

# PI System Crash Course: Get the most out of PI World

Isabelle Lacaille – Systems Engineer  
Joey Kim – Instructional Systems Designer

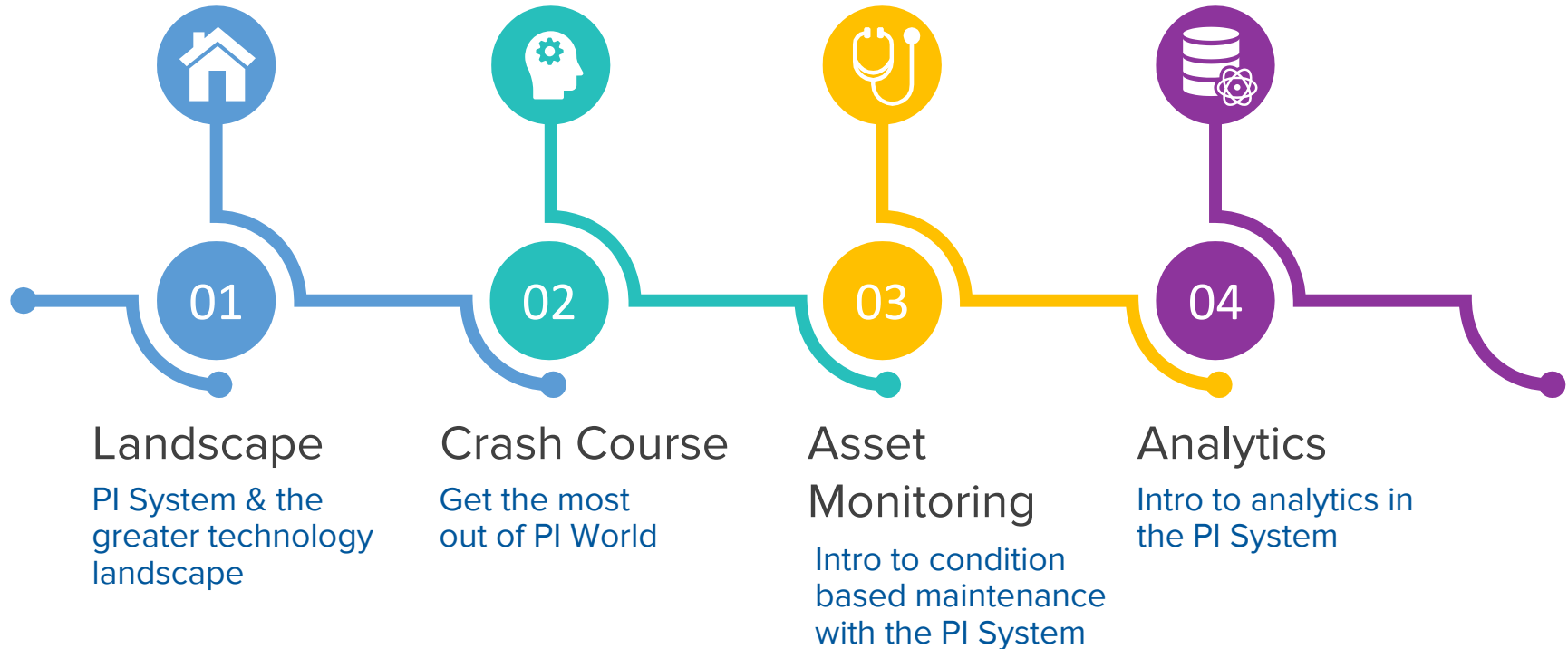


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# Where we are in our PI 101 Journey



## How familiar are you with the PI System?

Not at all **A**

Slightly **B**

Moderately **C**

Very **D**

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# You might be wondering...



What can I do with the PI System?



How to describe the PI System to my coworkers back at the office?



What PI System Tools should I focus on?



How to navigate PI World 2018?

What can I do with  ?

## Asset Health



## Process Optimization



## Quality Tracking



## Energy Efficiency



## Regulatory Compliance



## Safety & Security



## Asset Health



### Problem

Wind Farm can't meet generation targets

### Why?

Wind Turbine availability low due to curtailment and unplanned downtime

### Target

Increase Wind Turbine availability to 95%

### How?

Find biggest cause of lost production



Let's see the PI System  
IN ACTION!



# Windtopia

<b>Total Production</b> 8,187.5 kW	<b>Expected Production</b> 7,878.5 kW	<b>Turbines Available</b> 100 %	<b>Daily Revenue</b> 2,789.2 \$
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### Big Buffalo Wind Farm

Expected Power: 3,495.7 kW  
Current Power: 3,559.6 kW

Actual Capacity Factor: 49 %

Availability Factor: 65 %

### Black Mesa Wind Farm

Expected Power: 2,108.7 kW  
Current Power: 2,491.1 kW

Actual Capacity Factor: 80 %

Availability Factor: 44 %

### Black Wolf Wind Farm

Expected Power: 2,274 kW  
Current Power: 2,136.9 kW

Actual Capacity Factor: 42 %

Availability Factor: 74 %



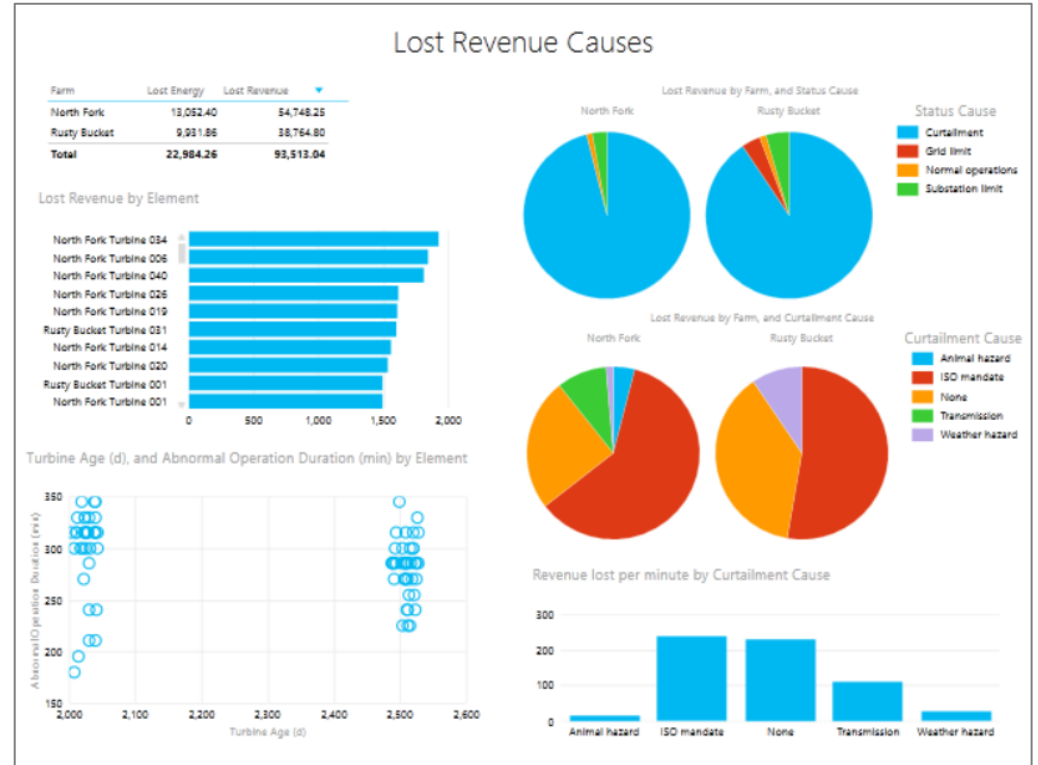
# How to describe the PI System?

