OSIsoft IIOT Data Readiness with the PI System

Presented by
Ken Startz, Systems Engineer
November 2nd, 2017

You've Collected All That IIoT Data…

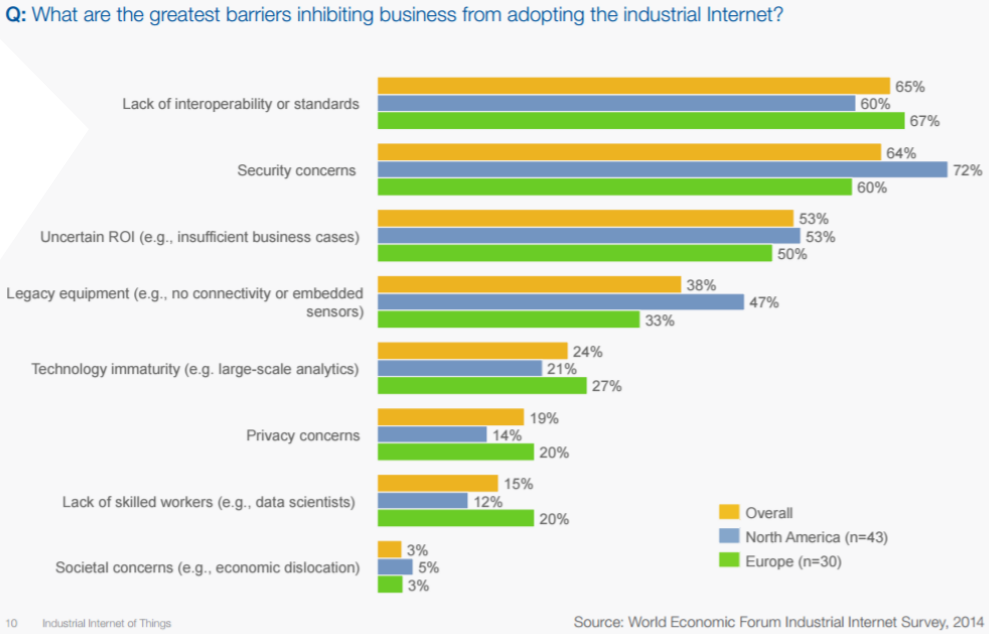
…Now What?

The Three Biggest Barriers to Adopting IoT

1. Lack of interoperability or standards

2. Security concerns

3. Uncertain ROI

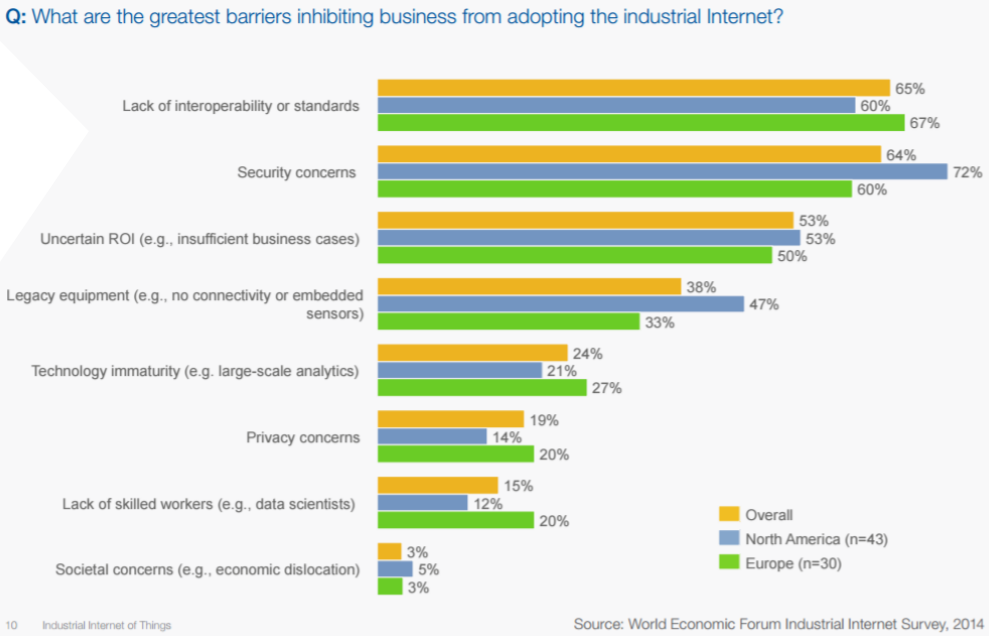


In This Talk, We Will Show How to Overcome Those Barriers

1. Lack of interoperability or standards
- Asset Framework

2. Security concerns
- Mitigation and best practices

3. Uncertain ROI
- Asset analytics, event frames, infrastructure approach



Symptoms of Poor Interoperability or Standards

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

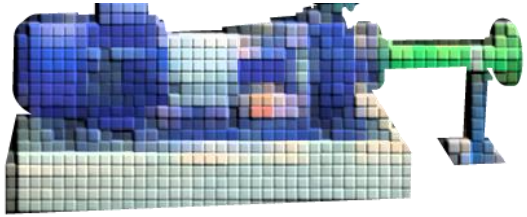
Notifications
- High torque alerts
- Rotor failure alerts

Capture Asset Information in Configurable Templates

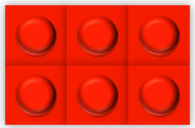
Discharge Pressure	539.342651367188 psi
Electricity Cost Factor	0.162879550235334 US$
Flow Rate	141.52 gpm
Impeler Size	3
LCL	92.5
Liquid Gravity	1 SG
Minimum Efficiency	90 %
Model Number	G11
Pump Curve Head	0.616988159999998 psi
Pump Downtime During Last Shift %	0.346886343426175 %

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

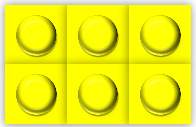
Create Flexible Views with Asset Building Blocks



