BERLIN · SEPT 26-29 · GERMANY

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BERLIN, GERMANY · SEPT 26-29, 2016

Getting started with Industry 4.0 and the PI System

Presented by **Chris Felts, Sr. Product Manager**

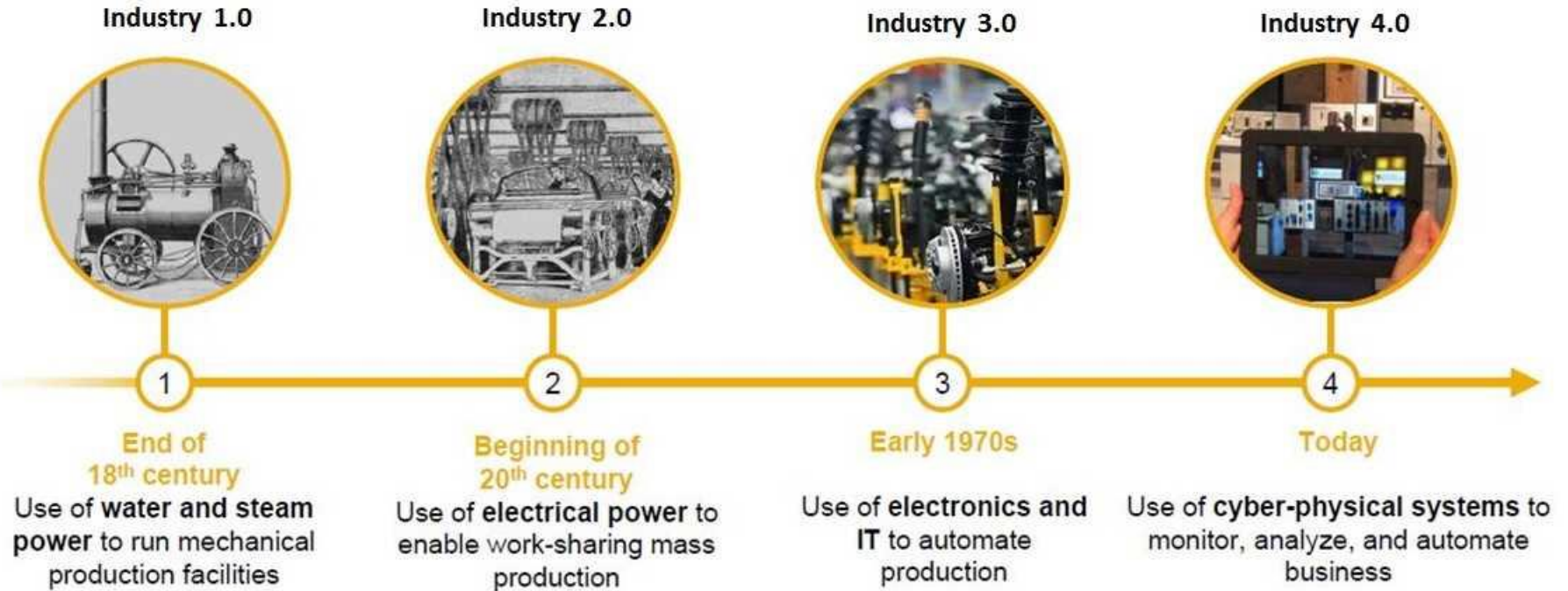**Christian Leroux, System Engineering**

Agenda

- Industry 4.0 Overview
- IIoT Overview
- What is OSIsoft doing for IIoT?
- IIoT Architecture
- IIoT Deployment examples
- Getting started
- Roadmap

Industry 4.0 Overview

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What is Industry 4.0?

Industry 1.0	Industry 2.0	Industry 3.0	Industry 4.0
End of 18th century	**Beginning of 20th century**	**Early 1970s**	**Today**
Use of **water and steam power** to run mechanical production facilities	Use of **electrical power** to enable work-sharing mass production	Use of **electronics and IT** to automate production	Use of **cyber-physical systems** to monitor, analyze, and automate business

