OSIsoft.
Petuum
WEBINAR
Beyond Digital Transformation:
What AI Means to the
Steel Industry
May 20, 2019 | 4PM (GMT)

Martin Provencher
Mining, Metals & Materials Industry Principal, OSIsoft
mprovencher@osisoft.com

Dr. Roberto Linares
AI Solution Principal, Petuum

Prabal Acharyya
Head of Industrial AI, Petuum

© Copyright 2019 OSIsoft, LLC

Agenda

Introduction

Digital Transformation in Steel

Artificial Intelligence Concepts

Petuum AI-pilot for Operations

Conclusion

OSIsoft. Petuum

© Copyright 2019 OSIsoft, LLC

Introduction

Digital Transformation is Changing the Steel Industry

Product Quality

ArcelorMittal Long Products significantly improved slab quality with no unplanned stoppages.

Process Improvement

Algoma Steel achieved minimum reduction of 5% of unplanned delays in the Direct Strip Production Complex resulting in 140,000 ton production increase.

© Copyright 2019 OSIsoft, LLC

It’s Time to Find a New Way to Work

© Copyright 2019 OSIsoft, LLC

And Deliver Value

PROCESS PRODUCTIVITY

- Real Time Process Monitoring
- Ad-hoc visualization
- Material flow, pacing and supply chain

ENERGY & WATER

- Real Time energy & water Monitoring
- Fuel / Coal Consumption
- Mobile equipment Fuel Efficiency

ASSET RELIABILITY

- Improve uptime
- Reduce unplanned downtime
- Condition-based maintenance
- Predictive Maintenance

ENVIRONMENT HEALTH & SAFETY

- Governmental regulations
- Accidents and incidents
- Environment monitoring
- Compliance and audit

QUALITY ASSURANCE

- Real-time monitoring
- Genealogy (history)
- Certifications
- Yield

KPI & REPORTING

- Plant-wide to enterprise
- Common definitions & calculations
- Benchmarking & comparison

© Copyright 2019 OSIsoft, LLC

The Value of Analytics

BIG DATA

3% EBITDA

5% Costs

© Copyright 2019 OSIsoft, LLC

Equipment Reliability

ArcelorMittal

CHALLENGES

- Inflation raised costs while market prices dropped
- Global competition with high-quality, low-price imports
- Shareholder value substantially eroded

SOLUTION

- Used the PI System to automatically collect DCS data and integrate with CMMS
- From reactive to predictive maintenance

BENEFITS

- Saved $1 million per year per furnace
- $19 million in total projected savings from one use case
- Increased time between furnace re-linings

"ArcelorMittal Dofasco changed its maintenance culture and integrated their new condition monitoring software with the PI System."

