



# Nutrien – Powered by AF

Bob McIntyre – Nutrien  
Heather Quale - Mera



# Agenda



**Heather Quale**

President  
Mera

- Introduction
- Leveraging PI in the Enterprise



**Bob McIntyre**

Senior Manager, Process Control  
Nutrien

- Develop Organizational Capability
- Leverage Partner Ecosystem
- Wrap-up and Q&A



- Nutrien is the world's largest provider of crop inputs and services (potash, nitrogen, phosphate, retail).
  - Formed Jan 1, 2018 as a “merger of equals” between PotashCorp and Agrium.
  - Nutrien plays a critical role in **Feeding the Future** by helping growers to increase food production in a sustainable manner.
- 



- Mera is a team of engineers and technical specialists with diverse expertise that provide services across many different industries on a global level.
- We work with our clients to leverage their operational data to optimize operations to deliver improved financial performance in a safe and sustainable manner.

# One Data Point – Many Uses

## Plant Managers

- Are we meeting our targets?
- Low frequency data

## Process Engineers

- How can we optimize the process?
- High frequency data

## Corporate Accounting

- What is our revenue from sales?
- Low frequency data



## Compliance Reporting

- Are we meeting regulatory requirements?
- Varies by requirement

## Maintenance Specialists

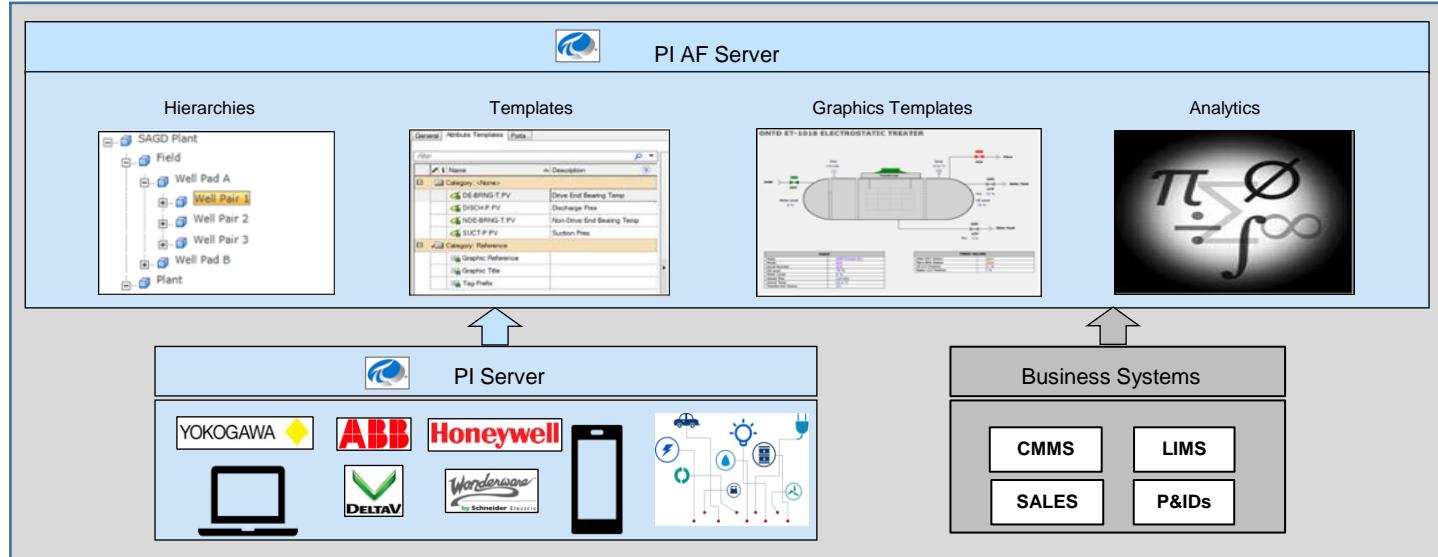
- What is the health of the equipment?
- High frequency data

## Data Scientists

- Are there new learnings using multiple data sets?
- Varies pending on investigation

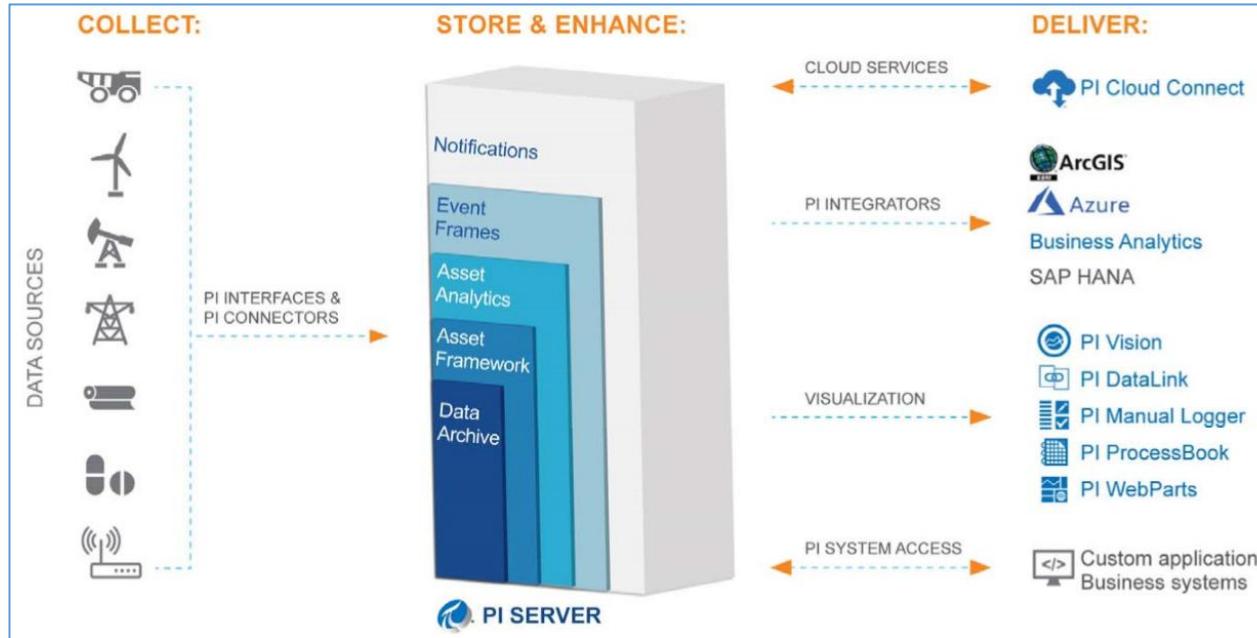
Each team has different needs and perspectives for operational data

# PI AF – OT Data “Game Changer”



Use PI AF to provide structure, organization and context to OT Data

# How to Leverage the PI System



White paper: Best Practices for Operationalizing Data Driven Decisions Across the Enterprise

<https://www.osisoft.com/whitepapers/Best-Practices-for-Operationalizing-Data-Driven-Decisions-Across-the-Enterprise.pdf>

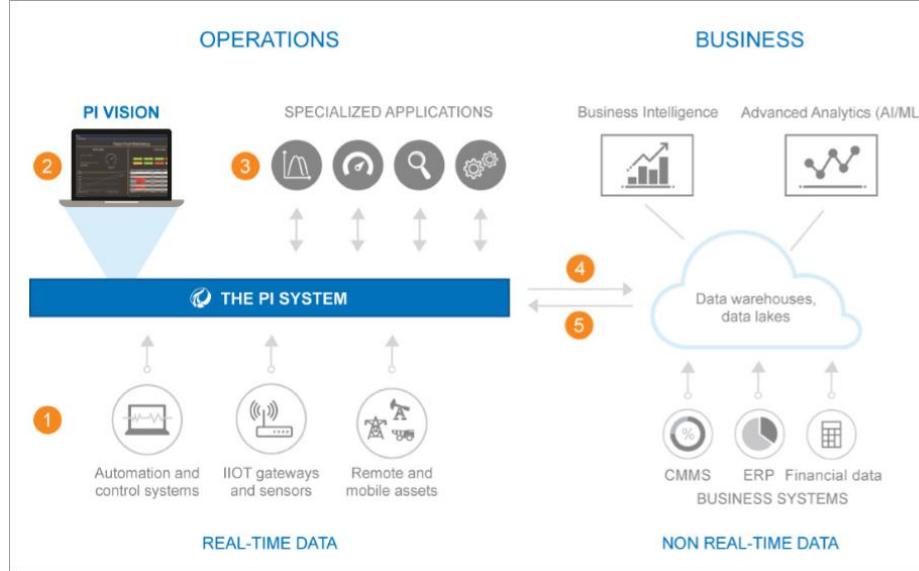
# Enterprise PI – Source for Trusted OT Data