Technologies Driving Industry 4.0

- Autonomous robots
- Simulation
- Horizontal and vertical system integration
- The IIoT
- Cybersecurity
- The cloud
- Additive manufacturing
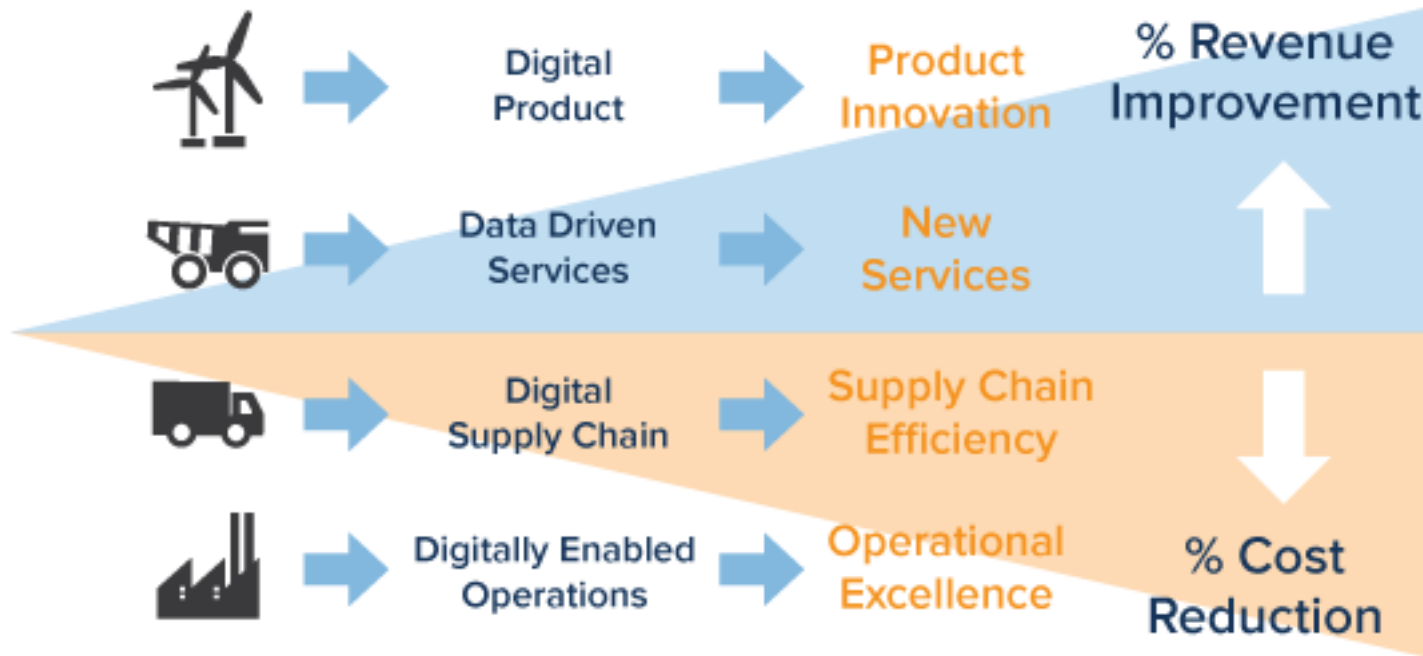- Augmented reality
- Big data analytics
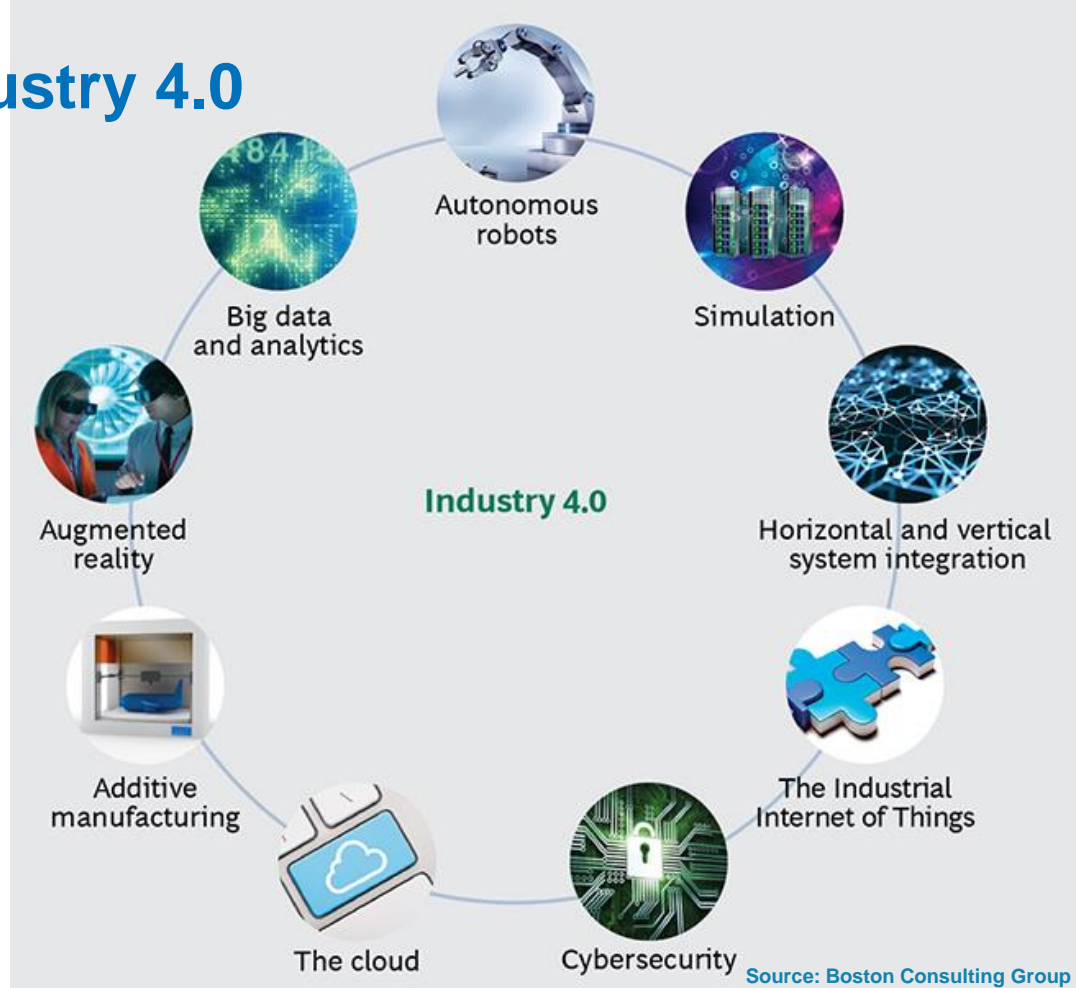
Source: Boston Consulting Group

OSIsoft and Industry 4.0

1 Real-time connectivity and monitoring

2 Analytics ready historical data

3 Open access to real-time and historical data
   for reality development

4 Cloud based data exchange and Web based connectivity

5 Three decades of hardening against security threats

6 End to end connectivity from edge devices to
   analytics applications

7 450+ options for real-time, historical, and transactional
   data connectivity

8 Seamless data transfer between on-line and off-line
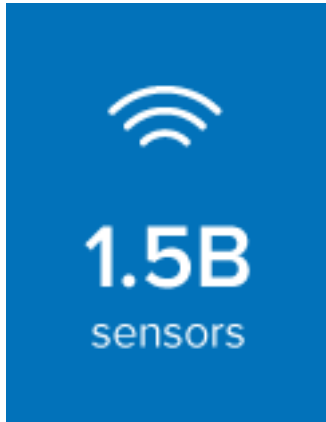   systems and asset analytics

Autonomous robots

1*

2 Big Data Analysis

3 Augmented Reality

4 The cloud

5 Cybersecurity

6 The Industrial Internet of Things

7 Horizontal and vertical system integration

8 Simulation

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The Industry 4.0 Digital Transformation

OSIsoft: Your Industry 4.0 Partner

35+ years	1.5B sensors	19,000 sites	127 countries	1300 case studies	65% of Industrial Fortune 500	2x employees in last 6 years

Oil & Gas	Power & Utilities	Chemicals	Life Sciences	Metals & Mining	Pulp & Paper
95% of top 60 companies	1000 of the world's leading companies	37/50 of the world's largest companies	9/10 of top pharma companies	100% of Fortune 500 companies	400+ sites

IIoT Overview

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OSIsoft and IIoT

1.5B sensors

450+ interfaces

What is Different About IIoT?

