Using the PI Integrator for MS Azure to Operationalize Predictive Analytics

Kevin Geneva, Field Service Engineer

Sept 22, 2016

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Global food processing company

- More than 270 plants worldwide
- Over 100 years old
- Grains and Seeds are processed for use in
  - Food and beverage
  - Industrial uses
  - Nutraceutical
  - Animal Feed

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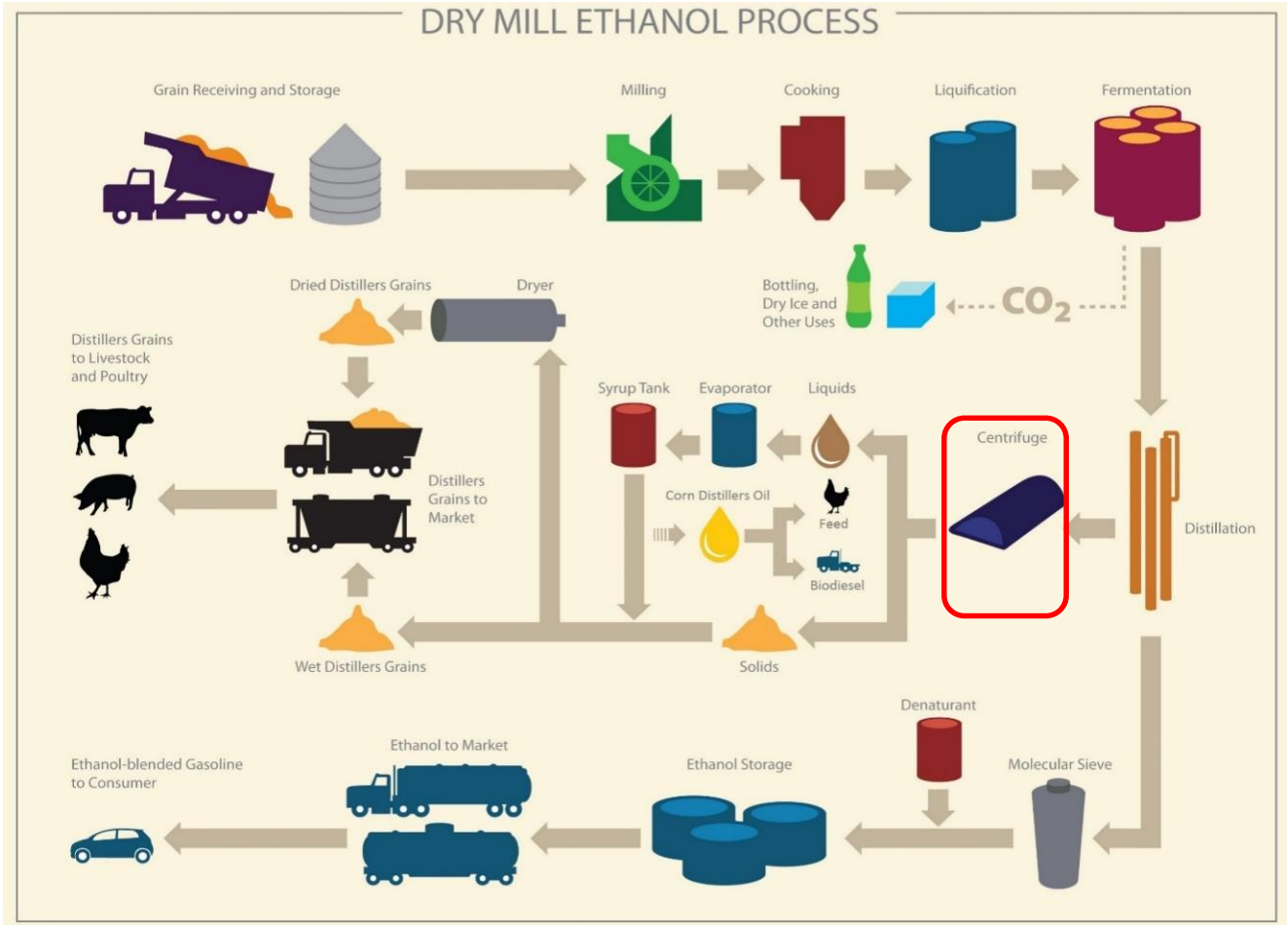

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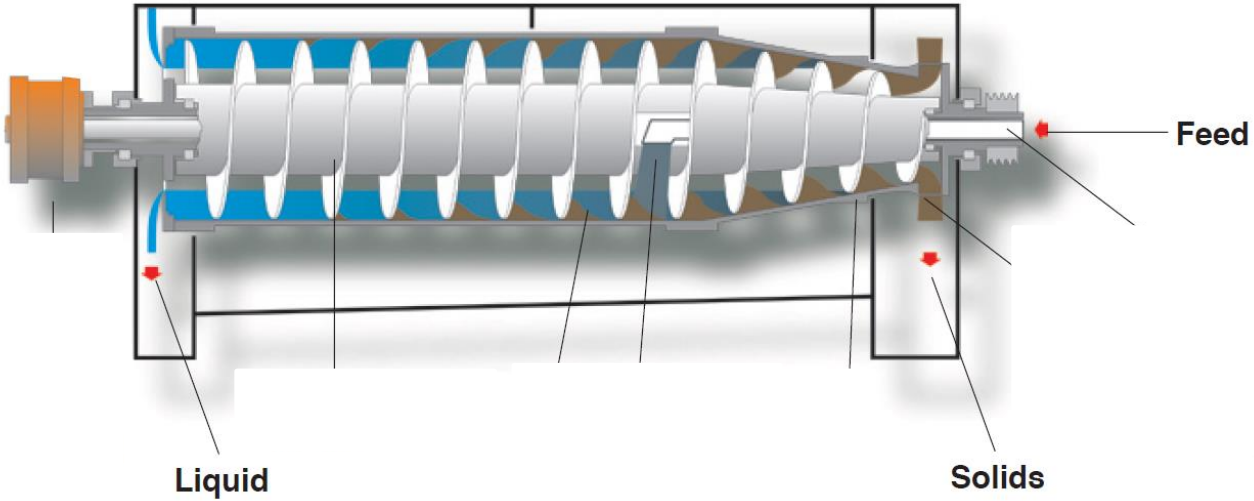
Centrifuge/Decanter Operation



Quick Facts

- 2 Plants
- 28 Machines
- 6 Month Average Life
- $50,000 per Rebuild

Variables

- 25 Feed Related
- 25 Per Decanter Related to Operational/Machine Behavior

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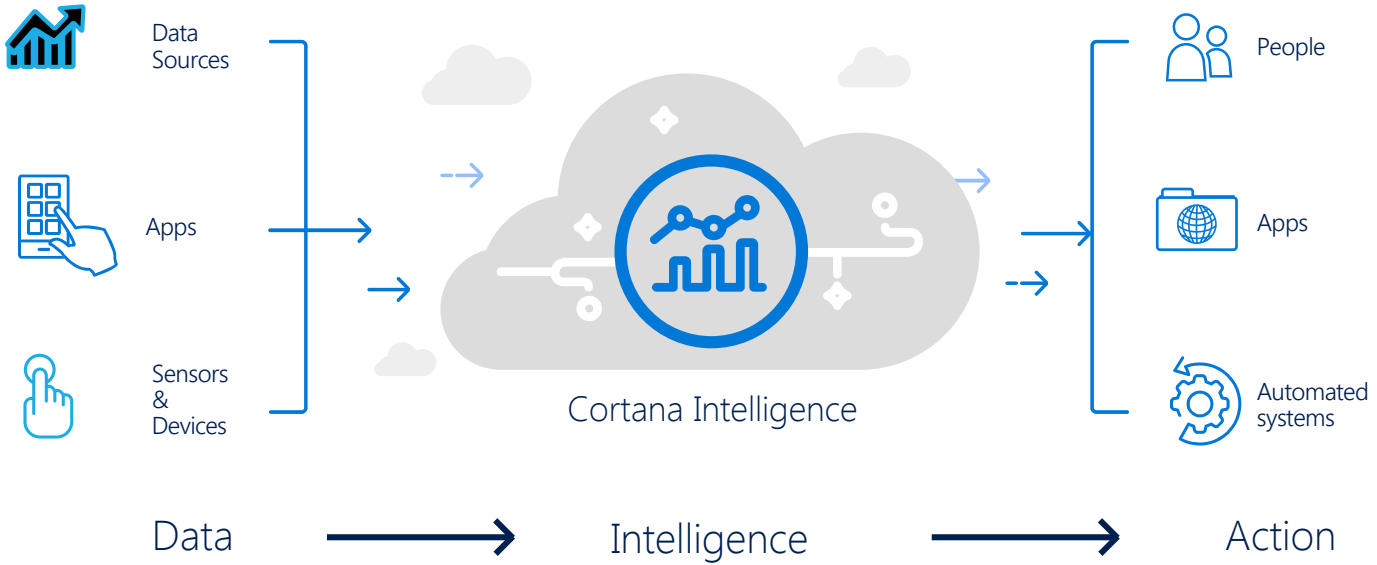
Analysis Model



