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

Bethanne Peters, Field Service Engineer

September 28th, 2016

Seeking Value in a Sea of Buzz and Jargon

Machine Learning

Internet of Things

Advanced Analytics

Data Lakes

Predictive Analytics

Big Data

Process Efficiency

Data Warehouse

Operational Intelligence

Data Science

Business Intelligence

Data Mining

Advanced Visualization

Leveraging the PI System and Cortana Intelligence to Increase Production Capacity

COMPANY and GOAL

Deschutes Brewery is the 7th largest craft brewery in U.S., and wanted to **maximize production with its existing infrastructure** to fund construction of an additional production facility in Roanoke, VA.

Process Efficiency!

CHALLENGE

▪ ▪ ▪

Impact: **Losing up to 72h** in production time

SOLUTION

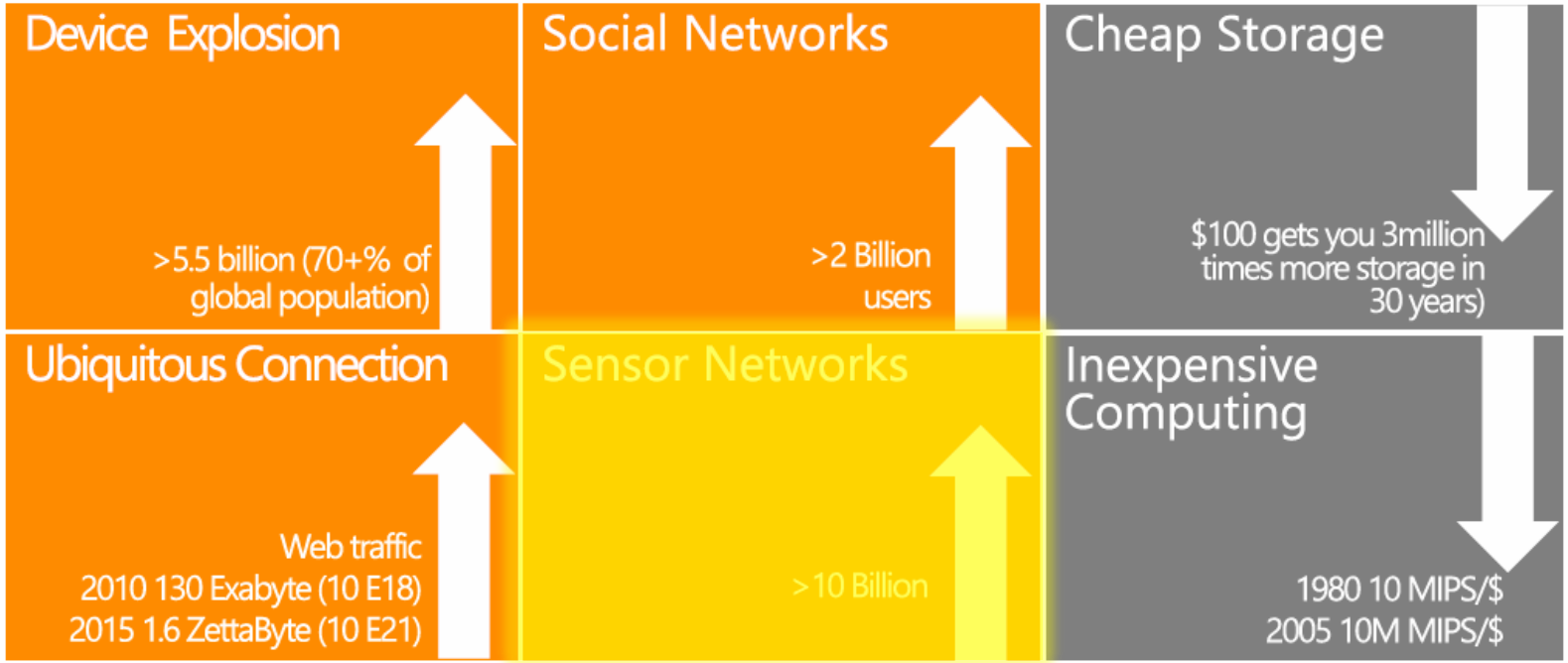
▪ ▪ ▪

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

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

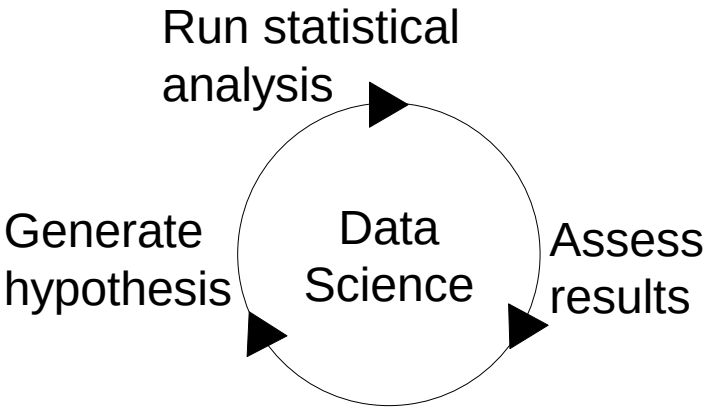
Approaches to Getting Value from this (Big) Data