Traditional PI System data pattern
A few large "pipes" to system level data
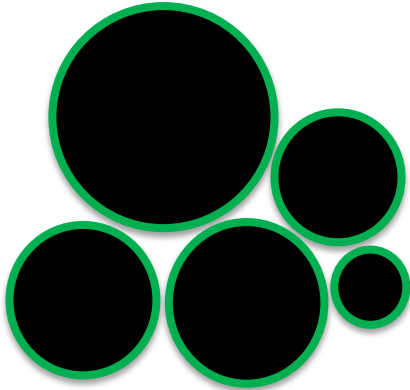
IIoT data pattern
Many small "pipes" to device level data
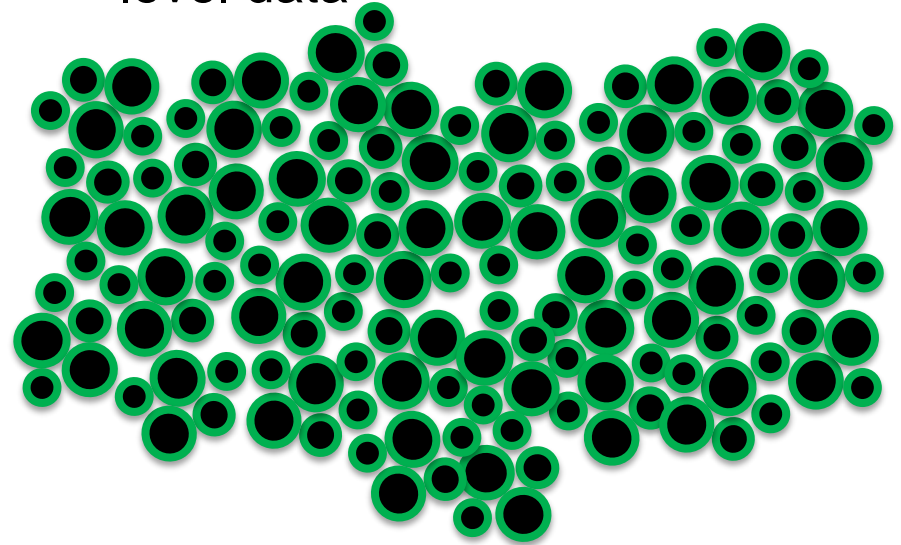
PI System Environment for IIoT

Hybrid of traditional PI System and IIoT data patterns

A few large "pipes" to system level data and many small pipes to device level data
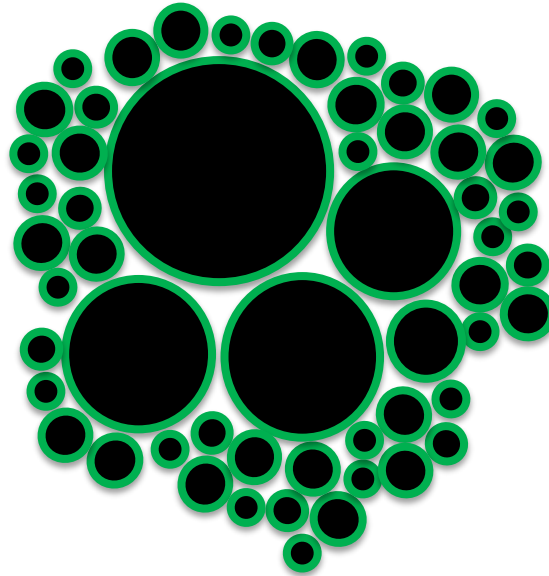
Typical IIoT Data Patterns

- Low cost sensors and pervasive networking enable
  - Increased insights into the monitoring and maintenance of existing assets
  - Visibility into remote, mobile, and/or geo-dispersed processes and assets
  - New, richly instrumented assets with improved efficiencies and lifecycles
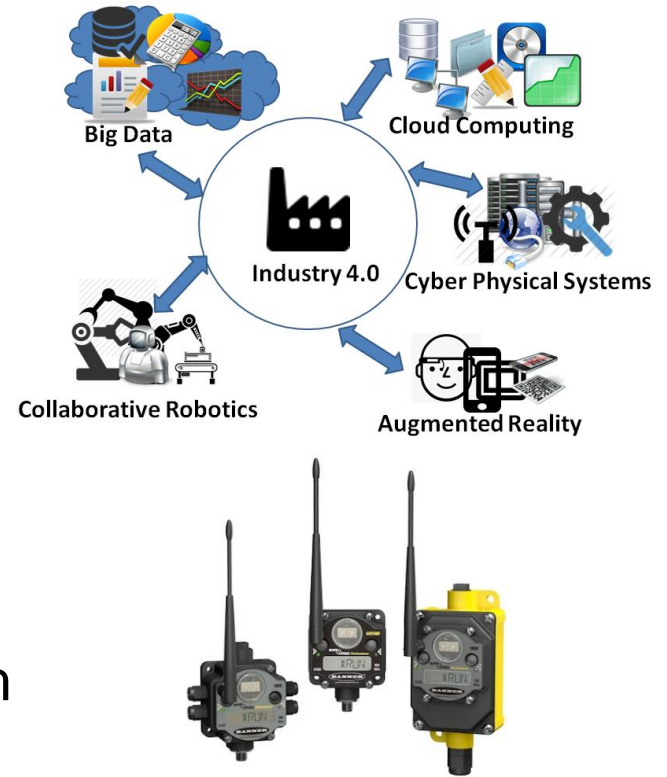
Industry Challenges of IIoT

