OSIsoft IIoT Overview
Chicago Regional Seminar 2016

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September 21, 2016
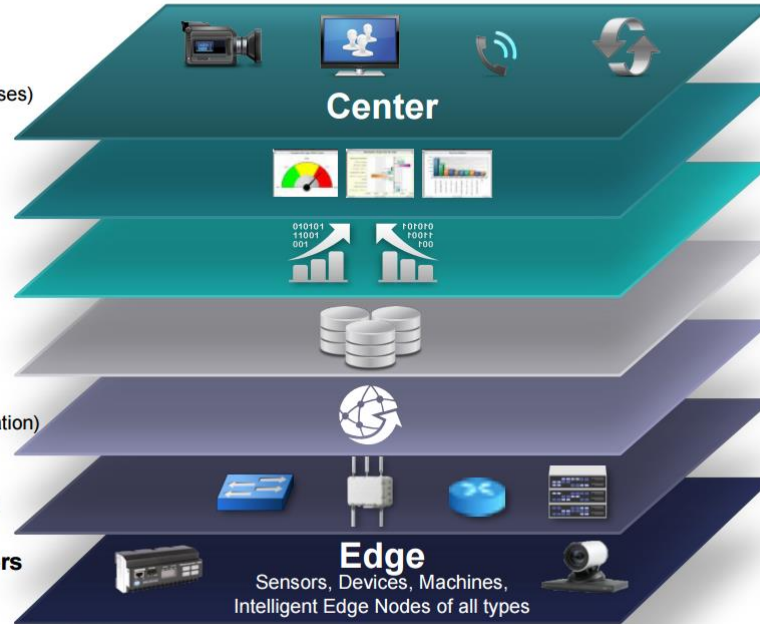
IIoT Reference Architecture

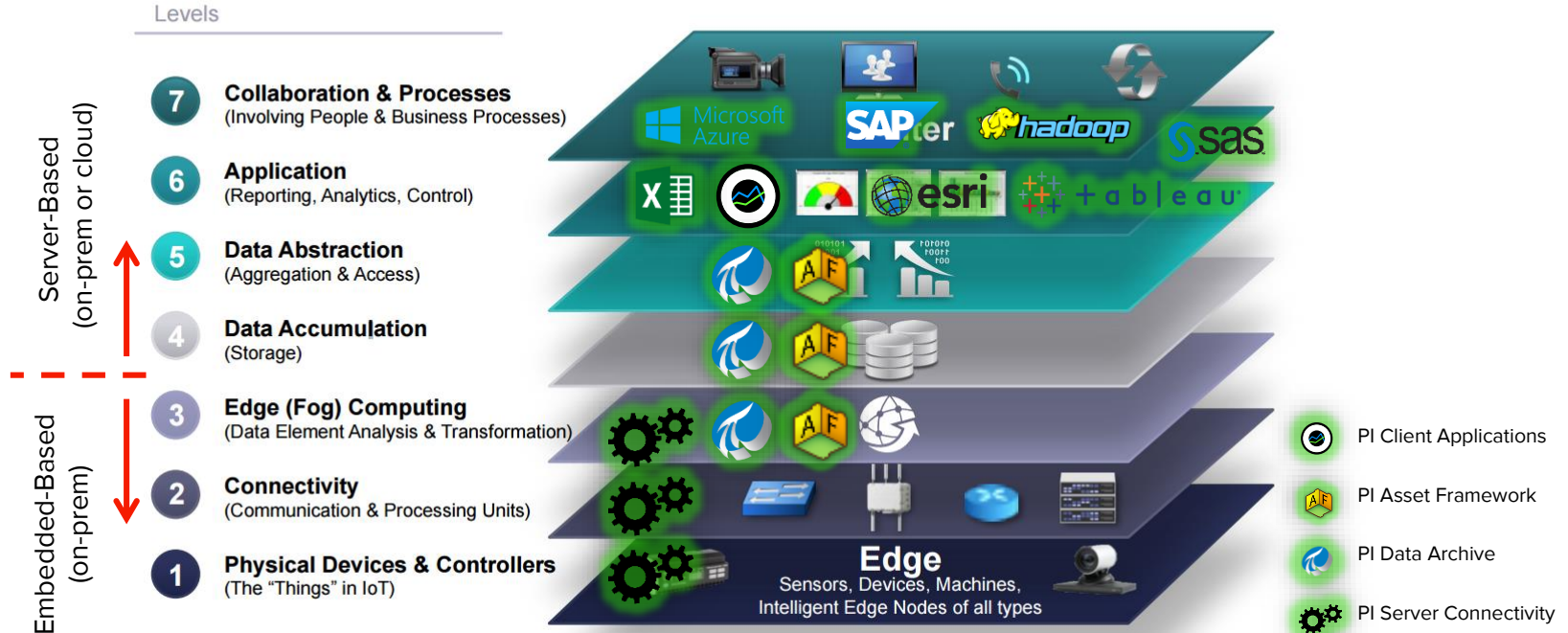## Internet of Things Reference Model

Levels

7	**Collaboration & Processes** (Involving People & Business Processes)	**Center**
6	**Application** (Reporting, Analytics, Control)	
5	**Data Abstraction** (Aggregation & Access)	
4	**Data Accumulation** (Storage)	
3	**Edge (Fog) Computing** (Data Element Analysis & Transformation)	
2	**Connectivity** (Communication & Processing Units)	
1	**Physical Devices & Controllers** (The "Things" in IoT)	**Edge** Sensors, Devices, Machines, Intelligent Edge Nodes of all types

Presented by Cisco at the IoT World Forum, October, 2014

PI System in IIoT Reference Architecture

Internet of Things Reference Model

Levels

7	Collaboration & Processes	(Involving People & Business Processes)
6	Application	(Reporting, Analytics, Control)
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3	Edge (Fog) Computing	(Data Element Analysis & Transformation)
2	Connectivity	(Communication & Processing Units)
1	Physical Devices & Controllers	(The "Things" in IoT)

Server-Based (on-prem or cloud)

Embedded-Based (on-prem)

Edge
Sensors, Devices, Machines,
Intelligent Edge Nodes of all types

PI Client Applications

PI Asset Framework

PI Data Archive

PI Server Connectivity

Presented by Cisco at the IoT World Forum, October, 2014

The "Edge"

