

# Using PI Integrators to Improve the Value of Your PI System Data

Martin Bryant, Field Service Engineer

November 2, 2016



# Seeking Value in a Sea of Buzz and Jargon



# Leveraging the PI System and Cortana Intelligence to Increase Production Capacity



## COMPANY and GOAL

Deschutes Brewery is the 7<sup>th</sup> largest craft brewery in U.S., and wanted to maximize production with its existing infrastructure to fund construction of a second production facility in Roanoke, VA.

Process Efficiency!

## CHALLENGE

...

Impact: Losing up to 72 hours in production time

## SOLUTION

...

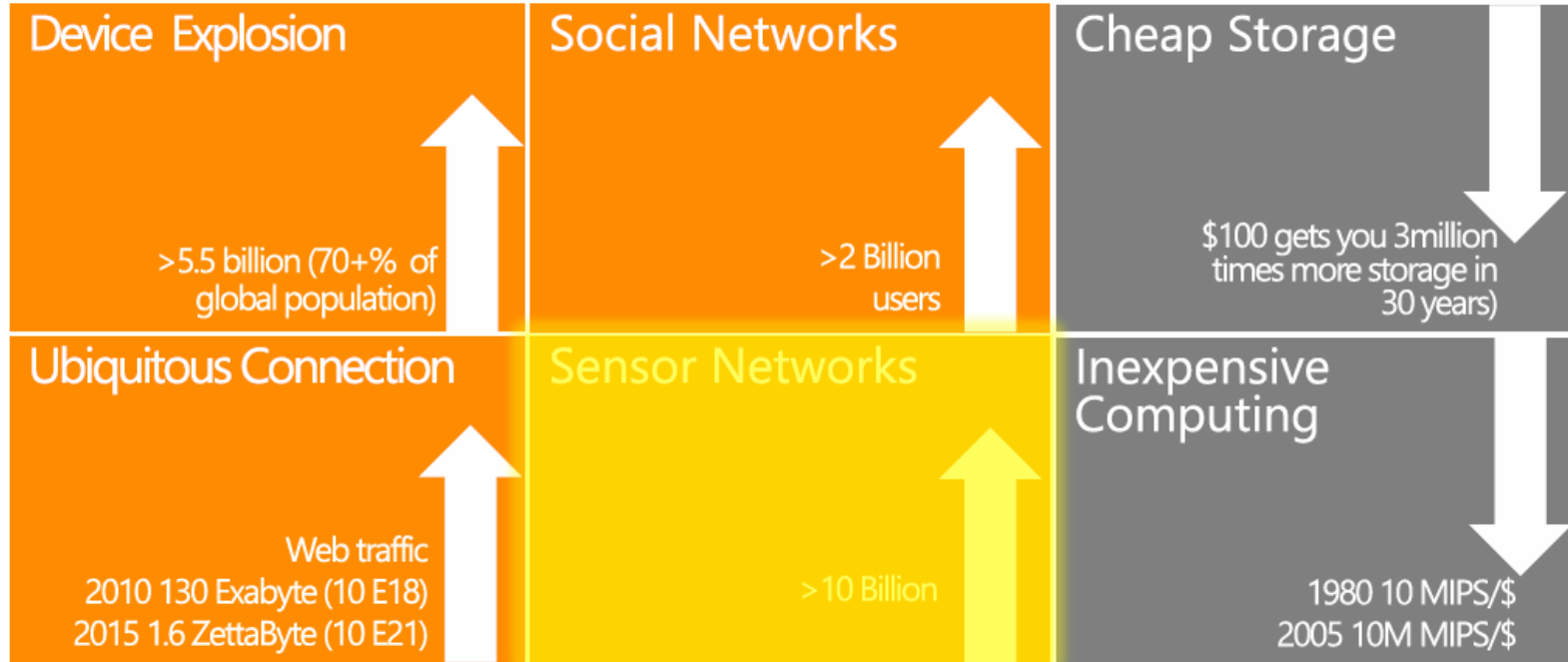
## OUTCOME

Ability to eliminate production time losses and increase production capacity

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



# The Importance of Data (and Sensor Data) is Increasing



# Sensor Data Occupies a Key Role in (Big) Data Projects



## Insight



### Time Series



### Relational



### Unstructured



# Approaches to Getting Value from this (Big) Data

## Data Warehousing



- **Centralizing data** from **different** business systems