- **Many sensors**
- **New protocols**
- **Various operating systems**
- Network bandwidth
- Data quality
- Software updates

- **Security**
- Data privacy
- **Data silos**
- **Evolving landscape**
- **Too much data**

How to Address the IIoT Industry Challenges

- Sensors aggregated in a gateway
- Embedded PI connectors
- The OSIsoft Message Format (OMF)
- PI System data infrastructure
- PI Integrators
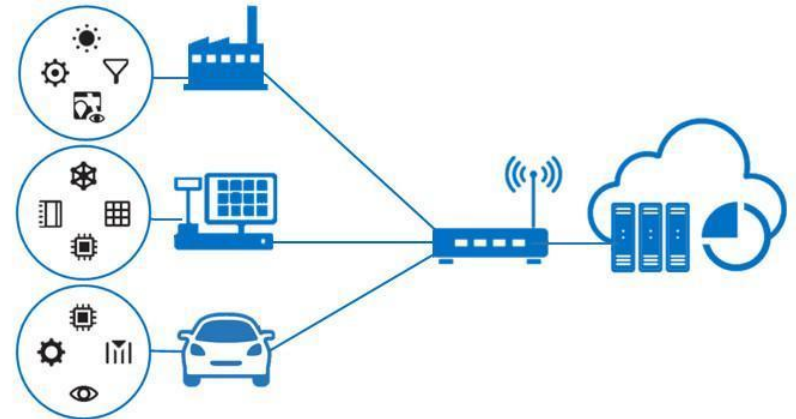
What is OSIsoft doing for IIoT?

OSIsoft

What is OSIsoft doing for IIoT?

- PI Connector Relay
- Embedded PI Connectors
- OSIsoft Message Format (OMF)

PI Connector Relay

- Acts as a gateway
- Increases endpoint visibility from remote data sources
- Separates the data collection mechanism from the data ingress process into the PI System

Edge   DMZ or Destination   Destination

Certificates   WIS
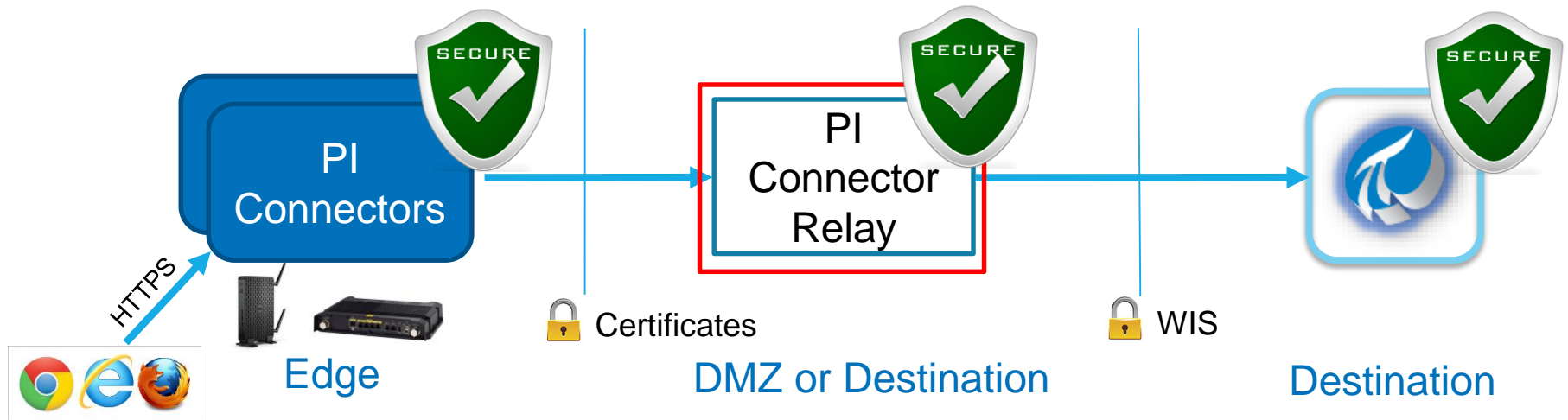
Embedded PI Connectors

- PI Connector for Modbus (embedded)
- Cisco IR8x9 Integrated Services Router is first example

