

# Digital Agility in The Enterprise

**Chris Nelson, VP Software Development**  
**20<sup>th</sup> August 2018**

# Agenda

1. Today's Digital Opportunity and Challenges
2. Digital Agility to Support Technology Trends
3. Enabling Digital Agility from Edge to Cloud





100,000,000,000,000  
Sensors by 2030

50+ Billion Devices  
Connected by 2020

16,000,000,000,000,000,000,000,000  
(Zetta)bytes of Data generated in 2018

65%+ of the Worlds  
Population is Connected

15% of all IT spend will be  
in Cloud by 2020

Future

A blue-tinted landscape featuring a path leading through a field towards distant mountains under a cloudy sky. The text is overlaid on the scene.

IT IS NOT THE STRONGEST OF THE SPECIES  
THAT SURVIVES, NOR THE MOST INTELLIGENT  
THAT SURVIVES. IT IS THE ONE THAT IS THE  
MOST ADAPTABLE TO CHANGE.

CHARLES DARWIN



# How Do You Manage Increasing Complexity?

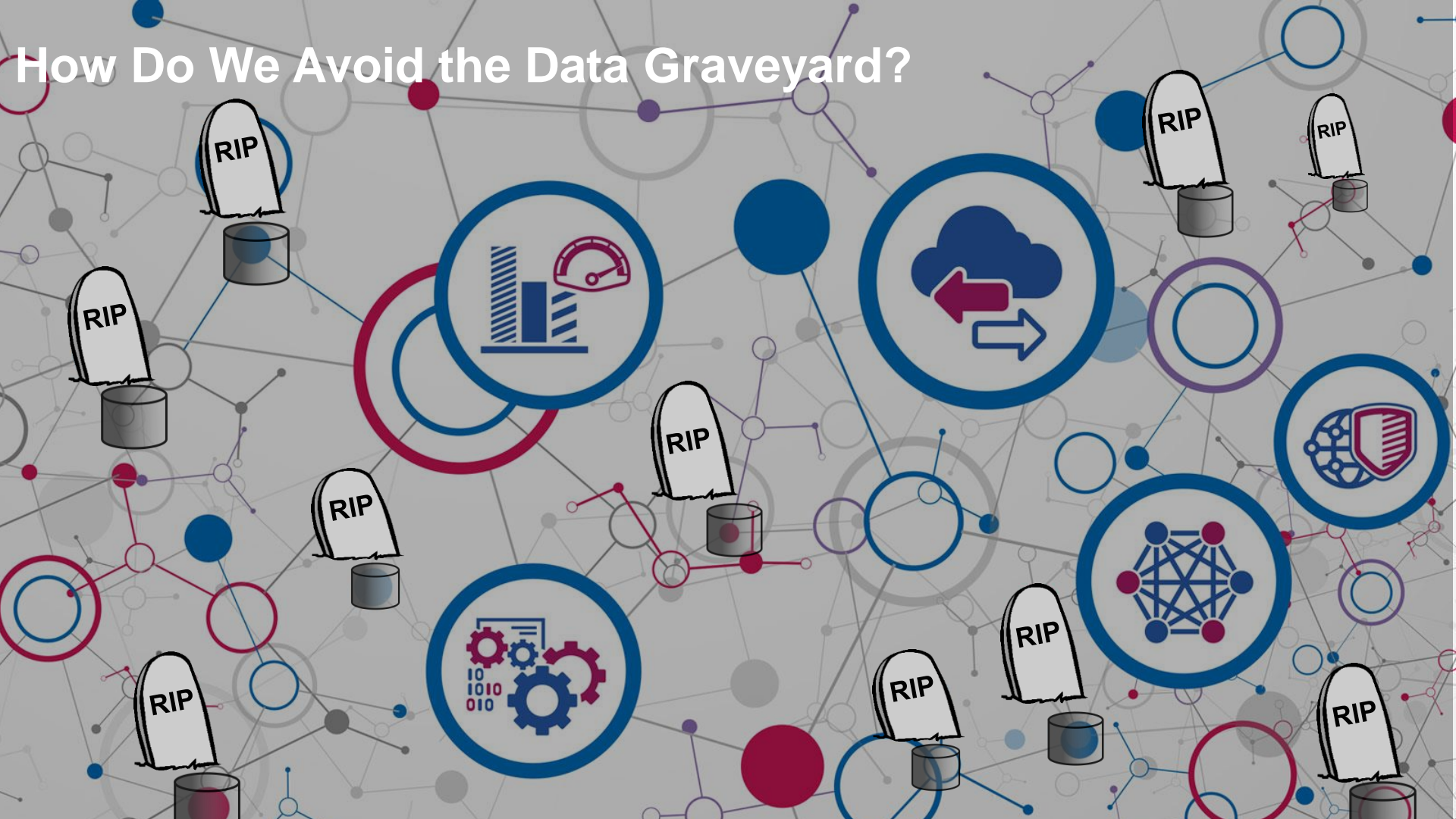


Saudi Aramco's Oil Supply Planning and Scheduling (OSPAS) Department

أرامكو السعودية  
saudi aramco



# How Do We Avoid the Data Graveyard?





# Why Try and Solve These Problems?

Revenue  
Growth

Profit

Shareholder  
Returns

5X

Their rivals

8X

Their rivals

2X

Their rivals

Source: McKinsey and Company-McKinsey Digital Quotient, Capital IQ

# The First to Last Mile of Operational Excellence

Community  
Analytics

Enterprise  
Advanced Analytics

Process Advanced  
Analytics

Asset Advanced  
Analytics

Real-time  
Analytics

Real-time  
Data

Historical Data  
Access

Human Knowledge



# Digital Agility is Key to Embracing the Opportunity

An aerial night view of a city, likely Shanghai, with a network overlay of glowing blue lines and nodes connecting various points across the cityscape. The sky is dark blue with scattered stars or light points.

- Support for IT and OT initiatives
- Adoption of best of breed IIoT technology
- Self-service access to operations data
- Application building agility
- Analytics where it makes sense

