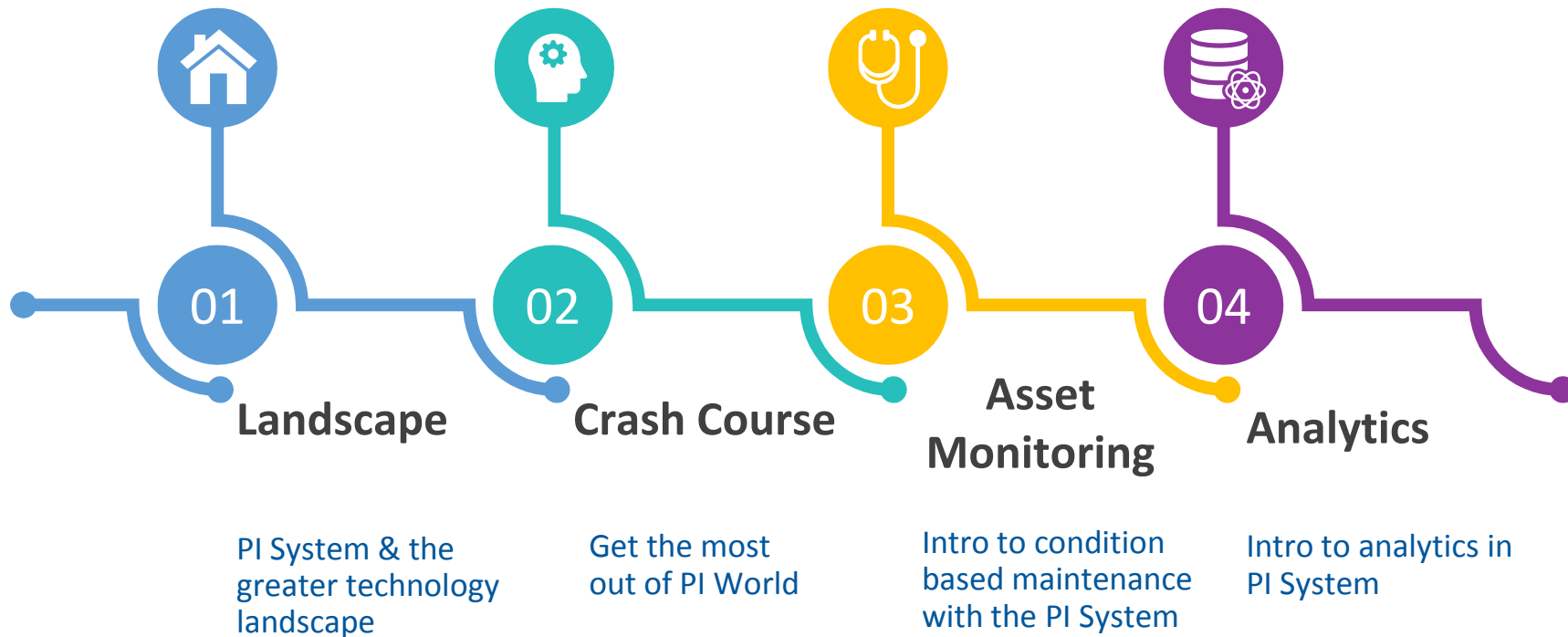
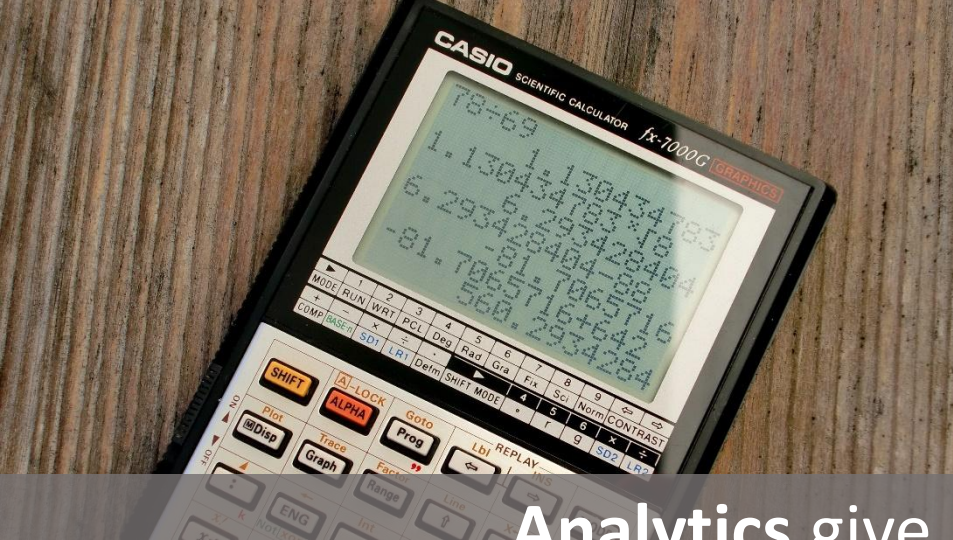