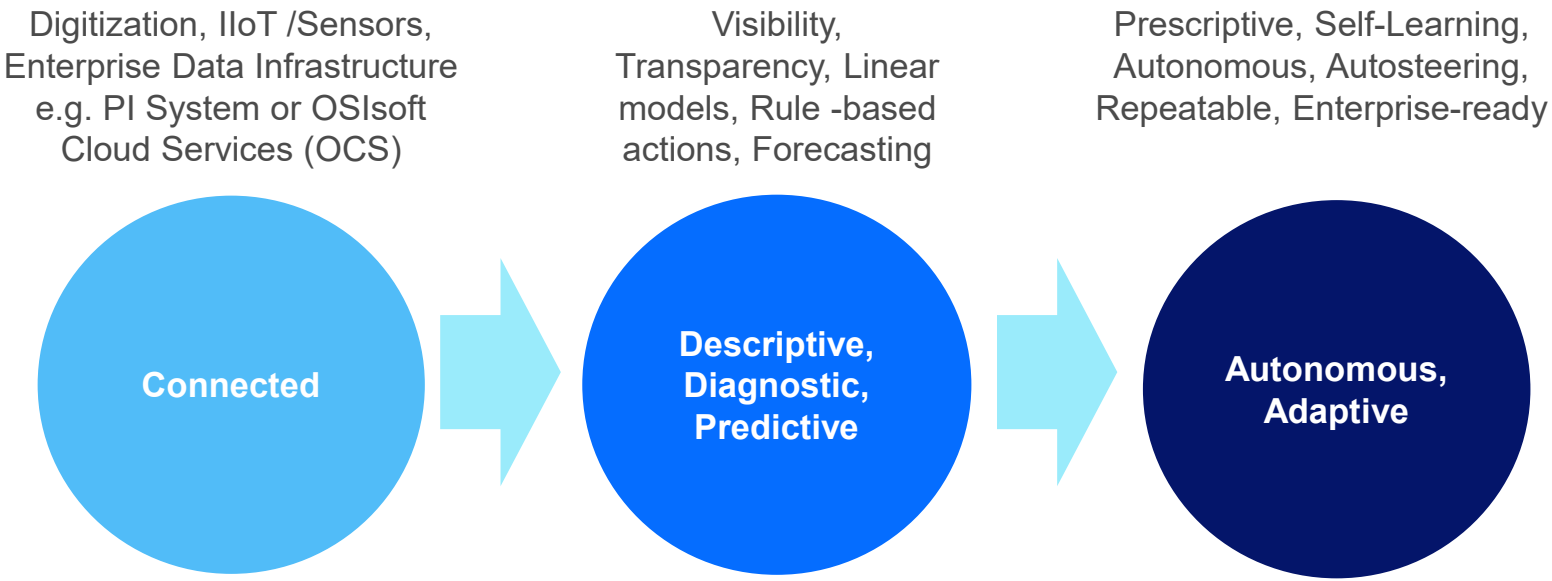
Vlad Djuric, ArcelorMittal Dofasco

© Copyright 2019 OSIsoft, LLC

Artificial Intelligence

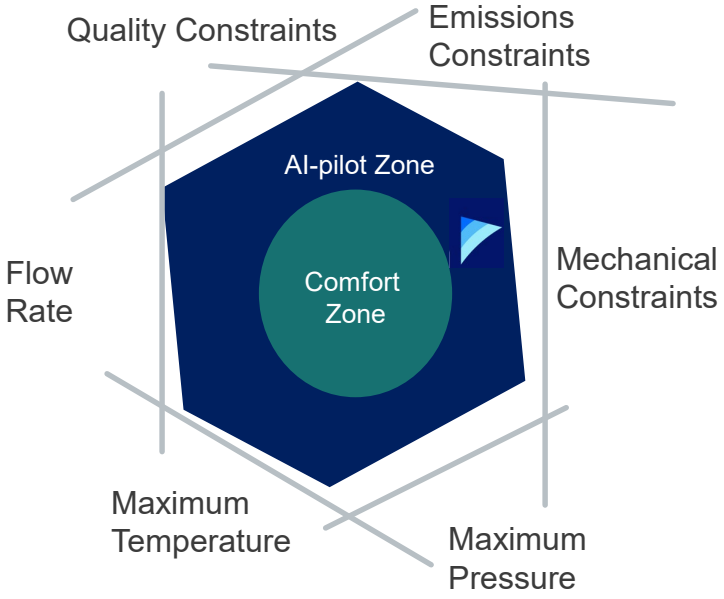
© Copyright 2019 OSIsoft, LLC

AI-powered Journey to Industry 4.0

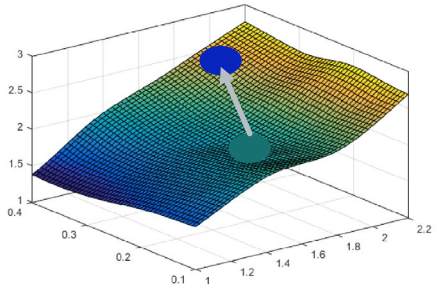


© Copyright 2019 OSIsoft, LLC

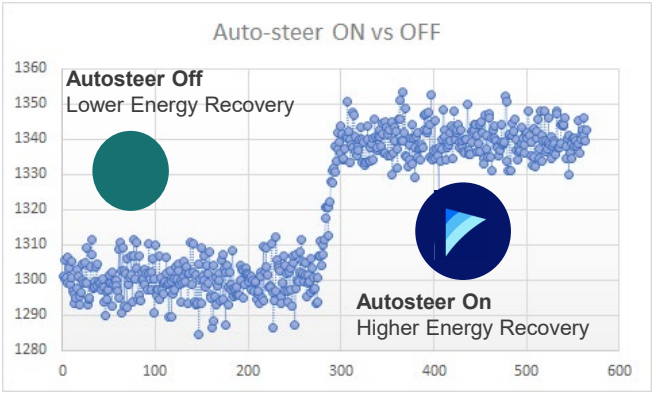
Petuum Industrial AI-pilot:
Operate Consistently, Optimal Zone with Autosteer