## Visual Correlations



- **Visualizing** data sets across **multiple** variables

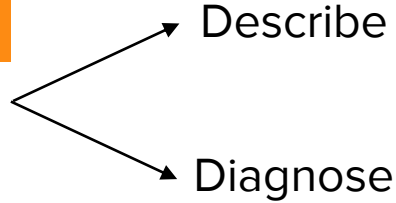
## Statistical Analytics



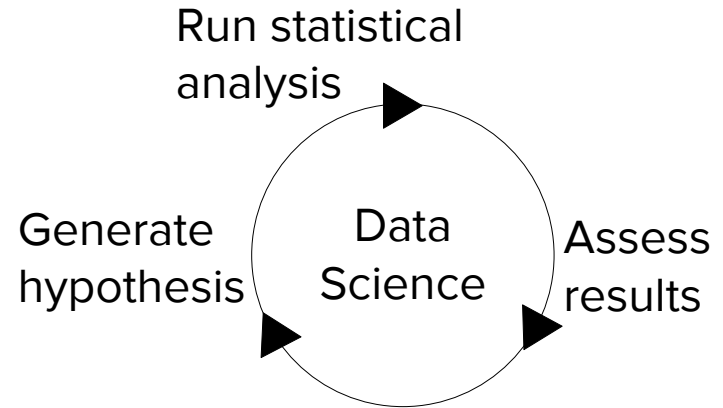
- **Identifying patterns** through statistical methods that require **large** and **diverse** datasets

# Approaches to Getting Value from this (Big) Data

## Visual Correlations

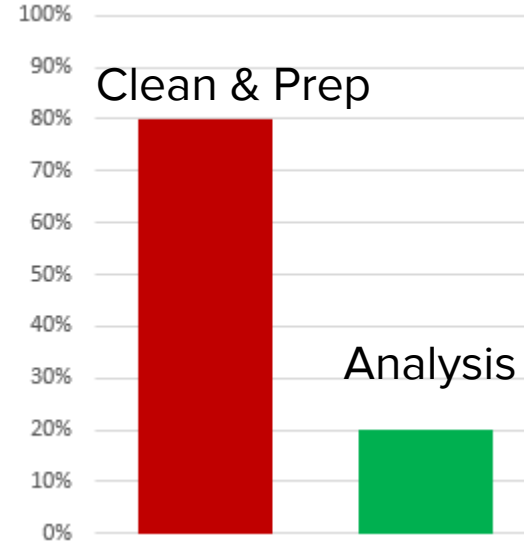


## Statistical Analytics



# (Big) Data Projects: Sound Attractive ... But There are Challenges

64% of large enterprises plan to implement a big data project.  
85% will be unsuccessful.



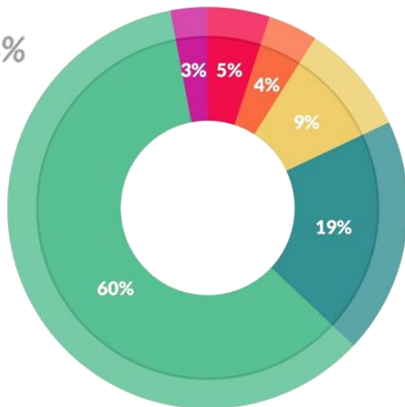
Data cleansing and preparation tasks can take 50-80% of the development time and funds.

Source: [Harvard Business Review](#)

# (Big) Data Projects: Time Spent in the Wrong Areas

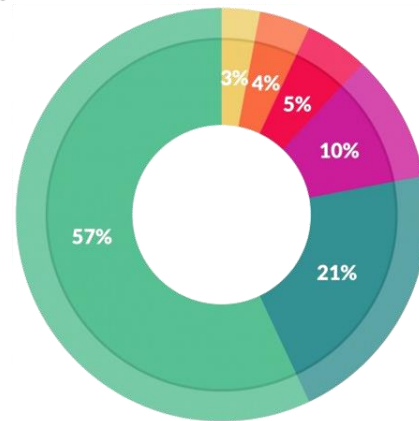
## What data scientists spend the most time doing

- Building training sets: 3%
- Cleaning and organizing data: 60%
- Collecting data sets; 19%
- Mining data for patterns: 9%
- Refining algorithms: 4%
- Other: 5%