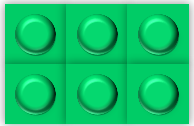
Pump



Heat Exchanger

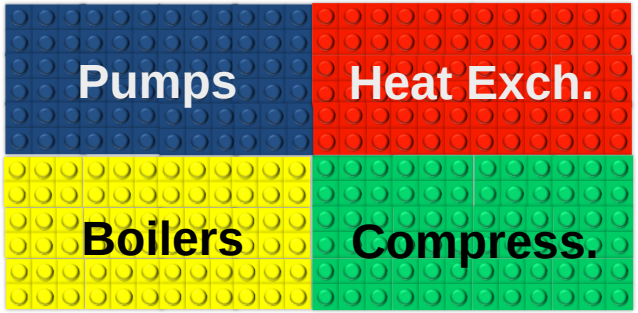


Boiler

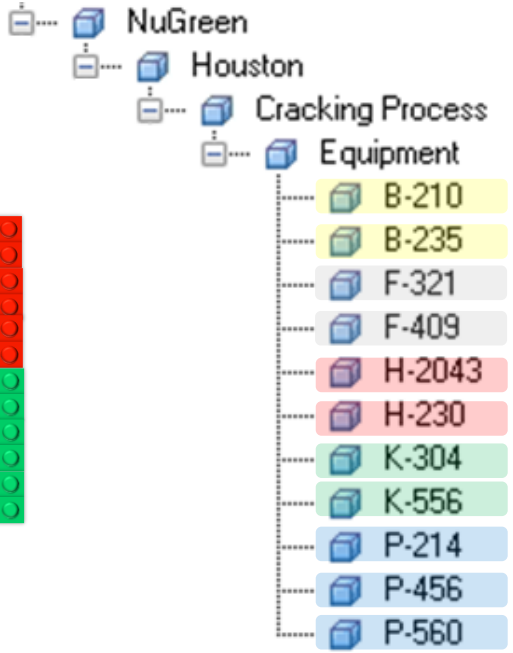


Compressor

Asset View

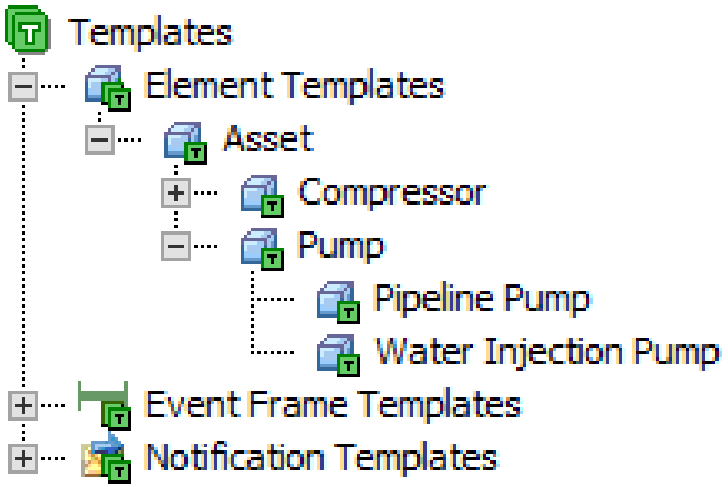


Process View

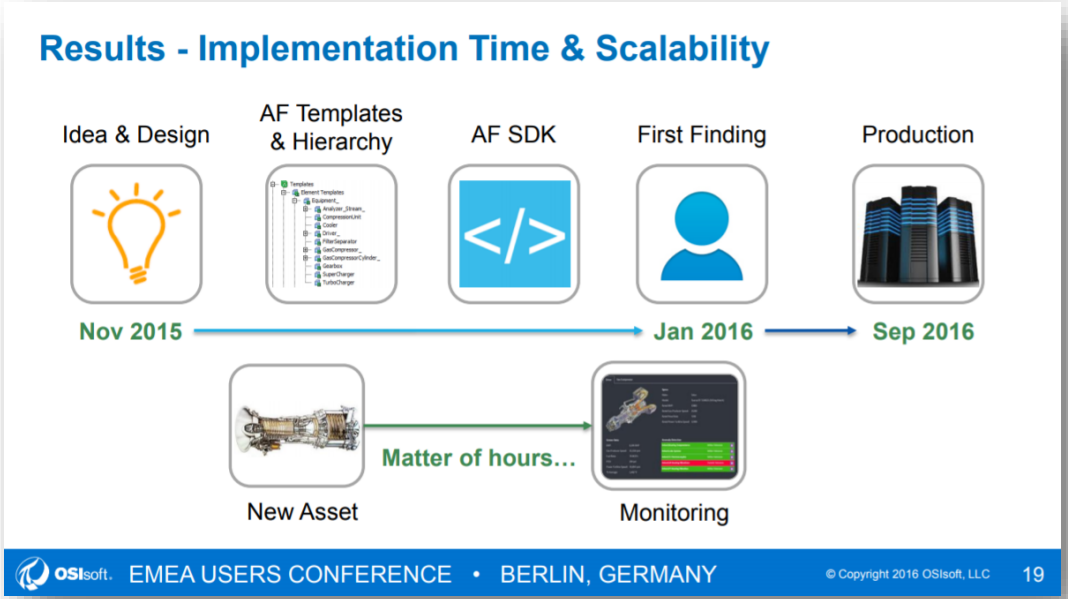


Support Ongoing Standardization with Asset Framework

- **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



"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**."

