

AVEVA PI WORLD

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# Using event frames to drive next generation process management

Presented By: Jordan Sellers

**AVEVA**

## Eastman: A global industry leader

- Fortune 500 specialty materials company with 2020 revenue of ~\$8.5B
- Global manufacturer and marketer of advanced materials and specialty additives
- Operates four business segments
- Global team of ~14,500
- Serving customers in >100 countries



# Improving process monitoring through operations transformation

**EASTMAN**



Provide an exception-based, real-time monitoring framework to empower operators to take ownership of, communicate, and document issues in the plant

Incorporated templated process monitoring analytics throughout PI AF with Event Frames to organize and consolidate exceptions from a wide variety of PI Vision monitoring dashboards

Enabled improvements to reliability, yield, catalyst usage, energy efficiency, safety and environmental metrics, and provided a platform to implement Machine Learning optimization results directly to operators

# Challenge: Operational Alert Tool Overload

- Operators had alerts (not DCS alarms) in too many different tools, with many nuisance alerts.
- We want to ensure that each alert has a true action.
- Toolset needed to
  - Monitor the process
  - Identify significant events using complex logic
  - Handle dynamic limits
  - Notify responsible parties and drive action
  - Have a streamlined, modular process for disparate chemical processes

Heat exchanger efficiency is low

Spare pump still needs to be run this week

Controller output is saturated

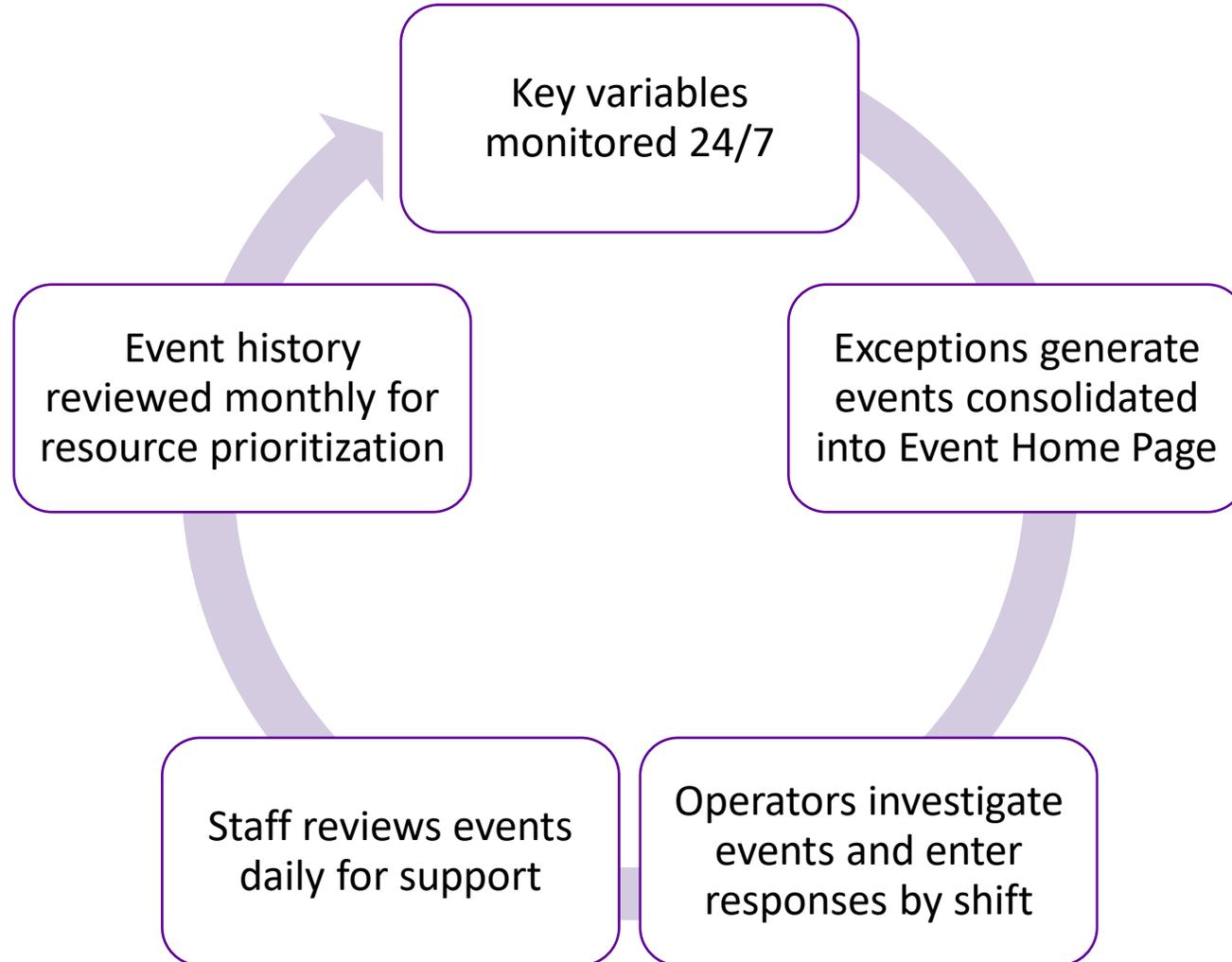
Should this unit be down right now?