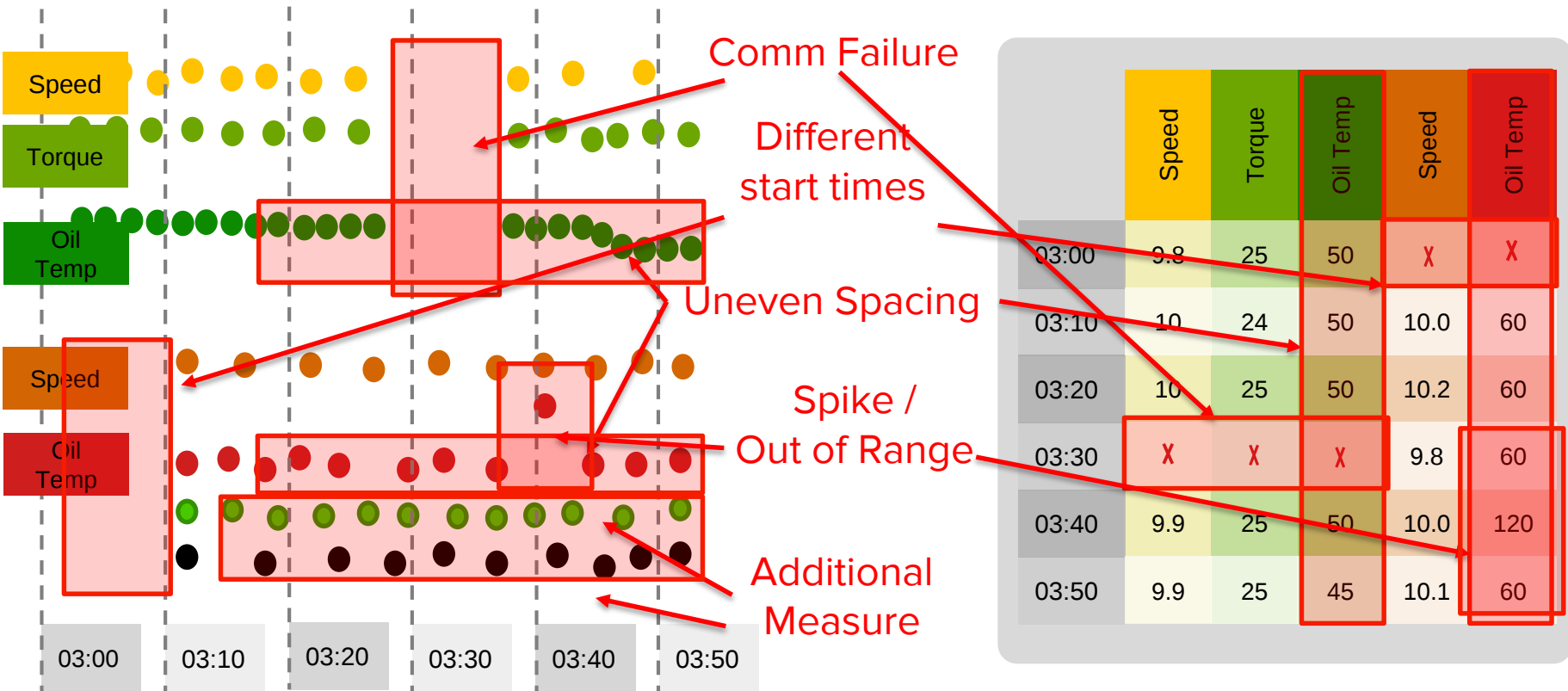
## What's the least enjoyable part of data science?

- Building training sets: 10%
- Cleaning and organizing data: 57%
- Collecting data sets: 21%
- Mining data for patterns: 3%
- Refining algorithms: 4%
- Other: 5%



Source: [Forbes](#)

# Cleaning & Preparing Sensor Data: It's Challenging

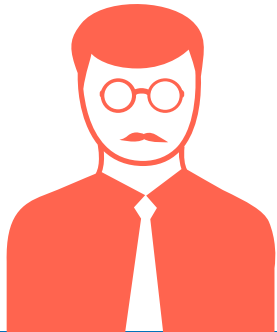


# OSIsoft has Listened to Your Needs

"We're looking to get the data into tools like Spotfire"

"Writing custom code and supporting it indefinitely is just not an option"

"I need to be able to look at data across similar and different assets at the same time"



