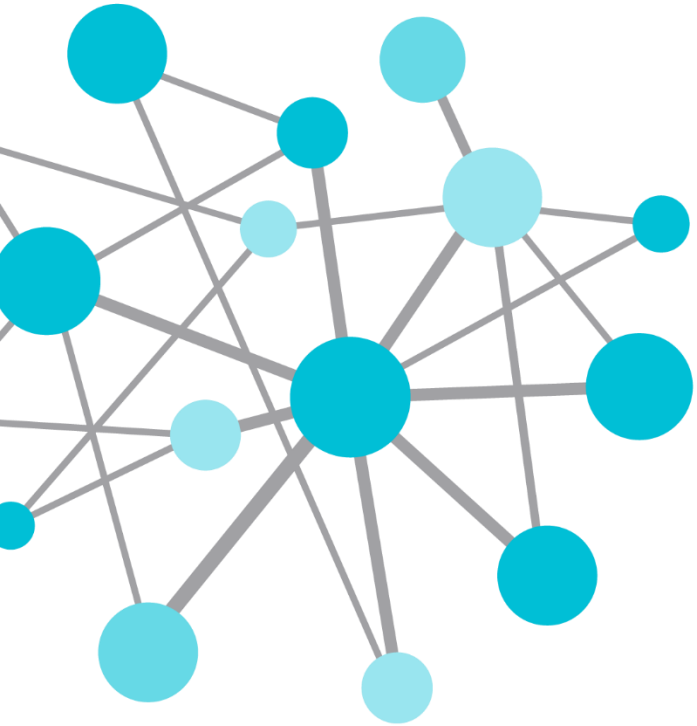

The Journey To Operational Intelligence

Presented by **Vlad Hristea, Territory Account Manager**

vhristea@osisoft.com

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What would life be like without electricity?

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What if you didn’t have any water?

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How would work change without the internet?

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Without visibility into your data what direction would you take?

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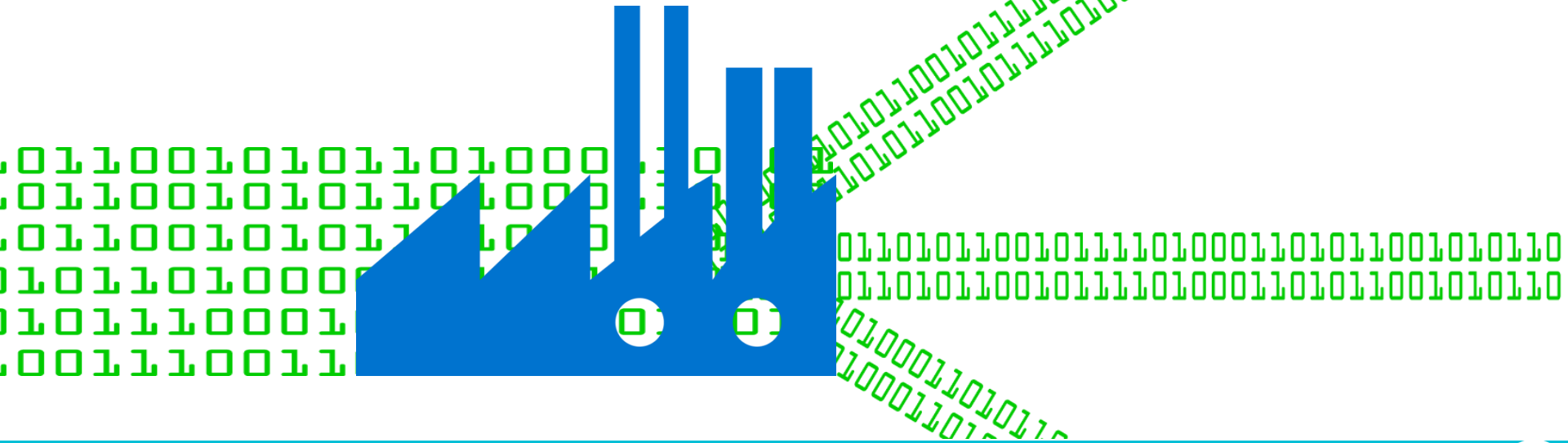
OT has known this for years: **“MIT research concluded that net gains in Output and Productivity were 5 to 6 % higher with Data Driven Decision Making”**



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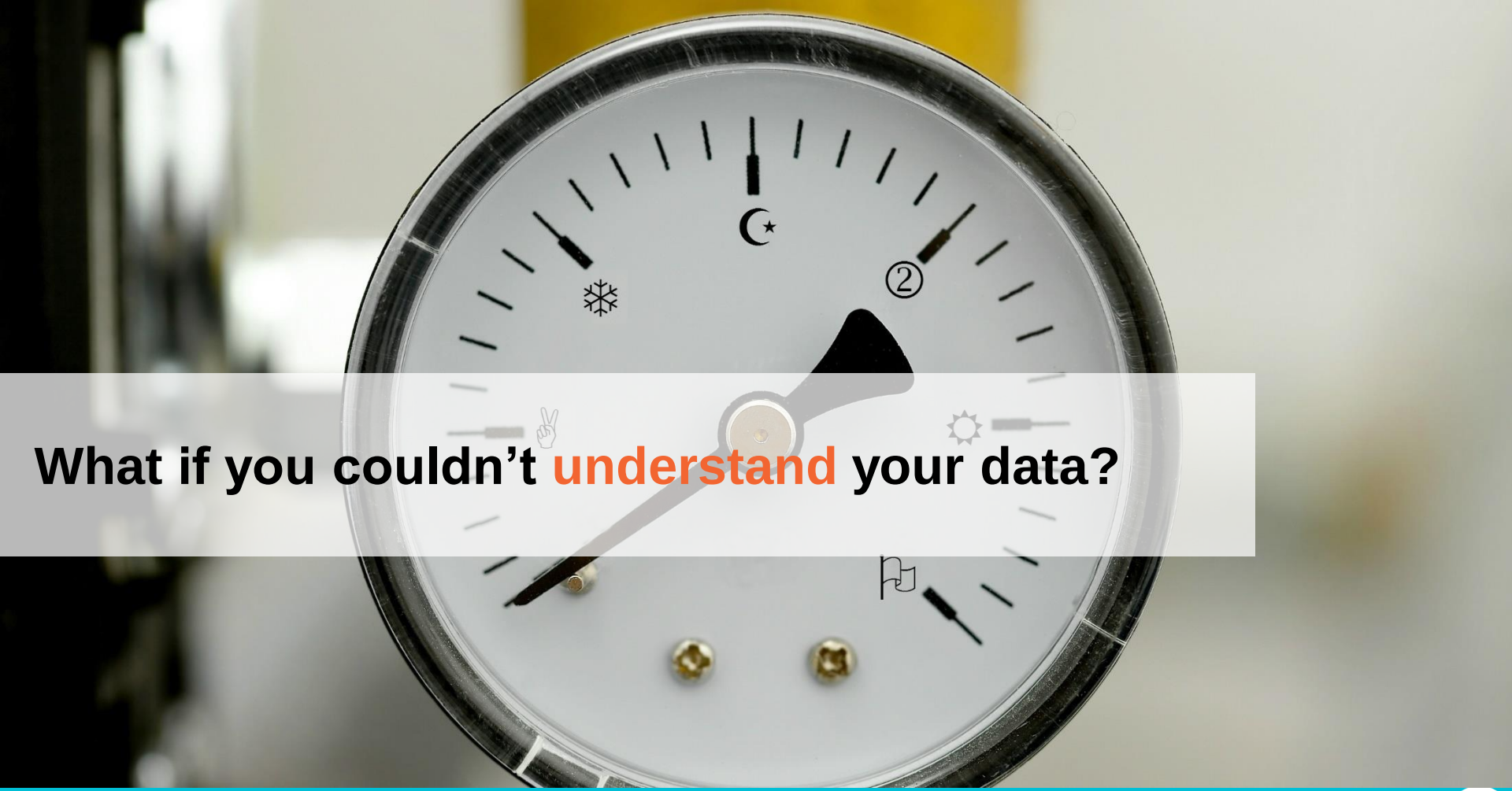

What if you couldn’t understand your data?

