IIOT Data Access with the PI System

Presented by **Nathawan H.**
Systems Engineer

PI System data is utilized across the enterprise to solve various business impacts

Safety & Security

Energy Utilization

Process Efficiency

Asset Health

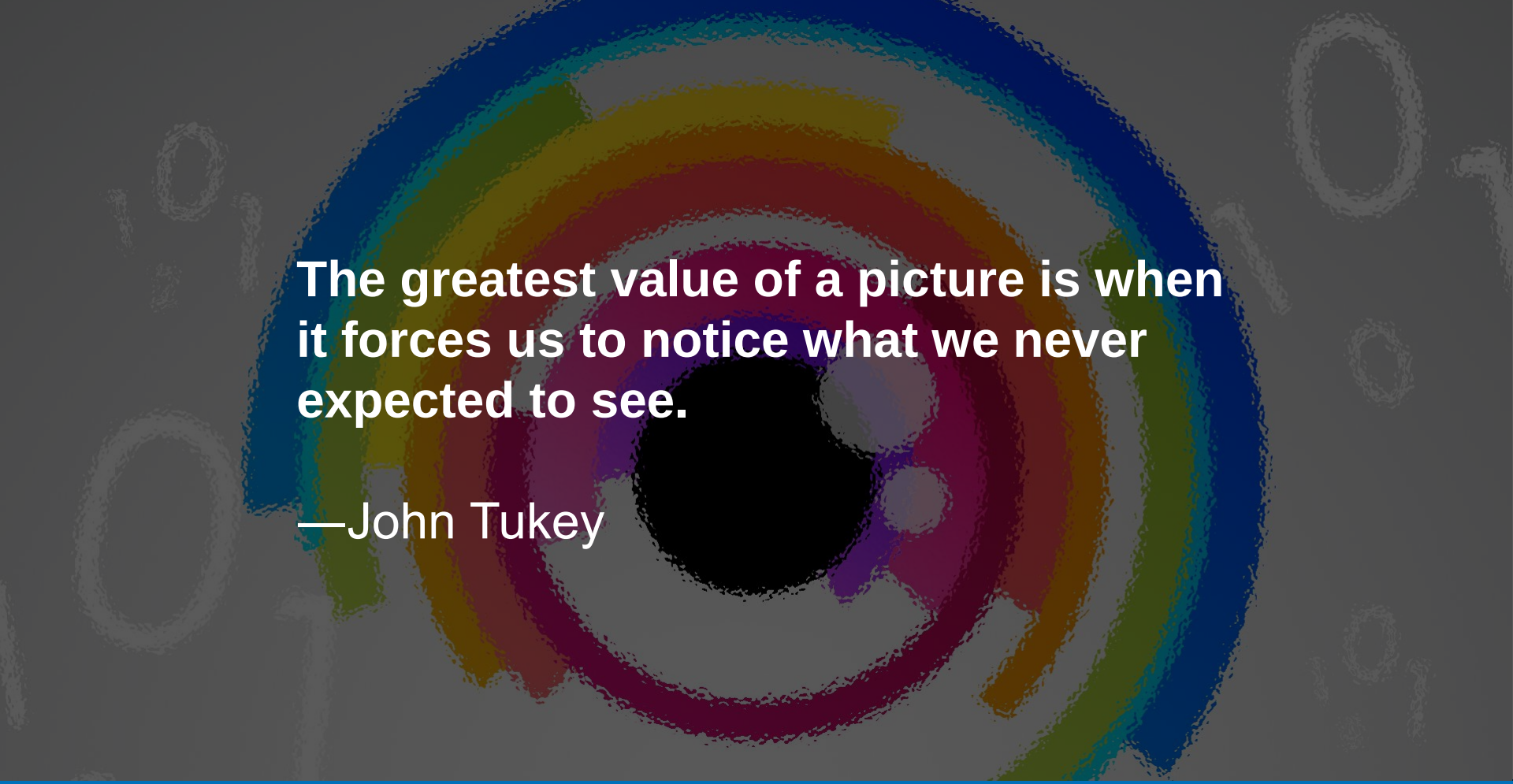
Quality

Regulatory Performance

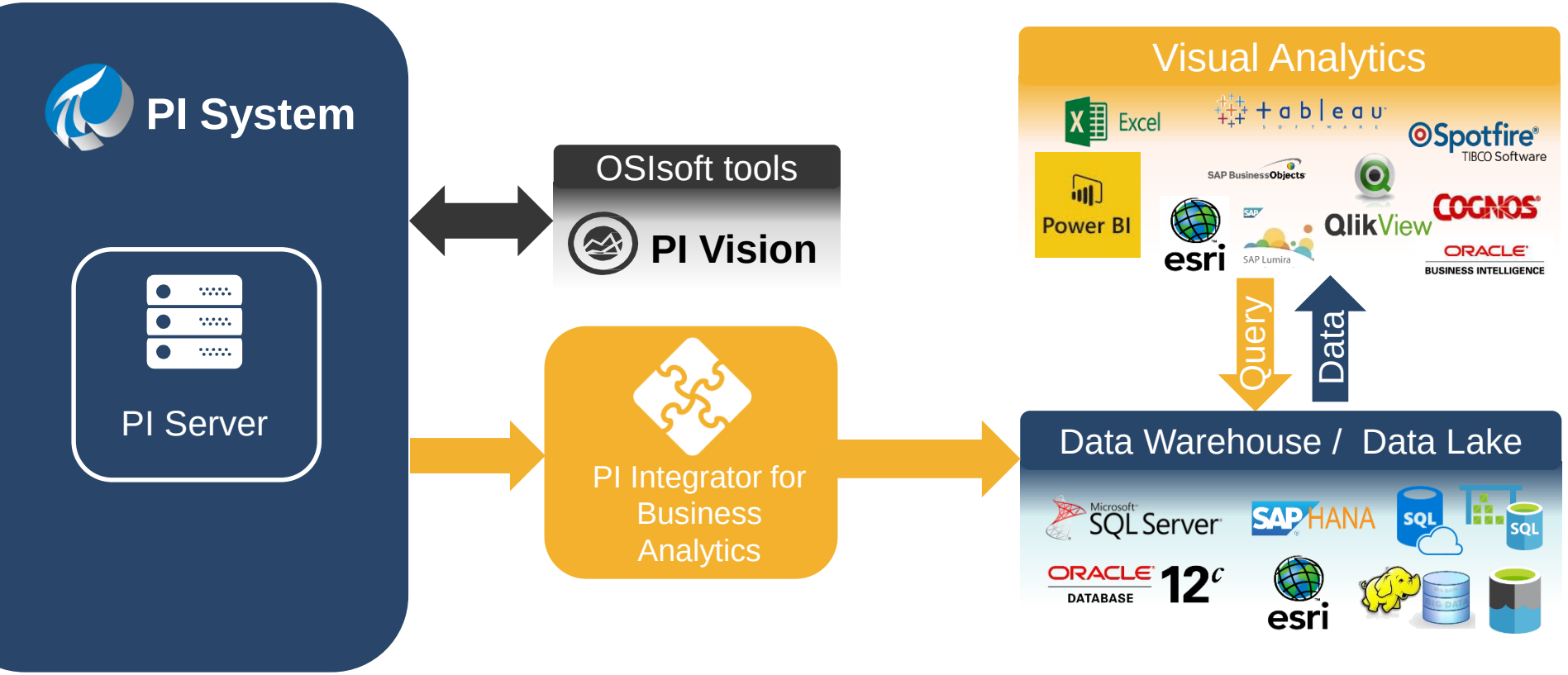
Operators
Craftsmen
Supervisors

Process Engineers
Production Superintendents
CoE experts

Location Managers
Regional/Global Ops
Business leadership



Streaming data to the right places