## Summary of Needs:

Familiar tools

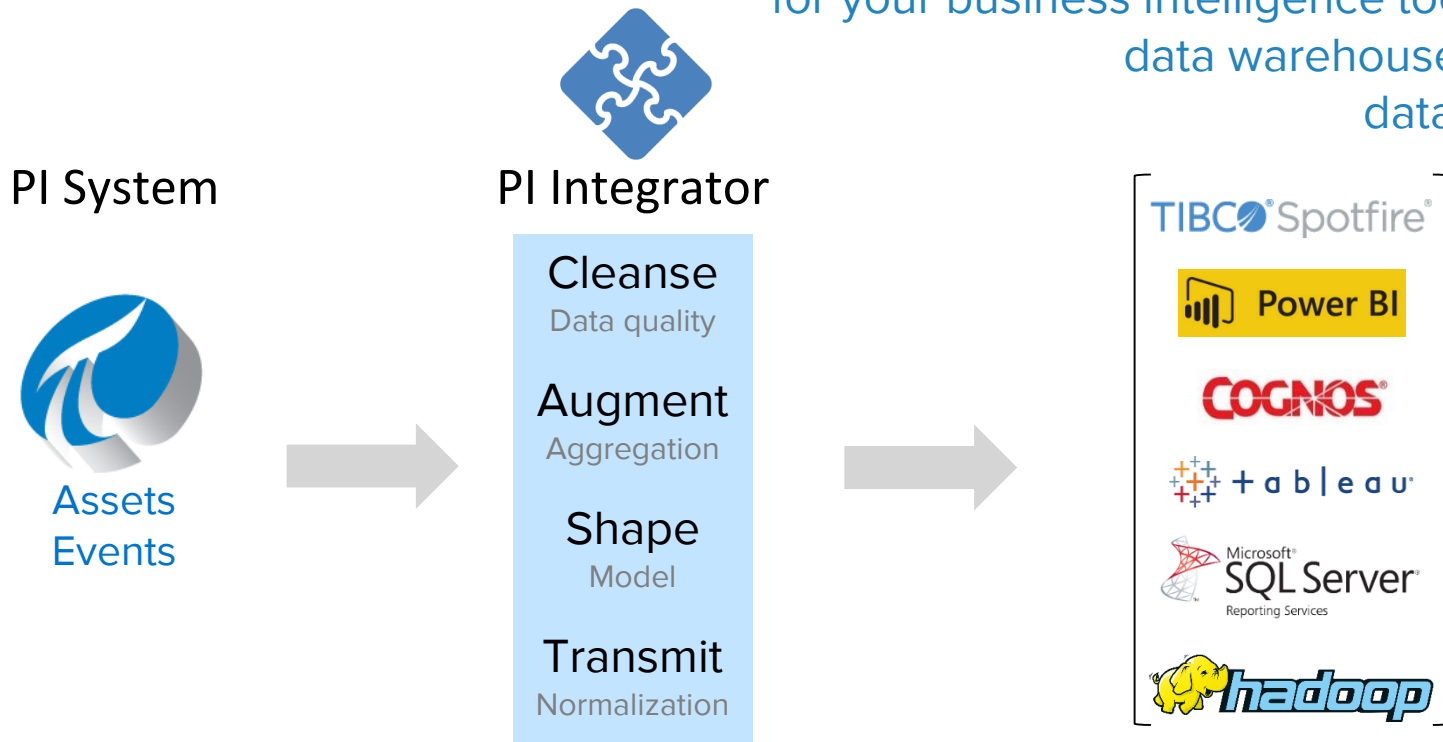
Scalability without code

Flexibility and trust



# PI Integrators Let You Clean and Prepare PI System Data

for your business intelligence tools,  
data warehouses, and  
data lakes



# Let's See This in Action!

Publishing Building Energy Consumption  
for 67 Buildings to SAP HANA



My Views

PROgreen

**+ Create Asset View**  
Build a data view starting with your asset hierarchy

**+ Create Event View**  
Build a data view starting with time series

**Modify View**  
Modify existing data view

**Remove View**  
Remove selected view

|  | Name                    | Run Status        | Type  | Run Mode | Start Time | End Time   | Last Run Time    |
|--|-------------------------|-------------------|-------|----------|------------|------------|------------------|
|  | Manufacturer Comparison | Published         | Asset | Once     | 1-dec-2015 | 1-apr-2016 | 5/5/16 11:00 PM  |
|  | NewPublication          | Publishing        | Asset | Once     | 1-jan-2013 | 1-mar-2013 | 5/16/16 10:17 PM |
|  | Compressors PI View     | Published         | Asset | Once     | 1-jul-2014 | 1-jul-2015 | 5/9/16 4:54 PM   |
|  | Oil Midstream Analysis  | Published         | Asset | Once     | 1-jul-2014 | 1-jul-2015 | 5/5/16 11:08 PM  |
|  | Compressors PI View 2   | Not Yet Published | Asset | Once     | 1-jul-2014 | 1-jul-2015 | Never            |
|  | Solar Array Publication | Published         | Asset | Once     | 1-jan-2016 | 1-mar-2016 | 5/9/16 3:30 PM   |
|  | Solar Array 2           | Not Yet Published | Asset | Once     | *-8h       | *          | Never            |

**Run Status**

Publishing 76%

View Name: NewPublication

PI AF Database: Utilities Analysis

Publish Target: SAP

View Type: Asset

Run Mode: Once

Last Run Time: 5/16/16 10:17 PM

Your Start Time is: 1-jan-2013

Your End Time is: 1-mar-2013

Sample Frequency: 30 minutes

**Publish Actions**

Resume

Stop

Update Data

**Search Shape**

**Asset Shape**

- Federal Site Building Template
  - 1st Char. of Building Code
  - 2nd Char. of Building Code
  - Active Energy Delivered
  - Area Code
  - Element Name
  - Element Type
  - Full Name
  - Parent Name
  - Parent Type

# Leveraging the PI System and Cortana Intelligence to Increase Production Capacity



## COMPANY and GOAL

Deschutes Brewery is the 7<sup>th</sup> largest craft brewery in US, and wanted to maximize production with its existing infrastructure to fund construction of a second production facility in Roanoke, VA.

Process Efficiency!

## CHALLENGE

...

Impact: Losing up to 72 hours in production time

## SOLUTION

...

## OUTCOME

Ability to eliminate production time losses and increase production capacity

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



# History and Background

- Located in Bend, OR
- Founded in 1988
- Pub opened in Portland, OR in 2007



- 2 brewhouses
- 50+ vessels
- Bottling and kegging
- 7<sup>th</sup> largest craft brewer in the U.S.