Visual Correlations

Describe

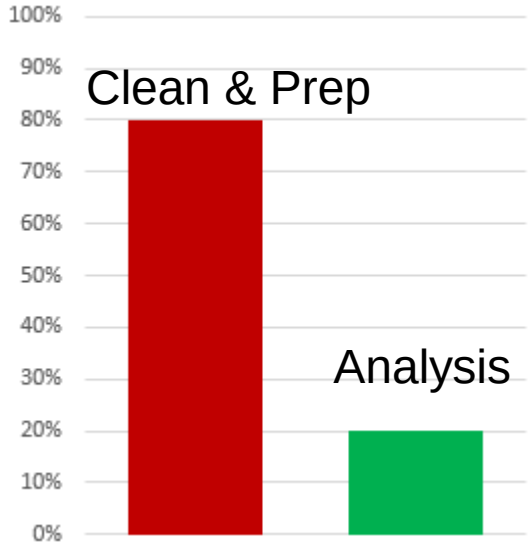
Diagnose

Statistical Analytics



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

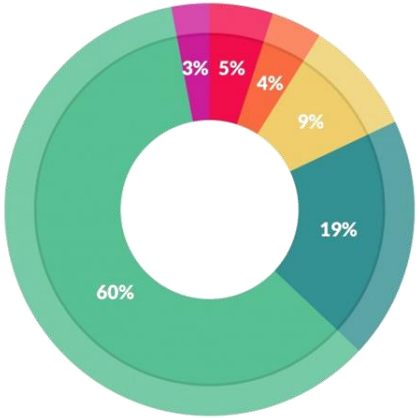
***64%** of large enterprises plan to implement a big data project.*
***85%** will be unsuccessful.*



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

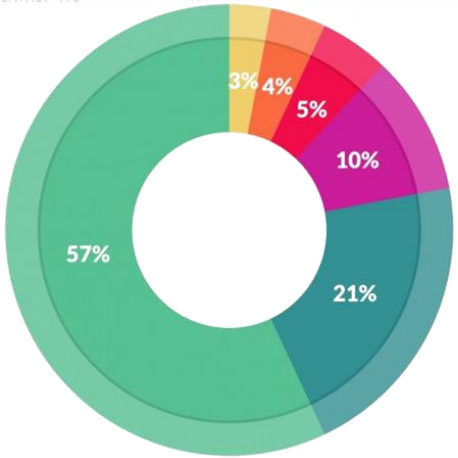
Source: https://hbr.org/2014/04/the-sexiest-job-of-the-21st-century-is-tedious-and-that-needs-to-change/

(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%*

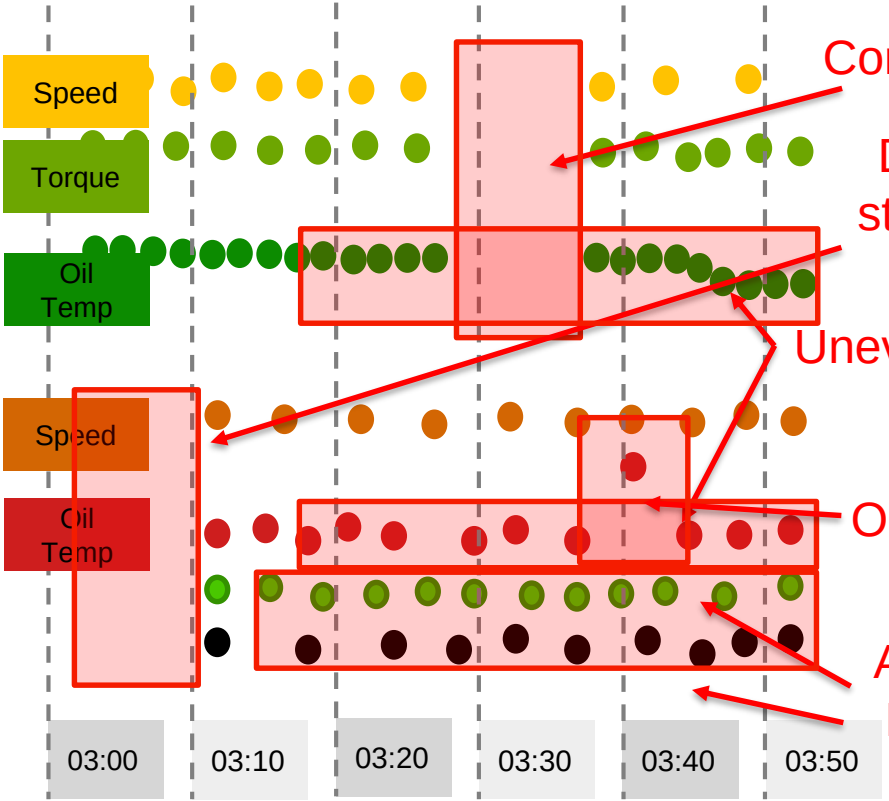


What's the least enjoyable part of data science?