# Our Vision- Edge to Community Transformations




# OSIsoft's Software and Services Direction

Pervasive Data  
Collection




Sensors



Millions of  
Smart Devices

Assets



Multiple  
Sensors

Plant



Multiple  
Assets

Enterprise



Multiple  
Plants

Community



Multiple  
Enterprises

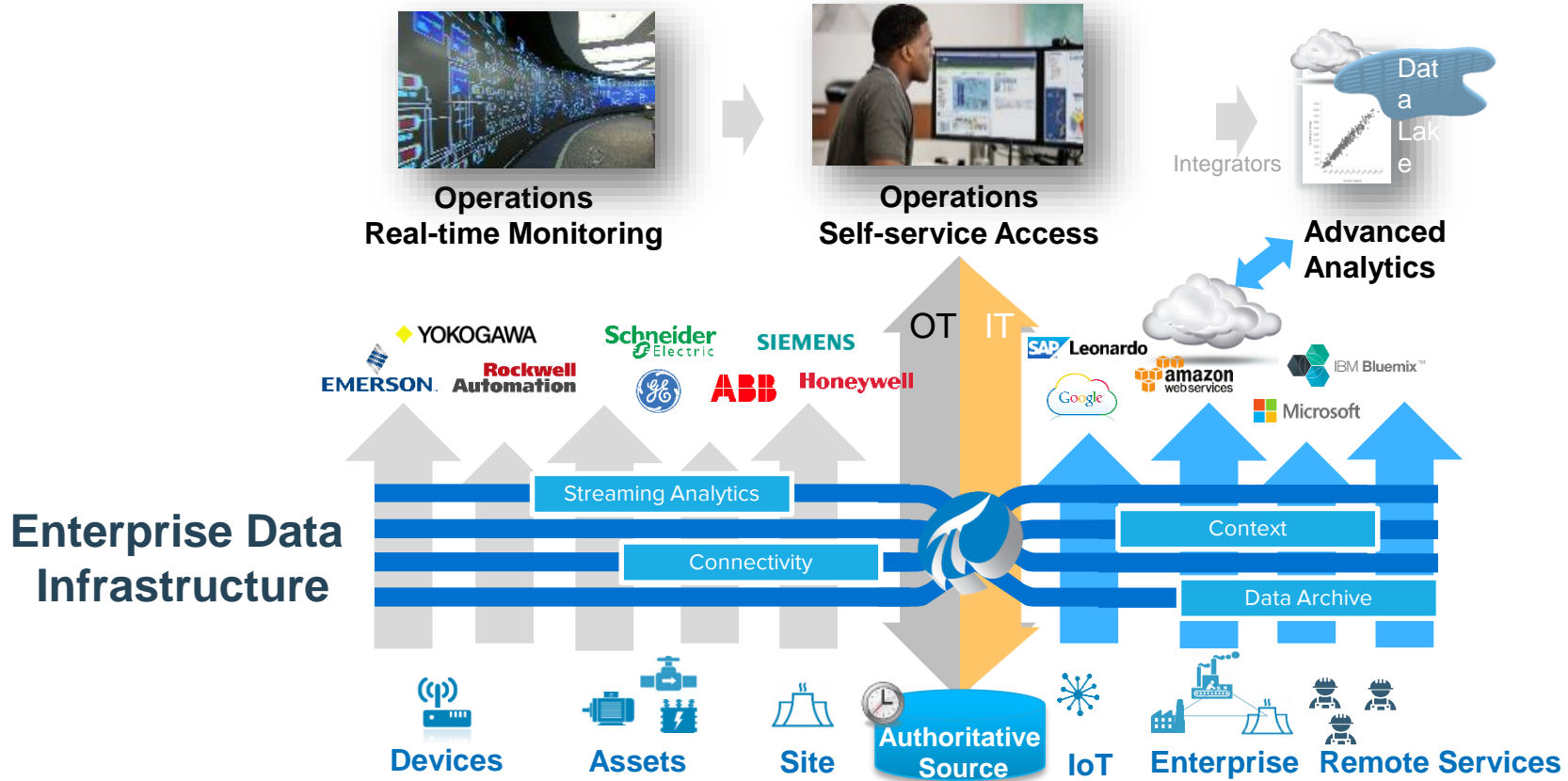
OSIsoft  
Cloud Services



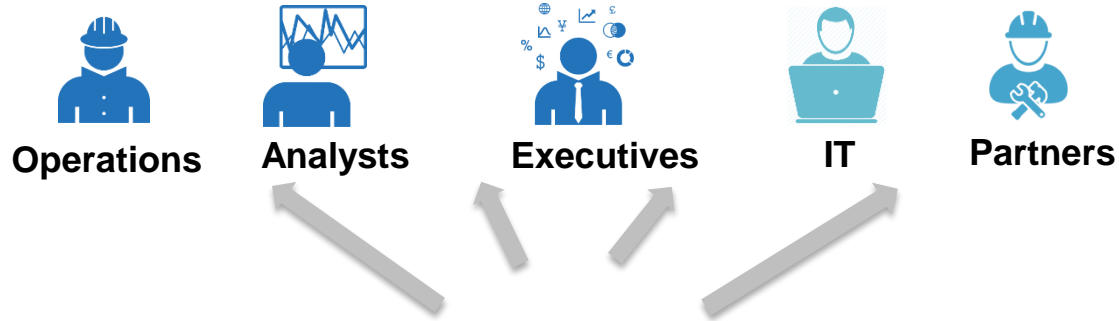
PI System



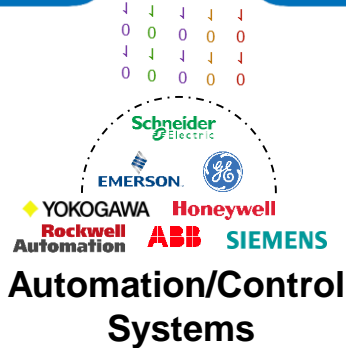
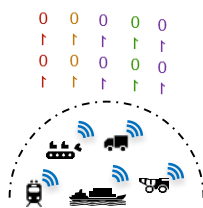
# Data Infrastructure Approach to Digital Agility



# Agility to Select Best of Breed IoT technology



>450  
Connectors &  
Interfaces



# Data Structure is Critical For Digital Agility

DM-05.BW.R DC.SJ.C1.Z1.R1.Rk06.S2.003.PWR QI-111 FinalProductBin.On 94:GRDIDX.ProdID  
Boiler-209.Fuel Gas Flow fic1001.C FR5001

GE05\_Energy C1:14AT5  
AC03.Air Flow FeedBin.Cmt Boiler Cold Reheat Pressure

11-174 asset1\_output Active Meters  