Let's compare creating this report

Without the PI System

and

With the PI System



# Without the PI System

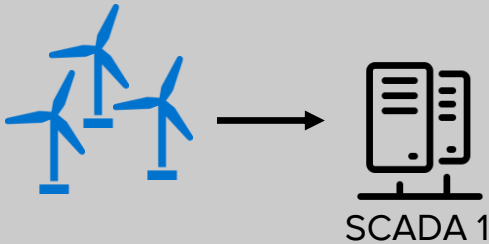
Corporate



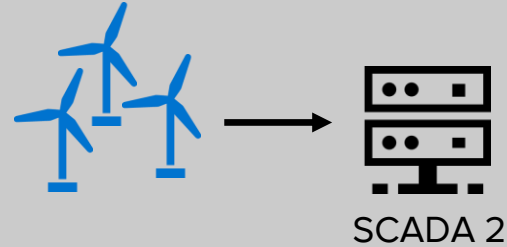
Lost Production



North Fork



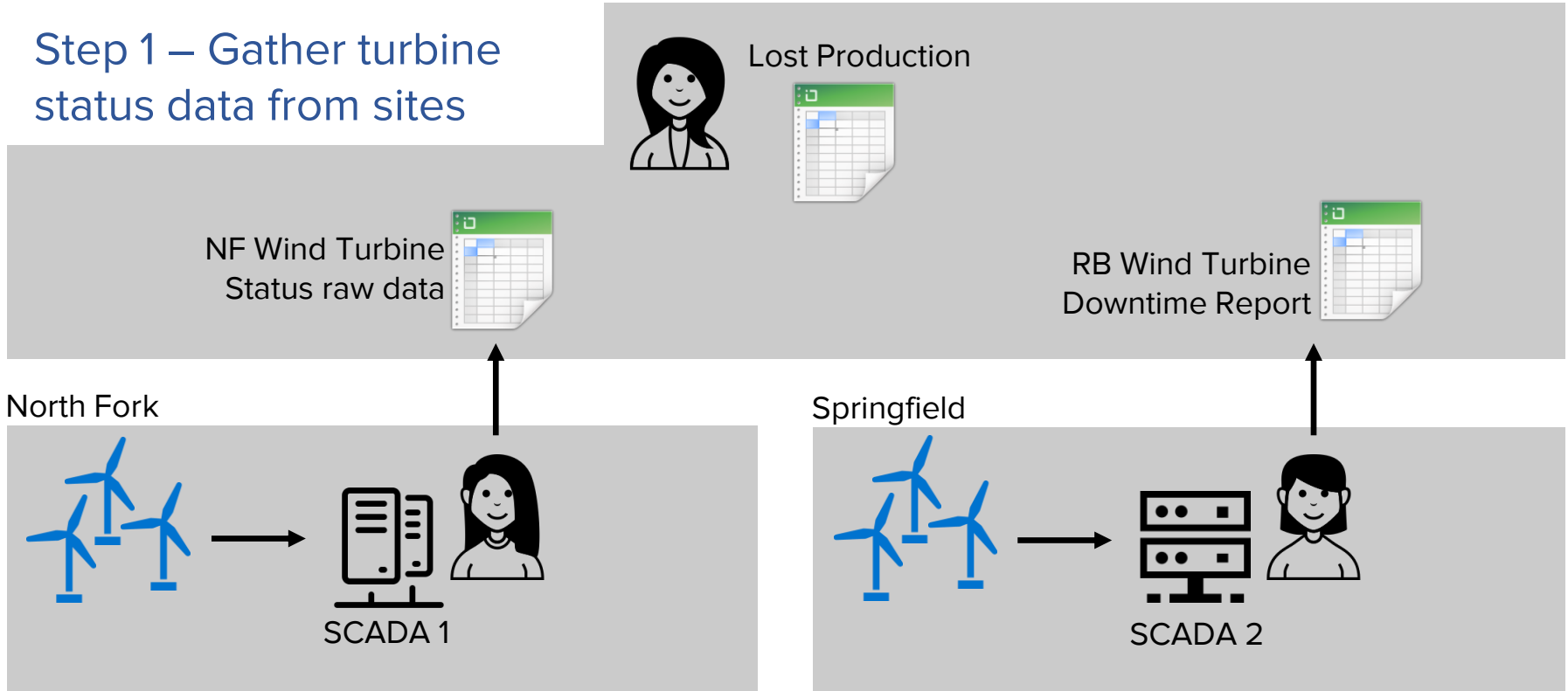
Springfield



# Without the PI System

Corporate

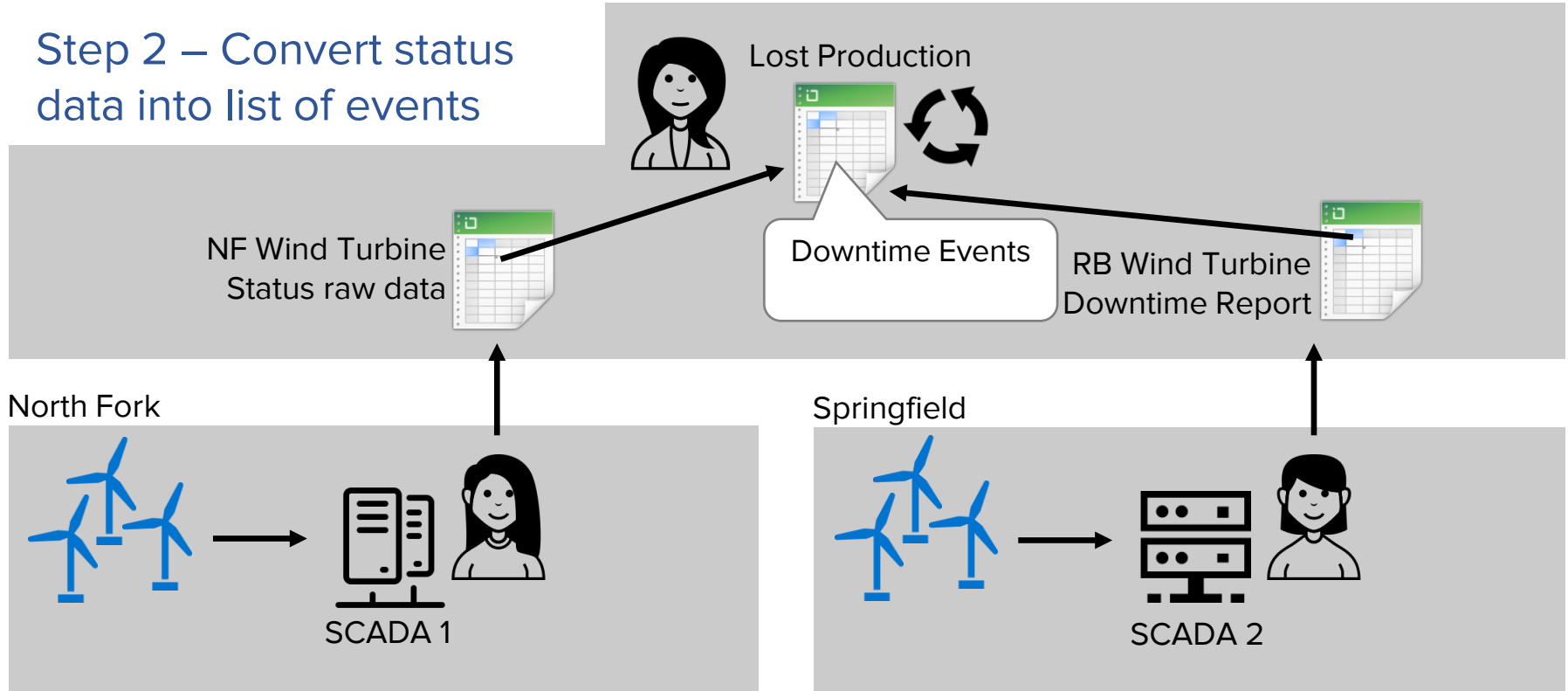
Step 1 – Gather turbine status data from sites



# Without the PI System

Corporate

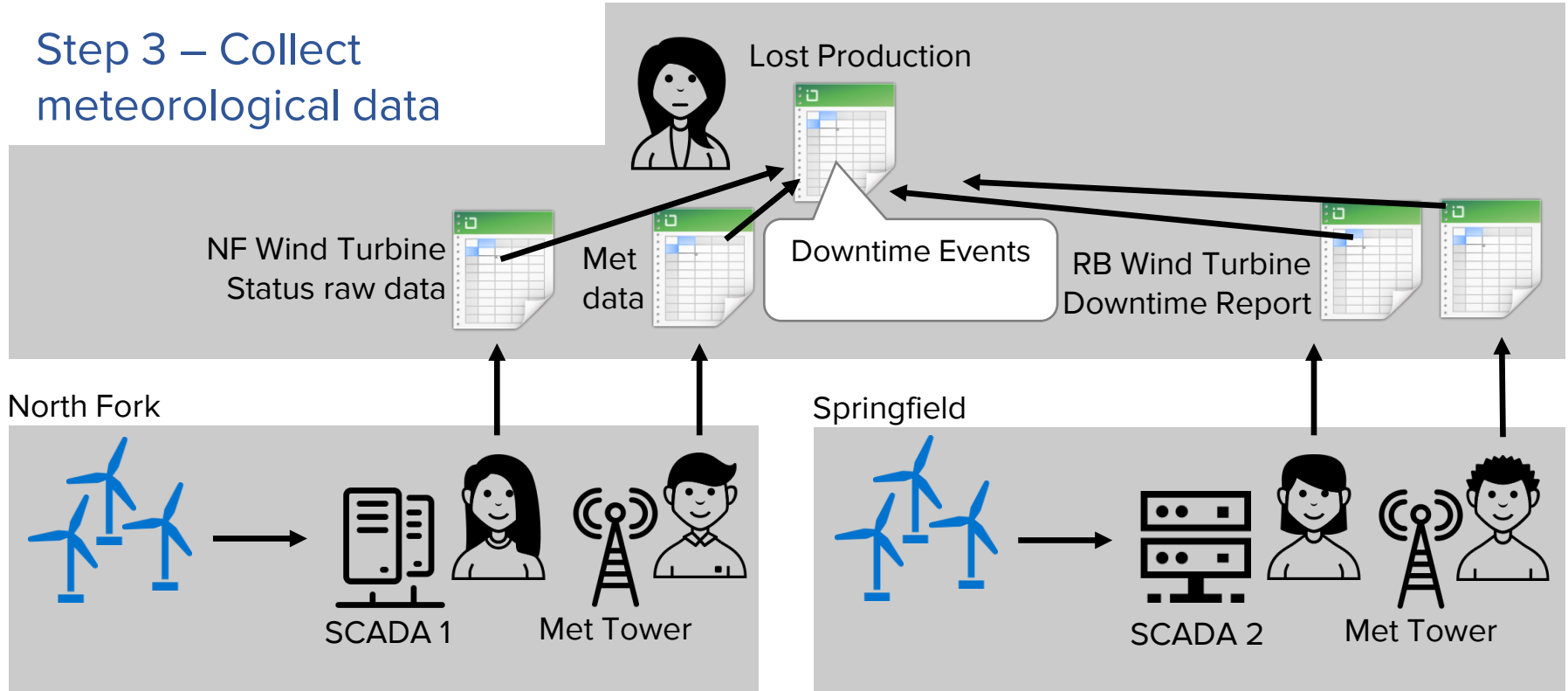
Step 2 – Convert status data into list of events



