

EMPOWER YOUR ANALYTICS WITH OPERATIONAL DATA  
2019 OSISOFT NEW DELHI SEMINAR

# Delivering High Quality Operational Data for Advanced Analytics

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*16th October 2019*

# Agenda

- Address excitement and obstacles around advanced analytics
- Provide an approach to increase your chances of success with advanced analytics
- Explain how the PI Integrator supports the proposed approach

# No Shortage of Interest in Advanced Analytics



**62%** running one or more advanced analytics projects today

**46%** have business leaders involved in investment decisions regarding advance analytics

# Success When Used to Augment Decisions

## Greater Operational Efficiency



Henkel (with pmOne) **predict when a transition occurs** for an exothermic reaction, **saving 5% of process time.**

## Enhanced Ability to Prevent Costly Failures



Invenergy (with SparkCognition) **predict catastrophic gearbox failures** at least **one month in advance.**

## Better Environmental Protection



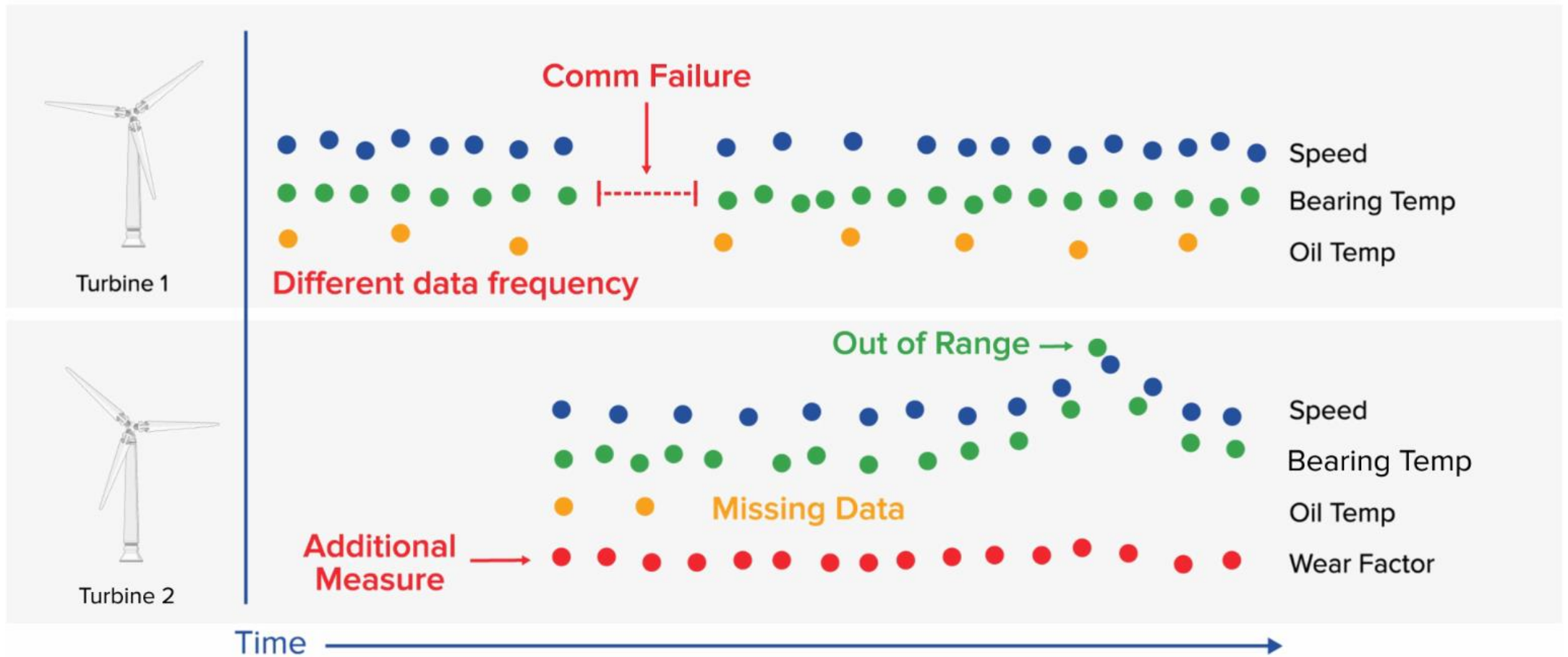
United Utilities proved an ability to accurately **predict combined sewer overflows 6 hours before an incident.**