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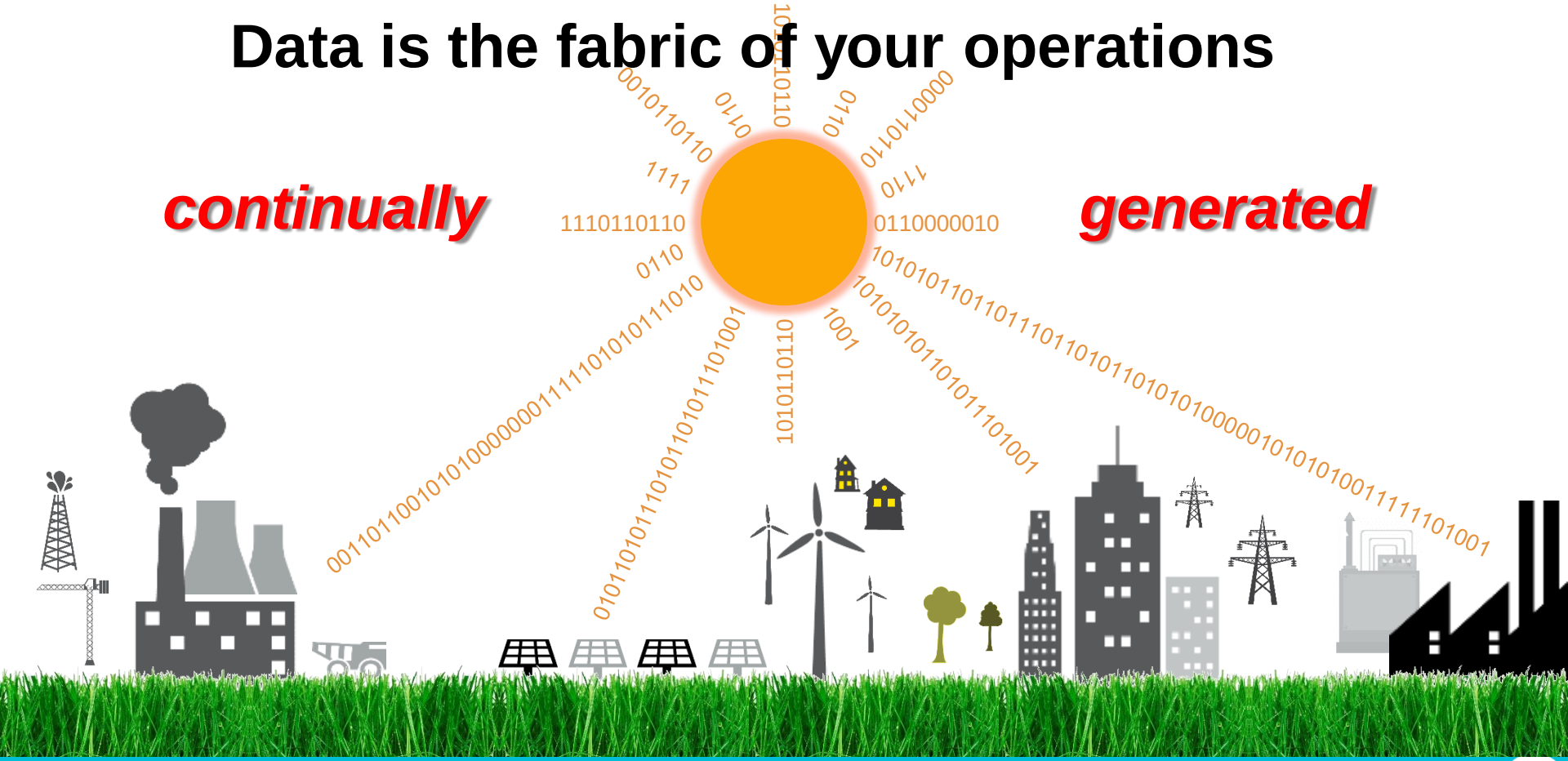
Data is the fabric of your operations



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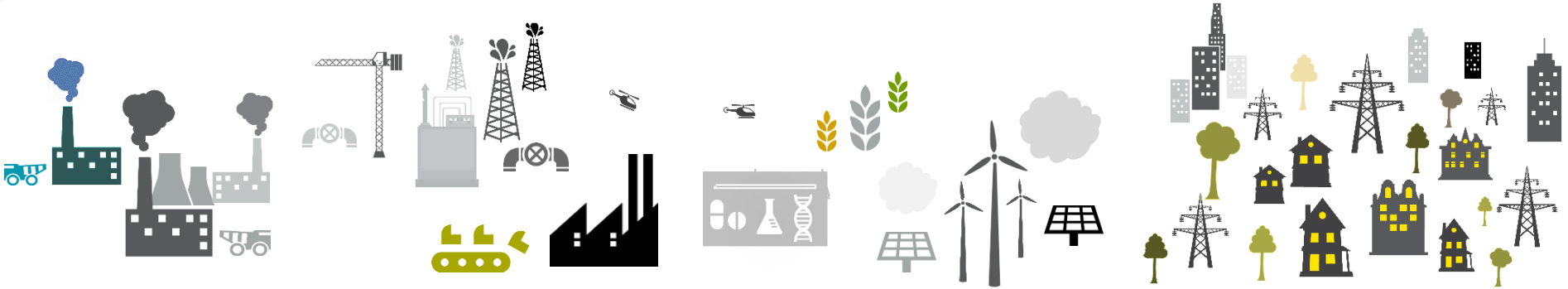
Real-time Operations Data Created Everywhere

Hundreds of assets to monitor & thousands of events to manage leading to

- Creating islands of systems
- Demanding we connect data, to systems, to people, to actions
- Availability and accessibility of this data is critical



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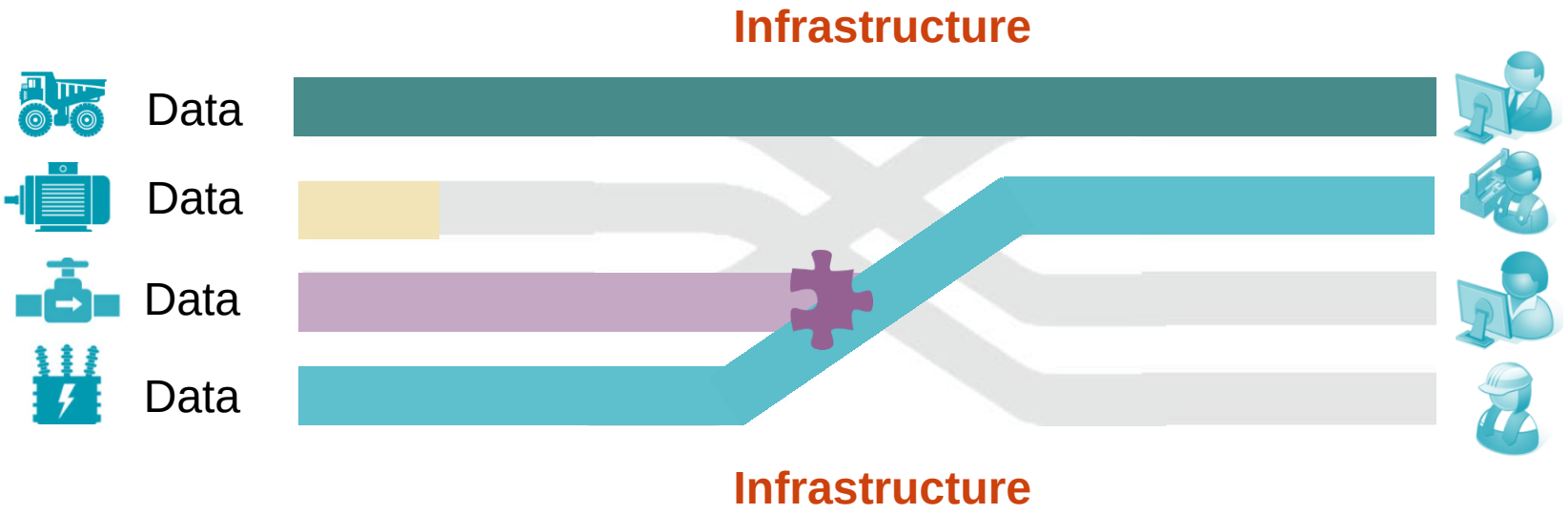
Today's Data Challenges



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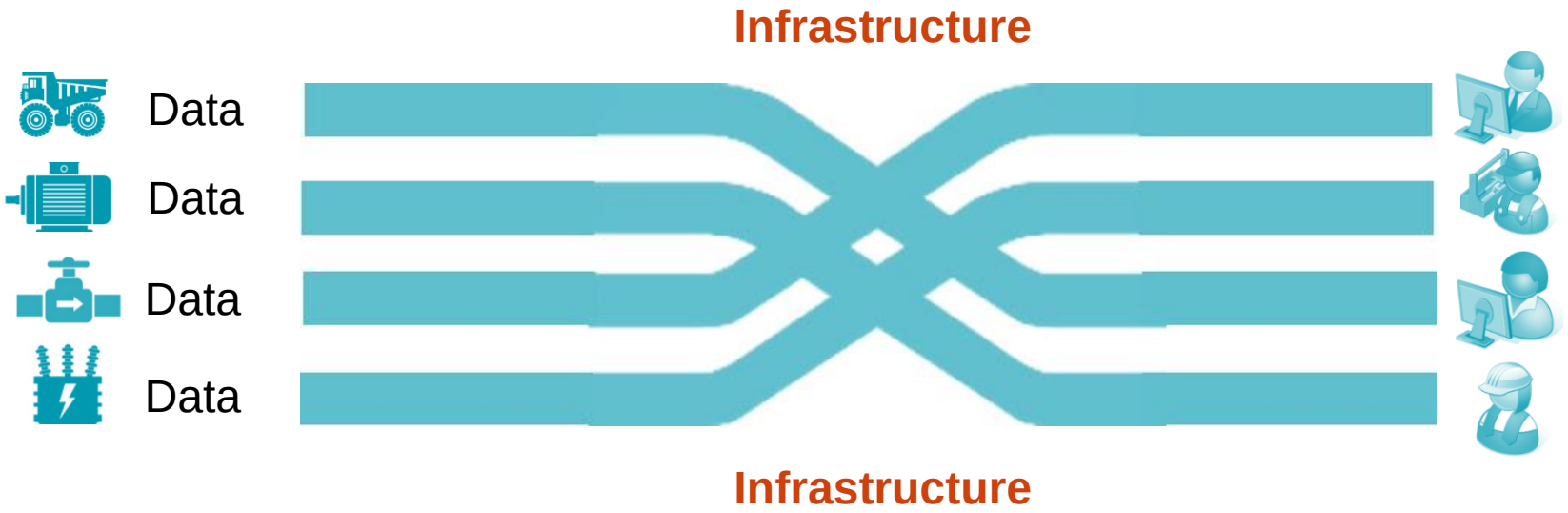
The Solution- Enterprise Infrastructure



Connect the right data to the right people in the right context
for the right decisions in real-time

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Why is Connectivity Important?

Context	Need	Solution
More data sources available Advanced analyses require information from multiple systems Expanding ecosystem of mobile devices	Imperative need to access all operational data and analyses, any time, any where	Implement a modern, **connected** PI System

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What

can this look like?