OSIsoft

OSIsoft Understands Connectivity

450+ PI interfaces and connectors to operations technology systems and industry standards;
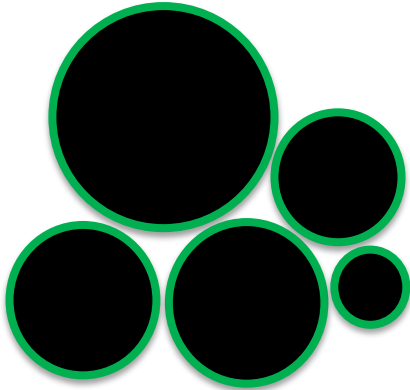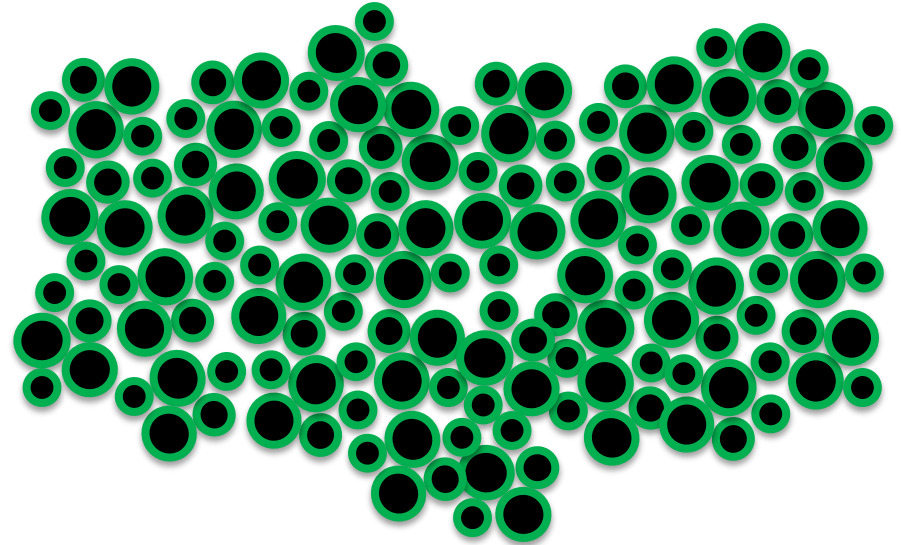1.5B+ data streams

What is Different About IIoT?

Traditional PI System data pattern
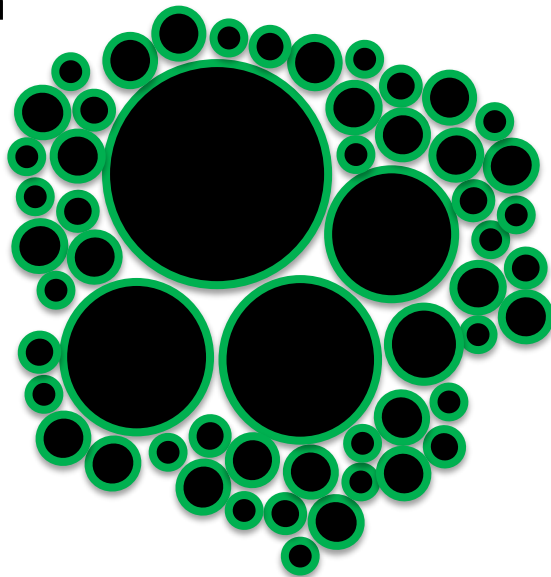A few large "pipes" to system level data

IIoT data pattern
Many small "pipes" to device level data

PI System Environment for IIoT

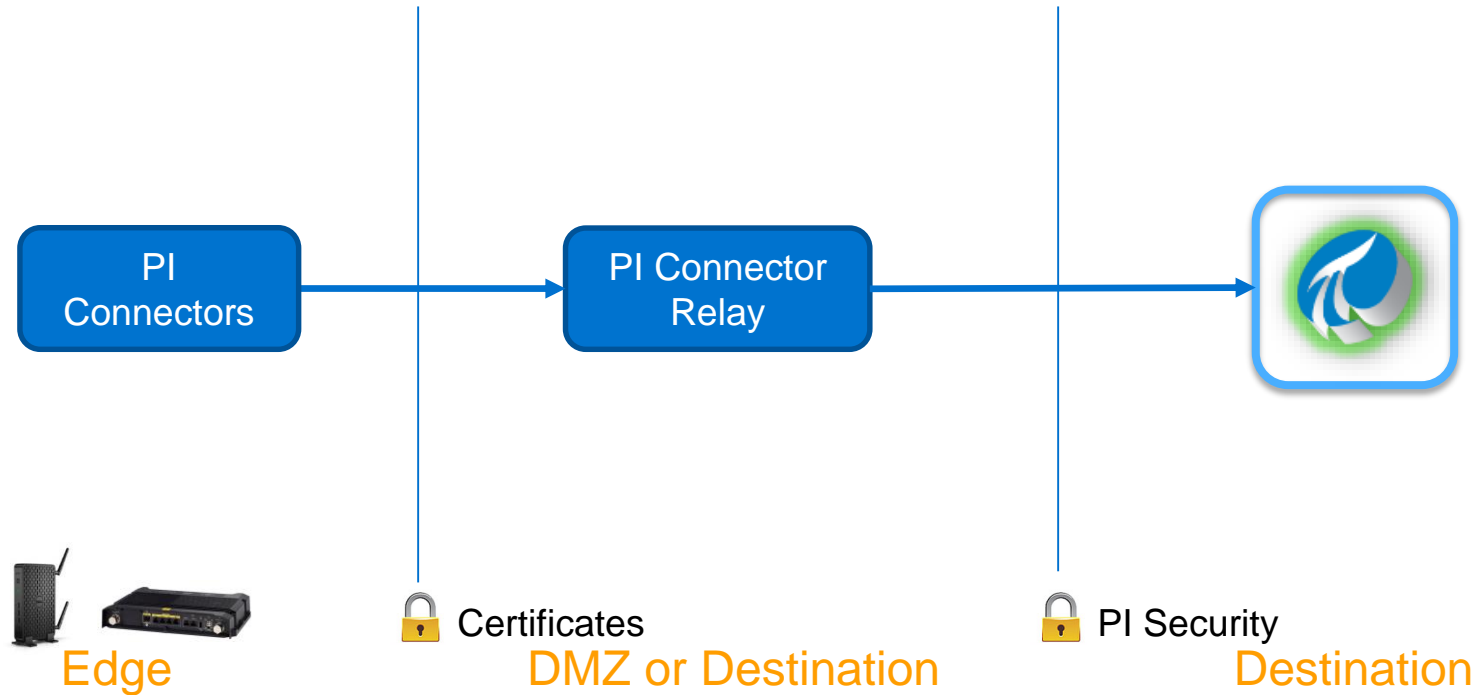## Hybrid of traditional PI System and IIoT data patterns