Dynamically Finds Higher Optima

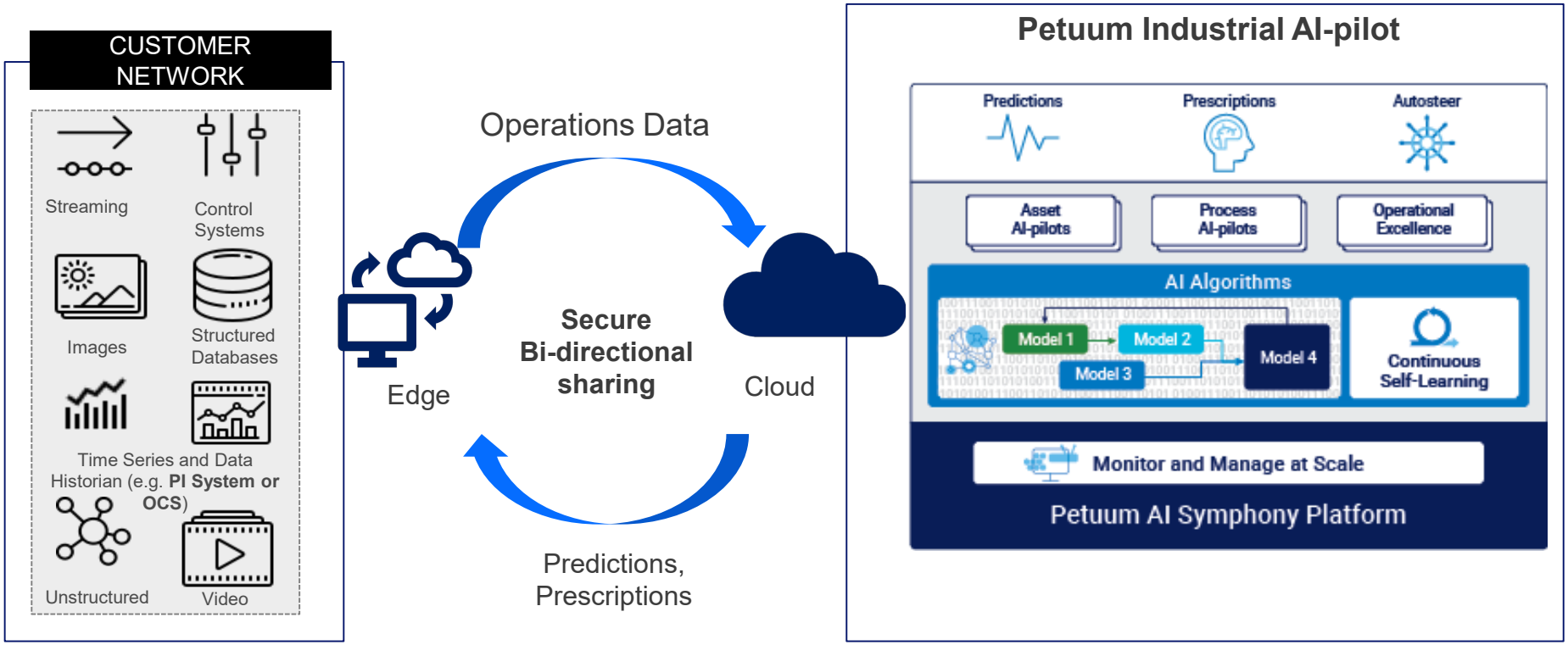


Typical Conditions with and without Autosteer



© Copyright 2019 OSIsoft, LLC

AI-pilot: Deployment Architecture



© Copyright 2019 OSIsoft, LLC

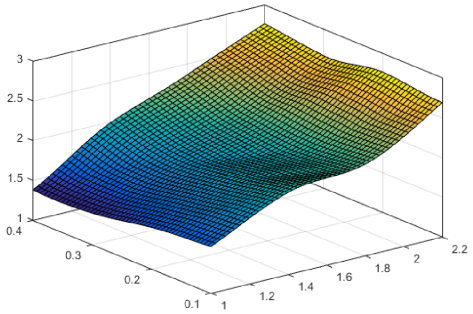
AI-pilot in Steel

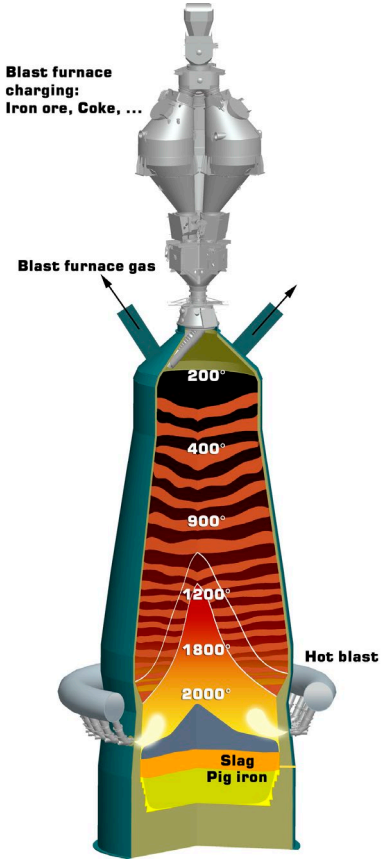
© Copyright 2019 OSIsoft, LLC

Blast Furnace Asset AI-pilot

- Define Objectives
  - Maximize throughput
- Consider Constraints
  - Height of burden surface
  - Gas composition
- Prescriptions
  - Coke flow rate