Solution

Implement a modern, **connected** PI System

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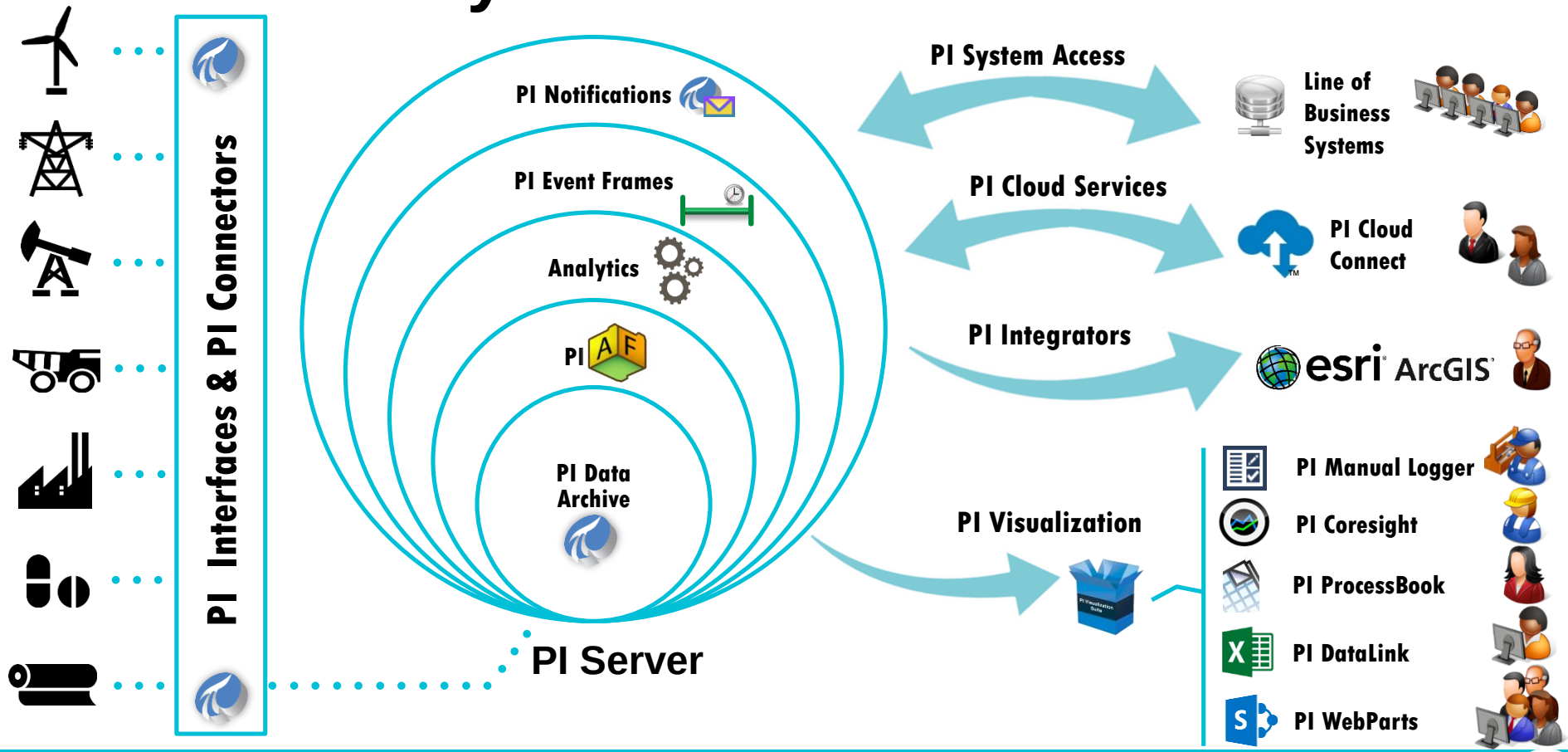
PI System Infrastructure



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How

can all of this

be done at

your organization*?*

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Key Steps

STEP 1

Connect Your PI System to Your Data

STEP 2

Connect Your PI System to Your Users

STEP 3

Connect Your PI System Across Boundaries

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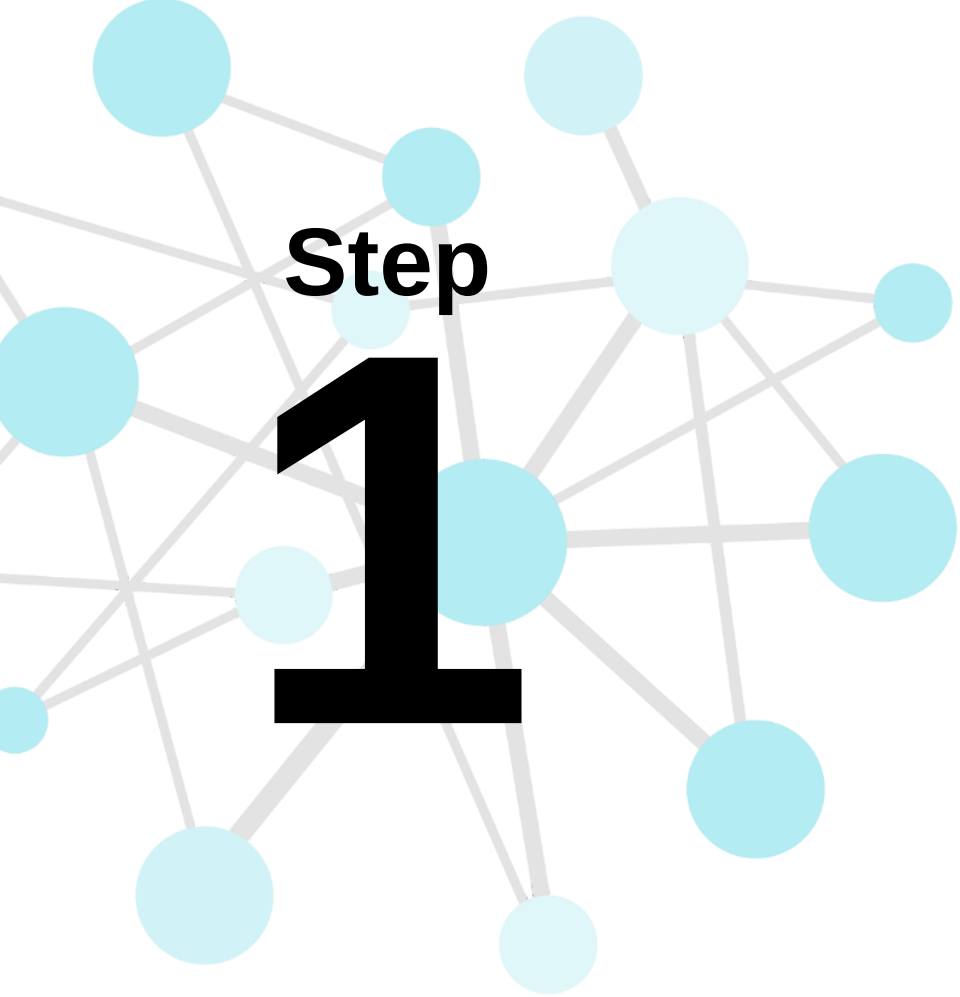

Step

1

Connect Your PI System to Your Data

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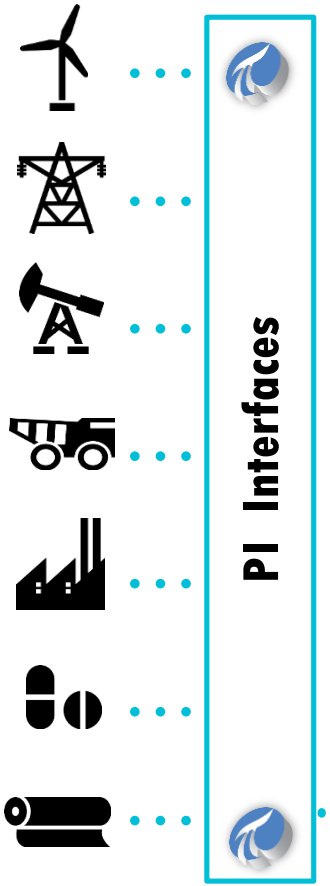
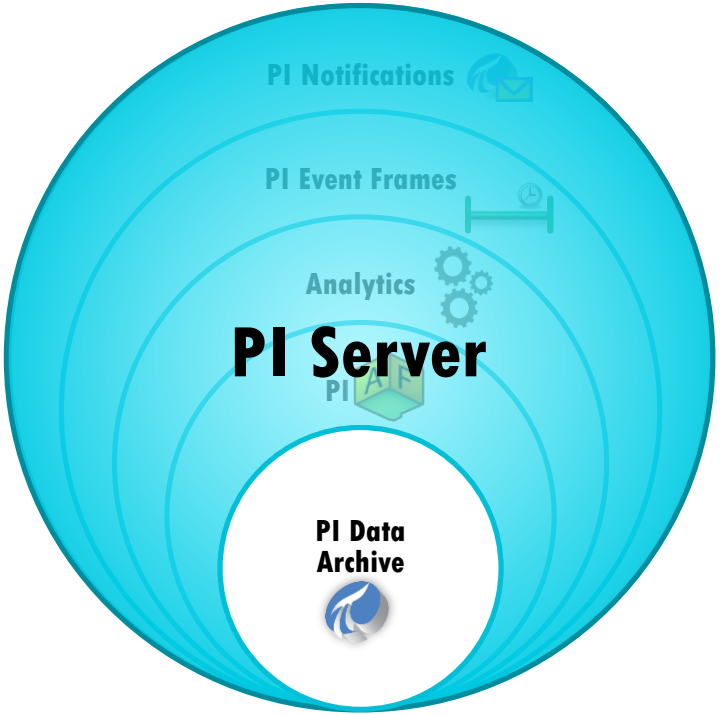
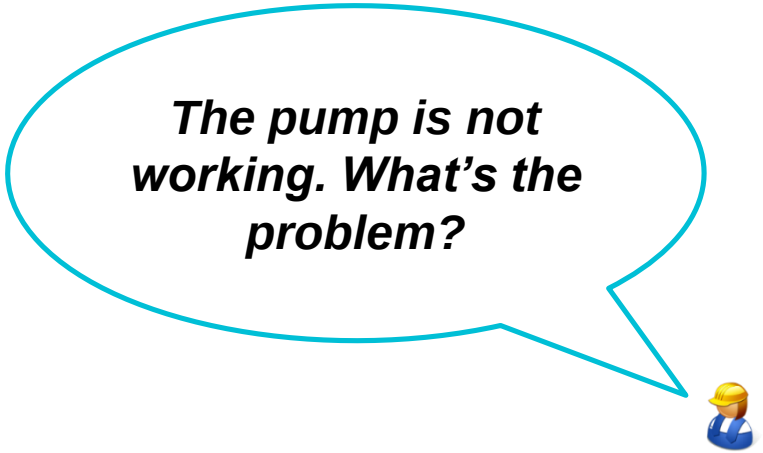
PI System Infrastructure







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The PI System adoption journey at NALCO - video

Nalco Holding Company, Ecolab Inc.; is a based supplier of water, energy and air improvement solutions and services for industrial and institutional markets. Their various products and services are designed to reduce energy, water and other natural resource consumption, enhance air quality, minimize environmental releases and improve productivity.