Quality results are drifting low

Temperature outside optimal range

Setpoint isn't right for this product

# Implemented a full alert management system with AF Events, PI Vision, and Power BI



# Consolidate alerts in Plantwide Home Page (Level I) for review and documentation

**Daily Process Monitoring Home Page**

**Daily Metrics**

Percent-In-Control: **98 %**

Plantwide Alerts: **12 /615** (total monitored)

Rate: **512.9** klb/d

Yield: **99.2 %**

Reliability: **93 %**

Env. Events: **1**

**Unacknowledged Alerts**

Asset	Event Type	Start Time	End Time	Duration	Reason	Comments	Acknowledgment
E-3 PREHEATER	PM_HeatXferCoeff	9/16/2021 2:04:00 AM	In Progress	7h 30m			Acknowledge
T-15 PREP TANK	PM_Sample	9/16/2021 2:23:00 AM	In Progress	7h 11m			Acknowledge
R-1 REACTOR	PM_ReactorHealth	9/16/2021 3:09:00 AM	In Progress	6h 25m			Acknowledge
FI-112	PM_Variable	9/16/2021 5:22:00 AM	In Progress	4h 12m			Acknowledge
TI-104	PM_Variable	9/16/2021 6:21:00 AM	In Progress	3h 13m			Acknowledge
PC-102	PM_Deviation	9/16/2021 7:15:00 AM	In Progress	2h 19m			Acknowledge

**Display Links**

Asset	Alerts	Link
Variable Monitoring	4	<a href="#">Link</a>
Heat Transfer Coefficient Monitoring	3	<a href="#">Link</a>
Sample Manager	1	<a href="#">Link</a>
Reflux Ratio Monitoring	1	<a href="#">Link</a>
Reactor Health Monitoring	1	<a href="#">Link</a>
Output Monitoring	1	<a href="#">Link</a>
Deviation Monitoring	1	<a href="#">Link</a>

**Acknowledged Alerts**

Asset	Event Type	Start Time	End Time	Duration	Reason	Comments	Acknowledgment
E-12 BASE REBOILER	PM_HeatXferCoeff	9/16/2021 1:04:00 AM	In Progress	8h 30m	Exchanger Fouled	Maintenance scheduled swap to E12-B on 10/15	Acknowledged
E-18 OVERHEAD CONDENSER	PM_HeatXferCoeff	9/16/2021 4:29:00 AM	In Progress	5h 5m	Cooling Water Temperature	Cross exchanger is running hot	Acknowledged
T2630_DESHYDRATATION KOLM	PM_RefluxRatio	9/16/2021 4:53:00 AM	In Progress	4h 41m	Experiment	Gathering data for reflux ratio	Acknowledged
AI-101 PRODUCT CONCENTRATION	PM_Variable	9/16/2021 5:03:00 AM	9/16/2021 5:43:00 AM	40m	See Comment	Not real (back to normal now)	Acknowledged
TC-139 REACTOR OUTLET TEMPERATURE	PM_Output	9/16/2021 5:57:00 AM	In Progress	3h 37m	Work Order Submitted	Transmitter is broken	Acknowledged

