OSIsoft

Regional Summit 2017

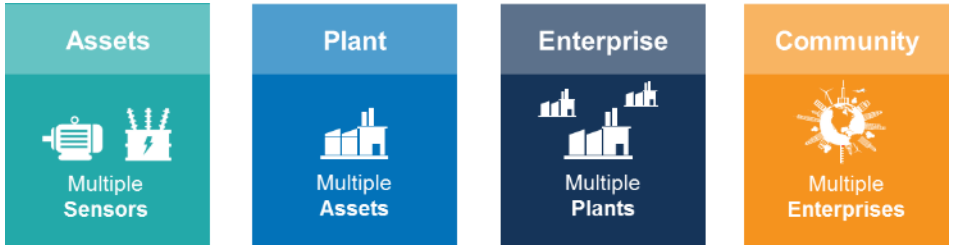
May 2-4, 2017 | West Palm Beach, FL

Best of UC 2017

Presented by **Sue Quense – Vice President US Sales**

Our Mission

Empower people, industries and communities to **transform their world** using operational data.



We Meet Customers Wherever They Are

Aurelia
Barrick Gold

Scrubgrass
Whitehouse
Utility Dist

Adani Ports
International
Paper

Eli Lilly
AeroVironment

Assets

Multiple
Sensors

Plant

Multiple
Assets

Enterprise

Multiple
Plants

Community

Multiple
Enterprises

24K MAGIC

How data helped turn a Gold mine around

Presented by **Peter Smith, Metallurgy Superintendent**
Gavin Strack, Director

aurelia METALS Ltd.
convergio

Contact Information

convergio aurelia METALS Ltd.

Peter Smith
psmith@aureliametals.com
Metallurgy Superintendent
Aurelia Metals

Gavin Strack
gavin.strack@convergio.com
Director
Convergio

Hera Processing Plant

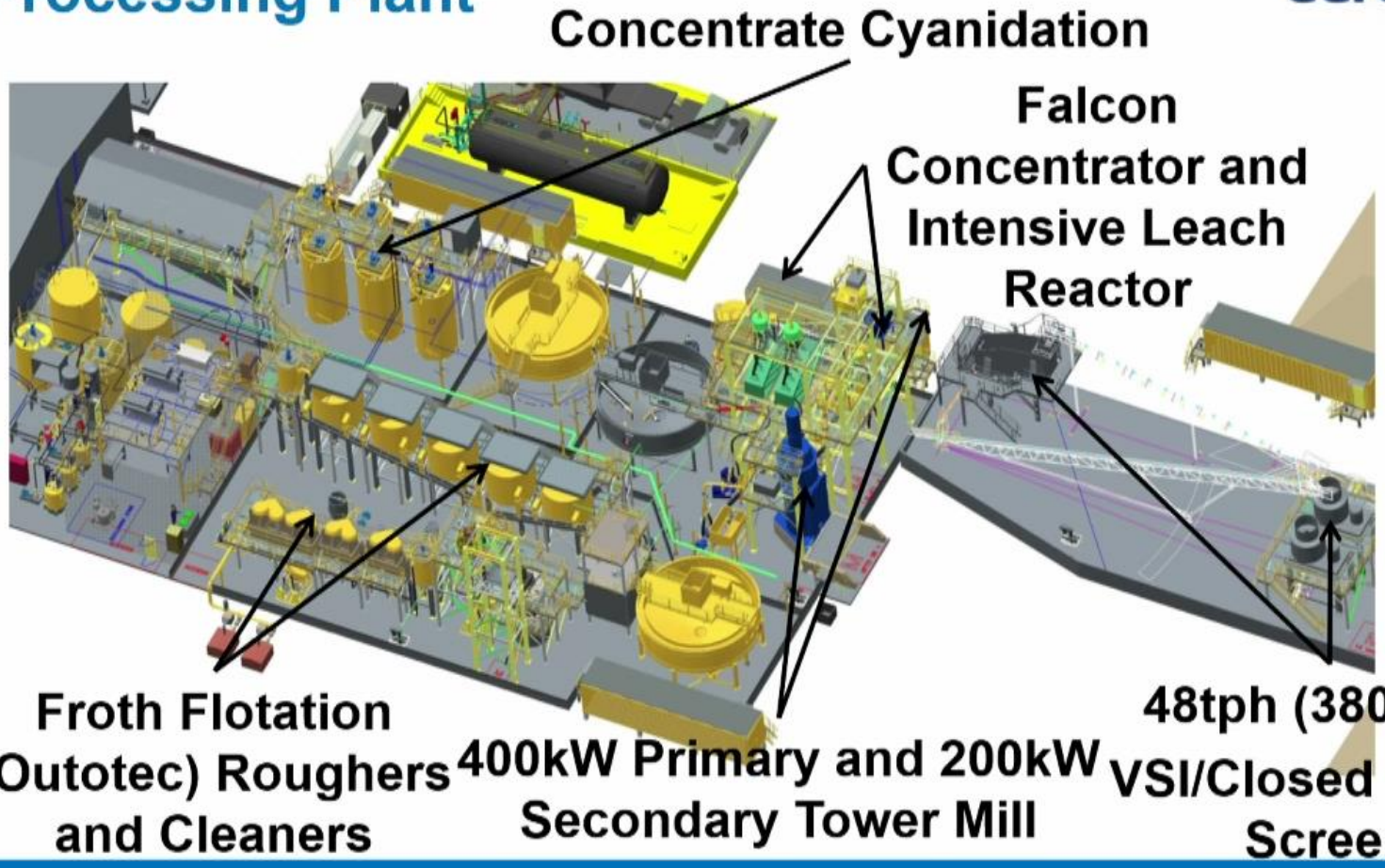
The Problem – December Quarter 2015

- Gold recovery was low (74.6%)
- EBITDA/Net Debt ratio was low (2.7%)
- Cash/Net Debt ratio was low (7.5%)
- Gold margin was low (7.1%)

The operation needed to be more profitable to survive the projected future of higher costs