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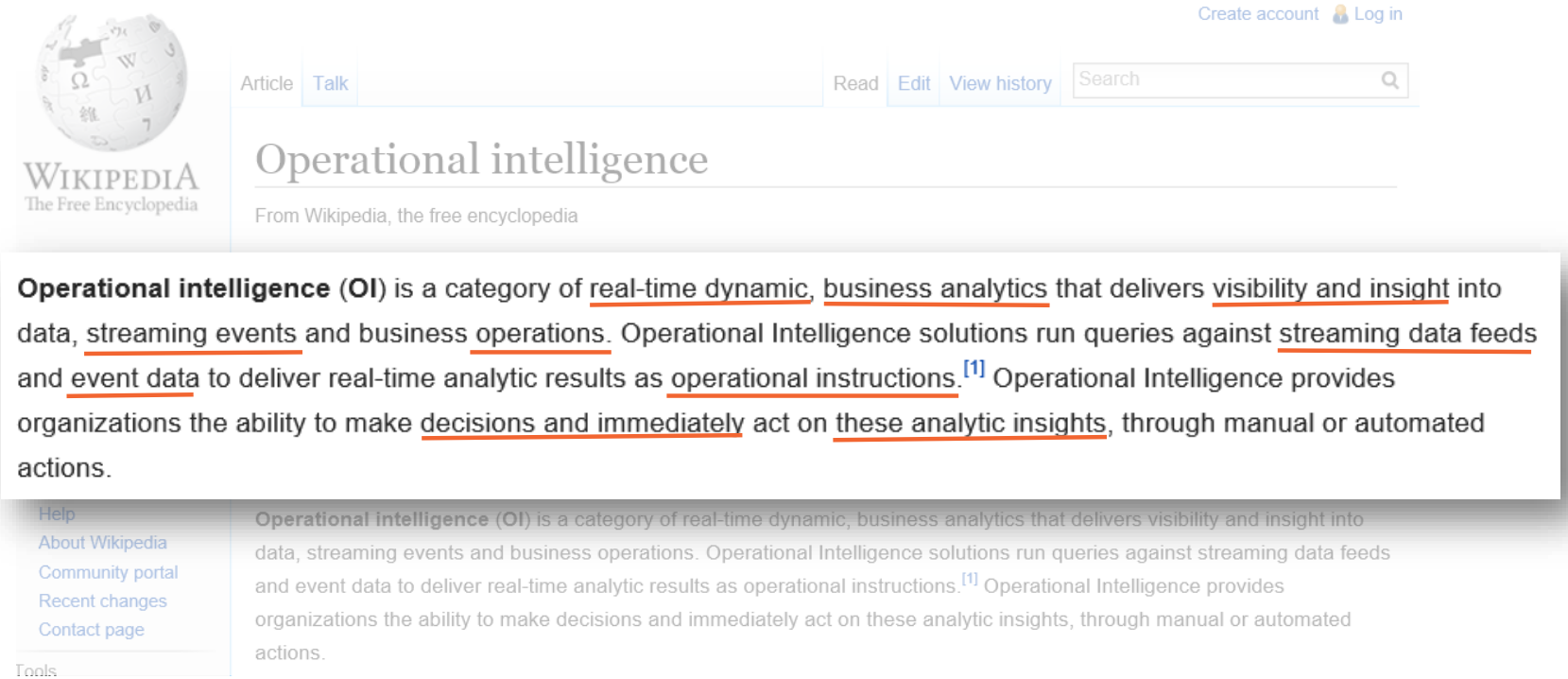
Operational Intelligence



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WIKIPEDIA
The Free Encyclopedia

Operational intelligence

From Wikipedia, the free encyclopedia

Operational intelligence (**OI**) is a category of real-time dynamic, business analytics that delivers visibility and insight into data, streaming events and business operations. Operational Intelligence solutions run queries against streaming data feeds and event data to deliver real-time analytic results as operational instructions.[1] Operational Intelligence provides organizations the ability to make decisions and immediately act on these analytic insights, through manual or automated actions.

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Tools

Operational intelligence (**OI**) is a category of real-time dynamic, business analytics that delivers visibility and insight into data, streaming events and business operations. Operational Intelligence solutions run queries against streaming data feeds and event data to deliver real-time analytic results as operational instructions.[1] Operational Intelligence provides organizations the ability to make decisions and immediately act on these analytic insights, through manual or automated actions.

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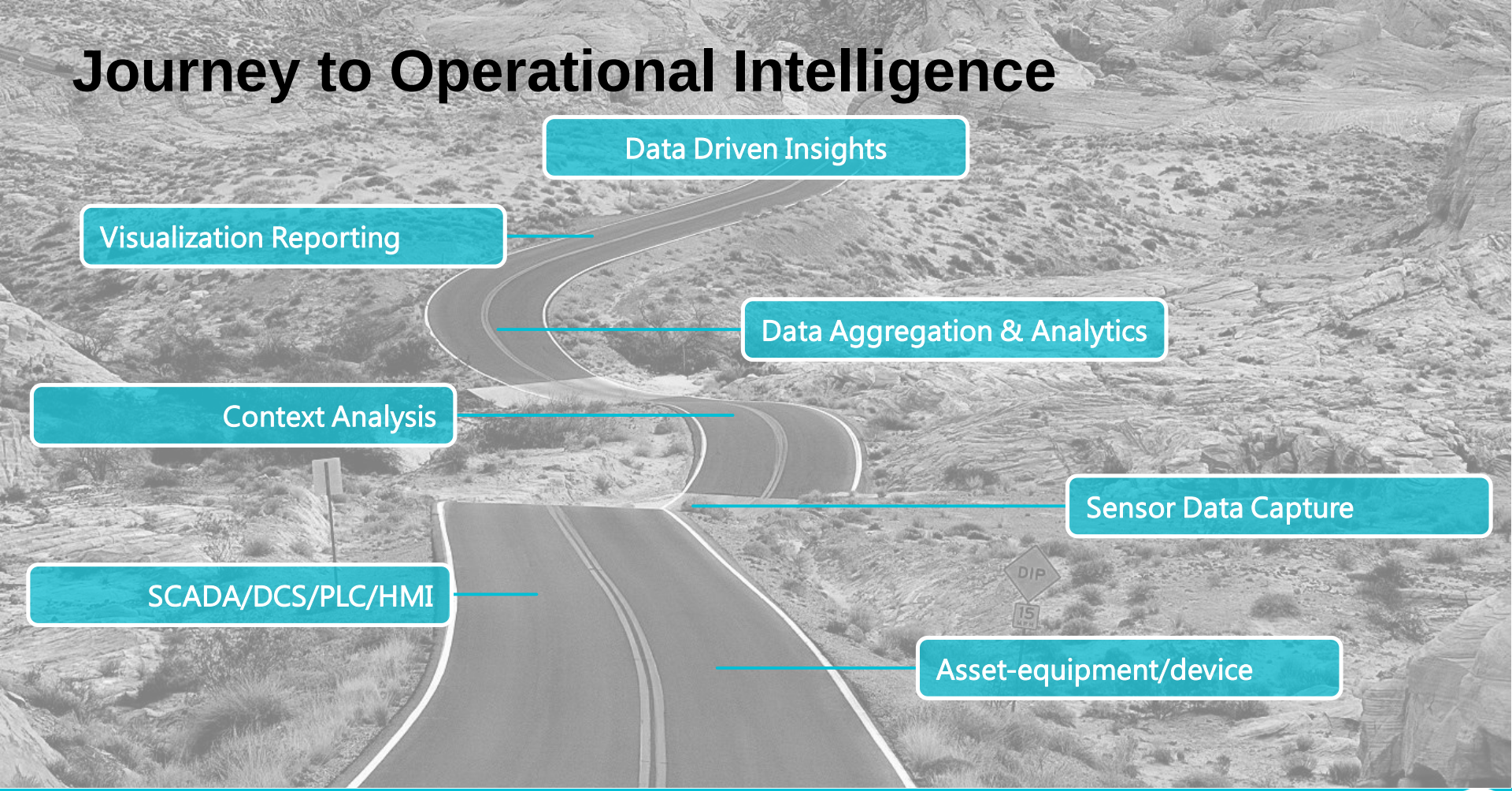
Journey to Operational Intelligence



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Decision Ready In Real-time

Creating a more sustainable enterprise

Drive profitability by increasing production (Asset availability / downtime)

Innovate by improving accessibility to information

Reduce capital & maintenance costs

Reduce risk & increase safety

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Journey to Operational Intelligence

Data Aggregation & Analytics

Predictive Insights

Infrastructure

Data Driven Insights

Visualization/Reporting

Sensor Data Capture

Context Analysis

Asset-equipment/device

SCADA/DCS/PLC/HMI

in·fra·struc·ture [in-fruh-struhk-cher]

"It can be generally defined as the set of **interconnected structural** elements that provide **framework supporting** an entire structure of development[1]"

[1] Online, January 7th 2014.