Utilizing PI System data

PI Vision

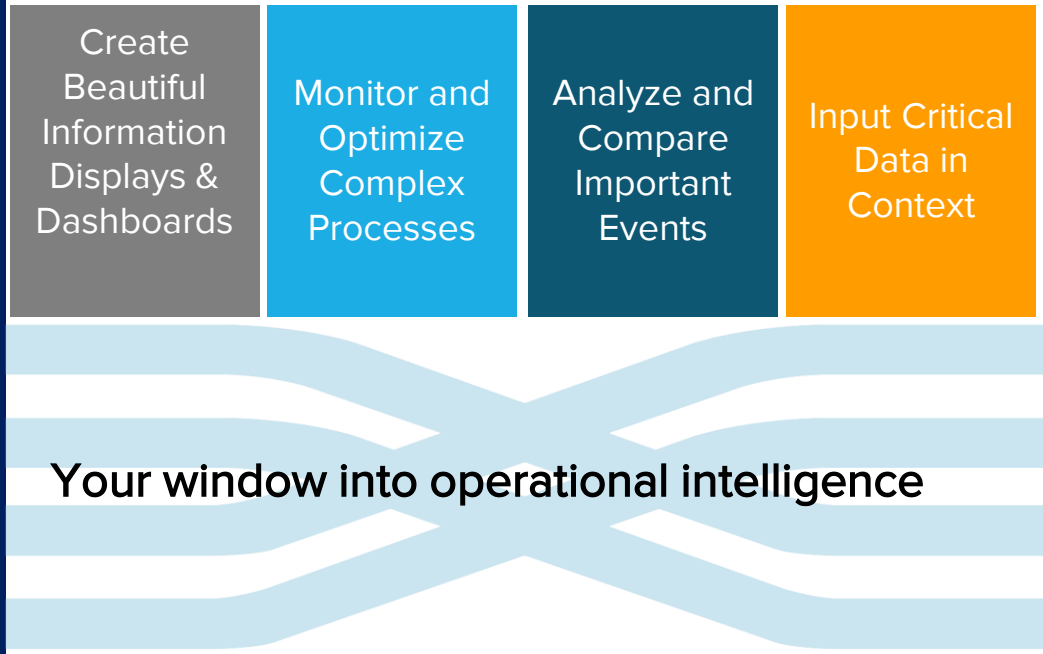
Unified visualization infrastructure, your window into operational intelligence

Integrators

Blend operational data with business data for complex analyses

PI Vision

We are embarking on a **unified visualization infrastructure** to deliver a seamless, powerful, extensible experience.



A single platform for your visualization needs

Today

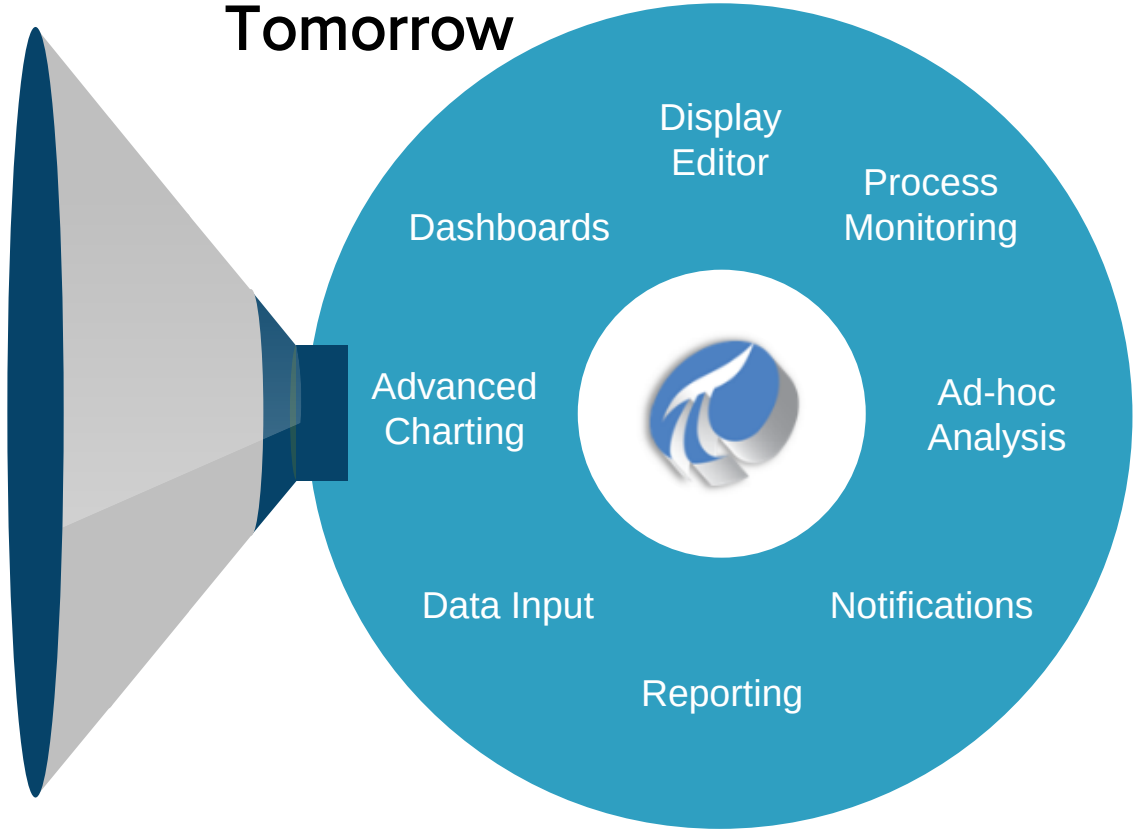
PI ProcessBook
Display Editor
Process Monitoring