# Without the PI System

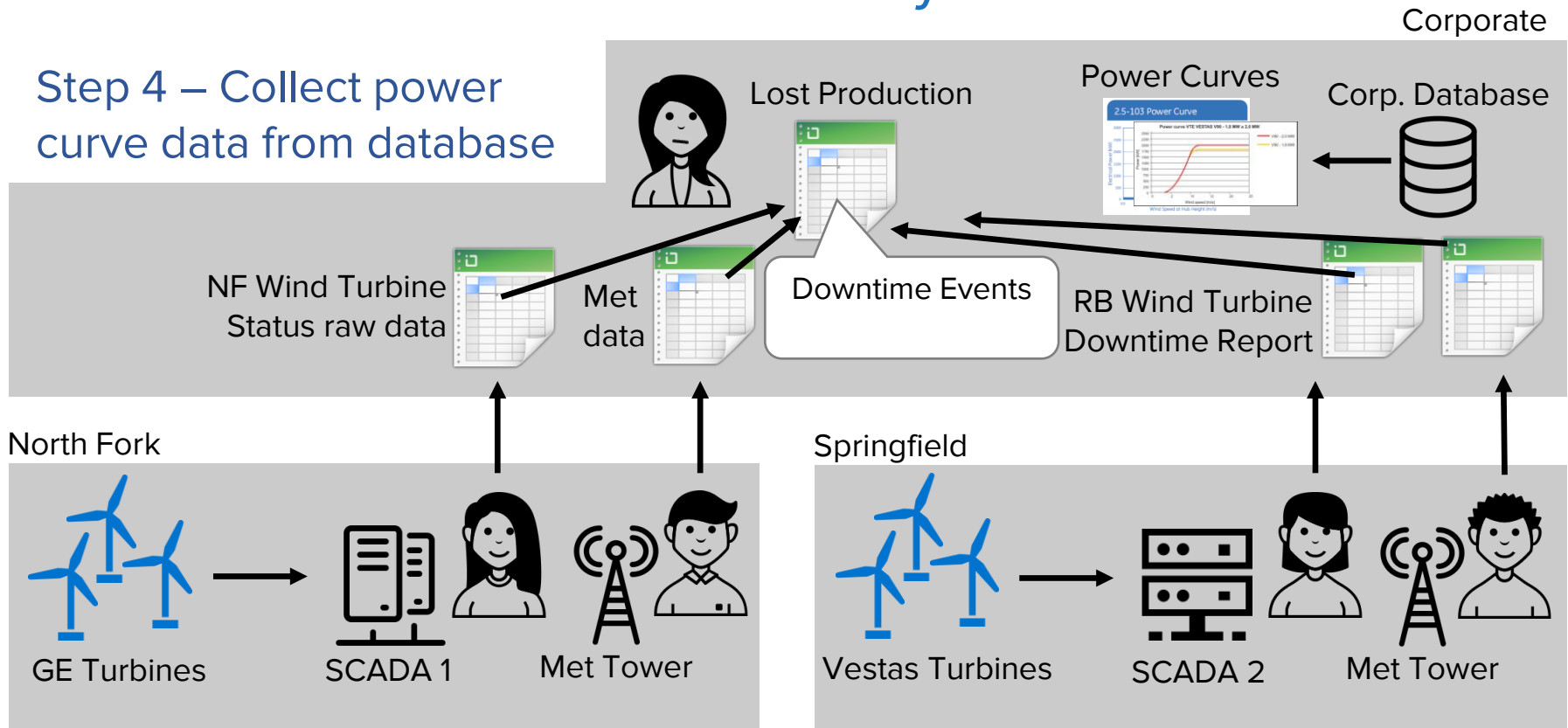
Corporate

## Step 3 – Collect meteorological data



# Without the PI System

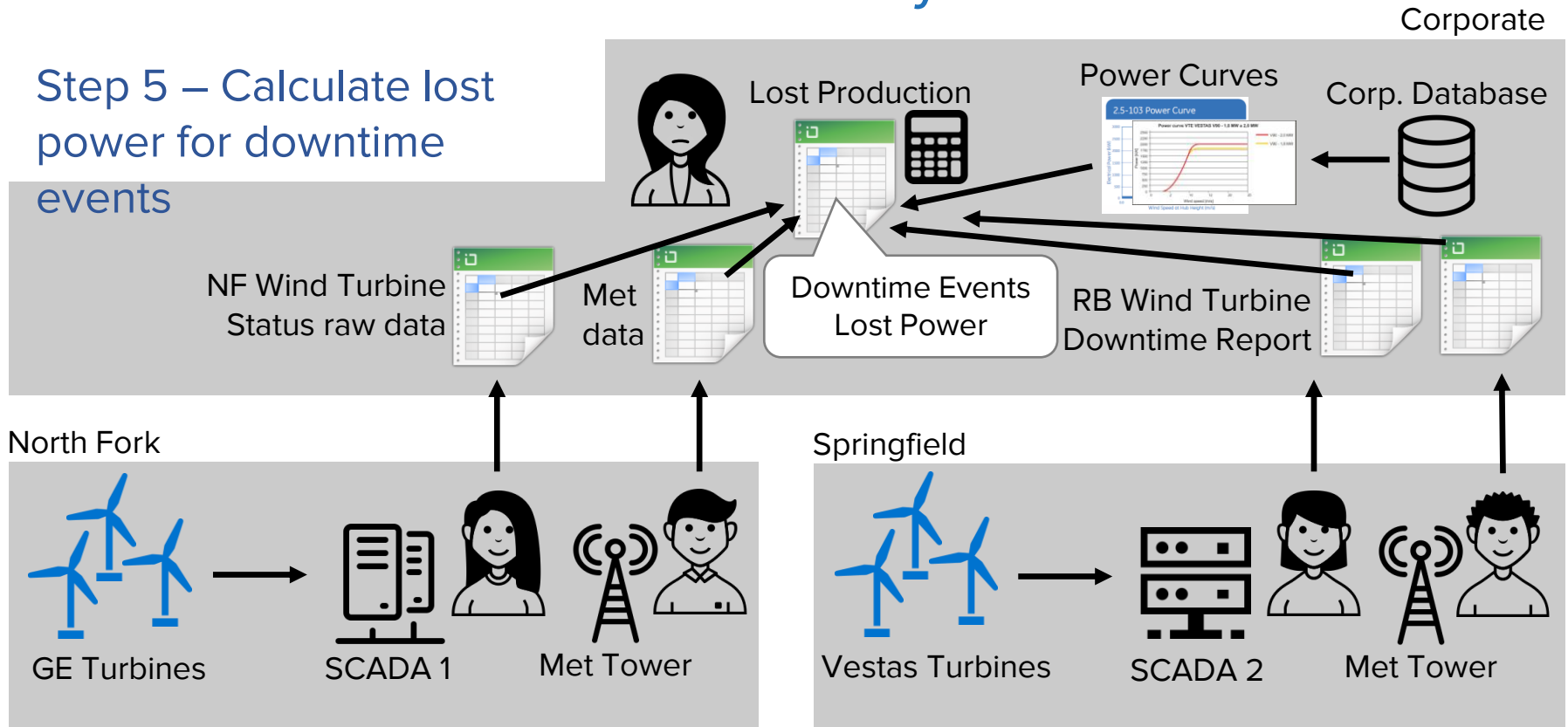
Step 4 – Collect power curve data from database





# Without the PI System

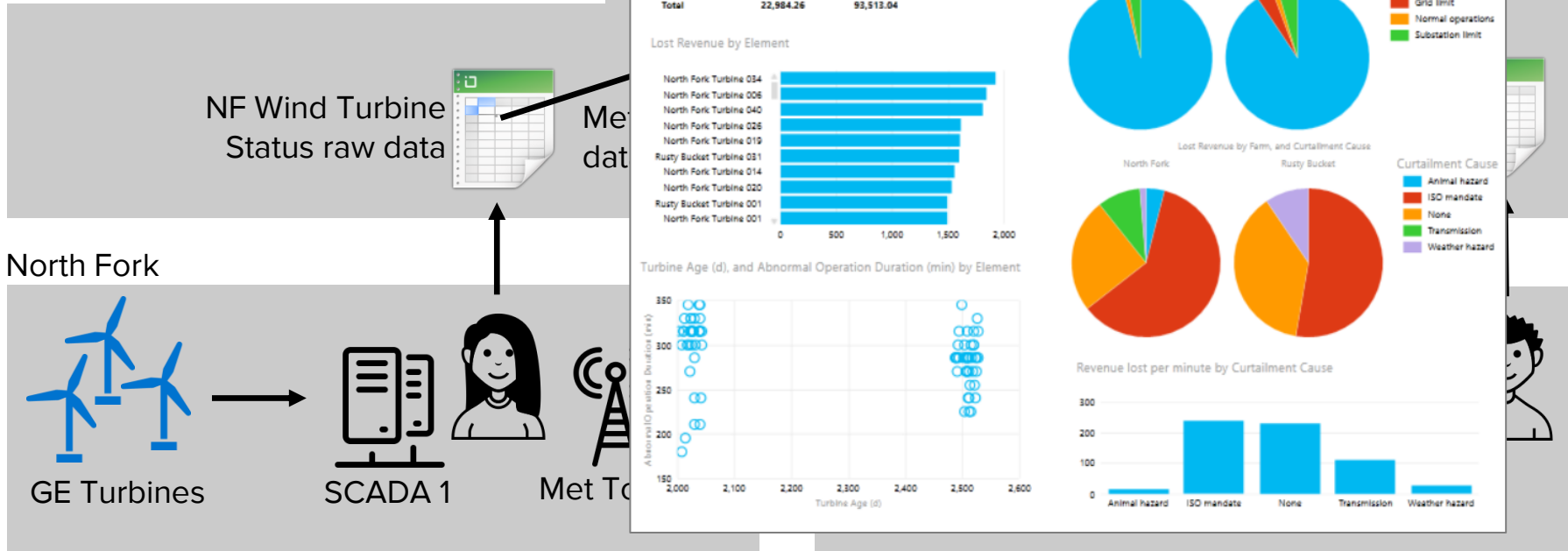
Step 5 – Calculate lost power for downtime events



# Without the PI System

Corporate

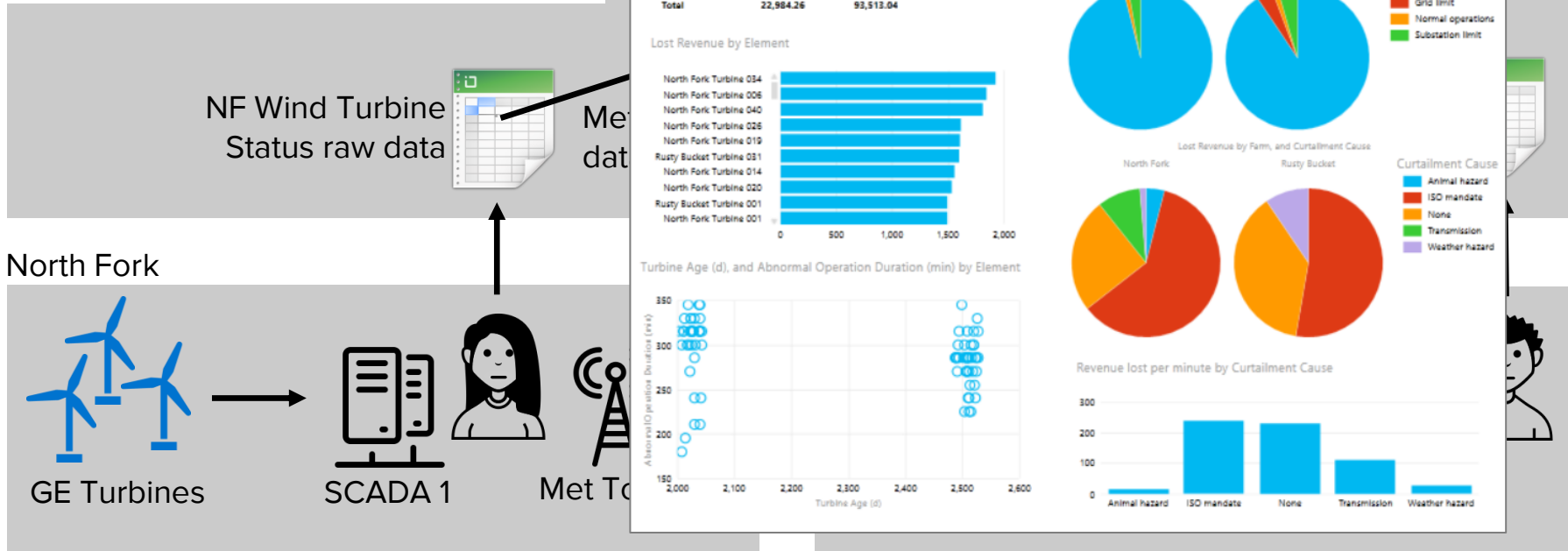
## Step 6 – Publish the report!



# Without the PI System

Corporate

Step 6 – Publish the report!  
... then start over next week



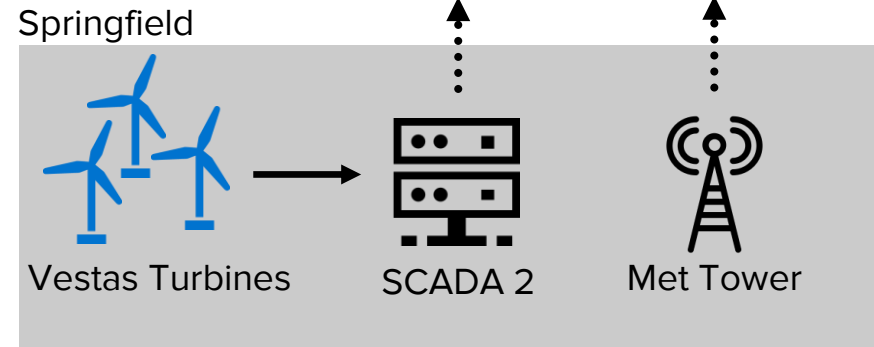
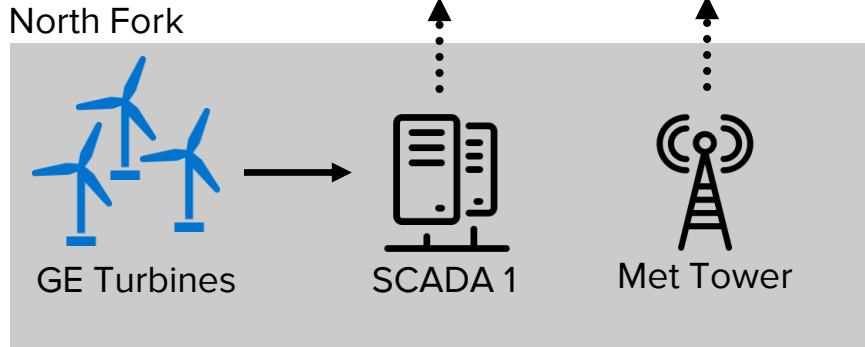
# With the PI System

Site operations data collection  
External database integration  
Real-time analytics and events  
Automated BI reporting



## OSIsoft® PI System Infrastructure

Downtime  
Lost Power





# What PI System tools do I need?

## What kind of solution are you looking for?

Collect data from  
disparate systems

Create calculations  
for assets

Identify & capture  
important events

Visualize & share data

Deploy BI & Machine  
Learning

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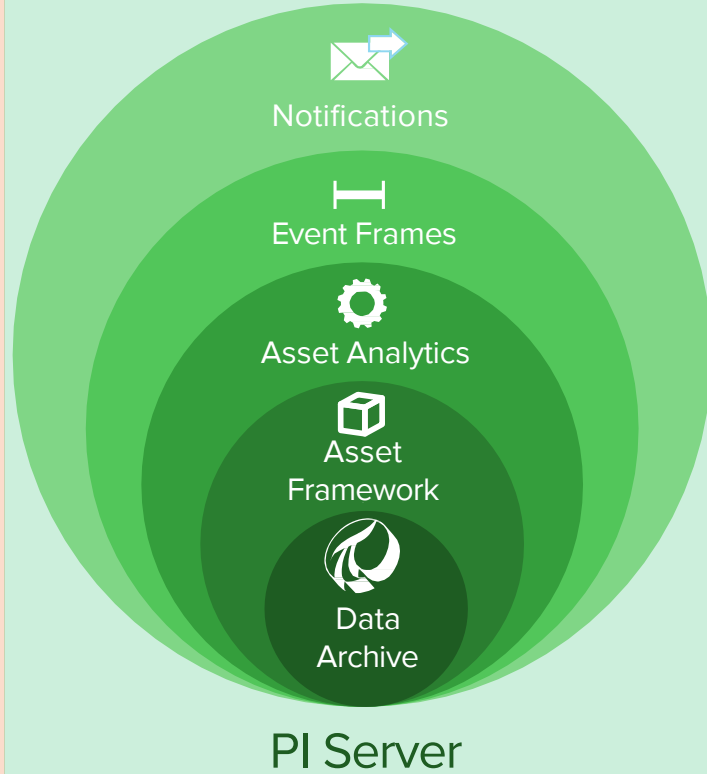
# Collect

Data Sources



PI Interfaces & PI Connectors

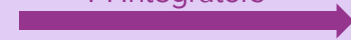
# Store & Enhance



# Deliver

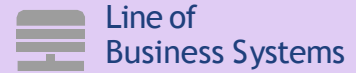
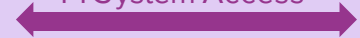


PI Integrators

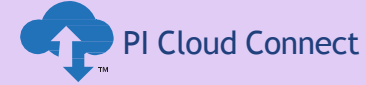
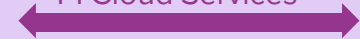


Business Analytics

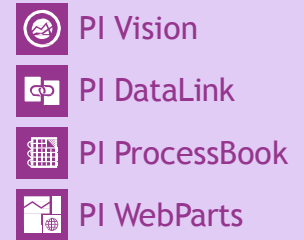
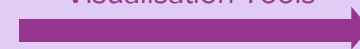
PI System Access



PI Cloud Services



Visualisation Tools

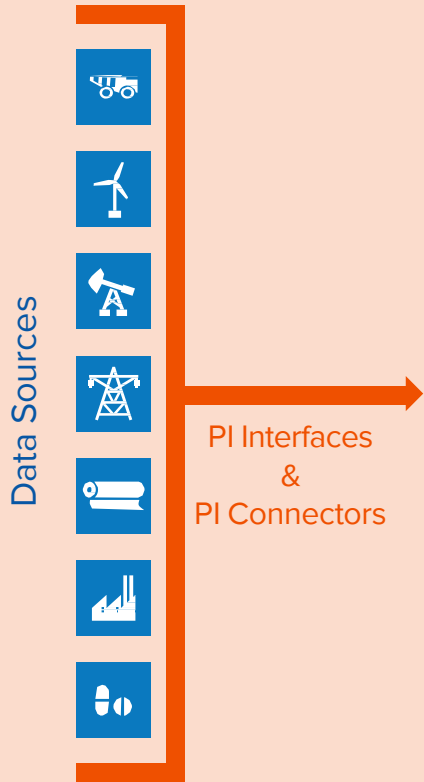


# Collect Data from Disparate Systems

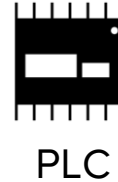
## “PI Connectors & PI Interfaces”



## Collect



Collects **time-series** and **meta-data** from any source



IoT Sensors



Databases



We have developed over **450** PI Interfaces and PI Connectors

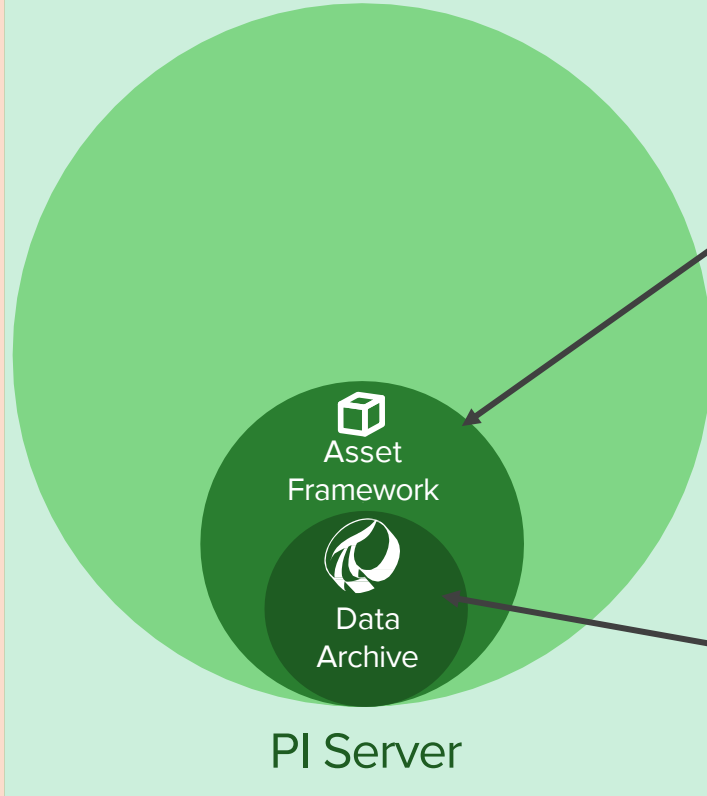
## Collect

Data Sources



PI Interfaces  
&  
PI Connectors

## Store & Enhance



Meta-data stored in the  
**Asset Framework**

- Manufacturer
- Longitude
- Latitude

Raw time-series data is stored  
in the **Data Archive**

- Turbine Status ON
- Active Power 317
- Nacelle Position 304

# Create Calculations for Assets

“Asset Framework & Asset Analytics”

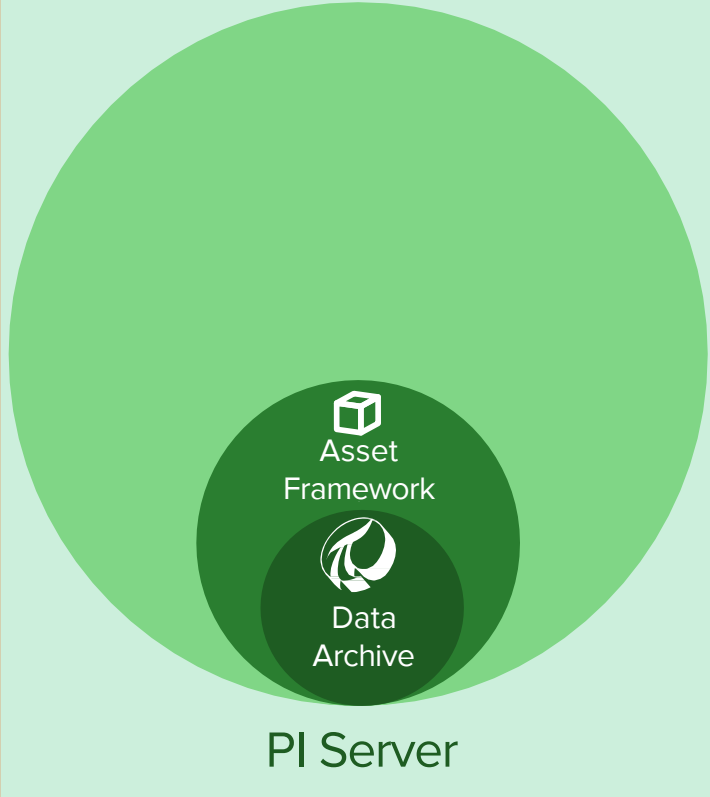
# Collect

Data Sources



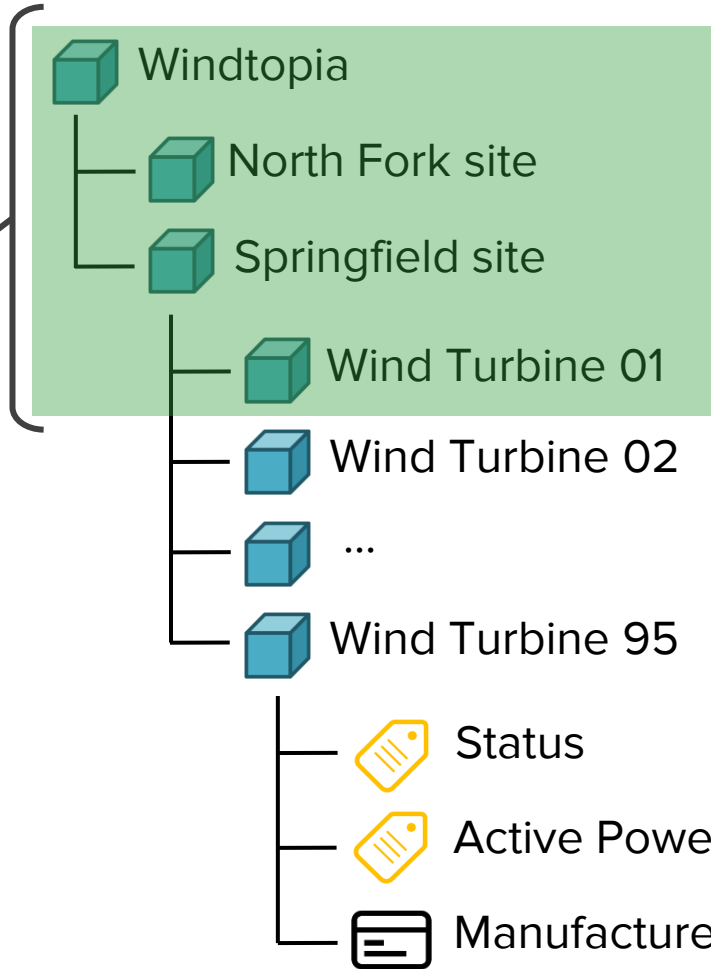
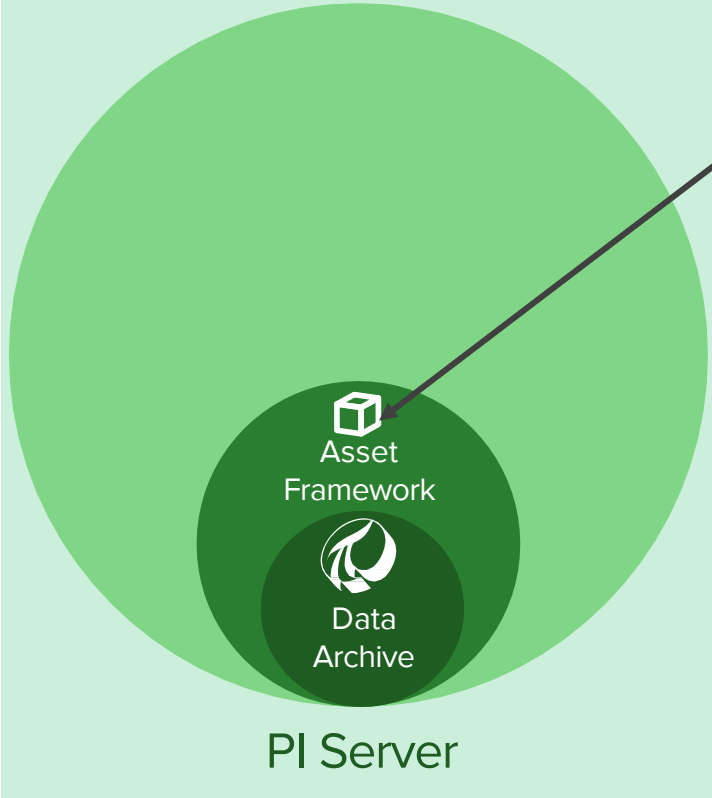
PI Interfaces  
&  
PI Connectors

# Store & Enhance



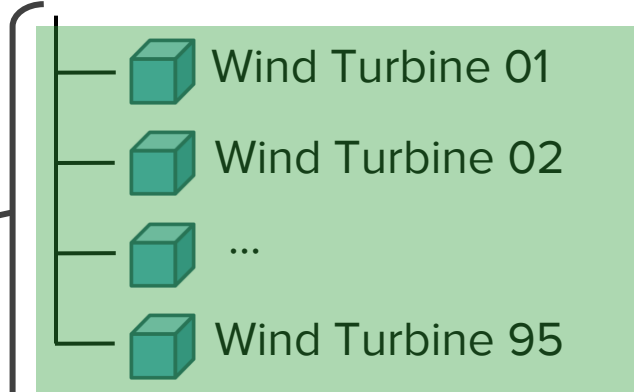
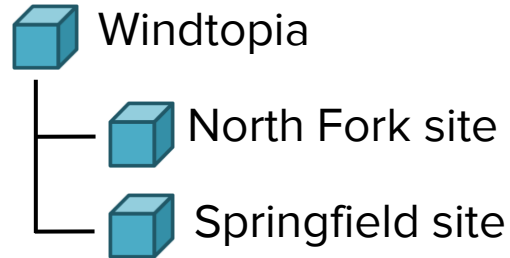
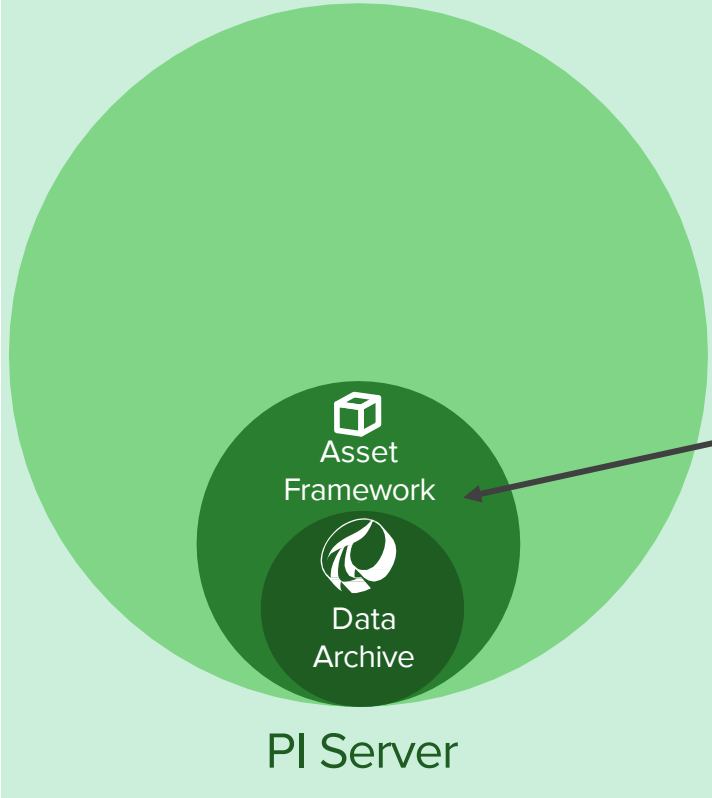
PI Server

# Store & Enhance



Build relationships between assets

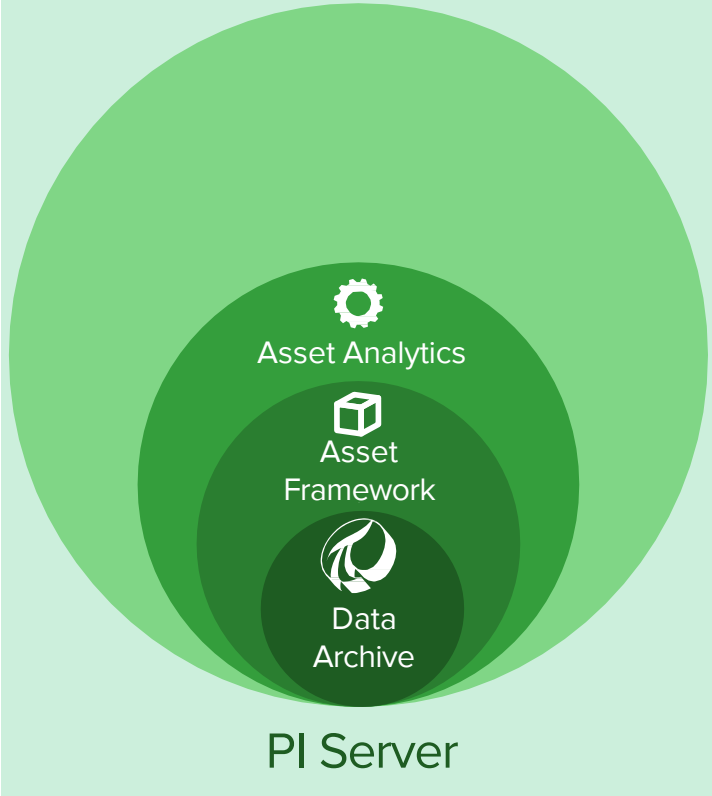
# Store & Enhance



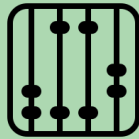
Build templates for common assets



# Store & Enhance



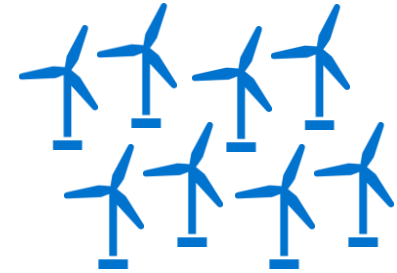
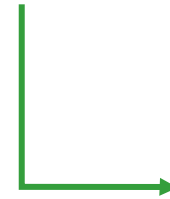
## Wind Turbine Template



Hourly Energy Production  
Power Factor

Build real-time analytics on templates...

... deploy them to your entire fleet...



## North Fork site



Total Energy Production  
Average Power Factor

... and roll it up to the site

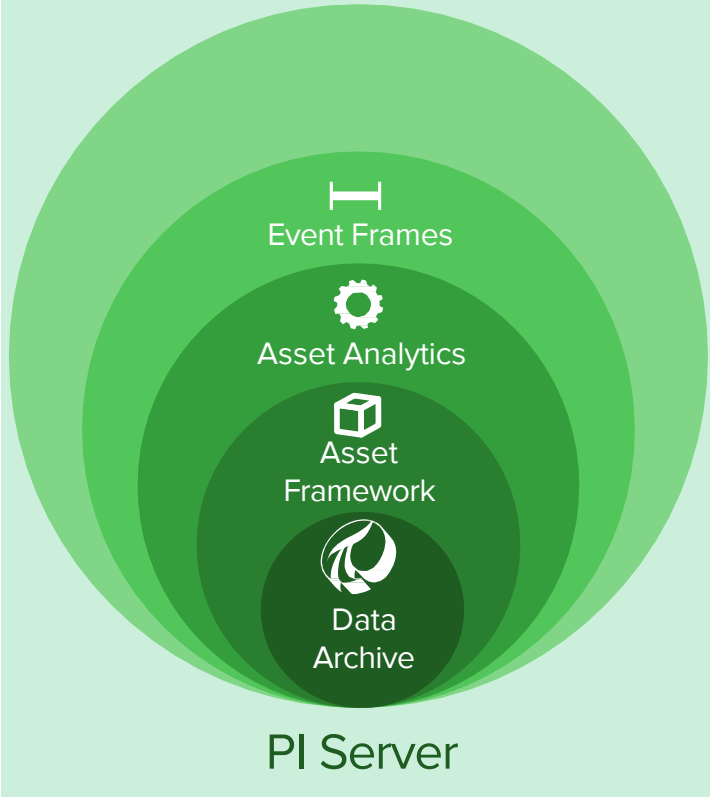


# Identify and Capture Important Events

“Asset Framework & Event Frames”




# Store & Enhance



## Store event context

 Gearbox overheating

 Downtime

 Turbine Curtailment

Triggers:  User defined

External Systems



## Store & Enhance



Notifications



Event Frames



Asset Analytics



Asset  
Framework



Data  
Archive

PI Server

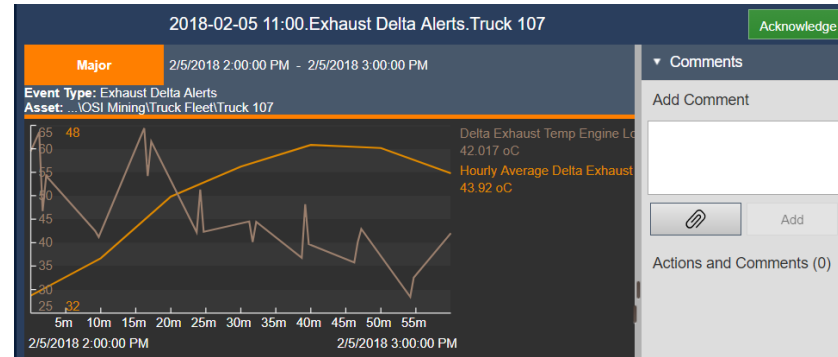
## Notification on important events



Gearbox overheating



Notification

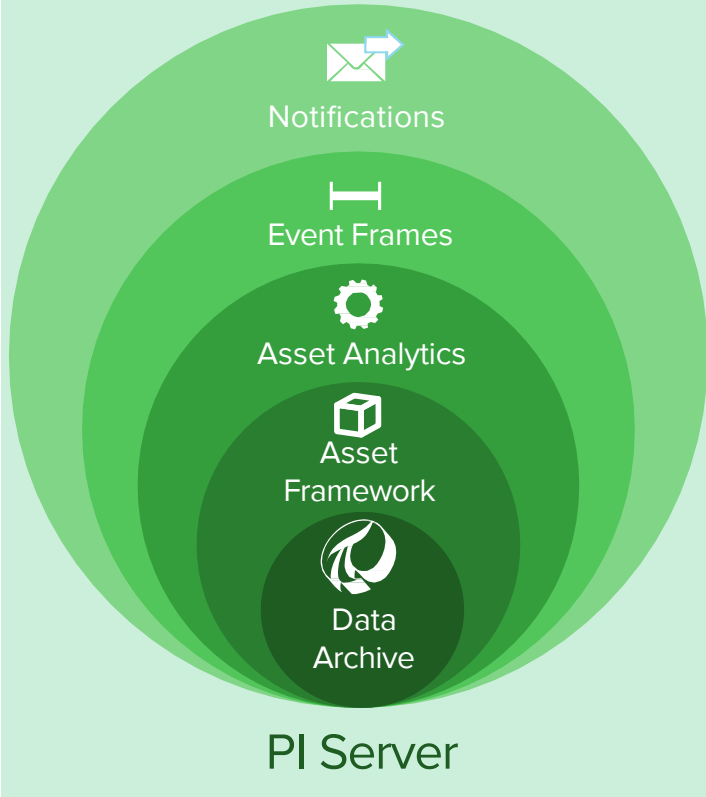


Operator can view, acknowledge  
and comment on event

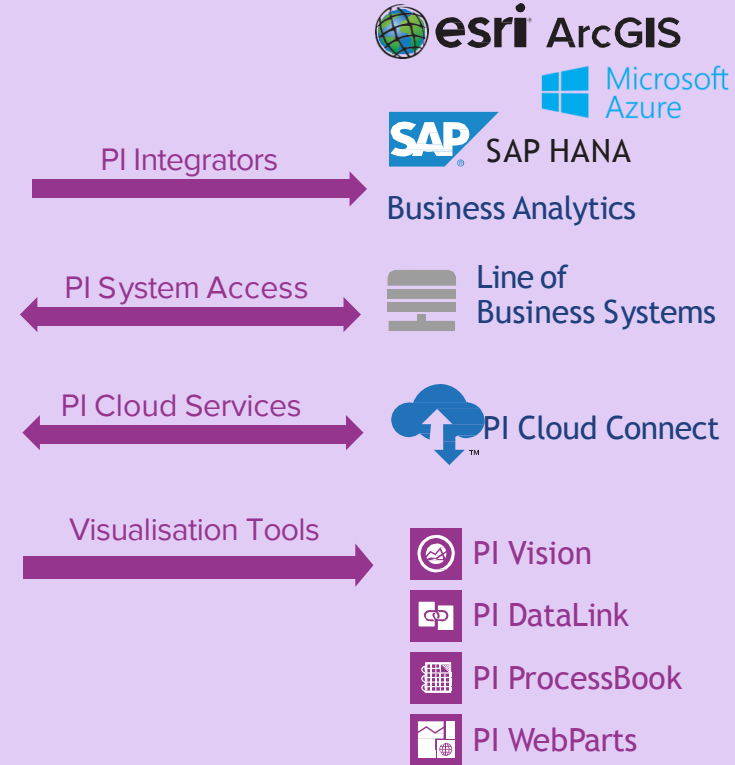
# Visualize and Share Data

“PI Vision & PI DataLink”

## Store & Enhance



## Deliver



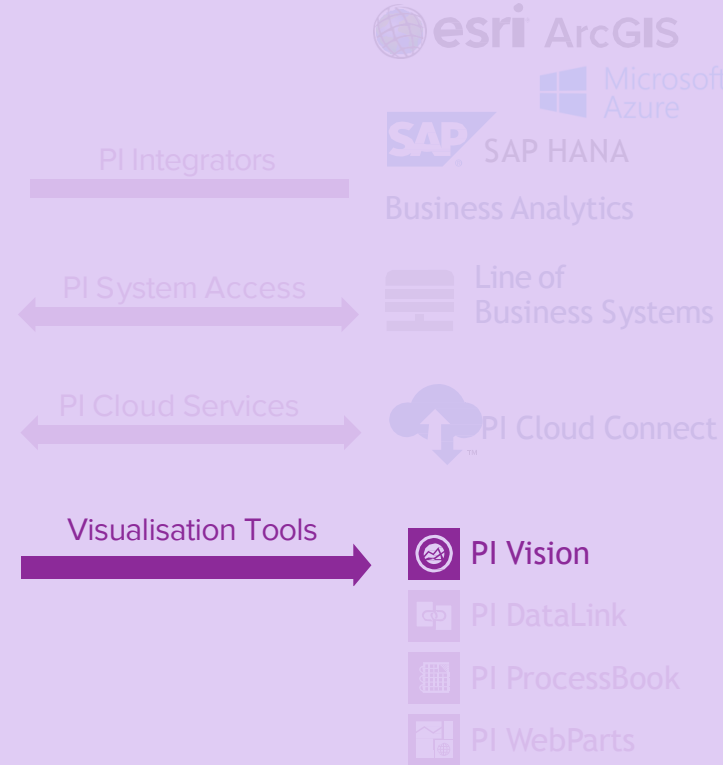


## PI System's flagship visualization tool

Designed with collaboration in mind  
Display editing and visualization  
Use any device  
Extensible



## Deliver



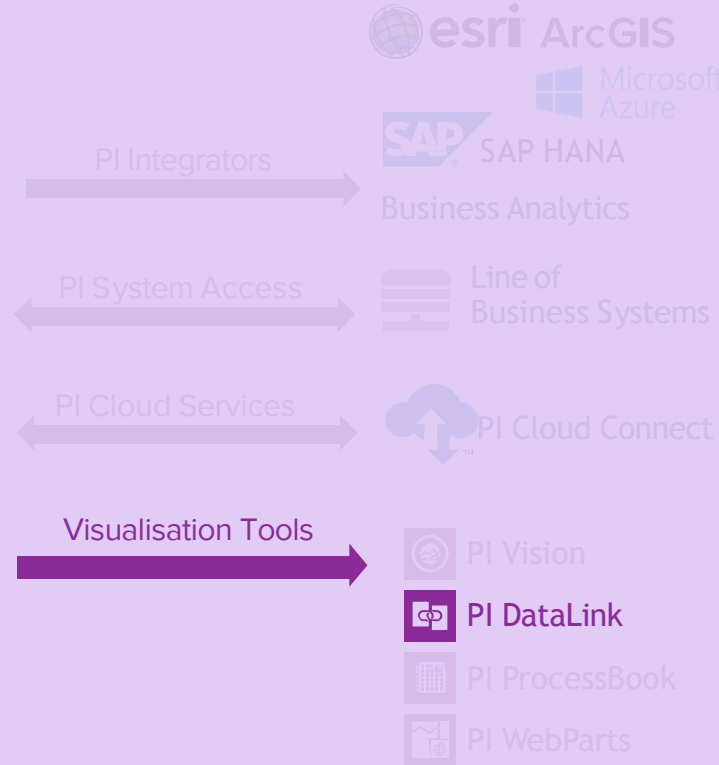
# PI DataLink

company name		Area		Line 1		
From	Unit		Injection Mold 1			
05/23/2017 00:00:00	Target	Production	Scrap	Scrap	Average Temperature	
To	Count	Count	Count	%	F	
05/24/2017 00:00:00						
0:00	580	560	40	7.14%	459.88	
1:00	500	502	29	5.78%	459.77	
2:00	580	573	27	4.71%	460.10	
3:00	580	572	28	4.90%	460.54	
4:00	580	571	29	5.08%	460.04	
5:00	580	574	26	4.53%	460.08	
6:00	500	466	40	8.58%	460.25	
7:00	580	572	28	4.90%	460.08	
8:00	500	490	22	4.40%	459.53	
9:00	580	574	26	4.53%	460.58	
10:00	500	259	132	50.97%	429.49	
11:00	580	303	87	28.71%	429.61	
12:00	580	312	87	27.88%	430.62	
13:00	500	236	129	54.66%	430.14	
14:00	580	290	93	32.07%	429.97	
15:00	580	435	62	14.25%	444.72	
16:00	580	578	25	4.35%	460.78	
17:00	580	570	30	5.26%	459.75	
18:00	580	574	26	4.53%	459.83	
19:00	580	576	24	4.17%	459.84	
20:00	500	437	20	4.58%	460.35	
21:00	580	307	76	24.76%	429.87	
22:00	580	572	28	4.90%	459.47	
23:00	580	568	32	5.63%	459.73	

## PI System data in Microsoft Excel

- Pull in raw data, calculations, events, filtered data
- Leverage Excel functionalities
- Automated reporting

## Deliver



# Deploy Business Intelligence (BI) & Machine Learning

“PI Integrators”

## PI Integrators

Prepare, clean and deliver PI System data to external systems



See your real-time data on a map



Develop machine learning models



Combine with business data



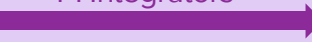
**Business Analytics**  
Connect to any BI platform

## Deliver

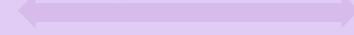


Business Analytics

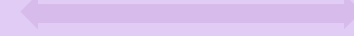
PI Integrators



PI System Access



PI Cloud Services



Visualisation Tools



Line of Business Systems

PI Cloud Connect

PI Vision

PI DataLink

PI ProcessBook

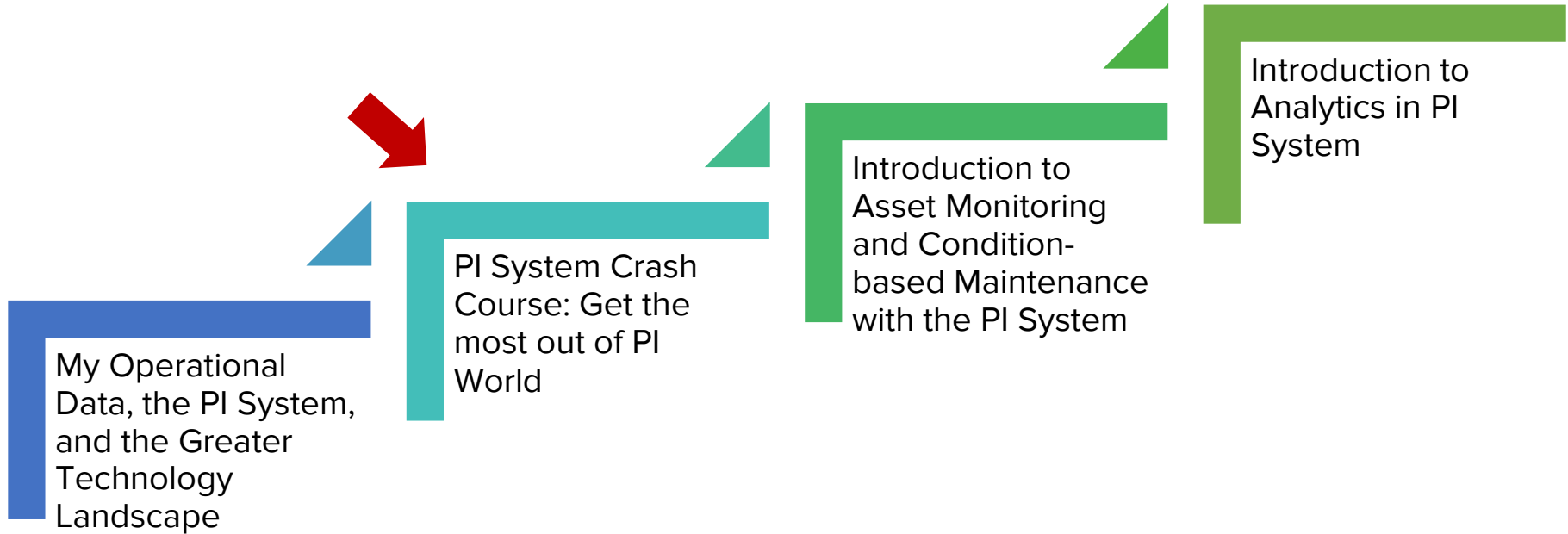
PI WebParts





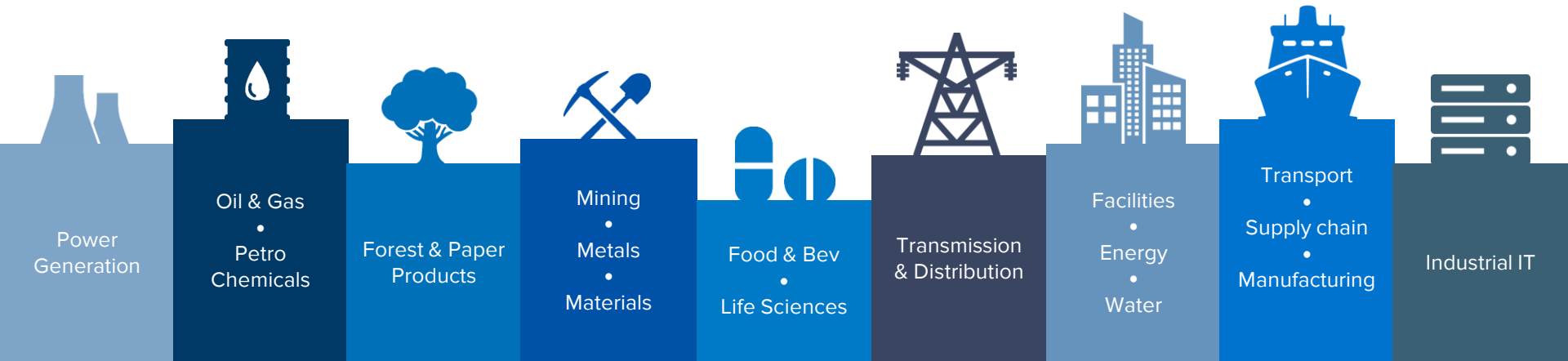
# How to navigate PI World?

# Day 1 - Introduction to the PI System Track



# Day 2 – Industry Day: Get Inspired!

- ✓ Various Industry Tracks
- ✓ Industry User Group Meetings
- ✓ \*Industry Dinners –registration required



## Day 3 – Product Tracks & Labs

- ✓ Learn more about individual products
- ✓ Partner & product expo
- ✓ \*Hands-on labs – registration required



Hands-On Labs

Register Today



## Day 4: More Hands-on Labs

- ✓ End User
- ✓ PI Admin
- ✓ Power User
- ✓ Developer
- ✓ Data Scientists



# How familiar are you with the PI System

Not at all

Slightly

Moderately

Very

Start the presentation to see live content. Still no live content? Install the app or get help at [PollEv.com/app](https://PollEv.com/app)



Isabelle Lacaille

[ilacaille@osisoft.com](mailto:ilacaille@osisoft.com)

Systems Engineer



Joey Kim

[jkim@osisoft.com](mailto:jkim@osisoft.com)

Instructional Systems Designer

# Questions

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

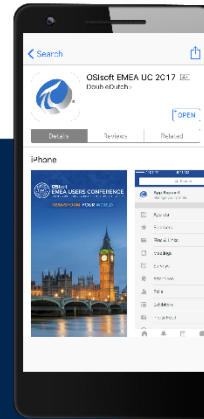


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name & company

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