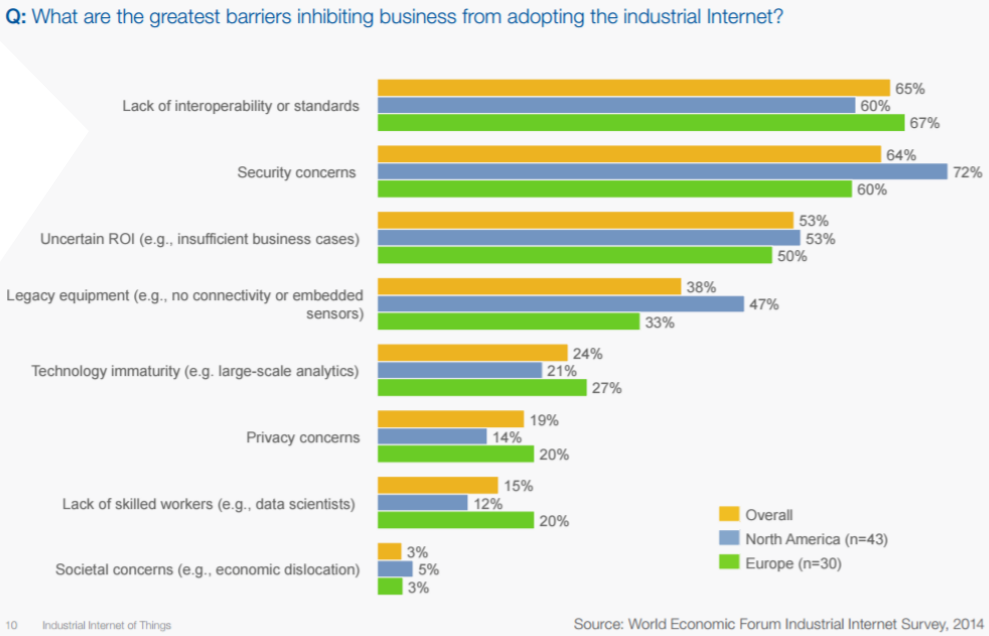
Brendan Bell, TransCanada

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



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 (Shodan.io)

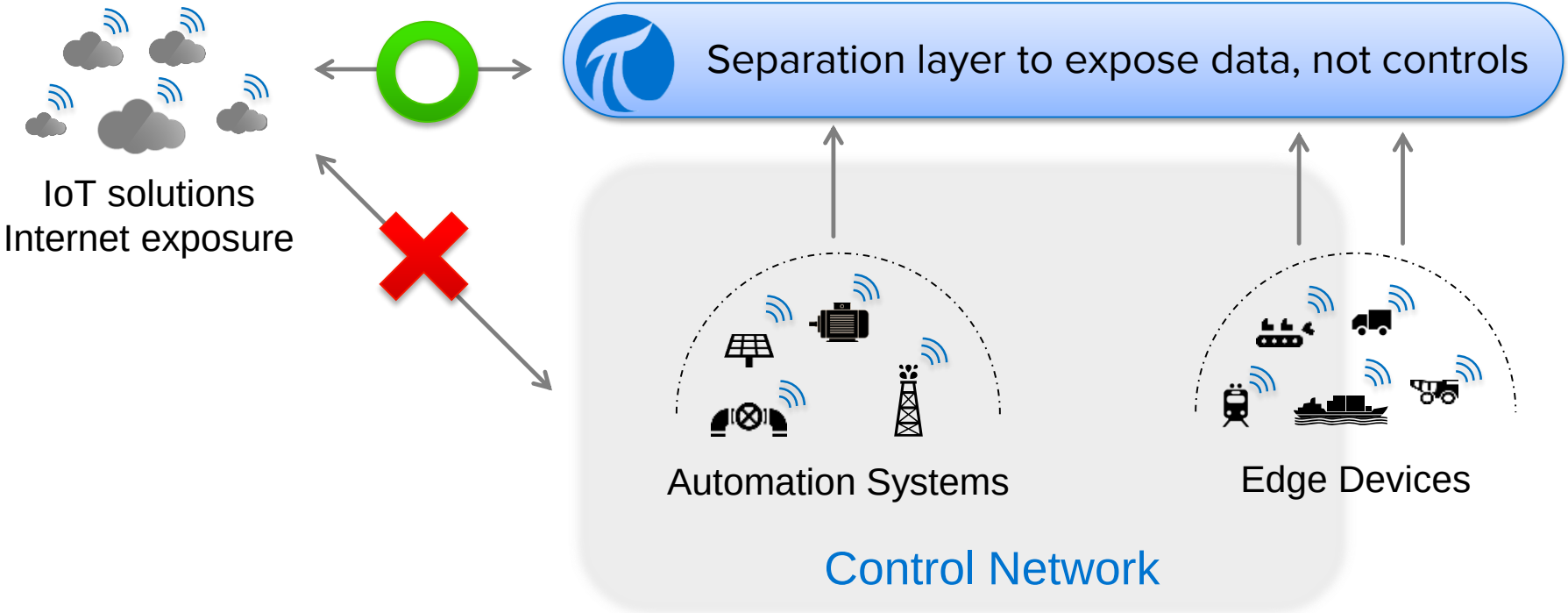
Many IIoT Devices Are Still Climbing the Internet Security Ladder

Industry 4.0 / IIoT Security Function	**Short Life Sensor** (Fitbit)	**Long Life Sensor** (Industrial)	**Sensor Gateway**	**Control**	**Control Gateway**
Health Telemetry					
Network Defenses					
End to End Identification					
Device Administration					
Data Integrity (anti-tampering)					