A few large "pipes" to system level data and many small pipes to device level data
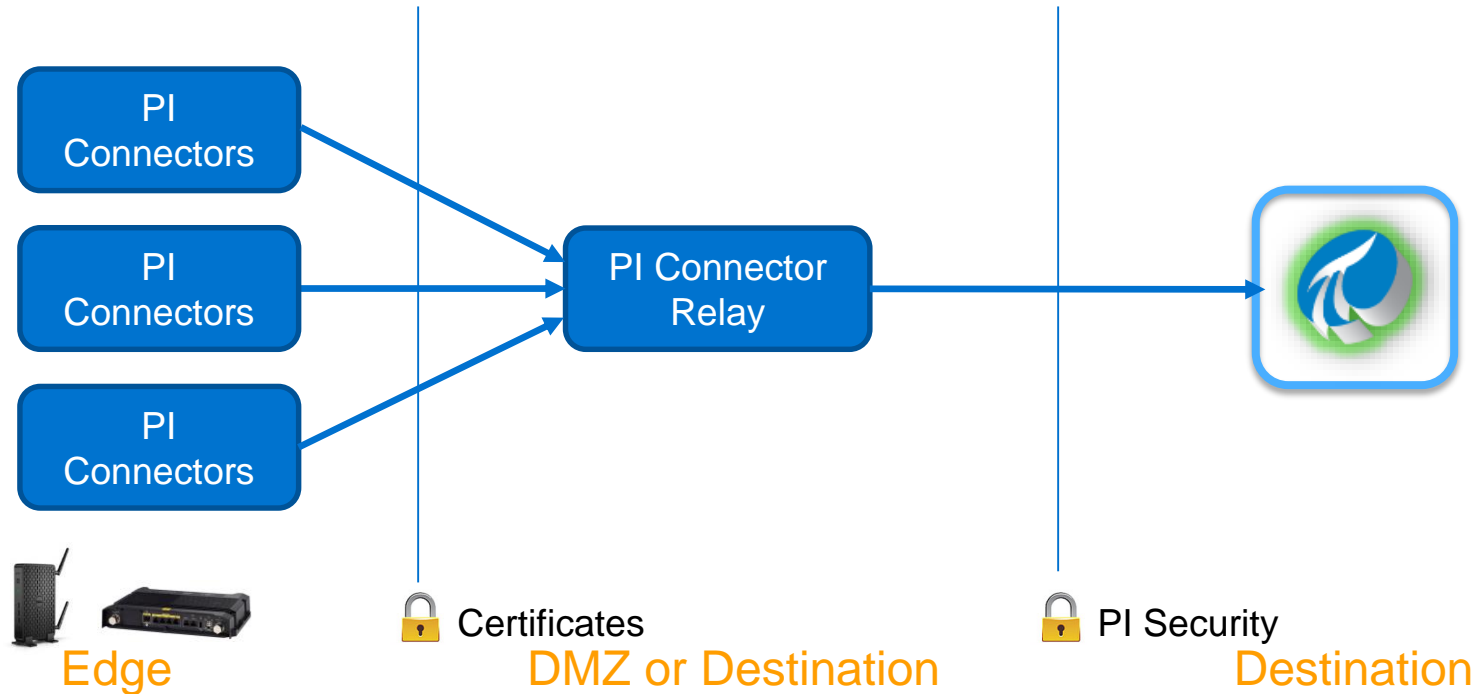
What is OSIsoft Doing Now?

- Building platform agnostic connectors with flexible deployment options on Windows and Linux based devices

- Enabling partners to development "connector-like" data ingress applications using the OSIsoft Message Format (OMF)

- Creating a new PI Connector Administration Experience

- Developing connectivity to analytics, visualization, and big data applications

PI Connector Architecture

PI Connectors → PI Connector Relay →

🔒 Certificates   🔒 PI Security

Edge   DMZ or Destination   Destination

Multiple Connectors per Connector Relay

PI Connectors

PI Connectors

PI Connectors

PI Connector Relay

🔒 Certificates

🔒 PI Security

Edge

DMZ or Destination

Destination

Multiple Connectors with Multiple PI Servers

PI Connectors

PI Connectors

PI Connectors

PI Connector Relay

🔒 Certificates

🔒 PI Security

Edge

DMZ or Destination

Destination
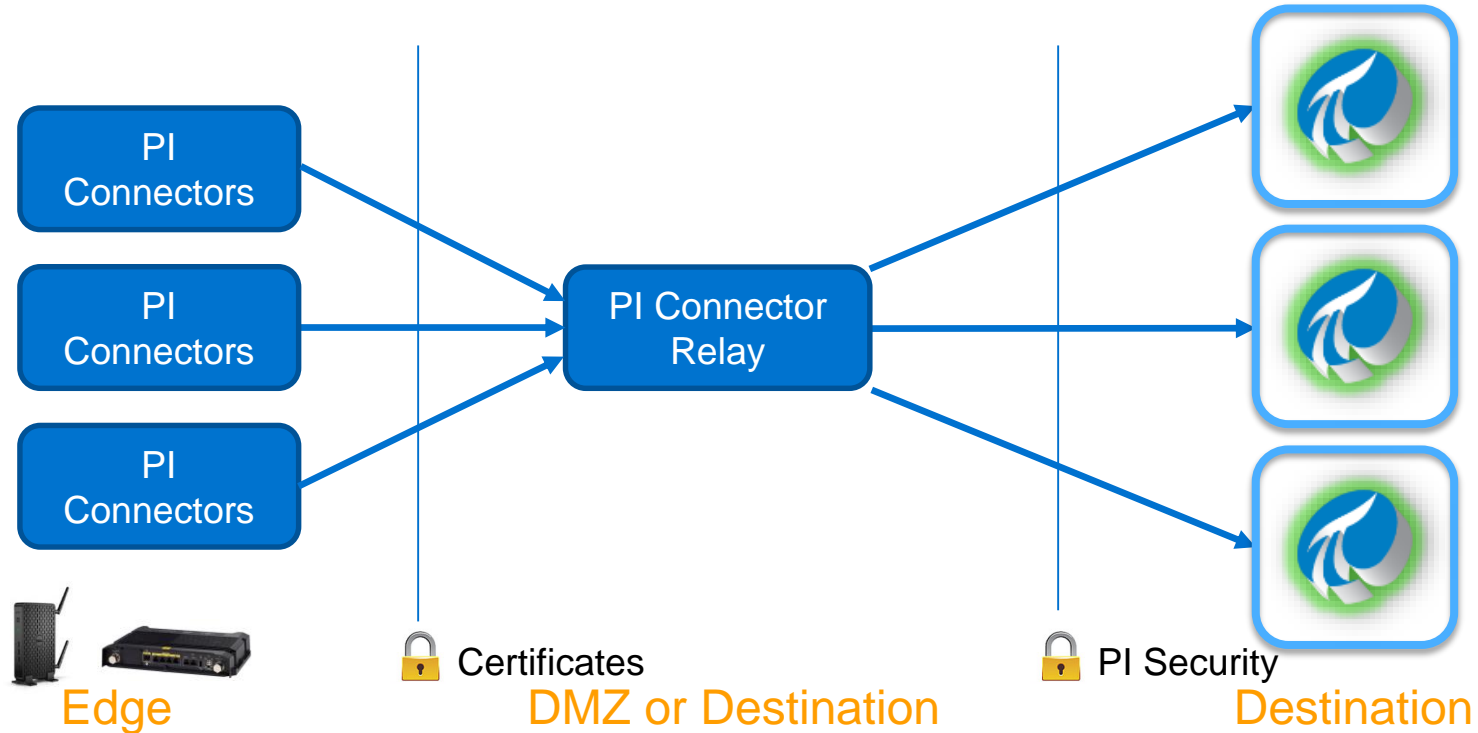
Multiple Connectors, Relays, and PI Servers
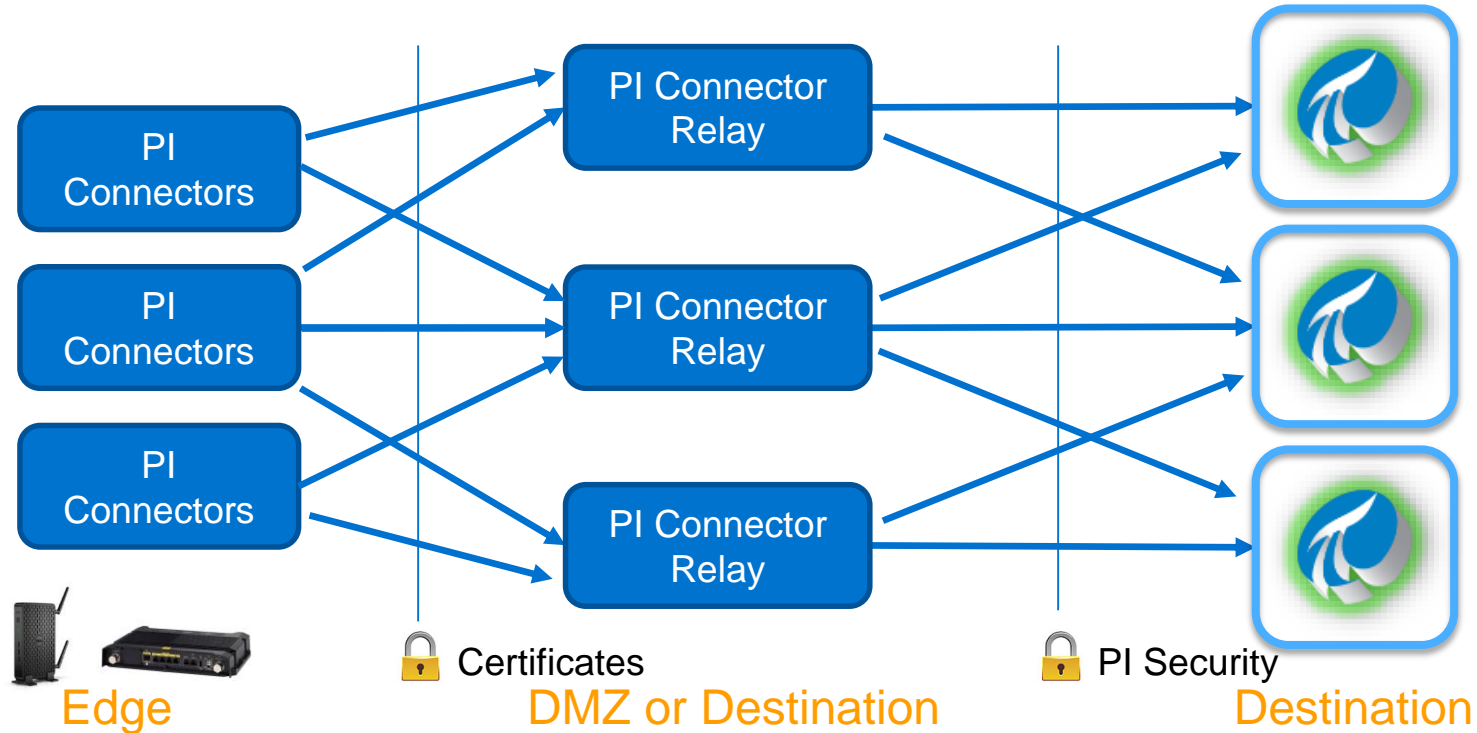
Multiple Data Ingress Options with Connector Relay
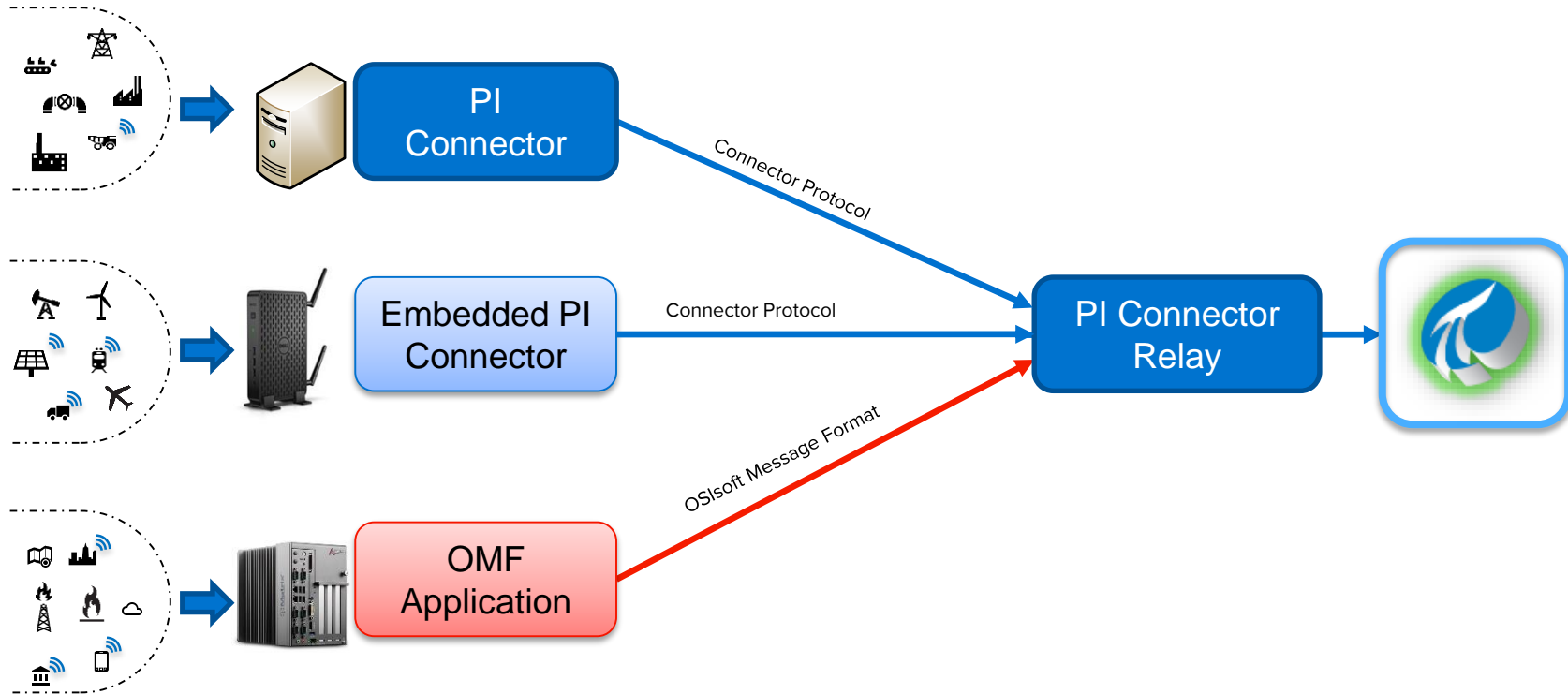
Edge Device Connectivity
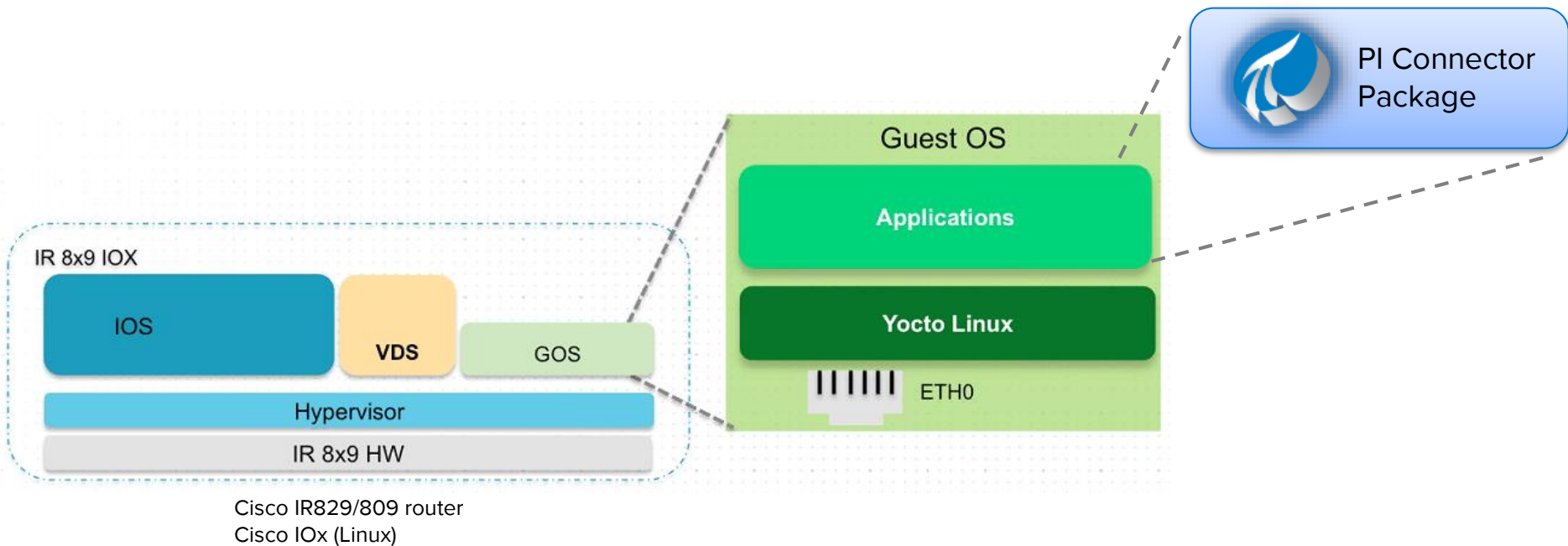

Cisco IR829 router
Cisco IOx (Linux)

Embedded PI Connector → PI Connector Relay →

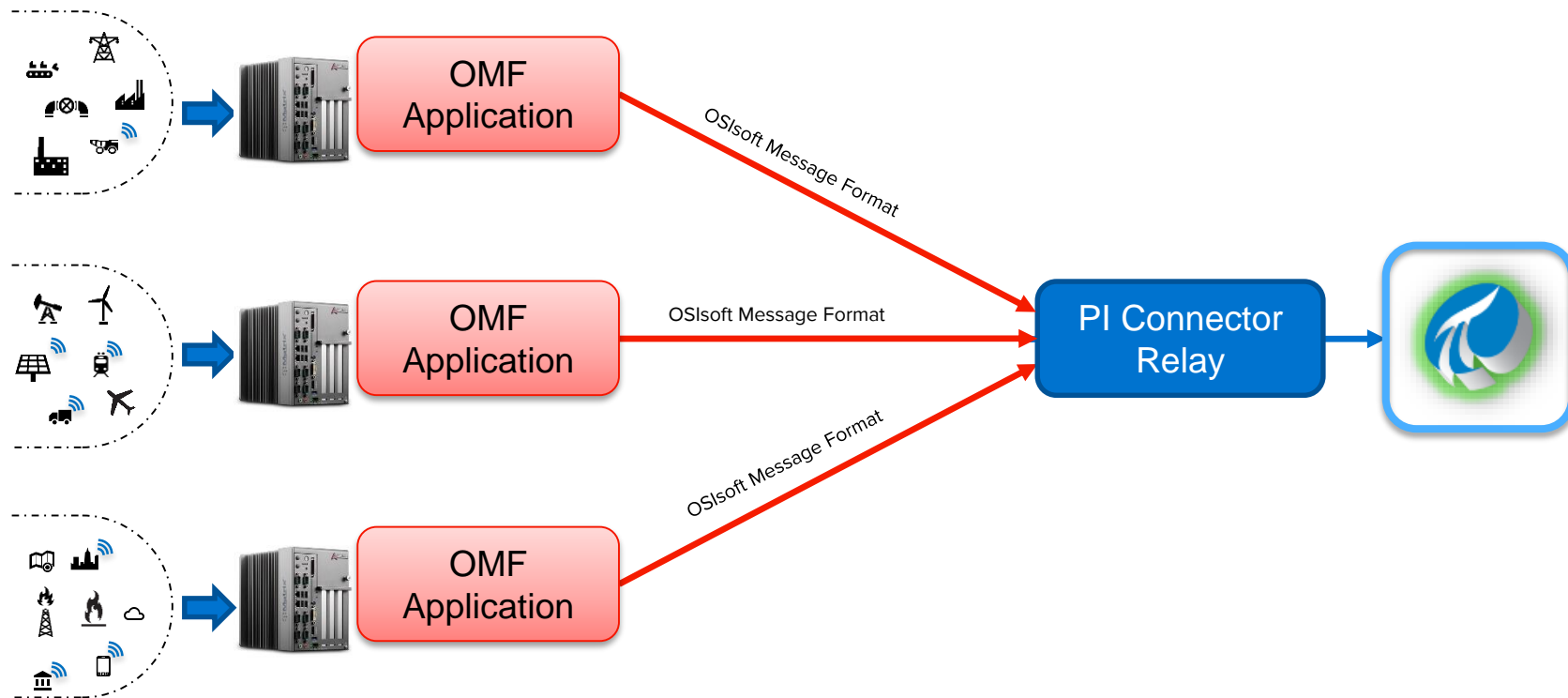Cisco IR809 router
Cisco IOx (Linux)

Cisco IOx Architecture with Embedded PI Connector

OMF Extends Edge Device Connectivity

OMF Application

OMF Application

OMF Application

OSIsoft Message Format

OSIsoft Message Format

OSIsoft Message Format

PI Connector Relay

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What is OMF?

- OMF is/does:
  - A simple, message based contract for data ingress
  - A written specification and sample code
  - Support data and metadata for streaming data
  - Operating system and programming language agnostic
  - Support multiple binary formats and protocol bindings
  - Enable partners to ingress data directly into OSIsoft software
  - Meant for both on premises and cloud services scenarios
  - Supplemental to existing and new PI interfaces and PI Connectors
- OMF is not:
  - A replacement for PI Web API, AF SDK, or any other OSIsoft API
  - An application development framework

Joe Admin

Components

filter Components

Node Map

Add Data Flow | Edit Data Flow | Actions

☐ Show only Components with issues

Data Sources	Connectors	Relays	Destinations

Data Sources ▲

- ✓ Dufftown_Cygnet
- ✓ Hogwarts_BACnet_01
- ✓ Parkmore_Cygnet

Connectors ▲

- ✓ Dufftown Connector
- ✓ Hogwarts Connector
- ✓ Parkmore Connector

Relays ▲

- ✓ Area Relay
- ✓ Facilities Relay

Destinations ▲

- ✓ PI Server 1
- ✓ PI Server 2

Node Map area:

- ✓ Dufftown_Cygnet → ✓ Dufftown Connec... → ✓ Area Relay → ✓ PI Server 1
- ✓ Parkmore_Cygnet → ✓ Parkmore Conne... → ✓ Facilities Relay → ✓ PI Server 2
- ✓ Hogwarts_BACn... → ✓ Hogwarts Conne...

Actions panel:

Top-Level Action 1
Descriptive text about what this action does goes here and can stretch to multiple lines.

Top-Level Action 2
Descriptive text about what this action does goes here and can stretch to multiple lines.

Environment Configuration
Descriptive text about what this action does goes here and can stretch to multiple lines.

> Conceptual:
> PI Connector Administration User Experience is Under Construction

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)
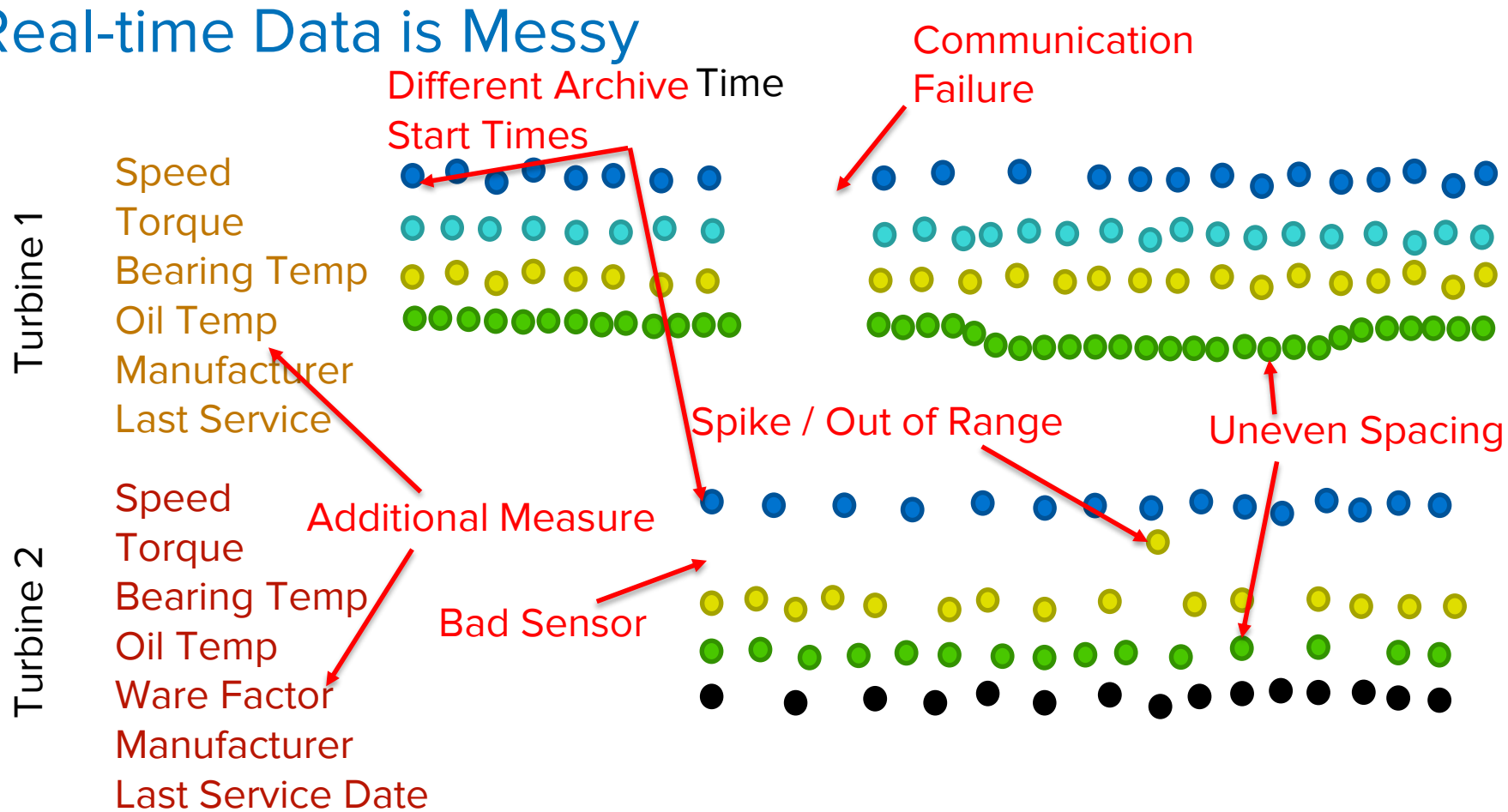
Intel / ODM
(PI Server connectivity - TBD)

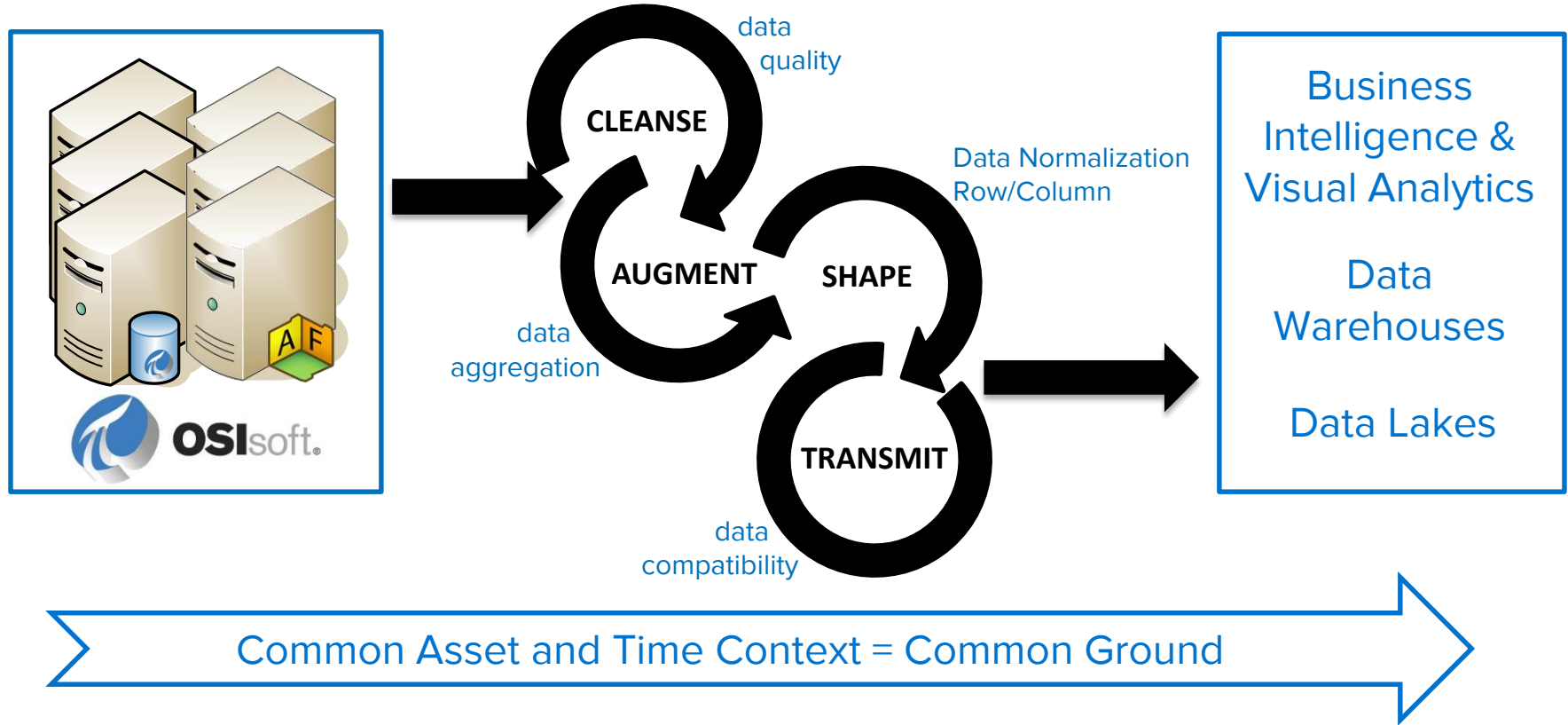OSIsoft

The "Enterprise"
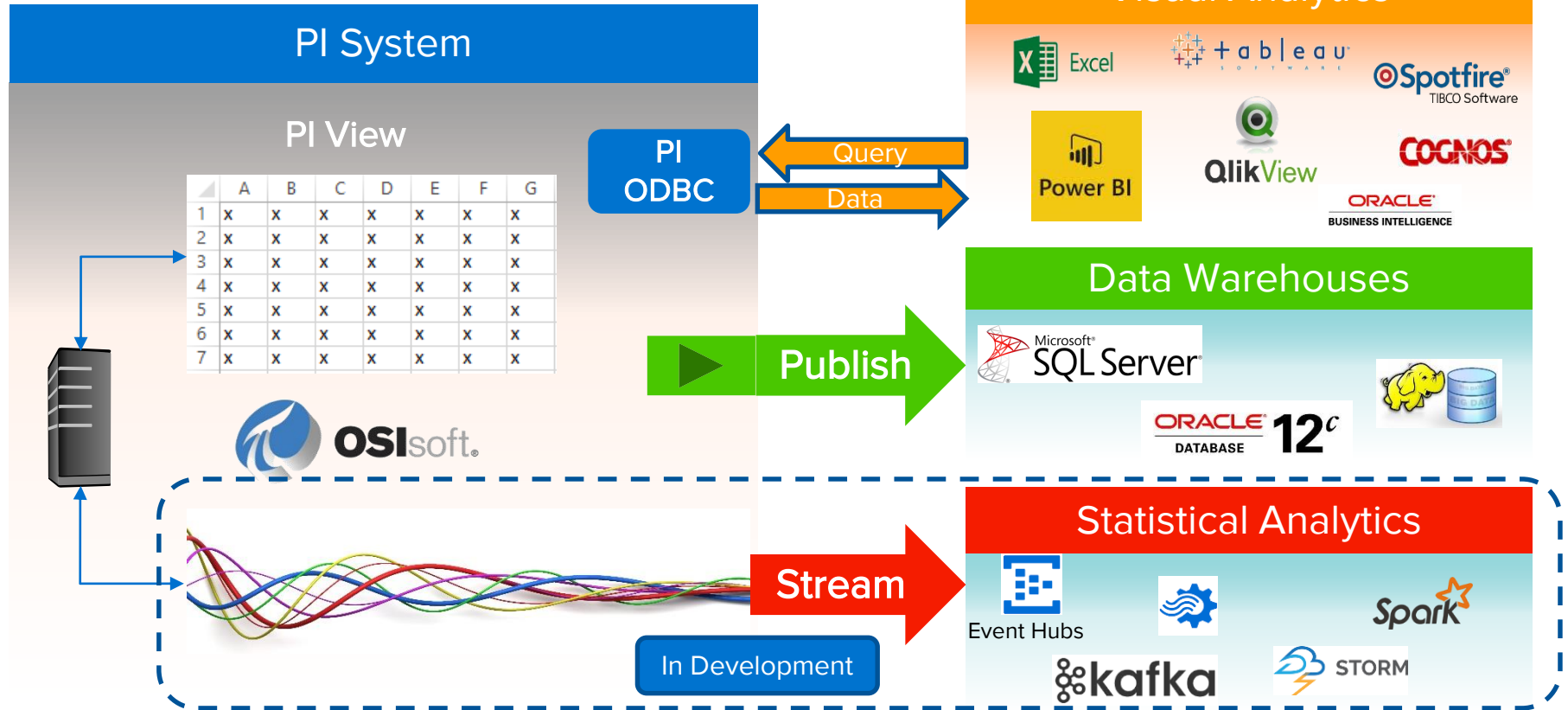
The Enterprise PI Server

PI Integrators

Real-time Data is Messy

Different Archive Start Times — Time — Communication Failure

Turbine 1

Speed
Torque
Bearing Temp
Oil Temp
Manufacturer
Last Service

Spike / Out of Range

Uneven Spacing

Additional Measure

Turbine 2

Speed
Torque
Bearing Temp
Oil Temp
Ware Factor
Manufacturer
Last Service Date

Bad Sensor

PI Integrators Enable Deep Data Analytics

CLEANSE — data quality

AUGMENT — data aggregation

SHAPE — Data Normalization Row/Column

TRANSMIT — data compatibility

Business Intelligence & Visual Analytics

Data Warehouses

Data Lakes

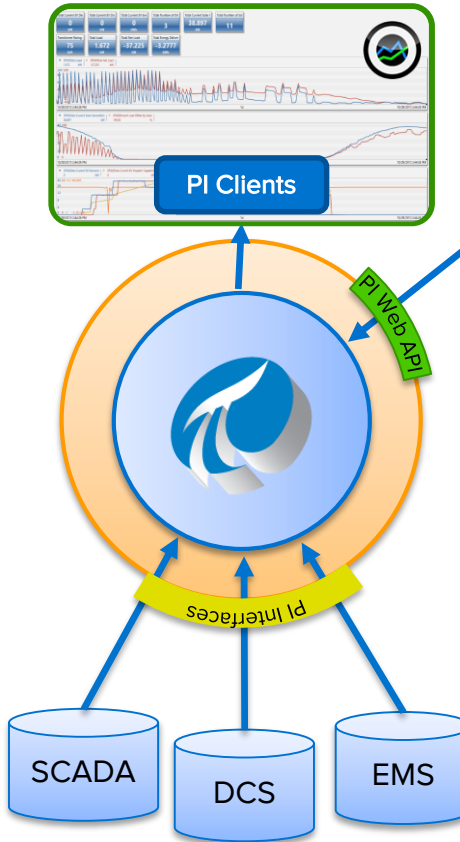Common Asset and Time Context = Common Ground

The "Cloud"

OSIsoft Cloud Services Vision
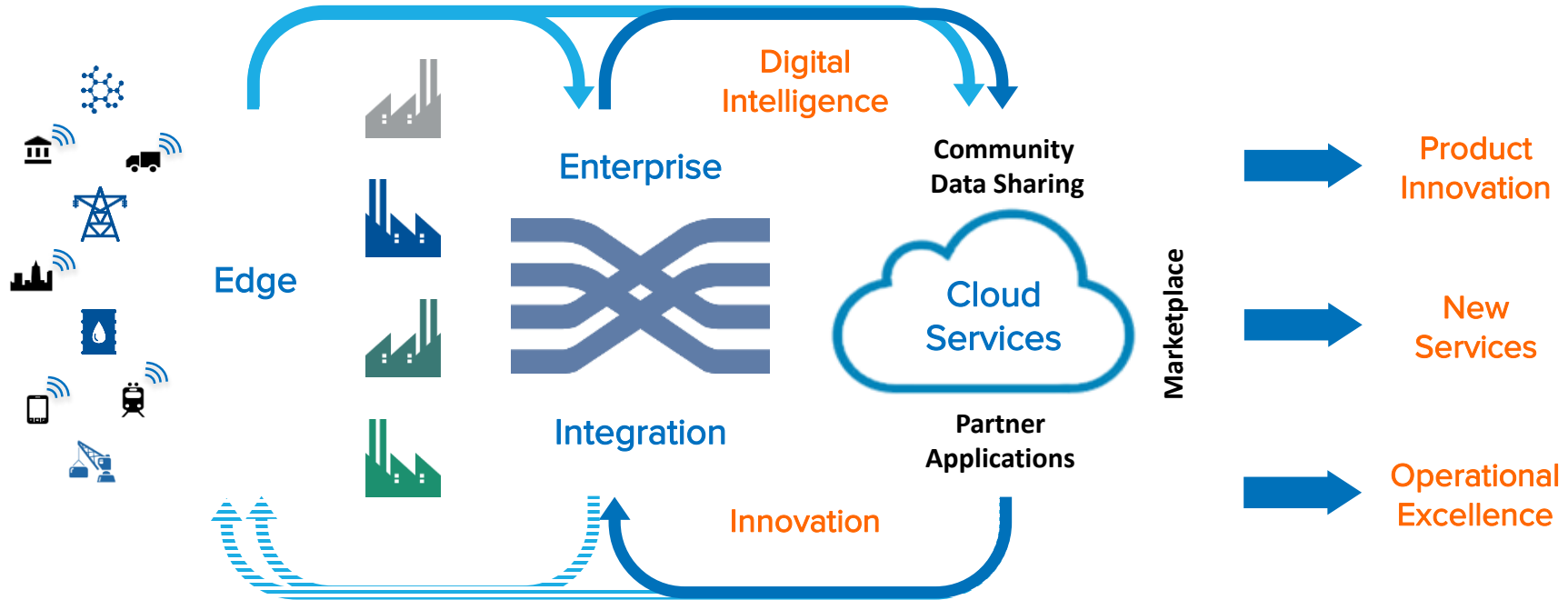
IIoT Architecture

PI System Architecture (typical)

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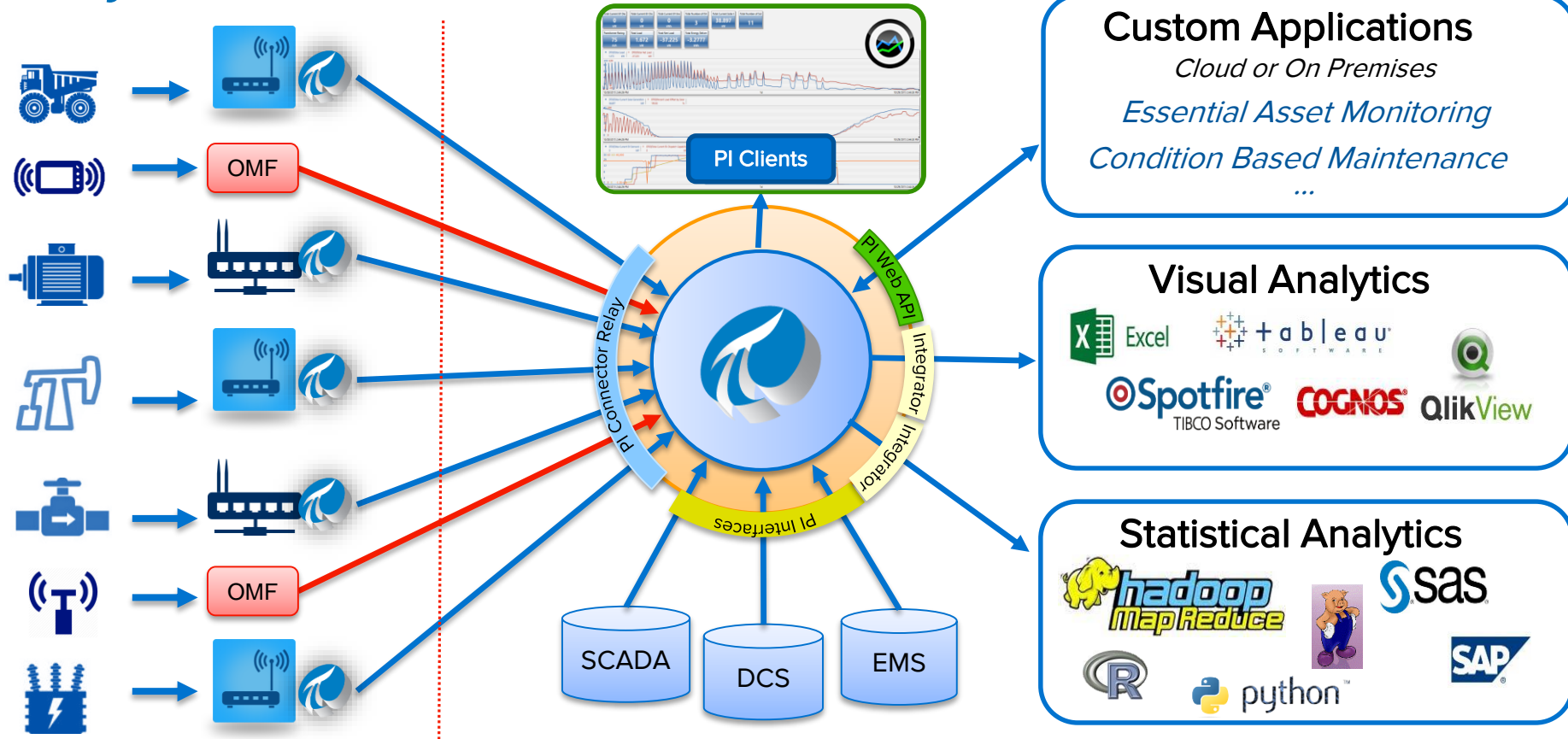...

PI Clients

PI Web API

PI Interfaces

SCADA
DCS
EMS

PI System IIoT Architecture

감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado