

AVEVA PI WORLD

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# Proactive Instrument Intelligence Leveraging the PI System

Instrument Condition Based Monitoring

Presented By: Jason Novotny & Tyler Sontag

AVEVA

# Flint Hills Resources

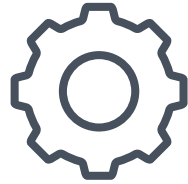
## Refining and Chemicals

- Headquarters in Wichita, KS
- Refineries in Rosemount, MN & Corpus Christi, TX
- Chemical Plants in Houston & Longview TX
- FHR Pipelines & Terminals



Pine Bend Refinery  
Rosemount, MN

## Challenge



Instrument health is foundation to data quality and trust. Combine and analyze disparate data systems to accurately evaluate instrument health and make the results easily accessible to the people who can resolve issues

## Solution



Deployed AVEVA PI System technology including PI AF and PI Vision as a foundation for proactive condition monitoring, analytics, and data reporting



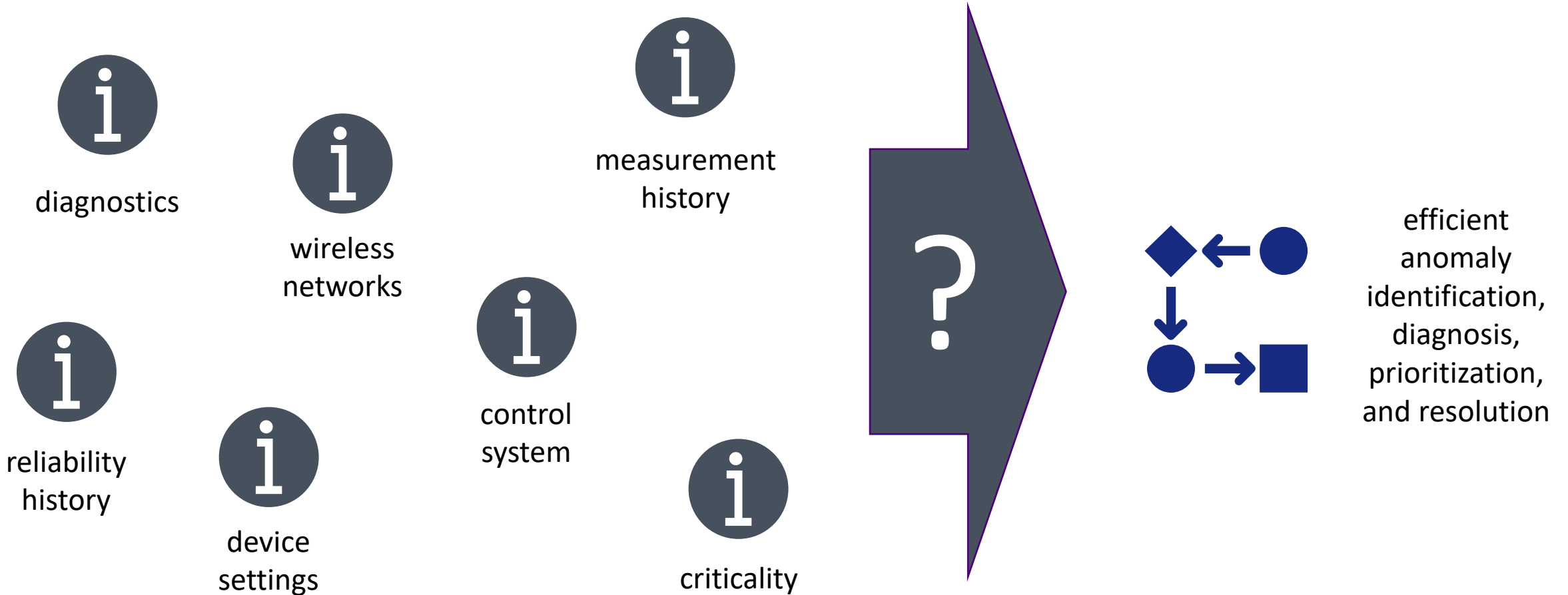
## Benefits



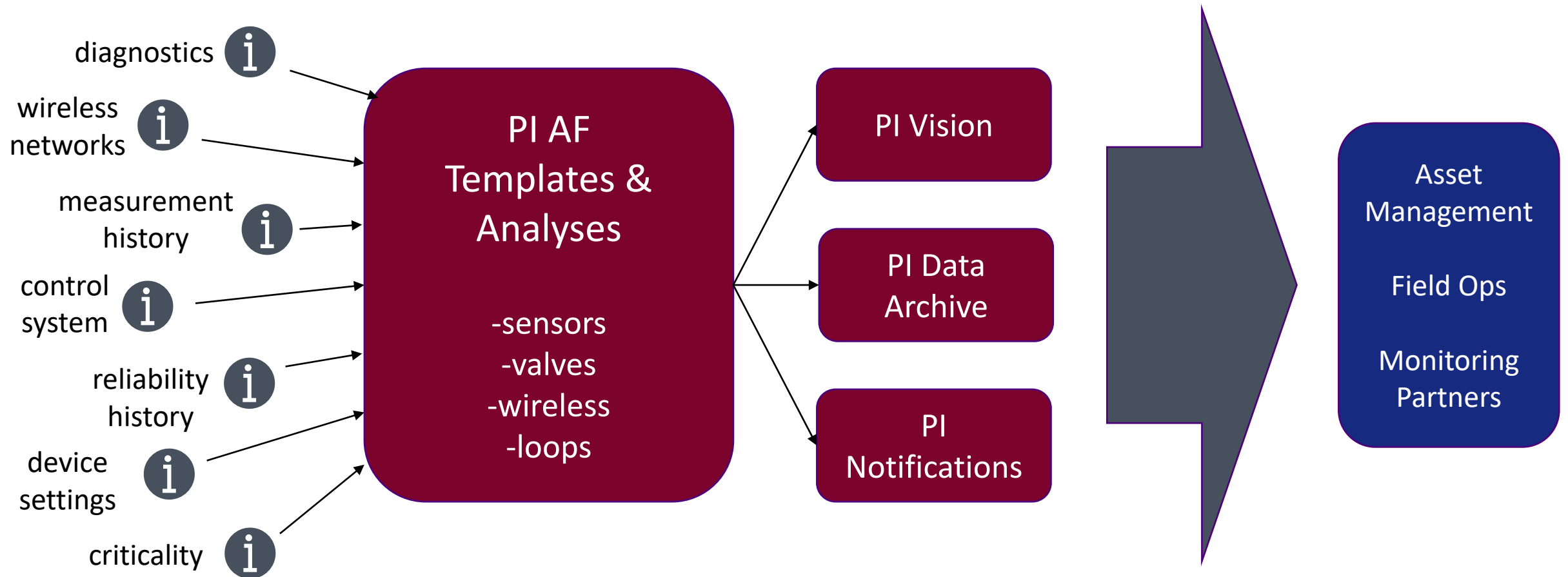
Visibility to instrument health shifts maintenance from break/fix to detect/adjust, enables higher mode of process control, reduced reactive maintenance, PM reduction, validation for other monitoring programs. Improvement in data quality and trust as a key part of our focus on operational intelligence and decision support with the PI System.