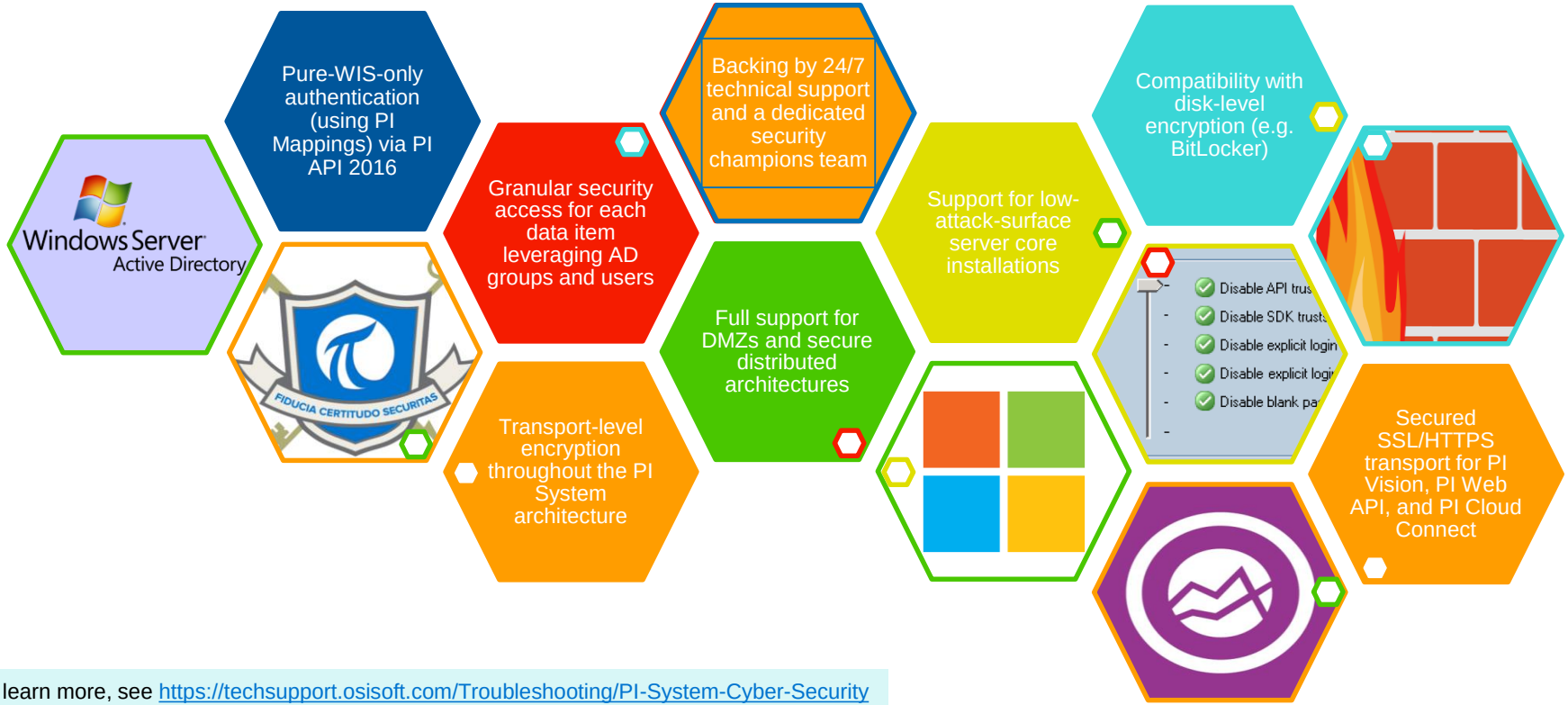
Many IIoT Devices Are Still Climbing the Internet Security Ladder

Industry 4.0 / IIoT Security Function	**Short Life Sensor** (Fitbit)	**Long Life Sensor** (Industrial)	**Sensor Gateway**	**Control**	**Control Gateway**
Health Telemetry					
Network Defenses					
End to End Identification					
Device Administration	Today: many still use defaults!				
Data Integrity (anti-tampering)					

Protecting the Control Network is More Important Than Ever



The Modern PI System is More Secure than Ever



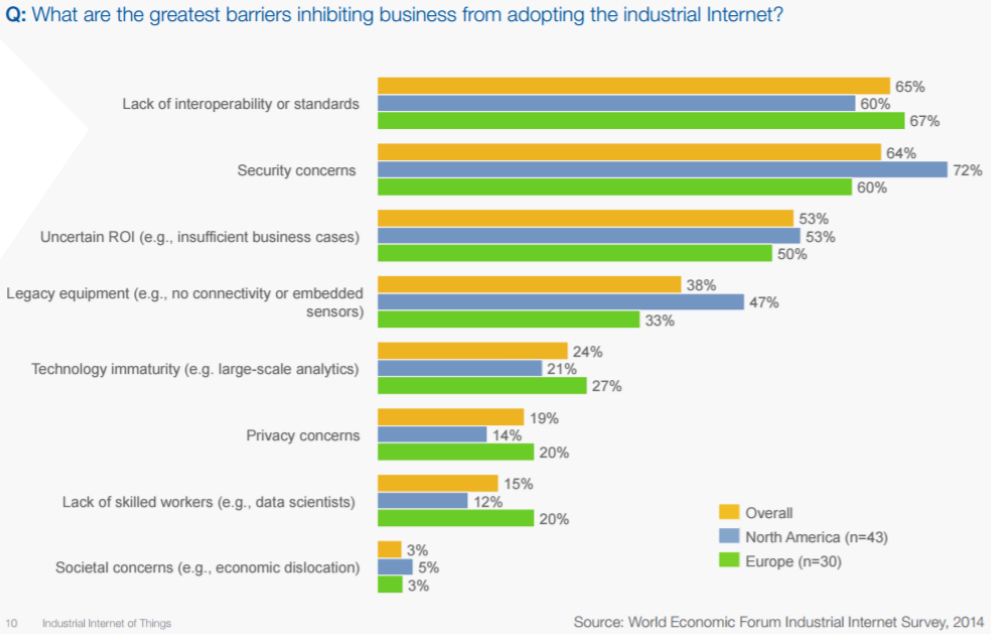
To learn more, see https://techsupport.osisoft.com/Troubleshooting/PI-System-Cyber-Security

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

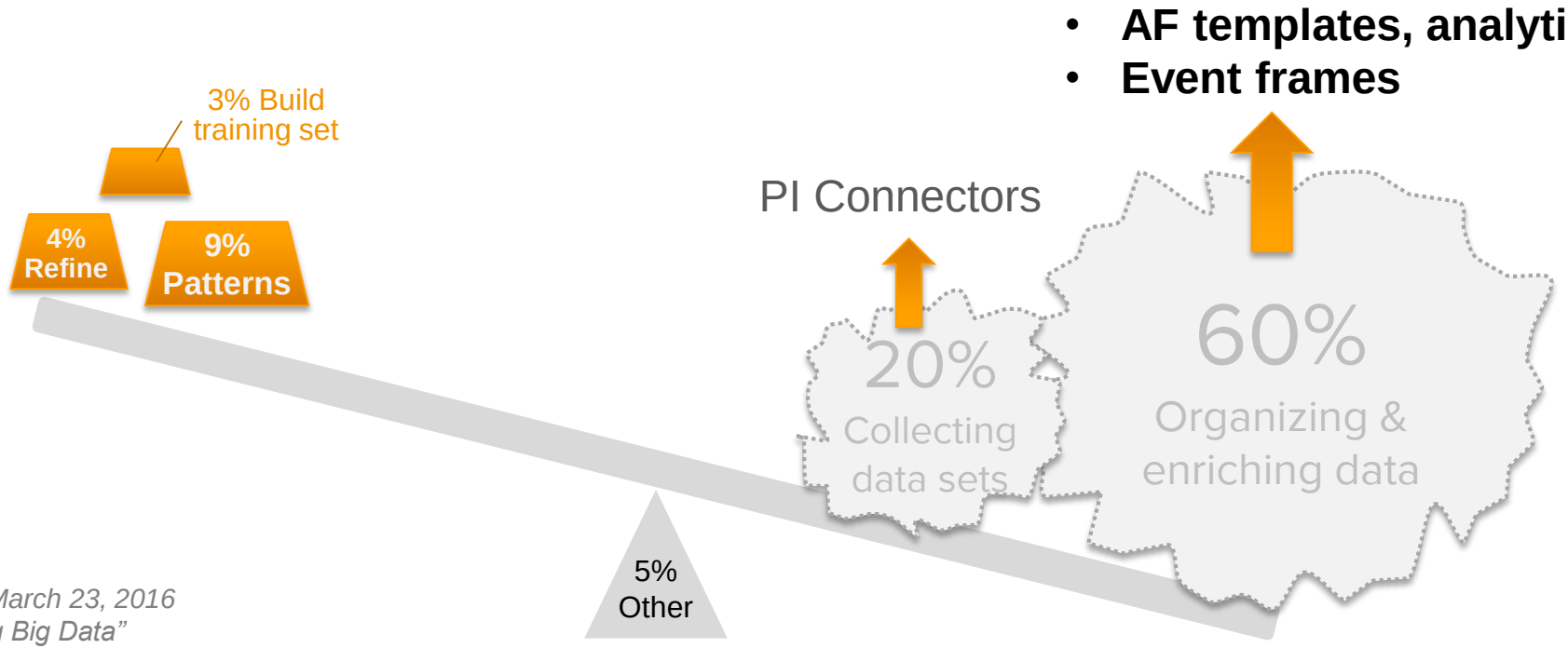
3. Uncertain ROI
   - Asset analytics, event frames, infrastructure approach



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

Forbes, March 23, 2016
"Cleaning Big Data"

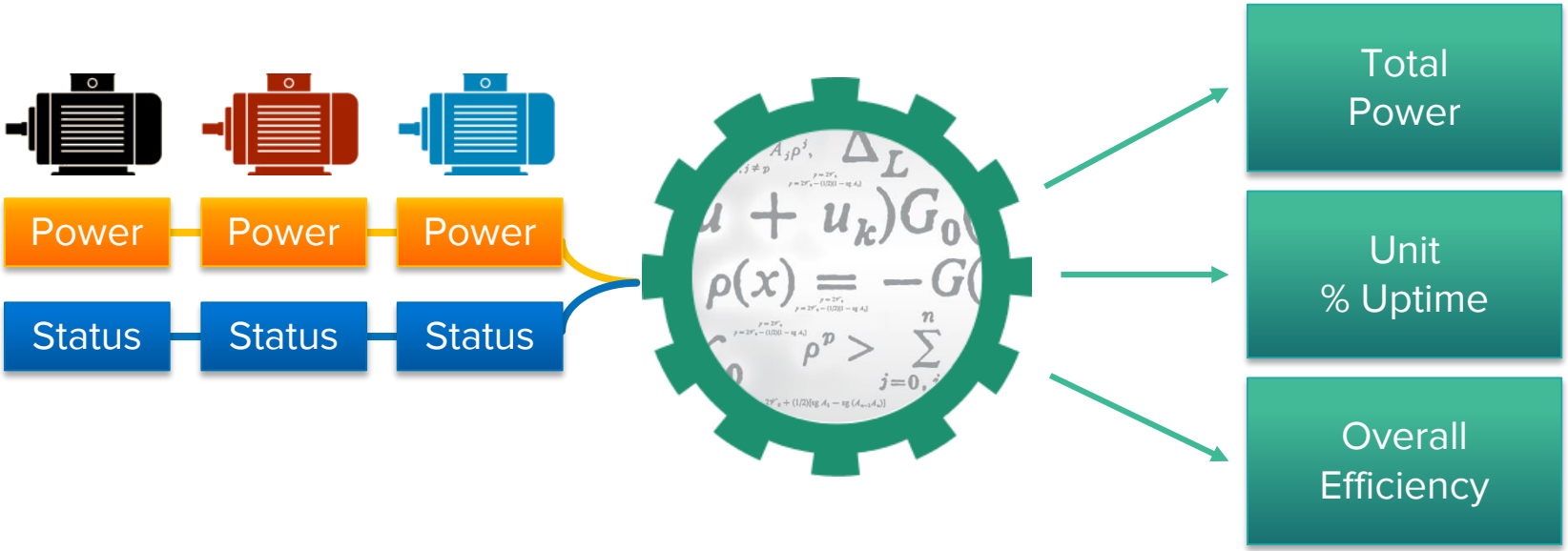
80% of the investment lost to data-prep **can be automated**



Forbes, March 23, 2016
"Cleaning Big Data"

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
Oil Flow Rate Rollup	
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

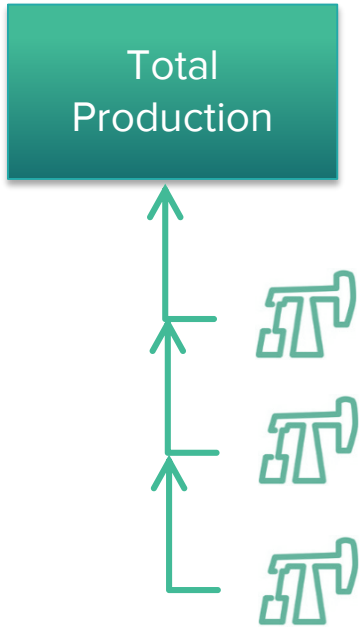
To select attributes set criteria below

Attribute Name: Oil Flow Rate

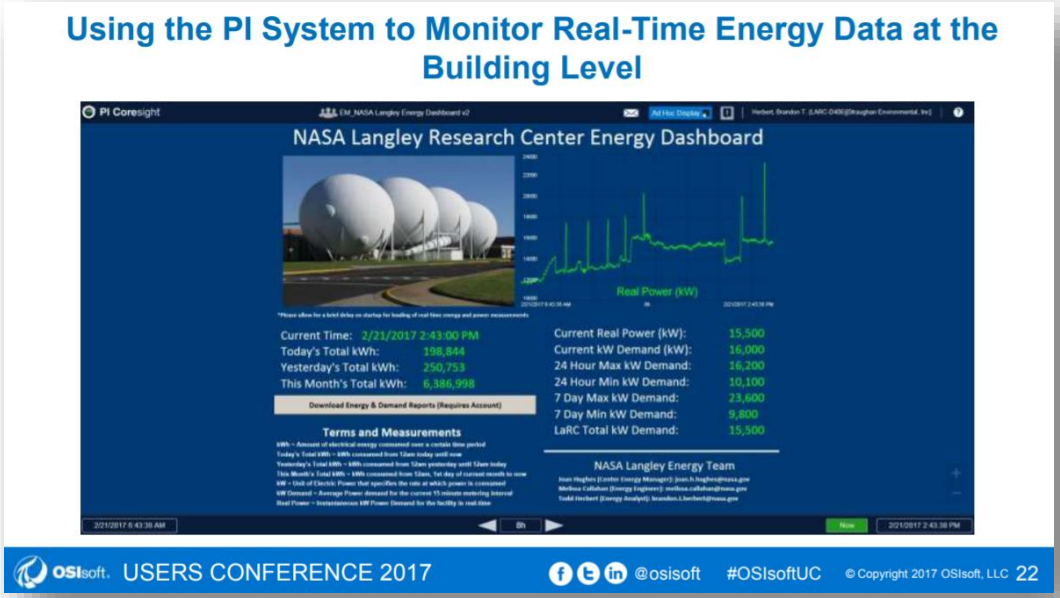
Attribute Category:

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



NASA Monitors Real-Time Facility Power Demand and Consumption

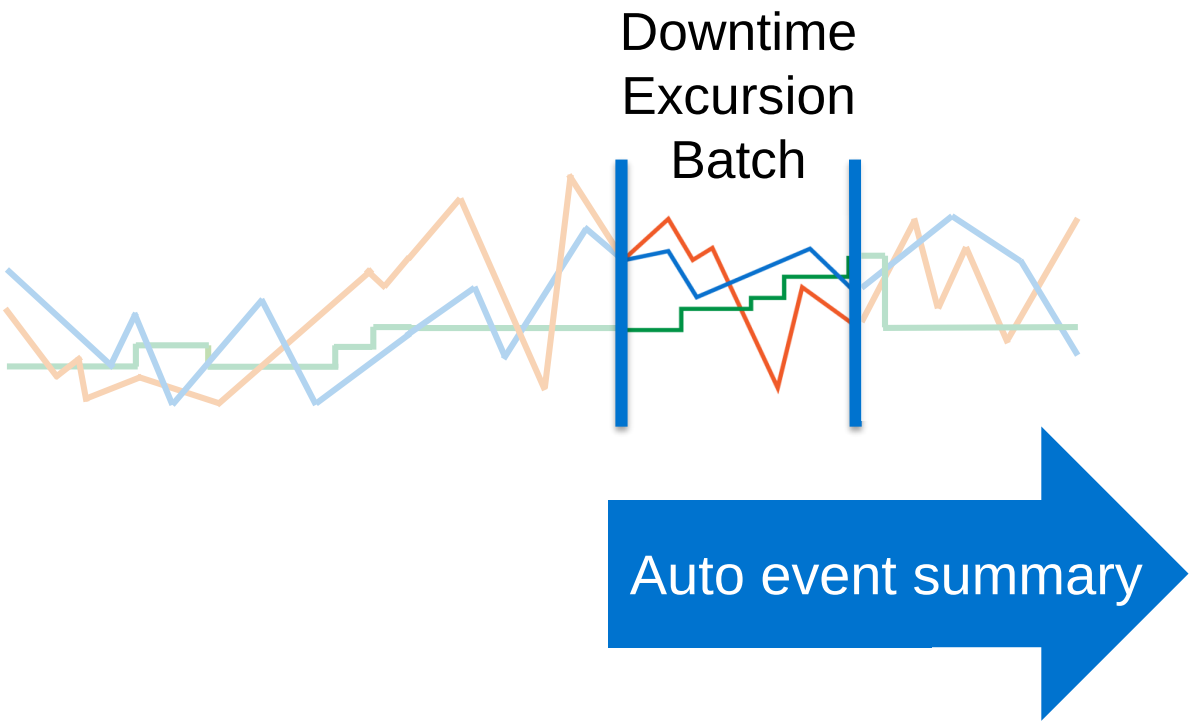


"I'm able to go into AF and make a bunch of calculated attributes.

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

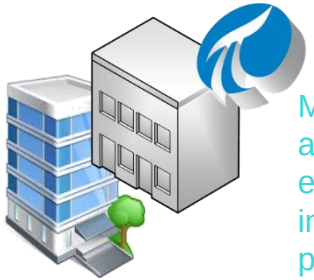
Event Frames: Out of Years of Data, Bookmark the One Minute that Matters



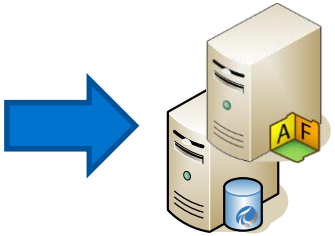
Event Attribute	Value
Name	Excur. 1215-002
Start	15-Dec-2013 10:35:02
End	15-Dec-2015 10:47:26
Asset	Boiler-352
Excursion Type	High Violation
Fuel Gas Flow.Avg	37.12 k sft3/h
myKPI.Max	47.19 bbl/d

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!

https://dfwebapp.osisoft.com/PIVision/#/Displays/192425/Fed

PI Vision - Federal Building ...

File Edit View Favorites Tools Help

OSIsoft PI Vision

New Display | OSI\dlopez

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

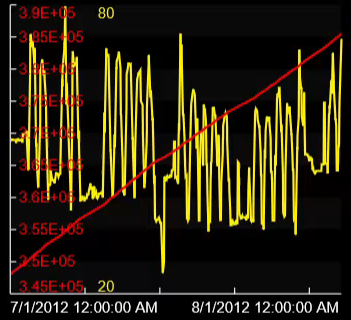
Ad Hoc Display

1E1|Element Name
1E1
8/1/2012 12:00:00 AM

1E1|Element Type
Building
8/1/2012 12:00:00 AM

1E1|Full Name
EAST Area Building 1E1
8/1/2012 12:00:00 AM

1E1|Area Code
EAST
8/1/2012 12:00:00 AM



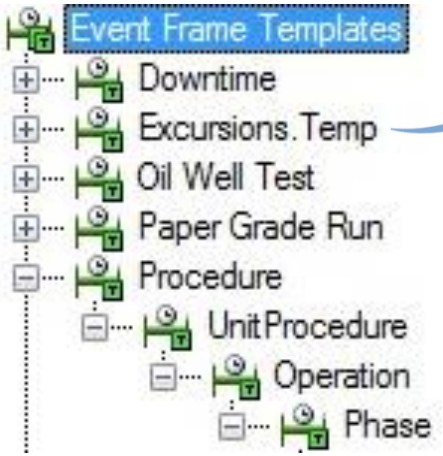
Active Energy Delivered
3.8552E+05 kWh
Calculated Hourly Energy Usage
72.969 kWh

Active Energy Delivered in Past 24 hours
1,341.7 kWh
Average Demand in Past 24 hours
55.905 kilowatt hours

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



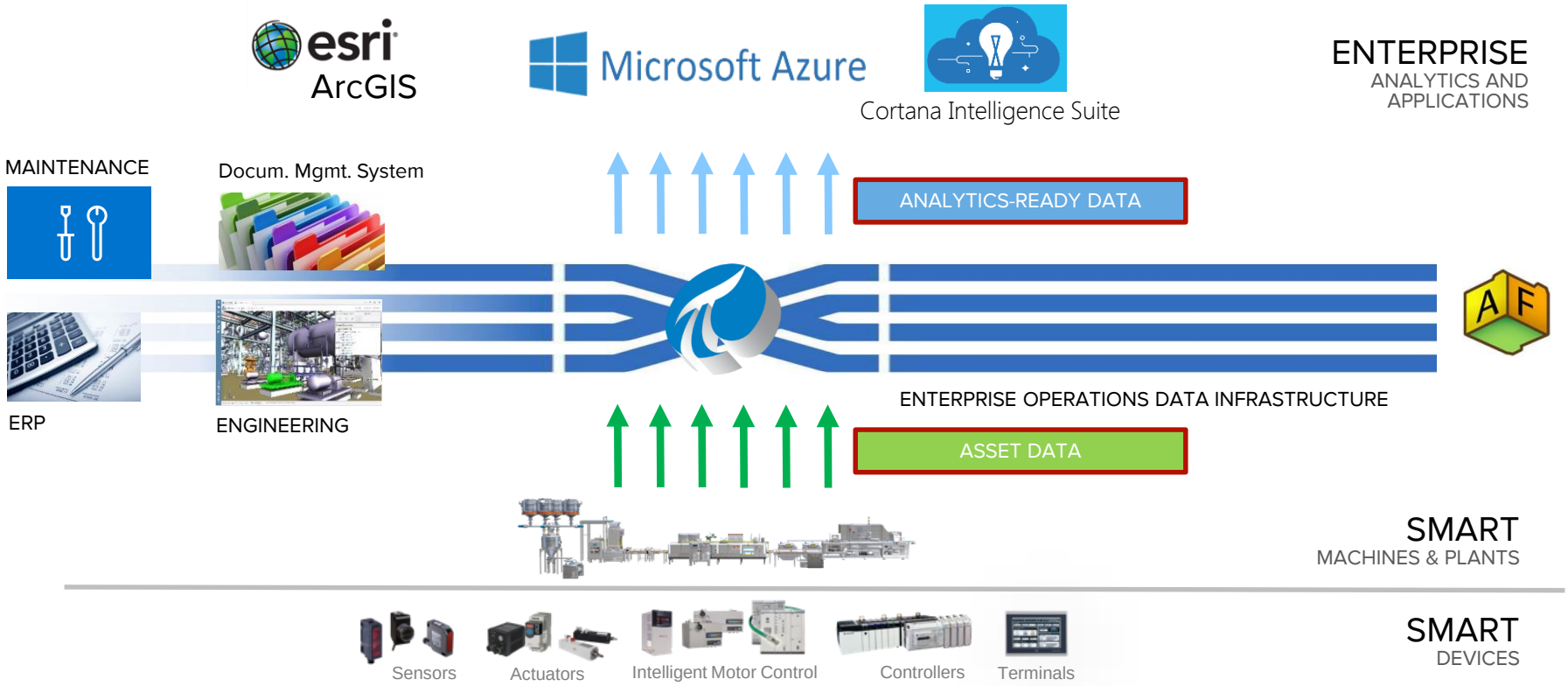
Name	Value
Category: General Info	
Comment	
Operator	Bobby Wolf
Phase	Dwell
Type	LOW TEMP
Category: Limits	
Temp.Limit.High	88 deg C
Temp.Limit.Low	70 deg C
Category: Manual Logger	
Comment	
Category: Process Parameters	
Level.Start	42.7438011169434 L
Temp.End	71.1539001464844 deg C
Temp.Max	71.1538998921712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