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

Source: http://www.forbes.com/sites/gilpress/2016/03/23/data-preparation-most-time-consuming-least-enjoyable-data-science-task-survey-says/#5481f6037f75

Cleaning & Preparing Sensor Data: It's Challenging



Comm Failure

Different start times

Uneven Spacing

Spike / Out of Range

Additional Measure

	Speed	Torque	Oil Temp	Speed	Oil Temp
03:00	9.8	25	50	X	X
03:10	10	24	50	10.0	60
03:20	10	25	50	10.2	60
03:30	X	X	X	9.8	60
03:40	9.9	25	50	10.0	120
03:50	9.9	25	45	10.1	60

OSIsoft has Listened to Your Needs

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

PI System

Assets
Events

PI Integrator

Cleanse
Data quality

Augment
Aggregation

Shape
Model

Transmit
Normalization

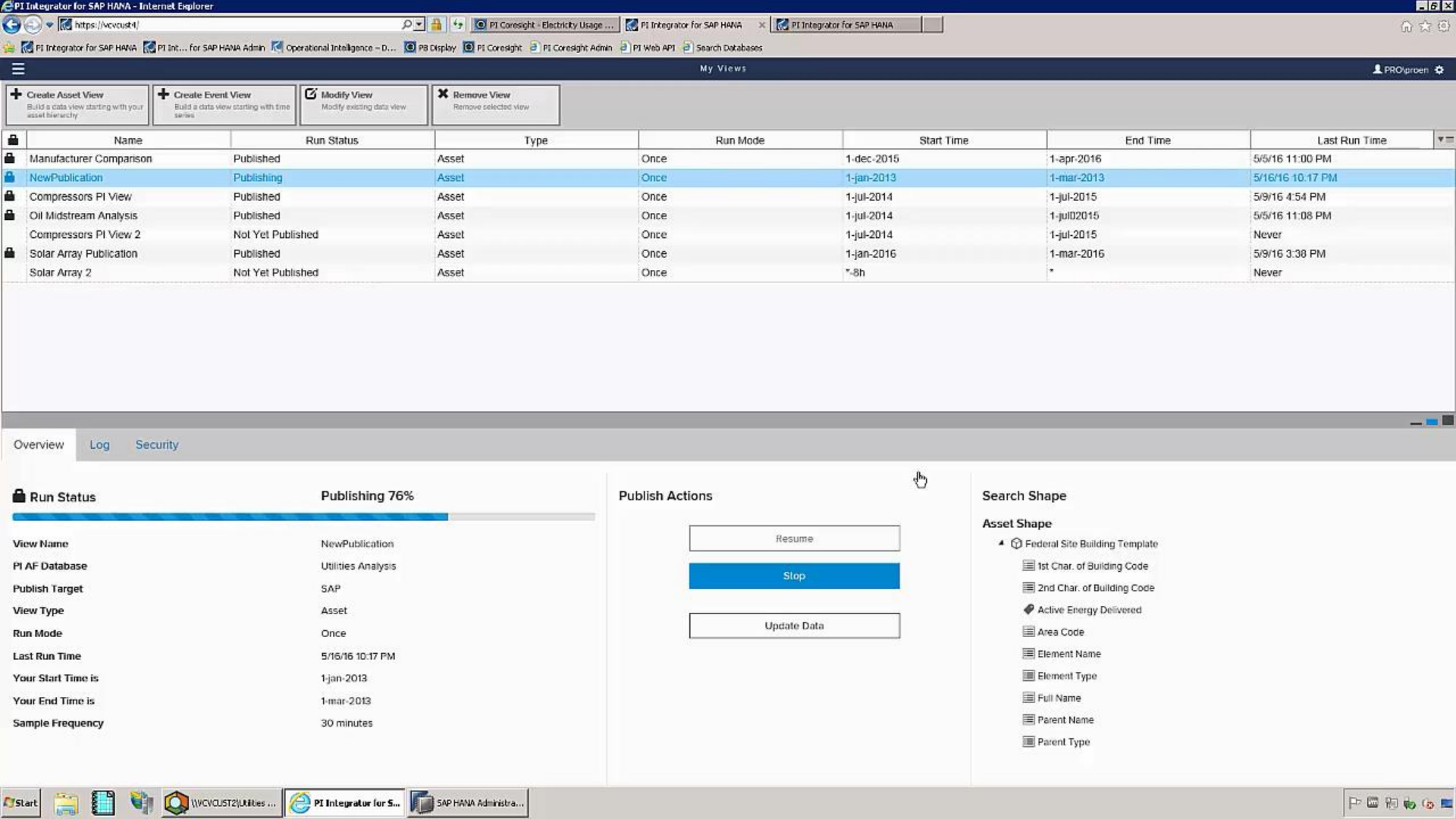
Clean & Prepare

TIBCO Spotfire
Power BI
COGNOS
tableau
Microsoft SQL Server Reporting Services
hadoop

Analyze

Let’s See This in Action!

Publishing Building Energy Consumption for 67 Buildings to SAP HANA


PI Integrator for SAP HANA - Internet Explorer
My Views
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-jul2015
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 3:38 PM
Solar Array 2
Not Yet Published
Asset
Once
*-8h
*
Never
Overview
Log
Security
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 7th largest craft brewery in US, and wanted to **maximize production with its existing infrastructure** to fund construction of an additional production facility in Roanoke, VA.

Process Efficiency!

CHALLENGE

▪ ▪ ▪

Impact: **Losing up to 72h** in production time

SOLUTION

▪ ▪ ▪

OUTCOME

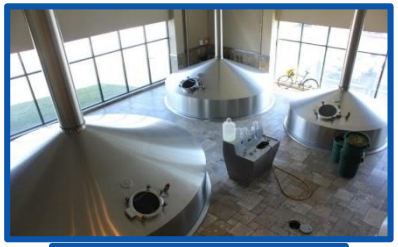
Ability to **eliminate production time losses** and increase production capacity

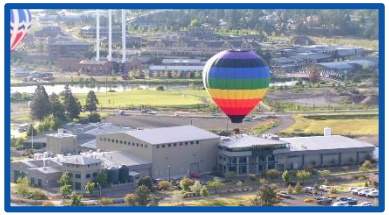
Accurate **predictions of** when a batch's phase **transitions** from fermentation to free rise

History and Background

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

- 2 brewhouses
- 50+ vessels
- Bottling and kegging
- 7th 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 7th largest craft brewery in US, and wanted to **maximize production with its existing infrastructure** to fund construction of another brewery in Roanoke, VA

CHALLENGE

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

Impact: **Losing up to 24H-72H** 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