PI Vision
Ad Hoc Analysis
PB Display Viewer

PI WebParts
Dashboards

PI Manual Logger
Manual Data Entry

Tomorrow



A truly extensible visualization infrastructure

Who benefits from extensions?

OSIsoft Teams

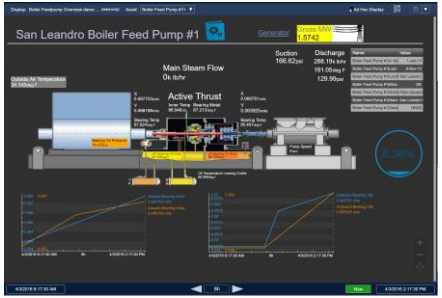
Partner EcoSphere

Partners

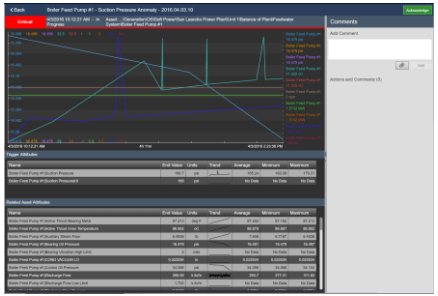
Customers

Modern Visualization for the Modern PI System

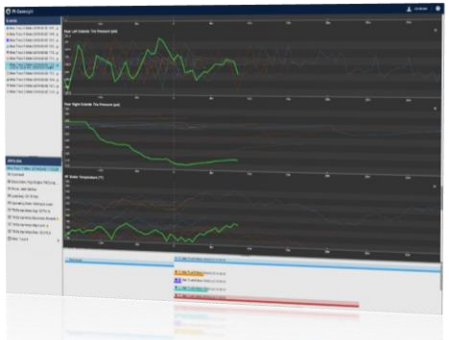
Authoring



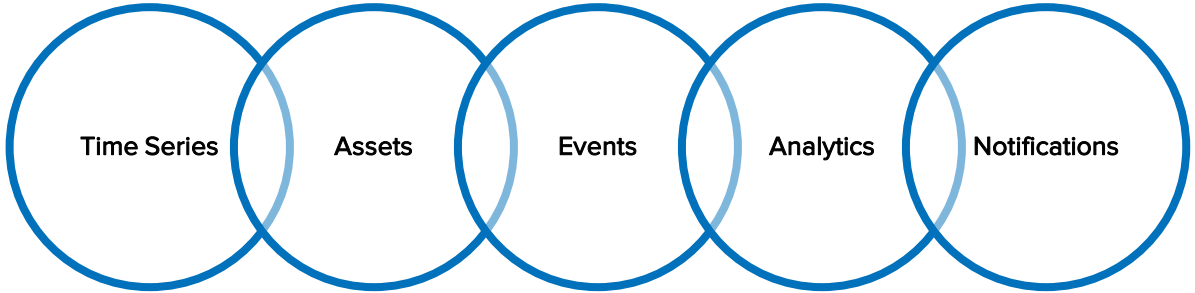
Monitoring



Manual Entry



Ad Hoc Analysis

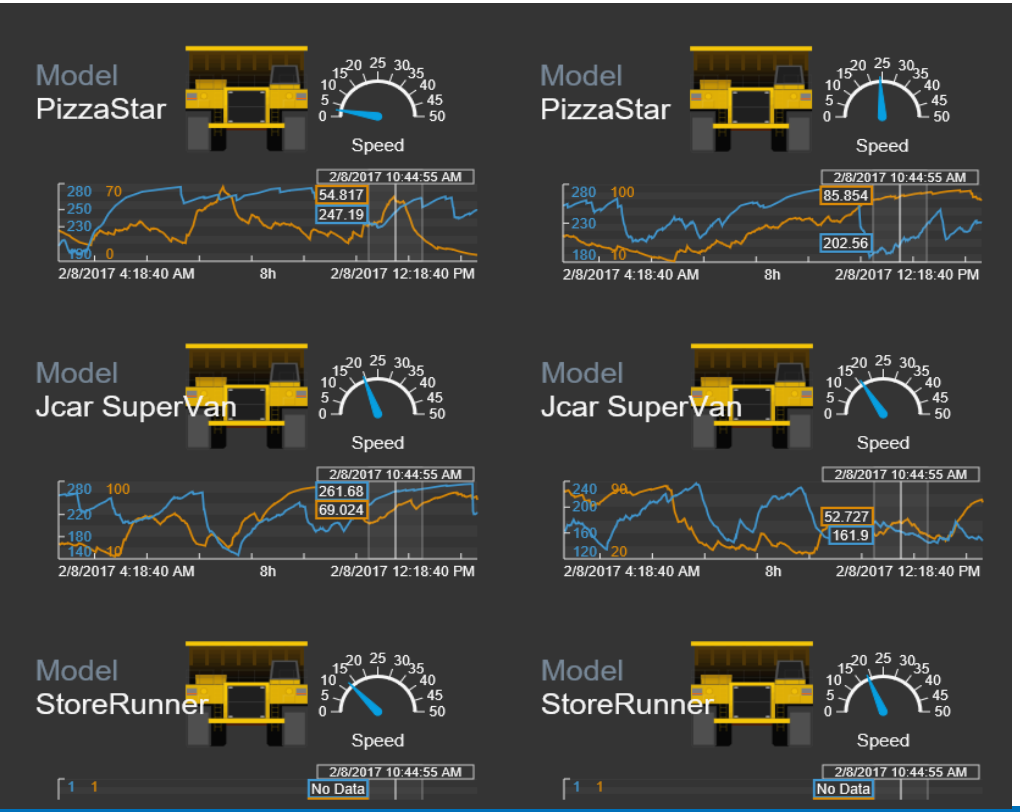


What is PI Vision?

The fastest, easiest way to visualize PI System data