Introduction to analytics in PI System

Landry Khounlavong
Product Marketing Manager

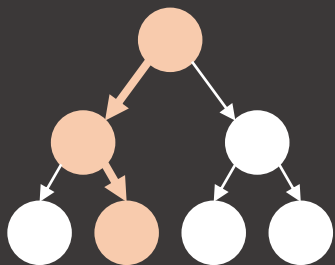
Intro to PI System Track





$$\frac{d[P]}{dt} = k(T)[A]^n[B]^m$$

Analytics give many choices...



Planning to start with big data? ... 5 gotchas!

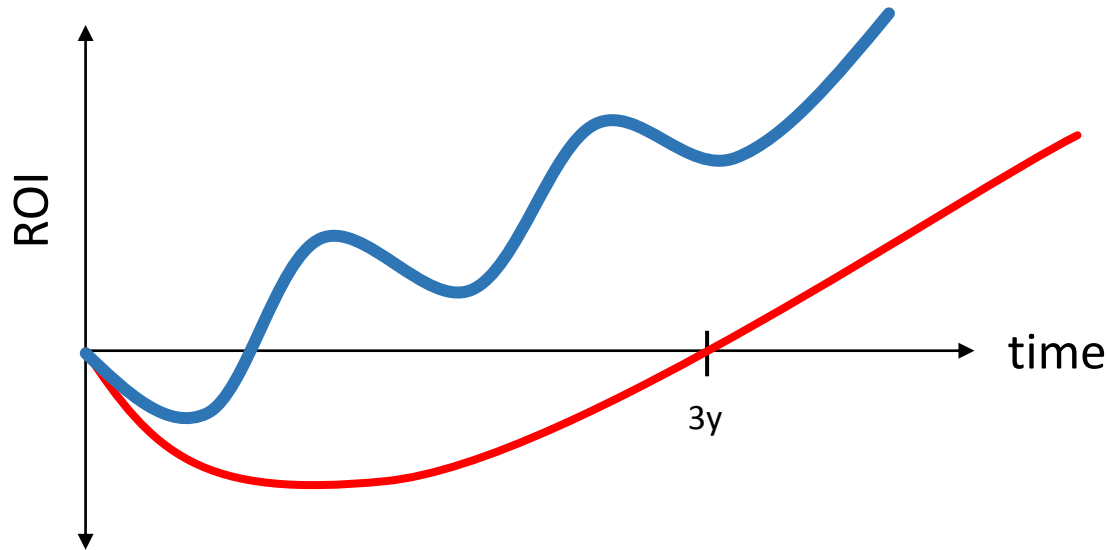
1. Gaps in data collection
2. Poor data quality
3. Low # of modes
4. Unknown relationships
5. Unable to influence decisions



MIND THE GAP

Where do I start?
or
Where are the quick wins?