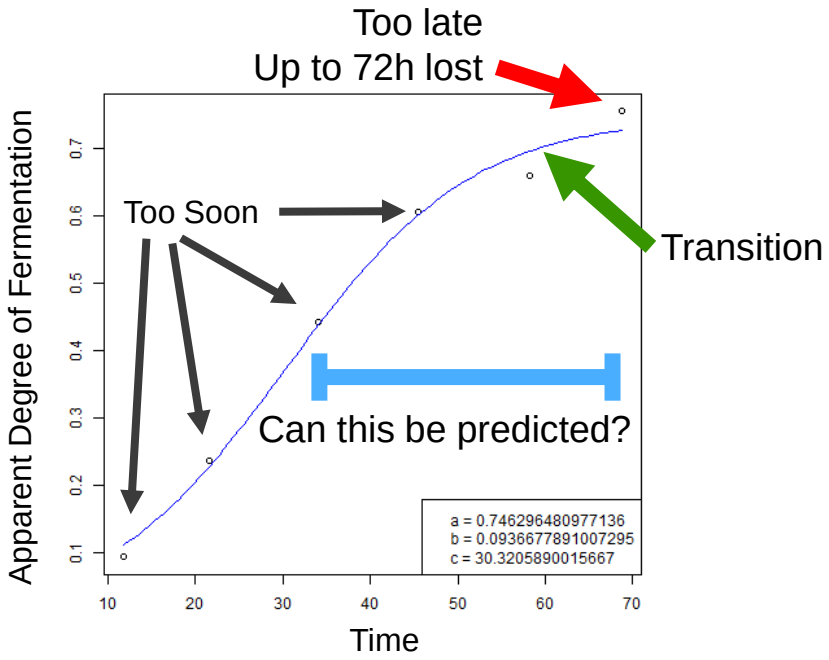
OUTCOME

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

Filling ▶ Fermentation ▶ Free Rise ▶ ▪ ▪ ▪



Options

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

Constraints

- CAPEX not an option
- One manual density measurement per vessel every 8-10h

Challenge

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

Machine Learning Model

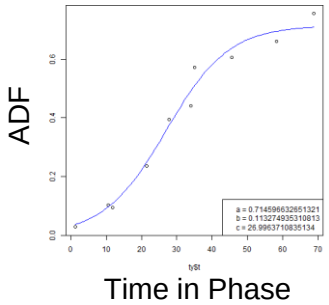
Proposal

Early Density Readings → Transition Time

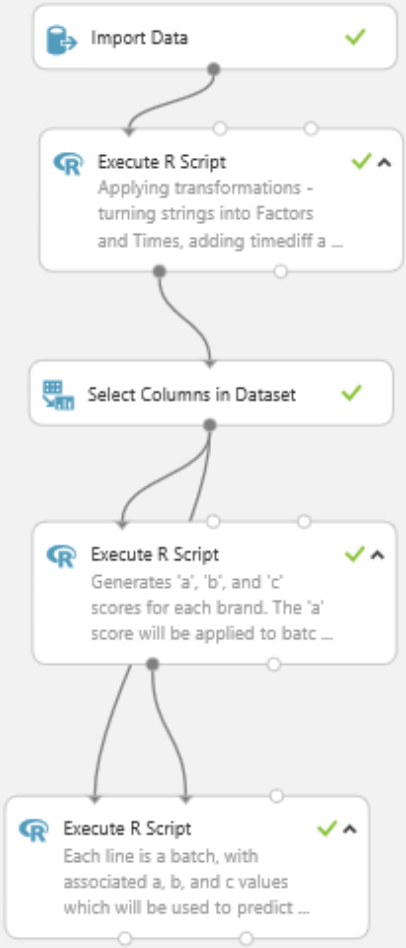
Hypothesis

Transition Time influenced by

- Brand of Beer
- Fermentation dynamics (Temperatures, pressures,..)
- Vessel's dimensions & volume



Time in Phase

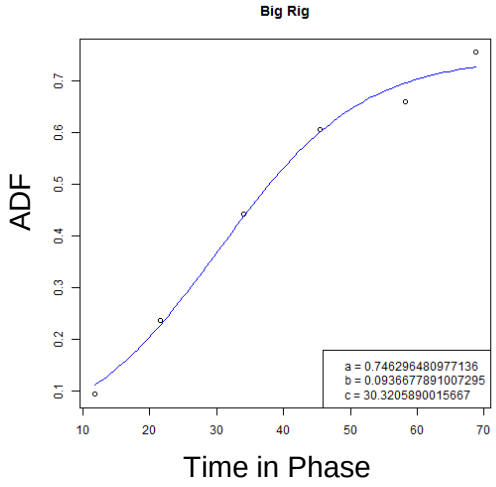


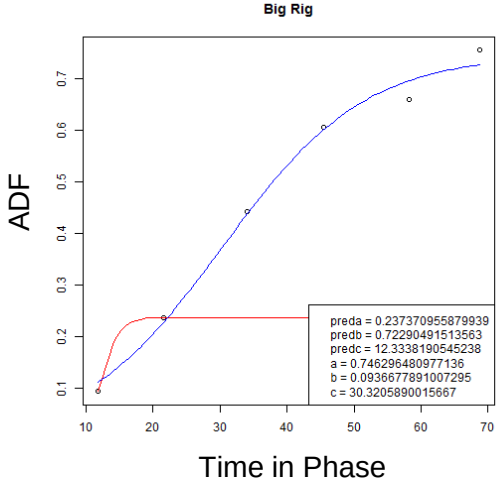
Azure ML Predicts Accurate Transition Time

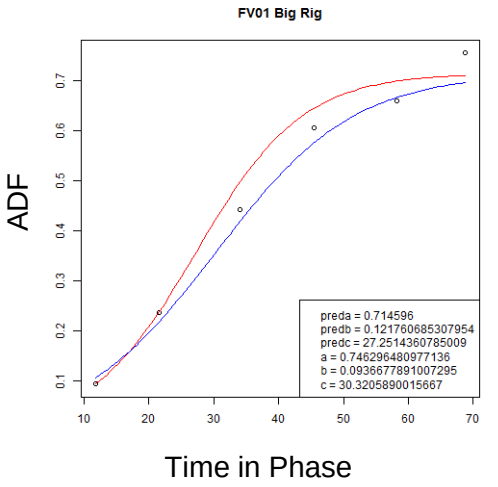
Benchmark: Measure accuracy against a standard (based on historical data)