- Access data from any web browser, including mobile device browsers
- Collaborate and share comments across the company
- Deploy and roll-out rapidly

Auto-populate monitoring displays with collections



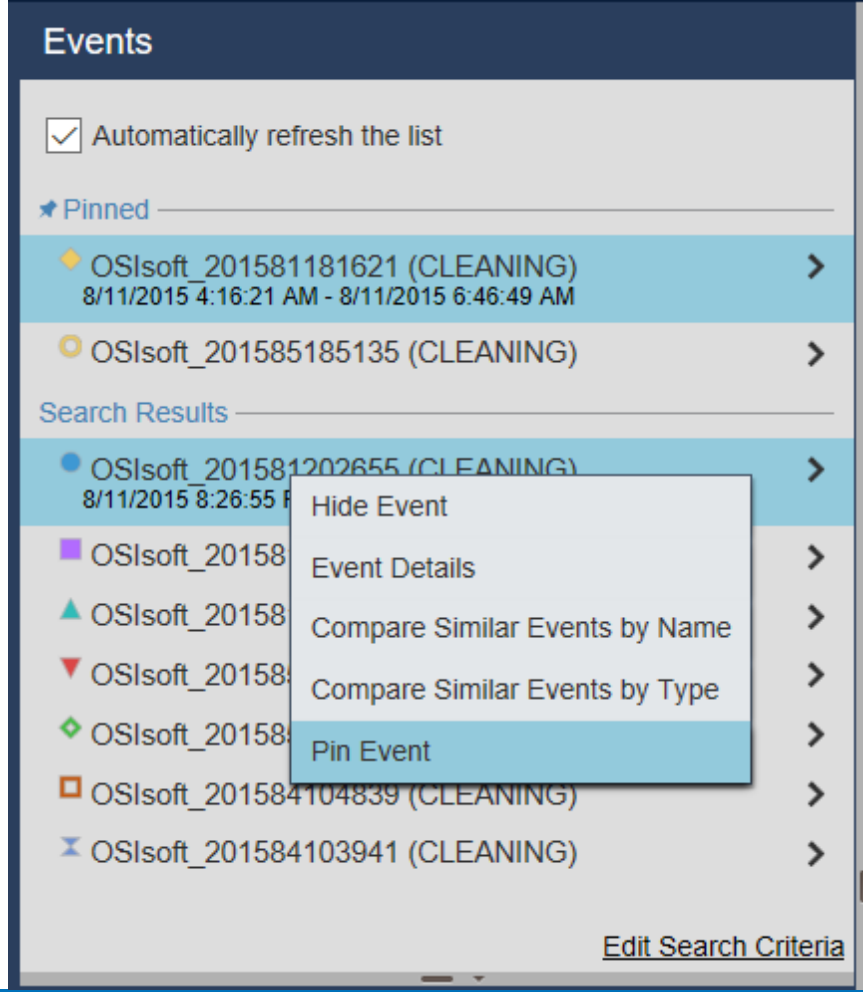
Group one or more symbols as a “collection”

Screen auto-populates that same grouping for all assets

- New assets are added automatically
- Add filter criteria to quickly see troubled assets

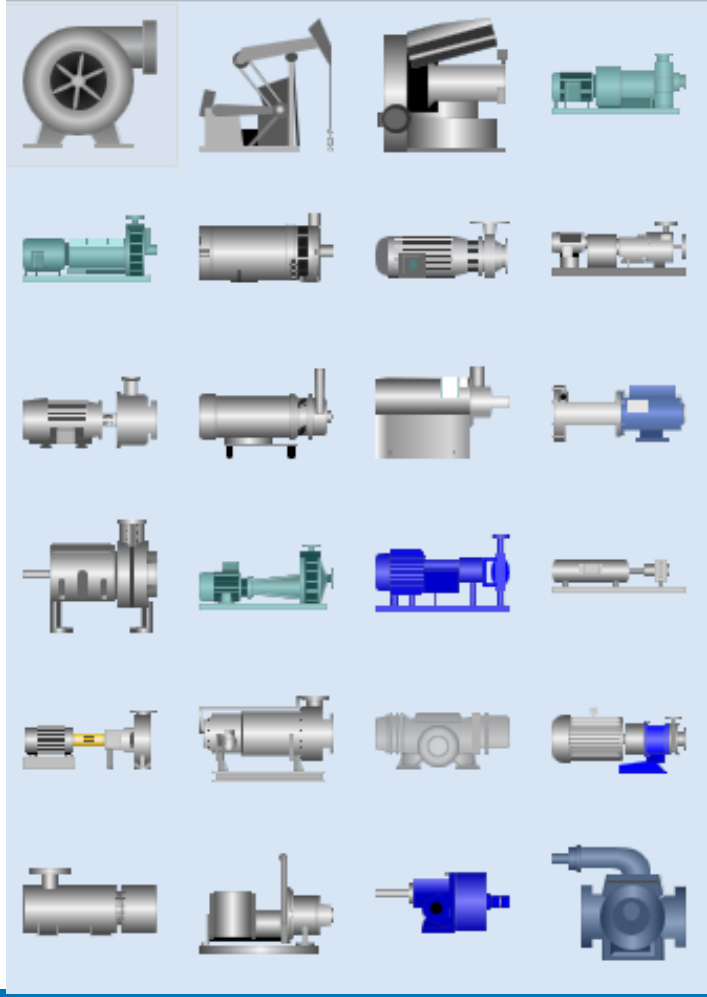
Pinned Events

- Identify batch process deviation by comparing to a reference
  - “Pin” one or more events, to be used as a reference
  - Pinned events are saved with the display



Graphics Library

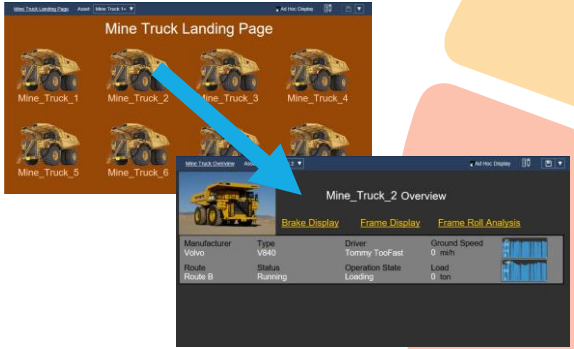
- Easily create standard views by using an extensive library of graphics symbols
- Same symbols as available from PI ProcessBook



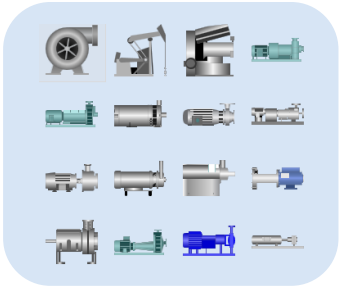
PI Vision 2017

Collections

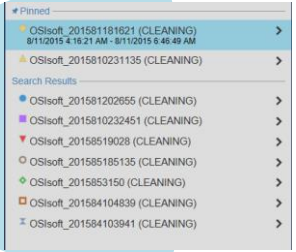
Drill-in Navigation



Graphic Library

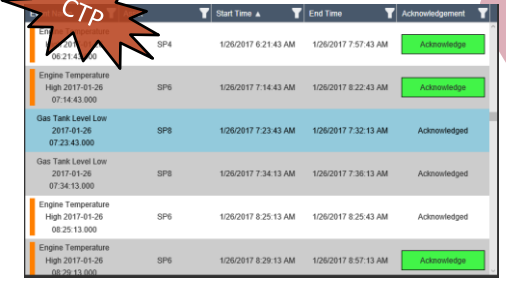


Pinned Events



Events Table

CTP

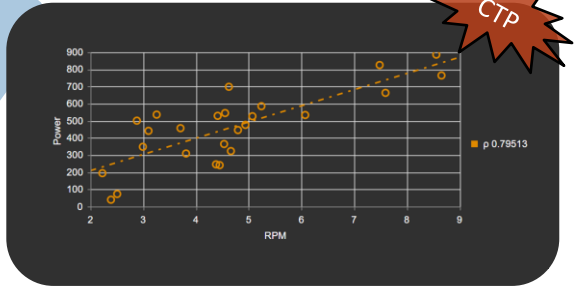


Asset Comparison Table

Asset	Manufacturer	Driver	Engine RPM	Load	Status
Mine Truck 1	Caterpillar	Jason Rice	0	0	Running
Mine Truck 2	Volvo	Tommy TooFast	0	0	Running
Mine Truck 3	Komatsu	Edna Thompson	1,682.6	159.87	Running
Mine Truck 4	Caterpillar	Revill Swivel	0	0	Running
Mine Truck 5	Volvo	John Sintilas	0	0	Running
Mine Truck 6	Komatsu	Steve Kwan	1,744.9	194.14	Running
Mine Truck 7	Volvo	Brian Bostwick	0	0	Running
Mine Truck 8	Caterpillar	Steve Kia	0	0	Running
Mine Truck 9	Caterpillar	Justin Brown	0	0	Running
Mine Truck 10	Volvo	Bob Bonkers	1,719.7	157.74	Running

XY Plot

CTP



Integrators:
Blending data to ask complex questions

Customers want to solve a variety of complex questions

Complexity

Disparate assets or interacting one-by-one

Interacting with common assets as a fleet

Monitoring

Real-time visibility

- HMI

Process Optimization

Real-time & historical view across any plant asset

- PI Vision
- PI Datalink

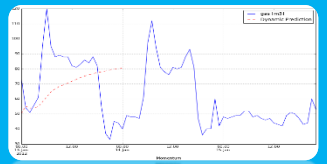
Benchmarking

Fleet-wide performance comparison

- BI App (i.e. Tableau, Spotfire, Lumira)
- PI Integrator for Business Analytics
- PI Integrator for SAP HANA

System Optimization

Large scale multi-variate analysis



- Machine Learning (Azure ML, R)
- PI Integrator for Business Analytics
- PI Integrator for SAP HANA

Data Integration can address Big Questions

Mining

- What material is being hauled?
- Was it raining?
- Holes in the road?
- On break?
- What is the grade of the hill?
- Scheduled downtime?
- Shifts—different driving behaviors

Oil & Gas

- When did the geology change?
- Which well was being drilled?
- What angle was the drill bit?
- Is production related to drill conditions?

Wind Power

- Was wind gusty or steady?
- Was the maintenance planned?
- How long does this issue usually take to fix?