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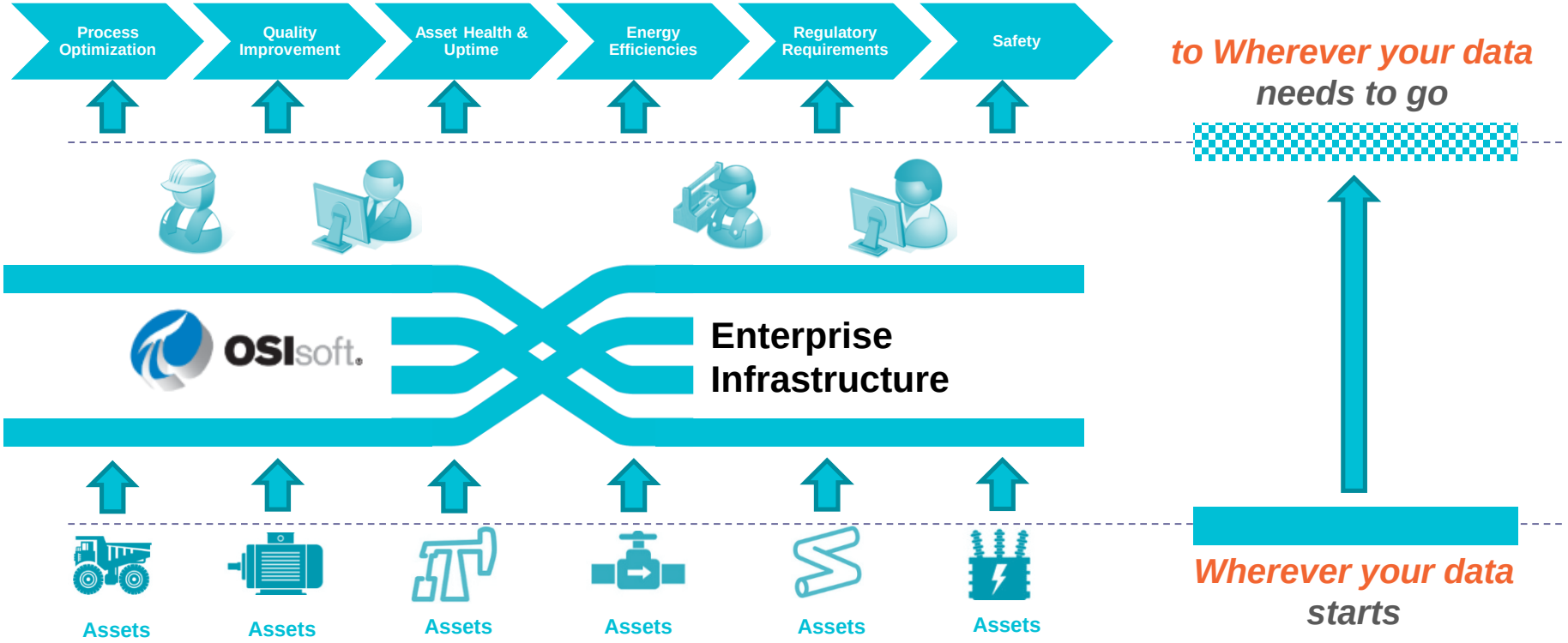
An Enterprise Infrastructure



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Partner Ecosystem for Infrastructure Excellence

Infrastructure

PI Integrator for Esri ArcGIS

Data Aggregation & Analytics

Sensor Data Capture

Asset equipment/device

SCADA/DCS/PLC/HMI

Predictive Insights

Data Driven Insights

Visualization/Reporting

Analysis

185+ Partners

- Integrations
- Services
- Embedded

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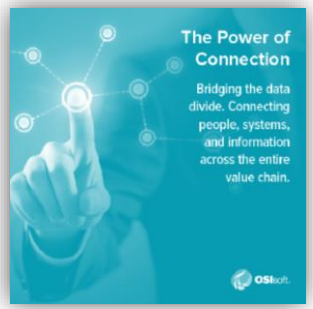
OSIsoft 2014 Investment In Your Infrastructure



Data Aggregation & Analytics

Sensor Data Capture

Asset-equipment/device

SCADA/DCS/PLC/HMI

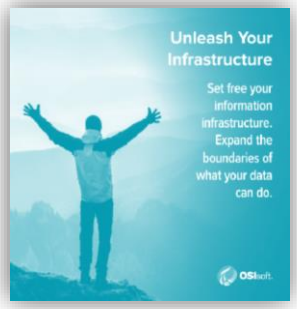
Predictive Insights

Data Driven Insights

Visualization/Reporting

Analysis

- PI Connectors
- PI Cloud Connect
- PI Integrator for Esri



- PI Server 2014
- PI Asset Calculations
- PI Event Frames

- ProcessBook Displays in PI Coresight
- PI Coresight Mobile

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OSIsoft PI System 2015 Developments

Predictive Analytics / Simulations

Integration with Big Data Analytics

Integration with Business Systems

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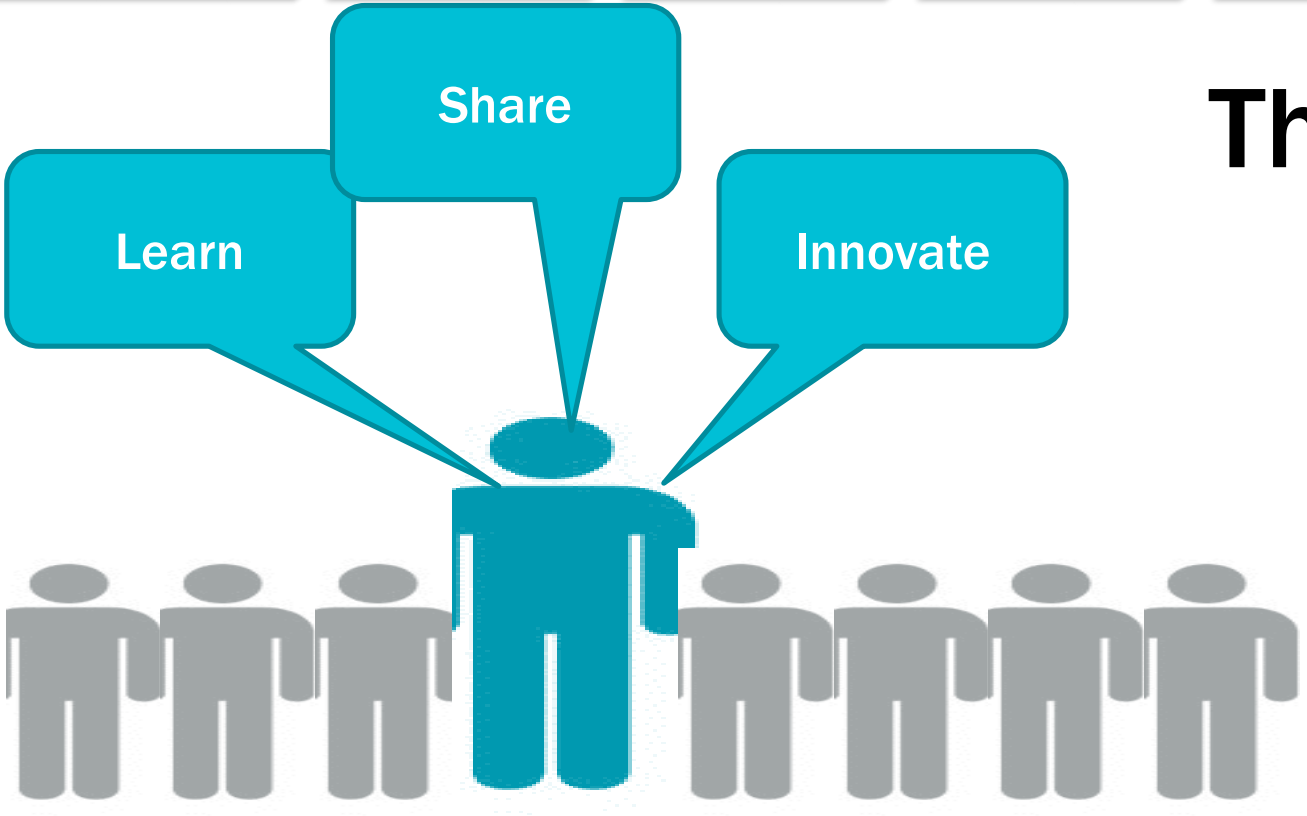
Process Optimization | Quality Improvement | Asset Health & Uptime | Energy Efficiencies | Regulatory Requirements | Safety



This is your work! True Business Impact

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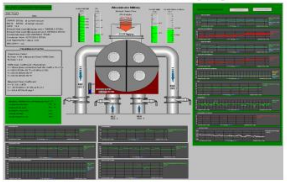
Process Optimization

Wheelabrator Technologies Inc.

