



# IloT Data Readiness with the PI System

Presented by  
Sebastien Raposo, Technical Support Jr Engineer  
October 17<sup>th</sup>, 2017



# You've Collected All That IIoT Data...



***...Now What?***

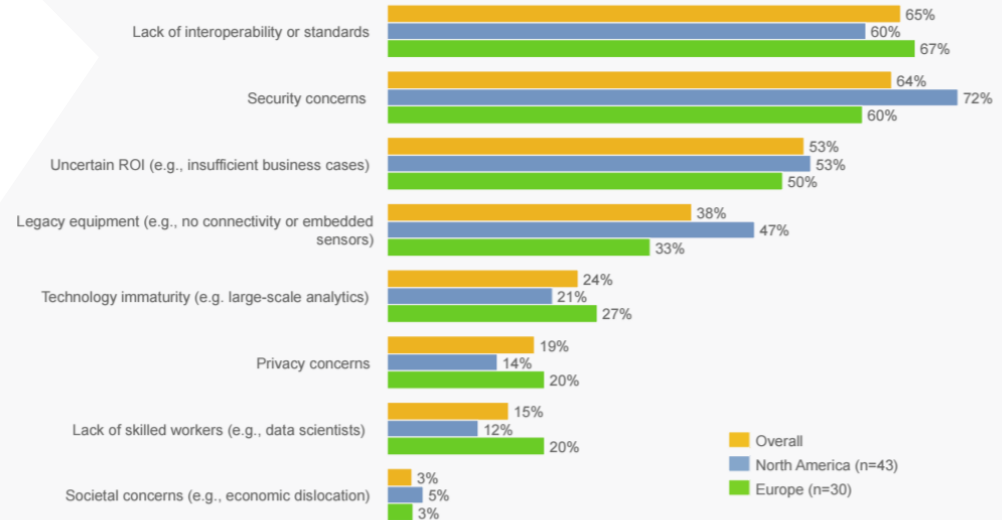
# The Three Biggest Barriers to Adopting IoT

1. Lack of interoperability or standards

2. Security concerns

3. Uncertain ROI

Q: What are the greatest barriers inhibiting business from adopting the industrial Internet?



# In This Talk, We Will Show How to Overcome Those Barriers

## 1. Lack of interoperability or standards

- Asset Framework

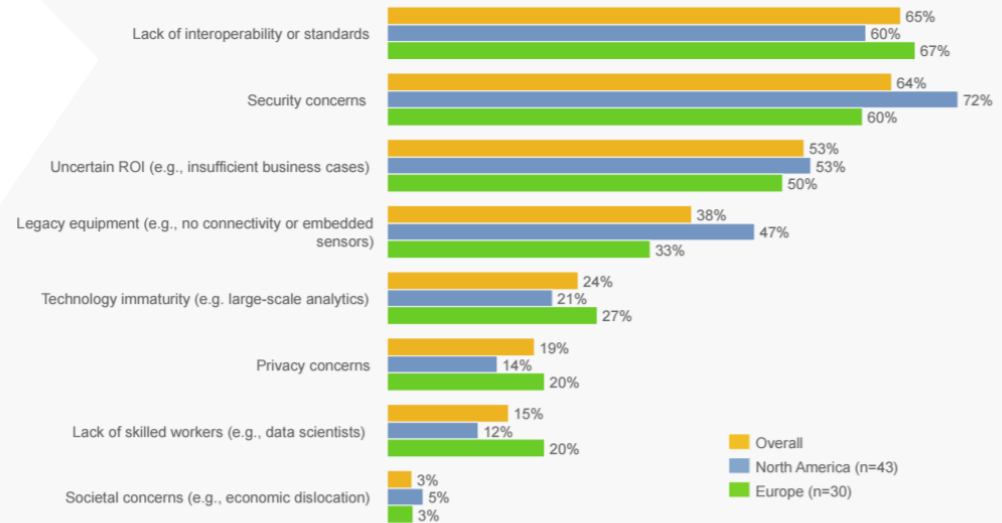
## 2. Security concerns

- Mitigation and best practices

## 3. Uncertain ROI

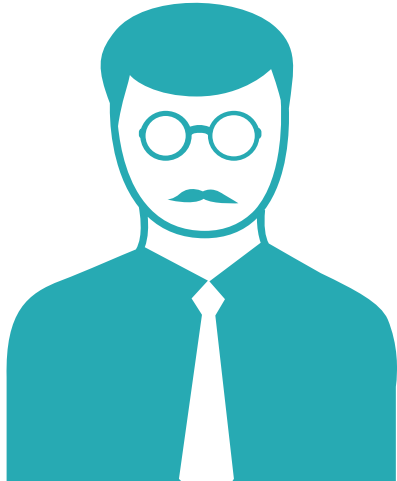
- Asset analytics, event frames, infrastructure approach

Q: What are the greatest barriers inhibiting business from adopting the industrial Internet?



# Symptoms of Poor Interoperability or Standards

I have to visit 5 groups just to get what I need!



Each team reports in a completely different way!



Just ignore it. It's outdated.



# Asset Framework: Bridge the Physical & Digital World

## Time series data

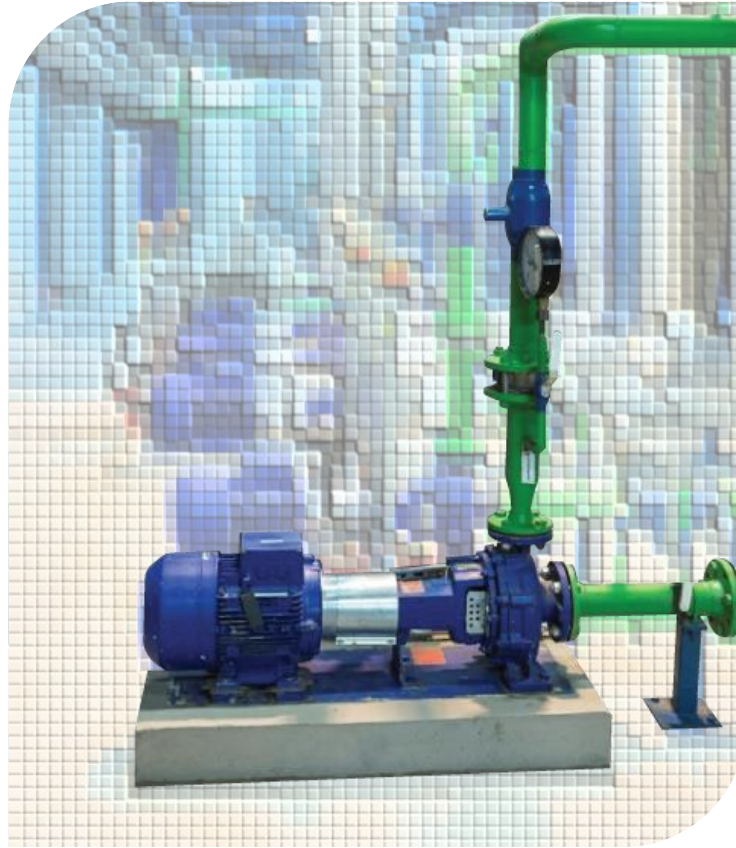
- Pressure data
- Vibration data
- Pulse counters