Small projects propel success for a large project



Must-have project characteristics

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

Building blocks of an analytics journey



Collect – measurements in one place



Calculate – physics-based decisions



Contextualize – system view of data



Model – enterprise-level comparisons



Combine – profitability analysis



Apply algorithm – augmented decisions

0-5.Net Volume DC.SJ.PUE **TI-102** DC.Zero **DY-108** trigger GE05_Energy **C1:14AT5 AC03.Air Flow**
GE01_A_DT DC.SJ.C1.Z3.R3.PDU1.PF GE01_A_DT AC09.Power FeedBin.CmtBoiler Cold Reheat Pressure
 GE04_OS **Asset1.Problem** DC.SJ.SiteRealTim Anacortes Refinery.Alkylation.Asset **B737 FG117** DC.TimeLoad
QI-122 FI-151 40351195 Wind Speed TLoad.PR FT9001 Problems B210_FG005.KPIExcursion **B737 FG117** DC.TimeLoad
 02FI102.1HRVAGT001 AQUA2-SI005.PV GE02_Energy 4-36.NetVolume **AC04.Air Flow** **FI-101** bf5e1d1d-39c9-
PI-111 facility_output 0_ENG_MODE_STS P4151 02T100 3LB0B2CT001-2 4b5b-b3d3-c2ce05fa3a26 GE04_DT **QI-121** GE03_V_WIN
 02T103.Q DC_ZIR GE02_100 DC.Zero **DC.N100 Actual.PWR.day.Tot** 0 CLR_FINAL_OUT_B TDC.Srv6R.GE04_Energy
AQUA2-TI-201.PV AlarmTest.Input.Float32.1 **364511575-AC Power** **QI-109** MP 339511775_Clear F506_E890 **TI-121** FT9001
 AlarmTest.Input.Float32.1 **364511575-AC Power** GE01_DT 409510395_Wind Speed **QI-109** Global Horiz GE01_DT FAC.OAK.Power-Kh-Val.PV
FI-101 bf5e1d1d-39c9-4b5b-b3d3-c2ce05f GE01_DT 409510395_Wind Speed **QI-109** Cooling Fan-711.Feed Rate
BGE003 FI-111 02T100 AF_FLOW3 02T103 AT401 0_ENG_MODE_STS **Boiler-209.Fuel Gas**
 ACEDemo.Unit1.Output TI-178 B352_W778 0_CMP_SVLV_PCT 02F104 CD:F161 1-13.Net Volume **DY-131** DC.SJ.PUE fic1001.C GE02_OT
 94:BW.R **TI-101** 1-13.Net Volume **DY-131** DC.SJ.PUE fic1001.C GE02_OT
 F723_E889 Compressor-439.Feed Rate **FI-101** bf5e1d1d-39c9-4b5b-b3d3-c2ce05fa3a26 AT401
369512185-Temp B045_FG978 **DI-131** DC.SJ.PUE fic1001.C GE02_OT
 02F104 CD:F161 0 CLR_FINAL_OUT_B TMP 339511775_Clear Sky Global Horiz GE01_DT
DC.CH.DCE FIC- 172:210 GE01_DT 0_ENG_MODE_STS GE03_Q
FI-121 AF_FLOW3 0 CLR_FINAL_OUT_B TMP 339511775_Clear Sky Global Horiz GE01_DT
DY-131:166 GE01_TD **FI-101** Boiler-334.Feed Rate Volume
 02F102.1HR BGE003 **FI-111** 02T100 AVG AF_FLOW3 02T103
 BGT001 ACEDemo.Unit1.Output TI-178 B352_W778 0_CMP_SVLV_PCT
PI-111 facility_output 02F104 CD:F161 **FIC-144** GE04_Status fasttag 02F101.C
 AQUA2-SI005.PV GE02_Energy 0_ENG_MODE_STS FI-151 02T103.Q asset1_output Active Meters
 DC_ZIR 0_CMP_HDR_SUC_PRS GE01_A_DT ASO **FI-111** PI-115 **DY-101** AF_NOISE DM-05.BWR

