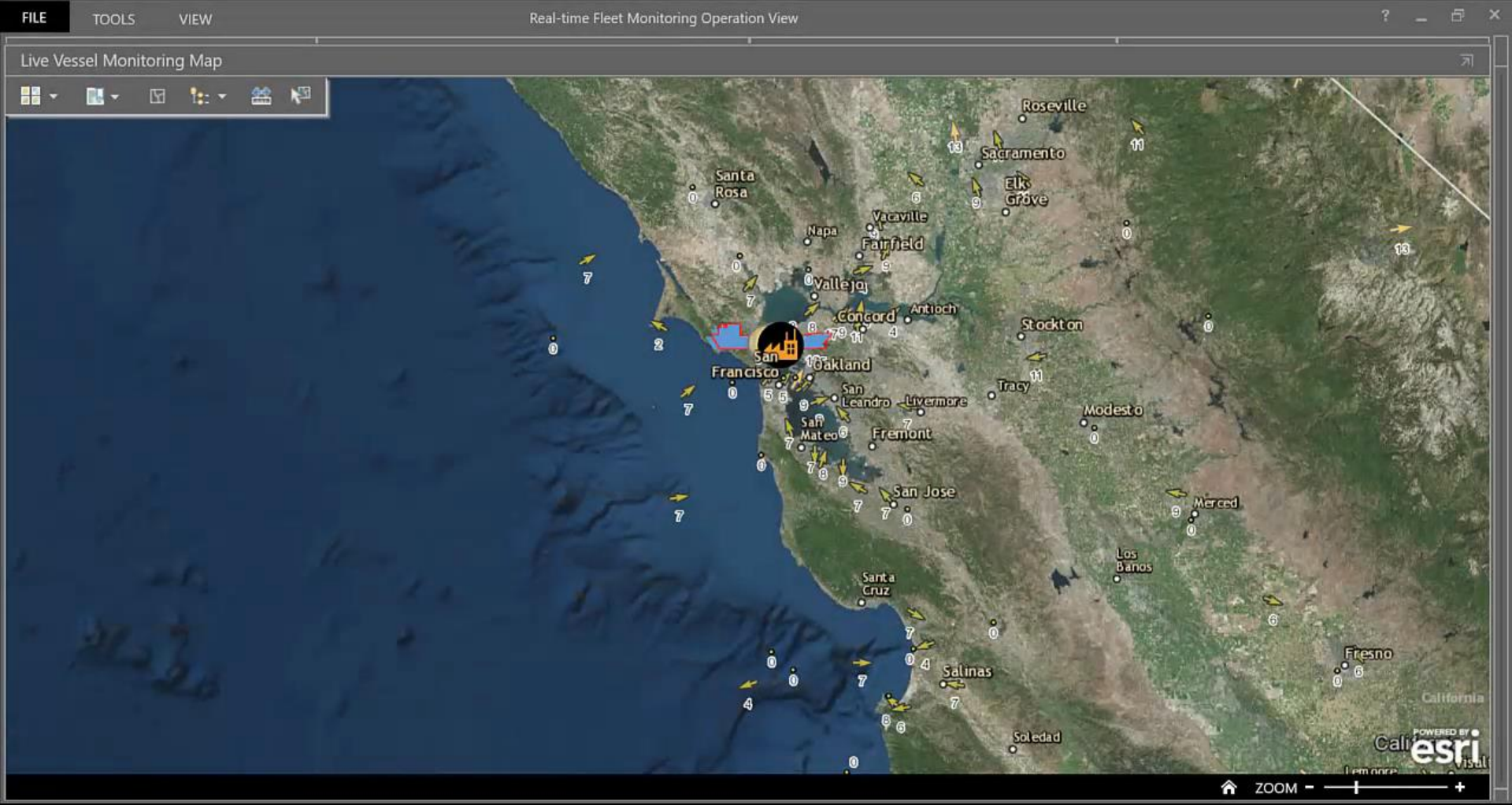
100 90 80 70 60 50 40 30 20 10 0

San Francisco Interna
66 °F
San Francisco Interna
65 %
Los Angeles Internatic
75 °F
Los Angeles Internatic
65 %
San Francisco Interna
A Few Clouds and Bre
Los Angeles Internatic
Partly Cloudy

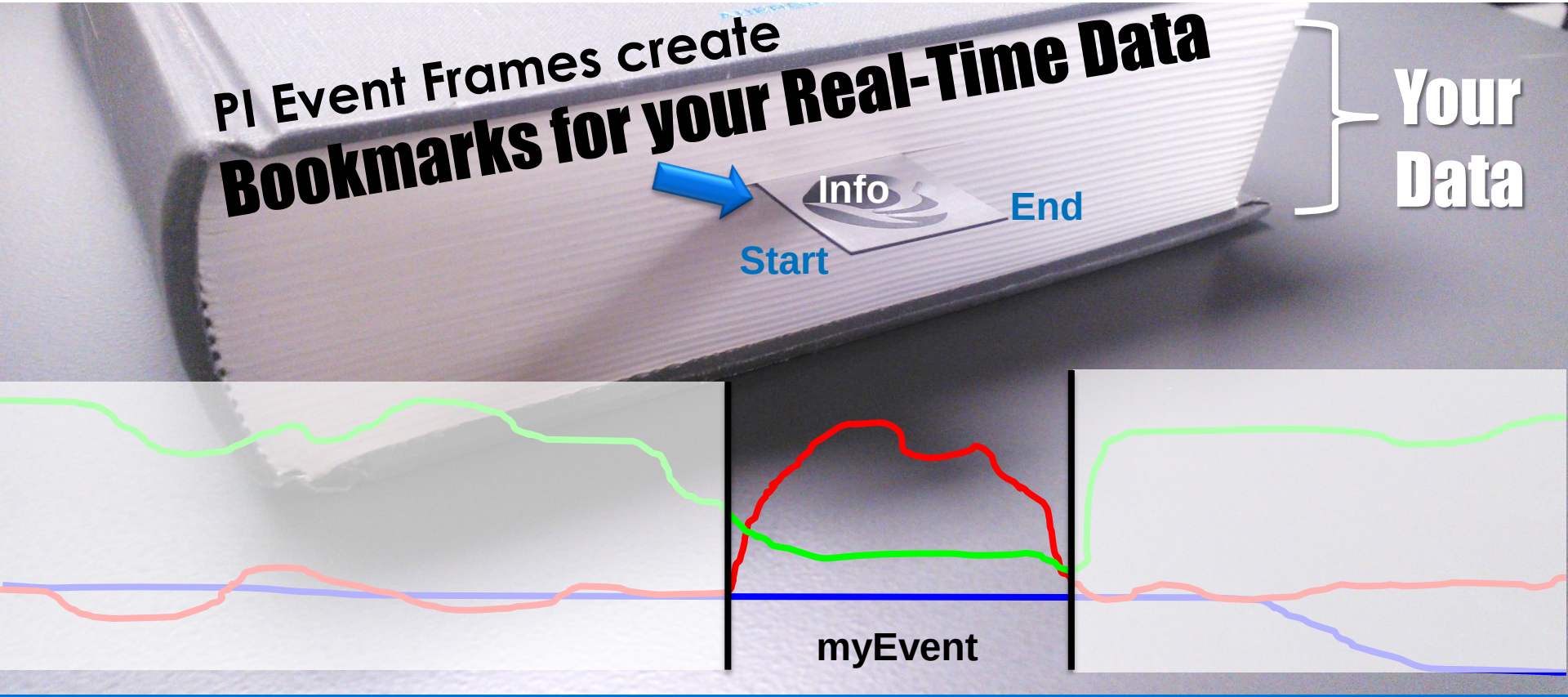
8/16/2016 12:00:00 AM ◀ 7d ▶ Now 8/23/2016 12:00

But what about critical assets that are bigger than entire facilities…

and that also move around?