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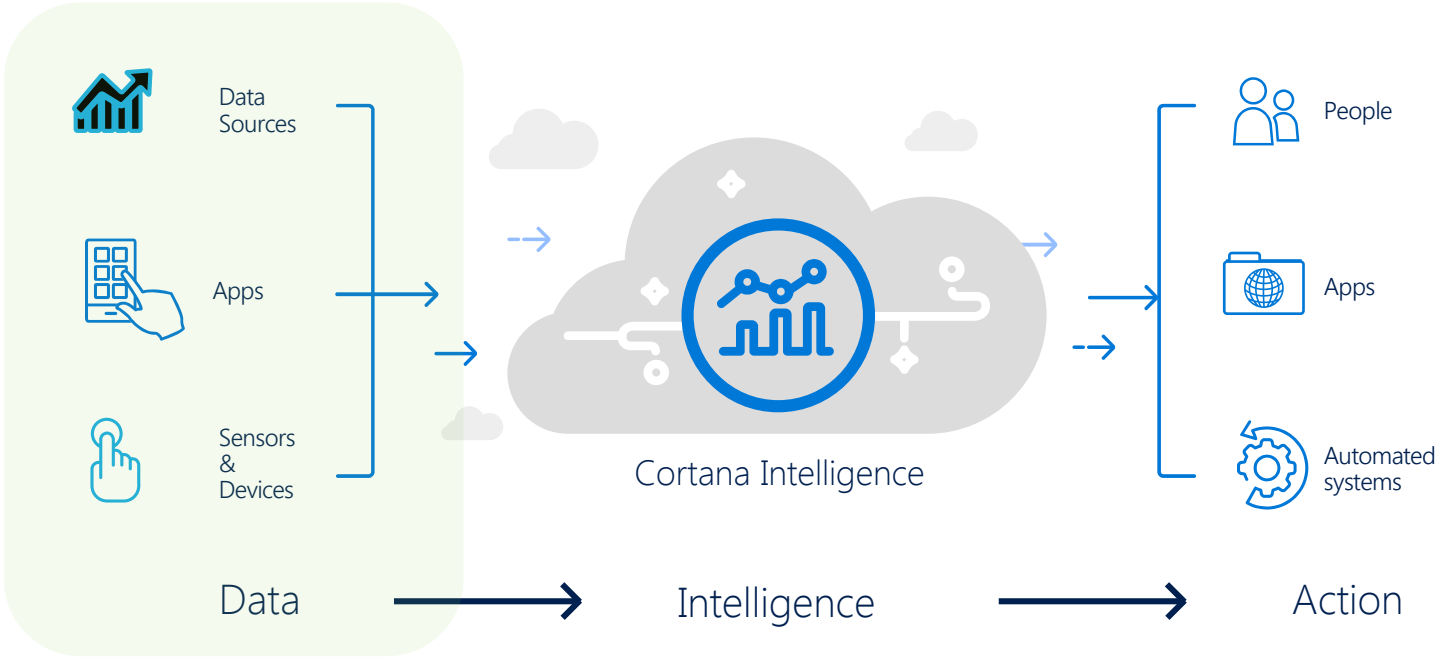
Preparing the Data



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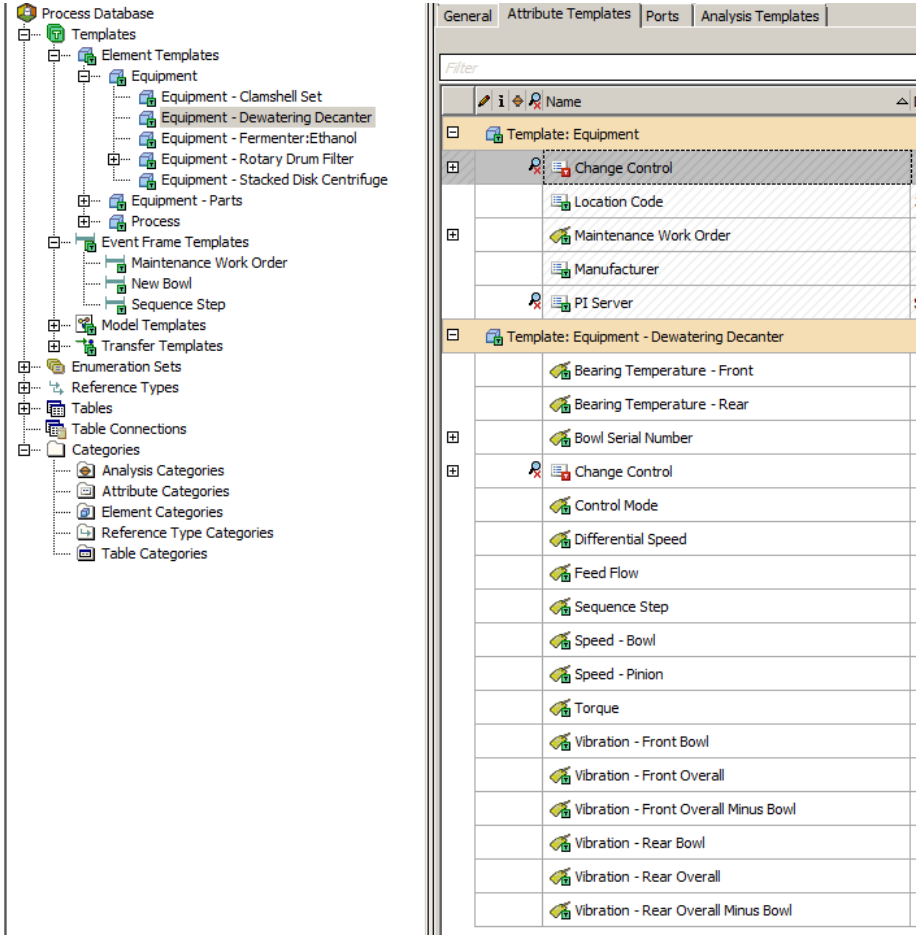
PI Asset Framework

One version of the truth

- 2 Plants
- 28 Machines

Preparation work

- Template Design
- Deployment



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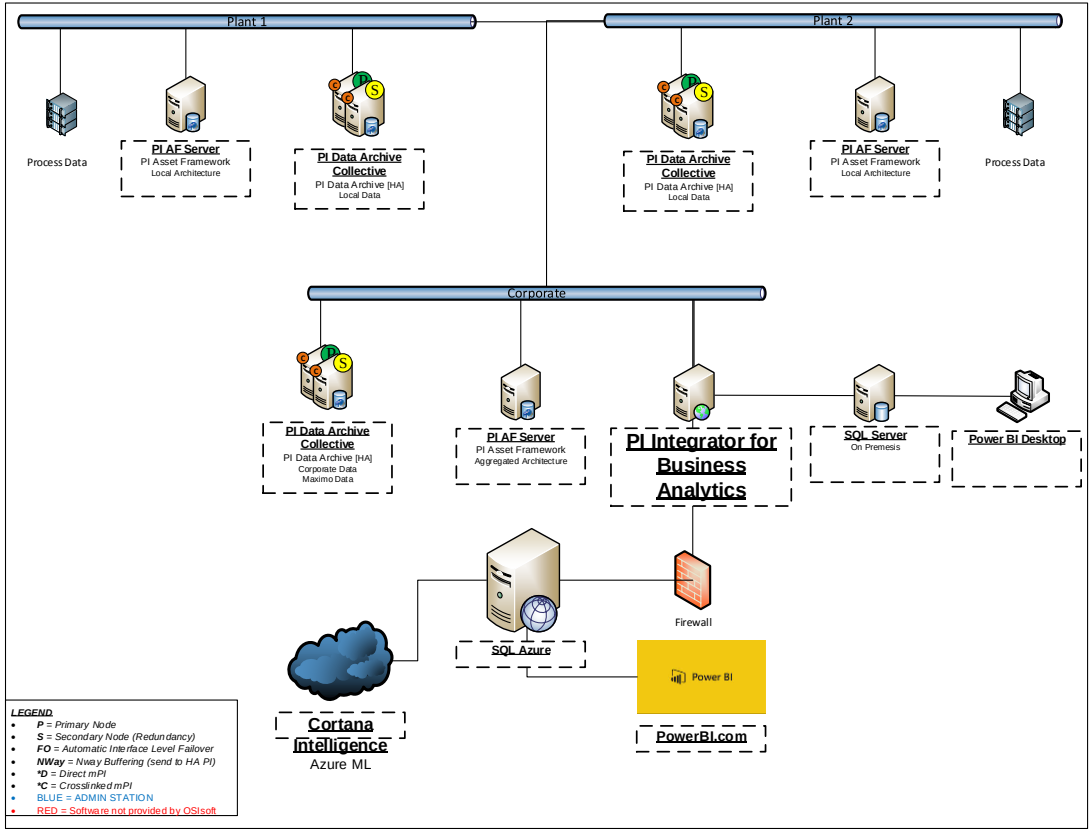
System Architecture

Archive data remained on source

Aggregated on central PI AF



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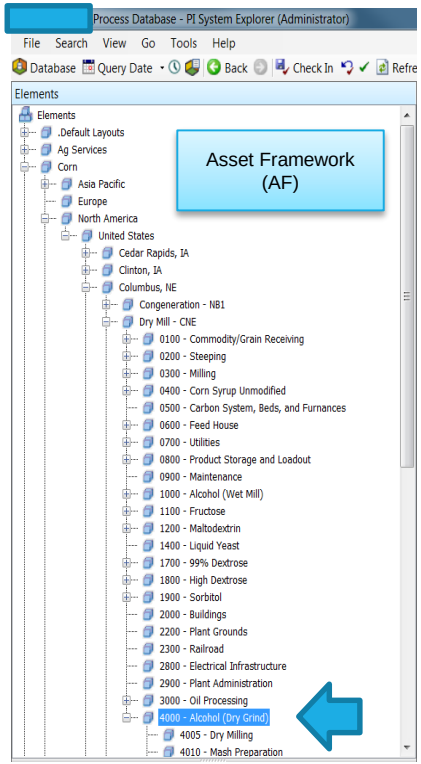
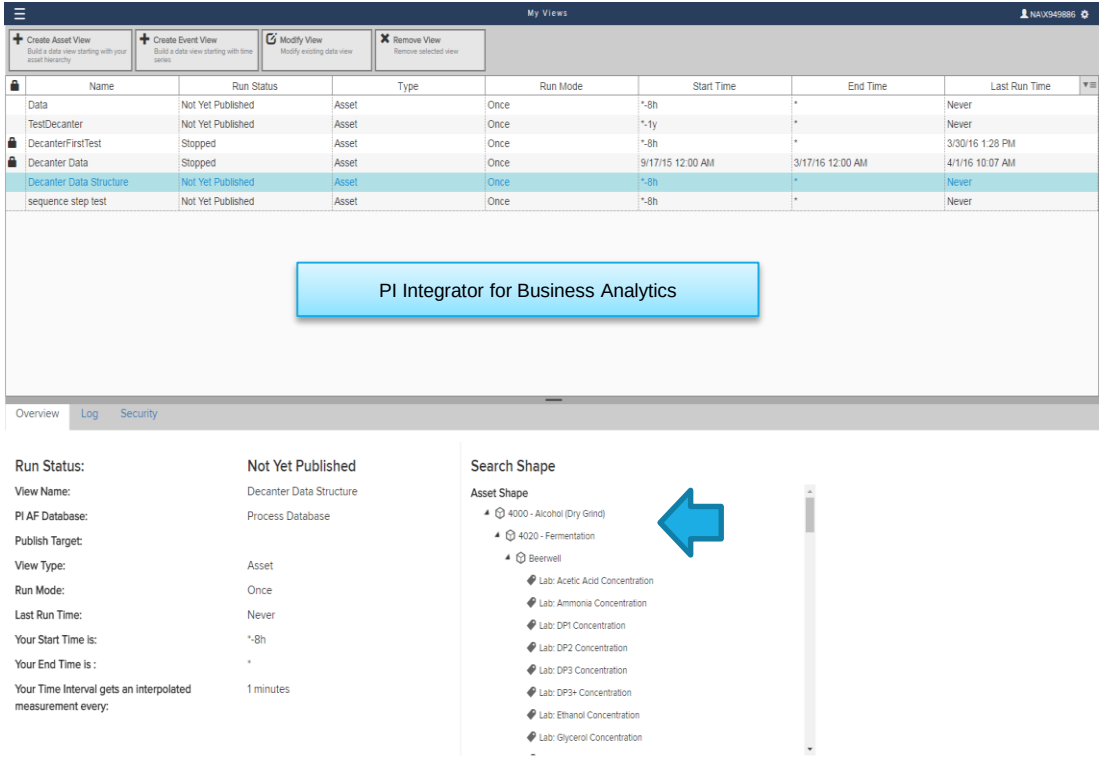
PI Integrator for Microsoft Azure





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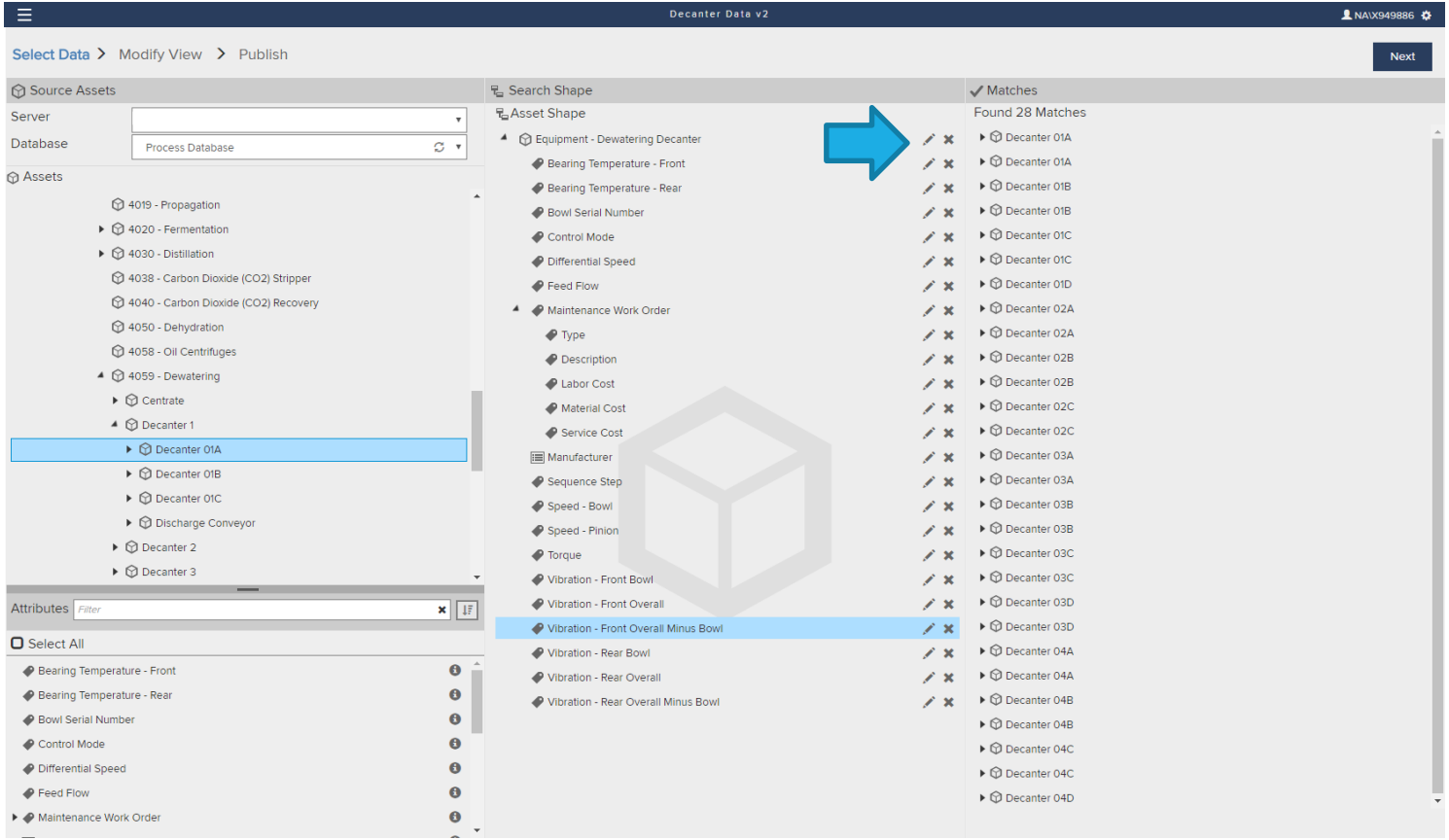
PI Integrator for Microsoft Azure



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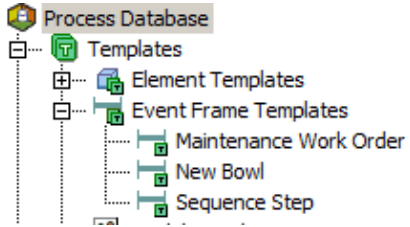
PI Event Frames



Template: Maintenance Work Order
Decanter
Decanter.Bowl Serial Number
Location Code
Maintenance Work Order
Maintenance Work Order Description
Maintenance Work Order Type

Template: Sequence Step
Beerwell.Lab: Acetic Acid Concentration Avg
Beerwell.Lab: Acetic Acid Concentration Stdev
Beerwell.Lab: DP1 Concentration Avg
Beerwell.Lab: DP1 Concentration Stdev
Beerwell.Lab: DP2 Concentration Avg
Beerwell.Lab: DP2 Concentration Stdev
Beerwell.Lab: DP3+ Concentration Avg
Beerwell.Lab: DP3+ Concentration Stdev
Beerwell.Lab: DP3 Concentration Avg
Beerwell.Lab: DP3 Concentration Stdev
Beerwell.Lab: Ethanol Concentration Avg
Beerwell.Lab: Ethanol Concentration Stdev
Beerwell.Lab: Glycerol Concentration Avg
Beerwell.Lab: Glycerol Concentration Stdev
Beerwell.Lab: Lactic Acid Concentration Avg
Beerwell.Lab: Lactic Acid Concentration Stdev
Beerwell.Lab: pH Avg
Beerwell.Lab: pH Stdev
Beerwell.Lab: Total Sugar Concentration Avg
Beerwell.Lab: Total Sugar Concentration Stdev
Decanter.Bearing Temperature - Front Avg
Decanter.Bearing Temperature - Front Stdev
Decanter.Bearing Temperature - Rear Avg
Decanter.Bearing Temperature - Rear Stdev
Decanter.Bowl Serial Number

Template: New Bowl
Beerwell.Lab: Acetic Acid Concentration Avg
Beerwell.Lab: Acetic Acid Concentration Stdev
Beerwell.Lab: DP1 Concentration Avg
Beerwell.Lab: DP1 Concentration Stdev
Beerwell.Lab: DP2 Concentration Avg
Beerwell.Lab: DP2 Concentration Stdev
Beerwell.Lab: DP3+ Concentration Avg
Beerwell.Lab: DP3+ Concentration Stdev
Beerwell.Lab: DP3 Concentration Avg
Beerwell.Lab: DP3 Concentration Stdev
Beerwell.Lab: Ethanol Concentration Avg
Beerwell.Lab: Ethanol Concentration Stdev
Beerwell.Lab: Glycerol Concentration Avg
Beerwell.Lab: Glycerol Concentration Stdev
Beerwell.Lab: Lactic Acid Concentration Avg
Beerwell.Lab: Lactic Acid Concentration Stdev
Beerwell.Lab: pH Avg
Beerwell.Lab: pH Stdev
Beerwell.Lab: Total Sugar Concentration Avg
Beerwell.Lab: Total Sugar Concentration Stdev
Decanter.Bowl Serial Number
Decanter.Maintenance Work Order Count
Decanter Feed.Lab: Dry Solids Concentration Avg
Decanter Feed.Lab: Dry Solids Concentration Stdev

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PI Event Frames

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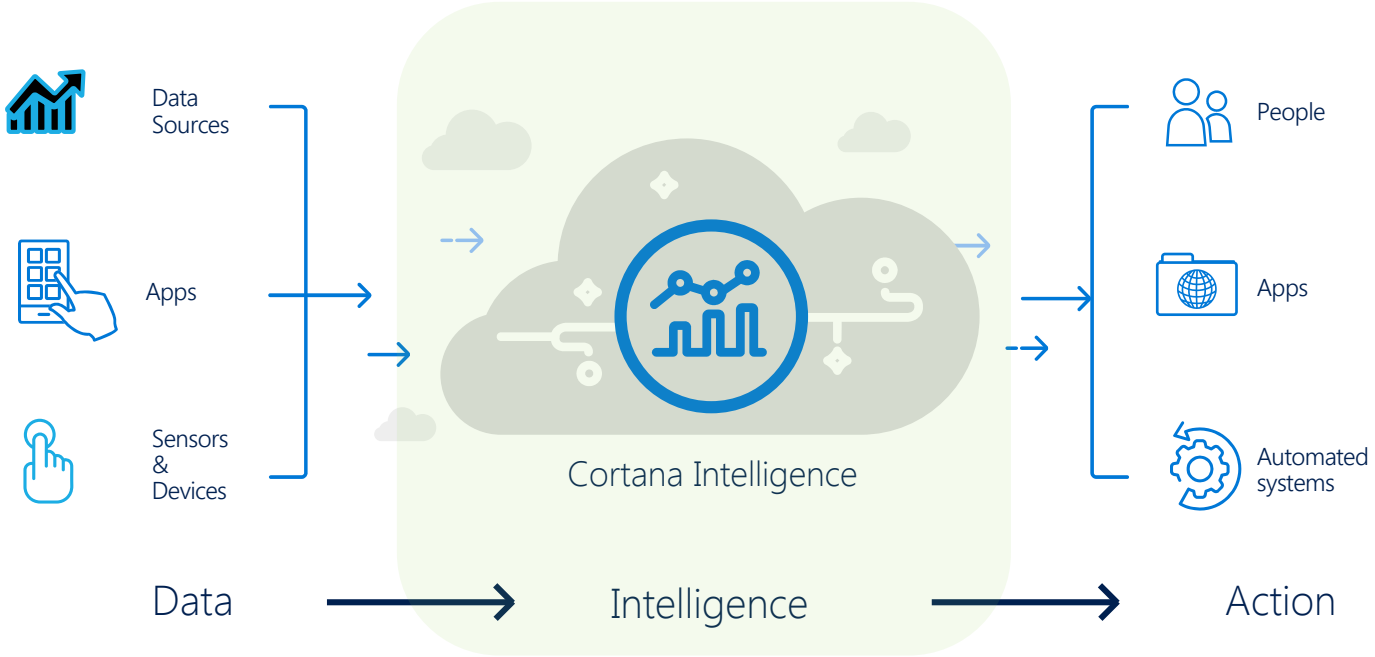
Data Analysis



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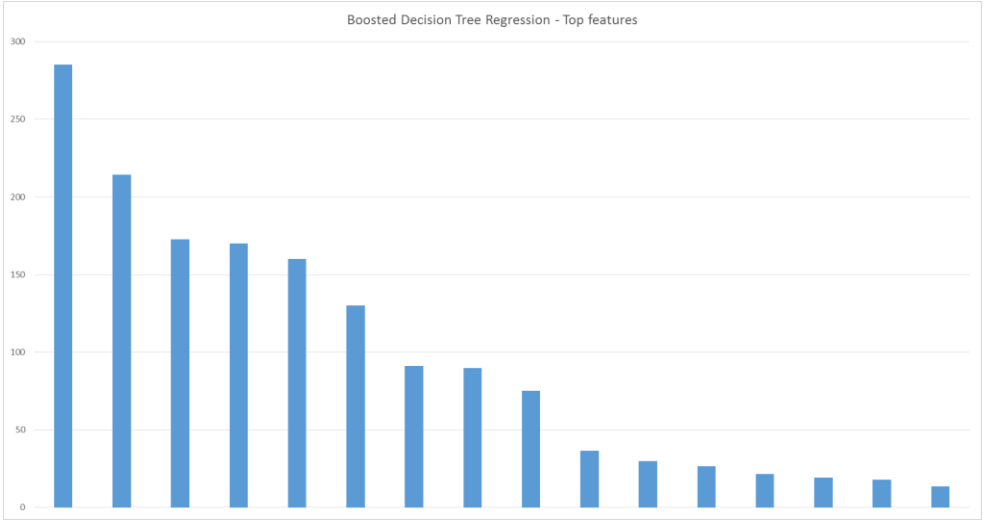
Top Features

Boosted Decision Tree Regression - Top features	
Variable 1	285.105583
Variable 2	214.418511
Variable 3	172.824017
Variable 4	169.973469
Variable 5	159.950095
Variable 6	130.138557
Variable 7	91.258758
Variable 8	89.65731
Variable 9	75.05133
Variable 10	36.644271
Variable 11	29.905867
Variable 12	26.395968
Variable 13	21.45298
Variable 14	19.099895
Variable 15	18.041149
Variable 16	13.537764