PI Connector

PI Connector Relay

🔒 Certificates

🔒 WIS
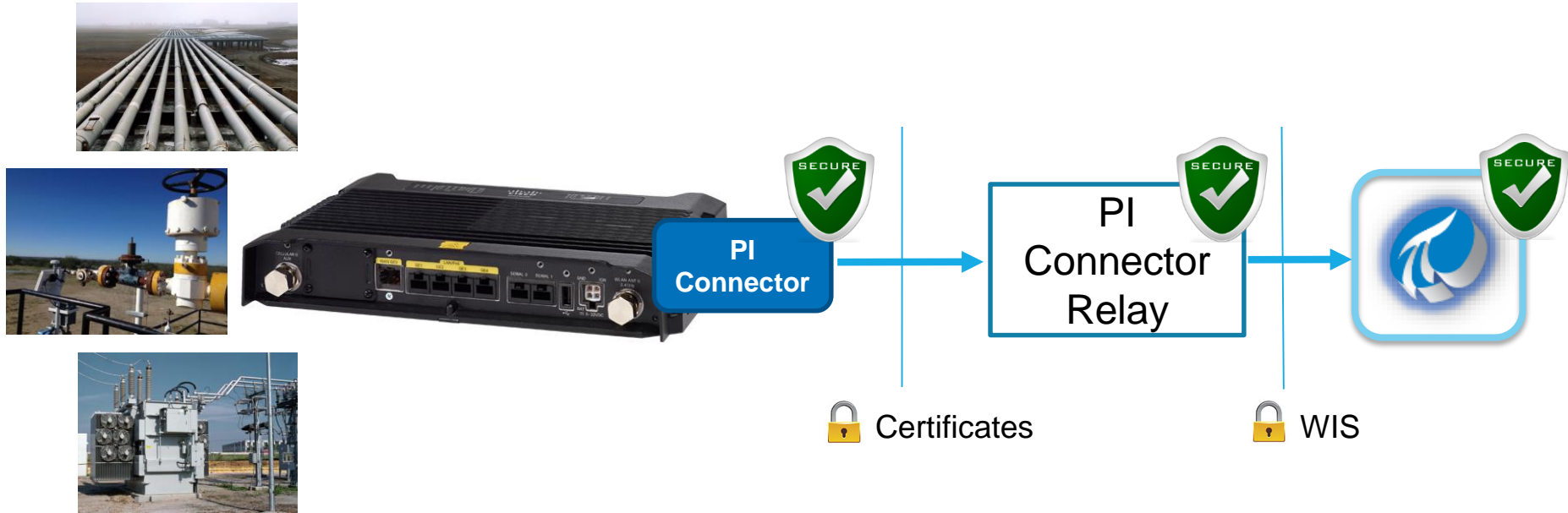
OSIsoft Message Format (OMF)

- Message headers and bodies specification
- Develop data acquisition on platforms and languages not supported by PI System libraries
- Leveraging OSIsoft Partners Community!

Header

```
producertoken = b7CNvN36cq
version = 0.9.0.0
messagetype = values
action = create
messageformat = json
```

Body

```
"streamId": "Building1TankMeasurements",
"values": [
{ "Time": "2015-12-31T22:33:39.069083Z", "Pressure": 25.4, "Temperature": 120.542 },
{ "Time": "2015-12-31T22:33:39.069083Z", "Pressure": 25.4, "Temperature": 120.542 },
{ "Time": "2015-12-31T22:33:39.069083Z", "Pressure": 25.4, "Temperature": 120.542 },
{ "Time": "2015-12-31T22:33:39.069083Z", "Pressure": 25.4, "Temperature": 120.542 }
]
```

http://omf-docs.osisoft.com/en/latest/

PI System data ingress options
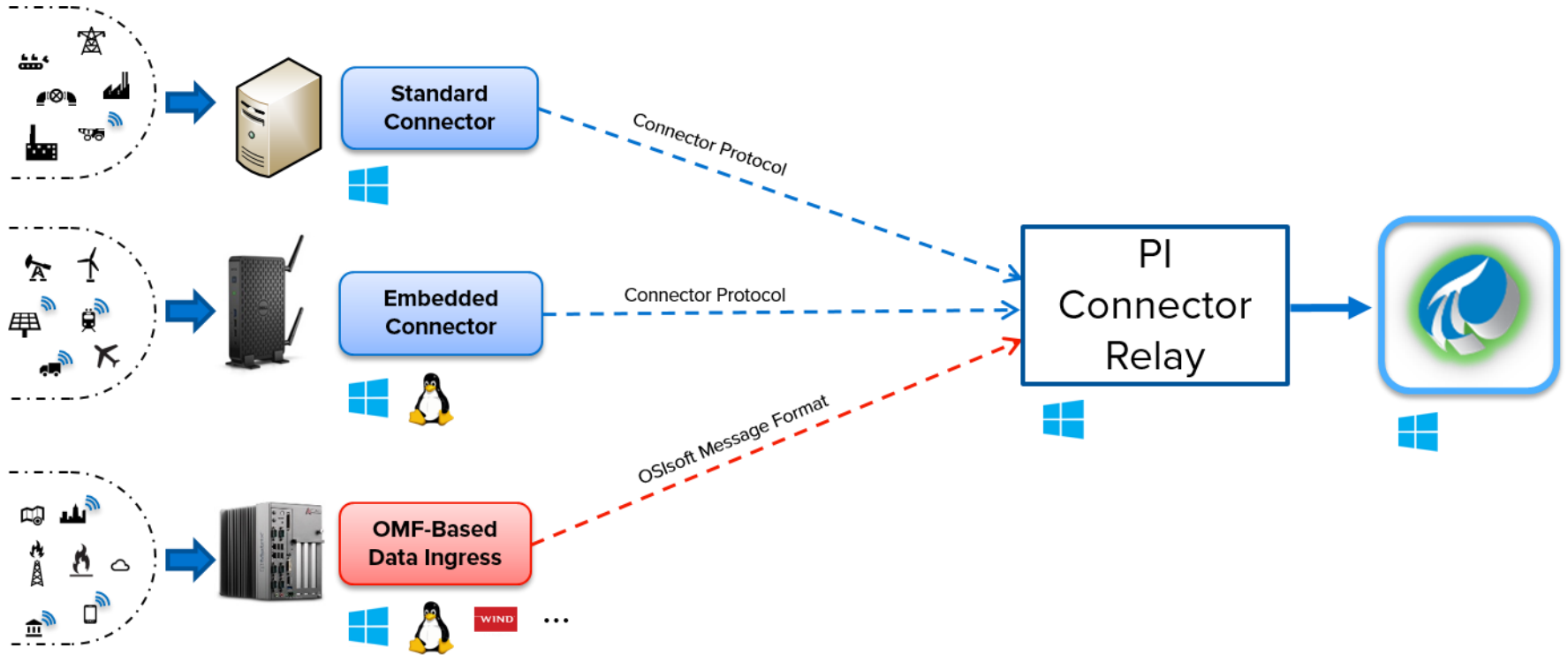
IIoT Architecture

PI System Architecture (typical)
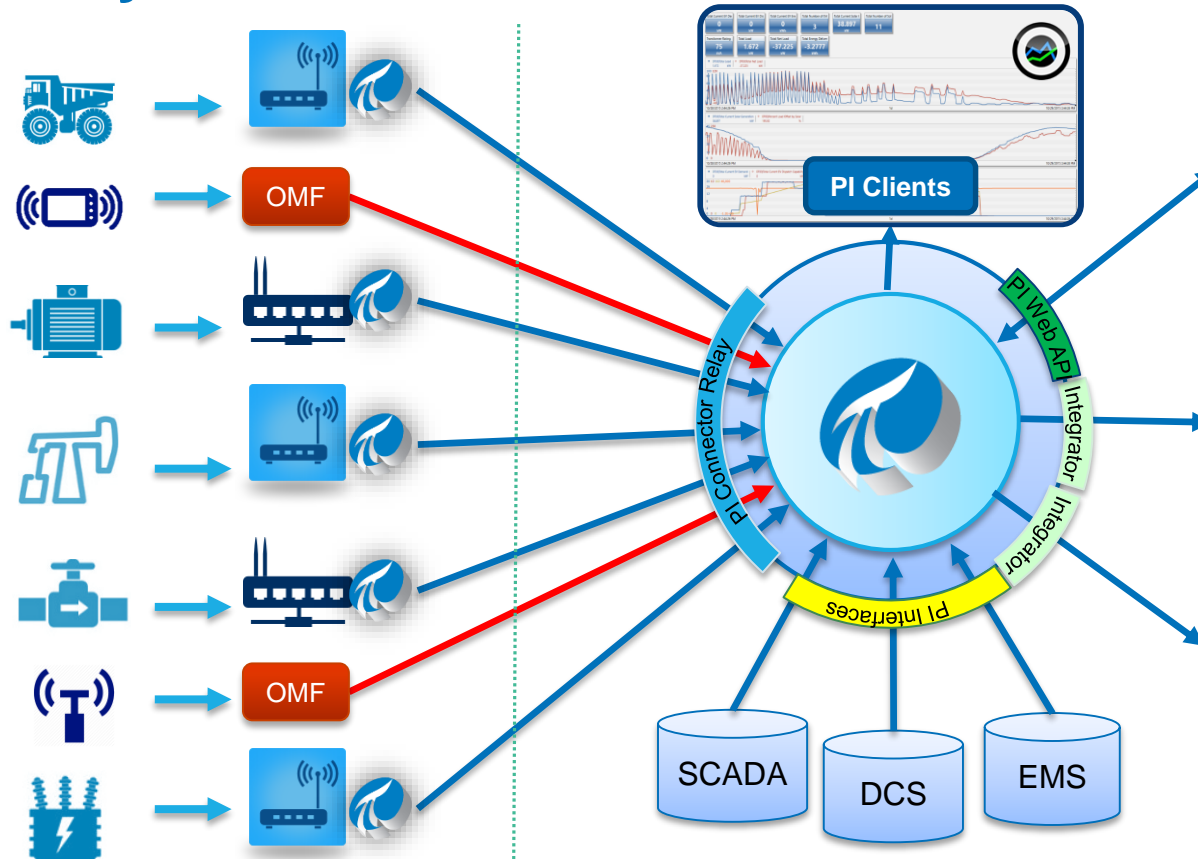
Custom Applications
Cloud or On Premises

Essential Asset Monitoring

Condition Based Maintenance
…

PI Clients

PI Web API

PI Interfaces

SCADA

DCS

EMS

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PI System IIoT Architecture

Custom Applications
Cloud or On Premises
Essential Asset Monitoring
Condition Based Maintenance
…

PI Clients

PI Connector Relay

PI Web API

PI Interfaces

OMF

SCADA

DCS

EMS

PI System IIoT Architecture

Custom Applications
Cloud or On Premises
Essential Asset Monitoring
Condition Based Maintenance
…

Visual Analytics

Statistical Analytics

PI Clients

PI Connector Relay
PI Web API
Integrator
Integrator
PI Interfaces

OMF
OMF

SCADA
DCS
EMS

IIoT Deployment Examples

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Port of San Diego

- PI Interface for HTML
- PI Connector for UFL
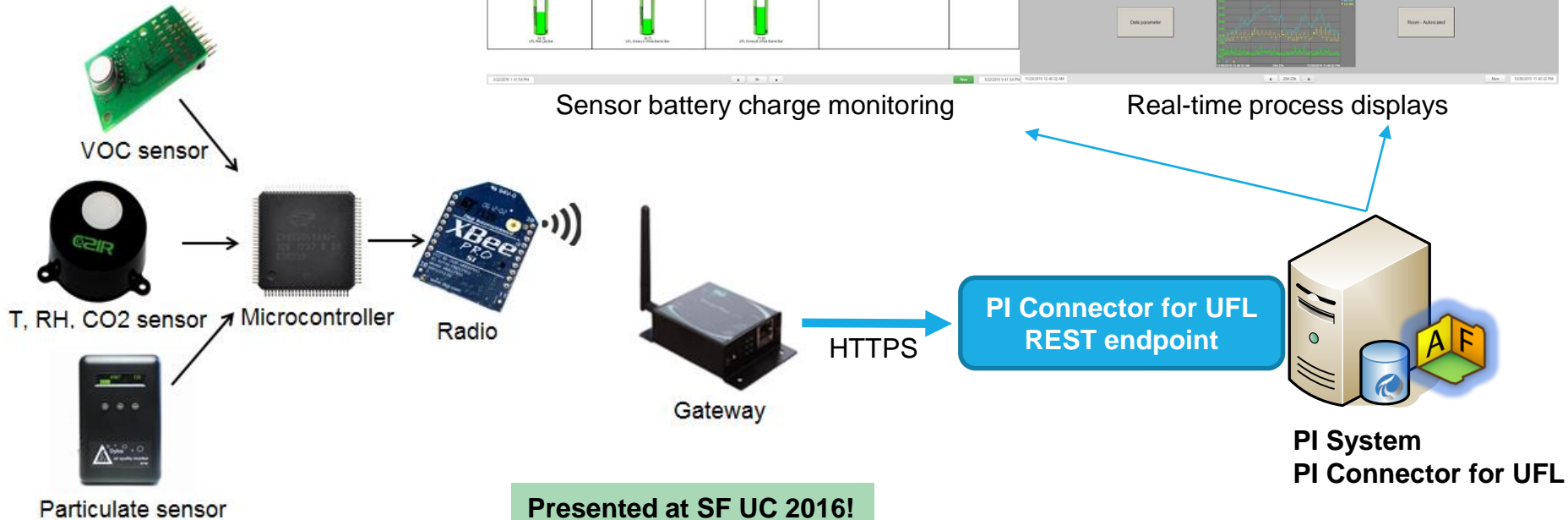- PI Web API
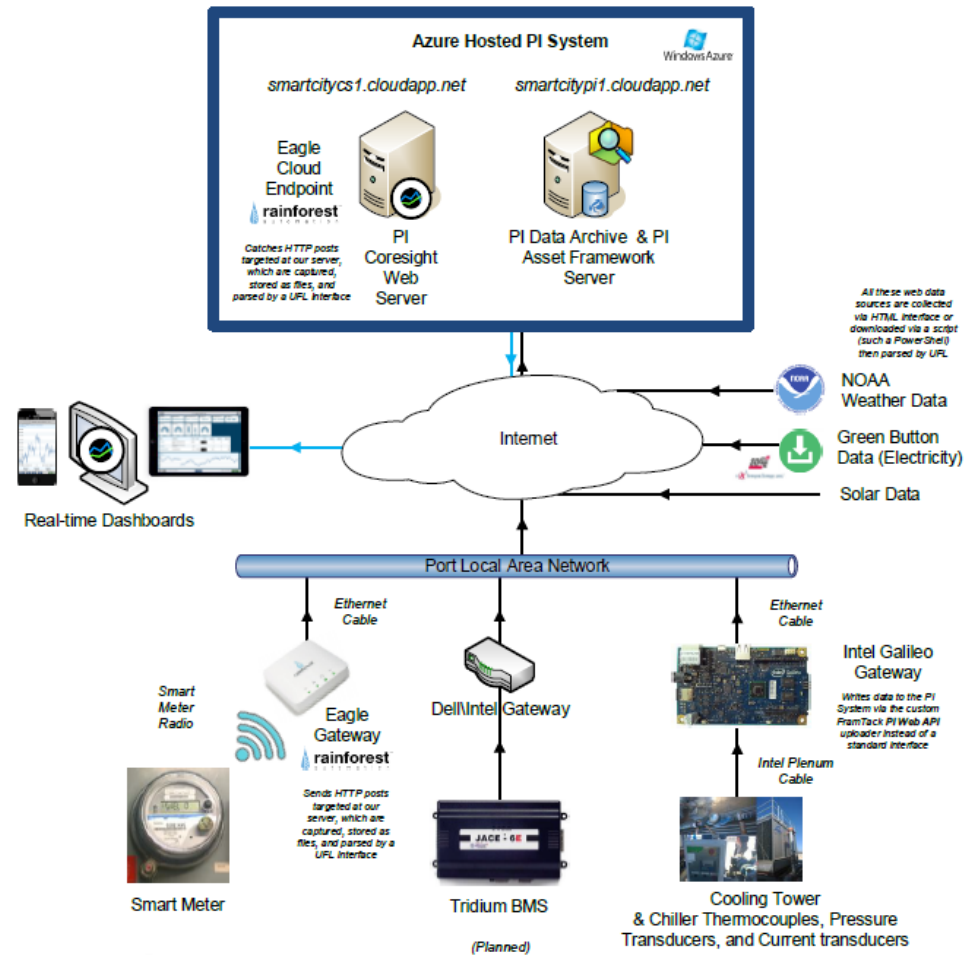
Facility Power Distribution Monitoring

- PI Interface for BACnet
- PI Interface for Modbus
- PI Connector for UFL

Dent PowerScout

Electrical Distribution Panel

Modbus

PI System - UFL Interface

BACnet™

ZigBee®

Visconics Thermostat

Edge 5000 Gateway

Digi Smart Socket

Steam Trap Monitoring

Remote Process Plant

Ethernet

Smart Wireless Gateway

Wireless Mesh Network

Acoustic Transmitters

Cellular Network

Microsoft Azure Cloud

Raw Acoustic Data

PI HART IP Connector

PI Server

Steam Trap Analytics

Internet

Remote Monitoring Applications

Indoor Air Quality Monitoring

Sensor battery charge monitoring

Real-time process displays

VOC sensor

T, RH, CO2 sensor → Microcontroller → Radio

Particulate sensor

Gateway

HTTPS

PI Connector for UFL REST endpoint

**PI System
PI Connector for UFL**

Presented at SF UC 2016!

Transmission Line Monitoring

HTTPS

PI WebAPI REST endpoint

**PI System
PI WebAPI**
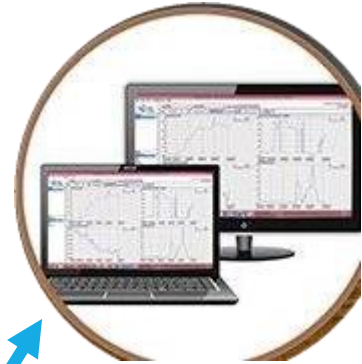
IIoT Gateway Examples

Monico
(PI Server connectivity - OMF)

Dell
(complete PI System)

HPE
(complete PI System)

Cisco
(PI Server connectivity – Embedded Connector)

Stratus IoT Solutions
(PI Server connectivity – OMF)

Intel / ODM
(PI Server connectivity - TBD)

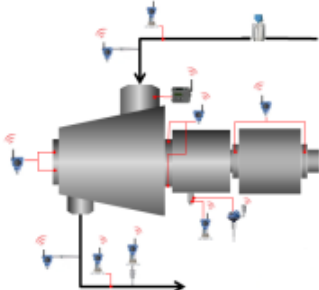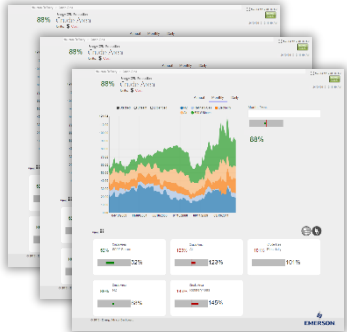# Getting Started

IIoT Opportunities
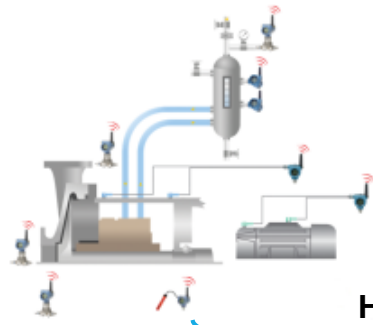
Pumps
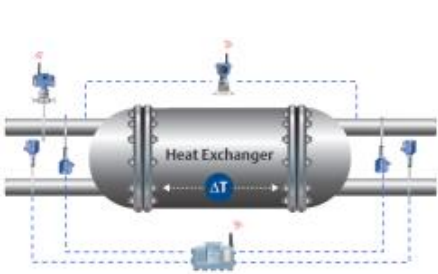
Heat Exchangers
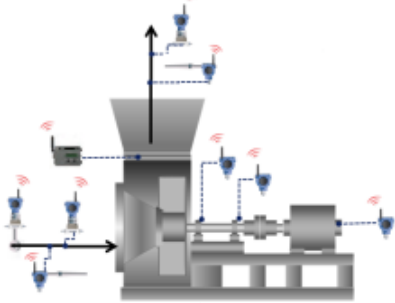
Blowers
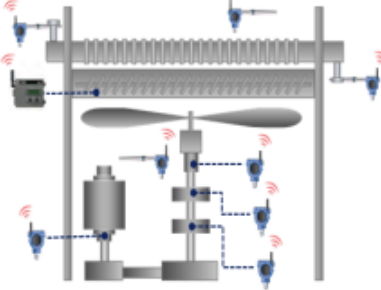
Air-Cooled Heat Exchangers
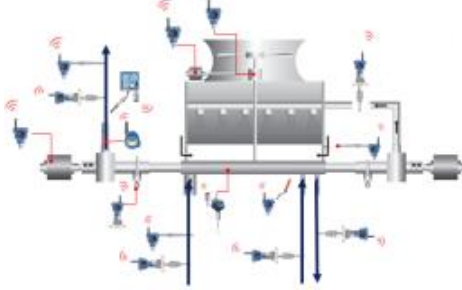
Cooling Towers
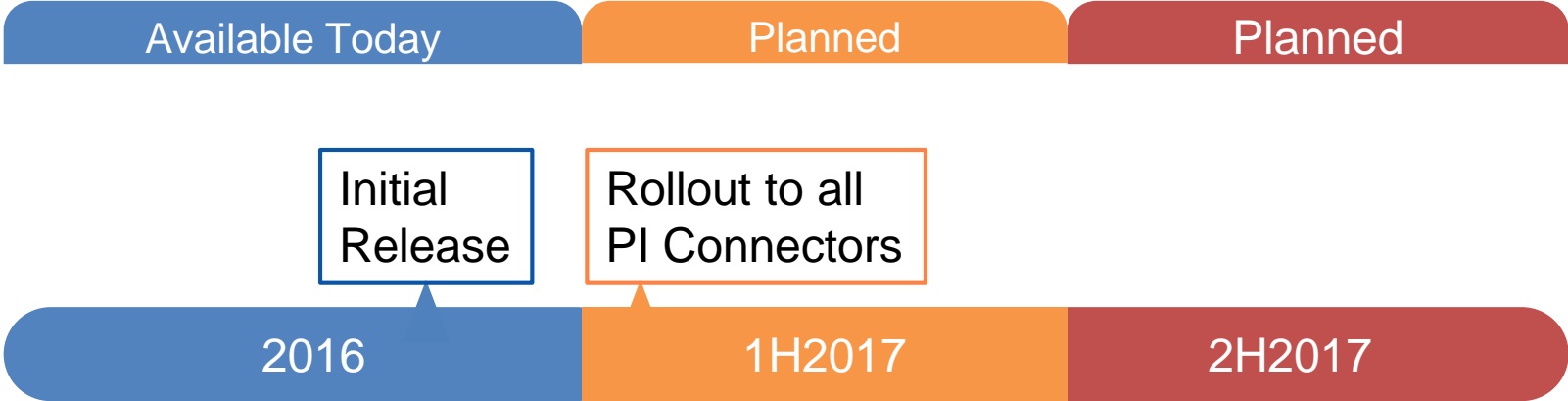
Compressors

Roadmap

Roadmap

PI Connector Relay

Available Today	Planned	Planned
Initial Release	Rollout to all PI Connectors	
2016	1H2017	2H2017

For More Information

OSIsoft IIoT microsite!

http://www.osisoft.com/enterprise-intelligence/iiot.html

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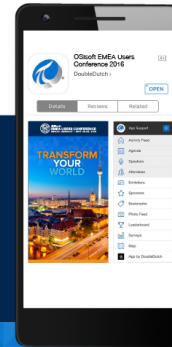System Engineering

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谢谢

Danke

Gracias

Merci

Thank You

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