## Asset details

- Name
- Model
- Manufacturer

## External data

- Performance curves
- Maintenance records



## Analyses

- Efficiency analyses
- Key Performance Indicators (KPIs)

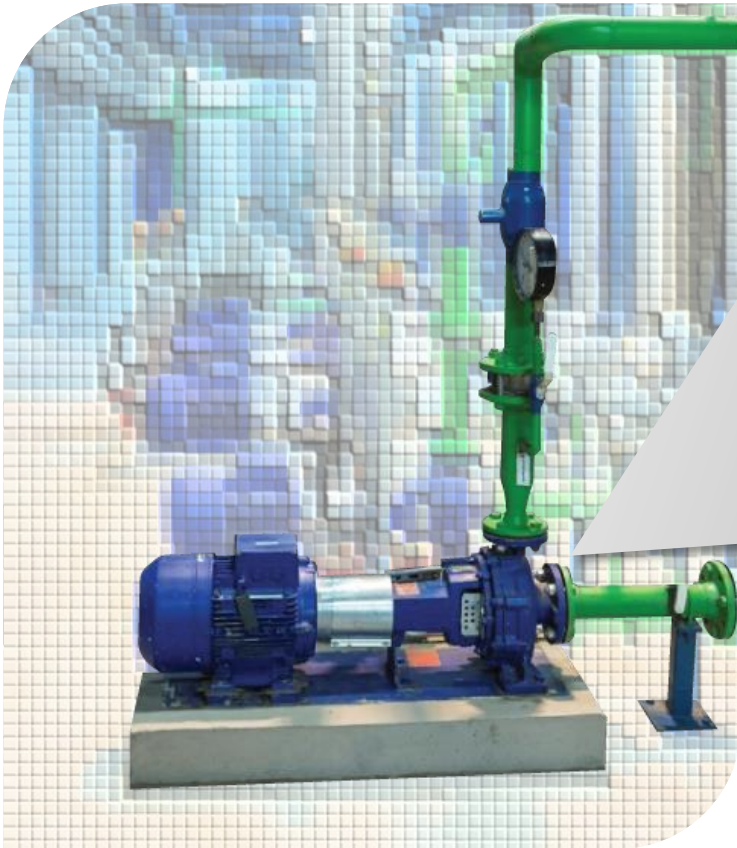
## Events

- Downtimes
- Startups
- Failures

## Notifications

- High torque alerts
- Rotor failure alerts

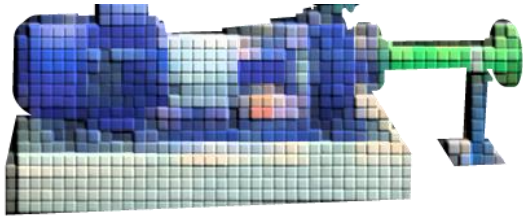
# Capture Asset Information in Configurable Templates



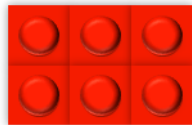
Discharge Pressure	539.342651367188 psi
Electricity Cost Factor	0.162879550235334 US\$
Flow Rate	141.52 gpm
Impeler Size	3
LCL	92.5
Liquid Gravity	1 SG
Minimum Efficiency	90 %
Model Number	G11
Pump Curve Head	0.616988159999998 psi
Pump Downtime During Last Shift %	0.346886343426175 %

- Reference data (without replicating it) from **external databases** with **AF linked tables**

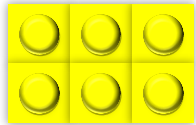
# Create Flexible Views with Asset Building Blocks



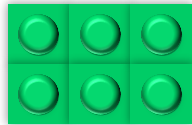
Pump



Heat Exchanger

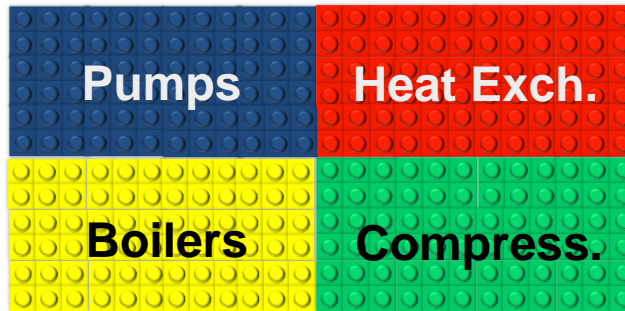


Boiler

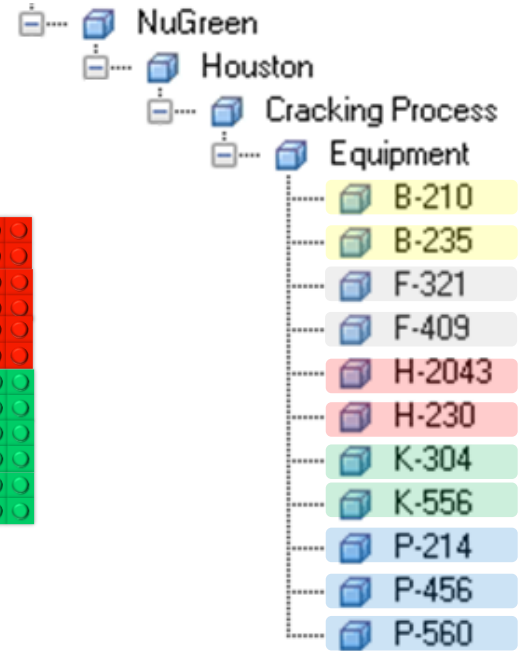


Compressor

## Asset View



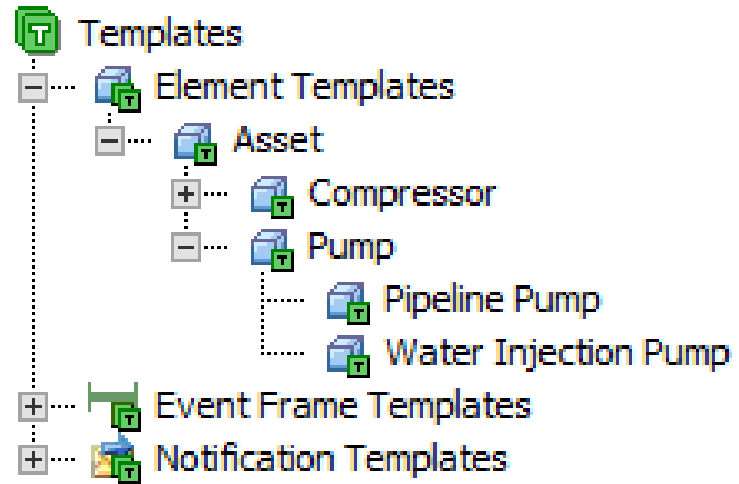
## Process View





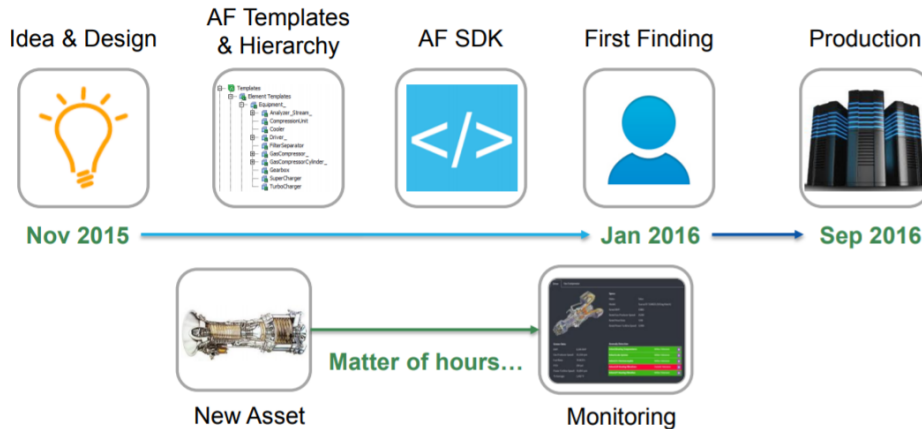
# Support Ongoing Standardization with Asset Framework

- **Update** templates over time
  - Start simple, add attributes as needed
- **Facilitate** asset management
  - Centrally push updates to all assets
- **Available** to visualization tools
  - Consistent displays for similar assets



# TransCanada uses AF to Achieve 98% Availability of their Compression Assets

## Results - Implementation Time & Scalability



“We were able to build out our entire AF hierarchy and we had our first finding within a couple months.

As [new assets] come online, they get built in AF in a matter of hours and automatically go into monitoring.”



**Brendan Bell, TransCanada**

# In This Talk, We Will Show How to Overcome Those Barriers

## 1. Lack of interoperability or standards

- Asset Framework

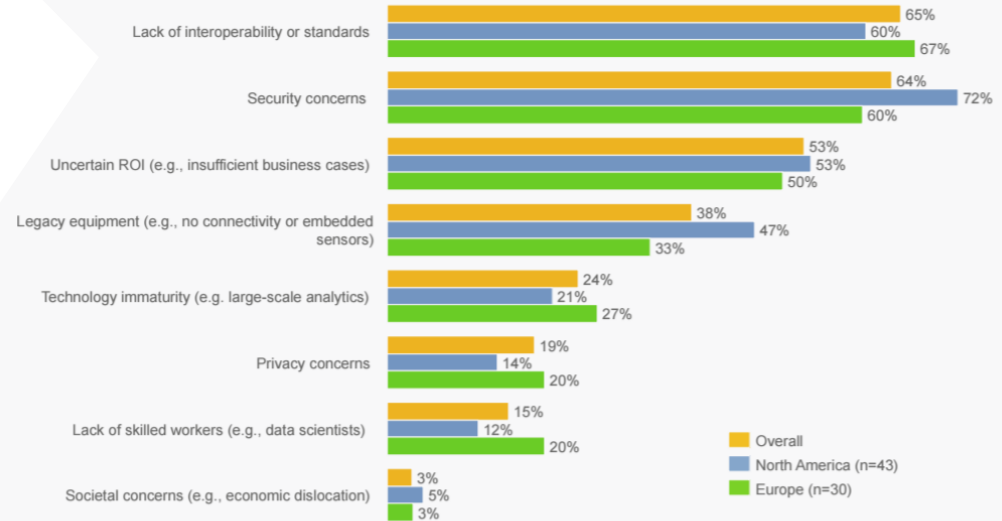
## 2. Security concerns

- Mitigation and best practices

## 3. Uncertain ROI

- AF, event frames, infrastructure

Q: What are the greatest barriers inhibiting business from adopting the industrial Internet?



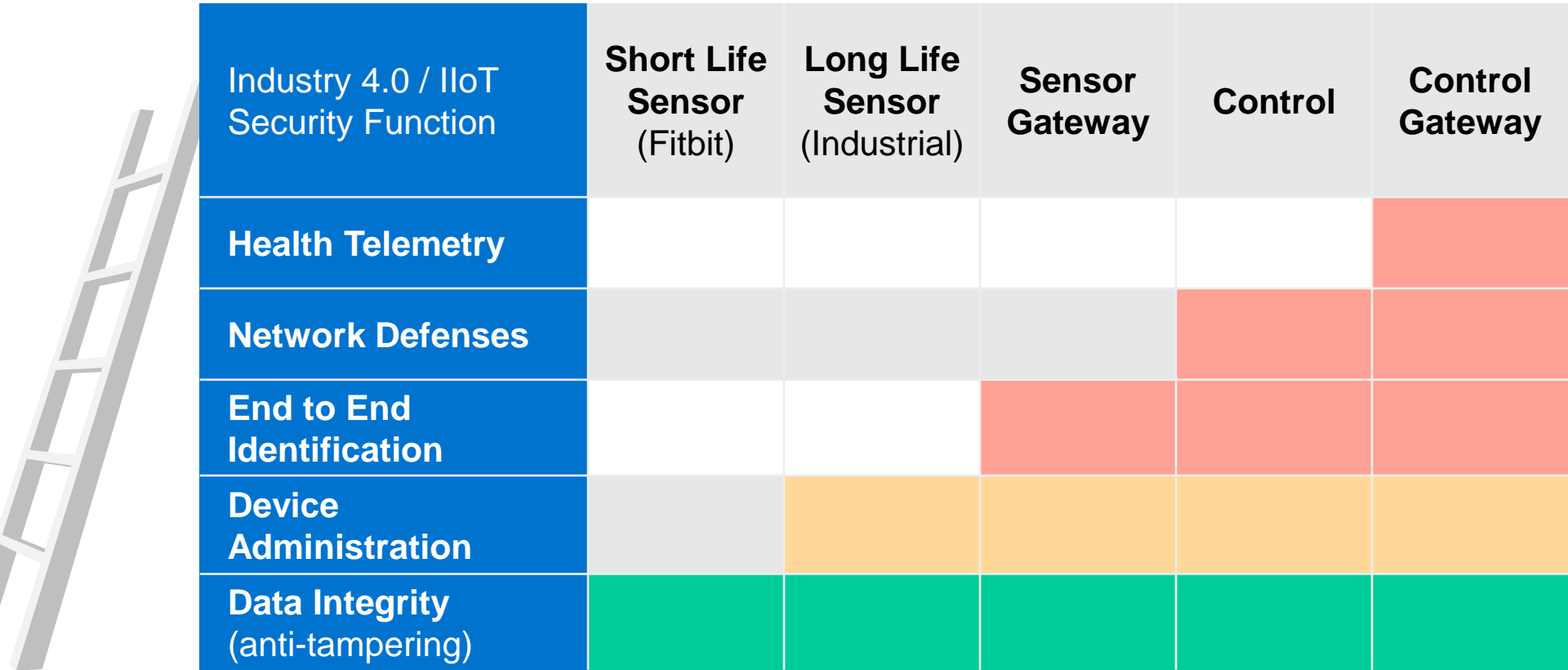
# Internet of Things...

# Or Threats?

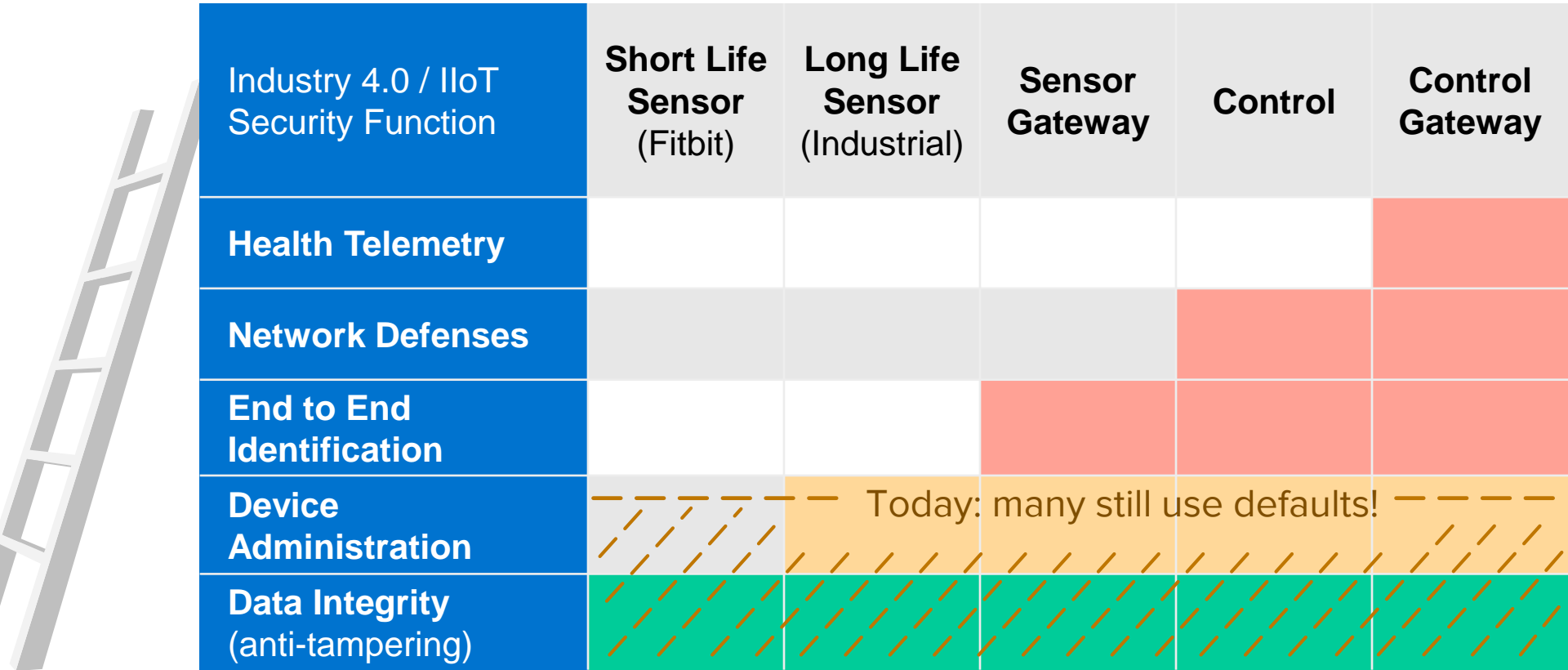


- Example: Mirai malware looks for IP addresses that use **default login names and passwords**
- **Controlled remotely**
- High-profile 2016 attacks:  
Twitter, Netflix, Reddit & others

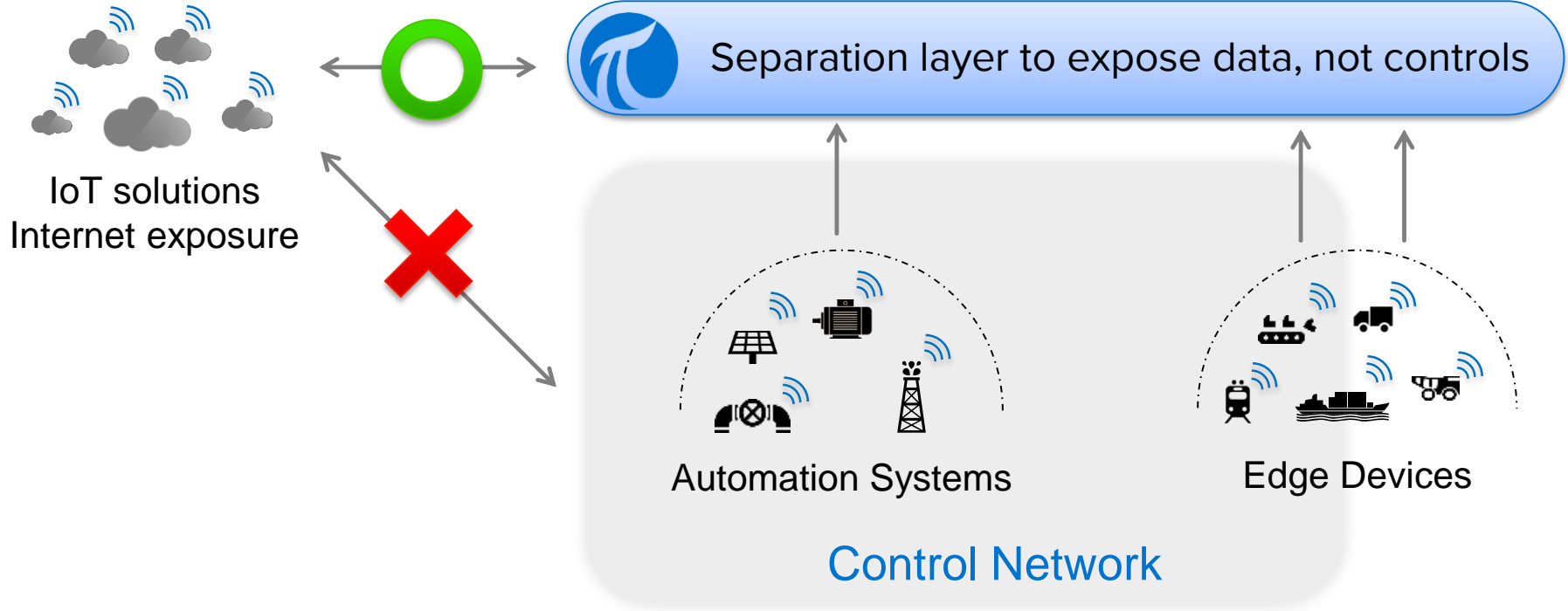
# Many IIoT Devices Are Still Climbing the Internet Security Ladder



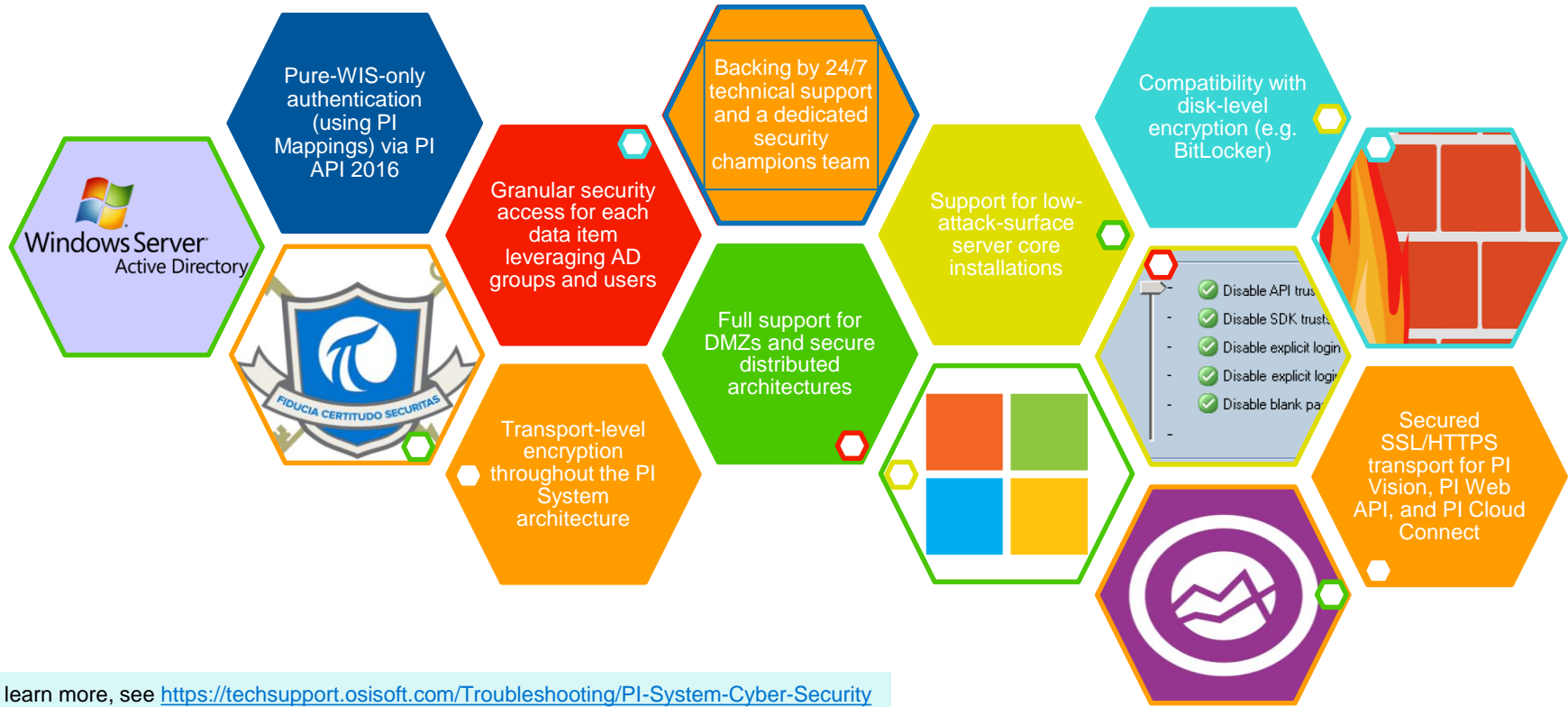
# Many IIoT Devices Are Still Climbing the Internet Security Ladder



# Protecting the Control Network is More Important Than Ever



# The Modern PI System is More Secure than Ever



To learn more, see <https://techsupport.osisoft.com/Troubleshooting/PI-System-Cyber-Security>



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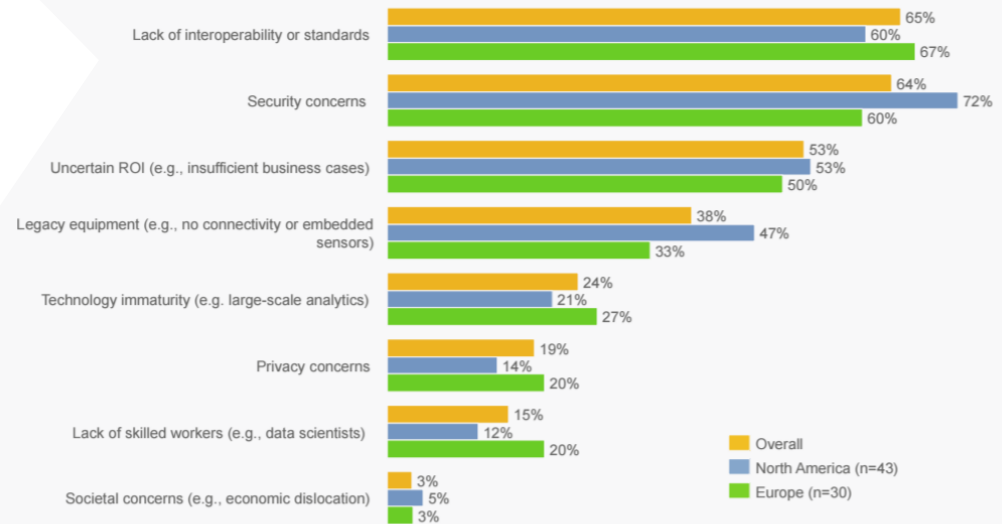
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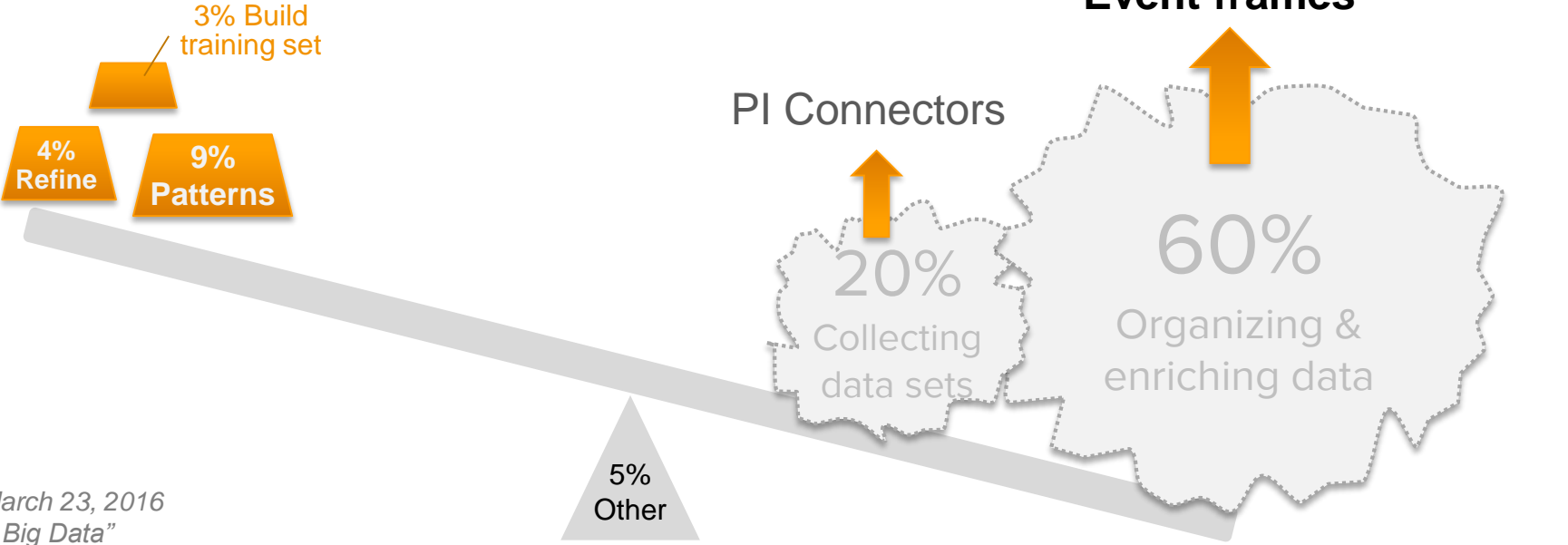


# 80% of the investment lost to data-prep can be automated



Forbes, March 23, 2016  
"Cleaning Big Data"

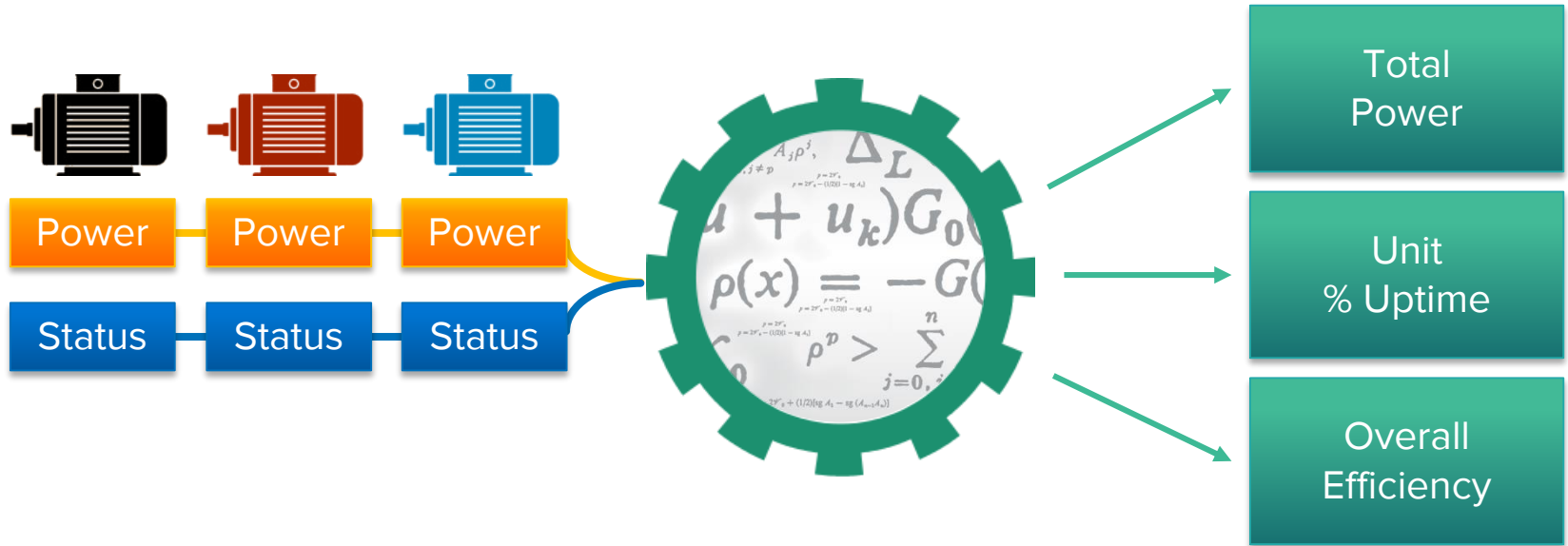
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Forbes, March 23, 2016  
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# AF Templates Put Data Into a Standard, Consistent Format

## Asset Analytics Turn Data into KPIs



# Easily Track Site-level Metrics with Rollup Capabilities

Well Pad 035

General Child Elements Attributes Ports Analyses Version

Name Backfilling

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Oil Flow Rate Rollup	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Well Pad Volume Flow Rate Rollup	

Name: Oil Flow Rate Rollup

Description:

Categories:

Analysis Type:  Expression  Rollup

Rollup attributes from

Child elements of Well Pad 035

This element - Well Pad 035

To select attributes set criteria below

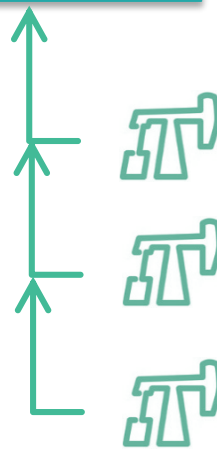
Attribute Name: Oil Flow Rate

Attribute Category:

Attributes

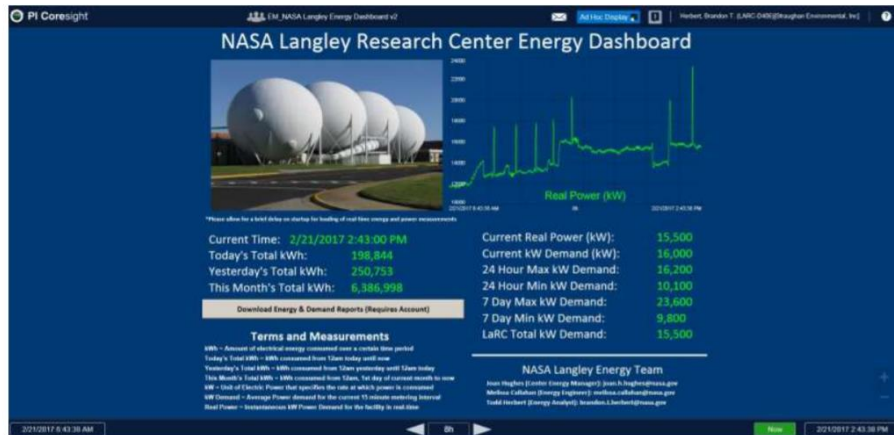
Name	Parent Element
✓ Oil Flow Rate	OW-259
✓ Oil Flow Rate	OW-262
✓ Oil Flow Rate	OW-258
✓ Oil Flow Rate	OW-261
✓ Oil Flow Rate	OW-260

Total  
Production



# NASA Monitors Real-Time Facility Power Demand and Consumption

Using the PI System to Monitor Real-Time Energy Data at the Building Level



“I’m able to go into AF and make a bunch of calculated attributes.

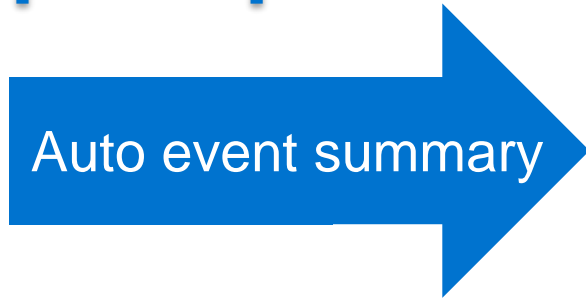
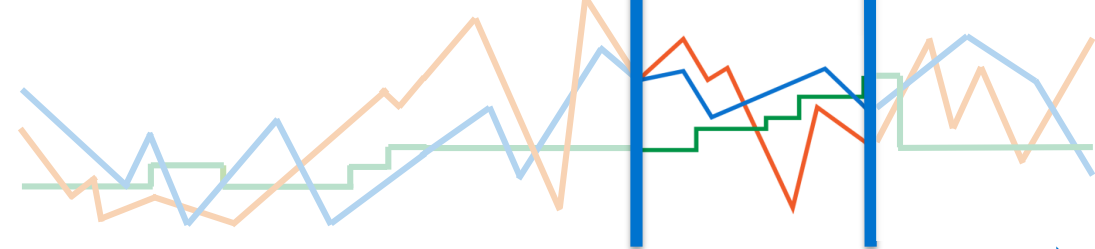
24 hour max demand, 7 day max demand, they are meaningful to us because at a glance, we can see how that building is doing.”



Todd Herbert, NASA

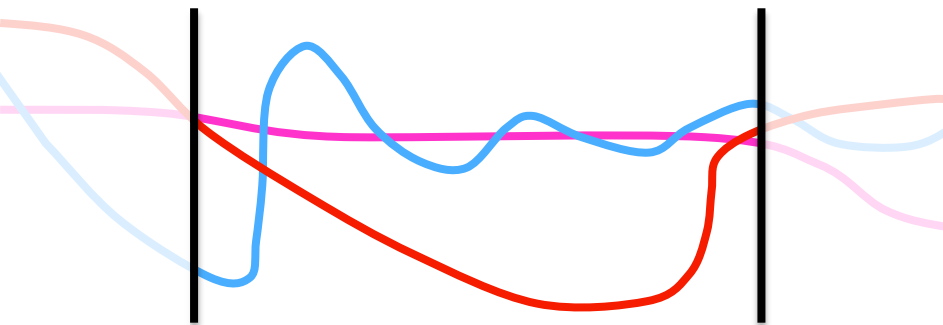
# Event Frames: Out of Years of Data, Bookmark the One Minute that Matters

Downtime  
Excursion  
Batch



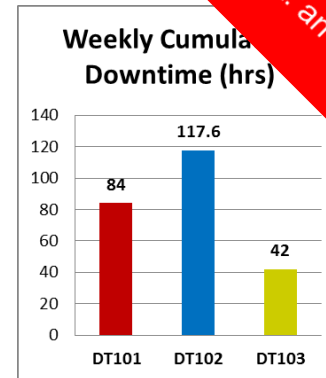
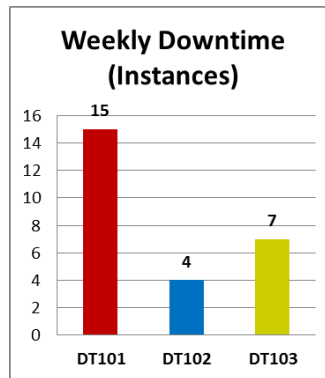
Event Attribute	Value
Name	Excur. 1215-002
Start	15-Dec-2013 10:35:02
End	15-Dec-2015 10:47:26
Asset	Boiler-352
Excursion Type	High Violation
Fuel Gas Flow.Avg	37.12 k sft3/h
myKPI.Max	47.19 bbl/d

# Simplify Data Analysis

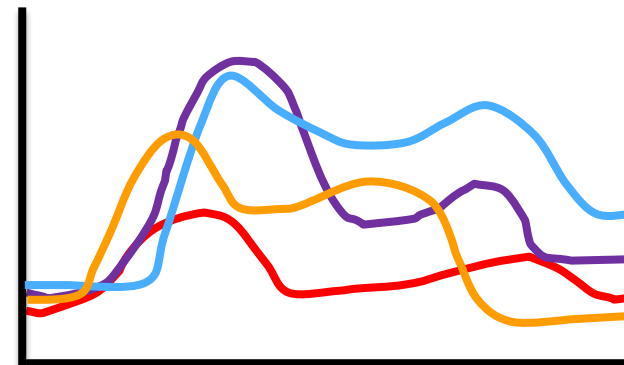


# Compare Assets

Next: an example!

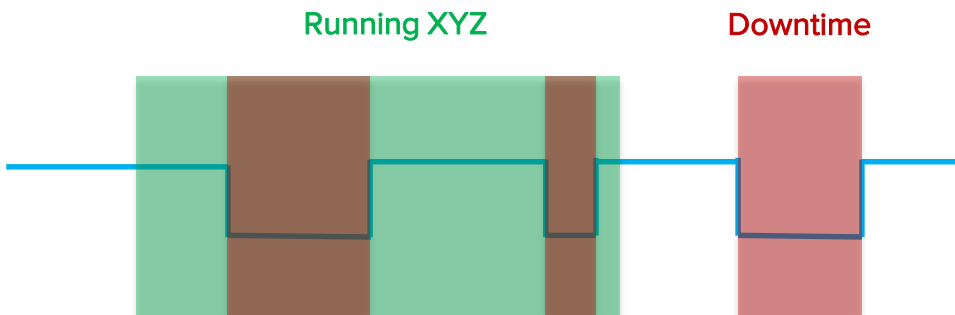


# Compare Events



Name	Max
EF1	122.47
EF2	112.73
EF3	98.61
EF4	125.24

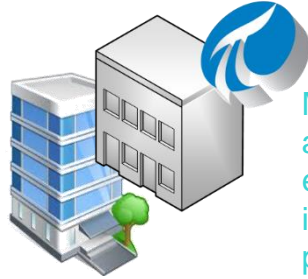
# Discover Event Interrelationships



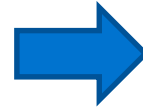


# What Can This Look Like?

**Example application:**  
Investigating electricity  
usage anomalies



Multiple buildings  
at a site all use  
electricity, ideally  
in a similar  
pattern



Meter readings are  
streamed in real-  
time to an OSIsoft  
PI System and  
compared with  
utility bills

1. Each week, buildings should consume electricity in a fairly consistent pattern
2. The PI System collects, manages, and enhances that data
3. **Our goal:** discover why electricity costs were so high in a given week

**Solution: PI Event Frames allows easily investigating a particular week's data!**

**OSIsoft PI Vision**

**Assets**

Search in East Area

- Home
- Sites
- Site 74656
- East Area**
  - 1E1
  - 1E2
  - 1F1
  - 1F2

**Attributes**

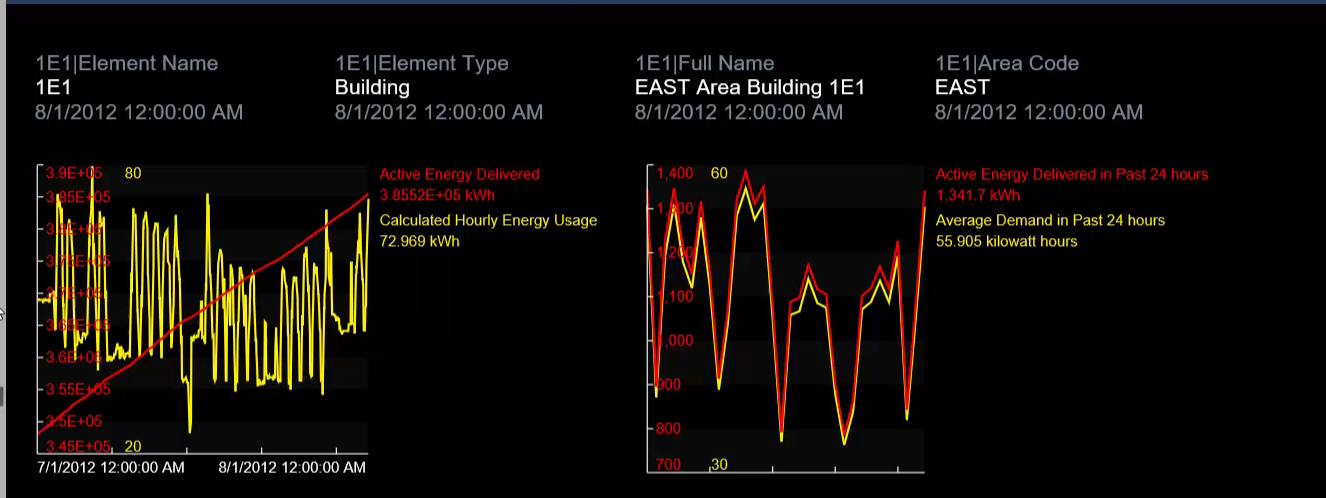
East Area

Metadata

- Area Code
- Element Name
- Element Type

Federal Building Dataset - Building El... (read-only) Asset: 1E1

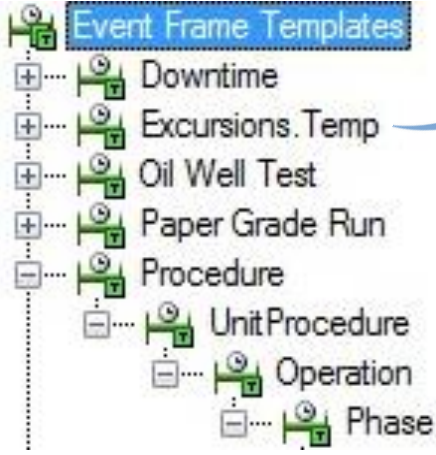
Ad Hoc Display



Name	Description	Value	Units
1E1 Calculated Hourly Energy Usage	Increase in lifetime energy usage during the past hour	72.969	kWh
1E1 Active Energy Delivered in Past 24 hours	Rolling sum, starting now	1,341.7	kWh
1E1 Active Energy Delivered in Past 7 days	Rolling sum, starting now	8,579.2	kWh
1E1 Average Demand in Past 24 hours	Calculated as (the energy delivered during the past 24 hours) / 24	55.905	kilowatt hours

7/1/2012 12:00:00 AM      31d      Now      8/1/2012 12:00:00 AM

# EF Templates Automatically Populate Consistent Summaries



Name	Value
Category: General Info	
Comment	
Operator	Bobby Wolf
Phase	Dwell
Type	LOW TEMP
Category: Limits	
Temp.Limit.High	88 deg C
Temp.Limit.Low	70 deg C
Category: Manual Logger	
Comment	
Category: Process Parameters	
Level.Start	42.7438011169434 L
Temp.End	71.1539001464844 deg C
Temp.Max	71.1538998921712 deg C
Temp.Min	62.1662445068359 deg C
Temp.Range	8.98765538533529 deg C

Text entries for filtering or grouping

Fields for comments

Calculated summaries like average, max, min

# Overcome Barriers Using the OSIsoft PI System

## 1. Lack of interoperability or standards

- Asset Framework

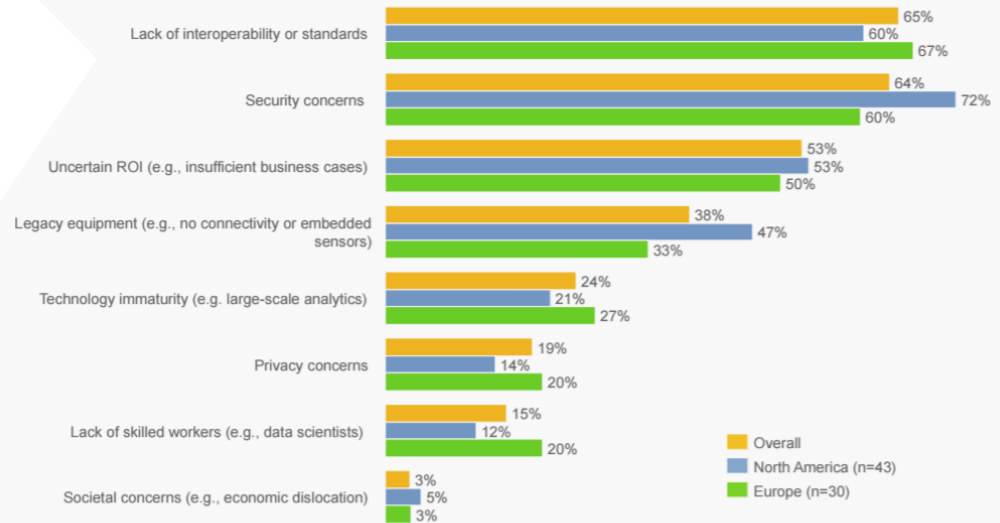
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# Infrastructure Improves ROI by Making Data Available for Multiple Projects



Cortana Intelligence Suite

ENTERPRISE  
ANALYTICS AND  
APPLICATIONS

MAINTENANCE



Docum. Mgmt. System



ANALYTICS-READY DATA



ERP



ENGINEERING



ENTERPRISE OPERATIONS DATA INFRASTRUCTURE



ASSET DATA



SMART  
MACHINES & PLANTS



Sensors



Actuators



Intelligent Motor Control



Controllers



Terminals

SMART  
DEVICES

# Contact Information

**Sebastien Raposo**

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Technical Support Junior Engineer  
OSIsoft



# Questions

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



State your **name & company**

# Please remember to...

Complete the Survey for this session

**OSIsoft. REGIONAL SEMINAR**  
Safeco Field – Seattle, WA – September 20, 2016

**Evaluation Form**

Name: \_\_\_\_\_ Company: \_\_\_\_\_  
Email: \_\_\_\_\_

**Quality of presentations**

	Poor	Good	Excellent	N/A
1. Digital Transformation with Today's PI System – OSIsoft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. PI Coresight 2016: New Vision, New Display Editor, New Look and Feel – OSIsoft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Monitoring Health and Performance of Grid-Scale Energy Storage Systems – UniEnergy Technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Using PI Integrators to Improve the Value of your PI Data – OSIsoft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. PI Asset Framework Ties Together Enterprise OEE for Clearwater Paper – Clearwater Paper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Solving Business Initiatives with the PI System – OSIsoft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. PI Analytics and Coresight for Business Process Improvement – Arista	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Seq helps customers get even more value from their OSIsoft PI System – Seq Inc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. What's Really Going on with your Beer's Fermentation? – Deschutes Brewery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Quality of seminar**

	Poor	Good	Excellent	N/A
1. Presentation topics meeting your needs or interests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Time allowed for lunch/breaks/discussions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Pace and time allocated to the presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

감사합니다

Danke

谢谢

Merci

Gracias

**Thank You**

ありがとう

Спасибо

Obrigado