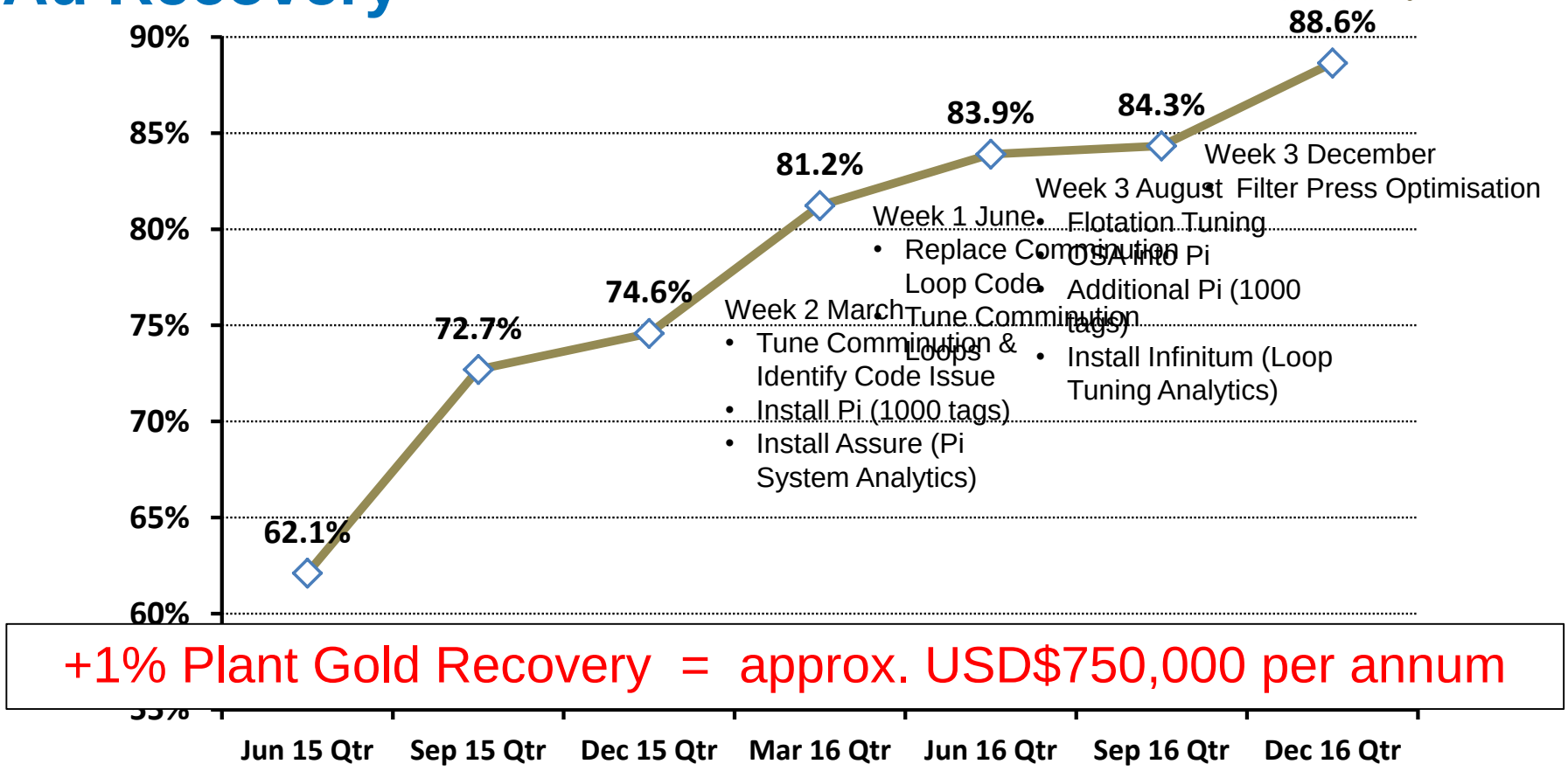
Capital was constrained

Hera Processing Plant



Au Recovery

Quarterly Gold recovery



+1% Plant Gold Recovery = approx. USD$750,000 per annum

Using the PI System to drive a process optimisation campaign

COMPANY and GOAL

Aurelia Metals operates a Gold mine and processing plant at Nymagee, NSW. It needed to **improve Gold recovery and reduce costs**.

CHALLENGE

No process historian. Manual reporting. Complex process. Limited capital. High production costs.

- Dozens of spreadsheets requiring large amounts of manual labour to create production reports.
- Very complex process with limited access to data made it incredibly difficult to identify opportunities.

SOLUTION

Installed PI System. Created real-time dashboards and automatic reports. New insights used to drive process improvement works.

- Significant time recovered that was used to develop improvements.
- Multiple Process Control Optimisation campaigns identified and validated using data from the PI System.

RESULTS

Gold recovery up 14% in 12 months.

Gold AISC down 39% in 12 months.

- Production throughput increased above original nameplate capacity.
- Improved recovery despite falling head grade.
- Significant improvement in company cash flow and share price.

Barrick Gold Pueblo Viejo

- More than 2,000 Employees
- Production of 1,165,645 oz. in 2016
- 150,000 Tons mined and moved per day

Contact Information

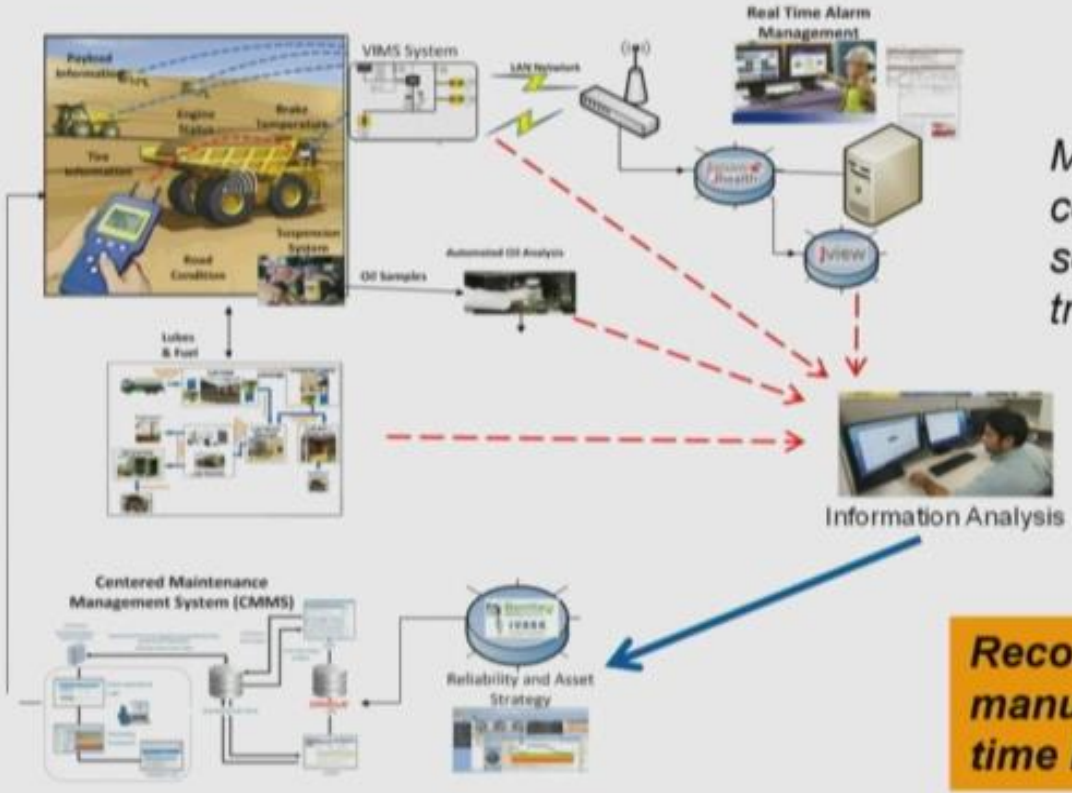
Alejandro S. Zappa
azappa@barrick.com
a_zeta@hotmail.com
Maintenance Reliability Engineer
Barrick Gold – Pueblo Viejo

Jose Crespo
jcrespo@barrick.com
MIT Analyst
Barrick Gold – Pueblo Viejo

The Mining Fleet

- Mining equipment:
  - 34 CAT789 Haul Trucks
  - 2 Hitachi 3600 Shovels
  - 3 CAT 994F Front Loaders
  - Other: 30 Support equipment
- Annual production target for 2017 is 45 Million tons
- Maintenance Annual Budget $56 Million
- Truck Fleet
  - Budget: 32% of Annual Maint. budget ($17.8 Million) allocated to Haul Truck fleet
  - Truck Down Time cost is **$700/Hr**

How we monitor health in mining?