Predict: use 2 early densities to estimate transition time

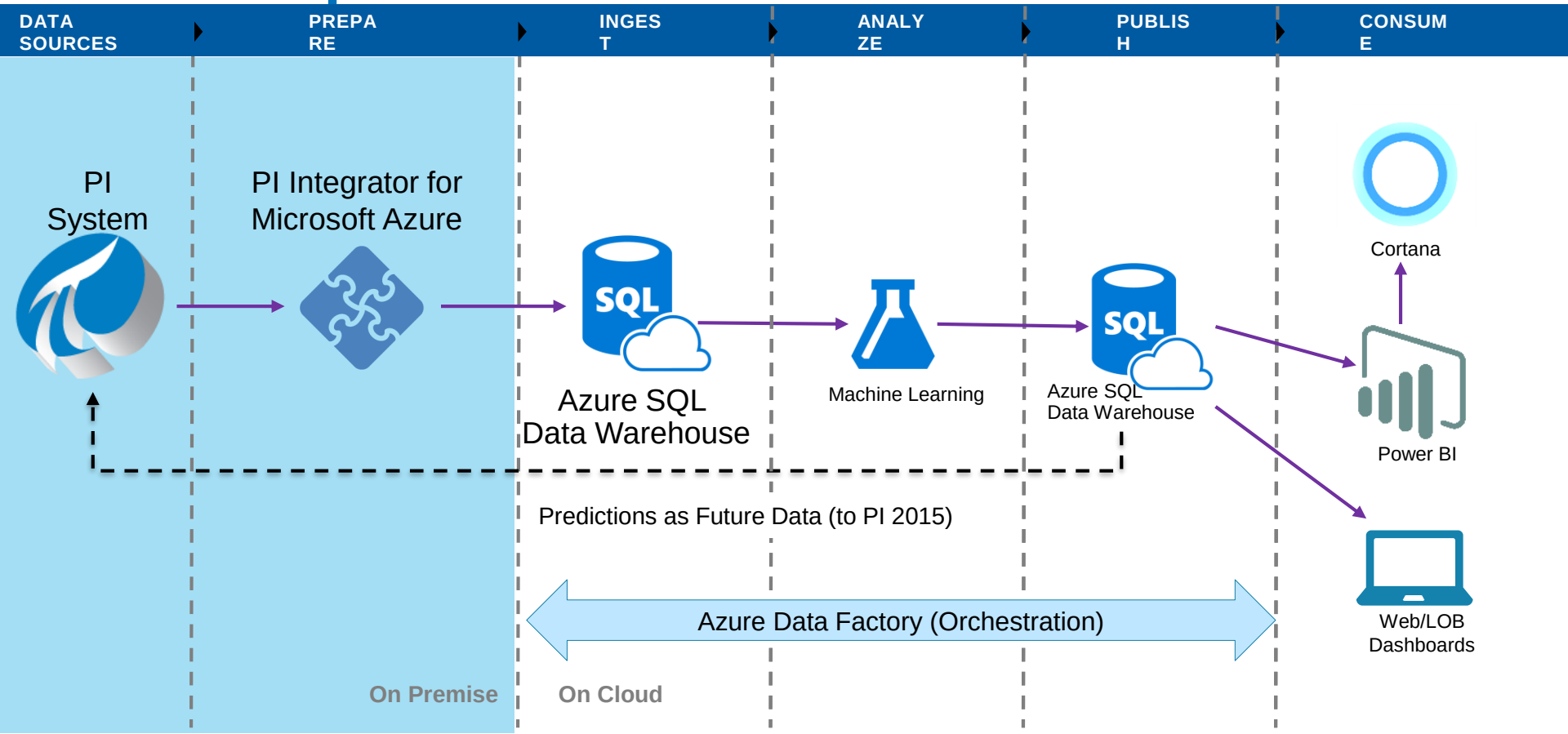
Refine: base predictions on brand for greater accuracy