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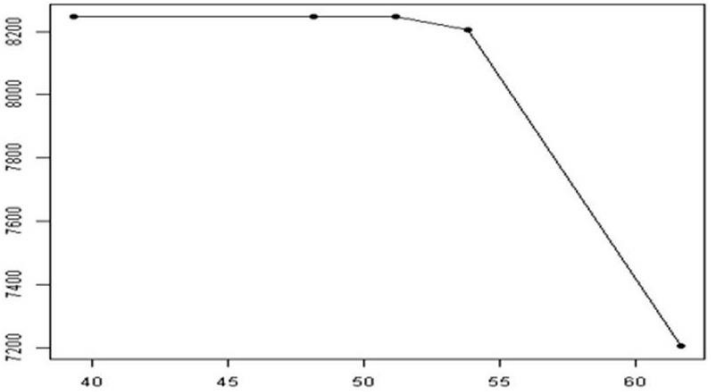
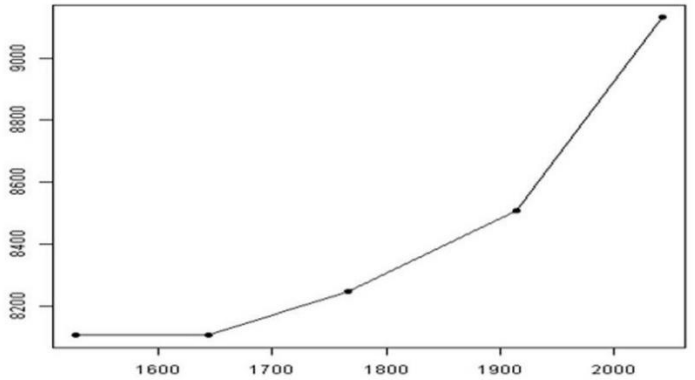
Top Features

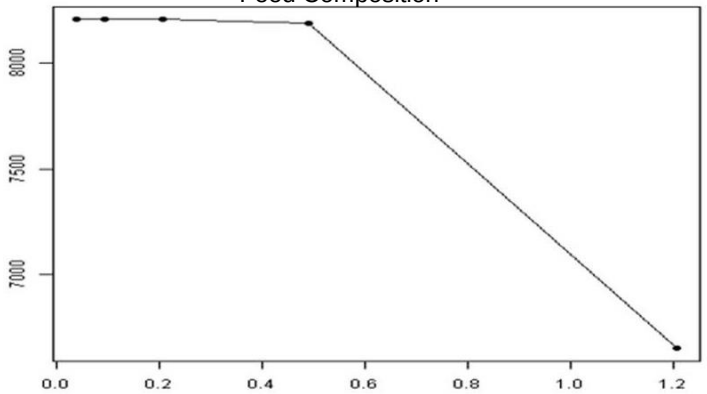
Operations Related



Machine Related



Feed Composition



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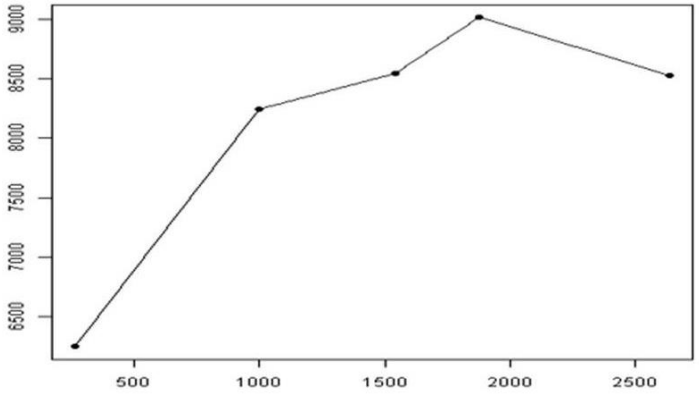

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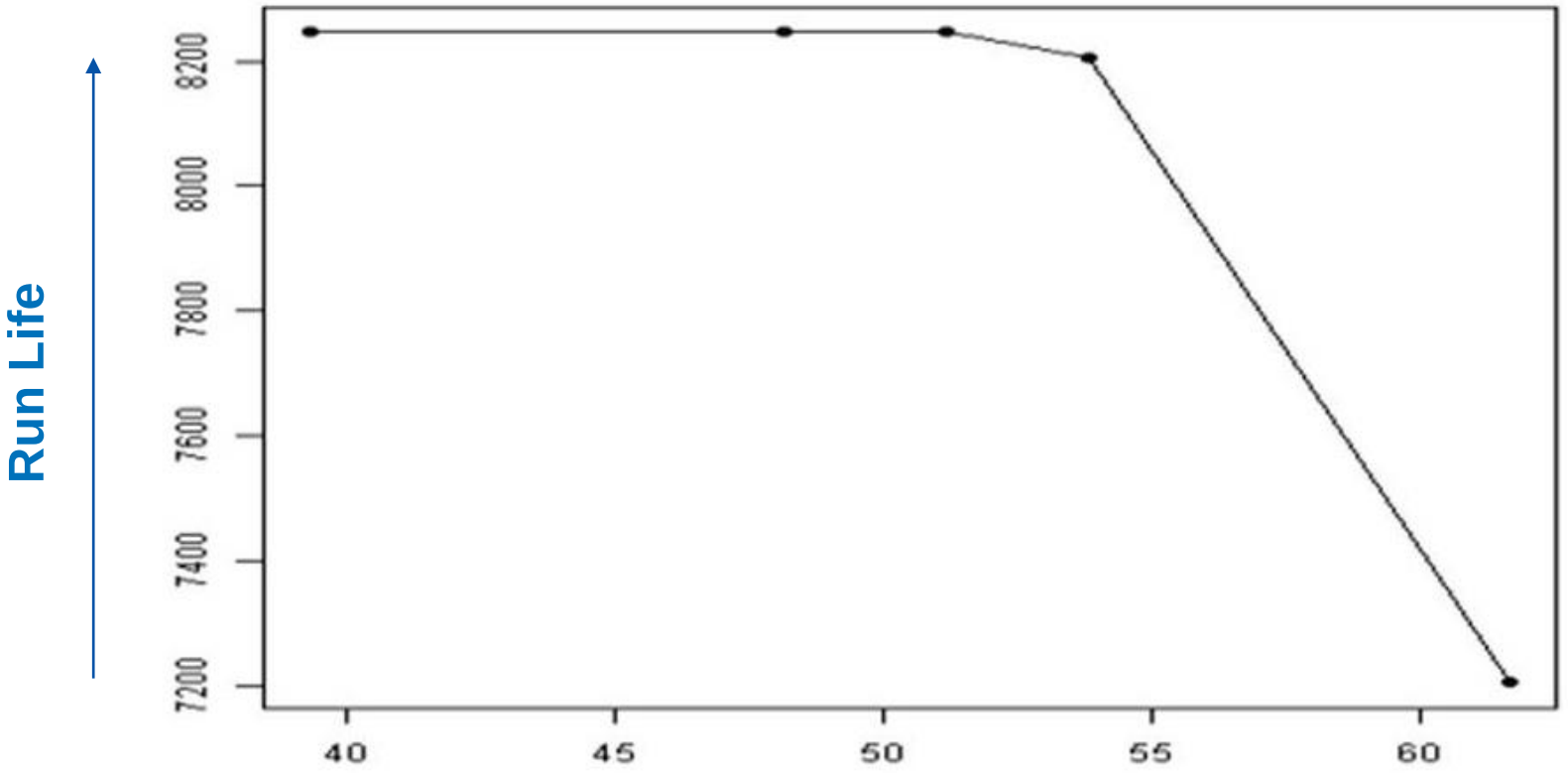
Operations Related



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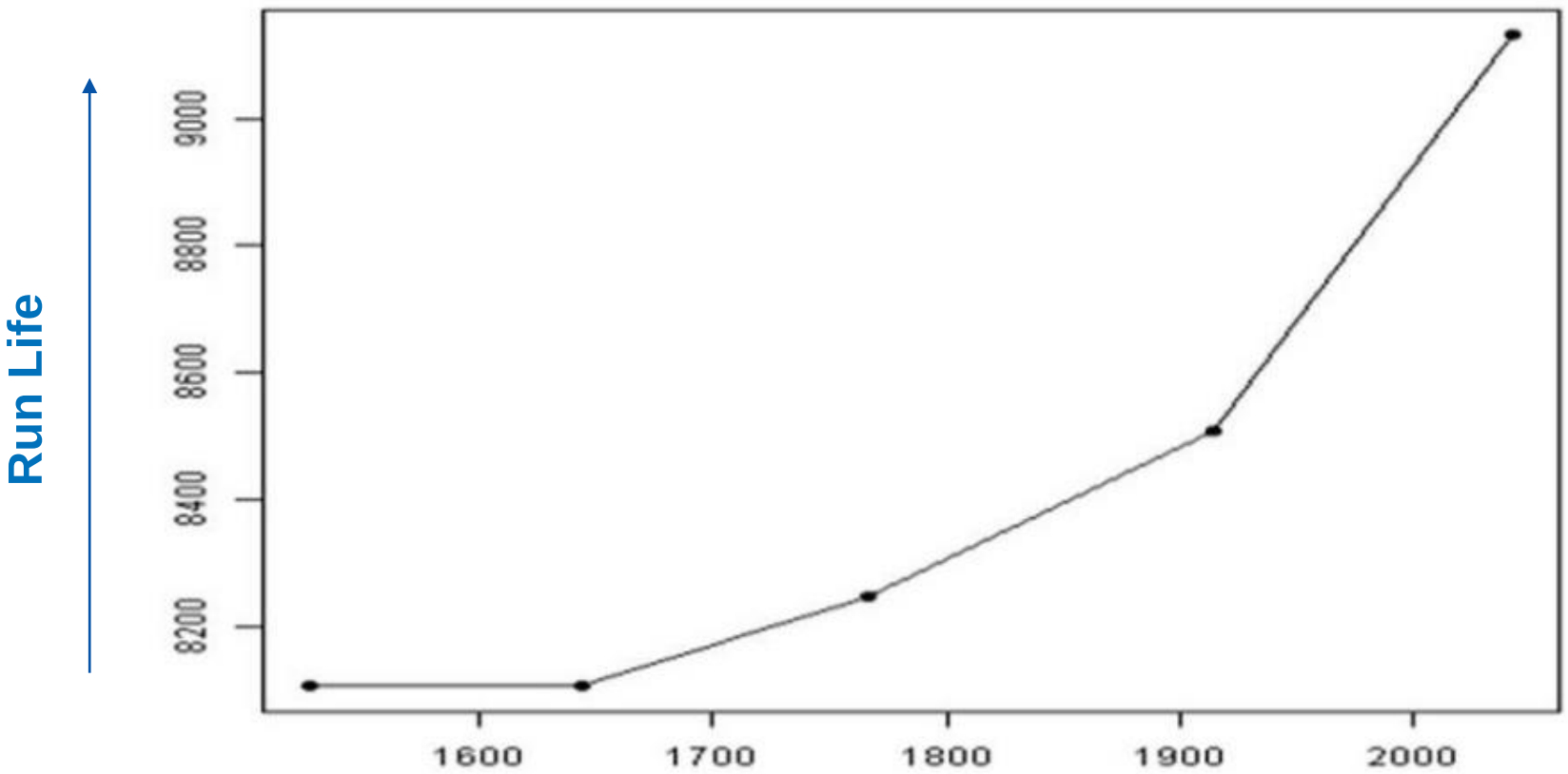
Machine Related



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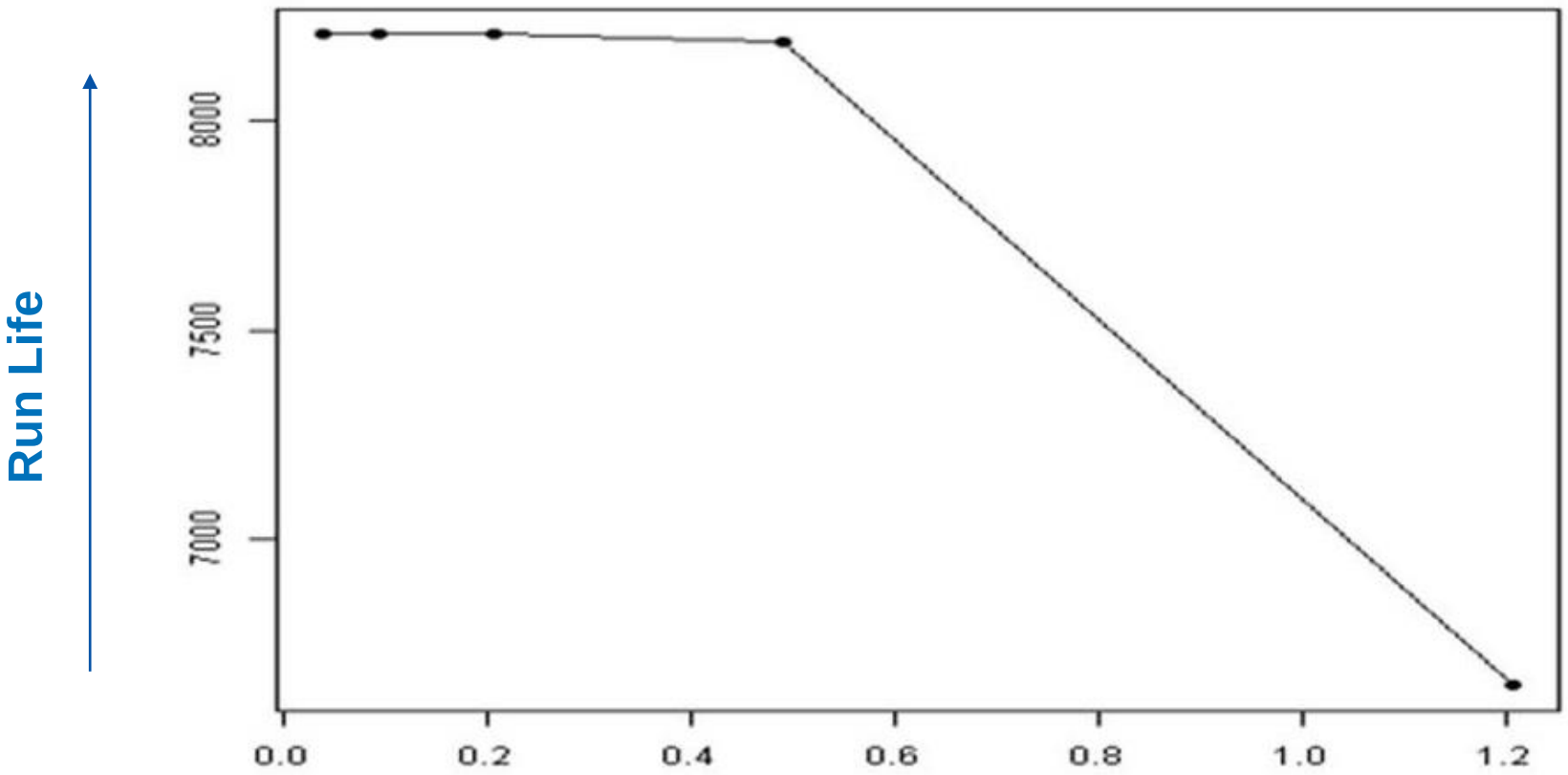

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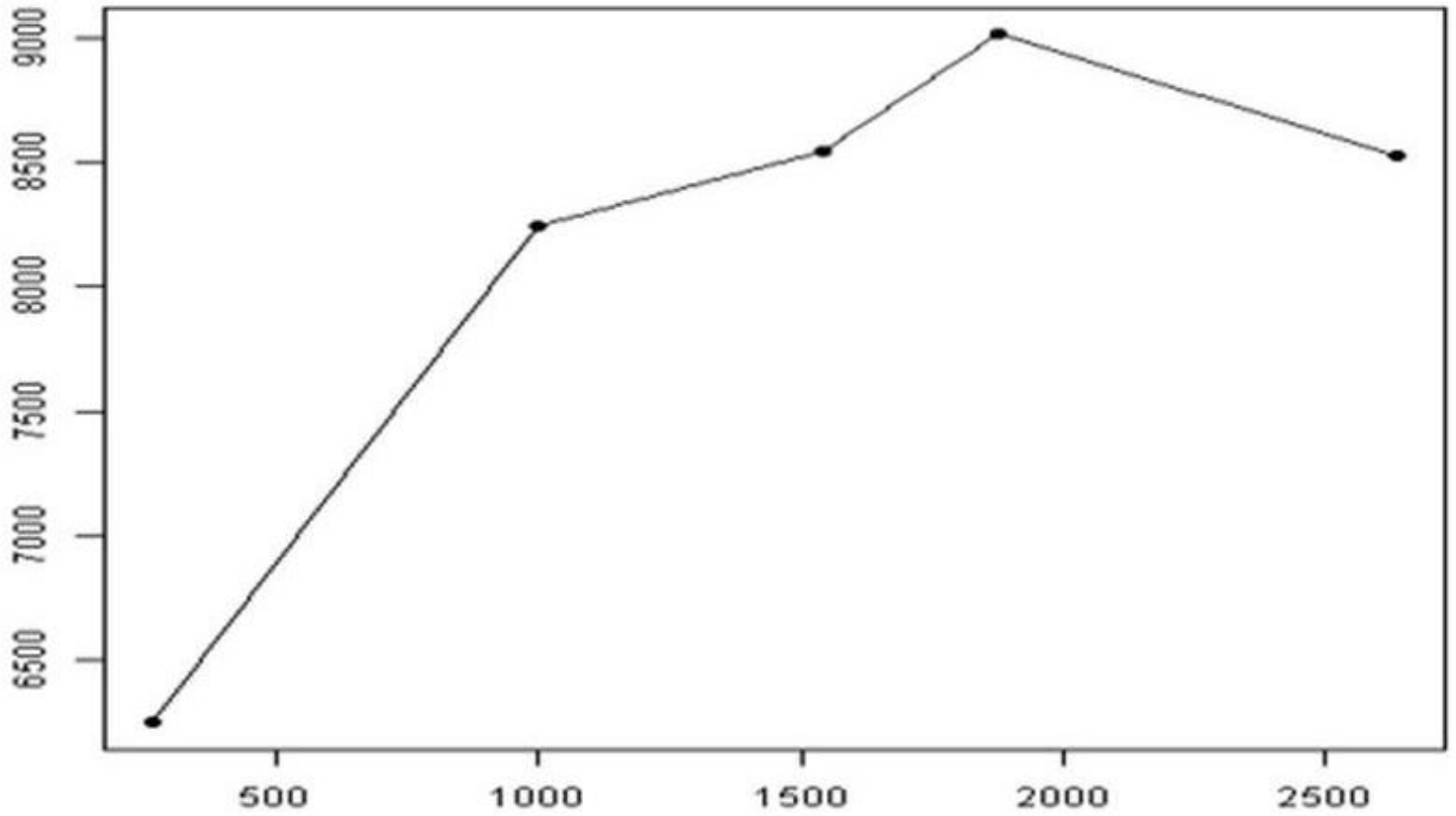
Run Life



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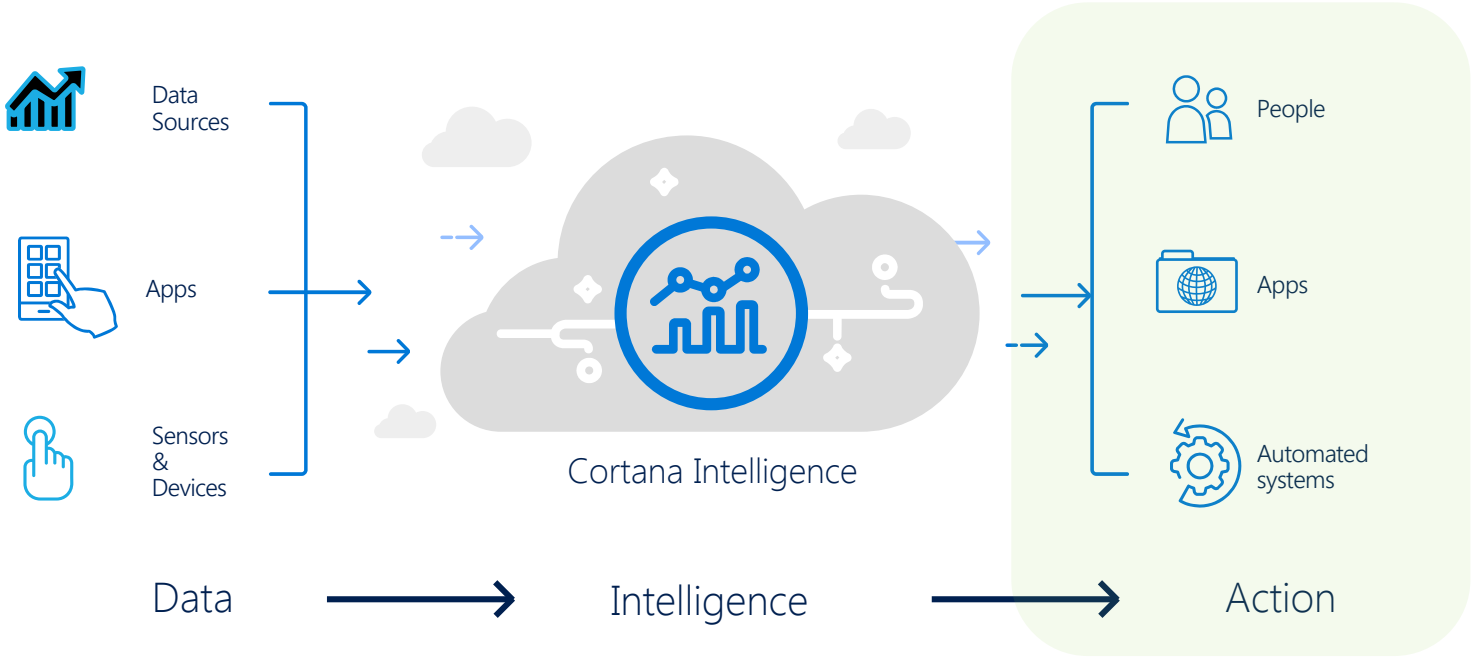
Results Analysis



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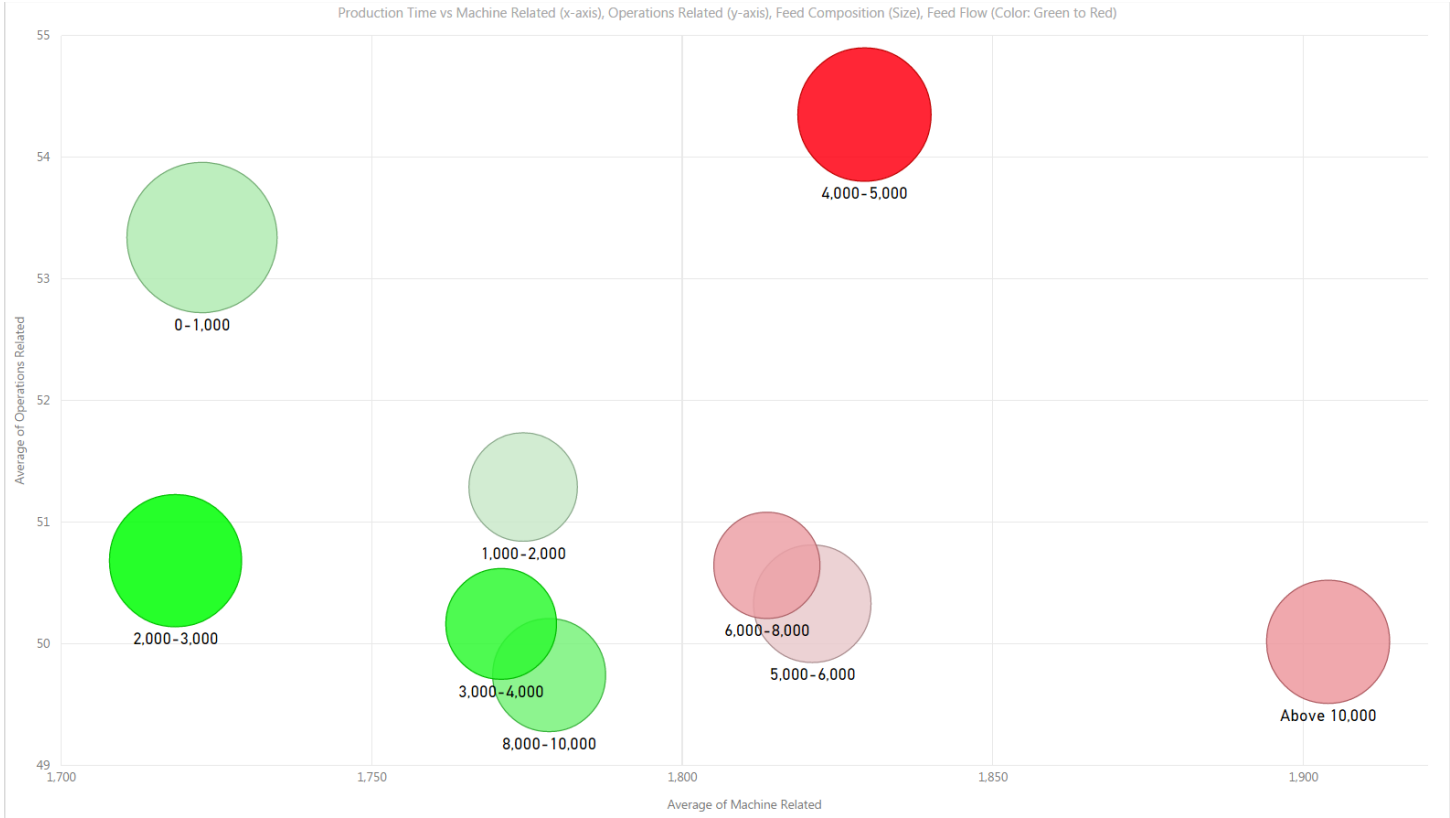