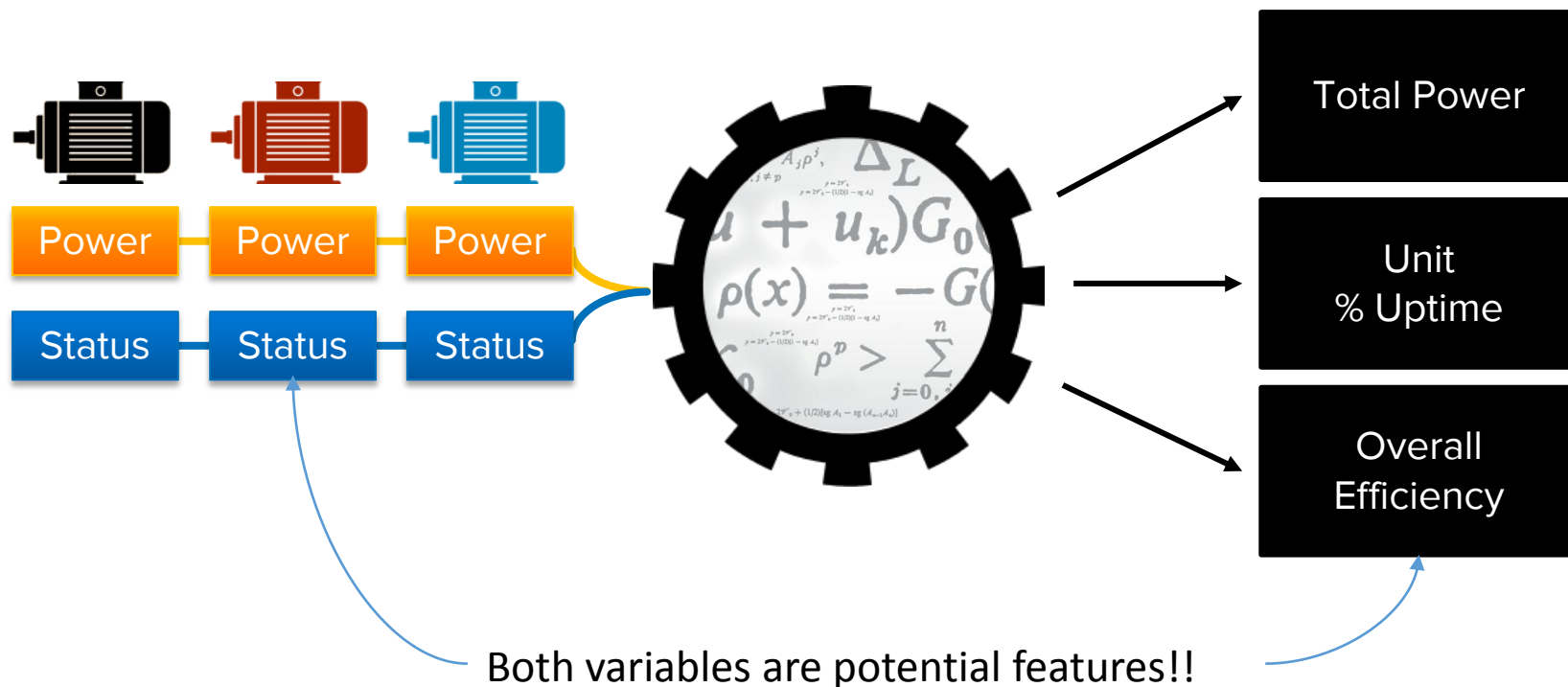
Operating Pressure: 110 psi
Charge Rate: 14 gph
Mix Valve Pressure: 8 psi
Water Rate: 8%

Relative Humidity: 34%
Current Temp: 85 F
High: 92
Low: 57 F
Wind: 8 mph/N

Draft Pressure: -0.5 WC
Stack Temp: 316 F
Oxygen: 2.5%
Outlet Temp: 840 F
Cold Oil Velocity: 6 ft/sec

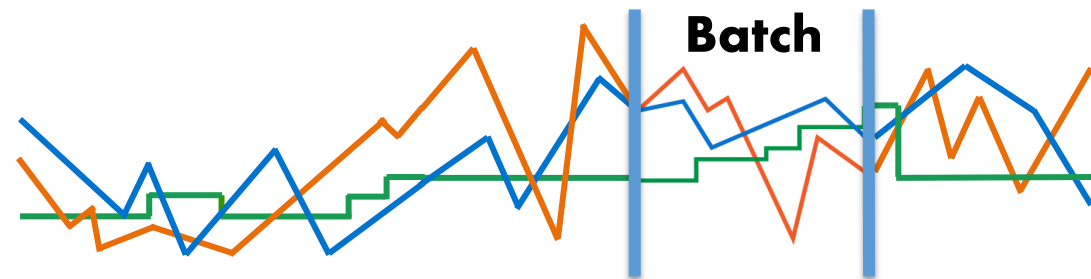


Make raw data decision-ready



Continuous streams have discrete events

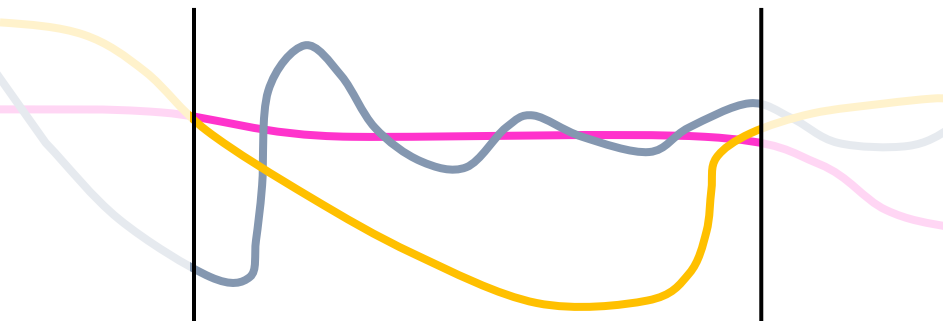
Downtime Excursion Batch



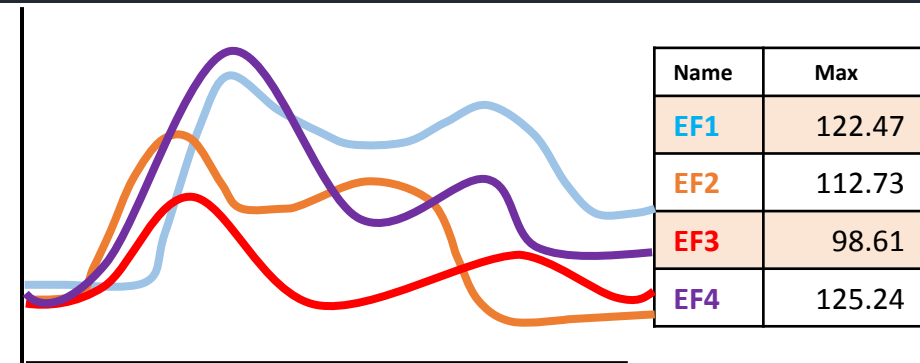
What happened during
the excursion event?

Event Attribute	Value
Name	Ex 20151215-0002
Start	15-Dec-2016 10:35:02
End	15-Dec-2016 11:47:26
Asset	Boiler-352
Excursion Type	High Violation
Fuel Gas Flow.Avg	37.12 k sft3/h
myKPI.Max	47.19 bbl/d

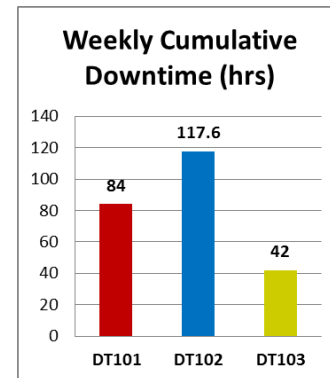
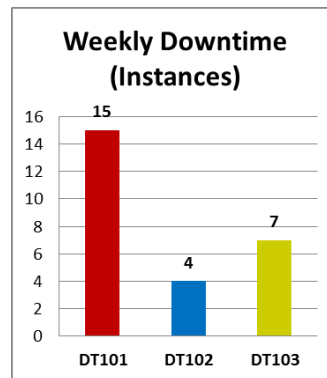
Simplify Data Analysis



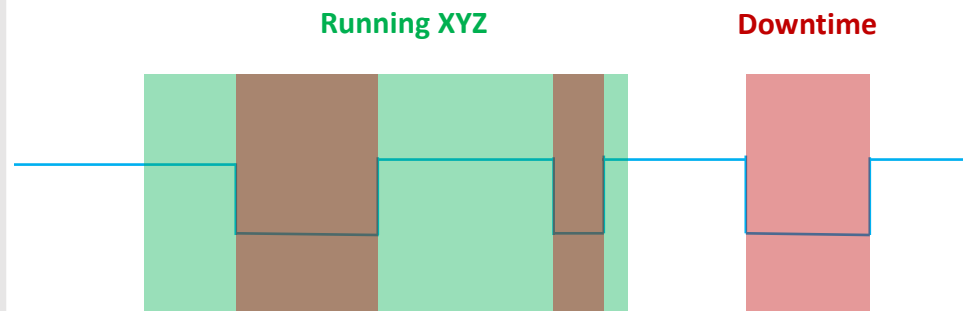
Compare Events



Compare Assets



Discover Event Interrelationships



Customer realizes value from Event Frames

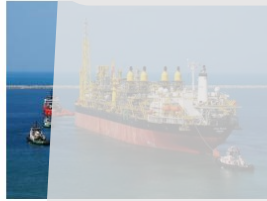
“90% time reduction on intelligence gathering”

“\$350k investment saving on offshore system solution”

CBM and Smart Monitoring in Frade FPSO with the PI System®

COMPANY and GOAL

One of the world's leading oil producer wanted to **improve its Frade FPSO monitoring capability and information quality through the PI System®**



CHALLENGE

Reduce the maintenance cost and increase monitoring capability

- Perform real time and historical data analysis on the condition of the Emergency Valves
- Shift the monitoring philosophy to event driven

SOLUTION

Implementation of PI System applications to automate the data analysis, event detection and notifications delivery

- Real time data analysis through Asset Analytics and Event Frames
- Custom Excel Report using PI AF SDK
- Web monitoring displays published in PI Coresight™

RESULTS

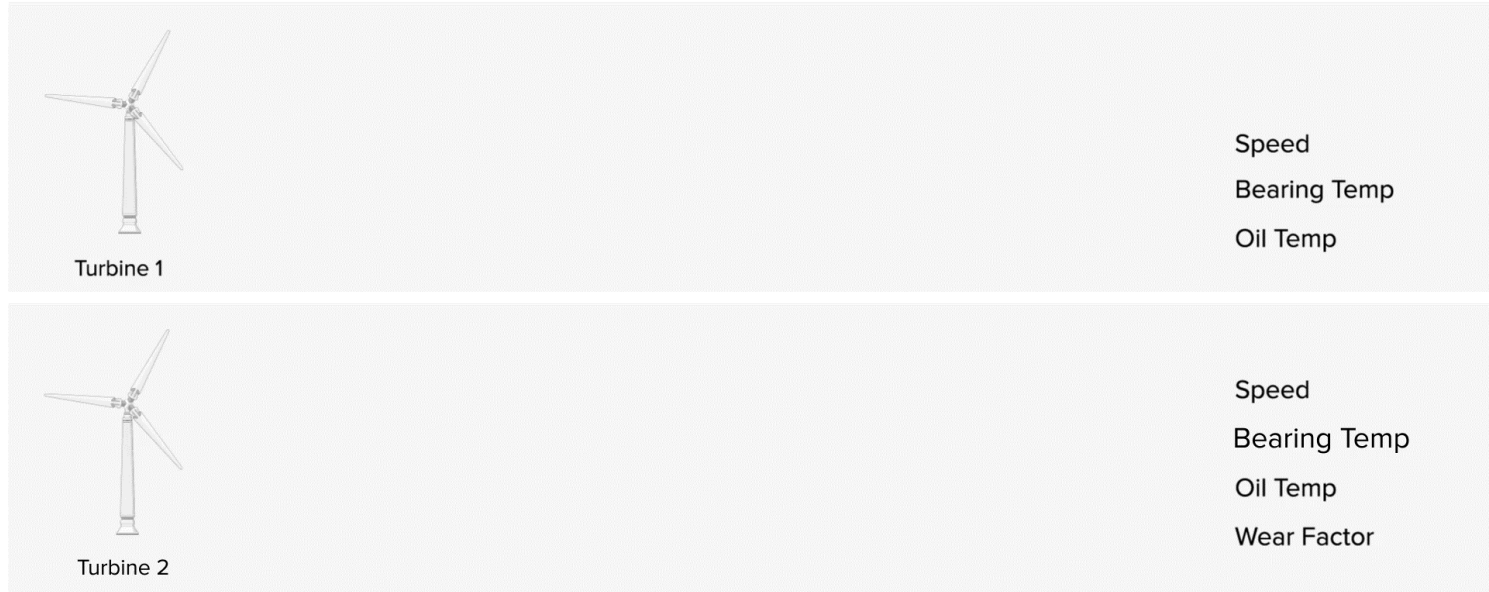
Emergency valves maintenance cost reduced and significant improvement on Operational Intelligence

- \$350k investment saving on offshore system solution
- Potential \$300k/year cost saving on third party monitoring solution
- 90% time reduction on intelligence gathering

What you can
analyze
depends on
the granularity
of your data



Time-series data is not naturally aligned



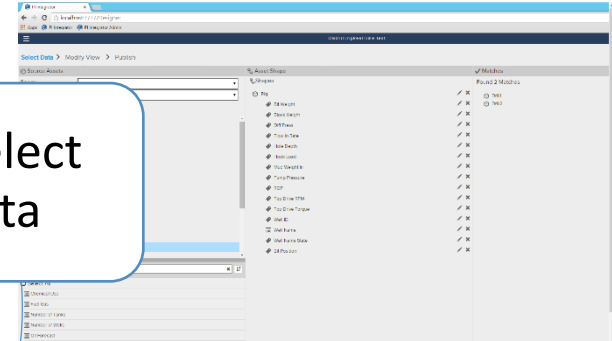
... remember this when you want to combine this data with business data!