# Leveraging the PI System and Cortana Intelligence to Increase Process Efficiency



## COMPANY and GOAL

Deschutes Brewery is the 7<sup>th</sup> largest craft brewery in US, and wanted to maximize production with its existing infrastructure to fund construction of a third 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 process

## SOLUTION

Used the PI Integrator for Microsoft Azure to prepare operating, asset, and event data for each batch in the PI System for use by Azure Machine Learning to train a predictive model and inform when a phase transition occurs

## OUTCOME

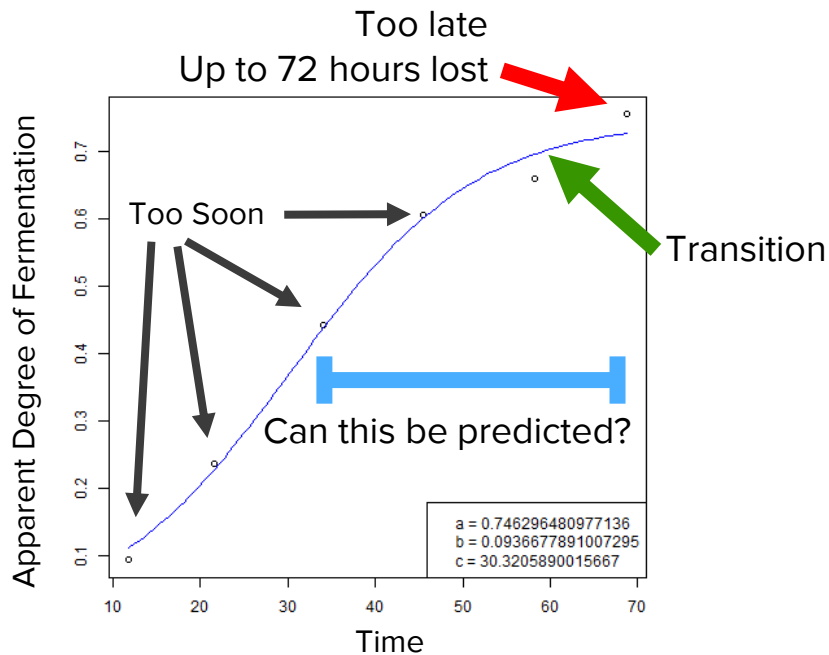
Ability to eliminate production time losses and increase production capacity

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



# Production Challenges

Filing ► Fermentation ► Free Rise ► ...



## Options

- Invest \$750k into inline density meters
- Manually predict transition in spreadsheets

## Constraints

- CAPEX not an option
- Only one manual density measurement per vessel every 8-10 hours

## Challenge

- Transition occurs between manual density measurements
- Prepare data for each batch prediction
- Automate & operationalize predictions
- Continuously improve accuracy of predictions



# Machine Learning Model

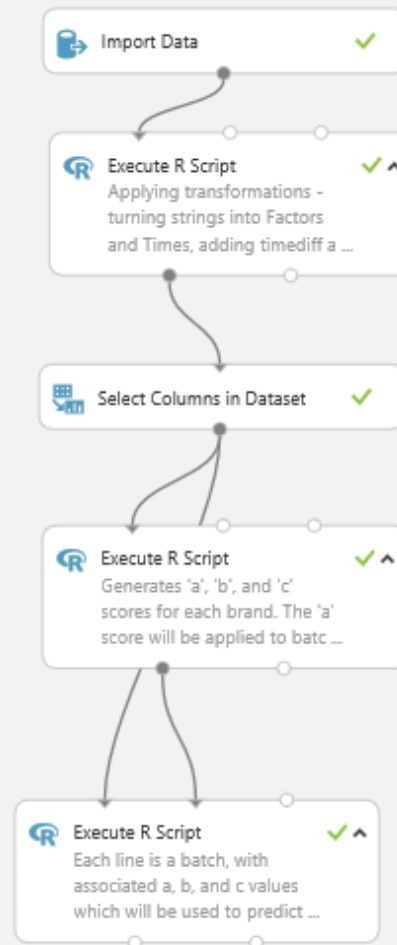
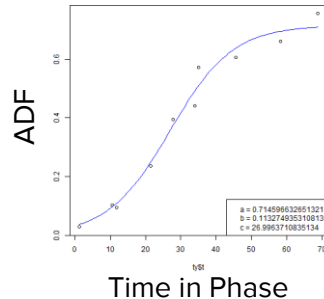
## Proposal

Early Density Readings → Transition Time

## Hypothesis

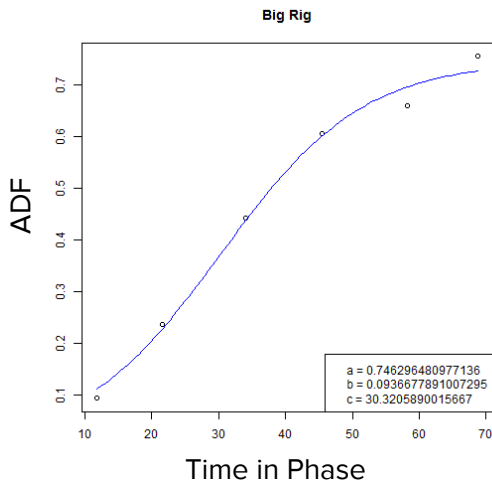
Transition Time influenced by

- Brand of beer
- Fermentation dynamics (temperatures, pressures, etc)
- Vessel's dimensions & volume