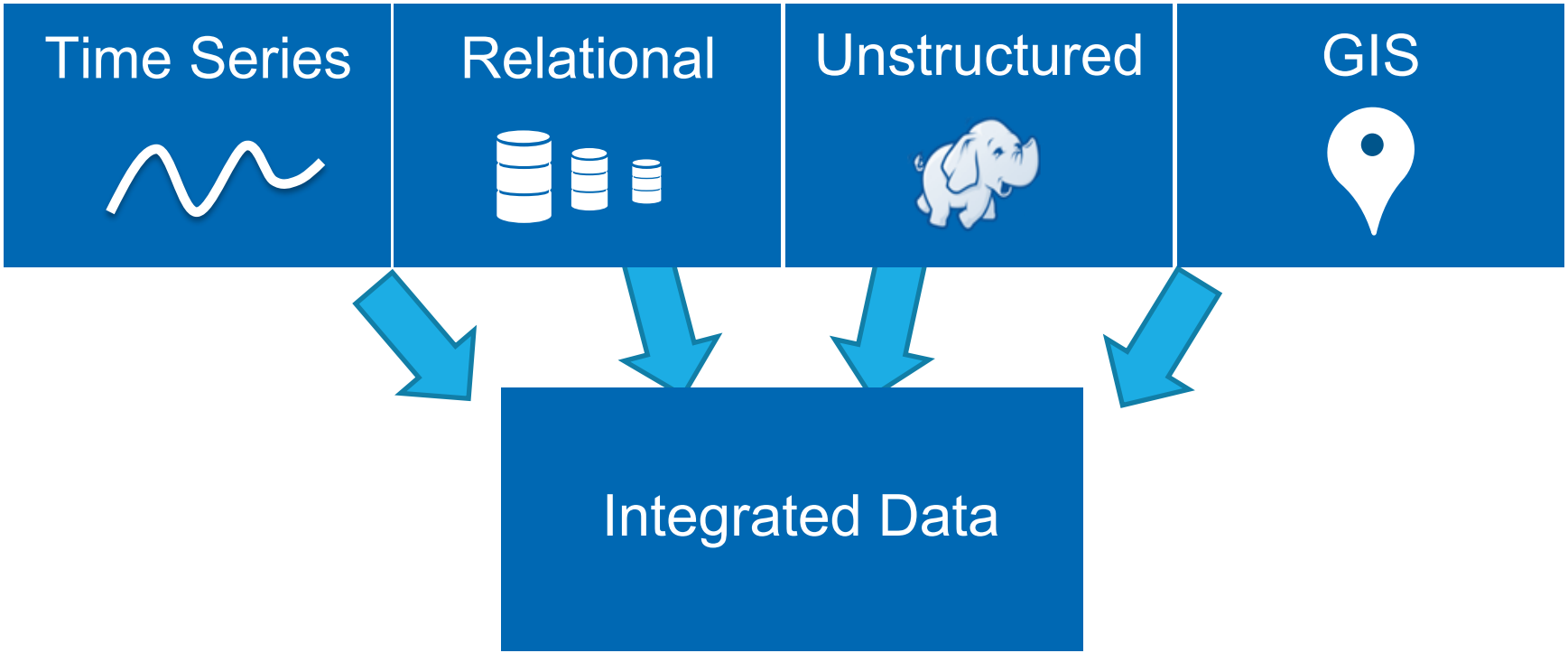
Pharmaceuticals

- What product is being made?
- When is the equipment empty?
- Where was the instrument when I took that measurement?

Transmission & Dist

- How are renewables impacting equipment?
- Was there a voltage violation?
- What are the changes in weather?

Data Integration brings together Different Data



Integrate, verb: combine (one thing) with another so that they become a whole

Time Series Data is Complex!

Turbine 1

Speed

Bearing Temp

Oil Temp

Turbine 2

Speed

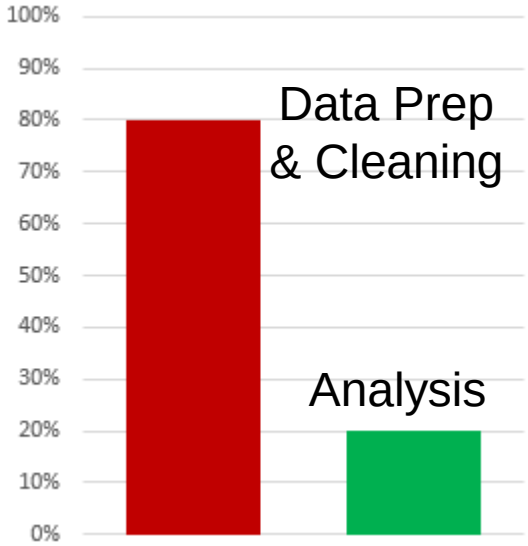
Bearing Temp

Oil Temp

Wear Factor

Data Integration Projects are Challenging

Time

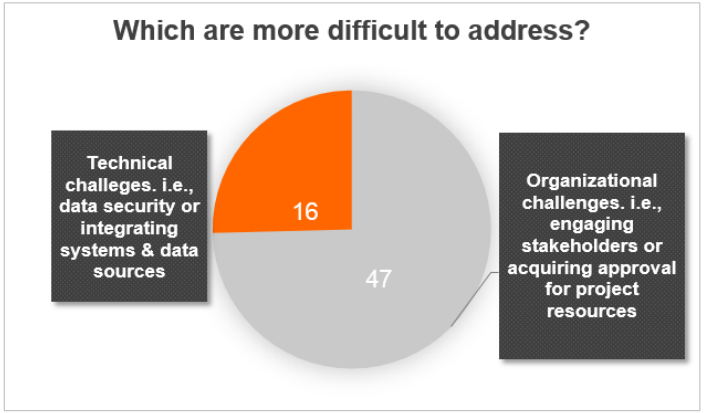


Warning: Currently, data analysts spend 50-80% of their time merely collecting and preparing data[1]