PI Integrators simplify joining time-series data with business data

1. Create View

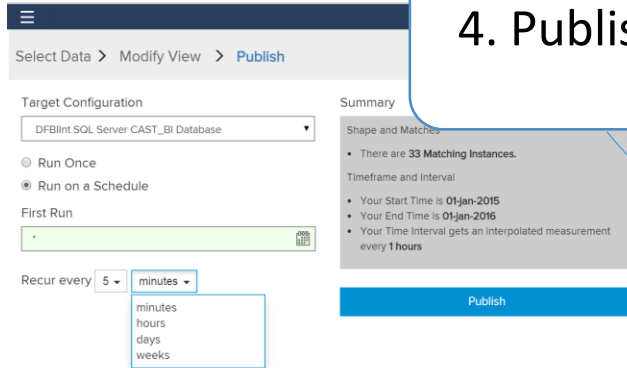
Name	Last Status	Type
DrillingTimeSeries		Asset
Facilities_AHubs	Complete	Asset
KLS_Drilling	Complete	Asset
MK-Drilling	Running	Asset
OGDrillingEvents	Complete	Event
OGDrillingEvents	Complete	Event

2. Select Data

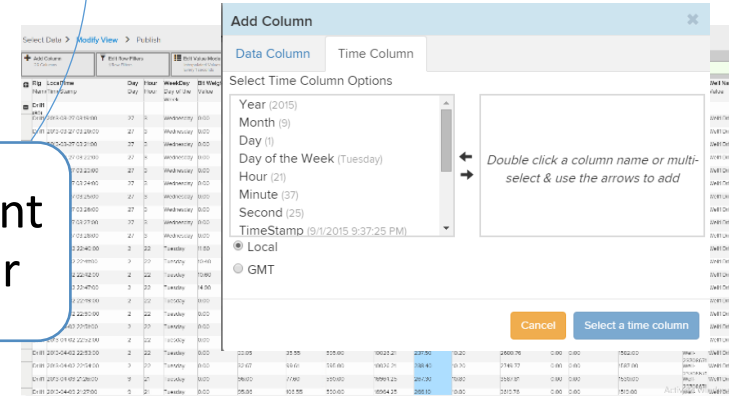


No code required!

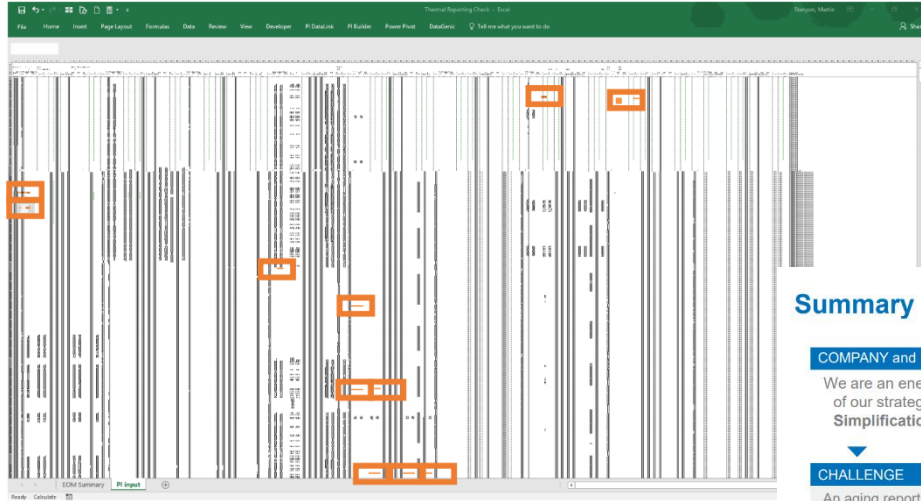
4. Publish



3. Augment and Filter



Customer realizes value from PI Integrators



“Over 200,000 calculations and 1,521 hard-coded cells

“New assets included and disposed of assets removed, automatically”

“Allowing Data & Analytics team to do more analytics and less data preparation”

Summary

COMPANY and GOAL

We are an energy and services company and one of our strategic goals is **Cost Efficiency & Simplification**

centrica

CHALLENGE

An aging reporting process with confused ownership of data took too long to produce and quality was questionable

SOLUTION

Give the data context using **Asset Framework**, find it using **Event Frames** and prepare using **Integrators**

- ZERO lines of custom coding
- New assets included and disposed of assets removed automatically

RESULTS

Vastly reduced time spent preparing reports

- We now have a simple and efficient process for operational reporting
- Allowing the Data & Analytics team to do more analytics and less data preparation



Building blocks of an analytics journey



Collect – measurements in one place



Calculate – physics-based decisions



Contextualize – system view of data



Model – enterprise-level comparisons



Combine – profitability analysis



Apply algorithm – augmented decisions

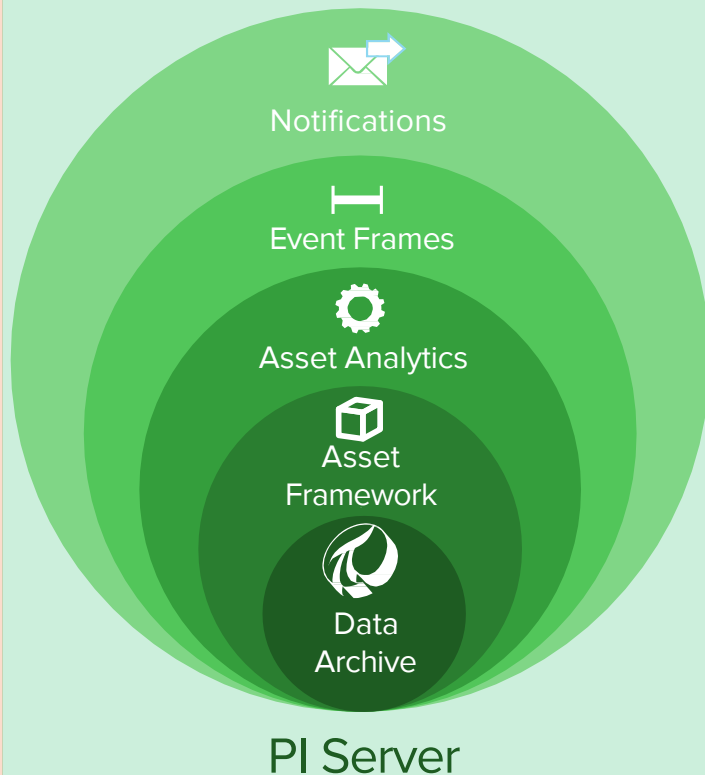
Collect

Data Sources



PI Interfaces
&
PI Connectors

Store & Enhance



Deliver



SAP HANA

PI Integrators

Business Analytics

PI System Access



Line of
Business Systems

PI Cloud Services



PI Cloud Connect

Visualisation Tools



PI Vision



PI DataLink



PI ProcessBook



PI WebParts

Takeaways

- Start small to de-risk analytics projects
- **PI System** offers many ways to accelerates analytics projects

Data Scientist

Investigate how
PI Integrators can
save you time
preparing data

Engineer/Operator

See how **PI Vision** can give
a full view of your
processes and systems

General Manager

Speak to our customers
about the value they
gain from **PI System**
and checkout industry
tracks on Wednesday

Some related presentations tomorrow

9:00a

Derek Shuen from **Goldcorp**:
Real Time Data Critical to Mining

“results after only 6 months of implementation have surpassed expectations”

2:30p

Rick Smith from **International Paper**:
Feeding the Machine Learning
Monster

9:45a

David Bartolo from **AGL Energy**:
AGL Energy's Real-Time Data
Journey Continues

“developing its own solutions for thermodynamic performance optimisation”

3:15p

Oscar Smith, Brian Morel from **EQT**:
The Evolution of PI System at EQT

THANKYOU

OSIsoft®

謝謝 KEA LEBONA
TAPADH LEIBH 고맙습니다
БАЯРЛАЛАА MISAOTRA ANAO
DZIĘKUJĘ CI NGIYABONGA
TEŞEKKÜR EDERIM OBRIGADO شڪرا
DANKON TANK TAPADH LEAT SALAMAT
DANKIE TERIMA KASIH GRACIES
СПАСИБО
KÖSZÖNÖM
PAKMET CIZGE
GO RAIBH MAITH AGAT
БЛАГОДАРЯ GRACIAS
ТИ БЛАГОДАРАМ
TAK DANKE MAHADSANID
РАҲМАТ
MERCİ
HATUR NUHUN
CẢM ƠN BẠN
WAZVIITA
DANK JE ΕΥΧΑΡΙΣΤΩ GRATIAS TIBI
AČIŲ SALAMAT MAHALO IĀ 'OE TAKK SKAL DU HA
GRAZZI PAKKA PÉR PAXMAT CAĞA
FALEMINDERIT
ありがとうございました
SIPAS JI WERE TERIMA KASIH
UA TSAUG RAU KOJ
ТИ БЛАГОДАРАМ
СИПОС
MULTUMESC
HVALA FAAFETAİ
ESKERRIK ASKO
HVALA ХВАЛА ВАМ
TEŞEKKÜR EDERIM
ДЗЯКУЙ
GRAZIE
DI OU MÈSI
ĎAKUJEM
MATUR NUWUN