Monitoring Technician and Engineers, collect information from different sources, to trend and investigate why a truck could fail or had failed.

Recommendations to take action is manual, time consuming task and some time late on time.

Using PI System for Real-Time Haul Truck Health Monitoring

COMPANY and GOAL

Barrick Gold Pueblo Viejo, the largest producer of gold in the Caribbean, wanted to improve the Asset Health Monitoring system for the Haul Truck fleet using real-time information to Improve Maintenance Efficiency and Costs.

BARRICK
PUEBLO VIEJO

CHALLENGE

To provide real-time information of 34 Haul Truck using the installed systems & minimum Investment.

- Reliability, Monitoring Condition, Maintenance and Planners often relied on incomplete or delayed information to make decisions rather than on real time data.

SOLUTION

On-board sensor information of haul truck are processed in real-time Using PI System, notifying about potential failures in real-time .

- "We used to use the in-vehicle sensors to investigate, post-mortem, why a truck failure had happened"
- “Now We can be one step ahead of a failure and be more proactive”

RESULTS

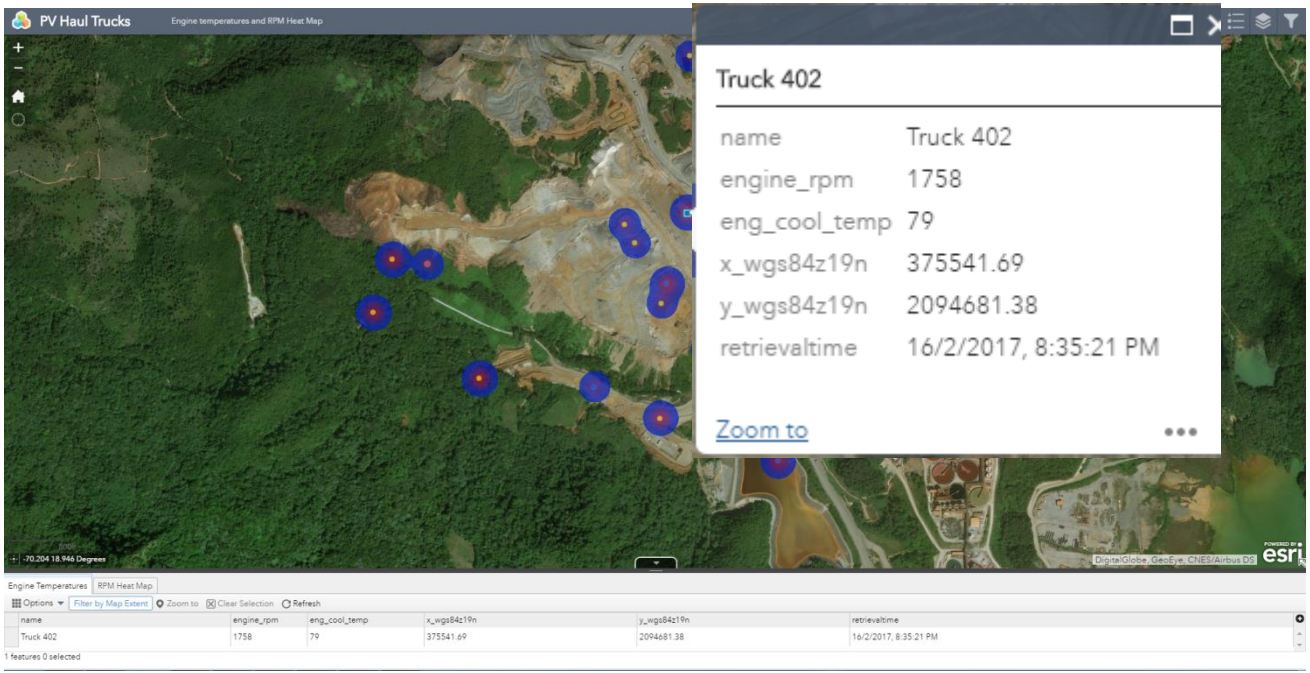
Reliability was increased, maintenance and availability were optimized and capacity to detect potential failures was improved.

- Able to detect & address failures
- Scalability to other fleet and sites
- Cost avoidance over $ 500,000 (Estimate in 2nd half of 2017)
- Reduce # of failures by 30% in Engine, Suspensions and Brakes

Future

- Esri ArcGIS and PI System integration will enable us to do Operational Performance Analysis in real time.

Example: Monitoring Engine Temperature to detect Where and Why and check if they are related to certain operational behaviors



The Journey from Historian to Business Intelligence

Jeff Campbell, Engineering Manager

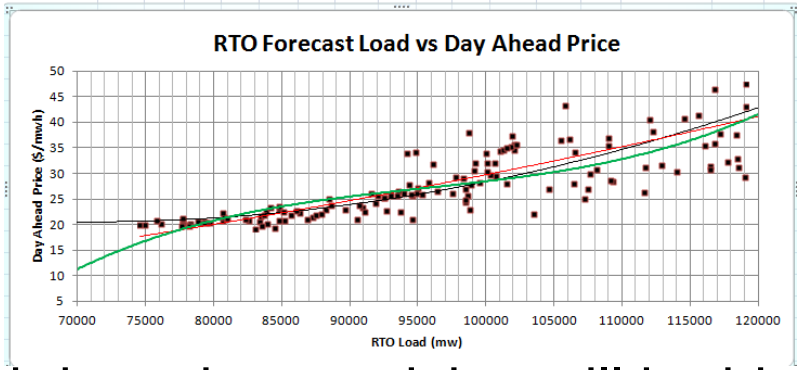
OSIsoft.

Scrubgrass Generating

- Located in Northwest PA
- Constructed in 1993
- 85 mw Fluid Bed boilers
- Designed to burn waste coal
- Sells power to PJM grid
- 35 employees

Forecasting using merged data streams

- Next week's weather looks like it will be a loss so we'll take a boiler off line.
- This 20 second check took 2 - 4 hours without the PI System



- The merged data shows pricing will be higher than expected next week… so we'll keep the boiler on line.
- That 20 second check translates into $160K additional revenue for the week

Summary

COMPANY and GOAL

Scrubgrass Generating Plant Generates power by reclaiming abandoned coal piles.

Scrubgrass needed **Real time feedback on revenue and costs**

Finance data is separate from process data
Finance results lag 2 months behind production
Incompatible data formats for external market data

CHALLENGE

Calculate plant revenue and margin real time

SOLUTION

Consolidated 6 data sources to allow real time cost calculations

- PI HTML web scraping
- PI DataLink tag upload and download
- PI ProcessBook visualization

RESULTS

Plant now has a tool to guide them to optimal run conditions

- HTML interface purchased
- In house development of cost tools (engineering department)
- Resulted in decision to continue running facility instead of mothballing

Did you know?

White House Utility District is the largest water utility in the state of Tennessee geographically.

Contact Information

Carl Alexander
calexander@whud.org
GIS Director
White House Utility District, TN

FILE TOOLS VIEW

DMA Zone Operation Dashboard

DMA Zone Detalis

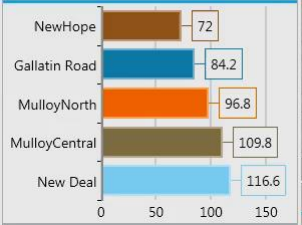
No Features

Total Cost per Day

$ 2740.08712389139

Cost is $2.00 per 1000 gallons

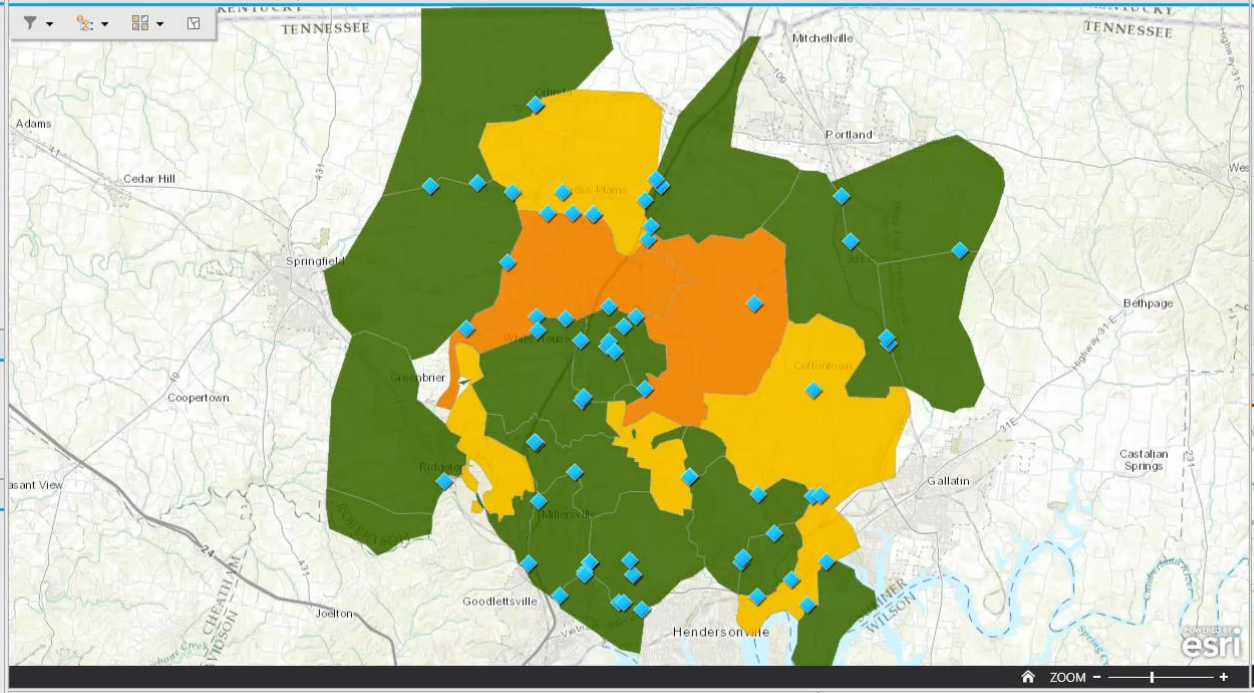
Top 5 GPM at Stake



Legend

- DMA Meters
- DMA Zones (GPM at Stake)
  - -60 to 50
  - > 50 to 100
  - > 100 to 150
  - > 150 to 500

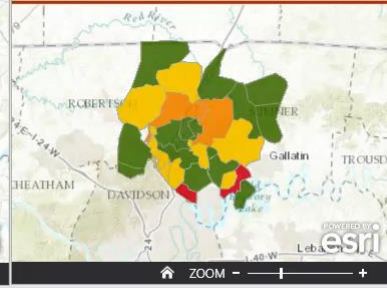
OSiSoft DMA Zones MNF Web Map



DMA Zones

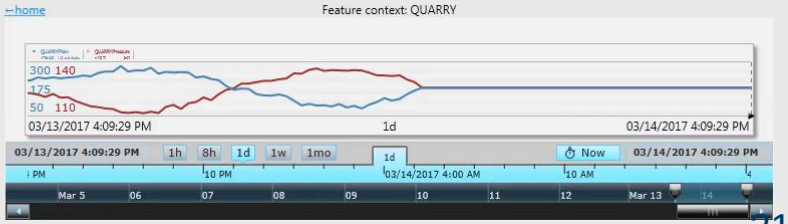
- **Gallatin Road**
  MNF 171.369995117188 @ 03/14/2017 3:45:00 AM
- **Mount Olive**
  MNF 49.7599983215332 @ 03/14/2017 3:15:00 AM
- **Ridgetop**
  MNF 56.4102554321289 @ 03/14/2017 2:50:32 AM
- **Bend Area**
  MNF 97.0400009155273 @ 03/14/2017 2:45:00 AM
- Hwy 41

DMA Zone MNF History Web Map



DMA Zone Flow

DMA Meter data



Goodlettsville DMA Zone Example – Leak Repaired

280 gpm leak = 403,000 gallons per day

147,168,000 gallons per year

Water Treatment Plant Running 1 Hour
Every Day just to feed this one leak

Enough Water every day for 2,239 homes

Or.....

6

$300,000 per year

Integrating Existing SCADA Sites Savings

$ 200,000

Workflow optimisation Yearly Savings

$30,000+

2016 & 2015 Water loss Savings

$900,000

WHUD

Delivering

Real Value

adani™

Yogi Barad
Yograjsinh.Barad@howeindia.com
Project In-charge
Howe Engineering Projects (India) Pvt. Ltd.(Adani Group)