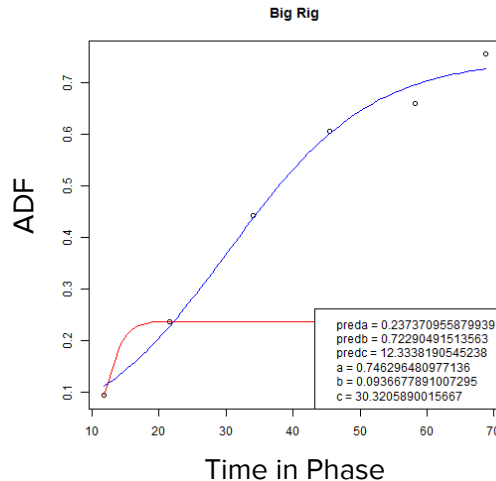


# Azure ML Predicts Accurate Transition Time

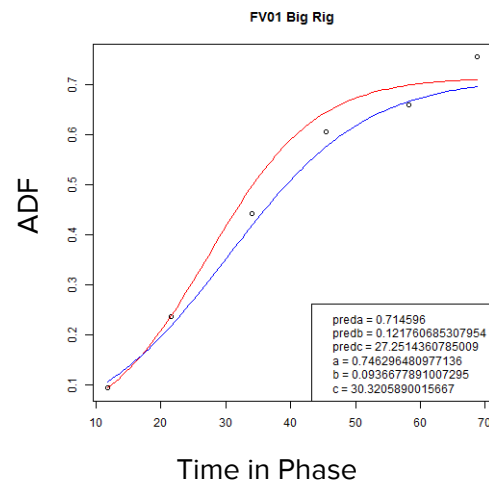
**Benchmark:** Measure accuracy against a standard (based on historical data)



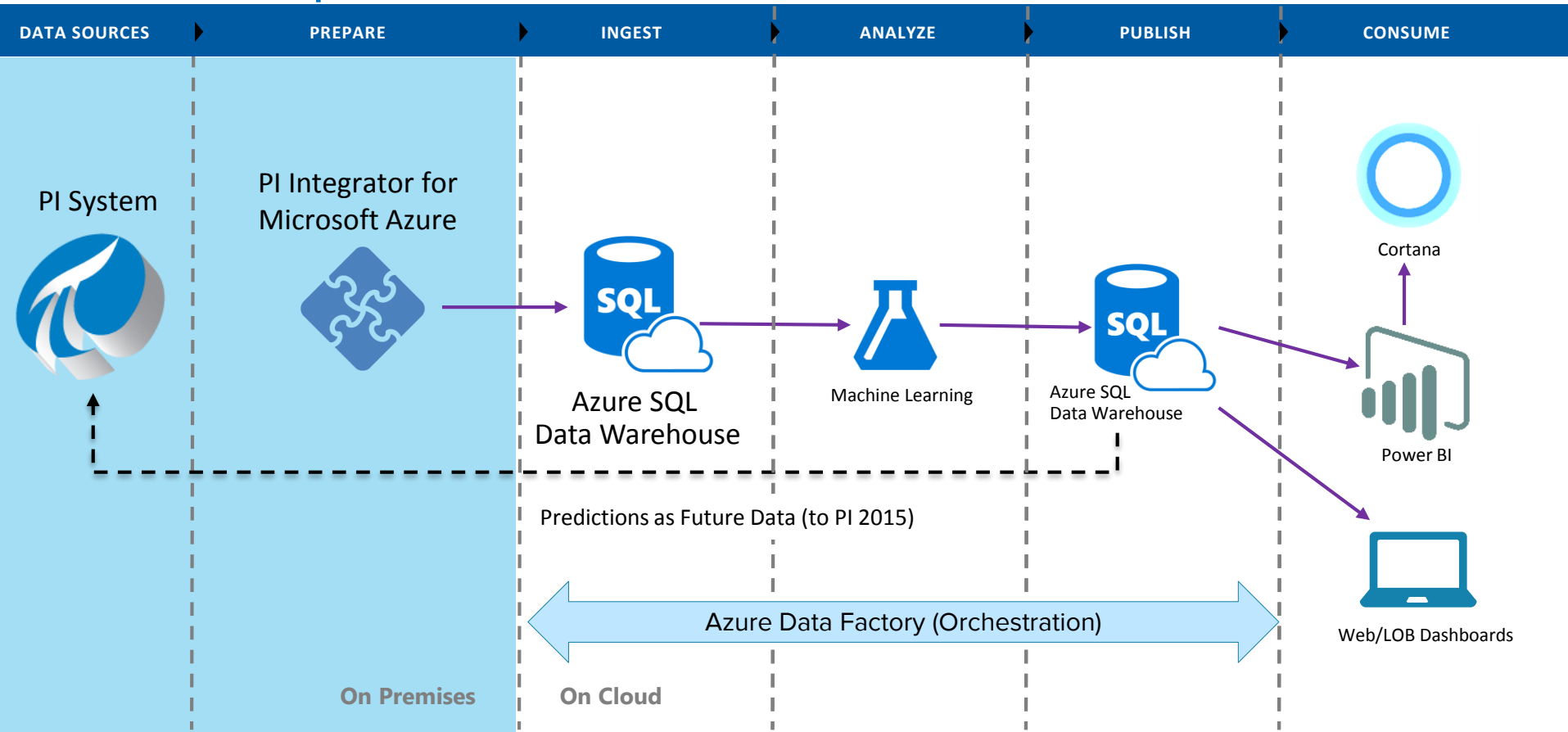
**Predict:** Use 2 early densities to estimate transition time



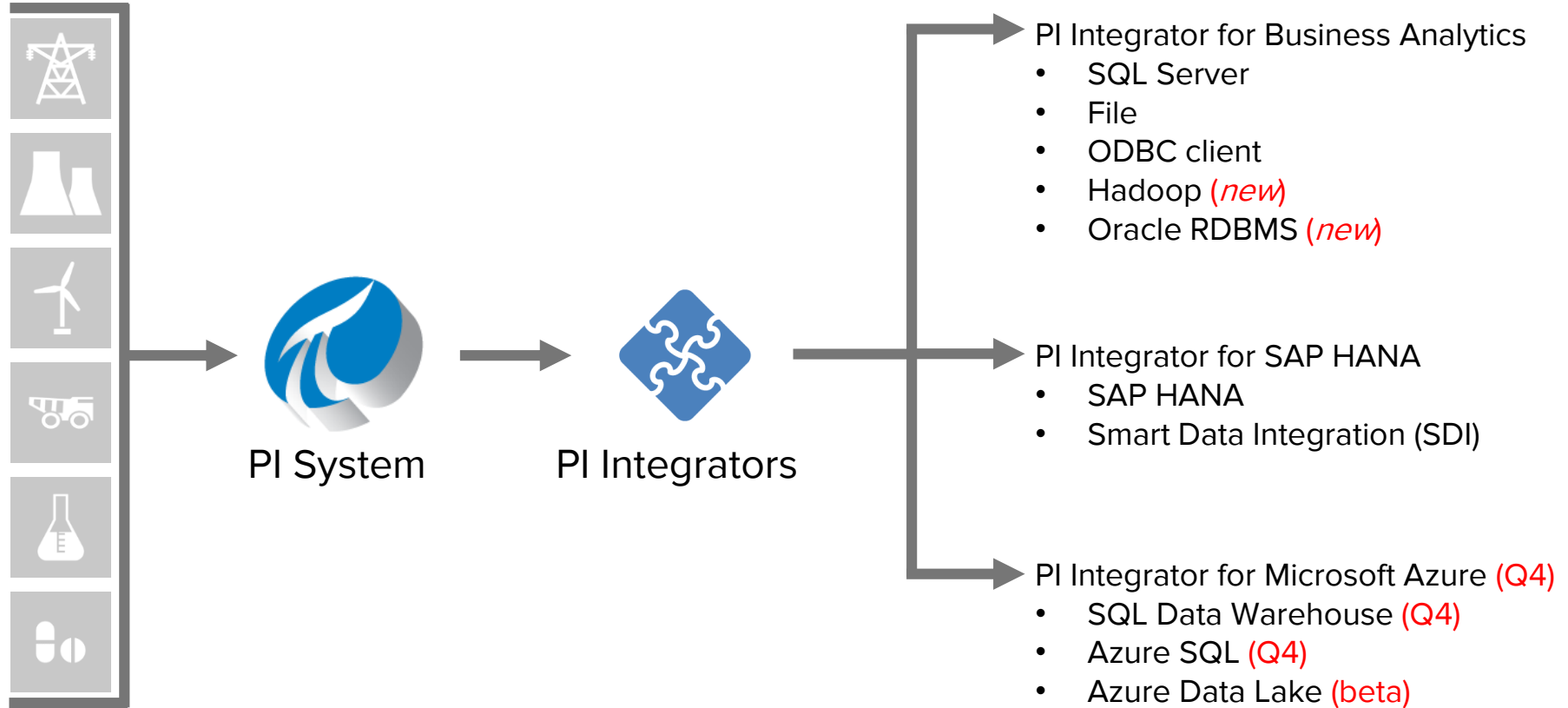
**Refine:** Base predictions on brand for greater accuracy



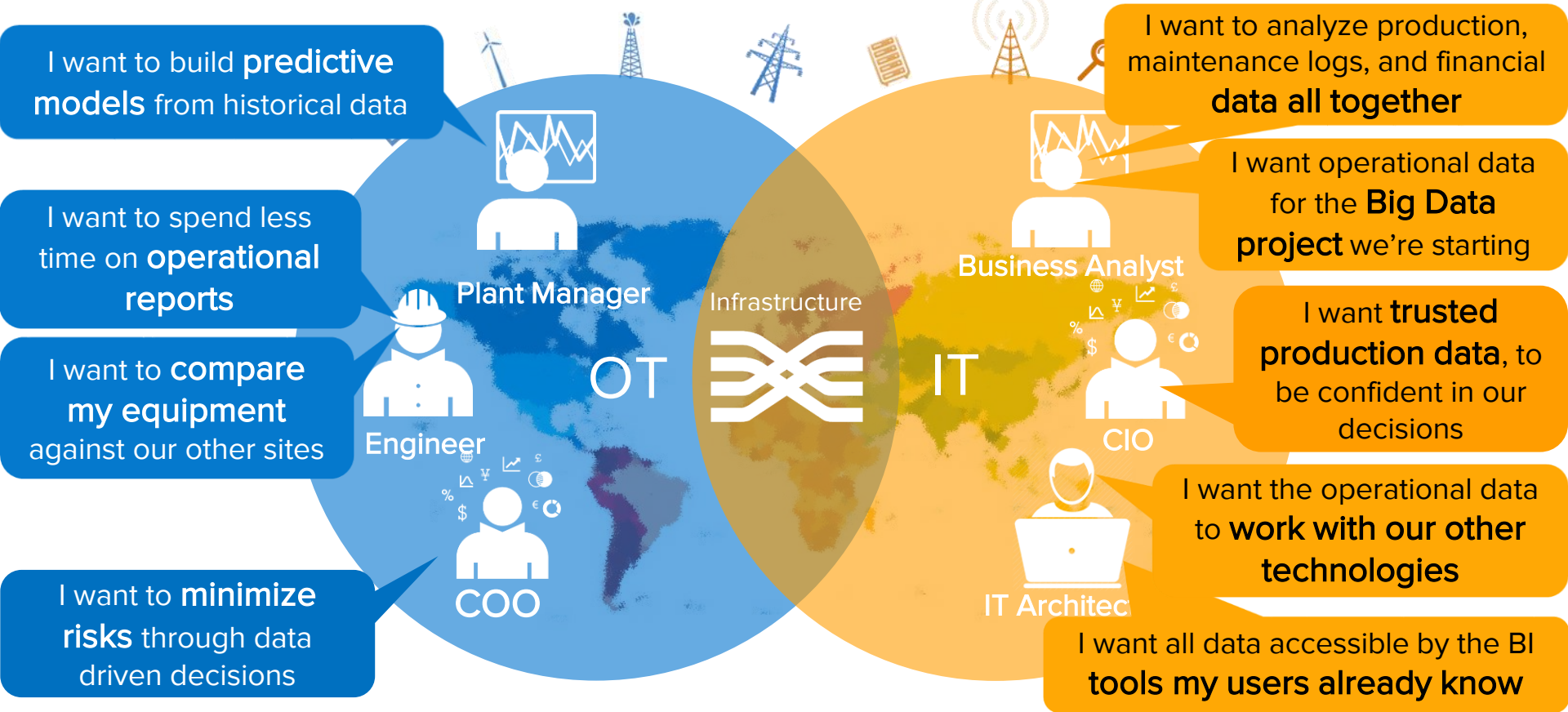
# How to Operationalize Predictions



# PI Integrators



# New Technology is bringing the IT and OT Worlds Together



## Oil and Gas

Drilling and production comparisons  
Information distribution



## Mining

Route optimization  
Energy reduction  
(across fleets of haul trucks)



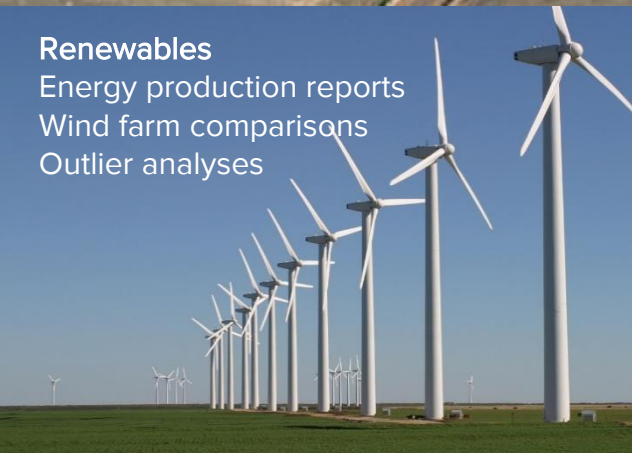
## Life Sciences

Reactor comparisons  
Process scale-ups  
(1L, 3L, 10L, 1kL, 10kL)



## Renewables

Energy production reports  
Wind farm comparisons  
Outlier analyses



## PI Integrator for Business Analytics is in use today!

- ✓ IT/ OT integration
- ✓ Business intelligence and reporting
- ✓ Data warehouse integration
- ✓ Support for cross-platform projects

## Food and Beverage

Utility usages  
Process analytics



# Move the Needle with PI Integrators

- Start the conversation!
  - Could a colleague make a **better decision** with **data you see daily**?
  - What **business intelligence tools** could you leverage further?
- Visit **YouTube** or [osisoft.com](https://www.osisoft.com) to see which PI Integrator works for you



PI Integrator for Business Analytics  
PI Integrator for SAP HANA  
PI Integrator for Microsoft Azure

# Contact Information

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OSIsoft, LLC



# 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"/> |

# Thank You



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