A Waste Management Company

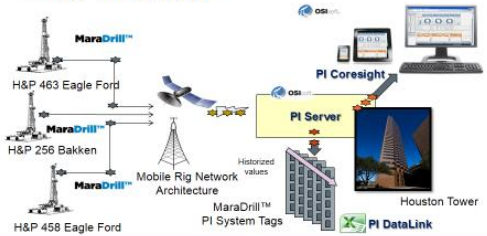
Performance Monitoring Center Hampton NH

Condenser Performance Display



Marathon Oil

Data Workflow

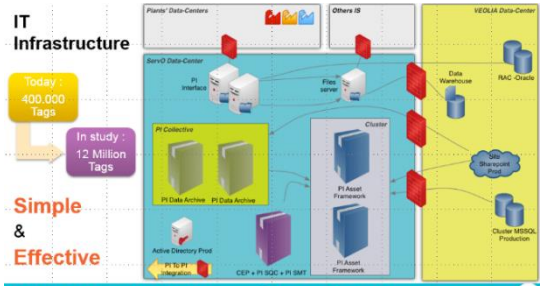


VEOLIA

Eau d'Ile-de-France

Délégataire du SEDIF

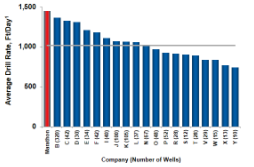
IT Infrastructure



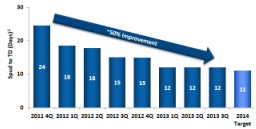
Results and Benefits

- Cooling Tower Performance Improvement - $450K/Year
- River Water Temperature Management - $300K/Summer
- Chemical Consumption Reduction - $70K/Year/Plant

Continuous Improvement in Rate of Penetration (ROP)



Eagle Ford Drilling – Spud to Total Depth



PI System and Real Time Data Analysis

A new generation of tools, agnostic technology, for an automatic and efficient detection

Leak Detection on demand

- Analyze every sensor in Real Time
- Put Data for analysis in SQC and Scilab
- compute proximities between the signals to determine the best location of leaks

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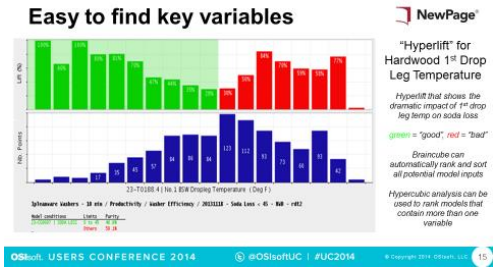
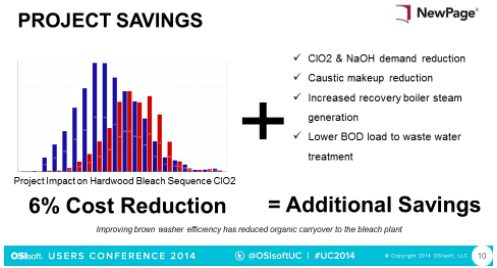
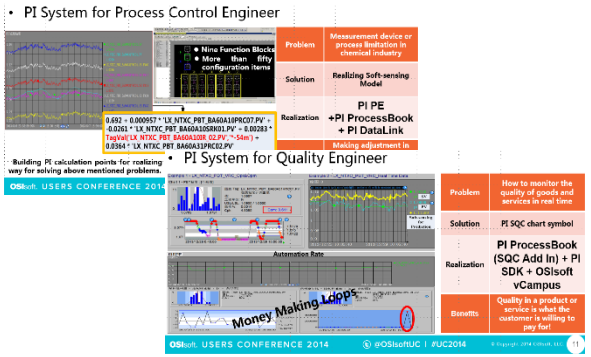
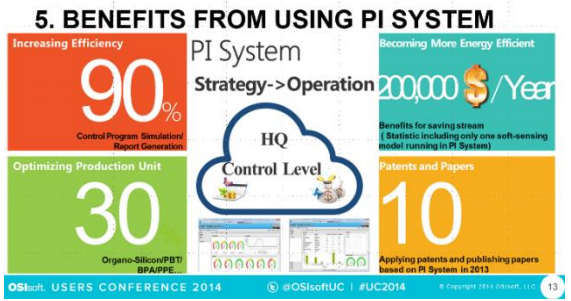
NewPage®





BLUESTAR China National BlueStar (Group) Co, Ltd.





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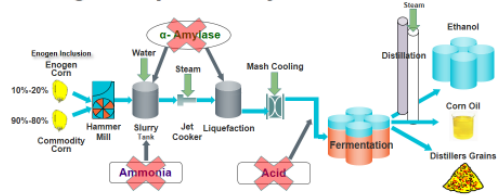
Process Optimization → Quality Improvement

Enogen® syngenta®

PG&E®

PETRONAS

Enogen Impact – Dry Grind Ethanol



PI System provides the ability to monitor, analyze, measure and visualize the Enogen impact.

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PG&E Gas Operation Center

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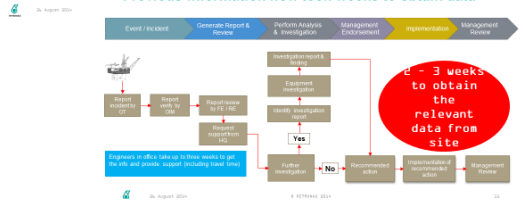
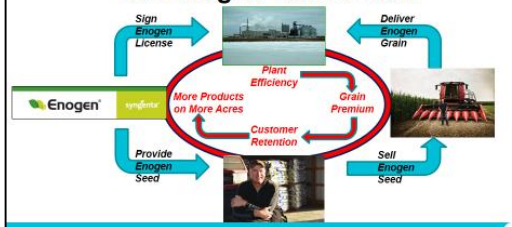
Why do we need PI System?

- Diverse operational facilities
- Inhomogeneous sources of operational data
- Real-time process data locked within isolated control systems
- Technical performance & business intelligence reliant on offline data

Previous information flow took weeks to obtain data



The Enogen Value Chain



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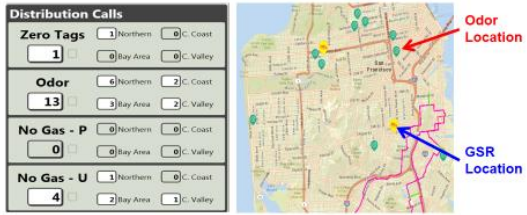
Customer Calls Displayed using Esri



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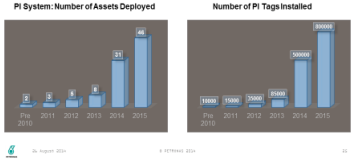
Troubleshooting made easy and accurate!

PI System deployment status



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Process Optimization → Quality Improvement

Pacific Rubiales Energy

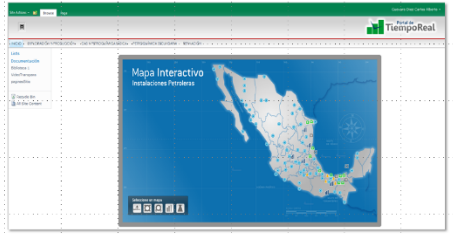
Business Challenges

- Manual data collection despite the existing automation system.
- Data is being organized using Microsoft Excel.
- Engineers spend long time organizing data and they don't have enough time to analyze it.
- Data is transmitted via email.

PEMEX

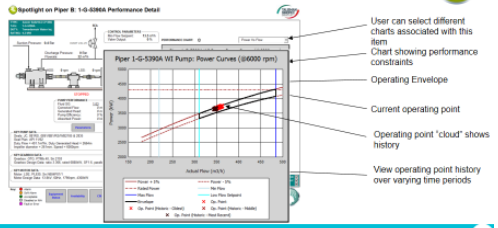
Standardized Real Time Portal at PEMEX

All 4 PEMEX Companies' Metrics are in a single Portal



TALISMAN SINOPEC ENERGY UK

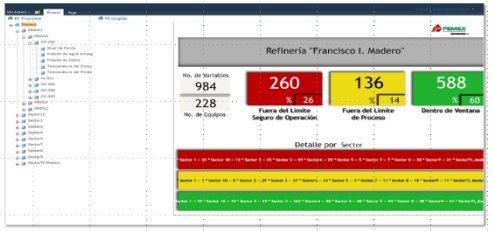
Spotlight Display - Performance



Solution

Implement PI System to manage, secure and display operational information through reports and KPIs of wells and CPF (Central Production Facilities)

A single detailed view for all equipment



Examples of Value Delivered

- **High Seal Gas filter DP Catch**
  - DP reached 3.5BarG, limit should be 1BarG
  - *Spotlight* alerted users, who followed up with operators to swap to standby filter and raised work order to replace fouled filter
  - If allowed to continue could have caused 14 days lost production @11,000bbls/day : 154,000bbls
- **High Seal Oil Tank Temperature Catch**
  - Temp should be around 60°C, but had reached 116°C
  - *Spotlight* alerted onshore users, who followed up with offshore team and it was picked up that 2 seal oil pumps were running instead of 1
  - If high temperatures had continued seals could have failed and caused 10 days lost production @7,000bbls/day : 70,000bbls
- **Surging Compressor Proactive Resolution**
  - Operators reported compressor surging
  - *Spotlight*'s history functions allowed engineers to confirm problems had occurred and make control tuning suggestions
  - If allowed to continue would have caused production/mechanical problems

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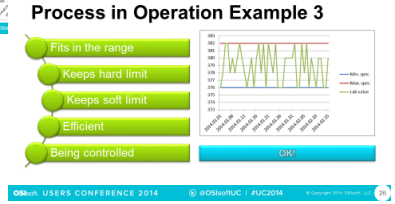
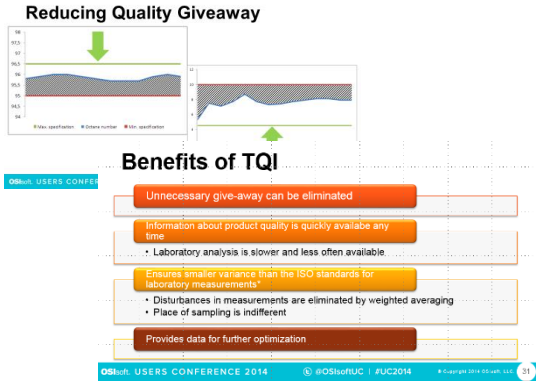
Process Optimization → Quality Improvement





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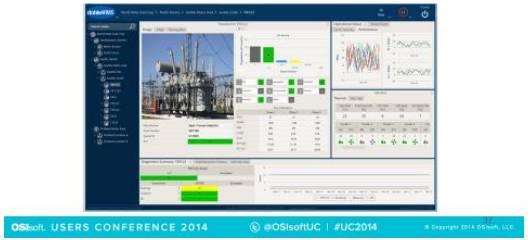
Process Optimization | Quality Improvement | Asset Health and Uptime

Columbia Pipeline Group

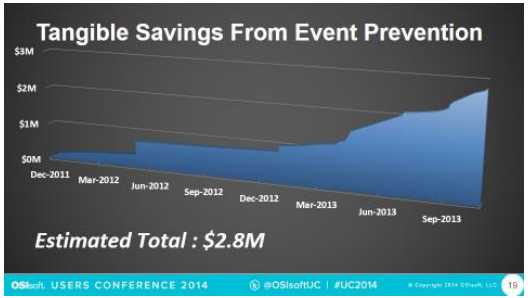
doble

Failure Analysis and Data



pjm

View of control room video walls



Fleet Risk, Financial, Health

Return on Investment

- Based on actuary data, failure reports and FMEA effectivity we expect:
  - 250% ROI for the cost the installed system per year
  - Expect that for every $10 Million spent on maintenance that, at least 25% on a rate base case study.