## Fit for Purpose

- OT Dashboards
- Specialized Point Solutions

## Consolidate Data

- Control Systems
- IOT Devices
- Mobile Assets



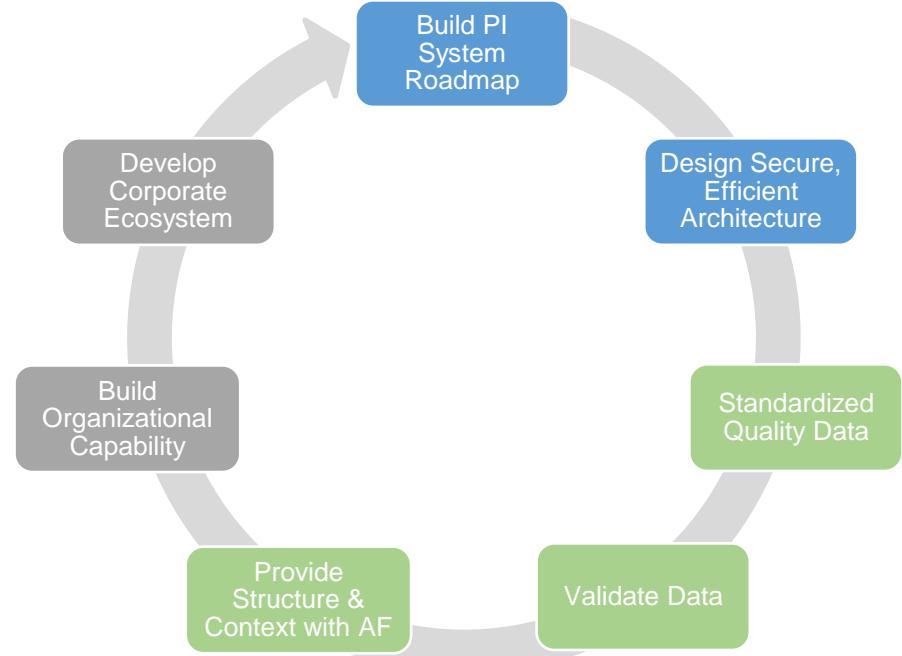
## Data Sharing

- Pass select data between OT and IT systems to meet specific needs
- Supports effective collaboration

Eliminate data silos to enable data access for the organization

# Success of a Deployment Plan

- Build the plan:
  - Architecture and data collection
- Standardize, validate, and organize:
  - Develop and apply standards
  - Data Validation
  - Add structure with AF
- Deliver value to the organization:
  - Develop organizational capability
  - Training program
  - Coaching and mentoring users leverage operational data
  - Sharing best practices
  - IT/OT collaboration



# Evolution of the PI System at Nutrien

## Before:

- Tracking and reporting based on past performance
- Decisions primarily based on historical metrics



## Now:

- Changed the paradigm - acknowledge previous performance but operate on current data
- Question becomes - “What can I impact right now to safely meet or exceed targets?”

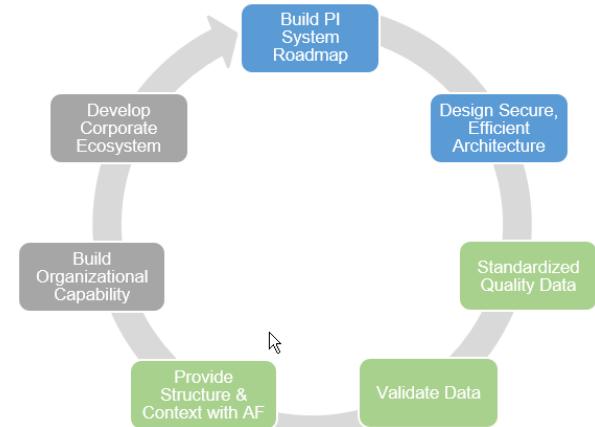
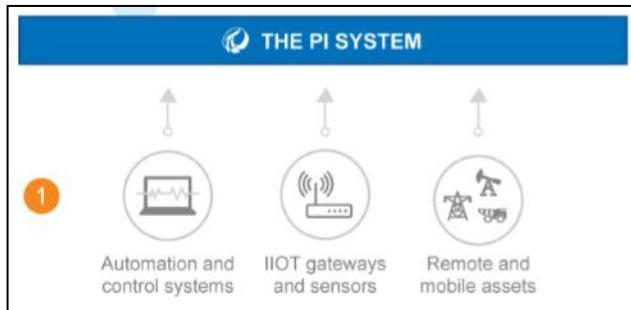
# Nutrien Business Challenges

- Merger: PotashCorp + Agrium = Nutrien
- Solution development:
  - Operations dashboards and reporting
  - KPI tracking
  - Energy monitoring
  - Equipment health
- Collect and organize data for analytics and machine learning:
  - Equipment analytics for Maintenance
  - Process analytics for Operations
  - Business analytics for Management