Limesh Misal
ECG – BOOTH 20

Kamaldeep Singh
VCS

Adani - Leading Business Conglomerate with interest in diversified sectors

Revenue: $12 B Assets: $19 B Employees: 10,400

Resources

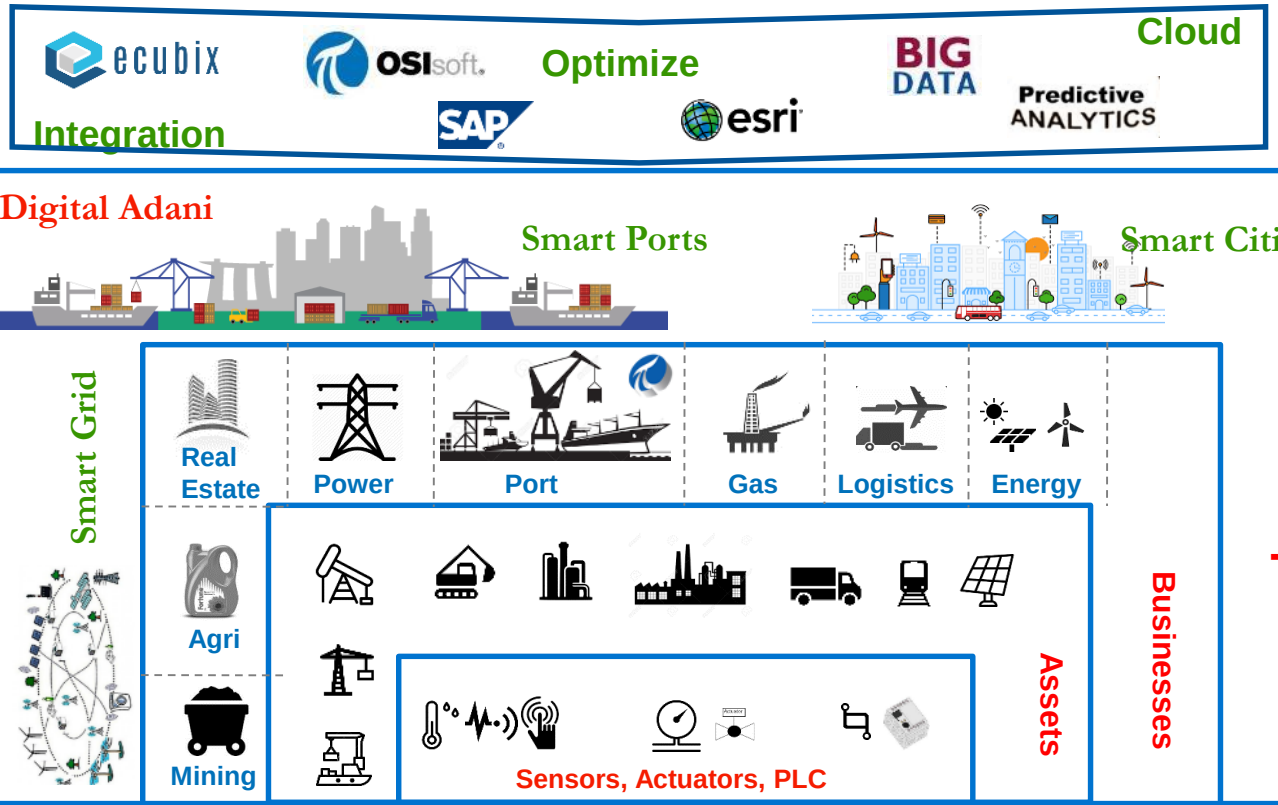
- Coal Mining
- Oil & Gas Exploration
- Coal Trading

Logistics

- Multi Modal Logistics
- Ports
- Special Economic Zones

Energy

- Gas Distribution
- Power
- Bunkering
- Edible Oil



Intelligent Operations for DVMS (Dynamic Vessel Monitoring System)

Safety Assets

VTMS

Weather

Advance Queuing
Vehicle Route Planning
Supply Chain Optimization

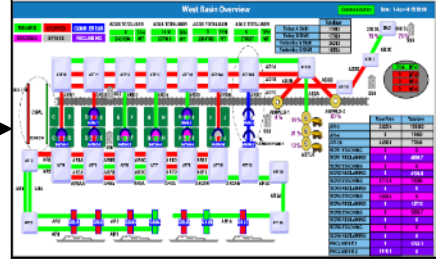
Forecasting of Vessel & Material

ecubix

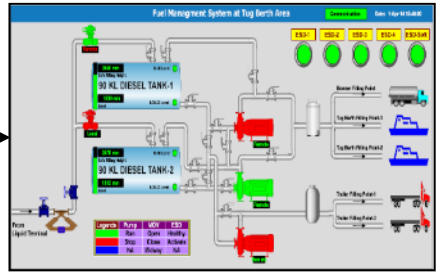
DVMS

- Berth planning
- Discharge Sequence & Sub sequence Planning
- Allocate Assets
- Monitor Plan Vs Actual
- Replan

esri



West Basin



FMS

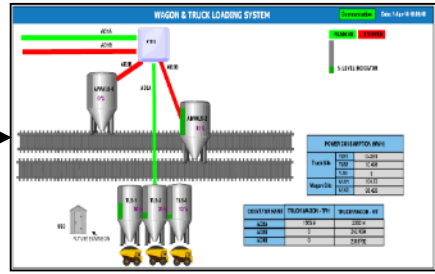
Share planning with stakeholders

Tugs boats – Anchorage to Berth

ecubix

HMI

Capture delay and stoppage reasons



WB WLS / TLS

Planned

FILE TOOLS VIEW APDPPL Cranes

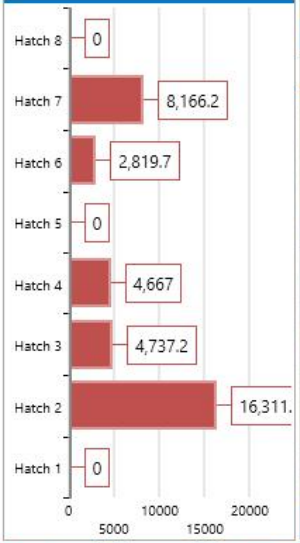
Gottwald Crane

1,355 MT

Liebherr Total Disc.

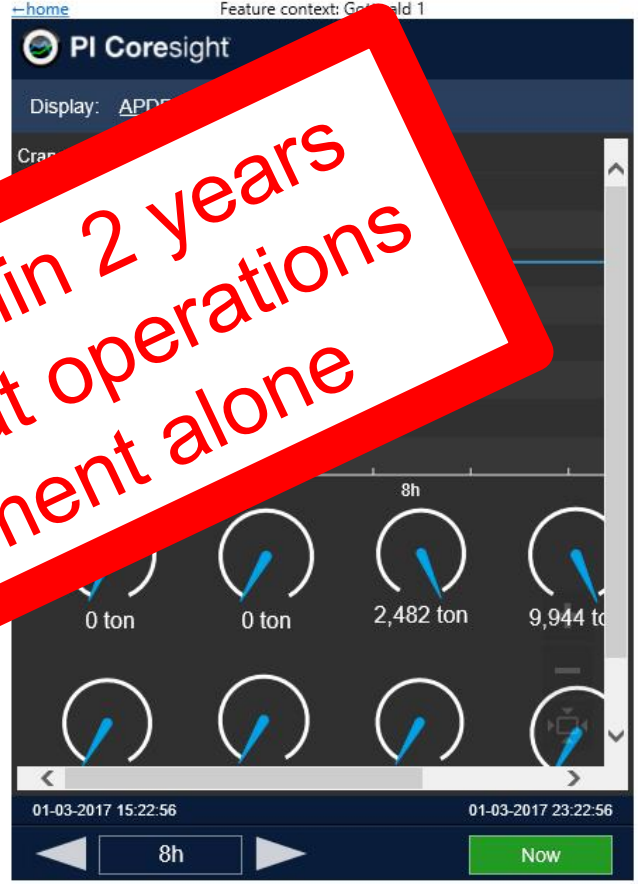
36,701MT

Liebherr Crane



APDPPL MAP

Gottwald OPR Cycle



Hatch Pie Chart [...

Hatch wise Discharge View

Hatch Pie Chart [...

Stacker [Reclaimi...