C001 A 01 ASO DY-101 02:F101.C

B737\_FG117 DC.TimeLoad  
D-110.Tank Pressure.PV  
GE04\_DT QI-121 GE03\_V\_WIN

GE01\_DT 409510395\_Wind Speed QI-109 GE01\_DT Cooling  
Fan-711.Feed Rate

DC.Rk07R DC.Srv06R GE04\_Energy  
TI-121 FT9001

GE01\_CON AlarmTest.Input.Float32.1  
1-13.Net Volume B045\_FG978  
DC.SJ.PUE TI-102 DC.Zero DY-108 DC.SJ.C1.Z3.R3.PDU1.PF GE01\_A\_DT FAC.OAK.Power-Kh.Val.PV FT9001

FI-151 0\_ENG\_AUX\_STS 80-5.Net Volume C001 A 01  
DER1\_A\_DT fic1001.C

AF\_NOISE PI-115 DM-05.BW.R 403511195\_Wind Speed FR2001 TIC-121  
02:F101.C

DC.Srv01R Boiler-125.Fuel Gas Volume DC.C2Z1.Pwr.Ripple GE01 A 01  
350 AT401 DC.Shv08

D-110.Tank Pressure.PV Boiler Feed Pump #1  
Anacortes Refinery.Alkylation.Asset Problems B210\_FG005.KPIExcursion

4-36.Net Volume AC04.Air Flow  
02T100 03.LBB02CT001-2  
DC.NY.Actual.PWR.day.Tot AlarmTest.Input.Float32.10  
364511575-AC Power DC.SJ.PUE GE04\_Status TIC-181  
fic1001.C GE02\_OT GE01\_DT 02:F101.C