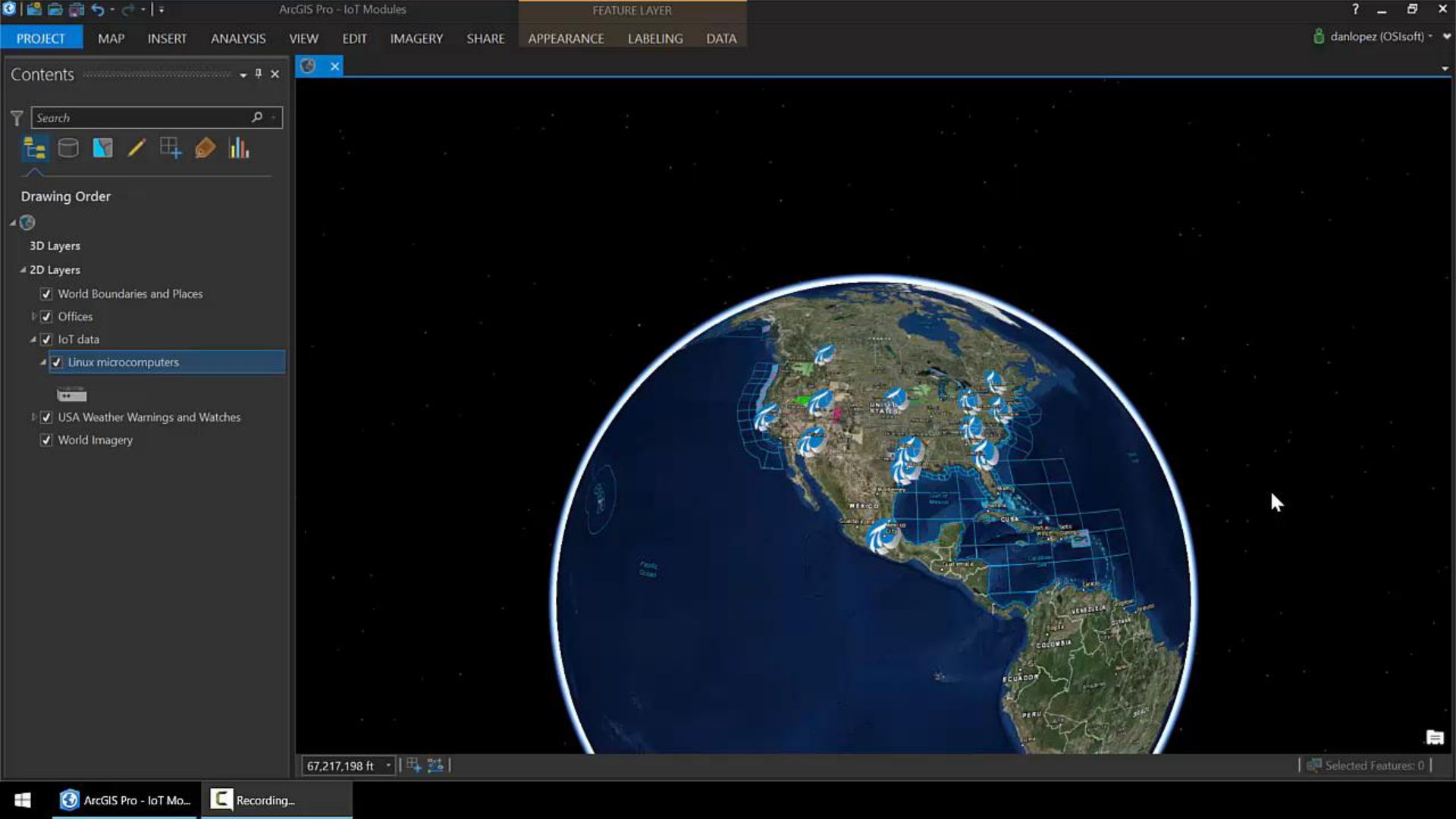

FILE
TOOLS
VIEW
Real-time Fleet Monitoring Operation View
Live Vessel Monitoring Map
Roseville
Sacramento
Elk Grove
Santa Rosa
Napa
Vacaville
Fairfield
Vallejo
Concord
Antioch
Stockton
San Francisco
Oakland
San Leandro
Livermore
Tracy
Modesto
San Mateo
Fremont
San Jose
Merced
Los Banos
Santa Cruz
Fresno
Salinas
Soledad
California
ZOOM
POWERED BY esri
Operations Dashbo...