# Five Considerations Before Starting with Advanced Analytics

1. Gaps in data collection
2. Poor data quality
3. Low # of modes
4. Unknown relationships
5. Natural skepticism

**MIND THE GAP**

# Time-series Data is Not Naturally Aligned or Contextualized

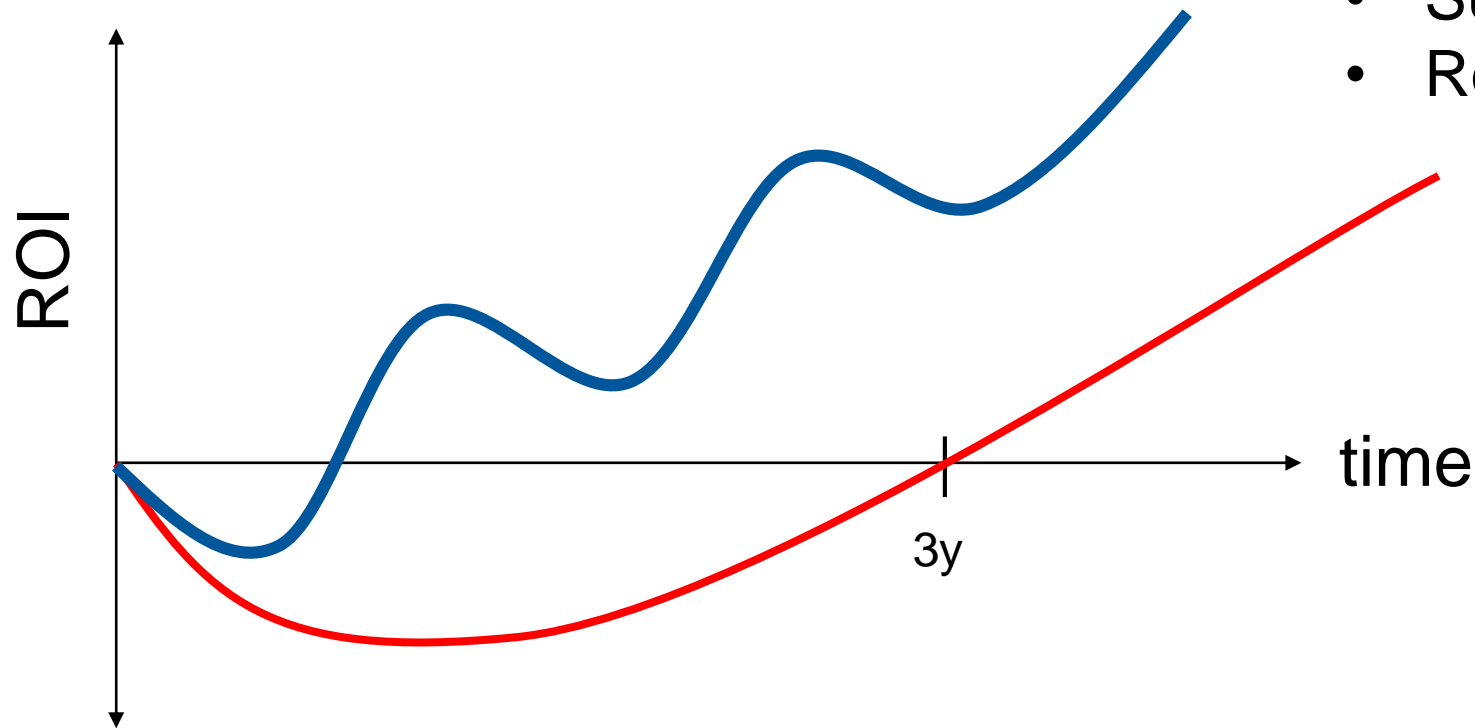


How do you reduce  
the **uncertainty** of  
what can be achieved  
with **advanced analytics** ?

# Small Projects Propel Success for a Large Project

## Must-have project characteristics

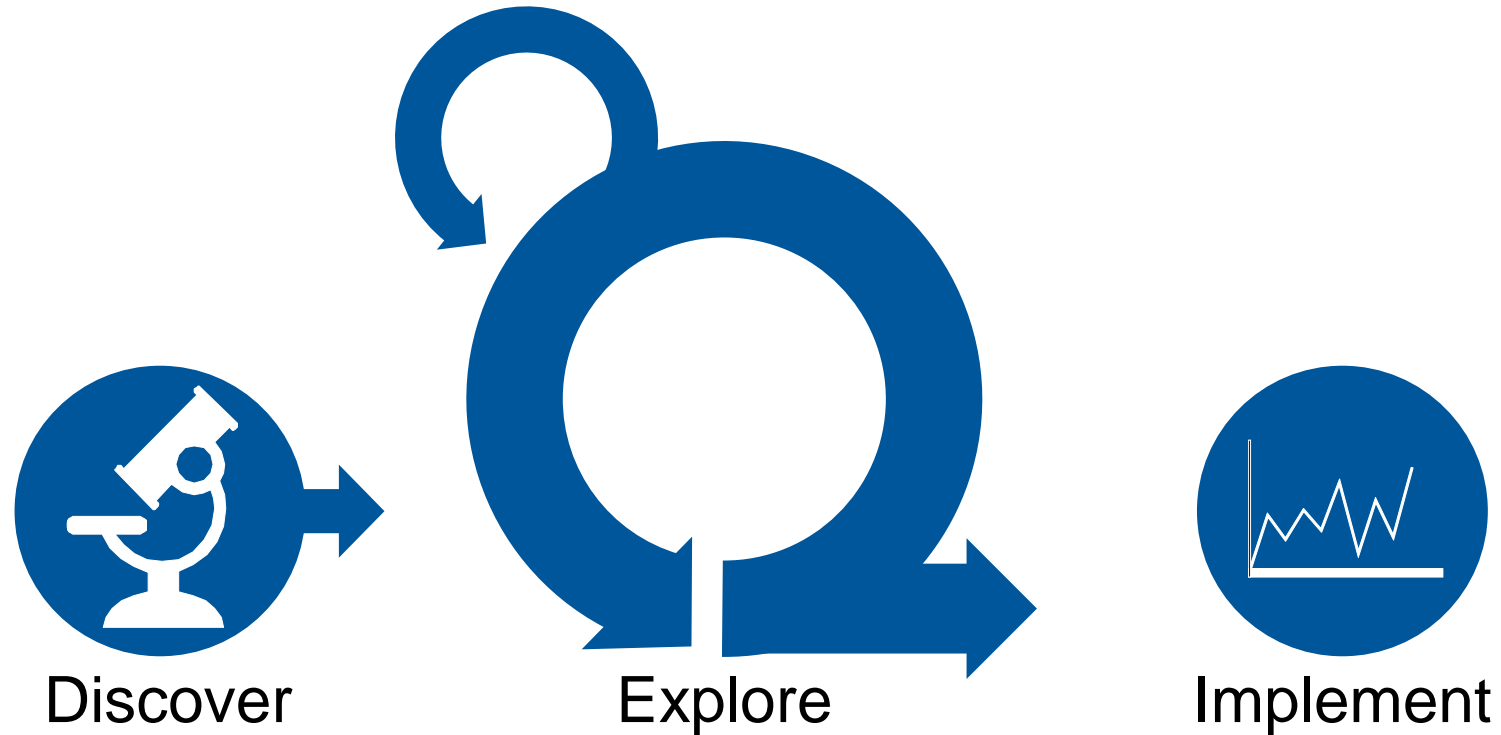
- Subject matter expert included
- Sufficient business value
- Related to larger initiative





# Adopt Iterative Workflows that Include SMEs

... and use technology that support these workflows





Discover

Select Data > **Modify View** > Publish

Back Next

+ Add Column  
9 columns

▼ Edit Row Filters  
1 Row Filters

☰ Edit Value Mode  
Interpolated Values  
Every 1 minute

Start Time

\*-1d

End Time

\*

Apply

Wind Turbine	TimeStamp	Day of the Week	Active Power	Apparent Power	Bearing A Temperature	Capacity	Rotor Speed	Operati
GE01	3/18/2019 10:52:57.477 AM	Monday	1,517.787	1,523.764	42.523	62.831	19.927	90.403
GE01	3/18/2019 10:53:57.477 AM	Monday	1,518.78	1,517.996	42.515	62.877	20.39	90.421
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GE01	3/18/2019 11:14:57.477 AM	Monday	1,519.61	1,523.788	42.339	63.851	19.749	90.801
GE01	3/18/2019 11:15:57.477 AM	Monday	1,526.237	1,524.405	42.33	63.897	19.949	90.818
GE01	3/18/2019 11:16:57.477 AM	Monday	1,532.863	1,525.036	42.322	63.943	19.886	90.835
GE01	3/18/2019 11:17:57.477 AM	Monday	1,509.635	1,515.866	42.313	63.99	19.921	90.855
GE01	3/18/2019 11:18:57.477 AM	Monday	1,522.636	1,525.022	42.305	64.036	19.992	90.876
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GE01	3/18/2019 11:21:57.477 AM	Monday	1,515.018	1,516.249	42.28	64.175	19.828	90.926
GE01	3/18/2019 11:22:57.477 AM	Monday	1,506.233	1,506.149	42.271	64.221	19.684	90.943

Data preparation capabilities that accelerate training algorithms or creating views for BI Tools:

- Common nomenclature
- Aligned data
- Normalized measurements across assets
- Complex filtering by
  - Asset type
  - Event type

Source Assets

Server: DFPIAFSERVERPRD

Database: Power Generation

Assets

- Generation
  - Equipment List
  - Fossil Generating Station
  - Matador 1 CCGT
  - OSIsoft Power
  - PowerCo
  - Solar Power Generation Fleet
  - Wind Power Generation Fleet
    - Big Buffalo Wind Farm
    - Black Mesa Wind Farm
      - GE01
      - GE02
      - GE03
      - GE04
      - GE05
      - GE06
      - GE07

Attributes: Filter

Select All

- Active Power
- Apparent Power
- Apparent Power (calc)
- BatchWindBinFilter

Search Shape

Asset Shape

- Wind Turbine
  - Active Power
  - Apparent Power
  - Bearing A Temperature
  - Capacity
  - Operating Efficiency
  - Rotor Speed

Select Data > Modify View > Publish

Source Assets

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    - Big Buffalo Wind Farm
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      - GE01
      - GE02
      - GE03
      - GE04
      - GE05
      - GE06
      - GE07

Attributes: Filter

Select All

- Active Power
- Apparent Power
- Apparent Power (calc)
- BatchWindBinFilter
- Blade3, Set Value
- Capacity
- Circuit Breaker Cut-Ins

Begin from common nomenclature & hierarchy



Discover

Pick from measurements that shape the model or view

Attributes: Filter

Select All

- Active Power
- Apparent Power

Edit Filters

- Asset Name: GE05
- Asset Template: Wind Turbine
- Asset Category: Wind Turbine

Cancel Save

Filter based on similar assets

9 columns   
  1 Row Filter   
  Interpolated Values Every 1 minute

Start Time: \*-1d    End Time: \*   

Wind Turbine	TimeStamp	Day of the Week	Active Power	Apparent Power	Bearing A Temperature	Capacity	Rotor Speed	Operati
GE01	3/18/2019 10:52:57.477 AM	Monday	1,517.787	1,523.764	42.523	62.831	19.927	90.403
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GE01	3/18/2019 10:58:57.477 AM	Monday	1,535.935	1,536.558	42.473	63.01	20.124	90.516
GE01	3/18/2019 10:59:57.477 AM	Monday	1,517.37	1,519.13	42.465	63.057	20.23	90.535
GE01	3/18/2019 11:00:57.477 AM	Monday	1,528.547	1,529.658	42.456	63.104	20.336	90.554
GE01	3/18/2019 11:01:57.477 AM	Monday	1,529.736	1,524.135	42.448	63.151	20.442	90.573
GE01	3/18/2019 11:02:57.477 AM	Monday	1,517.794	1,525.652	42.439	63.198	20.548	90.592
GE01	3/18/2019 11:03:57.477 AM	Monday	1,505.852	1,512.247	42.431	63.245	20.654	90.611
GE01	3/18/2019 11:04:57.477 AM	Monday	1,519.556	1,521.107	42.423	63.292	20.76	90.63
GE01	3/18/2019 11:05:57.477 AM	Monday	1,519.952	1,523.781	42.414	63.339	20.866	90.649
GE01	3/18/2019 11:06:57.477 AM	Monday	1,523.877	1,508.615	42.406	63.386	20.972	90.668
GE01	3/18/2019 11:07:57.477 AM	Monday	1,533.151	1,532.751	42.397	63.433	21.078	90.687
GE01	3/18/2019 11:08:57.477 AM	Monday	1,525.437	1,526.634	42.389	63.48	21.184	90.706
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GE01	3/18/2019 11:10:57.477 AM	Monday	1,522.443	1,522.936	42.372	63.574	21.396	90.744
GE01	3/18/2019 11:11:57.477 AM	Monday	1,509.033	1,522.19	42.364	63.621	21.502	90.763
GE01	3/18/2019 11:12:57.477 AM	Monday	1,524.965	1,525.264	42.355	63.668	21.608	90.782
GE01	3/18/2019 11:13:57.477 AM	Monday	1,511.918	1,508.629	42.347	63.715	21.714	90.801
GE01	3/18/2019 11:14:57.477 AM	Monday	1,519.61	1,523.788	42.339	63.762	21.82	90.82
GE01	3/18/2019 11:15:57.477 AM	Monday	1,526.237	1,524.405	42.33	63.809	21.926	90.839
GE01	3/18/2019 11:16:57.477 AM	Monday	1,532.863	1,525.036	42.322	63.856	22.032	90.858
GE01	3/18/2019 11:17:57.477 AM	Monday	1,509.635	1,515.866	42.313	63.903	22.138	90.877
GE01	3/18/2019 11:18:57.477 AM	Monday	1,522.636	1,525.022	42.305	63.95	22.244	90.896
GE01	3/18/2019 11:19:57.477 AM	Monday	1,518.829	1,519.512	42.296	64.082	20.067	90.893
GE01	3/18/2019 11:20:57.477 AM	Monday	1,527.32	1,526.332	42.288	64.129	20.043	90.91
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GE01	3/18/2019 11:22:57.477 AM	Monday	1,506.233	1,506.149	42.271	64.221	19.684	90.943

### Row Filters

Add New Row Filter

String

Digital

Numeric

Null Values

Event Frame

Include rows based on whether the contents of a column match a string pattern

Include rows based on whether the contents of a column contain certain digital values

Include rows based on whether the contents of a column contain certain numeric values

Include rows where the contents of a column contain a value

Include rows where certain Event Frames are active



Discover

Various ways to clean the data

Select all data from a particular event type

Event Frame	Related Asset	Start Time	End Time
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
GE02 2019-03-06 11:56:46	GE02	3/6/2019 11:56:46 AM	3/6/2019 12:06:46 PM
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Event Frame	Related Asset	Start Time	End Time
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
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GE06 2018-08-15 19:43:21	GE06	8/15/2018 7:43:21 PM	12/31/9999 11:59:59 PM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM
GE06 2019-03-06 11:31:52	GE06	3/6/2019 11:31:52 AM	3/6/2019 11:41:37 AM

Quickly preview events after applying filter



Discover



Discover

Include multiple filters to clean data

### Row Filters

Event Row Filter 1

Criteria 1: Match Event Frames where Event Template = Wind Curtailment Related Shape Asset is **any**

Add New Row Filter

- String: Include rows based on whether the contents of a column match a string pattern
- Digital: Include rows based on whether the contents of a column contain certain digital values

### Row Filters

Include rows where all of these conditions are true

Bearing A Temperature > -273.15

Event Row Filter 1

Criteria 1: Match Event Frames where Event Template = Wind Curtailment Related Shape Asset is **any**

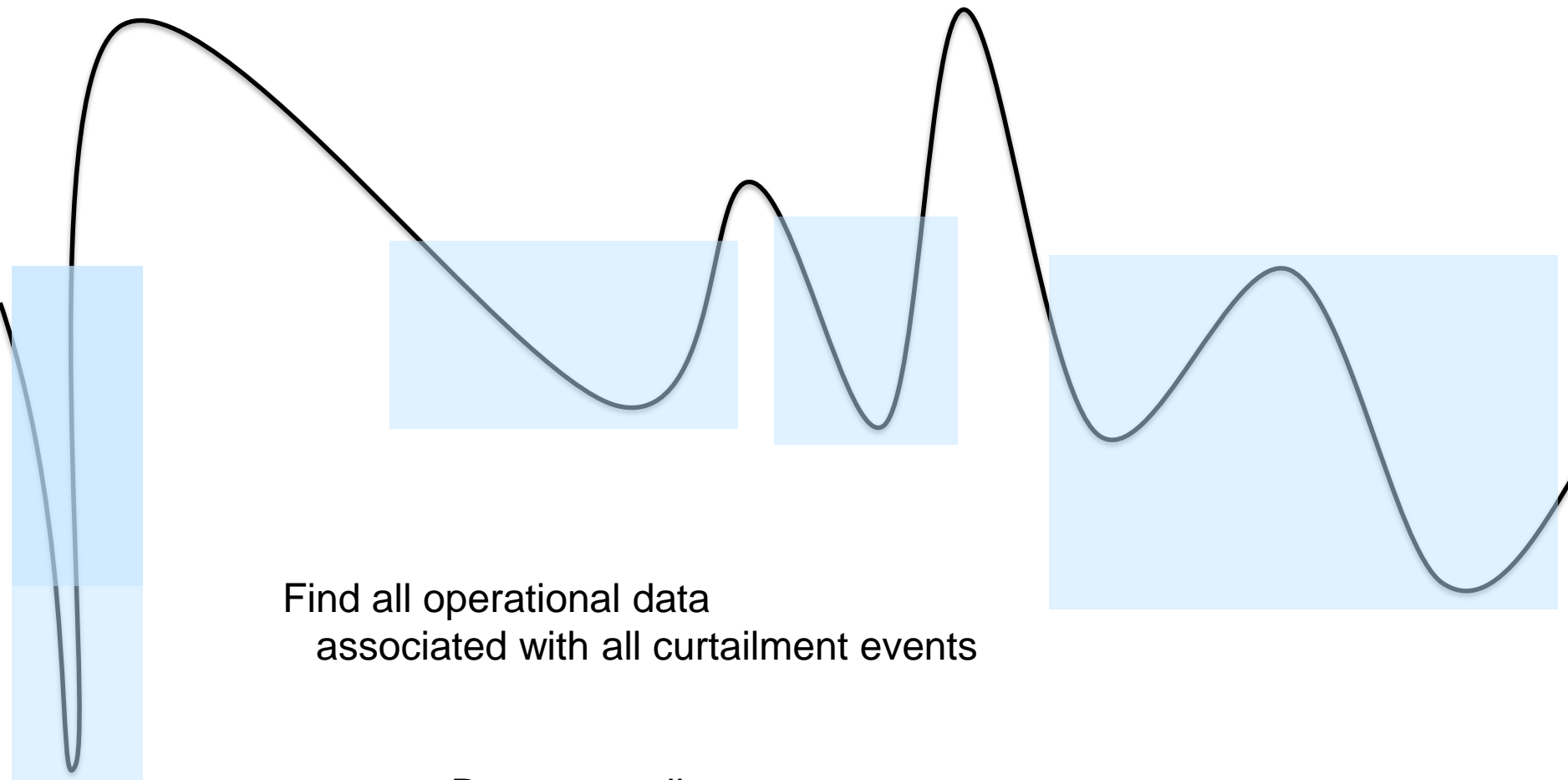
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- Digital: Include rows based on whether the contents of a column contain certain digital values
- Numeric: Include rows based on whether the contents of a column contain certain numeric values
- Null Values: Include rows where the contents of a column contain a value
- Event Frame: Include rows where certain Event Frames are active

Close



Discover



Find all operational data  
associated with all curtailment events

Remove outliers





Discover

Select Data > **Modify View** > Publish

Back Next

+ Add Column  
9 columns

▼ Edit Row Filters  
1 Row Filters

☰ Edit Value Mode  
Interpolated Values  
Every 1 minute

Start Time

\*-1d

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\*

Apply

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GE01	3/18/2019 11:19:57.477 AM	Monday	1,518.829	1,519.512	42.296	64.082	20.067	90.893
GE01	3/18/2019 11:20:57.477 AM	Monday	1,527.32	1,526.332	42.288	64.129	20.043	90.91
GE01	3/18/2019 11:21:57.477 AM	Monday	1,515.018	1,516.249	42.28	64.175	19.828	90.926
GE01	3/18/2019 11:22:57.477 AM	Monday	1,506.233	1,506.149	42.271	64.221	19.684	90.943

Operational data of an asset that is usable by algorithms or BI Tools!!



- Asset Context
- Data Alignment
- Asset Normalization
- Filtered on a Curtailment Event Type
- Filtered for  $T > -273.15\text{ C}$





Discover

Select where you want to publish

One-time bulk or incrementally push

☰ LK\_WindFarm

Select Data > Modify View > Publish

**Target Configuration**


Westeros ▾

**Run Mode**

Run Once

Run on a Schedule

**First Run**

\* 

Recur every

**Summary**

Shape and Matches

- There are 75 Matching Instances

Timeframe and Interval

- Your Start Time is \*-1d
- Your End Time is \*
- Your Time Interval gets an interpolated measurement **Every 1 minute**

**Publish**

Benefit from native integration to  
AWS, Azure, Hadoop, and SAP HANA



# Discover

What if you want to analyze events relative to each other?



Source Events

Server: DFPIAFSERVERPRD  
Database: Power Generation

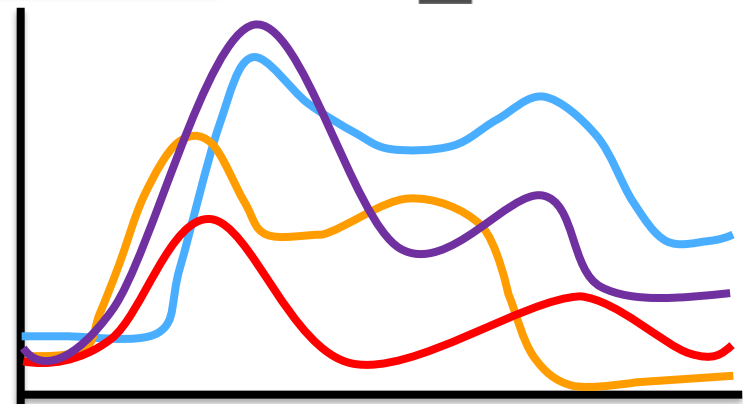
Search Shape

Event Shape: Wind Curtailment

Matches: Found 100+ Matches

Attributes: Filter

Production Loss





## Discover

Index views of operational data by events

Compare events on a timescale relative to start of the event

Select Data > **Modify View** > Publish

Back Next

+ Add Column 11 columns Edit Row Filters 0 Row Filters Edit Value Mode Interpolated Values Every 10 minutes

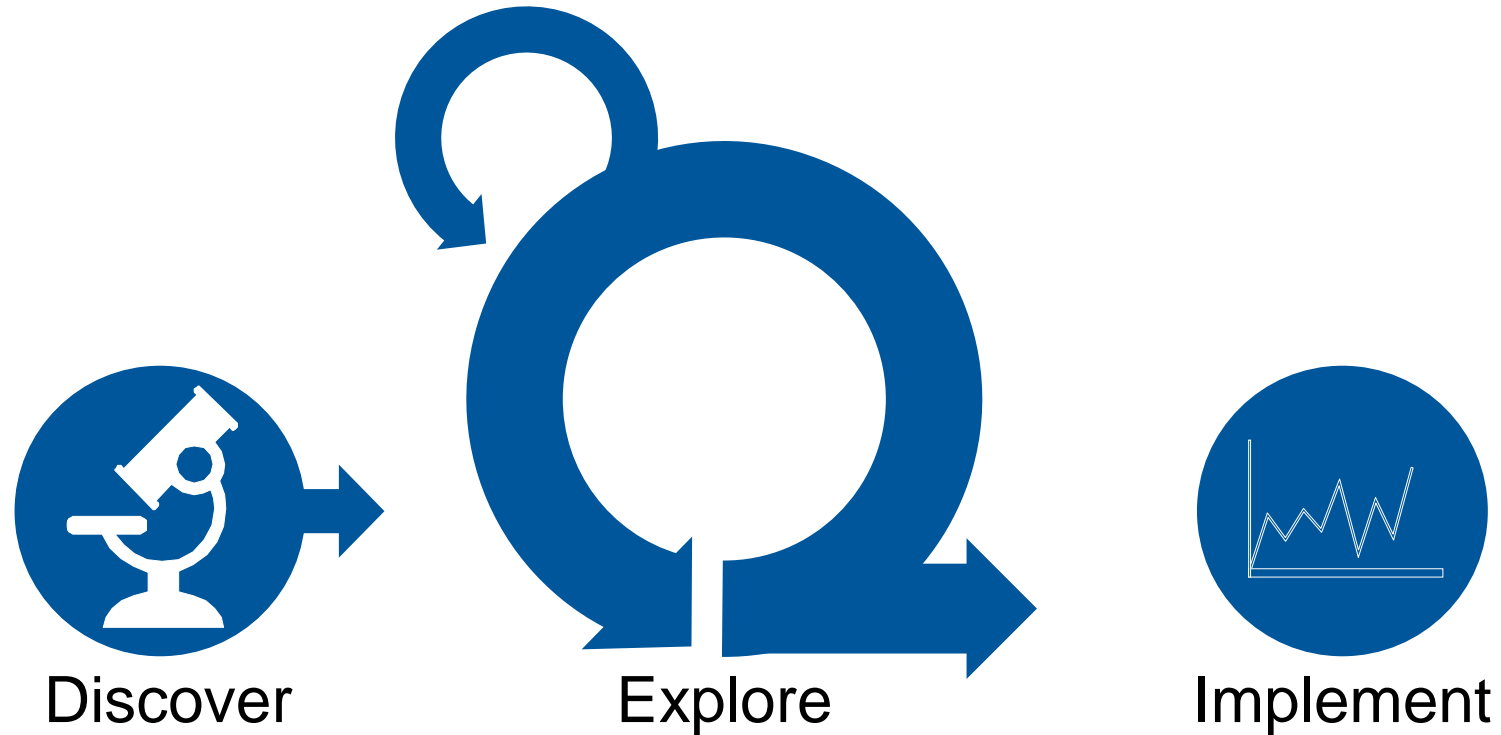
Start Time 1/1/17 1:14 PM End Time \*

Apply

Wind Turbine	Wind Curtailment	Event Frame Start Time (Local) TimeStamp	Event Frame Relative Time Second	Production Loss	Turbine	Manufacturer
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	0	0.398	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	600	0.412	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	1200	0.405	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	1800	0.407	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	2400	0.345	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	3000	0.391	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	3600	0.346	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	4200	0.377	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	4800	0.407	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	5400	0.379	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	6000	0.326	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	6600	0.31	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	7200	0.333	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	7800	0.241	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	8400	0.119	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	9000	0.147	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	9600	0.219	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	10200	0.322	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	10800	0.287	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	11400	0.321	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	12000	0.353	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	12600	0.375	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	13200	0.179	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	13800	0.057	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	14400	0.175	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	15000	0.201	GE09	GE
Generation\Wind Power Generation Fleet\Windy Valley Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	15600	0.075	GE09	GE
Generation\Wind Power Generation Fleet\Black Mesa Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	0	0.101	GE09	GE
Generation\Wind Power Generation Fleet\Black Mesa Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	600	0.101	GE09	GE
Generation\Wind Power Generation Fleet\Black Mesa Wind Farm\GE09	GE09 2017-01-01 10:43:39	1/1/2017 10:43:39 AM	1200	0.101	GE09	GE

# Adopt Iterative Workflows that Include SMEs

... and use technology that support these workflows







# Implement

Create a stream of features for your algorithm

Begin from the shape of your training data

Buttons: + Create Asset View (Build a data view starting with your asset hierarchy), + Create Event View (Build a data view starting with your event frame hierarchy), + Create Streaming View (Build a streaming view with a custom output shape), Modify View (Modify existing data view), Remove View (Remove selected view)

Name	Run Status	Type	Run Mode	Start Time	End Time	Last Run Time
EF_View_Example_KP	Not Yet Published	Event	Once	10/5/18 4:17 AM	*	Never

Navigation: Select Data > Modify View > Publish

Source Assets:

- Isabelle\_PowerGen (Asset)
- LK\_Test (Asset)
- LK\_WindFarm (Asset)
- Rory Test Asset (Asset)
- TestGrubbs (Asset)
- Wind\_Data\_Ali (Asset)
- Dis\_EF\_TEST1 (Event)
- EFTESY (Event)
- EF\_View\_Example\_KP (Event)
- Isabelle\_HRSG\_Events (Event)
- KP\_EFViewTest2 (Event)
- KP\_Nonstream\_EFView\_Test (Event)
- bpope\_test (Event)
- KP\_Streamtest (Streaming Out)
- VerseAI - Stream 1 (Streaming Out)
- test (Streaming Out)

Search Shape: Asset Shape

- Wind Turbine
  - Active Power
  - Apparent Power
  - Bearing A Temperature
  - Capacity
  - Operating Efficiency
  - Rotor Speed

Matches: Found 75 Matches

- GE01 (10 items)
- GE02 (10 items)
- GE03 (5 items)

Use this Shape



# Implement

Select Data > **Modify View** > Publish

Message Designer

Schema Options: Syncing mode (flattened)

Message Trigger: Trigger a new message when 1 key values change

Backfill Data: Do not backfill data

Message Filters: 0 filters

Preview Start Time: \*-8h

Preview End Time: \*

```
{
  "Wind Turbine": "GE01",
  "Active Power": 1155.0897216796875,
  "Apparent Power": 891.489990234375,
  "Bearing A Temperature": 37.61890411376953,
  "Capacity": 6.590443134307861,
  "Operating Efficiency": 95.10331493280601,
  "Rotor Speed": 19.7457275390625,
  "Timestamp": "2019-03-15T01:26:19.4230957-07:00"
},
{
  "Wind Turbine": "GE01",
  "Active Power": 1118.7607421875,
  "Apparent Power": 889.1935424804688,
  "Bearing A Temperature": 37.61298751831055,
  "Capacity": 6.515948295593262,
  "Operating Efficiency": 95.09685325688397,
  "Rotor Speed": 19.595481872558594,
  "Timestamp": "2019-03-15T01:26:33.1416015-07:00"
}
```

Adjust object if needed and determine how it updates

Select Data > **Modify View** > Publish

Target Configuration: Veresai Stream

Run Mode

First Run: \*

Summary

Shape and Matches

- There are 75 Matching Instances

Timeframe and Interval

- Your Start Time is \*
- Trigger a new message as values change

Publish

Pick a messaging hub to stream to

# Capabilities That Streamline Advanced Analytics

Context

Normalization

Event Marking

Iterative Workflows

Operationalization

Select Data > **Modify View** > Publish Back Next

**Add Column** 9 columns **Edit Row Filters** 1 Row Filters **Edit Value Mode** Interpolated Values Every 1 minute

Start Time: \*-1d End Time: \* Apply

Wind Turbine	TimeStamp	Day of the Week	Active Power	Apparent Power	Bearing A Temperature	Capacity	Rotor Speed	Operati
GE01	3/18/2019 10:52:57.477 AM	Monday	1,517.787	1,523.764	42.523	62.831	19.927	90.403
GE01	3/18/2019 10:53:57.477 AM	Monday	1,518.78	1,517.996	42.515	62.877	20.39	90.421
GE01	3/18/2019 10:54:57.477 AM	Monday	1,528.438	1,527.098	42.507	62.924	19.877	90.44
GE01	3/18/2019 10:55:57.477 AM	Monday	1,524.599	1,525.12	42.498	62.97	20.002	90.459
GE01	3/18/2019 10:56:57.477 AM	Monday	1,521.875	1,521.751	42.49	63.016	19.913	90.478
GE01	3/18/2019 10:57:57.477 AM	Monday	1,525.674	1,531.629	42.481	63.063	19.726	90.497
GE01	3/18/2019 10:58:57.477 AM	Monday	1,535.935	1,536.558	42.473	63.109	20.013	90.516
GE01	3/18/2019 10:59:57.477 AM	Monday	1,517.37	1,519.13	42.465	63.155	20.232	90.535
GE01	3/18/2019 11:00:57.477 AM	Monday	1,528.547	1,529.658	42.456	63.202	20.065	90.554
GE01	3/18/2019 11:01:57.477 AM	Monday	1,529.736	1,524.135	42.448	63.248	19.922	90.573
GE01	3/18/2019 11:02:57.477 AM	Monday	1,517.794	1,525.652	42.439	63.294	19.955	90.592
GE01	3/18/2019 11:03:57.477 AM	Monday	1,505.852	1,512.247	42.431	63.341	19.708	90.61
GE01	3/18/2019 11:04:57.477 AM	Monday	1,519.556	1,521.107	42.423	63.387	20.054	90.627
GE01	3/18/2019 11:05:57.477 AM	Monday	1,519.952	1,523.781	42.414	63.433	20.173	90.644
GE01	3/18/2019 11:06:57.477 AM	Monday	1,523.877	1,508.615	42.406	63.48	19.949	90.662
GE01	3/18/2019 11:07:57.477 AM	Monday	1,533.151	1,532.751	42.397	63.526	19.94	90.68
GE01	3/18/2019 11:08:57.477 AM	Monday	1,525.437	1,526.634	42.389	63.572	19.999	90.698
GE01	3/18/2019 11:09:57.477 AM	Monday	1,523.269	1,518.825	42.381	63.619	19.862	90.716
GE01	3/18/2019 11:10:57.477 AM	Monday	1,522.443	1,522.936	42.372	63.665	20.009	90.733
GE01	3/18/2019 11:11:57.477 AM	Monday	1,509.033	1,522.19	42.364	63.712	19.63	90.75
GE01	3/18/2019 11:12:57.477 AM	Monday	1,524.965	1,525.264	42.355	63.758	20.008	90.767
GE01	3/18/2019 11:13:57.477 AM	Monday	1,511.918	1,508.629	42.347	63.804	19.621	90.784
GE01	3/18/2019 11:14:57.477 AM	Monday	1,519.61	1,523.788	42.339	63.851	19.749	90.801
GE01	3/18/2019 11:15:57.477 AM	Monday	1,526.237	1,524.405	42.33	63.897	19.949	90.818
GE01	3/18/2019 11:16:57.477 AM	Monday	1,532.863	1,525.036	42.322	63.943	19.886	90.835
GE01	3/18/2019 11:17:57.477 AM	Monday	1,509.635	1,515.866	42.313	63.99	19.921	90.855
GE01	3/18/2019 11:18:57.477 AM	Monday	1,522.636	1,525.022	42.305	64.036	19.992	90.876
GE01	3/18/2019 11:19:57.477 AM	Monday	1,518.829	1,519.512	42.296	64.082	20.067	90.893
GE01	3/18/2019 11:20:57.477 AM	Monday	1,527.32	1,526.332	42.288	64.129	20.043	90.91
GE01	3/18/2019 11:21:57.477 AM	Monday	1,515.018	1,516.249	42.28	64.175	19.828	90.926
GE01	3/18/2019 11:22:57.477 AM	Monday	1,506.233	1,506.149	42.271	64.221	19.684	90.943



# How does the PI Integrator help you with these obstacles?

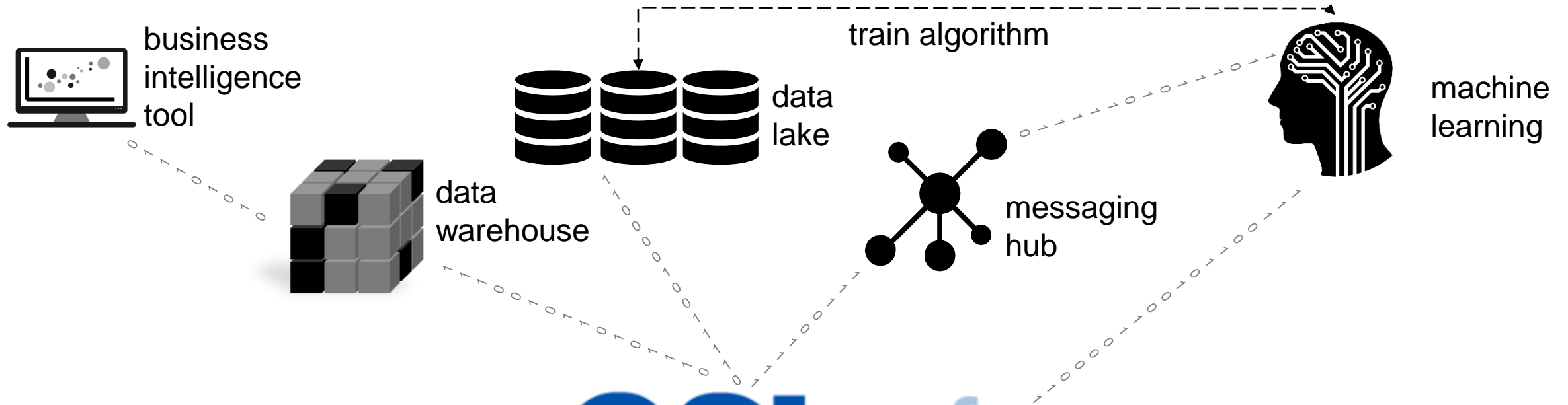
1. Gaps in data collection – filter or interpolate
2. Poor data quality – filter unreasonable values
3. Low # of modes – determine modes by indexing on events
4. Unknown relationships – work with data experts, no code needed
5. Natural skepticism – involve SME in iterative training without requiring a lot of their time

**MIND THE GAP**

*PI Integrators speed the process that brings trustworthy data to many unique analytics tools*



# PI Integrators Support Lambda and Kappa Architectures



**OSIsoft**®

**Enterprise Operations Infrastructure**



Assets



Automation Systems



Edge Devices / Sensors



IoT solutions

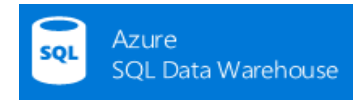
# PI Integrators Lower Your Risk to Begin Advanced Analytics

## PI Integrator benefits

Integrate operational data to your choice of advanced analytics platforms

Avoid delays from analyzing cryptic data sets

Eliminate the need to create & manage scripts that prepare operational data for other systems



SAP HANA



### **CEMEX:**

“Now we don't spend any time preparing data - It's there.  
Now, your time is spent in value-add activities...”

<http://www.osisoft.com/Presentations/Transforming-Process-Data-Into-Information--PI-Integrator-for-Business-Analytics/>



**New!**

Support for Amazon

PI Integrator for  
Business Analytics  
2018 R2

PI Integrator for  
SAP HANA  
2017

PI Integrator for  
Esri ArcGIS  
2017 SP1

Category	Destination	Standard	Advanced	PI Integrator for SAP HANA 2017	PI Integrator for Esri ArcGIS 2017 SP1
General	PI ODBC or Flat Files	✓	✓	✓	
Relational Database	SQL Server	✓	✓		
	Azure SQL Database	✓	✓		
	Oracle RDBMS	✓	✓		
Data Warehouse	SAP HANA Smart Data Integration			✓	
	Apache Hive	✓	✓		
	Azure SQL Data Warehouse	✓	✓		
	<b>New!</b> Amazon Redshift	✓	✓		
Data Lake	Hadoop HDFS	✓	✓		
	Azure Data Lake Store	✓	✓		
	<b>New!</b> Amazon S3	✓	✓		
Messaging Hub	SAP Streaming Analytics			✓	
	Apache Kafka		✓		
	Azure IoT Hub or Event Hubs		✓		
	<b>New!</b> Amazon Kinesis Data Streams		✓		
GIS	ArcGIS GeoEvent Server				✓

# Summary

## Advanced Analytics

Start with a small project that involves SMEs

Use an iterative approach to your projects

## PI Integrators

Support analytics workflows with **drag-and-drop data preparation** for SMEs

Provide **native integration** to a variety of advanced analytics platforms and BI Tools

Sends curated data via **bulk** and **incremental uploads** and **streams**

# Contact Information

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謝謝

KEA LEBONA

TAPADH LEIBH

고맙습니다

DZIĘKUJĘ CI  
NGIYABONGA

БАЯРЛАЛАА

MISAOTRA ANAO

OBRIGADO شكرا

TEŞEKKÜR EDERİM

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ТИ БЛАГОДАРАМ

TAK DANKE

MAHADSANID

THANK YOU

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ΕΥΧΑΡΙΣΤΩ GRATIAS TIBI

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MAHALO IĀ 'OE

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ありがとうございました

ДЗЯКУЎ

GRAZIE

HATUR NUHUN

PAXMAT CAҒA

SIPAS JI WERE

TERIMA KASIH

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MATUR NUWUN

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