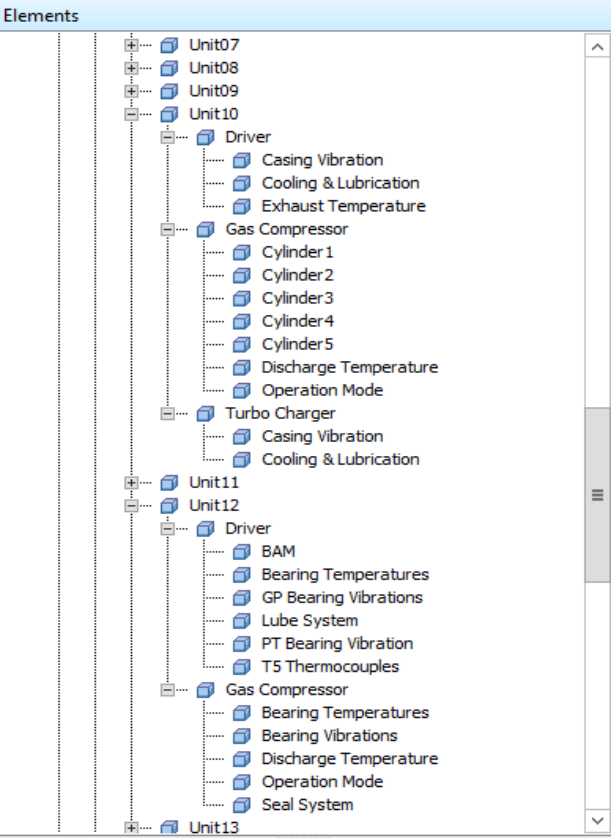
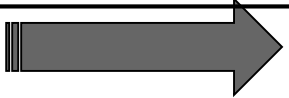
Boiler-209.Fuel Gas Flow DC.Srv01R 94:GRDIDX.Tr FI-101 80-13.Net Volume  
1-16.Net Volume CB1992\_MS 0\_CMP\_FLOW\_TOTAL GE02\_Energy FT9001

FI-101 bf5e1d1d-39c9-4b5b-b3d3-c2ce05fa3a26 DM-05.BW.R AT401  
0\_CLR\_FINAL\_OUT\_B\_TMP F506\_E990 339511775\_Clear Sky Global Horiz GE01\_DT FT9001  
AlarmTest.Input.Float32.1 AQUA2-TI-201.PV DC.SJ.SiteRealTimeTLoad.PWBv01 AT401 FT9001

02F102.1HRAVG BGT001 BGE003 FI-111 02T100  
PI-111 facility\_output 1-8.Net Volume AF\_FLOW3 02:T103 AT401  
03LBA32CT001-2 45-2.Net Volume ACEDemo.Unit1 Output TI-178  
DC.SJ.ITLoad.PWR  
B352\_W778 0\_CMP\_SVLV\_PCT  
02F104 CD:F161 GE04\_O5  
FeedBin.Cmt DC.Zone1.Number TI-145 FR2001  
Asset1.Problems QI-122 FI-151  
Daily Trigger TI-178 GE04\_OS FI-111 94:BW.R TI-101 F7Z3\_E889  
FrgPrbCos\_ER FT9001 369512185-Temp  
AF\_NOISE FI-144 02F100 fasttag Compressor-439.Feed Rate