  - Air flow rate
  - Iron ore flow rate
- Go into Autosteer Mode
  - Send prescriptions to control system

PREDICT 1 PRESCRIBE 2 AUTOSTEER 3



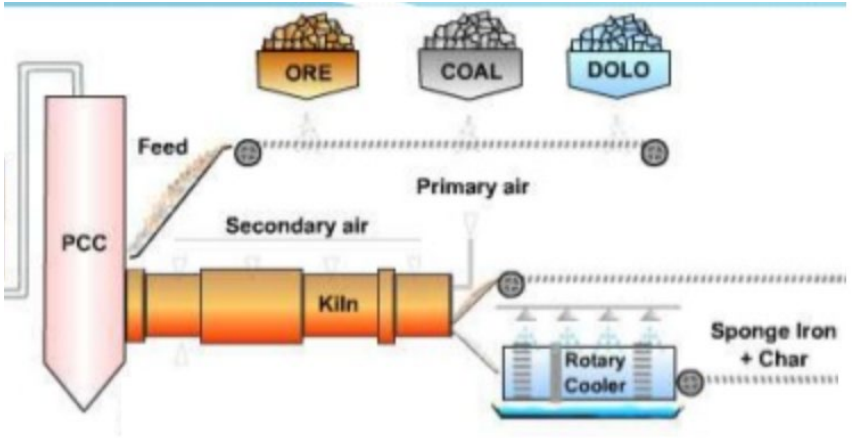


© Copyright 2019 OSIsoft, LLC

Rotary Kiln Asset AI-pilot

- Define Objectives
  - Maximize throughput
  - Minimize coal flow rate
- Consider Constraints
  - Exit bed temperature
  - CO and CO2 composition
- Prescriptions
  - Iron ore flow rate
  - Coal Flow rate
  - Primary Air and Secondary Air
- Go into Autosteer Mode
  - Send prescriptions to control system

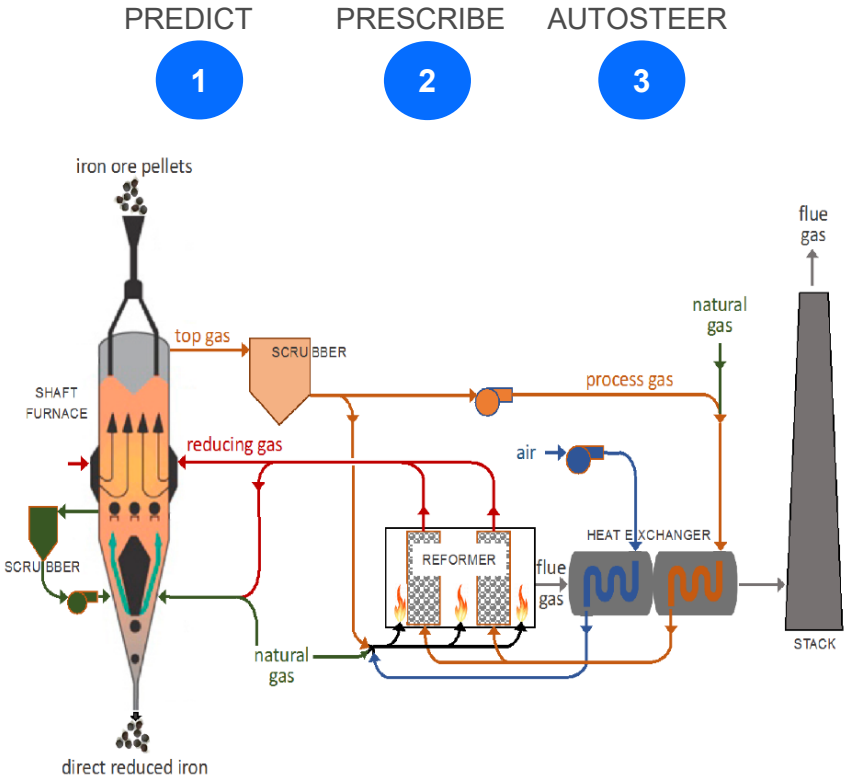
PREDICT 1 PRESCRIBE 2 AUTOSTEER 3



© Copyright 2019 OSIsoft, LLC

Direct Reduction Asset AI-pilot

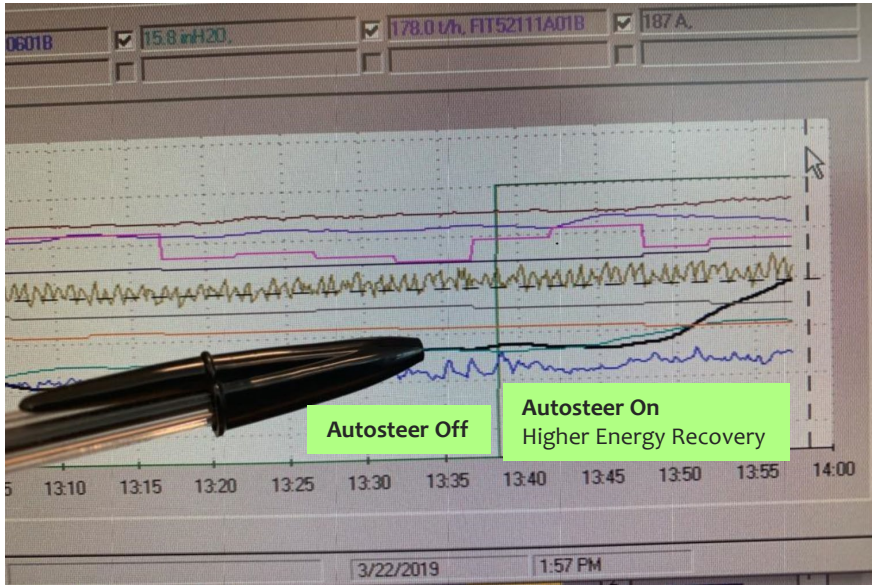
- Define Objectives
  - Maximize throughput
  - Minimize Natural Gas
- Consider Constraints
  - Gas compositions
- Prescriptions
  - Air flow
  - Natural Gas
  - Feed rate
- Go into Autosteer Mode
  - Send prescriptions to control system



© Copyright 2019 OSIsoft, LLC

Immediate Results with Petuum AI

- As soon as “Autosteer” picks up driving the asset operation, immediate increases in energy recovery can be seen
- Secondary Air Temp for K1 Cooler (black line), results in energy savings as soon as the Autosteer is switched ON by the Operator.