Situational awareness in control room

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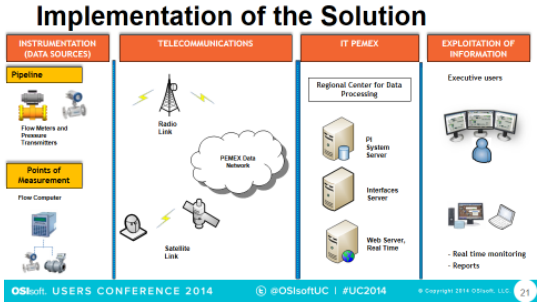
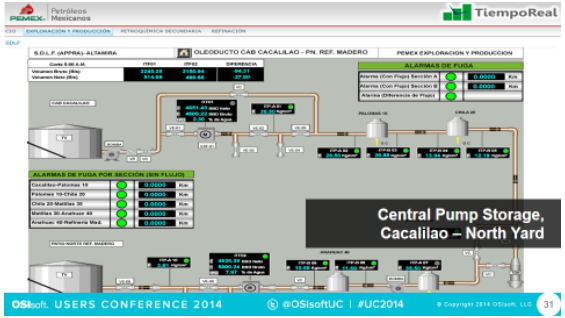
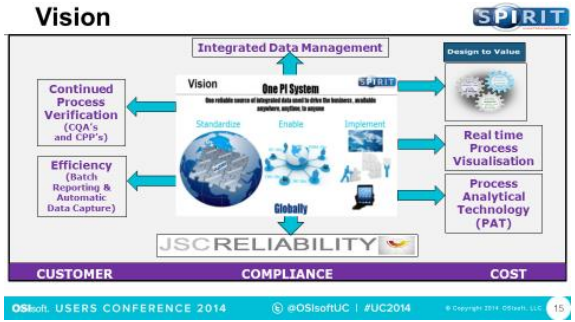
Process Optimization | Quality Improvement | Asset Health and Uptime

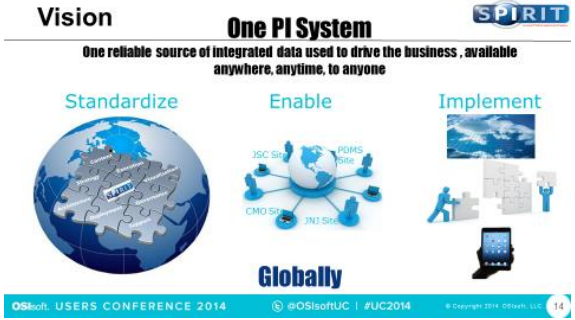
PEMEX





Janssen | PHARMACEUTICAL COMPANIES OF Johnson & Johnson





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Process Optimization | Quality Improvement | Asset Health and Uptime | Energy Efficiencies

AngloAmerican

PI System in AA Copper

Business Challenge: The need of **real-time information management** for Operational Excellence, Safety & Sustainability

OSIsoft PI System:

- Single platform to **integrate all data** from the Operations Value Chain.
- Enabling infrastructure to develop **value applications** in real-time.

Real-time Operations Management

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PI System in AA Copper

2013 results:

- Operating profit: **US$ 1,739 millions (26%)**
- EBITDA: US$ 2,402 millions, ROCE: 25%
- Production Cu fine: **775 [kton]**
- Average number of Employees: 4,200

Economic Benefits (as Project estimation):

- Increase in the availability of processes and equipments: **0.2%**
- Increase in Energy Efficiency: **1%**
- Decrease of Maintenence Costs: **1%**

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Carnegie Mellon University

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Urban Energy Information Modeling

Aggregated High Fidelity Building Simulation for District Energy Systems

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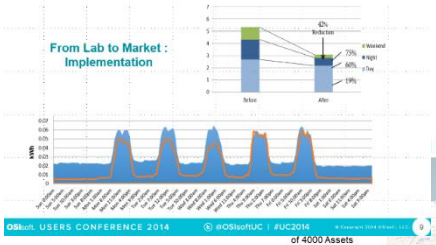

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Partner : Pittsburgh Bank

of 4000 Assets (Headquarter, datacenters, branches, ATMs) for strategic improvements

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VERSO.

EA Journey – From Real Time to Future Time

- Every PC in the Mill has PI ProcessBook
- Every PC with Excel has PI DataLink
- Master PI Processbook
  - used Mill wide
  - over 1000 PB displays
- Majority of PB displays
  - developed by area process and operation experts

VERSO.

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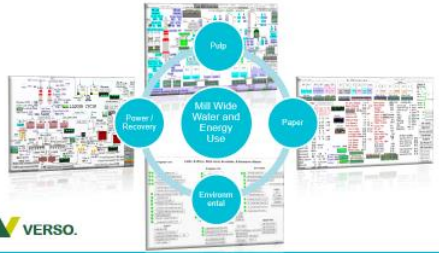
EA Journey – From Real Time to Future Time



VERSO.

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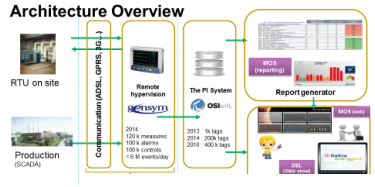
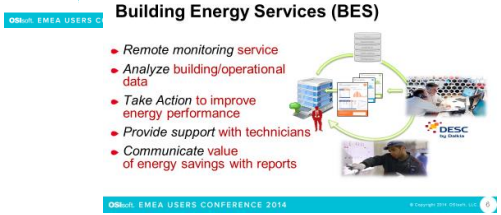
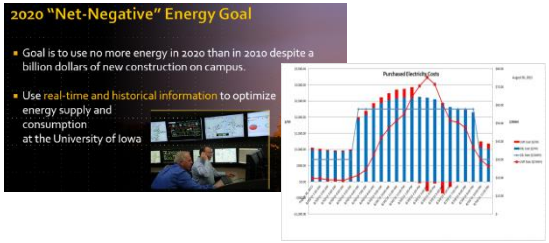
Process Optimization | Quality Improvement | Asset Health and Uptime | Energy Efficiencies

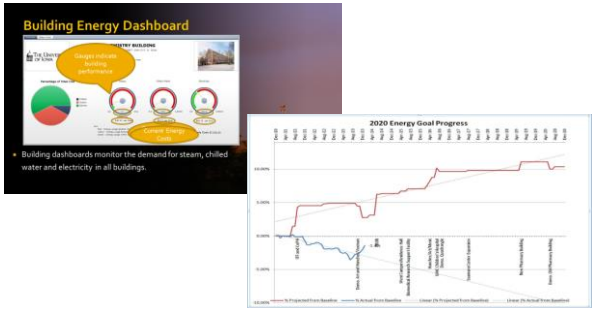
dalkia GROUPE EDF



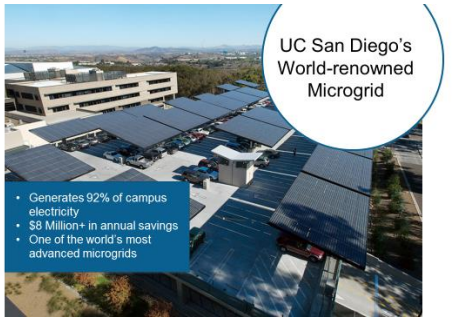


Facilities Management
The University of Iowa





CleanTECH San Diego



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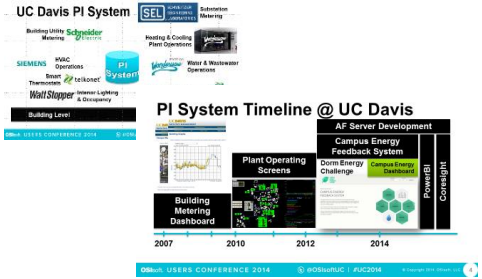
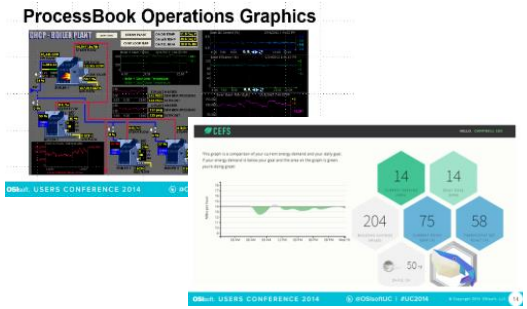
UCDAVIS





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Process Optimization | Quality Improvement | Asset Health and Uptime | Energy Efficiencies | Regulatory Requirements

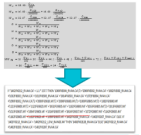
DOLPHIN ENERGY دولفين للطاقة

Air Emissions Calculation System

- Process Units:
  - Boilers/Heaters/ Furnace
  - Turbines
  - Incinerators
  - Sulfur Recovery
- Flares
  - Offshore Flares
  - Onshore Flares
- Compounds/ Pollutants:
  - O_2
  - NO_x
  - CO
  - SO_2/H_2S
  - Greenhouse (
    - CO_2
    - CH_4
    - N_2O

AECS Review – *Process & Environmental Knowledge*

- Reviewed/confirmed/revised/added calculation methods
- Identify all PI Tags related to air emissions calculations
- Review/confirm existing tags and tag equations
- Revise and add new tags based on environmental regulatory compliance requirements



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Southern California Gas Company

A Sempra Energy utility

Key Provisions in the Rules

Requirements

- The CPMS must collect data at least once every 15 minutes
- "I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this compliance certification are true, accurate, and complete."