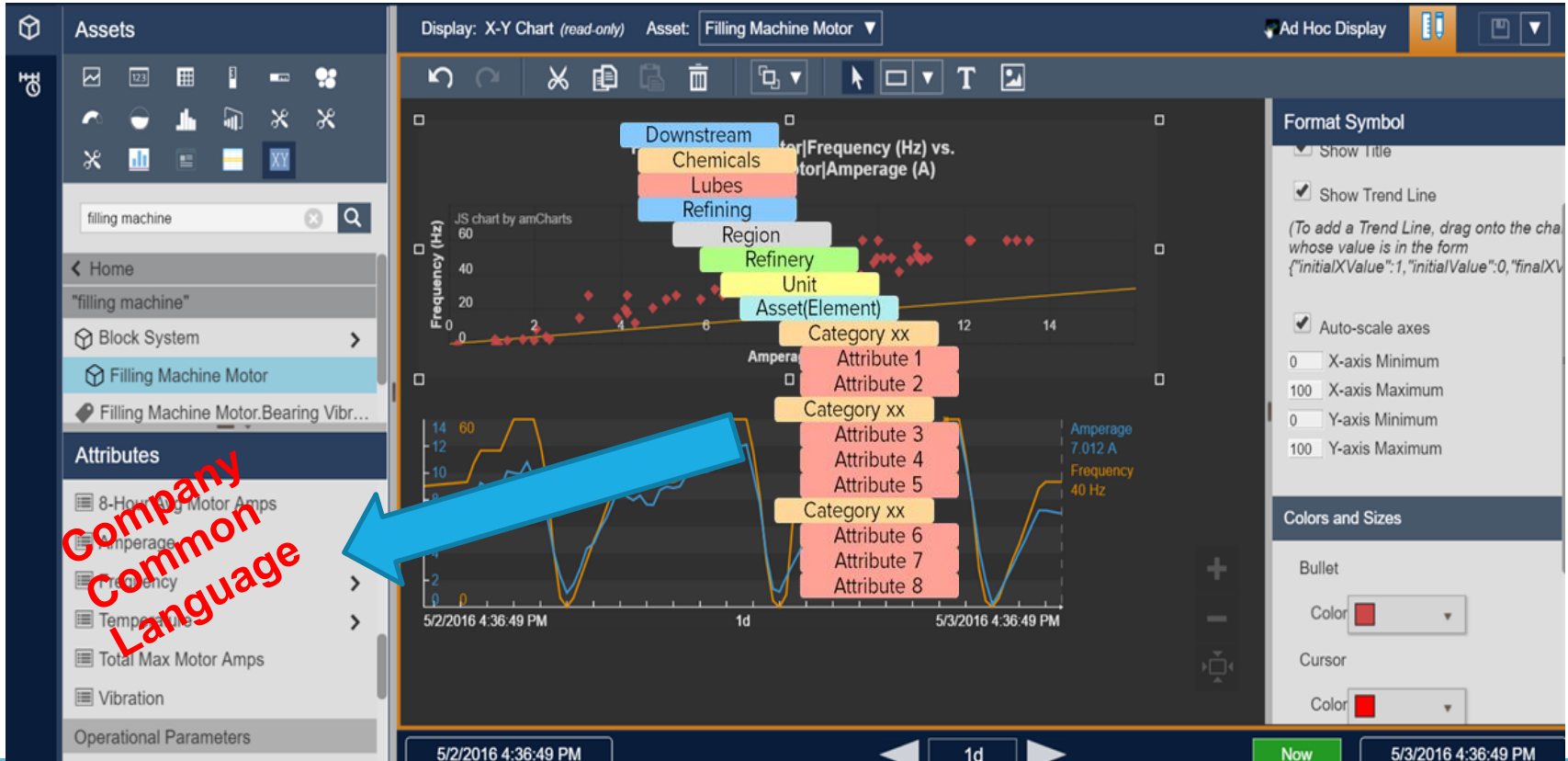
AQUA2-SI005.PV GE02\_Energy  
0\_ENG\_MODE\_STS % CO2 GE05\_EST DC.Ch.DCE FI-172:210 FI-121  
FI-151 02T103.Q DC.Z1R 0\_ENG\_MODE\_STS GE03\_Q  
0\_CMP\_HDR\_SUC\_PRS DY-131:166 GE01\_TD  
Boiler-334.Feed Rate

PI Asset Framework structures and creates data consistency for easy interpretation by anyone





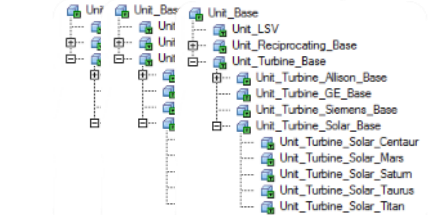
# Self-service Data Access by Anyone



# Application Building Agility



## Physical Compressor Stations



Digital Compressor Stations

Asset	Location	Status
Asset 1	Location 1	Status 1
Asset 2	Location 2	Status 2
Asset 3	Location 3	Status 3
Asset 4	Location 4	Status 4
Asset 5	Location 5	Status 5
Asset 6	Location 6	Status 6
Asset 7	Location 7	Status 7
Asset 8	Location 8	Status 8
Asset 9	Location 9	Status 9
Asset 10	Location 10	Status 10



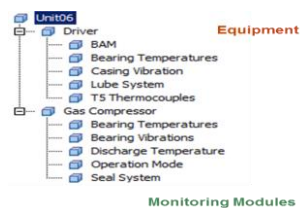
Centrifugal Compressor Templates

Asset	Location	Status
Asset 1	Location 1	Status 1
Asset 2	Location 2	Status 2
Asset 3	Location 3	Status 3
Asset 4	Location 4	Status 4
Asset 5	Location 5	Status 5
Asset 6	Location 6	Status 6
Asset 7	Location 7	Status 7
Asset 8	Location 8	Status 8
Asset 9	Location 9	Status 9
Asset 10	Location 10	Status 10

Availability	Performance	Quality
<b>Downtime</b>	<b>Runtime</b>	<b>Anomaly Detection</b>
<ul style="list-style-type: none"> <li>Event Frames</li> <li>Downtime classification</li> <li>Planned vs. unplanned</li> <li>Maintenance data</li> </ul>	<ul style="list-style-type: none"> <li>Event Frames</li> <li>RACR</li> <li>Horse power usage</li> <li>Efficiency</li> </ul>	<ul style="list-style-type: none"> <li>Sensor data behavior based on historical normal</li> <li>Oil analysis</li> <li>Equipment analysis reports</li> </ul>
<b>Health Index</b>		