PI AF Automatically Framed Critical Events For Us



But what about critical assets that are incredibly small…

and incredibly numerous?

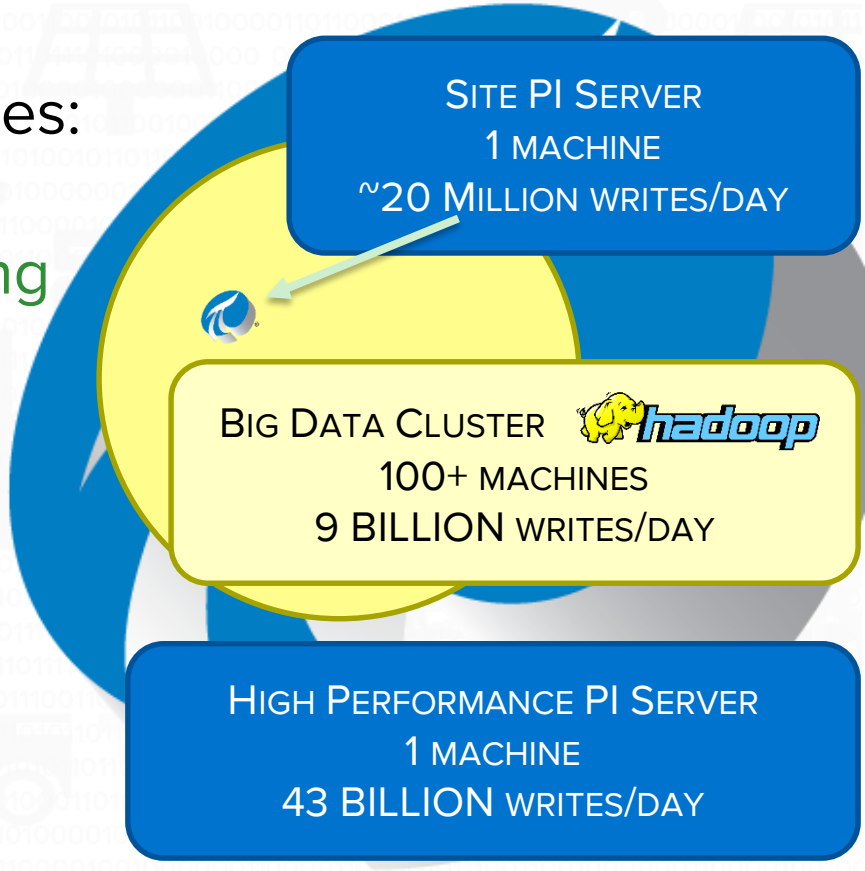

ArcGIS Pro - IoT Modules
FEATURE LAYER
PROJECT
MAP
INSERT
ANALYSIS
VIEW
EDIT
IMAGERY
SHARE
APPEARANCE
LABELING
DATA
danlopez (OSIsoft)
Contents
Search
Drawing Order
3D Layers
2D Layers
World Boundaries and Places
Offices
IoT data
Linux microcomputers
USA Weather Warnings and Watches
World Imagery
MEXICO
CUBA
VENEZUELA
COLOMBIA
ECUADOR
PERU
67,217,198 ft
Selected Features: 0
ArcGIS Pro - IoT Mo...
Recording...

Where Was That Data Stored? In A Proven Engine

PI Data Archive

The PI Server provides:

- System of Record
- Real-time Processing
  - Data Calculations
  - Alerting Engine
  - Metadata Layers
  - Event Tagging



Over the past 37 years, OSIsoft's PI Systems have monitored

1.5 BILLION

sensor data streams

Who wants to be next?

What To Do With Your Questions?

Ask OSIsoft Tech Support for guidance!
Email techsupport@osisoft.com

Check our online YouTube Channel!
https://www.**youtube**.com/user/**OSIsoft**Learning

Browse our Tech Support Site:
https://techsupport.osisoft.com/Products/Product-Roadmap
https://techsupport.osisoft.com/Troubleshooting/Releases/

Questions?

Please wait for the **microphone** before asking your questions

State your **name & company**

Please remember to…

Complete the survey for this session