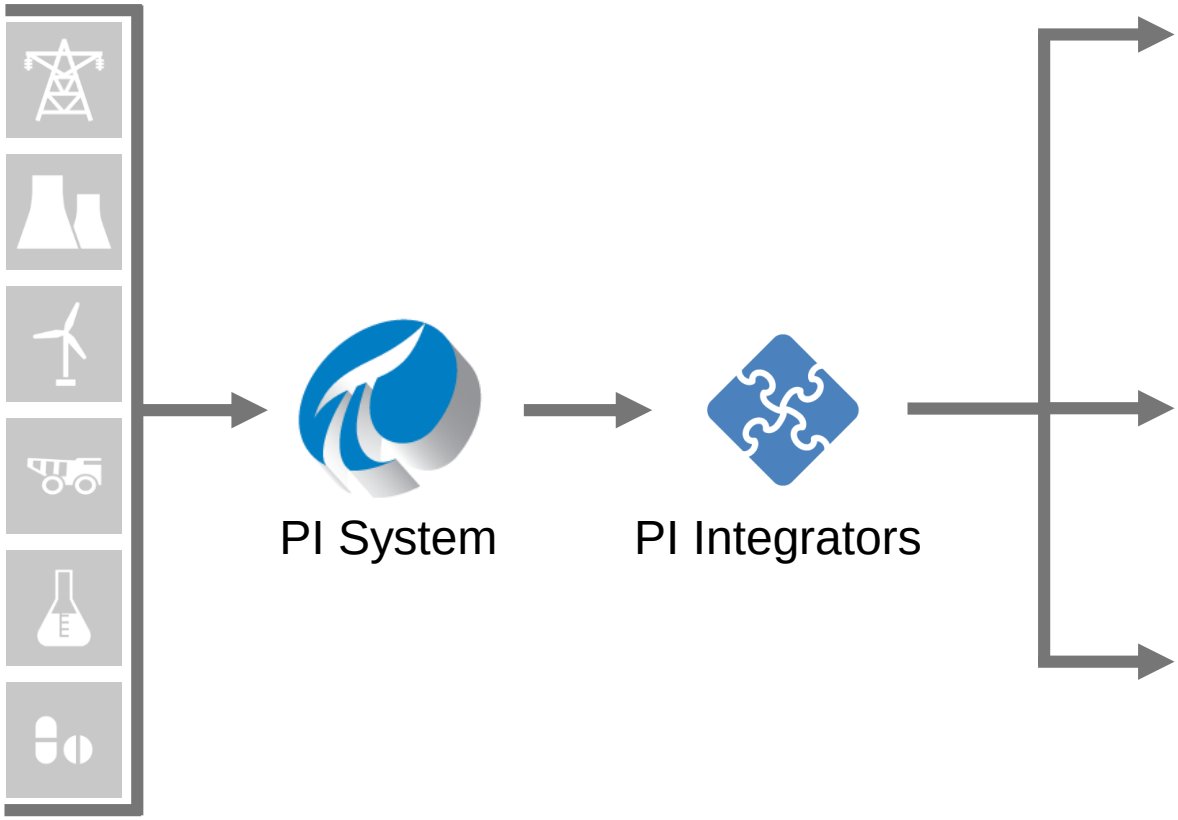




How to Operationalize Predictions



PI Integrators



PI Integrator for Business Analytics
- SQL Server
- File
- ODBC client
- Hadoop (*new*)
- Oracle RDBMS (*new*)

PI Integrator for SAP HANA
- SAP HANA
- Smart Data Access (SDA)

PI Integrator for Microsoft Azure (Q4)
- SQL Data Warehouse (Q4)
- Azure SQL (Q4)
- Azure Data Lake (beta)

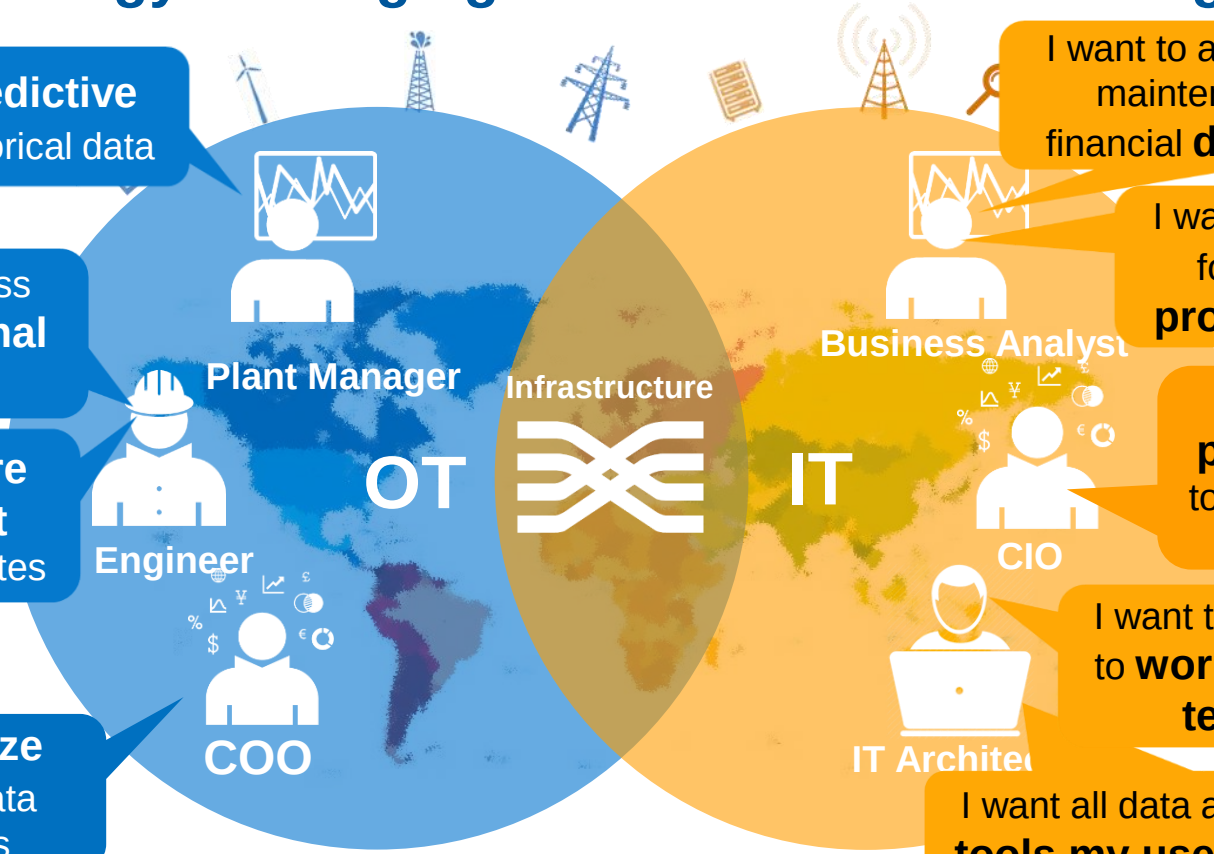
New Technology is bringing the IT and OT Worlds Together

I want to build **predictive models** from historical data

I want to spend less time on **operational reports**

I want to **compare my equipment** against our other sites

I want to **minimize risks** through data driven decisions



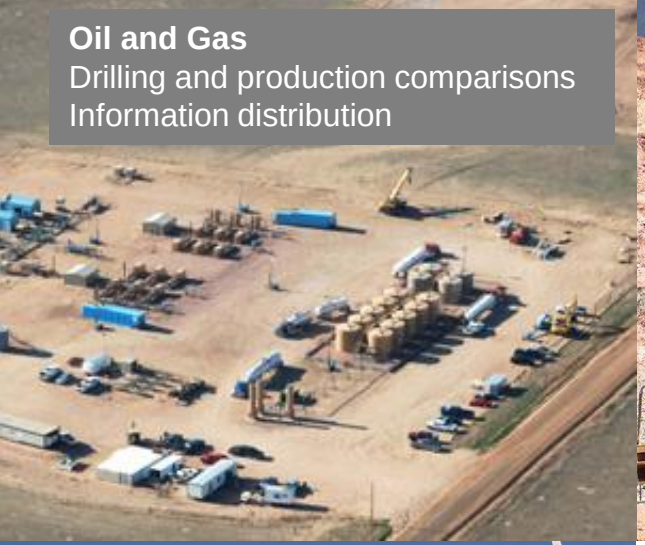
I want to analyze production, maintenance logs, and financial **data all together**

I want operational data for the **Big Data project** we're starting

I want **trusted production data**, to be confident in our decisions

I want the operational data to **work with our other technologies**

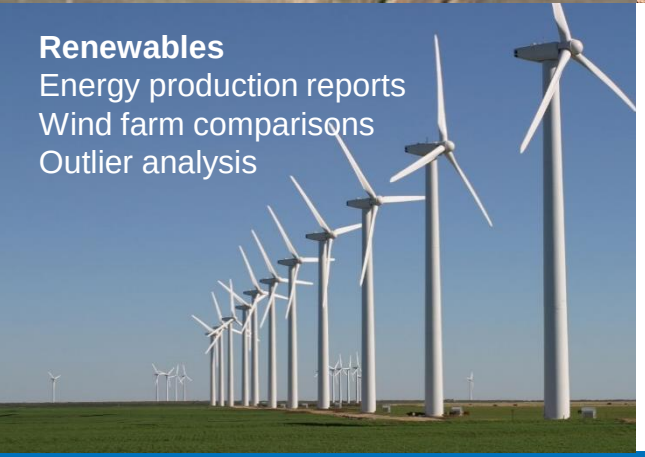
I want all data accessible by the BI **tools my users already know**



Oil and Gas
Drilling and production comparisons
Information distribution

Mining
Route optimization
Energy reduction
Across 300 haul trucks

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



Renewables
Energy production reports
Wind farm comparisons
Outlier analysis

PI Integrator for Business Analytics is in use today!

- ✓ IT/ OT integration
- ✓ Business intelligence and reporting
- ✓ Data warehouse integration
- ✓ Supporting 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** 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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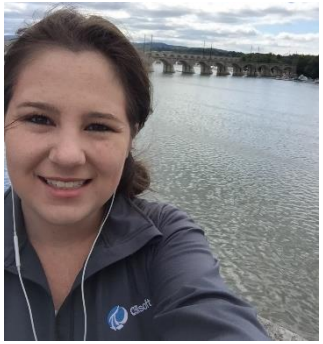

Questions

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	☐	☐	☐	☐

Thank You