© Copyright 2019 OSIsoft, LLC

CEMEX: Petuum AI-pilot

CHALLENGE

Need predictable, repeatable ”golden day” operations – high yield, high quality at low cost sustainably

- Complex, highly variable operations
- No real-time prediction, reactive operator actions
- Sustainability and quality goals requirements

SOLUTION

Petuum Industrial AI taps into PI system data and other sources of information to deliver real time forecast of process variables, prescriptions for operator actions and a supervised autosteer

“This is a giant step in digital transformation towards safe, highly standardized operations, that will help us strengthen our high-quality products portfolio while also ensuring we meet our operational and sustainability goals and minimize costs.” - Rodrigo Quintero, Digital Operations Manager, CEMEX

RESULTS

Expected yield improvements and energy cost reductions improvements in the range of 2-7%

- Reduced process variability
- Increased throughput
- Cost reductions from increased energy recovery:
  - Secondary Air ΔT:+100 °F
  - Tertiary Air ΔT: +15 °F
  - Clinker Temp ΔT: +5 °F (did not decrease; acceptable)

https://petuum.com/cemex/

CEMEX Presentation at PI World

business@Petuum.com

OSIsoft. Petuum

© Copyright 2019 OSIsoft, LLC

Petuum Industrial AI-pilot Suite

Petuum

Petuum Industrial AI-pilot Suite for Steel Industry		
Asset AI-pilots	**Process AI-pilots**	**Operational Excellence**
Kiln	Reduction Process	Energy Consumption
Blast Furnace	Steel Production	Product Quality
Basic Oxygen Furnace	Coking	Predictive/Prescriptive Maintenance
Electric Arc Furnace	Secondary Metallurgy Refining	Emissions Reduction

Transforming traditional factories into smart factories. **To our clients, "Petuum Industrial AI is like having a golden day of operations, repeated and sustained every day."**