# Challenges connecting sources of data

Siloed data everywhere

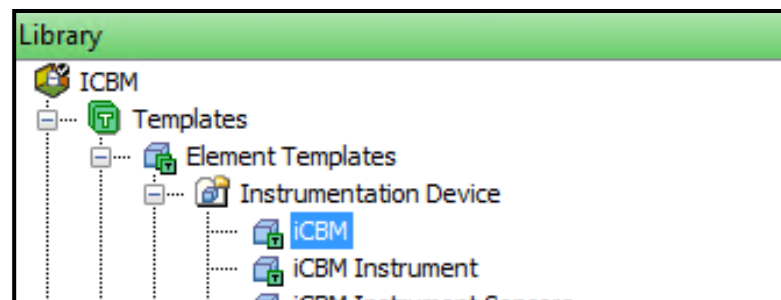


# Aveva PI solution to collect, analyze, and publish key metrics



# PI AF template versatility

## Template Library



## Health Analysis

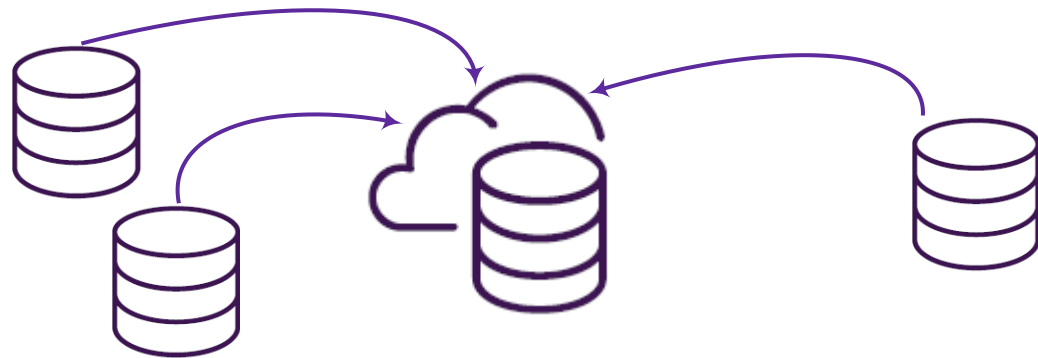
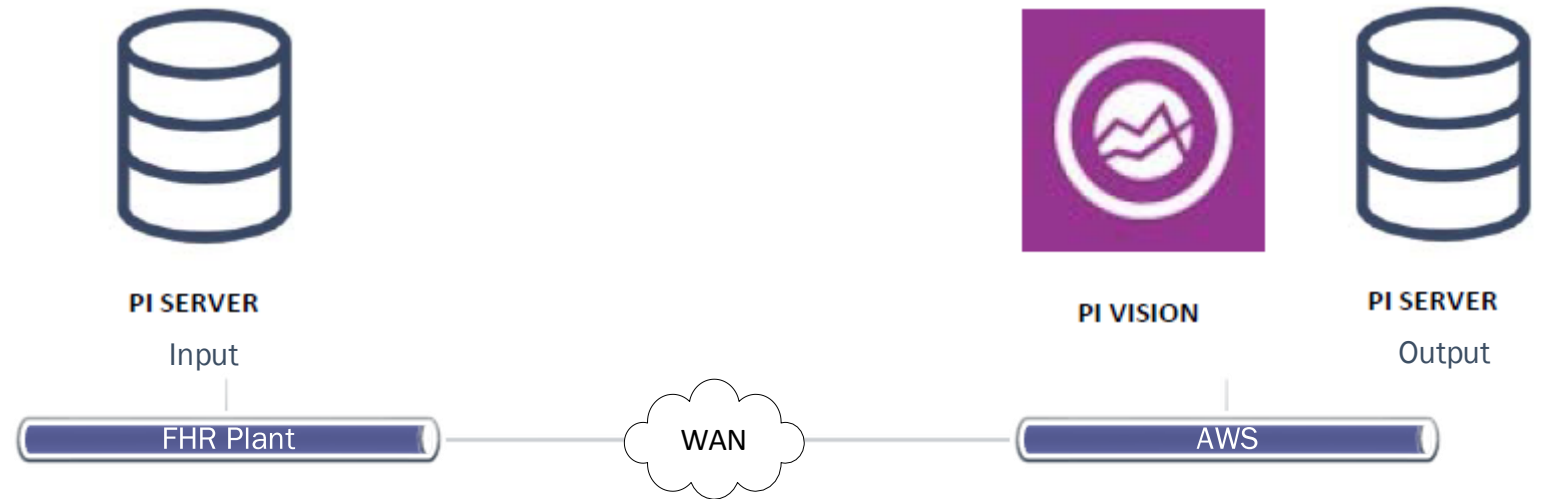
## Health Attributes

| Category: _Health Summary |                    |                        |  |
|---------------------------|--------------------|------------------------|--|
|                           | Availability       | 100.0 %                |  |
|                           | Changes Text       | Status has changed 0 t |  |
|                           | Control Mode Flag  | 0                      |  |
|                           | Control Mode Score | 0                      |  |
|                           | Control Status     | Loop is healthy        |  |
| +                         | Duration           | 0 d                    |  |
|                           | Flag               | 0                      |  |
|                           | Health Score       | 0                      |  |
| +                         | Priority           | 0.85                   |  |
| +                         | Program            | Control, APC, Rely     |  |
|                           | Risk               | 0.00                   |  |
| +                         | Status             | OK, Not in alarm       |  |

| Name           | Expression                                                                                                                                                     |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Severity       | //Check for an alert severity from AMS, if there is none, output that it is n<br>if BadVal('Alert Severity') then "Not HART Monitored" else 'Alert Severity'   |
| Description    | //Check for an alert description from AMS, if there is none, output that it i<br>if BadVal('Alert Description') then "Not HART Monitored" else 'Alert Descript |