7,320 MT

Stacker [Stacking]

7,320 MT

Payback within 2 years from Tug boat operations improvement alone

ENG 23:22 01-03-2017

Summary

COMPANY and GOAL

Adani is $12 B conglomerate with diversified business interests and widely spread assets, **manage business complexity effectively for improved Performance**

CHALLENGE

Unique business needs of each business and too many Information platforms

- Difficult to have an integrated view of operations at Group level
- Pilot project in One business area (Ports) to build a **common information platform** that can be rolled out to other businesses

SOLUTION

Implemented PIMS and 'PI Integrator for Esri ArcGIS', and optimized tug boat operations

- PIMS implemented
- First phase for Dahej port implemented that includes PI Integrator for Esri ArcGIS, Dynamic Vessel Management, Alert Intelligence, PI Coresight and HMI implementation

RESULTS

Ascertained a common approach that can work across businesses

- **Payout less than 2 years** from Tug boat operations improvement alone
- **Advanced analysis platform** and enhanced visualization for decision making

Rick Smith

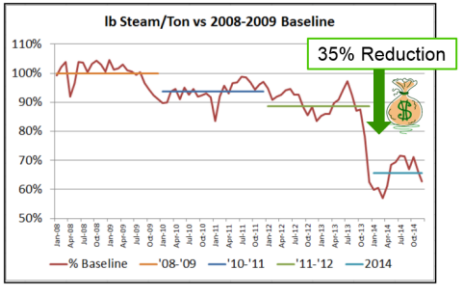
Richard.SmithJr@ipaper.com

Manufacturing Process Information Consultant

International Paper

Tracking Energy Consumption

- Huge Cost Driver
- Time Consuming to Monitor
- When to Invest?
- Where to Invest?



INTERNATIONAL PAPER

Enhancing Operational Data

International Paper had a goal to start promising projects to improve in three specific area: **managing data, downtime tracking, energy management**

International Paper

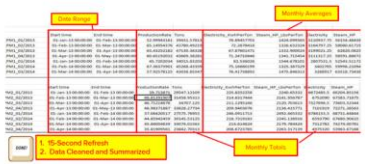
Rick Smith, Manufacturing Process Information Consultant

INTERNATIONAL PAPER

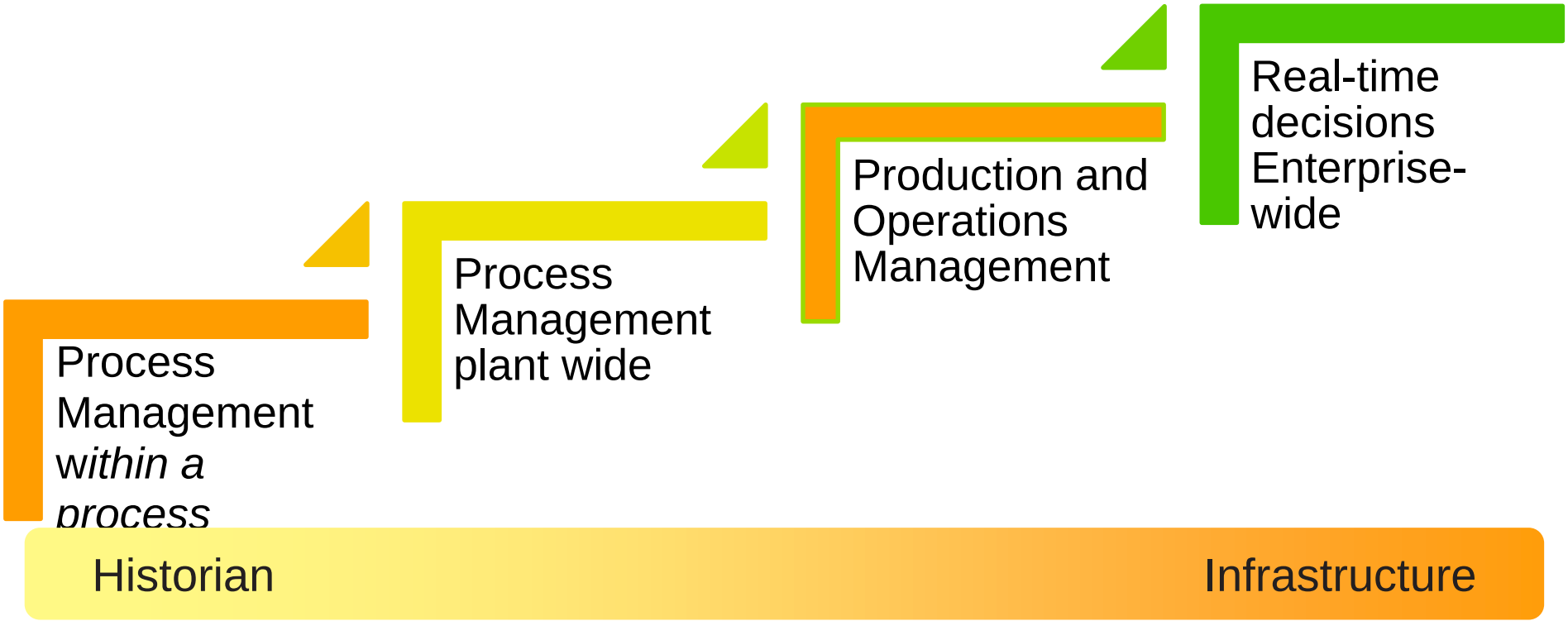
BUSINESS CHALLENGES	SOLUTION	RESULTS AND BENEFITS
• Important tasks using spreadsheets and mired in 'excel hell'. Other systems with a lot of point to point data exchange, and point solutions.	Develop and share the business case for implementing Asset Framework and other newer solutions	• New projects in in three areas: single version of the truth, downtime (asset) tracking, and tracking energy consumption.
People like what they have – difficult to change	Build a business case for change and improvement	Infrastructure for future improvement projects

Benefits of Converting to Event Frames

- Reduce Monthly Task to < 4 Hours (est.)
  - Data Transfer Time Reduced by > 98%
  - Eliminate Data Cleaning Step
  - Eliminate per Ton Calculation Step
- Simplify Reporting



Evolution: Mill-wide to Enterprise-wide



My Selection Criteria for Picking Projects

- High Return and Unit Level Scope
  - Mill-Wide/Enterprise Projects Create Lots of "Help"
- Look for High Replication Potential
  - 10 Times… 50 Times… 1000 Times
- Leverage AF Features
  - We Are Not Just Replacing Performance Equations
- Find Hard to Analyze Scenarios
  - 3+ Hours -> 5 Minutes
- Know How to Collect/Transform/Visualize/Alert Operators

AF Projects (2015-Present)

- **Batch Digester Performance (2015)**
- Paper Machine Winder Performance (2015)
- Paper Machine Sheet Break Analysis (2016)
- Track/Alarm on Heat Exchanger Fouling (2016)

- Pick a Project…
  - **We Are Going to Make Mistakes…**
  - **Admit it… Get Over it… and Get Started!!!**

Return on Investment

Project	Implementation (Calendar Days)	Cost Payback (Calendar Days)
Batch Digester (1st)	**20**	**<1**
PM Winder (1st)	5	<1
PM Sheet Break Data Collection (1st)	<1	n/a
Batch Digester (2+)	**5**	**<1**
PM Winder (2+)	1-2	<1
Heat Exchanger (1st Prototype)	5	?
Heat Exchanger (2+) (2017 Project)	0.2	varies

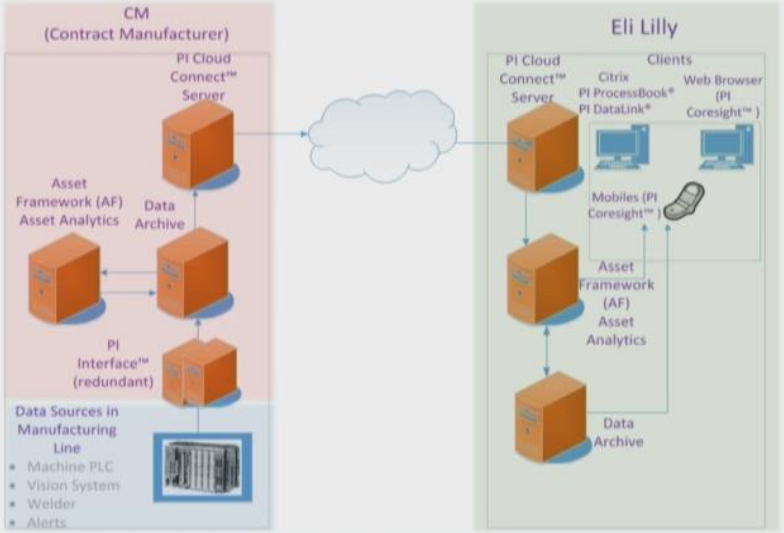
Data Sharing in a Contract Manufacturing Environment

Presented by Doug Berg, Brian Goldinger (Eli Lilly)
Colin Moore, Abel Padilla (PA-ATS)

Business Needs

- Reduce manual collection of performance data
- Harmonize data analysis for performance
  - Multiple Contract Manufacturer sites (CMs)
  - Multiple products
  - Standard KPI's across CMs
- Enable SPC/trending to anticipate/avoid downtime
- Identify/justify improvement projects
  - Metadata from smart instruments
- Enable Lilly engineers to assess performance independent of CM, without assistance

System Architecture



Implementation Phases

1.- Data Collection

- Allen Bradley Logix 5572
  - OSI OPC Interface
  - OSI E\IP Connector
- Cognex Vision Systems
  - OSI UFL Connector
  - OSI OPC Interface
- Ultrasonic Welder
  - OSI UFL Connector

Process Data:
Production counters
Machine Status
Faults and Auto-restart codes

Measurement Data:
Failed\passed test numbers
Tool measurements

Welding Data:
Energy, Power, Amperage, etc

Easily create reports to identify alarms affecting machine availability and performance.

Run | Start Time | End Time | DAY | MONTH | YEAR | TIME

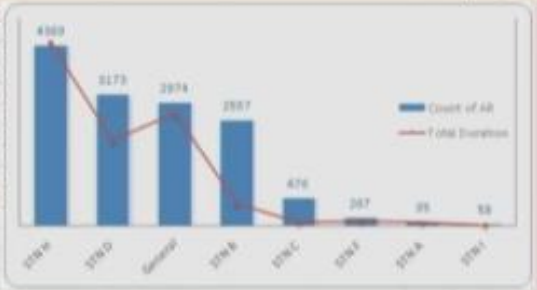
MACHINE A

Lilly

PER STATION

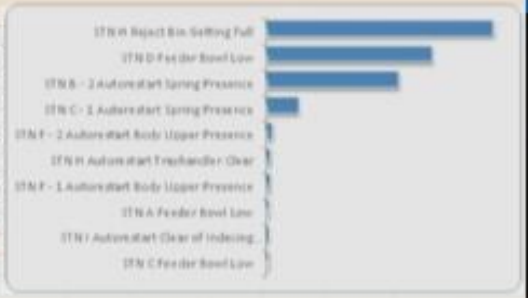
AUTO RESTARTS

AutoRest	Count of AR	Total Duration
STN H	4369	21:12:54
STN D	3173	09:52:07
General	2974	12:59:53
STN B	2557	02:33:07
STN C	676	00:21:13
STN F	207	00:30:47
STN A	95	00:19:33
STN I	58	00:00:58
Grand Total	14109	23:50:32



TOP 10

Auto Restart Messages	Count of AR	Total Duration
STN H Reject Bin Getting Full	4283	20:53:14
STN D Feeder Bowl Low	3135	09:40:42
STN B - 2 Autorestart Spring Presence	2505	02:29:18
STN C - 1 Autorestart Spring Presence	621	00:18:46
STN F - 2 Autorestart Body Upper Presence	127	00:16:39
STN H Autorestart Trayhandler Clear	85	00:19:39
STN F - 1 Autorestart Body Upper Presence	80	00:14:08
STN A Feeder Bowl Low	67	00:18:02
STN I Autorestart Clear of Indexing Conveyor	58	00:00:58
STN C Feeder Bowl Low	55	00:02:27
Grand Total	11016	10:33:53



FAULTS

Faults	Count of Fault	Total Duration
STN N	252	00:36:55
STN G	124	00:19:41
STN J	116	00:23:07
STN P	112	00:20:09
STN A	87	00:14:17
STN C	56	00:09:30
STN B	52	00:07:37
STN F	47	00:10:40
STN D	25	00:06:19
STN Q	14	00:02:35
STN Z	13	00:02:36
STN AA	6	00:01:29
STN W	6	00:01:20
Grand Total	910	02:36:15

Faults	Count of Fault	Total Duration
STN N - 1 Part Not In Position (17_185, 17_188)	143	00:21:40
STN N - 2 Part Not In Position (17_285, 17_288)	74	00:06:43
STN G - 2 Bad Parts Shuttle Upper Presence/Position	66	00:11:42
STN J - 2 Vision Spring Exposed REMOVE PART	60	00:13:02
STN P - 1 Feed Jam	59	00:09:46
STN G - 2 Sensor Fault (9_2a818)	41	00:05:32
STN J - 1 Vision Spring Exposed REMOVE PART	39	00:06:29
STN F - 1 Feed Jam	38	00:09:24
STN P - 2 Feed Jam	33	00:08:29
STN A Feed Jam	29	00:05:15
Grand Total	582	01:38:02

PI Coresight™ allows near real-time visualization of the process data in a format that's easy to understand.

Data Sharing in a Contract Manufacturing Environment

COMPANY and GOAL

Eli Lilly and Company, a global leader in healthcare, continuously optimizes the performance of its medical device assembly lines at contract manufacturers to assure adequate supply control of expenses.

Lilly

CHALLENGE

The data environment in medical device assembly at contract manufacturers must be enhanced to enable the next level of performance

- Process engineers must work in a data rich environment to be effective in process improvement
- The competitive landscape continues to drive optimization of manufacturing

SOLUTION

The PI System® and PI Cloud Connect™ enable the contract manufacturer and Lilly to be more effective

- Potential for implementation at 5 CM sites

RESULTS

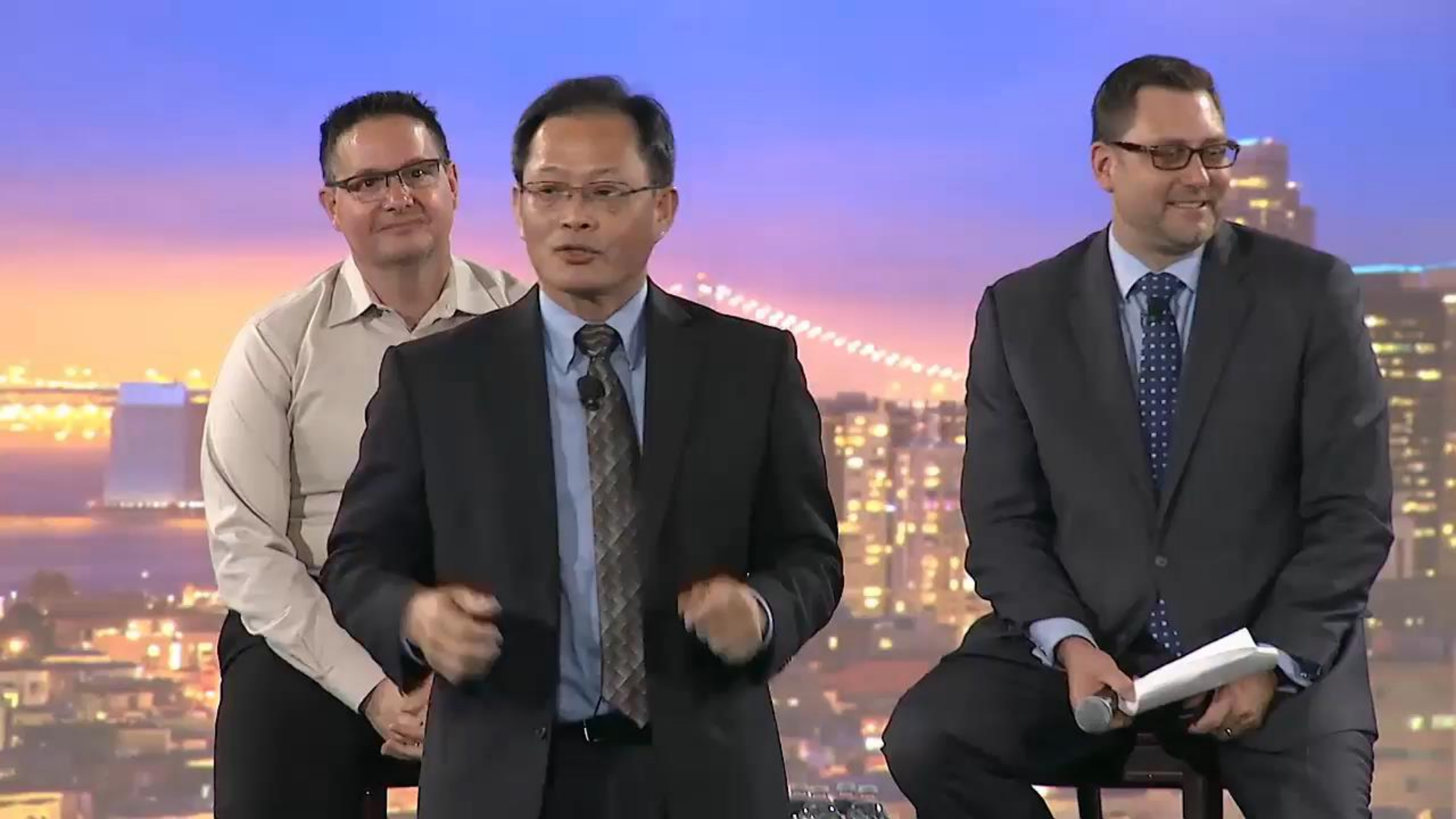
Come back to #OSIsoftUC next year to find out!

Physical and Economic Feasibility

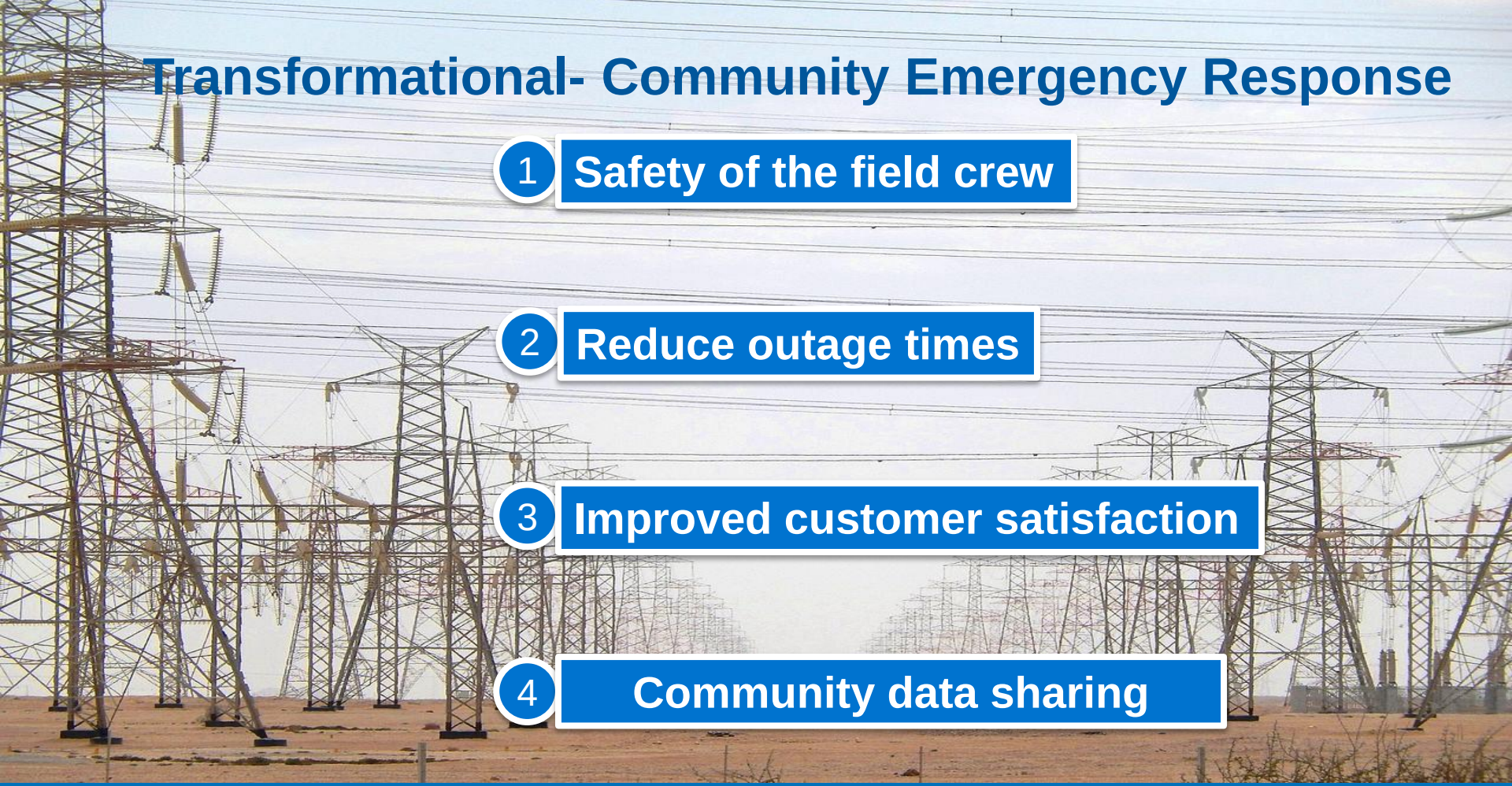
Geospatial, Sensor Driven Analytics

- Asset Location
- Visual inspection
- Sensor data
- Events
- Automation
- Scale

https://www.youtube.com/watch?v=637U347fKbE



Transformational- Community Emergency Response



1. Safety of the field crew
2. Reduce outage times
3. Improved customer satisfaction
4. Community data sharing

Thank You