Health Index Templates

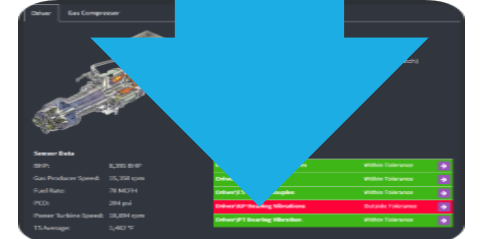
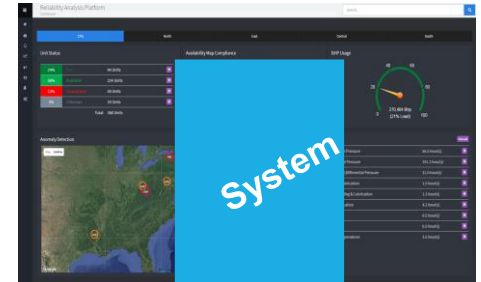
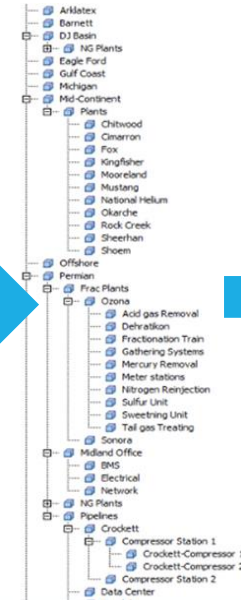
Asset	Location	Status
Asset 1	Location 1	Status 1
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Asset 3	Location 3	Status 3
Asset 4	Location 4	Status 4
Asset 5	Location 5	Status 5
Asset 6	Location 6	Status 6
Asset 7	Location 7	Status 7
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Asset 9	Location 9	Status 9
Asset 10	Location 10	Status 10



Monitoring Modules

Anomaly Detection Templates

Exception based KPI Dashboard system



System  
Contextual  
Drill Down

# Example: Application Development Agility within Oil and Gas

**1000's of Applications**

The image displays several software interfaces:

- DrillingRig1 - Rig Overview:** Shows a 3D model of a drilling rig with various operational parameters and status indicators.
- Controller Overview:** A table listing controllers for different assets (Tiger, Leopard) with their modes (Automatic, Manual, Off) and setpoints (SP, OP, PV).
- Petrosim Refinery Dashboard:** Displays KPIs for a refinery, including Feed QC (Sulfur, Chlorination Factor, etc.) and equipment status.
- PI Vision Heat Exchanger-014:** Shows a detailed view of a heat exchanger with flow rates, temperatures, and pressure drops.
- Petrosim Downstream FCC Equipment Summary:** A grid of equipment status cards for various units like Pumps, Air Blowers, Heat Exchangers, and Wet Gas Compressors.
- ANA FCC 1:** A process flow diagram for an FCC unit with associated KPIs and equipment details.



# Advanced Analytics Challenges

A hand is shown pointing at a digital data visualization on a screen. The background is dark blue with glowing lines and data points, suggesting a complex data analysis environment. The hand is in the foreground, with the index finger pointing towards the center of the screen.

- IT want to move everything to a data lake in the cloud
- Advanced analytics projects challenged:
  - Trust
  - Quality
  - Access
- Time spent on the processing data and not the analysis

# Best Practices for Analytics

Imagine your future Driverless car is your critical operations.  
Where should you do the analytics?

## Real-time electronic braking

Where would you trust the analytics?



Edge analytics

## 70mph on the freeway

Where would you trust the analytics?



“Site” analytics

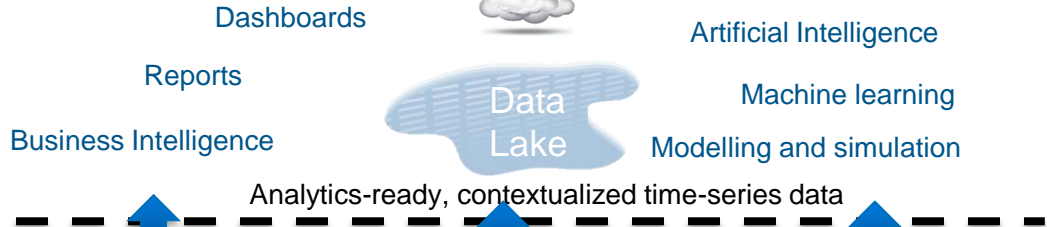
## Commuter Route

Where would you trust the analytics?



Cloud analytics

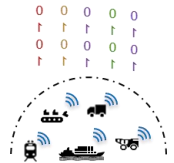
# Enterprise Analytics Initiatives



# Trusted Source of Quality Operations Data



# Real-time Industrial Operations



Remote and Mobile Assets

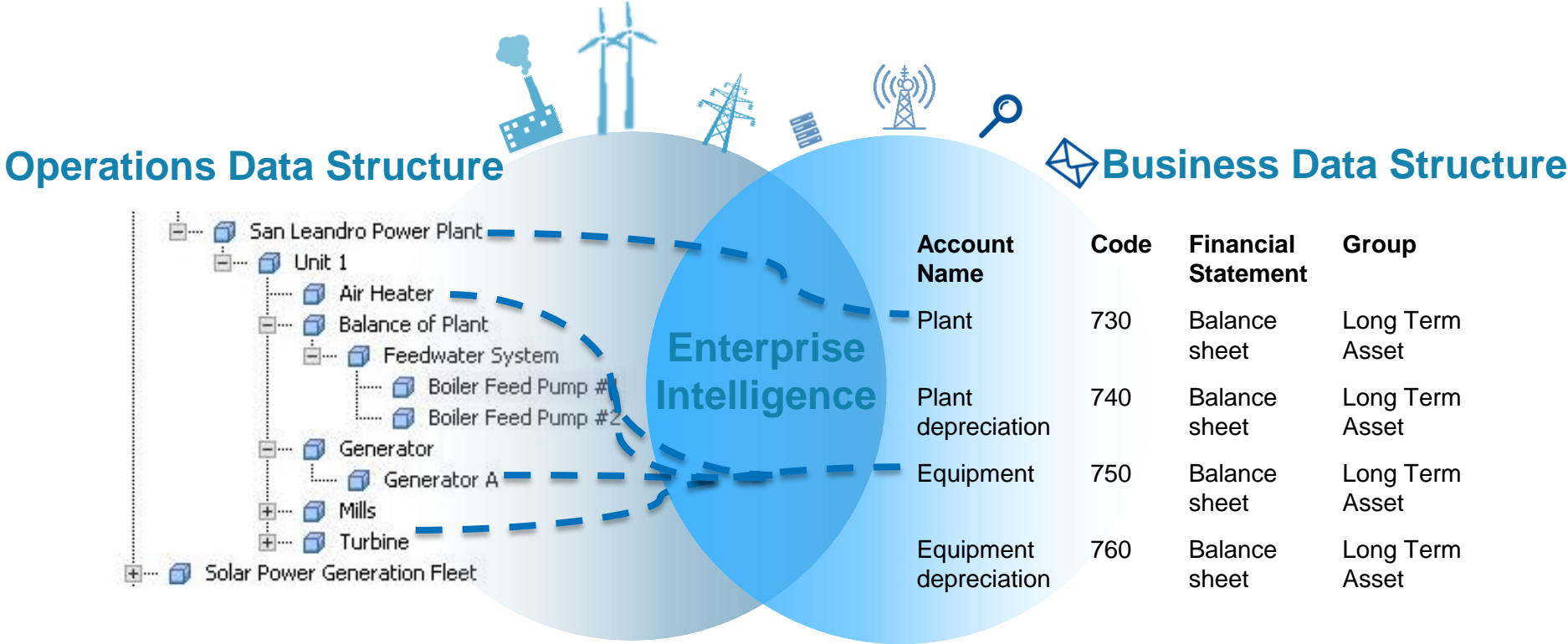


Automation/Control Systems



Cloud

# Asset Framework Enables Fast Data Integration

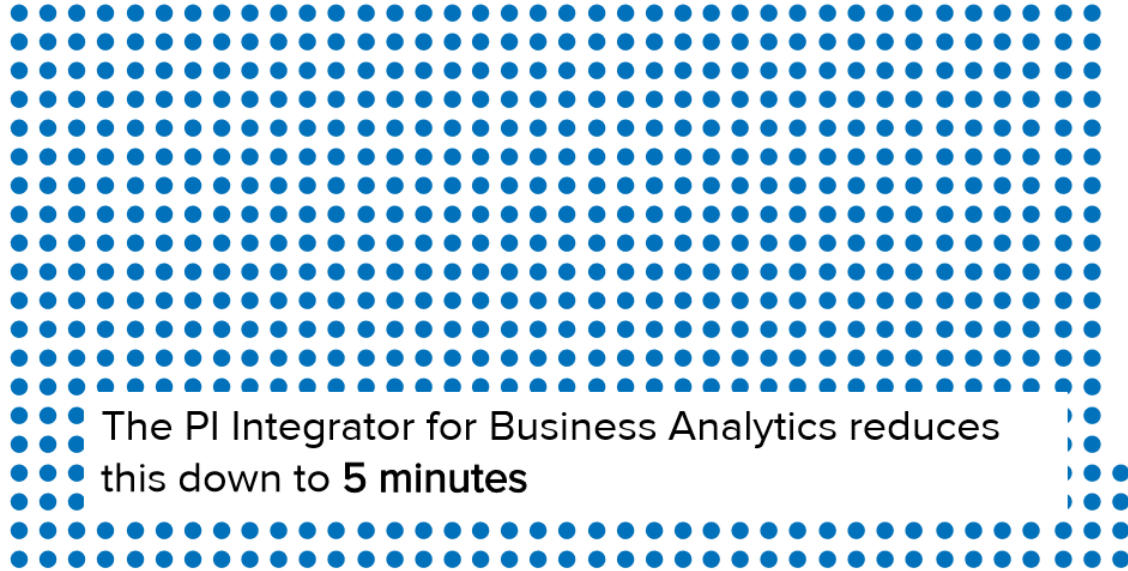




## Result: PI Integrators Delivers Analytics Ready Data

Quick access to analytics ready data gives data scientists the agility to explore questions and answers:

A typical data extraction initiative can take upwards of a **month** (or 744 hours) to complete for 70 sites



The PI Integrator for Business Analytics reduces this down to **5 minutes**



Leveraging the...



# 2018/19 Technology Focus

OSIsoft Cloud Services

Remote Operations Monitoring

Visualization as a Service


PI Vision 2017R2

D. Sci. Enablement

Pervasive Data Collection


Integrators

Industrial IoT



Millions of Sensors & Devices

Assets



Multiple Sensors

Plant



Multiple Assets

Enterprise



Multiple Plants

Community



Multiple Enterprises

PI System 2018 &

PI System LTSB

# Our Data Collection Technologies

PI  
Connectors



Plants

Edge Data  
Store



Assets

Open Edge  
Module



Devices

OMF  
Application



Sensors

10,000's



Data Streams



10's

High

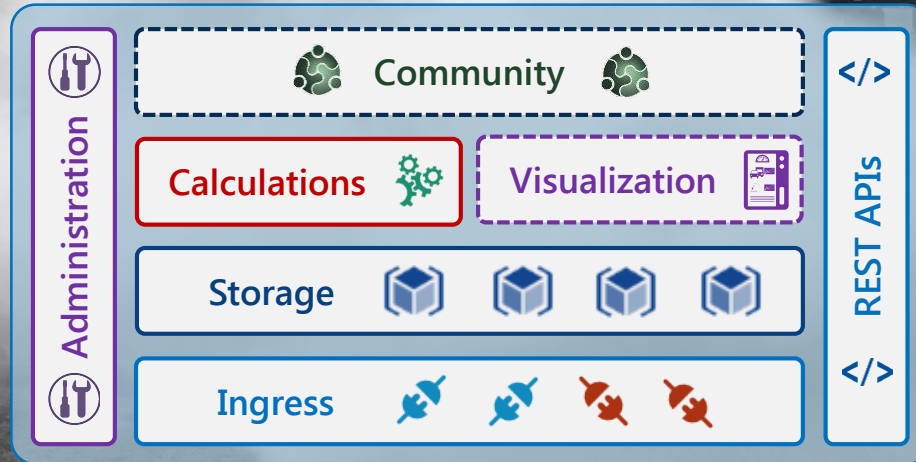


Compute Resources



Low

# OSIsoft Cloud Services



## OSIsoft Messaging Format (OMF)



# Summary: Digital Agility is Key

- Support for IT and OT initiatives
- Adoption of best of breed IIoT technology
- Self-service access to operations data
- Application building agility
- Analytics where it makes sense

# Examples of Digital Agility

## 3 Additional Talks Today



Condition Based  
Maintenance with the  
PI System



- Delivering Analytics  
with the PI System



Sustainability  
Improvements with the  
PI System

## Questions

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



State your **name & company**

## Please don't forget to...

complete the Post  
Event Survey



# Thank You



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謝謝

KEA LEBONA

TAPADH LEIBH

고맙습니다

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NGIYABONGA

TEŞEKKÜR EDERİM

БАЯРЛАЛАА

MISAOTRA ANAO

OBRIGADO شكرا

DANKON TANK TAPADH LEAT

SALAMAT

KÖSZÖNÖM

DANKIE

TERIMA KASIH

GRACIES

СПАСИБО

PAKMET CIZGE

GO RAIBH MAITH AGAT

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ТИ БЛАГОДАРАМ

TAK DANKE

RAHMAT MERCI

HATUR NUHUN



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HVALA ХВАЛА ВАМ

TEŞEKKÜR EDERİM

THANK YOU

DANK JE

ΕΥΧΑΡΙΣΤΩ GRATIAS TIBI

AČIŪ

SALAMAT

MAHALO IĀ 'OE

TAKK SKALDU HA

ДЗЯКУЙ

GRAZIE

DI OU MÈSI

ĎAKUJEM

MATUR NUWUN

GRAZZI

PAKKA PĒR

ありがとうございました

SIPAS JI WERE

TERIMA KASIH

CẢM ƠN BẠN

UA TSAUG RAU KOJ

ТИ БЛАГОДАРАМ

WAZVIITA

СИПОС

FALEMINDERIT