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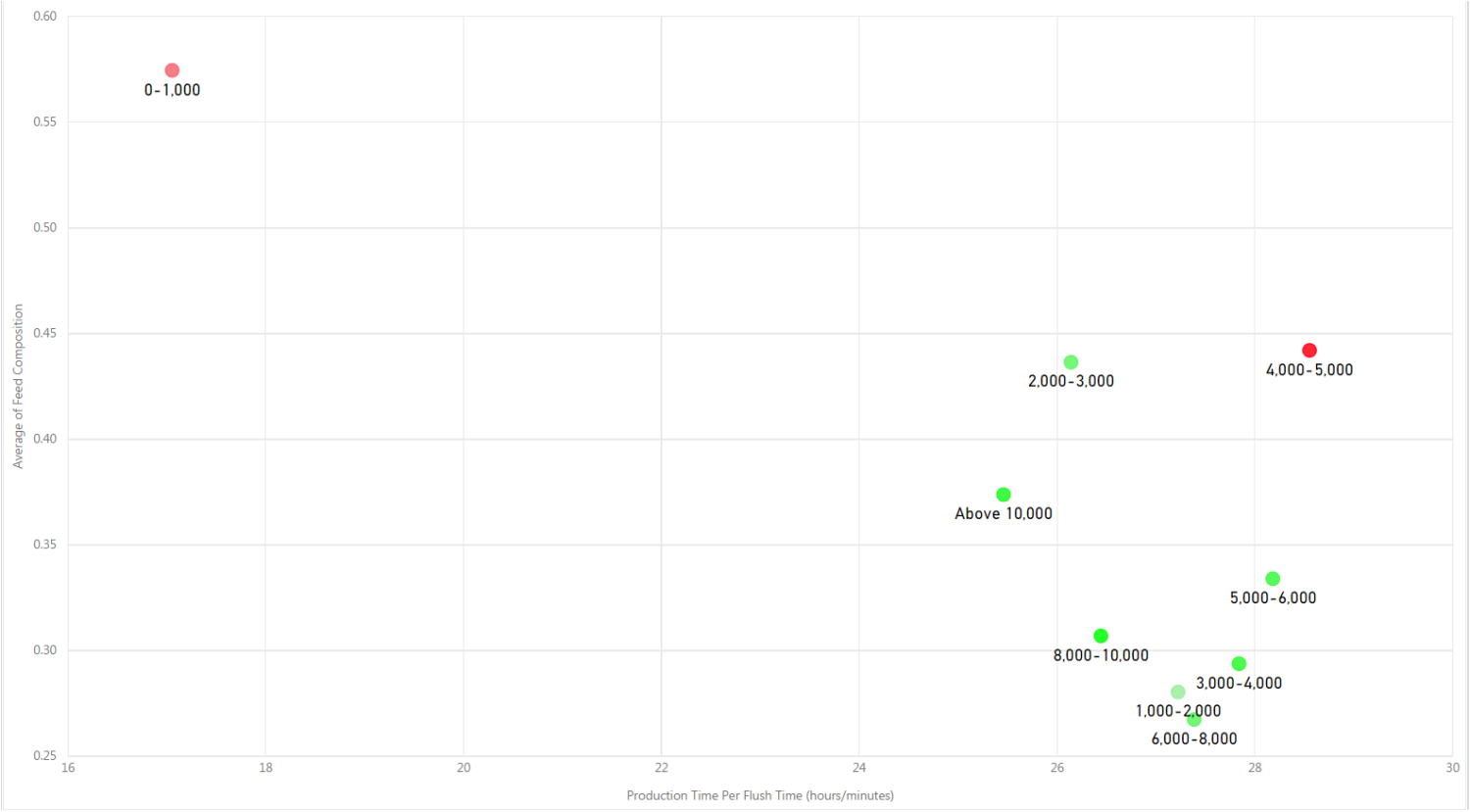

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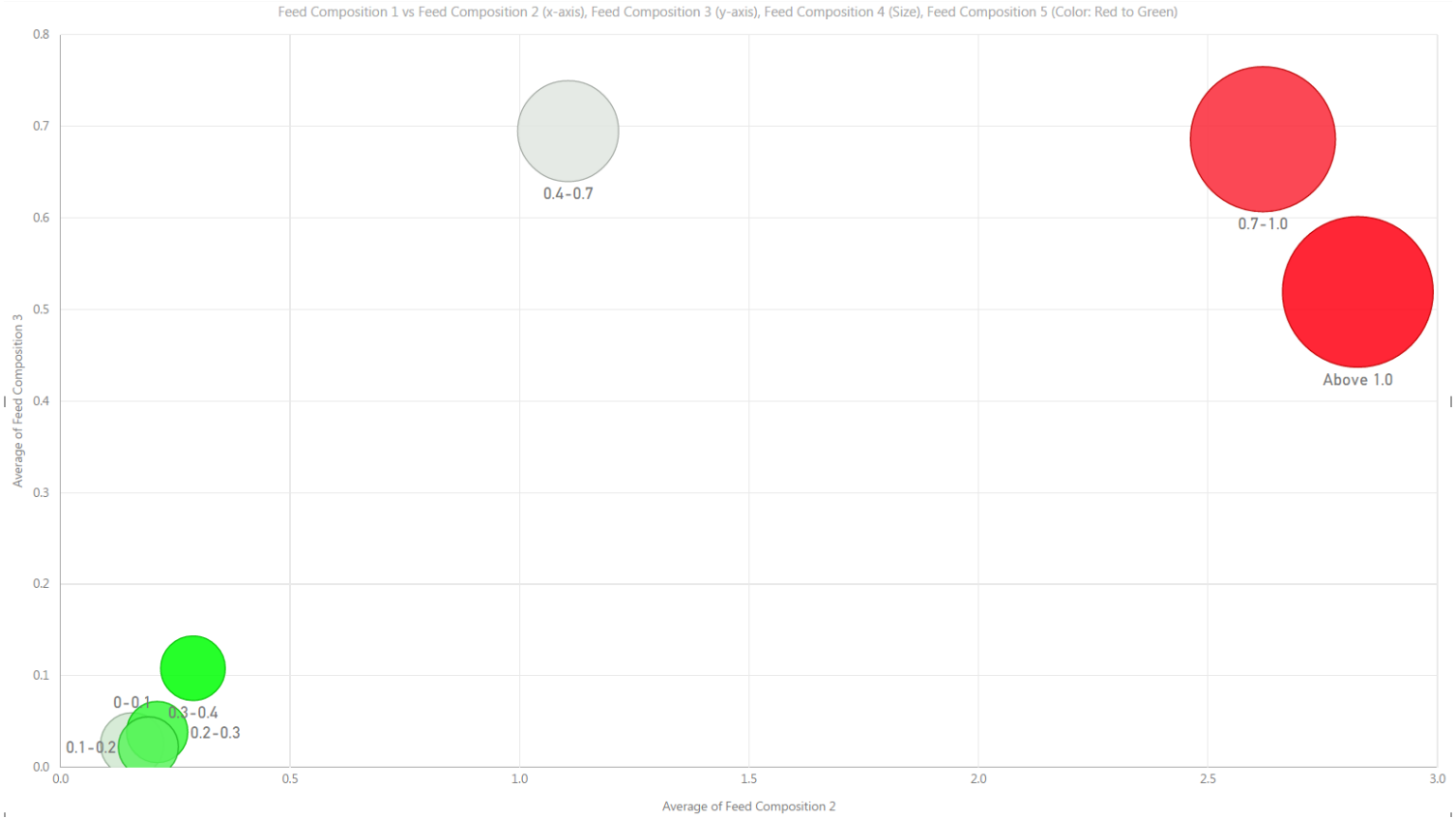

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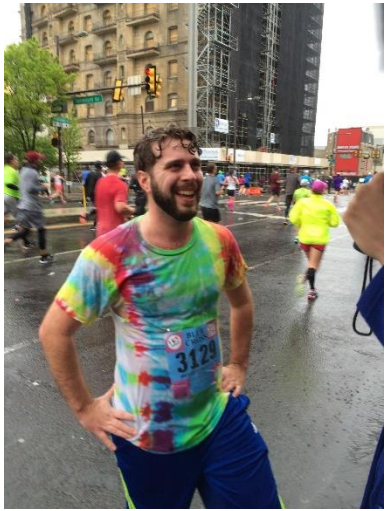
Contact Information

Kevin Geneva

kgeneva@osisoft.com

Field Service Engineer

OSIsoft, LLC



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Name:_____ Company: _____

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Quality and content of the presentations	Poor	Good	Excellent	N/A
Welcome	○	○	○	○
The Journey To Real-Time Operational Intelligence	○	○	○	○
The Power of Connection	○	○	○	○
Tank Level Management System	○	○	○	○
Using the PI System to Aid in Troubleshooting Operational Aspects of Oil and Gas Well Drilling and Completion	○	○	○	○
Unleash your Infrastructure	○	○	○	○
Information on the Spot	○	○	○	○
Wrap-up/Seminar Conclusion	○	○	○	○

Quality and organization of the seminar				
Choice of date	○	○	○	○
Time allowed for lunch/breaks	○	○	○	○
Choice of presentations	○	○	○	○
Pace and time allowed for the presentations	○	○	○	○

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감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado

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