Expense

Warning: data integration often requires ongoing upkeep

Risk

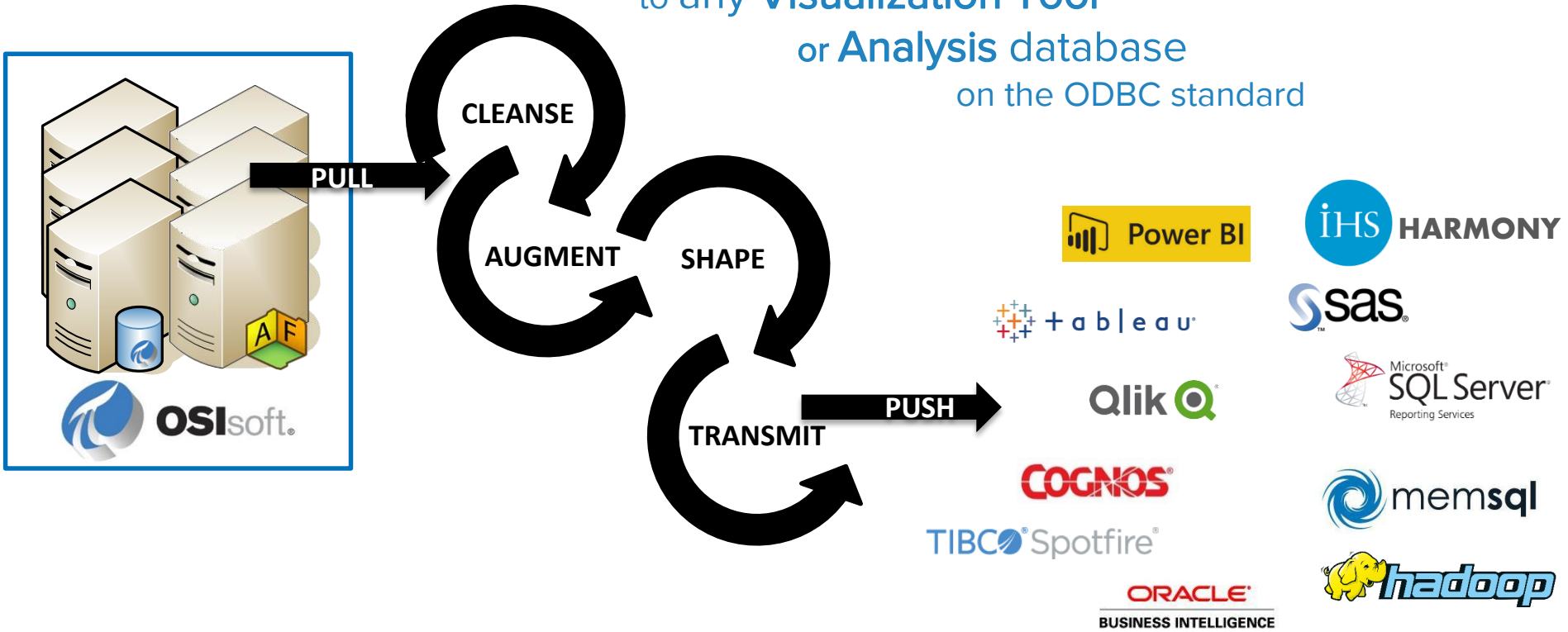


Warning: If "why?" for the project is not clearly communicated, business barriers will delay and risk the project

[1] *https://hbr.org/2014/04/the-sexiest-job-of-the-21st-century-is-tedious-and-that-needs-to-change/*