Violations

- Rule violations or violations from the standards are:
  - Deviations from the rules, regulations, or standards occurs.
  - Fines up to $10,000 per day per count per facility.

List of Applicable Rules

- MDAQMD Rule 1203 (D)(1)(h)(i)
- MDAQMD Rule 1201 (I)(2)
- MDAQMD Rule 1203(D)(1)(g)(iv)
- MDAQMD Rule 204
- MDAQMD Rule 1203(D)(1)(d)(iii)
- SJVAPCD Rule 1080
- SJVAPCD Rule 4703
- SJVAPCD Rule 2530
- VCAPCD Rule 74.9
- VCAPCD Rule 33
- VCAPCD Rule 10
- 40 CFR 52.220(c)(39)(iii)(B)
- 40 CFR 70.6 (a)(3)(i)(B)
- 40 CFR 70.6(a)(3)(iii)(B)
- 40 CFR 60.8625
- 40 CFR 60.6340
- 40 CFR 60.8855
- 40 CFR 98.232 (g)
- 40 CFR 98.236 (e)
- 40 CFR 98.236 (c)
- 40 CFR 98.237
- 40 CFR 98.237 (e)
- 40 CFR 98.3 (e)
- 40 CFR 98.3 (c3)
- 40 CFR 98.3 (c8)
- 40 CFR 98.3 (c9)
- 40 CFR 98.3 (c1)
- 40 CFR 98.3 (f)
- 40 CFR 98.3 (g)
- 40 CFR 98.3 (g)(5)
- 40 CFR 98.4 (e)
- 40 CFR 98.4 (e)
- 40 CFR 98.8
- 40 CFR Subpart GG

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Daily Utility Release Report example

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SANOFI

RtReport Review Screen

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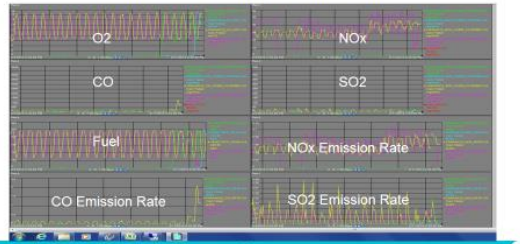
Compliance

PI ProcessBook Display Example

A Dashboard of All Key Parameters for A Process Unit



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Old MACT/NESHAPS Report

Time	Temp	4HrAvg	Time	Temp	4HrAvg	Time	Temp	4HrAvg	Time	Temp	4HrAvg
0:00	840	800	0:15	835	805	0:30	830	803	0:45	820	799
1:00	795	797	1:15	815	800	1:30	820	805	1:45	799	800
2:00	800	801	2:15	780	785	2:30	775	780	2:45	780	775

It would take two employees approximately 1 ½ hours to review 6 months of records. 8 reads for each hour X 24 hours X 183 days yields over 35,000 reads per unit. One location had 2 units another had 3 units.

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Benefits of using PI System

- System Reliability
- Flexible Data Handling
- Tunable Security Parameters
- Scalable

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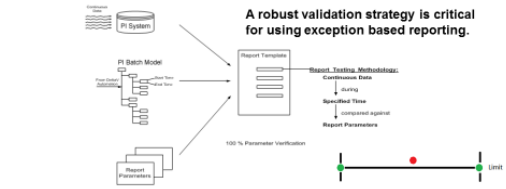
RtReport Validation Methodology

A robust validation strategy is critical for using exception based reporting.



Edit / Test Report

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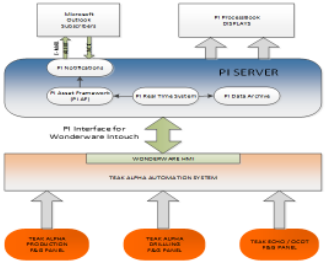
Process Optimization | Quality Improvement | Asset Health and Uptime | Energy Efficiencies | Regulatory Requirements | Safety

REPSOL

PI System Fire & Gas Dashboard Architecture



- Data from the F&G panels are sent to the Wonderware HMI via the automation network
- PI Interface for WonderWare Intouch transfers data to the PI Data Archive.
- PI Notifications (alert conditions from F&G panel) are forwarded to selected e-mail subscribers
- PI ProcessBook display dashboards allow end users to immediately determine the health of the overall system down to sensor level.

Benefits of PI System for Fire & Gas Monitoring

- Real time monitoring of F&G system health: minimizing system downtime and maximizing availability, quality control of preventive maintenance
- Historical archiving of F&G system events: timeline of event reconstruction, identifying faults and root causes
- Better management of control for bypassing
- E-mail notification of system health issues: bypass, sensor trouble, communication failures, panel fault
- Superior process safety: assurance of safety barrier integrity
- High potential for improved safety and production with negligible capital investment

MOL

Controlling Safety via PI System Tools

- On-line analyzers
- Interlock
- Flare

- Notifications
- Reports
- Displays

- Safe operation
- Reduced shut-downs
- Efficiency

Interlock program benefits

Switched off interlocks more than 1 day	2013 (H2)	2014 (H1)
Pcs.	964	881
Days	29.052,4	10.857,97
Total switched off interlocks	**2013 (H2)**	**2014 (H1)**
Pcs.	2294	2224
Days	31.710,3	21.436,9

	2013 (H1-H2)	2014 (H1)
Interlock relevant events (pcs.)	111	22
Unit shutdowns due to interlocks (pcs.)*	11	0

*2013 /11 pcs. shutdowns = 84 lost operation hours

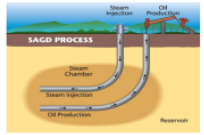
Calculated loss based on EDC is **1.000.000€**

EDC: Equivalent Distillation Capacity – Solomon study

SUNCOR

Steam-Assisted Gravity Drainage (SAGD)

- Approximately 80% of Canada's Oil Sands too deep to mine
- Two key SAGD facilities – Firebag & MacKay River
- Parallel pairs of horizontal wells are drilled:
  - one for steam injection
  - one for oil recovery
- Safety and Operational challenges:
  - Large numbers of assets and instrumentations
  - Complex logic and criteria
  - Process Changes



Low Flow alerts on ESPs (electric submersible pump)

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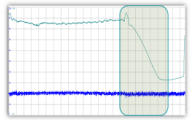
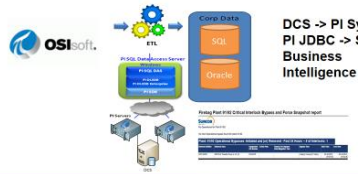
A Low Flow event was detected in one of the pumps based on wellhead temperature fall off

- Lost production
- Potentially fail of an ESP, around $0.5 million at risk
- 130+ wells at Firebag



Data Flow for the Bypass & Equipment Trips Monitoring

SUNCOR



DCS -> PI System -> PI JDBC -> SQL -> Business Intelligence Tools

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Summary: Operational Intelligence

- It's a Journey
- Accelerated by the right infrastructure

"Intelligence without data is the slowest path to success. Data without intelligence is the noise before failure"

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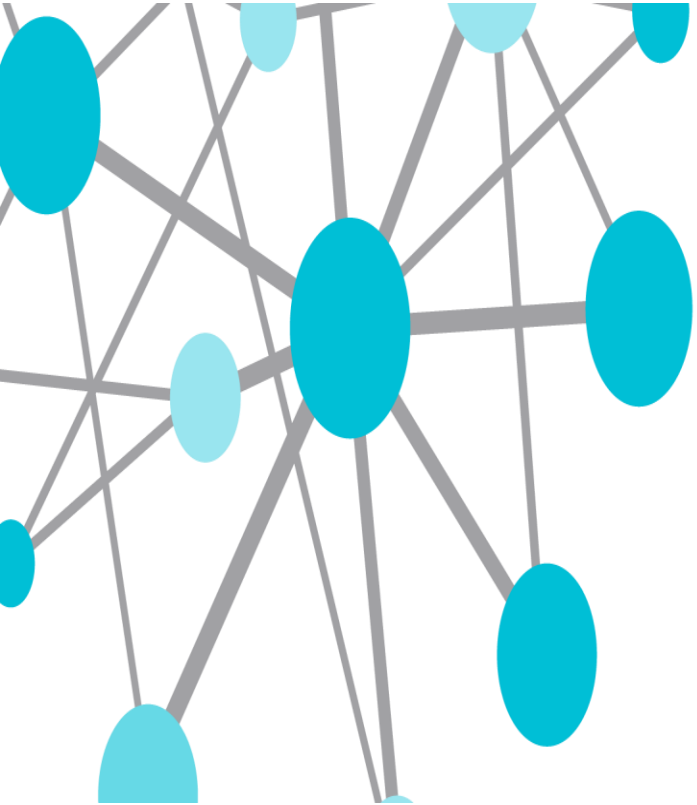

YOU

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