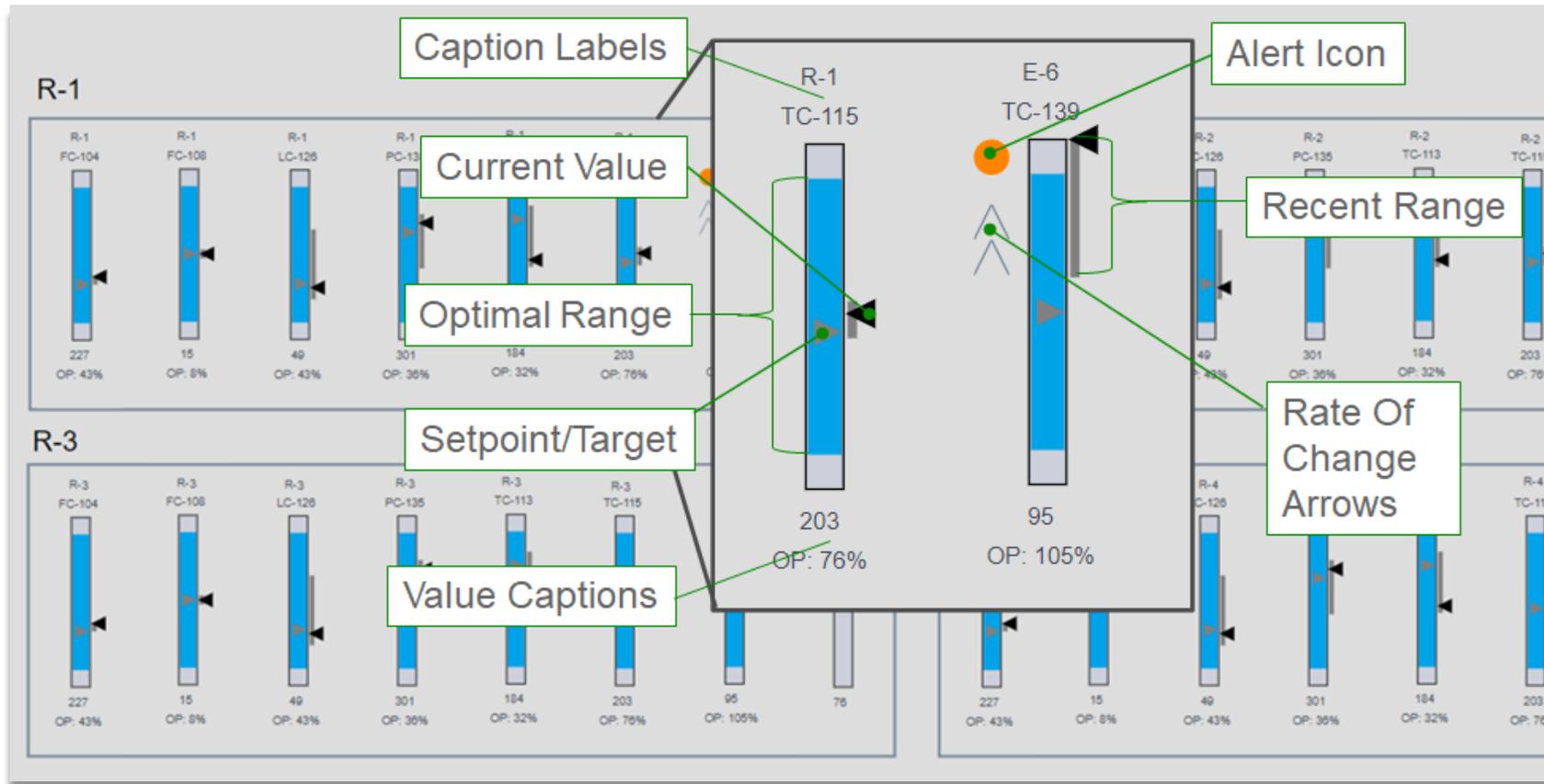
Consolidates Event Frame alerts from all monitoring dashboards and sorts them into Acknowledged vs Unacknowledged

Operators assign reasons, comments, and acknowledge new event frames by end of shift

Events reviewed by day staff in morning meeting

Operators can see alert totals for specialized monitoring dashboards (Level II) and open them directly from Display Links

# Monitor key event parameters in Gauge Dashboards (Level II) for event prevention and real-time optimization

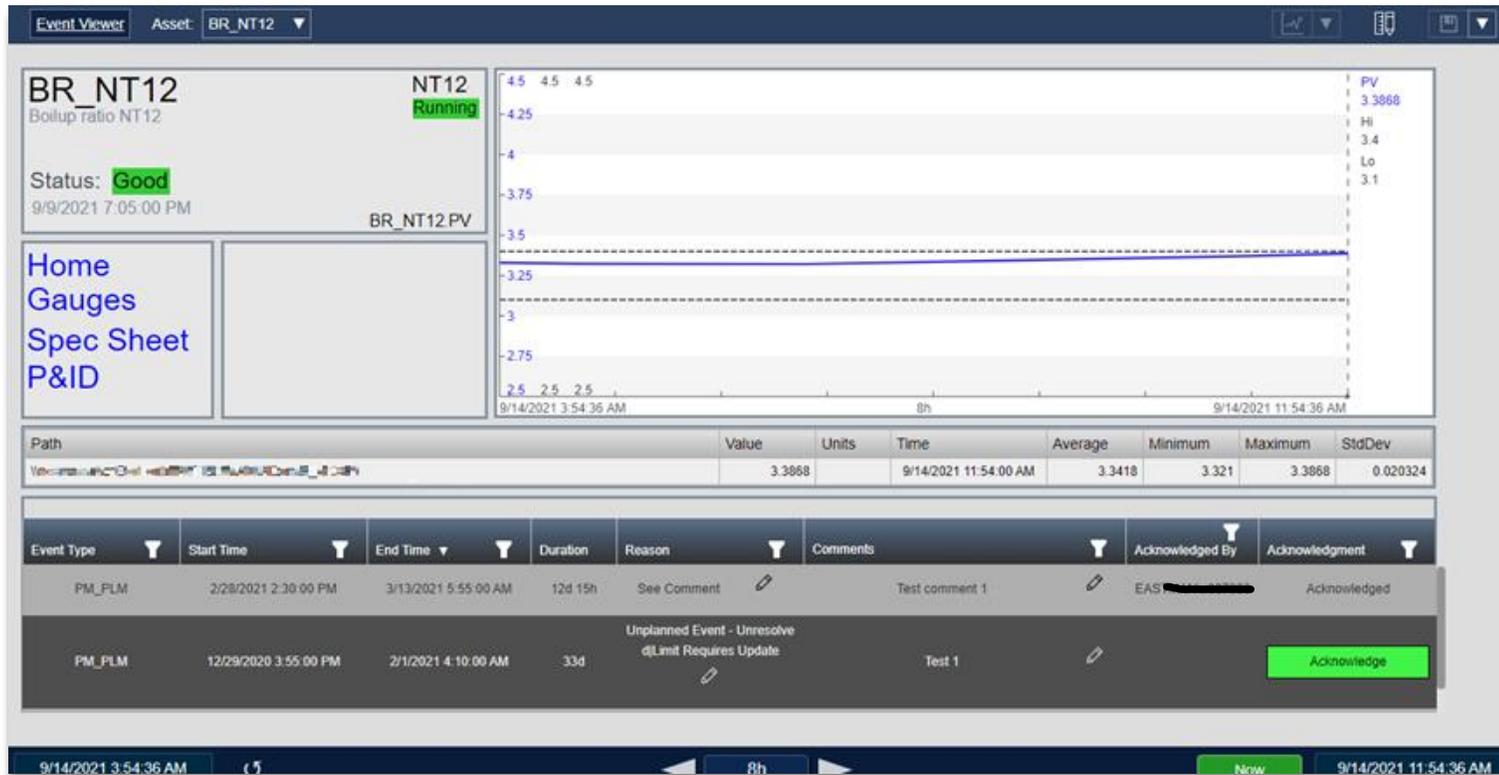


Open 24/7 on dedicated screens for operators to view the real time status of monitored variables

An event frame is generated if an orange circle alert is not resolved during the shift

Collections are used to populate the dashboard utilizing variable base templates

# Investigate individual events by drilling down to Variable Event View (Level III) for history and troubleshooting



Additional attributes can be added to the trend for troubleshooting

Time range of trends can be applied quickly from current or historical events

Navigation to this display is integrated throughout Level II's

# Review history of events in Power BI for better resourcing decisions



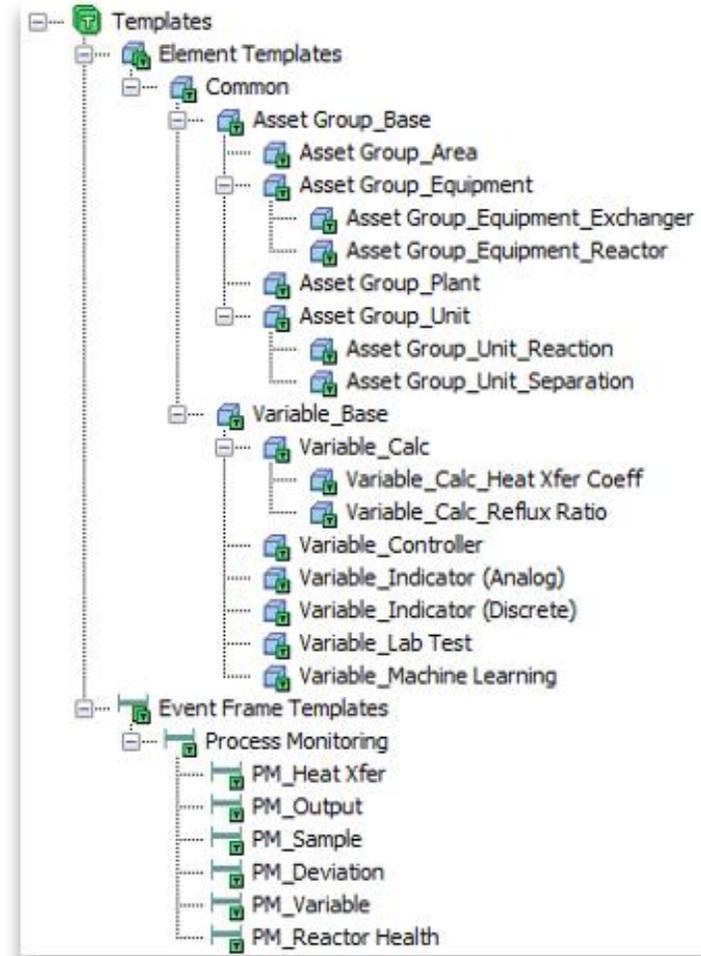
Historical events can be filtered by:

- Event Type
- Area
- Steward (Responsible person)

Incorporated into monthly staff meetings to identify reoccurring or severe events for resourcing and prioritization

# Implementation details from Asset Framework Templates to drive standardization and scalability

Variable_Controller		
General Attribute Templates Ports Analysis Templates Notification Rule Templates		
Filter		
	Name	Description
Category: Process Information		
	OP	
	PV	
	SP	
Category: Process Monitoring		
	Deviation Monitoring Status	Process Monitoring: PV within range of SP
	Output Monitoring Status	Process Monitoring: OP within optimal range
	Setpoint Monitoring Status	Process Monitoring: SP within optimal range



Rolls up alert counts for each type of monitoring

Variable templates contain respective PM Status and Event Frame analytics

Status analytics utilize dynamic limits, deadbands, equipment state, time delays, and conditional logic to ensure alerts are meaningful to operators

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# Achieved sustained improvements

- Hard Value

- Reliability gains from downtime and maintenance monitoring
- Yield improvement from real-time yield optimization monitoring
- Catalyst usage optimized in real-time
- Improved energy efficiency, safety and environmental metrics

- Soft Value

- Improved accountability for equipment optimization
- Better communication of activities between shifts
- Historized documentation of issues for prioritization and tool maintenance
- Provides a natural method to forward machine learning insights directly to operators



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# Typical presentation — order of slides

AVEVA PI WORLD

## Presentation Title

Optional Subtitle

Presented By: Name Goes Here

AVEVA

1 Title

### About PI Geek, Inc

Our Digital Transformation with AVEVA

- Here's background on our company and what AVEVA was able to do to help us digitally transform
- We sell widgets on the world wide web
- I started working at the company in 2014 and at that time, we were using Excel to manually sift through our operational data

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2 About Your Company

### How AVEVA improved our operations

Challenge	Solution	Benefits
Providing state-of-the-art real-time monitoring and analytics capabilities for Prelude FLNG, the largest and most sophisticated offshore production facility in the world	Deployed the latest AVEVA PI System technology including PI AF and PI Vision as an advanced foundation for Process Monitoring, Condition Based Maintenance & Advanced Analytics	Increased production and operational efficiency, reduced costs, mobile inspections, exception-based surveillance, significantly accelerated "Time to Value" for Advanced Analytics & Machine Learning projects

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3 Challenge-Solution-Benefits

### The challenge this project tackled

Manually sifting through data is a hassle

- We have a lot of data that needs processing to understand our operations.
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- Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy tincidunt ut laoreet dolore magna aliquam volutpat.

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4 Business Challenge

### Using the PI System for Operational Insights

Making better decisions with better data

- Here's the application details around how we were able to create the operational improvements using the PI System
- Edge to plant to cloud architecture
- Integrated data archives and self service tools

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5 AVEVA System Application

### Implementation Details

How we implemented the project

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6 Implementation Details

### Impact of Implementation

We've doubled operational capacity

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7 Impact / Savings

"This quote illustrates the huge benefits that our company is experiencing since implementing this project."

-My Coworker

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8 Key Stakeholder Quote

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9 Speaker Contact Me

THANK YOU

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10 Thank you!

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