Prepare and Deliver Process Data

to any **Visualization Tool**
or **Analysis** database
on the ODBC standard



Advanced Integrations – Supported Systems

Visual Analytics

Excel

Spotfire® TIBCO Software

SAP BusinessObjects

COGNOS

esri

ORACLE BUSINESS INTELLIGENCE

tableau SOFTWARE

Power BI

SAP Lumira

QlikView

Data Warehouse / Data Lake

SQL

Microsoft® SQL Server®

SQL

ORACLE DATABASE 12c

SAP® HANA

BIG DATA

Streaming Analytics – 2017

IoT Hub

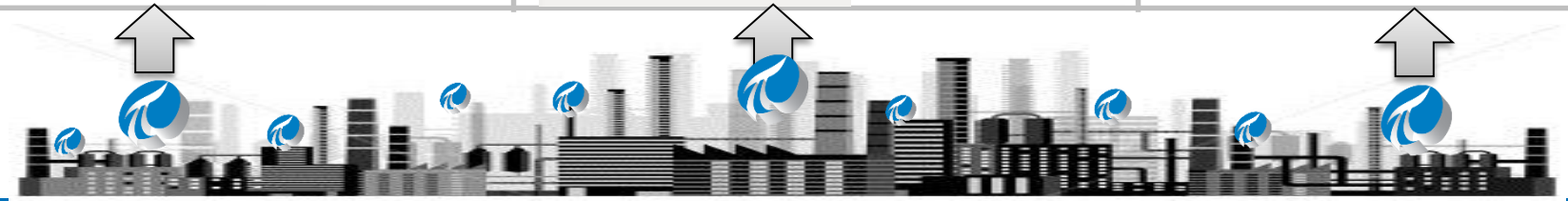
Machine Learning

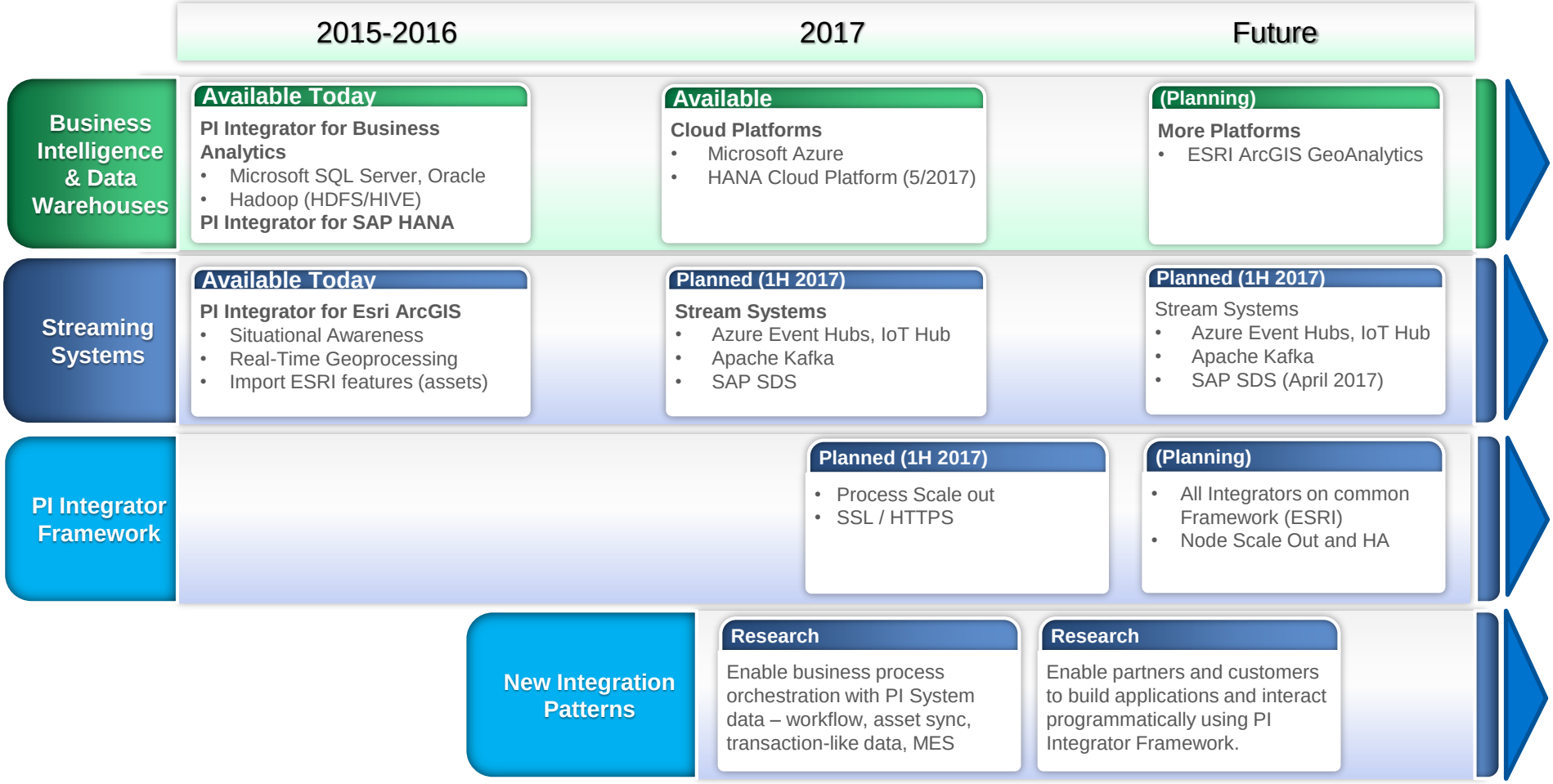
Stream Analytics

Spark

kafka

SAP®





Customer Example: Deschutes Brewery

Leveraging the PI System and Cortana Intelligence to Increase Process Efficiency

COMPANY and GOAL

Deschutes Brewery is the 7th largest craft brewery in US, and wanted to maximize production with its existing infrastructure to fund construction of a 2nd brewery in Roanoke, VA

CHALLENGE

Batch's phase transition happens between manual density measurements occurring every 8-10 hours

- Impact: Losing up to 72 hours in production time

SOLUTION

Use data science to achieve accurate predictive analytics for determining a batch's density measurements

- PI System
- PI Integrator for Microsoft Azure
- SQL Data Warehouse
- Azure Machine Learning
- Azure Data Factory

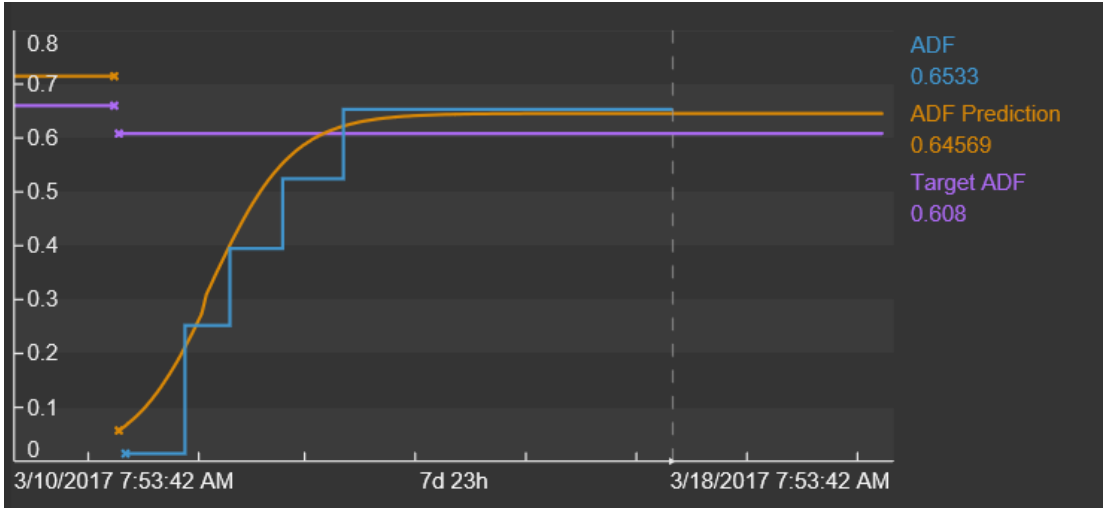
RESULTS

Ability to eliminate production time losses and increase production capacity

- Accurate predictions of when a batch's phase transitions from fermentation to free rise

Detecting Early Deviations and Taking Corrective Action

Black Butte Porter – Vessel 45



Indications:

- Uncharacteristic fermentation

Actions taken:

- Transition to free rise early

Results:

- Production time reduced
- Batch saved
- Quality maintained

Related talks

2:15pm – 2:45pm	Roadmap for the PI System Development	PI Integrator for ArcGIS	PI 101 - Introduction to Process Optimization & Big Data Analytics with the PI System
2:45pm – 3:00pm	**Transfer Time**	**Transfer Time**	**Transfer Time**
3:00pm – 3:30pm	Engaging Product, People and Process for Operational Transformation	PI Server 2017	PI 101 - Introduction to Visualizing Data with the PI System
3:30pm – 3:45pm	**Transfer Time**	**Transfer Time**	**Transfer Time**
3:45pm – 4:15pm	The Business Case for IIoT Panel	PI Visualization 2017	

감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado