Introduction to **Process Optimization** and **Advanced Analytics** with the **PI System**

Live Polling in this session:
PollEV.com/osisoft2

Presented by Landry Khounlavong (Product Marketing Manager, OSIsoft)
Selmane Sekkai (Systems Engineer, OSIsoft)

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Where are we in our PI System Basics journey?



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Where are we in our PI System Basics journey?



Landscape

My Operational Data, the PI System and the Greater Technology Landscape

Asset Health

Introduction to Asset Monitoring & CBM with the PI System

Process Optimization

Intro to Process Optimization & Advanced Analytics with the PI System

Visualization

Introduction to Visualizing data with the PI System

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Process optimization is a journey



Issue needs a solution



Opportunity is identified



Heroic levels of optimization

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Two questions to be addressed in 30 minutes

How can the process of **process optimization** be optimized?

Is there a *buzz* word that I can use to optimize a process?

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Age-old questions in process optimization

How can we:

- ↑ production by X%?
- ↓ production time by Y hours?
- ↓ operating costs by $Z?



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Process optimization can be streamlined with the right tool set



What components are inefficient?	**Why** is it inefficient?	**How** can we improve it?	**Did** the process's efficiency improve?
Challenges Data silos Access overhead	Challenges Many "truths" Comparison difficulty	Challenges Thermodynamics Fluid mechanics	Challenges Data silos Access overhead
Solution ?	Solution ?	Solution ?	Solution ?

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How can the **PI System** help optimize a process?

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Customer Success Story

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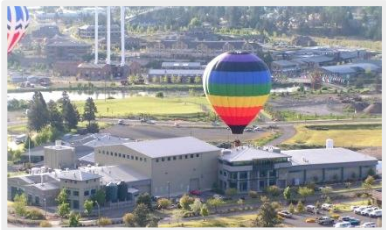
- Located in Bend, OR
- Founded in 1988
- Pub opened in Portland, OR in 2007

- 2 brewhouses
- 50+ vessels
- Bottling and kegging
- 7th largest US craft brewer











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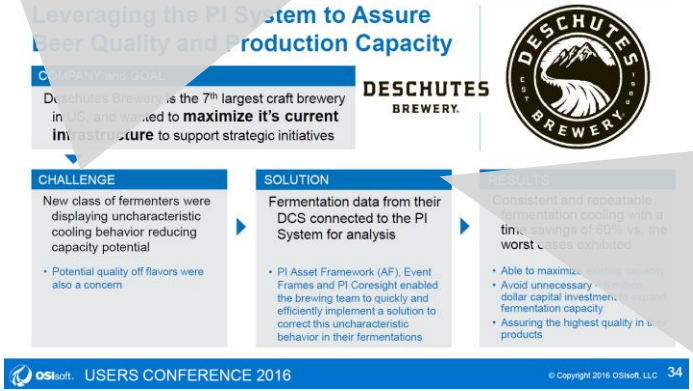
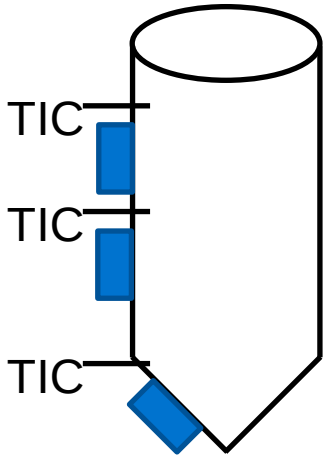
Quick data access enables production increase

Challenge

"…uncharacteristic cooling behavior…"





Solution

"…PI System enabled the brewing team to quickly and efficiently implement a solution to correct this uncharacteristic behavior…"

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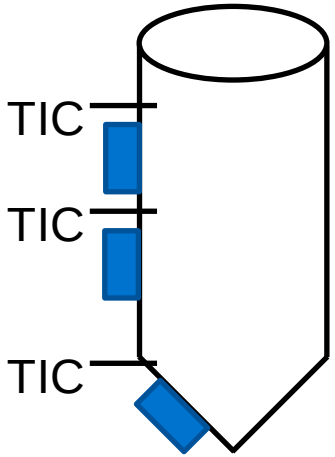
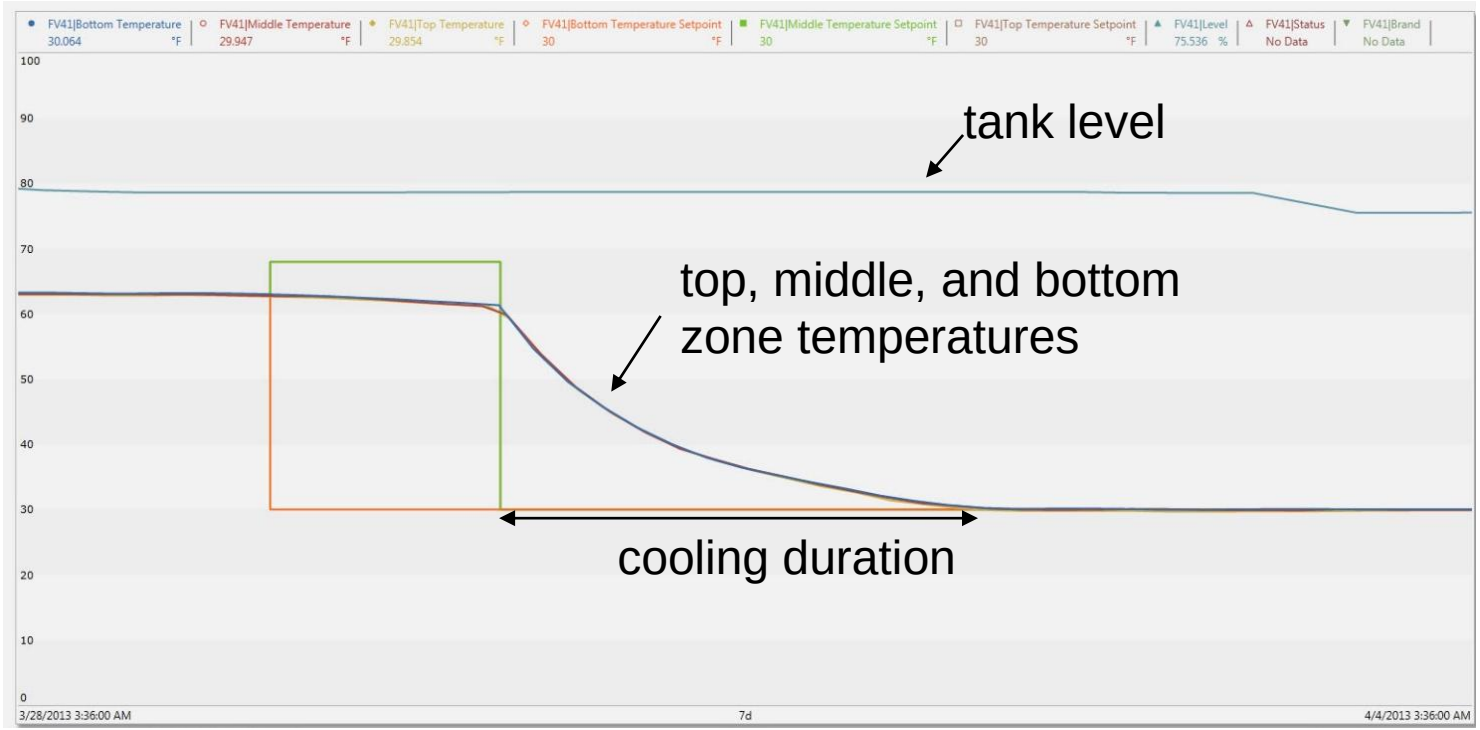
An ideal cooling process for the *entire* tank





Identify → Analyze → Implement → Validate

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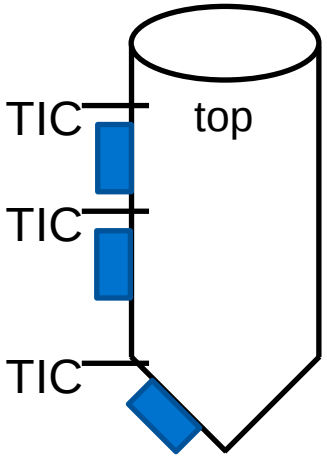
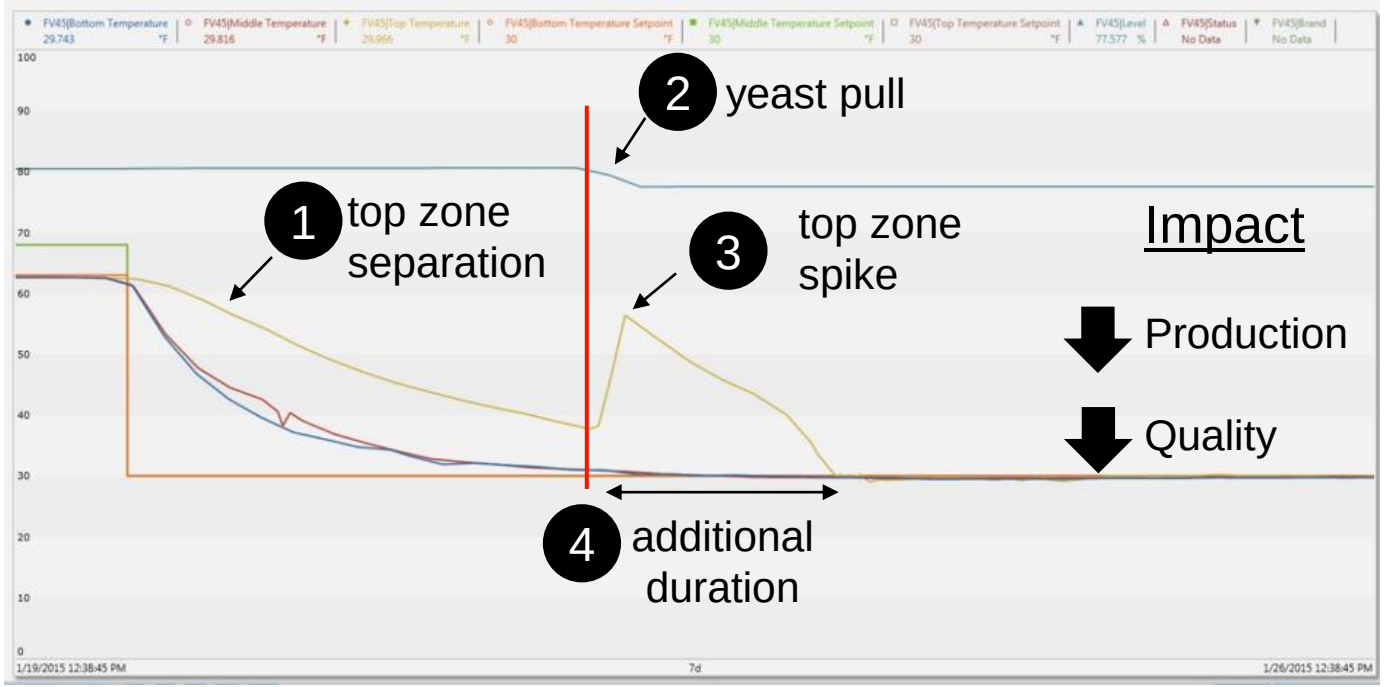
A deviation in cooling causes a delay in production





Identify → Analyze → Implement → Validate

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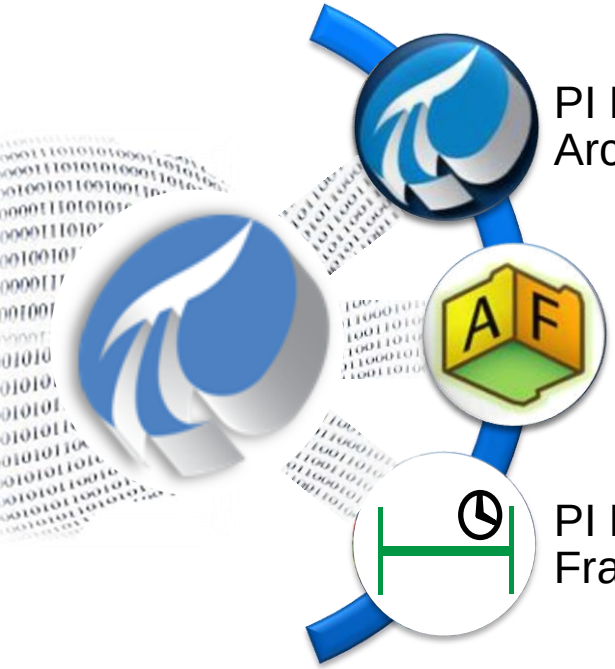
Before we save the beer … what magic happened?

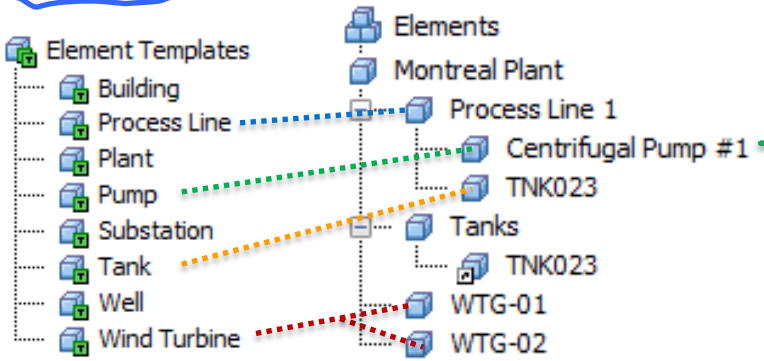


PI Data Archive

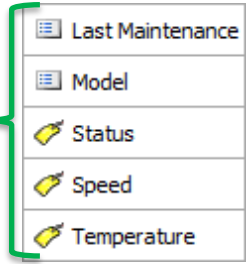
PI Asset Framework

PI Event Frames

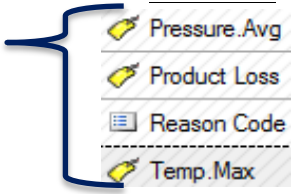




Element Attributes



Event Frame Attributes



Process Excursion

Startup

Downtime

Shift

Shutdown

Batch

Environmental Excursion

Grade Change

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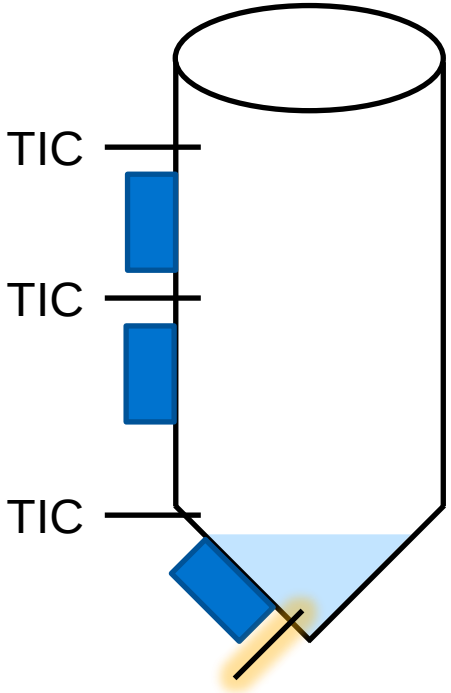
Monitor temperature at the bottom of the vessel



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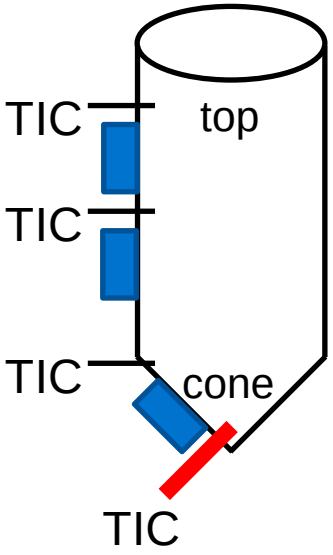
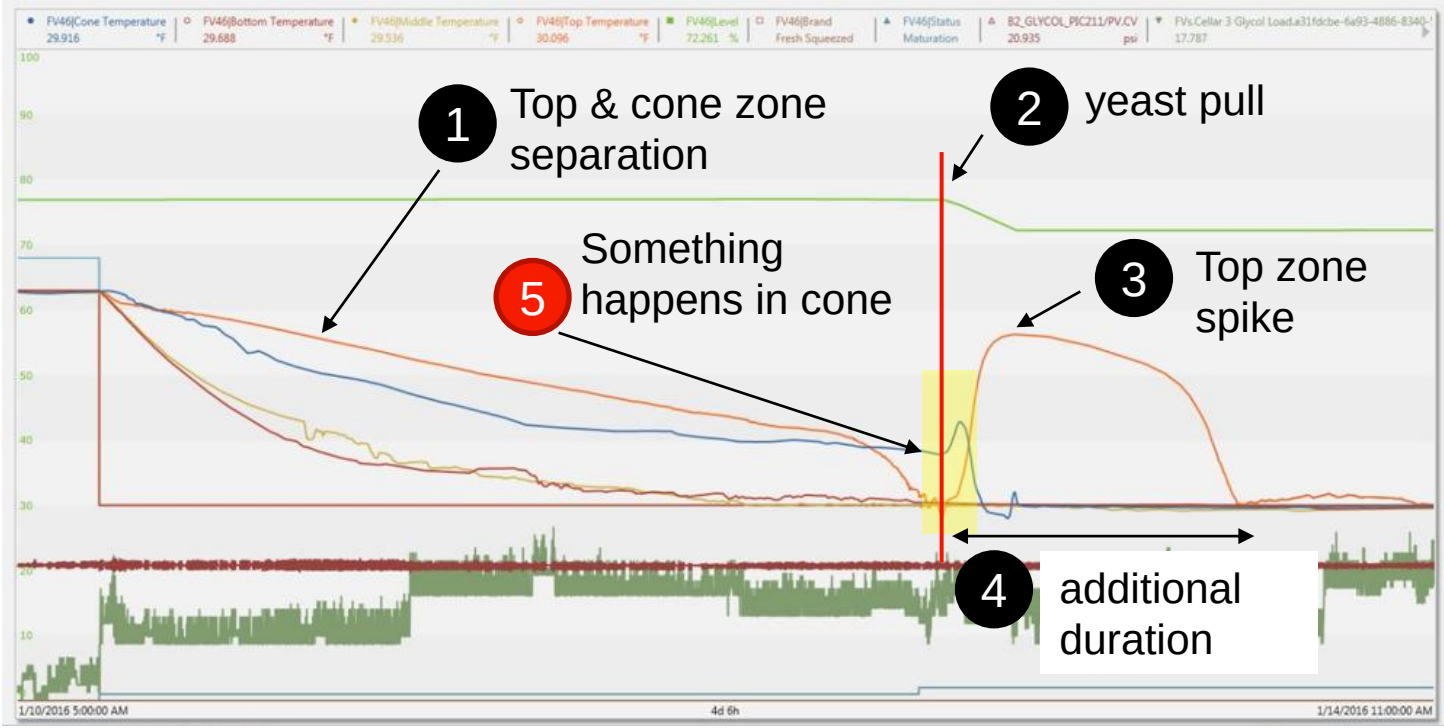
Cone region response correlated with top region





Identify → Analyze → Implement → Validate

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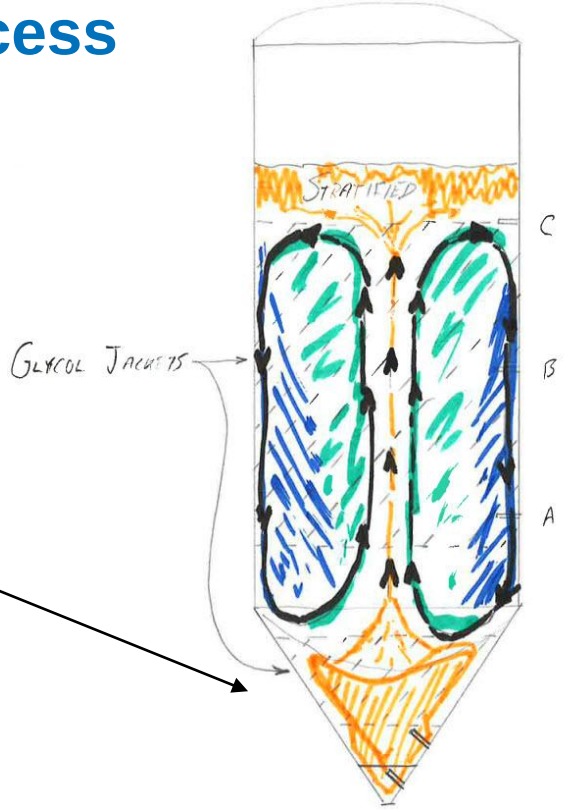
Hypothesis drives change in process

Cool the cone of the vessel as fermentation begins to cease



Identify → Analyze → Implement → Validate

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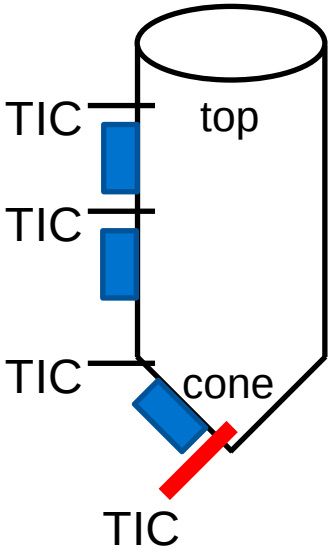
Process change reduces cooling time





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Process optimization can be streamlined with the right tool set

Identify	Analyze	Implement	Validate
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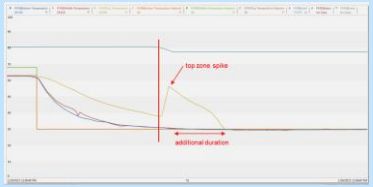
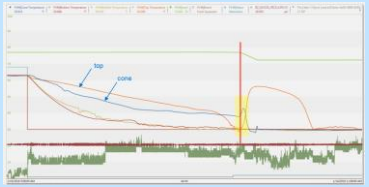
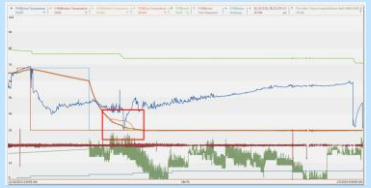
Solution	Solution	Solution	Solution
		 Domain expertise required	

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Advanced Analytics

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What words describe your advanced analytics journey?

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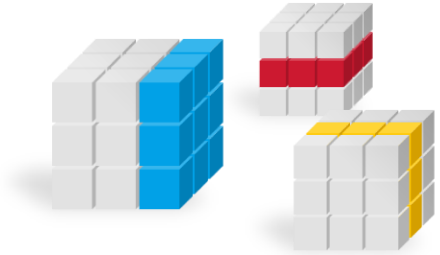
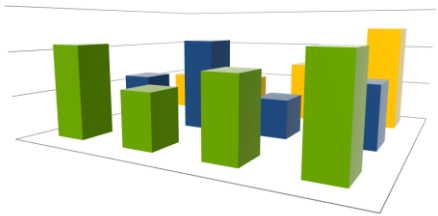
Ways to get value from (big) data with advanced analytics

Data Warehouses



Centralizing data from **different** business systems

Visual Correlations



Visualizing data sets across **multiple** variables

Data Science



Identifying patterns with statistical approaches

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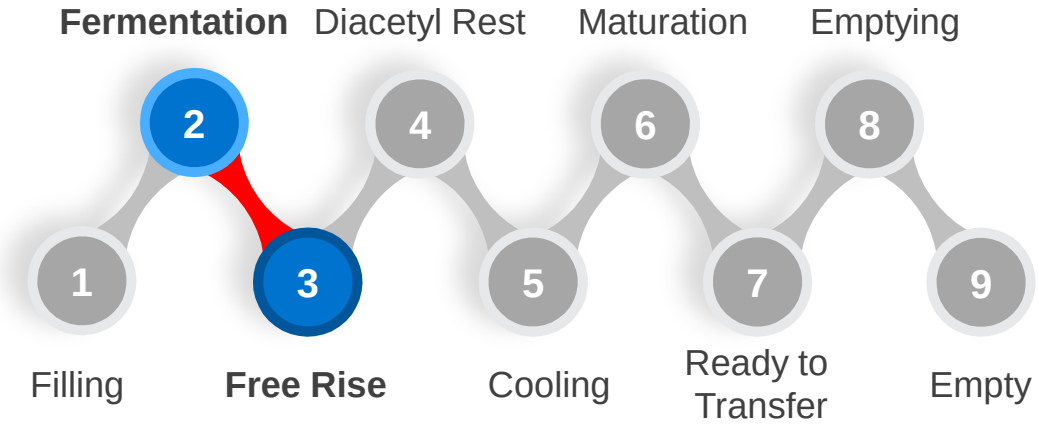
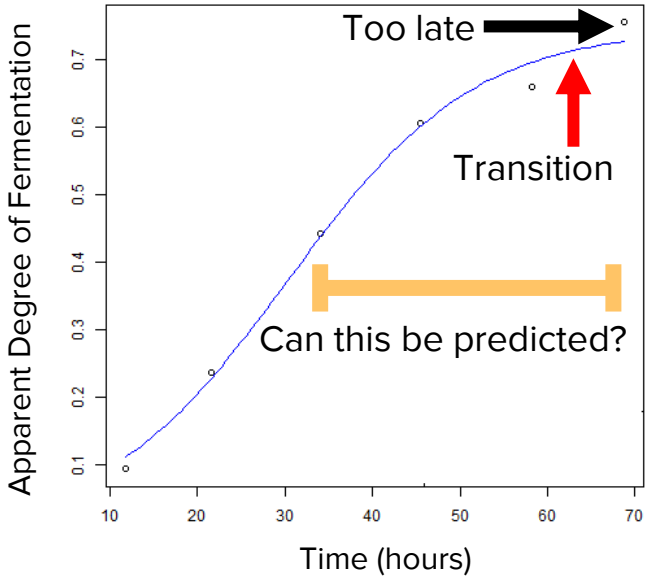
Need to predict transition from fermentation to free rise



Challenge

- Transition occurs between infrequent manual measurements



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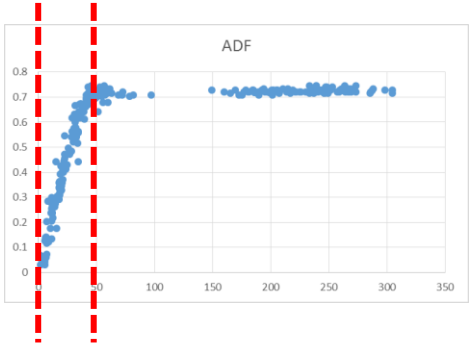
Spreadsheet analytics proves confidence in predictability

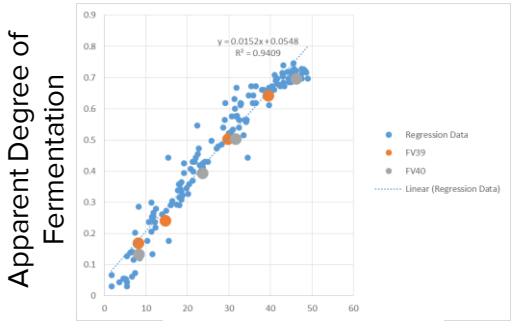
Bring Raw Data In

	A	B	C	D	E	F	G	H
1	FV	Brand	FV Full	FV Full °P	°P Timestamp	°P	Hours since FV Full	ADF
2	FV43	Fresh Squeezed	10/20/15 7:48 PM	16.50142	10/20/15 9:31 PM	15.4	1.720277778	0.066747
3	FV44	Fresh Squeezed	9/29/15 7:31 AM	16.50996	9/29/15 9:17 AM	16	1.767777778	0.030888
4	FV39	Fresh Squeezed	8/13/15 4:16 AM	16.5059	8/13/15 7:52 AM	15.8	3.595555556	0.042767
5	FV39	Fresh Squeezed	10/11/15 3:05 AM	16.5057	10/11/15 7:43 AM	15.6	4.632777778	0.054872
6	FV46	Fresh Squeezed	7/10/15 3:44 AM	16.51289	7/10/15 8:34 AM	15.6	4.834722222	0.055284
7	FV40	Fresh Squeezed	8/27/15 3:01 AM	16.49278	8/27/15 8:11 AM	15.6	5.175555555	0.054132
8	FV40	Fresh Squeezed	7/15/15 2:05 AM	16.52212	7/15/15 7:30 AM	15.8	5.411944444	0.043706
9	FV42	Fresh Squeezed	8/31/15 2:53 PM	16.50258	8/31/15 8:20 PM	16	5.466388889	0.030454
10	FV43	Fresh Squeezed	10/7/15 2:55 AM	16.50425	10/7/15 8:24 AM	14.4	5.494722222	0.127498
11	FV38	Fresh Squeezed	10/1/15 1:38 AM	16.49718	10/1/15 7:54 AM	14.2	6.263611111	0.139247
12	FV46	Fresh Squeezed	7/23/15 3:29 PM	16.50286	7/23/15 10:06 PM	15.5	6.626944444	0.060769
13	FV43	Fresh Squeezed	12/3/15 1:46 AM	16.50147	12/3/15 8:24 AM	14.2	6.6375	0.139471
14	FV40	Fresh Squeezed	11/15/15 1:52 AM	16.30823	11/15/15 8:31 AM	14	6.650833333	0.141538
15	FV40	Fresh Squeezed	7/3/15 1:39 AM	16.51333	7/3/15 8:44 AM	14.6	7.079722222	0.115866
16	FV38	Fresh Squeezed	10/28/15 11:49 PM	16.53811	10/29/15 [illegible]			0.201844
17	FV39	Fresh Squeezed	7/27/15 1:55 PM	16.4914				
18	FV42	Fresh Squeezed	7/31/15 11:41 PM	16.50569				
		Fresh Squeezed	8/5/15 10:30 PM					

Clean it Up



Fit to a Line



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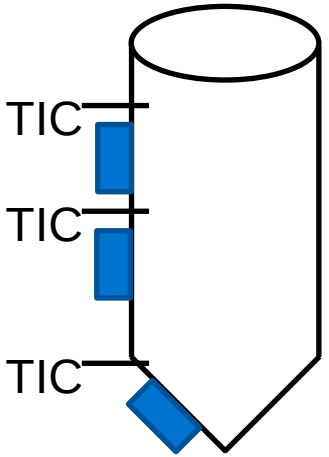
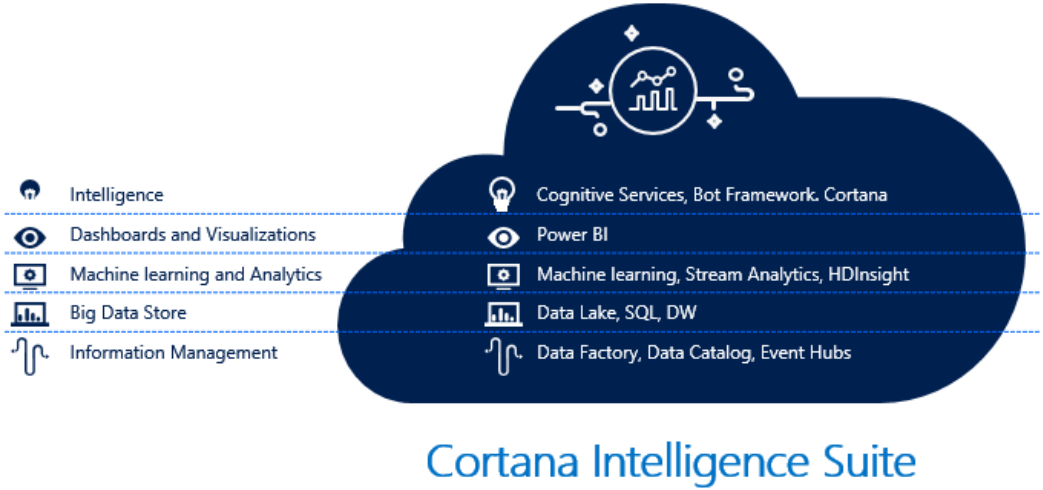
How to operationalize data preparation and predictions



PI System

?



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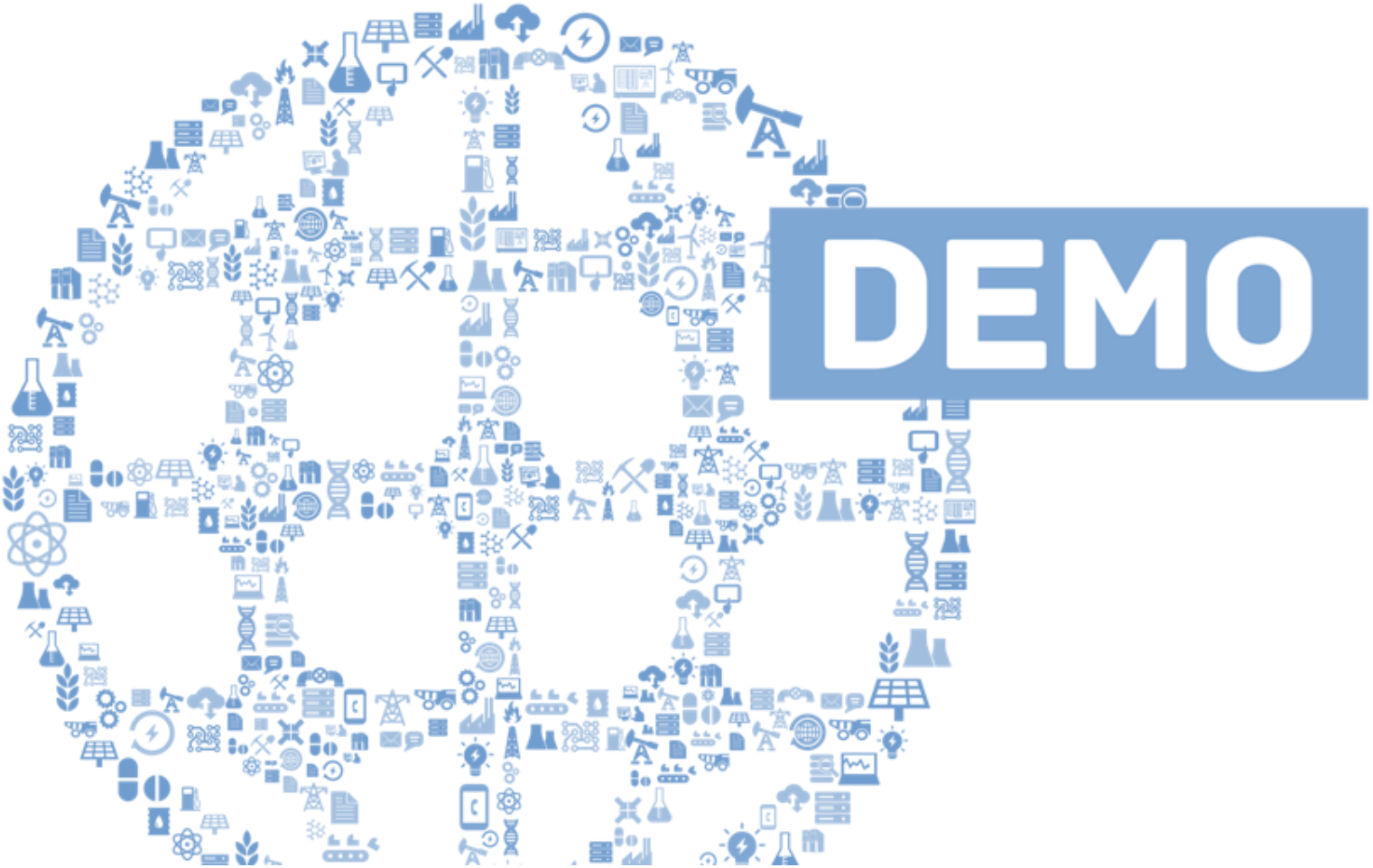

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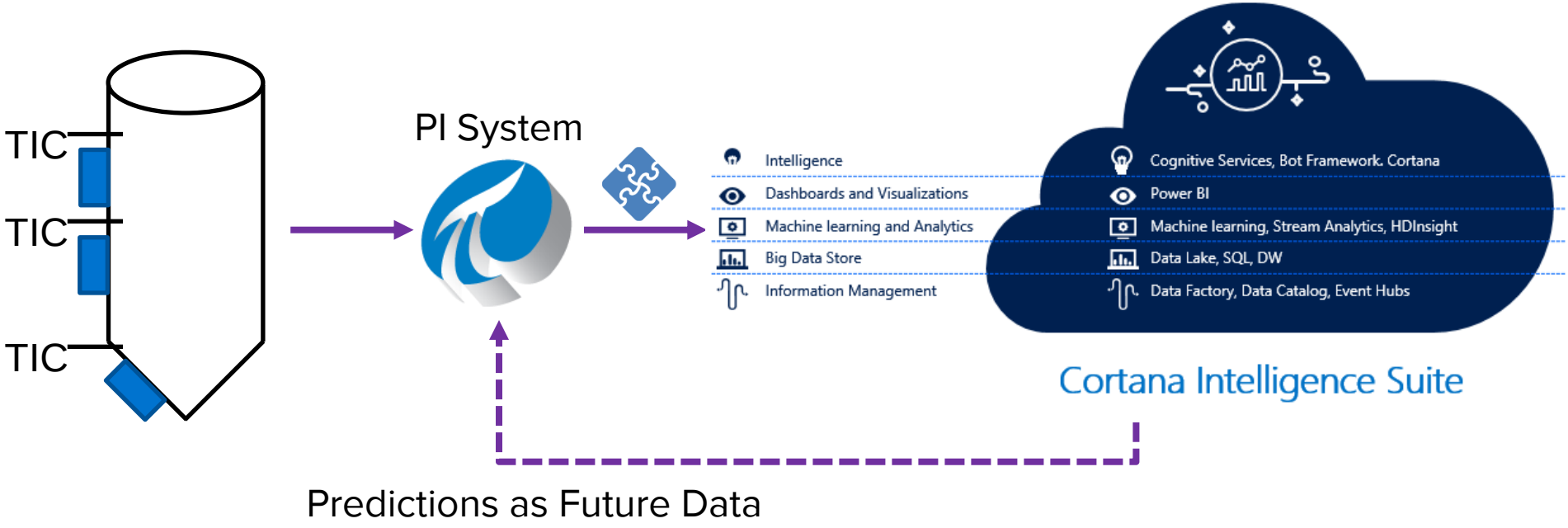
How to operationalize data preparation and predictions



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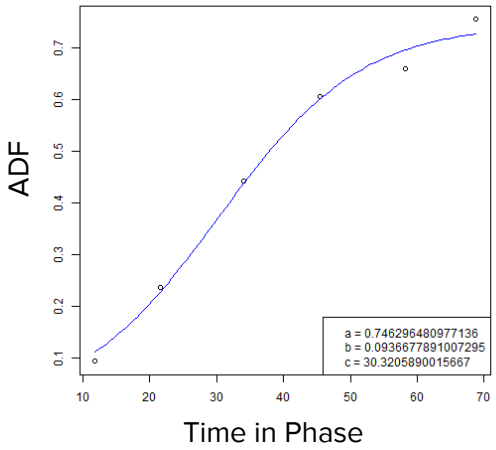
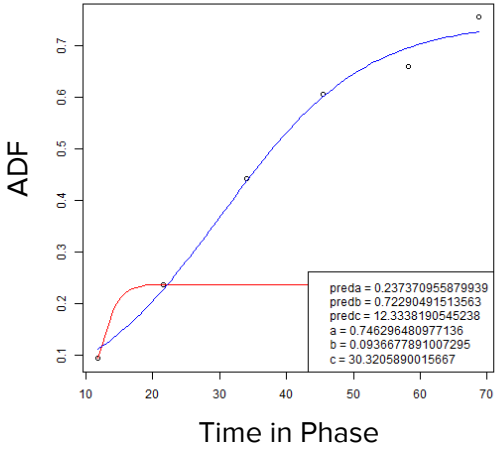
Refining a predictive model take iterations and expertise

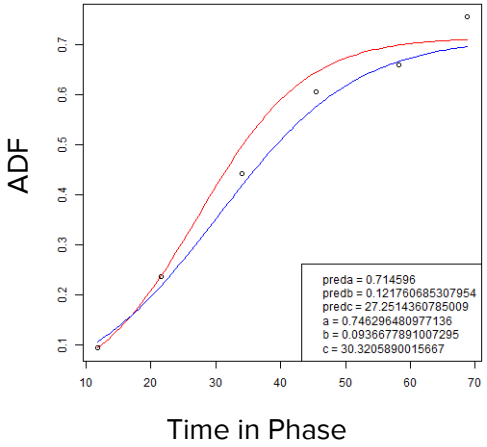
Benchmark: Measure accuracy against a standard (based on historical data)

Predict: Use 2 early densities to estimate transition time

Refine: base predictions on brand for greater accuracy







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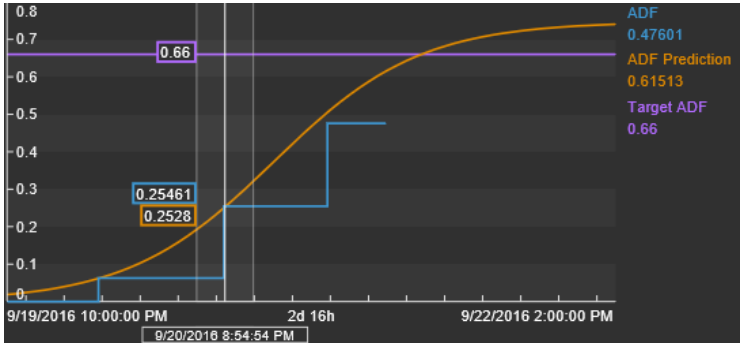
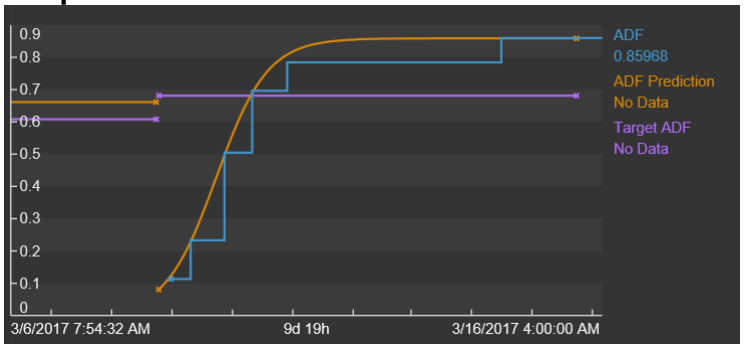
Operationalizing predictions for all brands and vessels

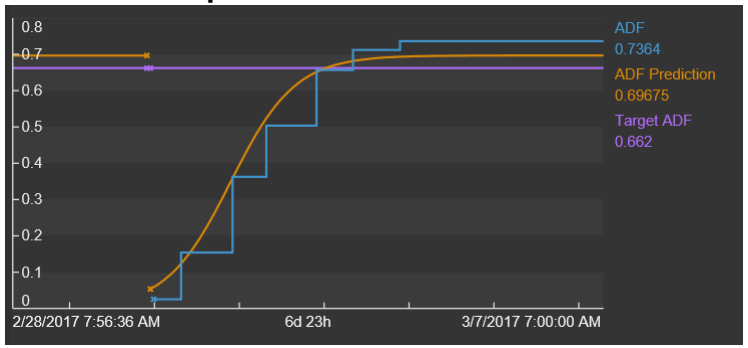
Mirror Pond Pale Ale – Vessel 16



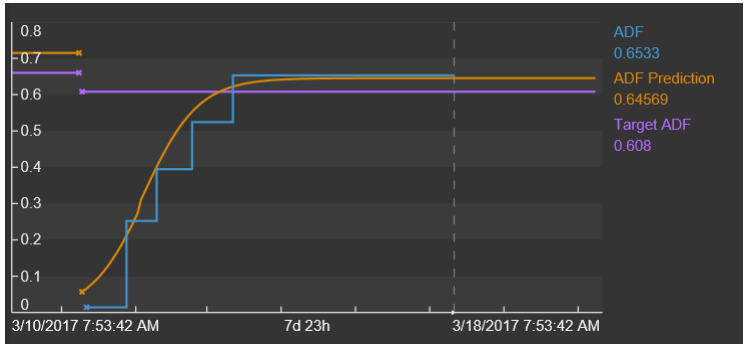
Hop Slice Summer Ale – Vessel 27



Fresh Squeezed IPA – Vessel 39



Black Butte Porter – Vessel 45



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In summary

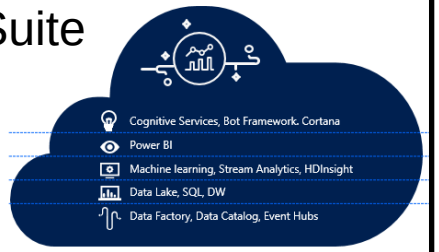
Is there a *buzz* word that I can use to optimize a process?

PI Integrators

Automated data preparation for advanced analytics

Cortana Intelligence Suite

Apply advanced analytics to data to gain insight



Cortana Intelligence Suite

How can the process of **process optimization** be optimized?

PI System

- Quick data access
- One version of truth
- Asset and event organization

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Relevant Product Talks & Booths

Thursday (Day 3): 12:15 – 13:00

Product Track – Advanced PI System User – Arora 17

Streaming Analytics, Data Lakes and PI Integrators

Matt Ziegler and Daniele Farris

Partner and Product Expo – Arora Foyer

Visualizing PI System Data booth

PI Integrator booths

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Questions

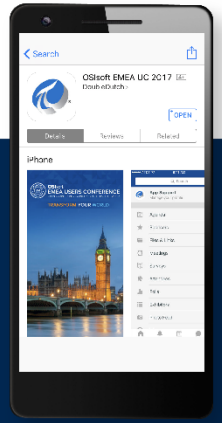
Please wait for the **microphone** before asking your questions



State your **name & company**

Please remember to…

Complete the Online Survey for this session



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What basic PI System questions do you have?

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Have an idea how to improve our products?

OSIsoft wants to hear from you!

https://feedback.osisoft.com/



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Where are we in our PI System Basics journey?



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감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado

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