| AMSScore       | //Classify the health score based on the AMS severity<br>if Contains(Severity,"Fail") then 4 else if Contains(Severity,"Maint") or Con                         |
| Flatline       | //If a flatline is detected, output a 1<br>if BadVal('Flatline Flag') then 0 else 'Flatline Flag'                                                              |
| Spike          | //If a spike is detected, output a 1<br>if BadVal('Spike Flag') then 0 else 'Spike Flag'                                                                       |
| ElecTempFlag   | //If high electronics temperature is detected, output a 1<br>if BadVal('Max Electronics Temp Flag') then 0 else 'Max Electronics Temp Flag                     |
| ElecTempStat   | if ElecTempFlag=0 or BadVal('Max Electronics Temp - Hourly') then NoOutput()                                                                                   |
| BadDataFlag    | if BadVal('Bad Data Flag') then 0 else 'Bad Data Flag'                                                                                                         |
| BadDataStat    | if BadDataFlag=0 then NoOutput() else Concat((100-Roundfrac('Good Data Percen                                                                                  |
| BadDataLevel   | if BadDataFlag=1 then (if 'Good Data Percent - Rolling' <= 50 then 4 else (if                                                                                  |
| OldDataFlag    | if BadVal('Old Data Flag') then 0 else 'Old Data Flag'                                                                                                         |
| OldDataStat    | if OldDataFlag = 0 then "" else 'Old Data Status'                                                                                                              |
| DeviationMajor | //If a major measurement deviation is detected, output a 1<br>if BadVal('Measurement Deviation Major Flag') then 0 else 'Measurement Deviat                    |