Contact Petuum
prabal.acharyya@petuum.com | roberto.linares@Petuum.com

© Copyright 2019 OSIsoft, LLC

Conclusion

© Copyright 2019 OSIsoft, LLC

Keys to success

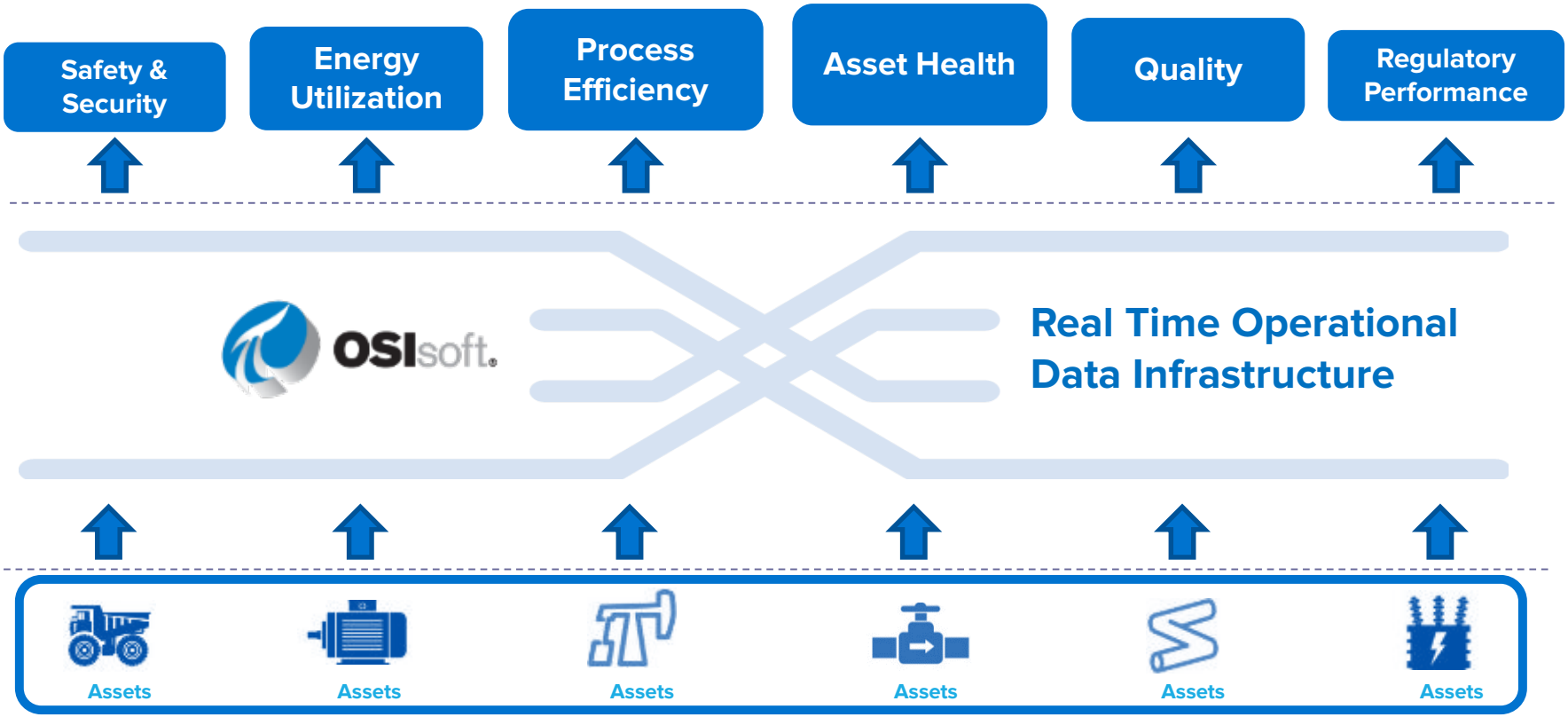
1. Digital Transformation

2. Operational Data Infrastructure to

3. Enable Artificial Intelligence for Autonomous Operations – AI-pilot

© Copyright 2019 OSIsoft, LLC

Where do I start?



© Copyright 2019 OSIsoft, LLC

We BELIEVE
People with DATA
Can TRANSFORM
THEIR WORLD

謝謝
KEA LEBOHA
TAPADH LEIBH
고맙습니다
БАЯРЛАЛАА
MISAOTRA ANAO
SALAMAT
DZIĘKUJĘ CI
NGIYABONGA
GRÀCIES
OBRIGADO
شكرا
TEŞEKKÜR EDERIM
DANKIE
TERIMA KASIH
DANKON
TANK
TAPADH LEAT
KÖSZÖNÖM
СПАСИБО
MULȚUMESC
OSIsoft
Petuum
PAKMET CIЗГЕ
FAAFETAI
GO RAIBH MAITH AGAT
MAHADSANID
ESKERRIK ASKO
HVALA
БЛАГОДАРЯ
GRACIAS
HVALA
ХВАЛА ВАМ
THANKYOU
ТИ БЛАГОДАРАМ
TEŞEKKÜR EDERIM
TAK
DANKE
DANK JE
ΕΥΧΑΡΙΣΤΩ
GRATIAS TIBI
GRAZIE
RAHMAT
MERCI
AČIŪ
SALAMAT
MAHALO IĀ ʻOE
TAKK SKAL DU HA
ДЯКУЙ
DI OU MÈSI
GRAZZI
ÞAKKA ÞÉR
ありがとうございました
ĎAKUJEM
HATUR NUHUN
PAXMAT САГА
SIPAS JI WERE
TERIMA KASIH
MATUR NUWUN
CẢM ƠN BẠN
UA TSAUG RAU KOJ
FALEMINDERIT
WAZVIITA
ТИ БЛАГОДАРАМ
СИПОС