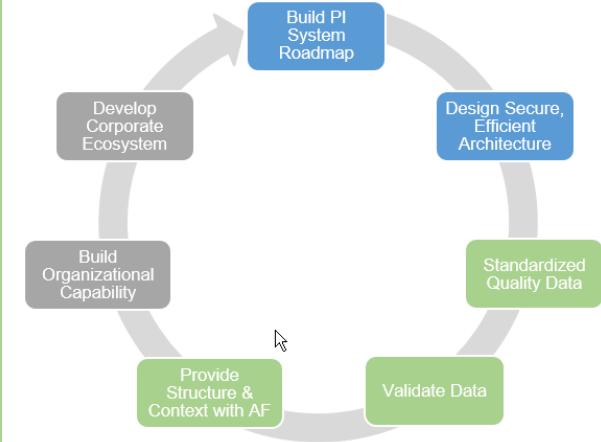
# Architecture and Data Collection

- PI System architecture
  - Ensure secure data transfer
  - Designed to meet specific site needs
- Interfaces and connectors:
  - Leveraged standard interfaces – predominantly OPC DA



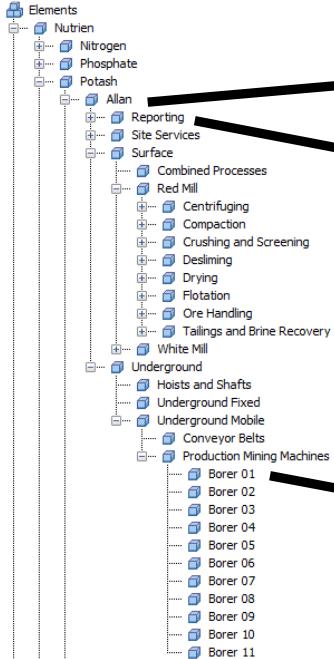
# Standardize, Validate, and Organize

- Vanscoy Site Deployment (4 Month, 28,000 Tags):
  - Standard architecture deployment for data collection
  - Data validation
  - Apply defined naming convention
  - AF rollout using defined templates
  - History migration
- Rollout to the rest of the company:
  - Nitrogen (11)
  - Phosphate (8)
  - Retail (5)



# Organizational Capability

## AF Integration



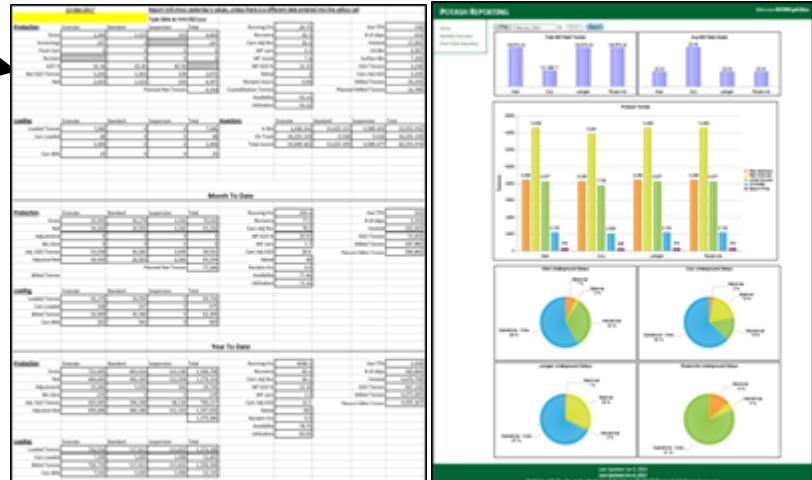
Equipment graphics,  
dashboards, etc.



Site graphics, dashboards  
and KPI's



Site Reports



# Organizational Capability

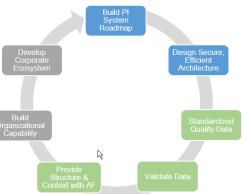
WebFocus example

Operations

Last 24 Hours Production (Metric Tonnes)

	Ammonia			Urea Synthesis			Nitric Acid		
	MSDR	Budget	Actual	MSDR	Budget	Actual	MSDR	Budget	Actual
Total									

From  
PI



# Organizational Capability

## PI Day:

- Building a PI Community
- Sharing best practices
- Testimonials
- Demonstration of new PI System capabilities
- Sharing perspectives
- Provide PI System awareness and user training



# Organizational Capability

## PI Vision Dashboards - Equipment



**Nutrien**

Equipment Dashboard Energy Dashboard Route Inspection - The Feed

Equipment Information Dashboard

- All
- Borers
- Rocanville
- Grizzly
- Grizzly Borer
- Jaguar Borer
- Kokak Borer
- Leopold Borer
- Liza Borer
- Panda Borer
- Panther Borer
- Puma Borer
- Tiger Borer
- Covered Bells

**ROCANVILLE GRIZZLY BORER**  
MARGRETA LUNGE, ROCANVILLE MINE, ROBERT FISHER

Production Data

Description	Value	Trend
Prod2000 Average Power Shift	1000.0	Up
Prod2000 Average Work Shift	1000.0	Up
Prod2000 Free	1000.0	Up
Prod2000 Taper On Grade Shift	1000.0	Up
Prod2000 Work Shift	1000.0	Up
Prod2000 Workshift/Work Shift	1000.0	Up

2/1/2019 12:30:40 PM - 7d 3/1/2019 12:30:40 PM

**K20 Probe Data**

Description	Value	Units
Probe 1 On Grade	PERCENT	
Probe 2 On Grade	PERCENT	
Probe 3 On Grade	PERCENT	
Probe 4 On Grade	PERCENT	
Probe 5 On Grade	PERCENT	
Probe 6 On Grade	PERCENT	
Probe 7 On Grade	PERCENT	

**Borer Data**

Description	Value	Units
Head Motor Current Max	AMPS	
Head Motor Current Min	AMPS	
Head Motor Current Avg	AMPS	
Head Motor Current Std Dev	AMPS	
Head Motor Current Total	AMPS	
Head Motor Current End Total	AMPS	
Head Motor Current Drive End Total	AMPS	
Left Bell Pressure	PSI	
Left Bell Temp	DEG F	
Left Year Pressure	PSI	
Right Bell Pressure	PSI	
Right Bell Temp	DEG F	

**Motor Data**

Description	Value	Units
Motor 1 Current	AMPS	
Motor 2 Current	AMPS	
Motor 3 Current	AMPS	
Motor 4 Current	AMPS	
Motor 5 Current	AMPS	
Motor 6 Current	AMPS	
Motor 7 Current	AMPS	

**Grizzly Bells**

Bell Name	Shift Work	Shift Type	Target Unit Grade	Use Grade	Target Status	Actual Status	Pass
30700 Grizzly							
30701 Grizzly							
30702 Grizzly							
30703 Grizzly							
30704 Grizzly							

**Equipment Work Order**

Work Order Number	Description	Work Order Type	Activity	Blockhouse	Material	Asset	Asset Location	Activity Sequence	Scheduled Completion Date	Actual Completion Date	Priority

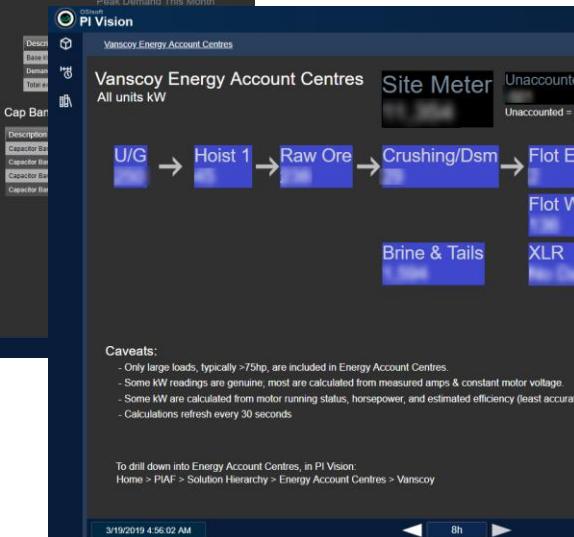
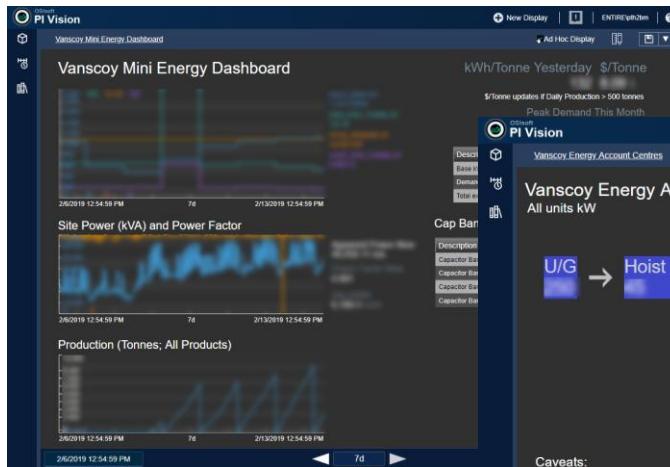
**Equipment Work Order Request**

Asset Number	Description	Work Order Number	Blockhouse	Material	Asset	Asset Location	Work Request Type



# Organizational Capability

## PI Vision Dashboards - Energy



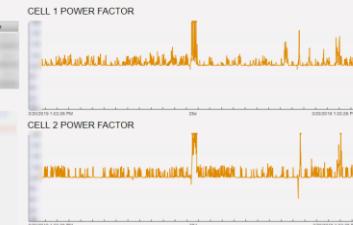
**Nutrien**

Energy Information Dashboard

- Allan
- Substation 1
- Cory
- Substation 1
- Vanscoy
- Substation 1

### ALLAN SUBSTATION 1

Description	Value
Incoming Power Total	
Outgoing Power Demand Total	
Actual Power Demand Total	
Incoming Apparent Power Total	
Outgoing Apparent Power Total	
Incoming Reactive Power Total	
Outgoing Reactive Power Total	
Current Month Incoming Net Power Total	



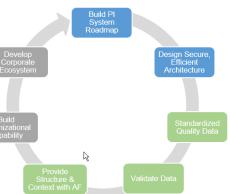
### Event Frame Area

Event Name	Event	Start Date	End Date	Associated
Monthly Power Event Frame 2019-01-01 00:00:00	SUBSTATION 1	3/19/2019 00:00 AM	3/19/2019 00:00 AM	
Monthly Power Event Frame 2019-02-01 00:00:00	SUBSTATION 1	3/19/2019 00:00 AM	3/19/2019 00:00 AM	
Monthly Power Event Frame 2019-01-01 00:00:00	SUBSTATION 1	3/19/2019 00:00 AM	3/19/2019 00:00 AM	
Monthly Power Event Frame 2019-12-01 00:00:00	SUBSTATION 1	3/19/2019 00:00 AM	3/19/2019 00:00 AM	



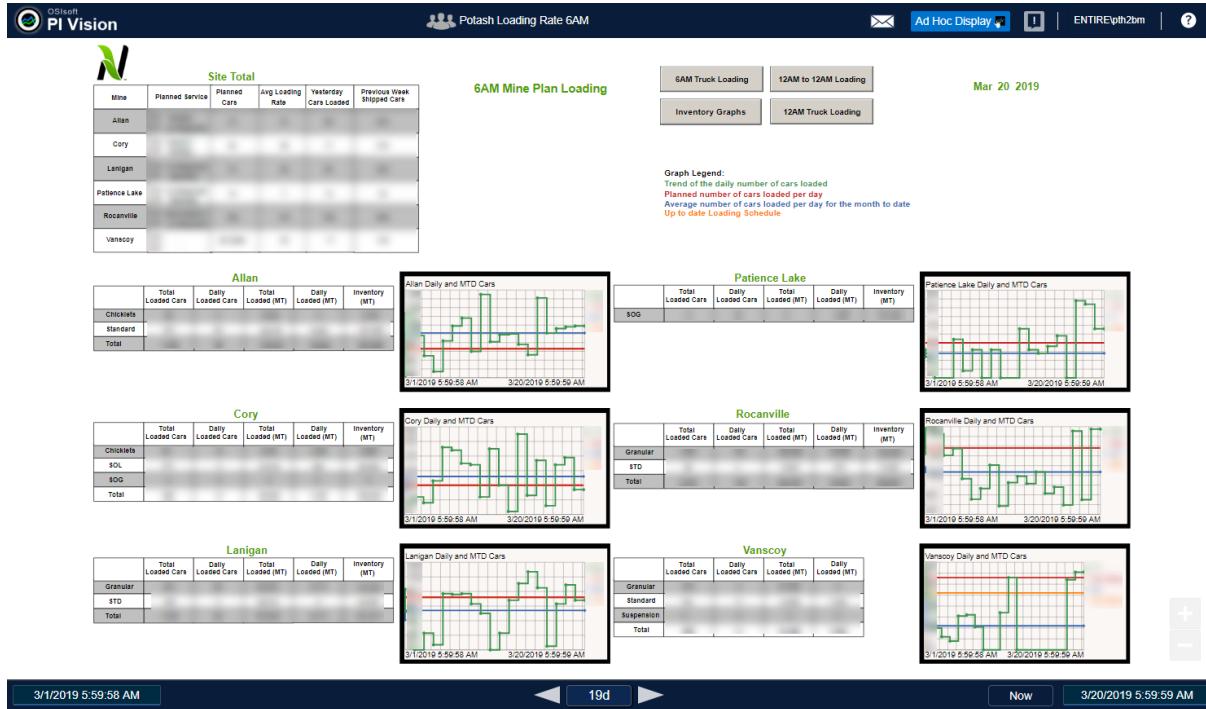
Mini Energy Dashboard

Now



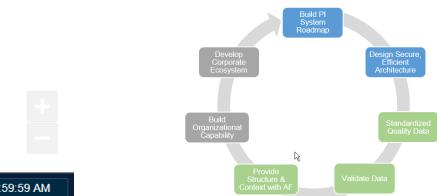
# Organizational Capability

## PI Vision Dashboards - Loadout



### AF Integration

- Home grown Loadout SQL database
- PI AF Integration makes summary information available to PI users in real time



# Organizational Capability

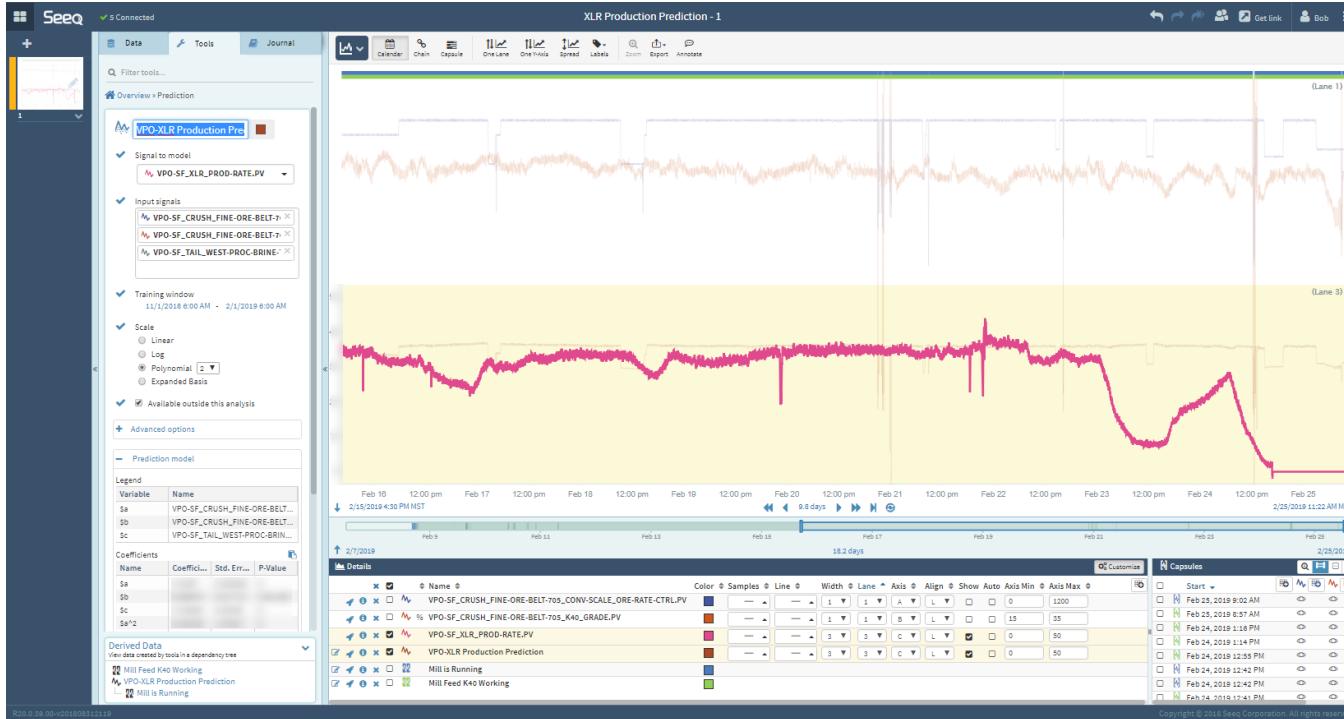
Leverage Partner Ecosystem - RtDuet

The screenshot displays the Nutrien RtDuet KPI dashboard interface. The top navigation bar includes tabs for EVENTS, KPI (selected), REPORTS, OVERVIEW, and OPTIONS. The left sidebar shows a hierarchical tree view of sites: Nutrien RtDuet, Nitrogen, Phosphate, Potash, Allan (Borers, Hoist, Surface), ALM Chicklets, ALM Red Mill, Surface Compaction, Surface Loadout, Surface White Mill, Cory, Langan, Patience Lake, Rocamville, and Vanscoy. The main content area features eight gauge charts under the heading 'Availability' (green), 'Utilization' (green), 'Demand' (green), 'Effective Utilization' (green), 'PCT Completed' (green), 'Effective Use Of Availability' (green), 'Operating Efficiency' (green), and 'Use Of Availability' (green). Below the gauges is a data grid table with columns: Source MC, Start Time, Availability, Utilization, Demand, Effective Utilization, PCT Completed, Effective Use Of Availability, Operating Efficiency, Use Of Availability, MTBF, MTBS, and MTTR. The table lists 14 entries for 'ALM Red Mill' from 3/4/2019 to 3/10/2019 at various times. A circular process diagram on the right outlines the 'Build PI System Roadmap', 'Design Secure Data Architecture', 'Standardized Quality Data', 'Validate Data', 'Provide Structure & Context with API', 'Build Organizational Capability', 'Develop Operational Ecosystem', and 'Build PI System Roadmap' again.

Source MC	Start Time	Availability	Utilization	Demand	Effective Utilization	PCT Completed	Effective Use Of Availability	Operating Efficiency	Use Of Availability	MTBF	MTBS	MTTR
ALM Red Mill	3/10/2019 18:00:00											
ALM Red Mill	3/10/2019 06:00:00											
ALM Red Mill	3/9/2019 18:00:00											
ALM Red Mill	3/9/2019 06:00:00											
ALM Red Mill	3/8/2019 18:00:00											
ALM Red Mill	3/8/2019 06:00:00											
ALM Red Mill	3/7/2019 18:00:00											
ALM Red Mill	3/7/2019 06:00:00											
ALM Red Mill	3/6/2019 18:00:00											
ALM Red Mill	3/6/2019 06:00:00											
ALM Red Mill	3/5/2019 18:00:00											
ALM Red Mill	3/5/2019 06:00:00											
ALM Red Mill	3/4/2019 18:00:00											
ALM Red Mill	3/4/2019 06:00:00											

# Organizational Capability

Leverage Partner Ecosystem - SEEQ



# Solving Operational Challenges



- PI System Event Frames

Leverage Event Frames and Notifications to Identify Emerging Issues

- PI Vision

Implement PI Vision Dashboards to Monitor Equipment



- Predictive Analytics

Integrate OT Data with Context into Predictive Analytics

- Specialized Analytics

Pass OT Data with Context to Specialized Analytics Applications



# Nutrien Powered by AF



Nutrien, the world's largest fertilizer company, **is leveraging operational data** to help feed the world.



## CHALLENGE

Require consistent operational data that users can trust and easily access to make informed decisions

- Strong desire to leverage operational data across the business
- Operational data differs site to site AND between business units
- Merger provided different options to gather operational data

## SOLUTION

Expanded PI System to incorporate the Agrium assets

- Integrated Agrium Vanscoy Potash Mine into PCS PI System
- Planning to integrate Nitrogen, Phosphate and Retail assets

## RESULTS

Created a trusted source of operational data to be readily leveraged for business solutions

- Leveraging structured OT data in PI System to rapidly deploy new functionality across the sites
- Benefits too many to measure
- Implementation changed from a PUSH to a PULL

# Contact Information



- **Heather Quale**
- [Heather.Quale@meragroup.net](mailto:Heather.Quale@meragroup.net)
- President
- Mera



- **Bob McIntyre**
- [Bob.McIntyre@nutrien.com](mailto:Bob.McIntyre@nutrien.com)
- Senior Manager, Process Control
- Nutrien



# Learn More About Nutrien/Mera Story

- 2018 Presentation: *Leveraging the IT/OT Relationship to Identify Optimization Opportunities*  
<https://www.osisoft.com/Presentations/The-PI-System-%E2%80%93-Leveraging-the-IT/OT-Relationship-to-Identify-Optimization-Opportunities/>
- 2018 Webinar: *IT/OT Convergence Solutions*  
[http://pages.osisoft.com/WS-CORP-Q1-18-02-15-ITOTConvergenceSolutions\\_RegisterNow-OnDemand.html?\\_ga=2.192337577.261080146.1553105510-1158374395.1543593304](http://pages.osisoft.com/WS-CORP-Q1-18-02-15-ITOTConvergenceSolutions_RegisterNow-OnDemand.html?_ga=2.192337577.261080146.1553105510-1158374395.1543593304)
- White paper: *Best Practices for Operationalizing Data Driven Decisions Across the Enterprise*  
<https://www.osisoft.com/whitepapers/Best-Practices-for-Operationalizing-Data-Driven-Decisions-Across-the-Enterprise.pdf>
- White paper: *7 Steps to Bring Operations Data to Your Enterprise*  
<https://www.osisoft.com/whitepapers/7-Steps-to-Bring-Operations-Data-to-Your-Enterprise.pdf>

# Questions?

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State your  
**name & company**

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ТИ БЛАГОДАРАМ  
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RAHMAT MERCI  
HATUR NUHUN

CẨM ƠN BẠN  
WAZVIITA

DZIĘKUJĘ CI  
NGIYABONGA  
TEŞEKKÜR EDERIM  
TERIMA KASIH

GRÀCIES

謝謝 KEA LEBOHA  
TAPADH LEIBH 고맙습니다  
БАЯРЛААА MISAOTRA ANAO  
**OBRIGADO** شکرا SALAMAT  
DANKON TANK TAPADH LEAT

  
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**THANK YOU**

DANK JE EYXAPIΣΤΩ GRATIAS TIBI  
AČIŪ SALAMAT MAHALO IĀ 'OE TAKK SKALDU HA  
GRAZZI PAKKA PÉR SIPAS JI WERE TERIMA KASIH  
PAXMAT CAGA FALEMINDERIT ありがとうございました  
дзякуюм UA TSAUG RAU KOJ  
DI OU MÈSI  
DAKUJEM  
MATUR NUWUN

谢謝 KEA LEBOHA  
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дзякуй GRAZIE  
DI OU MÈSI  
DAKUJEM  
MATUR NUWUN

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