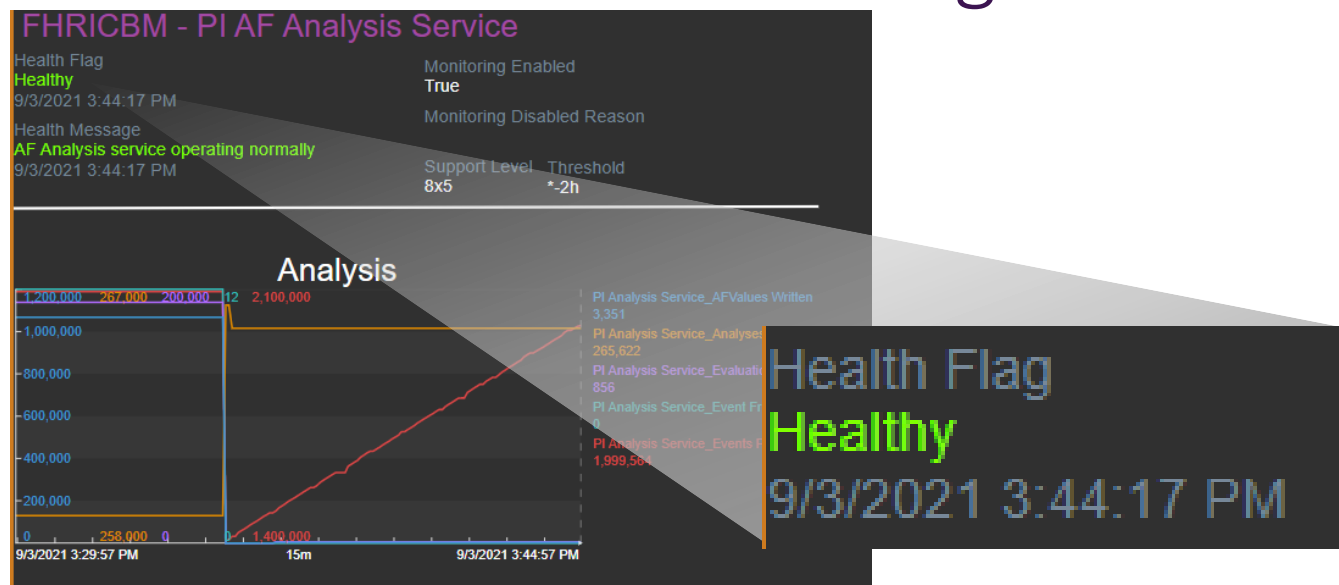
# The parts come together

To improve performance, we consolidated the output of our ICBM program to a single leveraged PI server from the many remote PI servers, nearer to PI Vision



Similarly, any external table connections are only setup to a consolidated database on the same network as our Asset Framework server

# PI Performance Monitoring



Using OSIsoft's Performance Monitoring template, FHR is able to monitor the status of 300k+ Analytics calculations on 130k+ Elements

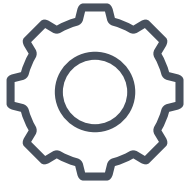
FHR's Doctor PI tracks the output of sample AF Calculation, AF responsiveness, and other KPIs to determine system health and respond if necessary.



# PI Vision Dashboard Demo



# Enabling optimized instrument performance



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## Benefits

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# Impact

- The equipment is talking to us – now we are listening
- New maintenance model driven by operational intelligence
- Culture shift to capture the value
- Improved instrument data visibility leads to better decisions



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## Jason Novotny

### Instrument Engineer

- Flint Hills Resources
- [Jason.Novotny@fhr.com](mailto:Jason.Novotny@fhr.com)



## Tyler Sontag

### IT/OT Lead

- Flint Hills Resources
- [Tyler.Sontag@fhr.com](mailto:Tyler.Sontag@fhr.com)



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