Text entries for filtering or grouping

Fields for **comments**

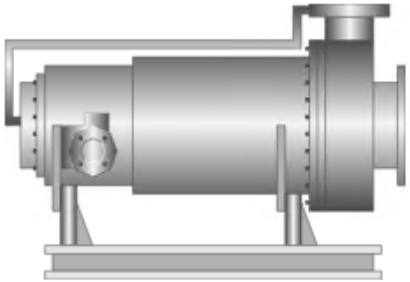
Calculated summaries like average, max, min

Infrastructure Improves ROI by Making Data Available for Multiple Projects



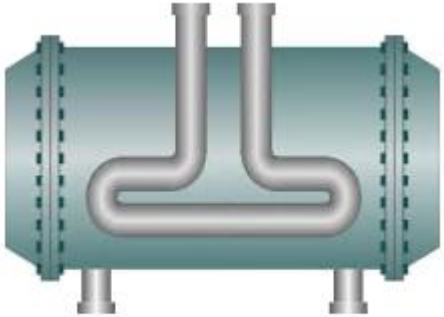
Missing Values from Control Systems

Pumps



Bearing Vibrations
Bearing Temperatures

Heat Exchangers



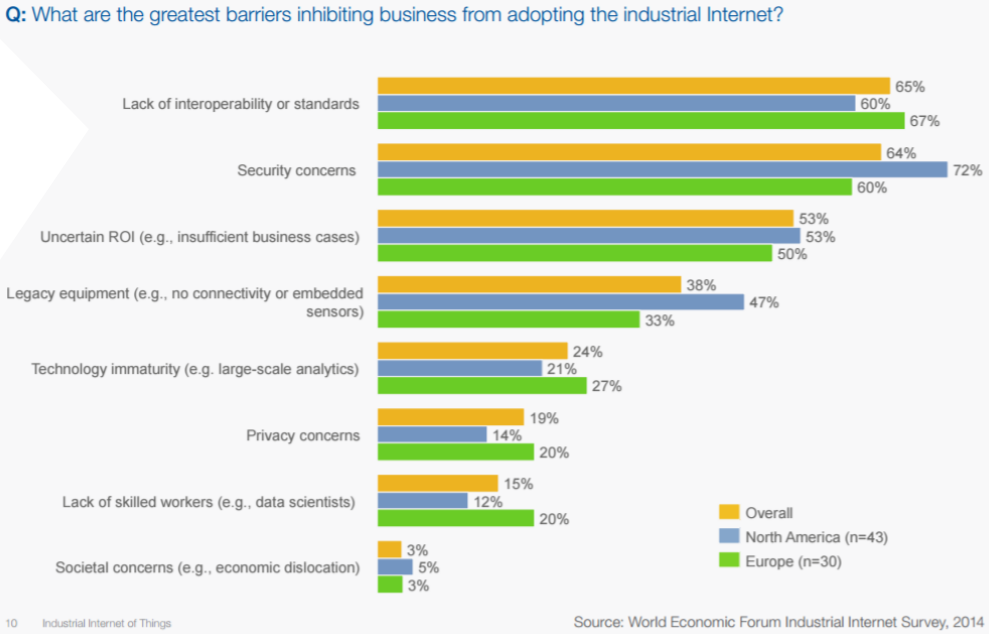
Heat Exchanger Temperature Inputs

Overcome Barriers Using the OSIsoft PI System

1. Lack of interoperability or standards
- Asset Framework

2. Security concerns
- Mitigation and best practices

3. Uncertain ROI
- Asset analytics, event frames, infrastructure approach



Contact Information

Ken Startz

Kstartz@osisoft.com

Services Delivery

OSIsoft

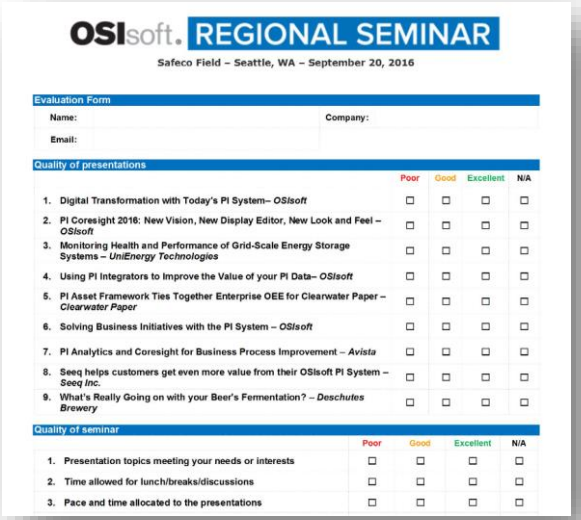
Questions

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*	☐	☐	☐	☐
2. PI Coresight 2016: New Vision, New Display Editor, New Look and Feel – *OSIsoft*	☐	☐	☐	☐
3. Monitoring Health and Performance of Grid-Scale Energy Storage Systems – *UniEnergy Technologies*	☐	☐	☐	☐
4. Using PI Integrators to Improve the Value of your PI Data– *OSIsoft*	☐	☐	☐	☐
5. PI Asset Framework Ties Together Enterprise OEE for Clearwater Paper – *Clearwater Paper*	☐	☐	☐	☐
6. Solving Business Initiatives with the PI System – *OSIsoft*	☐	☐	☐	☐
7. PI Analytics and Coresight for Business Process Improvement – *Avista*	☐	☐	☐	☐
8. Seeq helps customers get even more value from their OSIsoft PI System – *Seeq Inc.*	☐	☐	☐	☐
9. What's Really Going on with your Beer's Fermentation? – *Deschutes Brewery*	☐	☐	☐	☐

Quality of seminar

	Poor	Good	Excellent	N/A
1. Presentation topics meeting your needs or interests	☐	☐	☐	☐
2. Time allowed for lunch/breaks/discussions	☐	☐	☐	☐
3. Pace and time allocated to the presentations	☐	☐	☐	☐

감사합니다

Danke

谢谢

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado