Upstream Condensate Production Optimization in the Gulf of Thailand

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Our lives can be improved through technology

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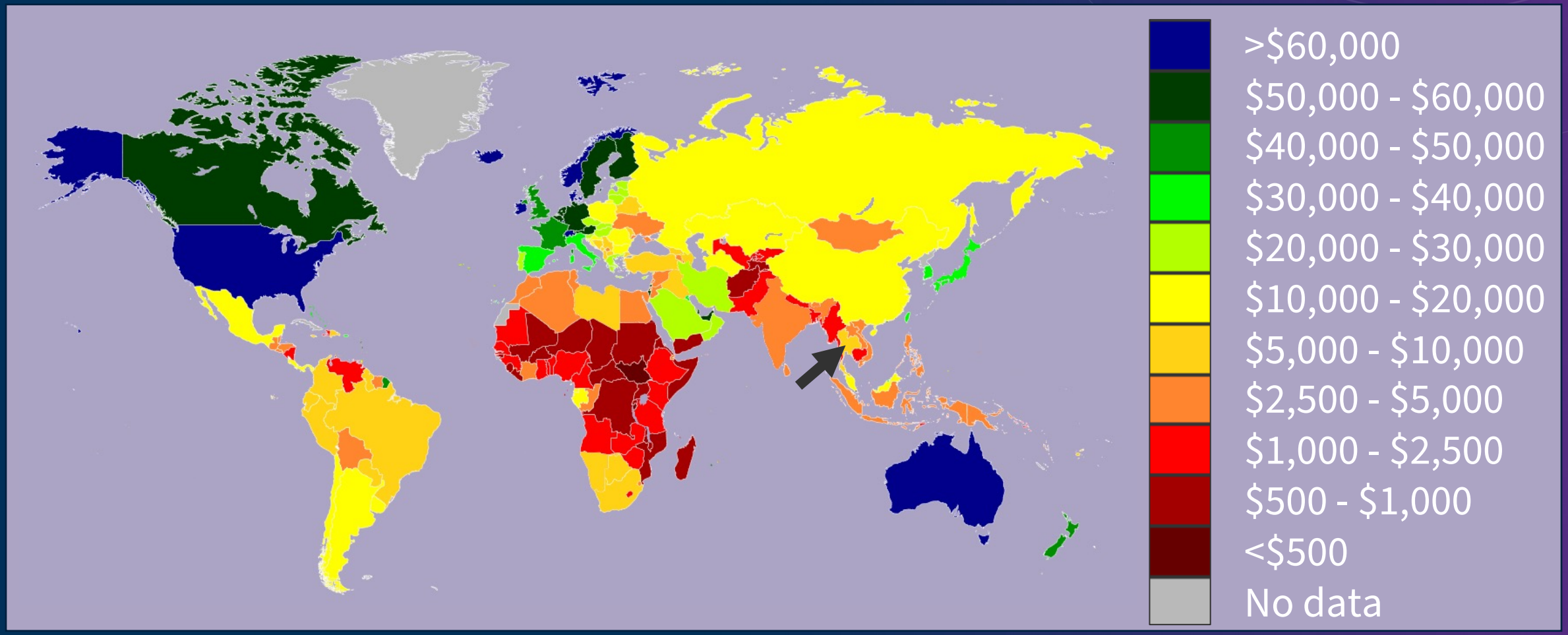

World map of countries by GDP per capita (nominal) for 2022
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Recent Thailand assets transition

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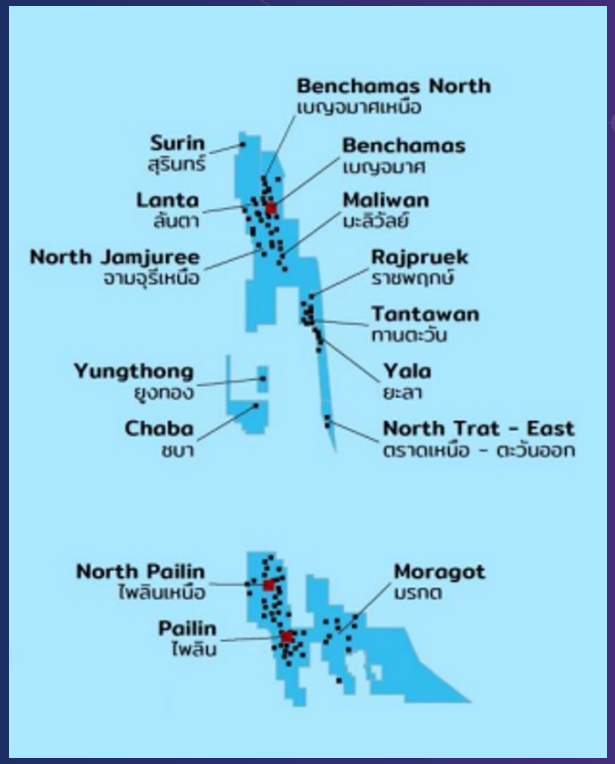
Pre-April 2022

Post-April 2022



Both production and organization size have been reduced

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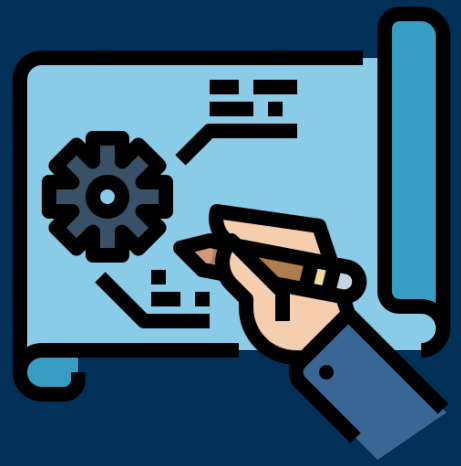
Process to implement new tool in Chevron Thailand

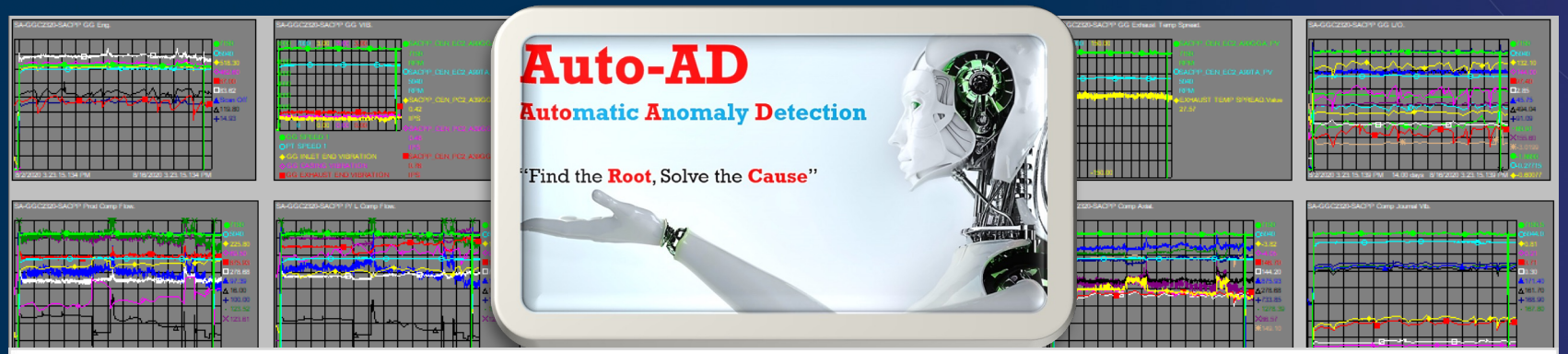


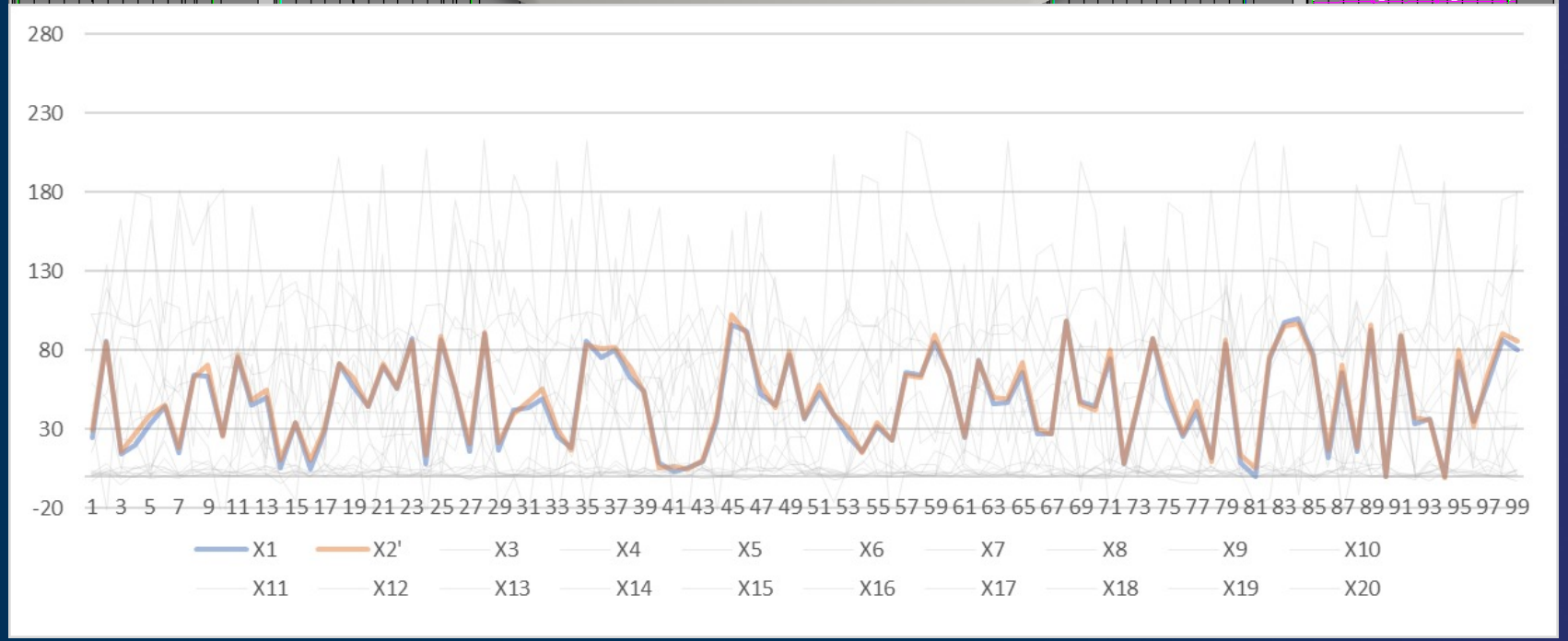
Local Prototype

Globally Check

New Development

Use case 1: Anomaly detection/Root cause analysis tool





Finding and analyzing

To analyze

Over 1,000+

faster than human

Sensors

Over 1,000,000+

Data Points

2 weeks

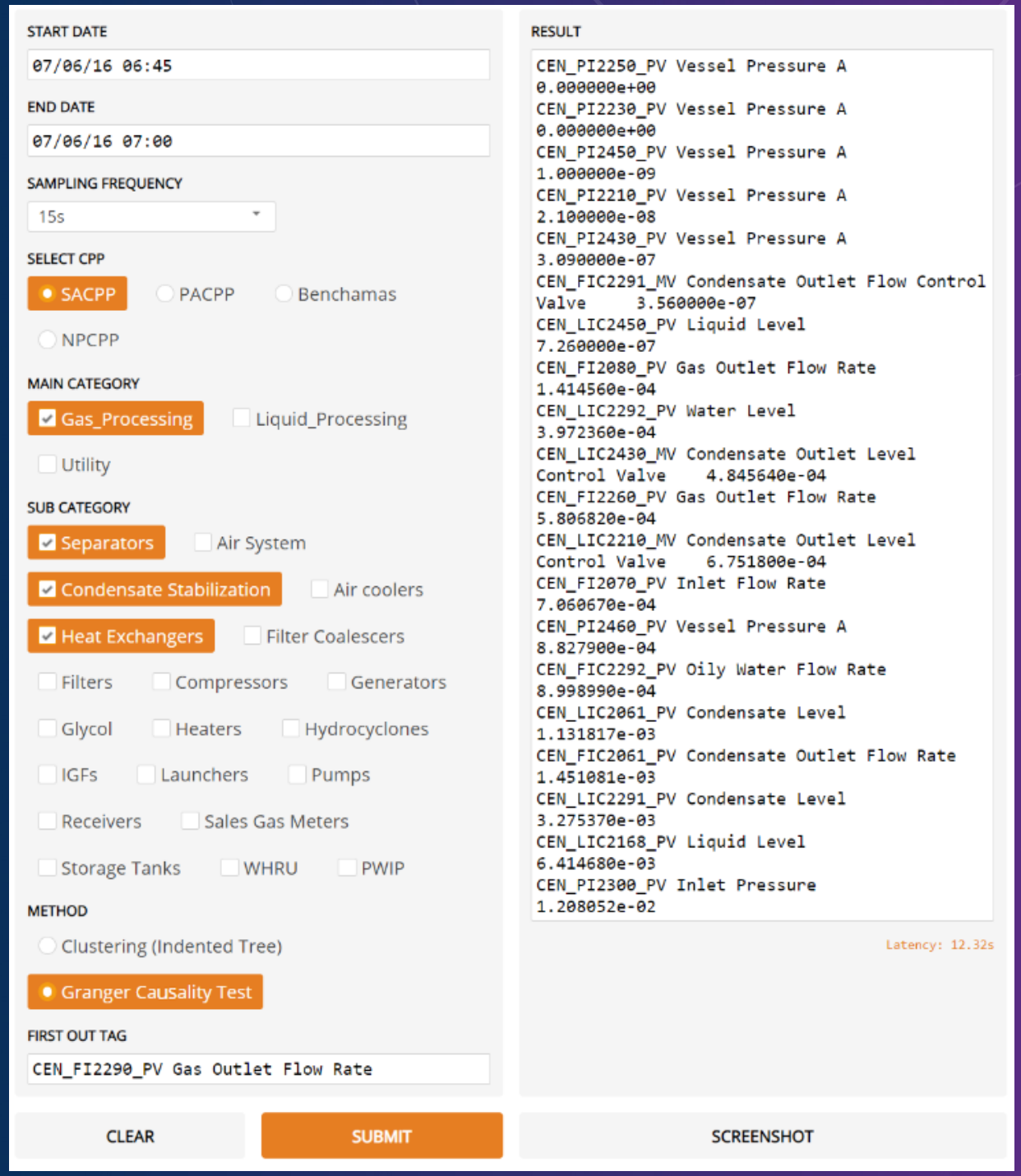
15 minutes

What is Auto-AD?

Auto-AD Prototype I is a **tool to detect statistical association** of reading from sensors by automatically streaming data from Aveva PI server, completing clustering algorithm and statistical tests, and reporting out.

Automatic **A**nomaly **D**etection

"Find the **Root**, Solve the **Cause**"



Use case 1: Anomaly detection with Seeq ML-Diagnose

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CHALLENGE

Lots of shutdown
No tool in place

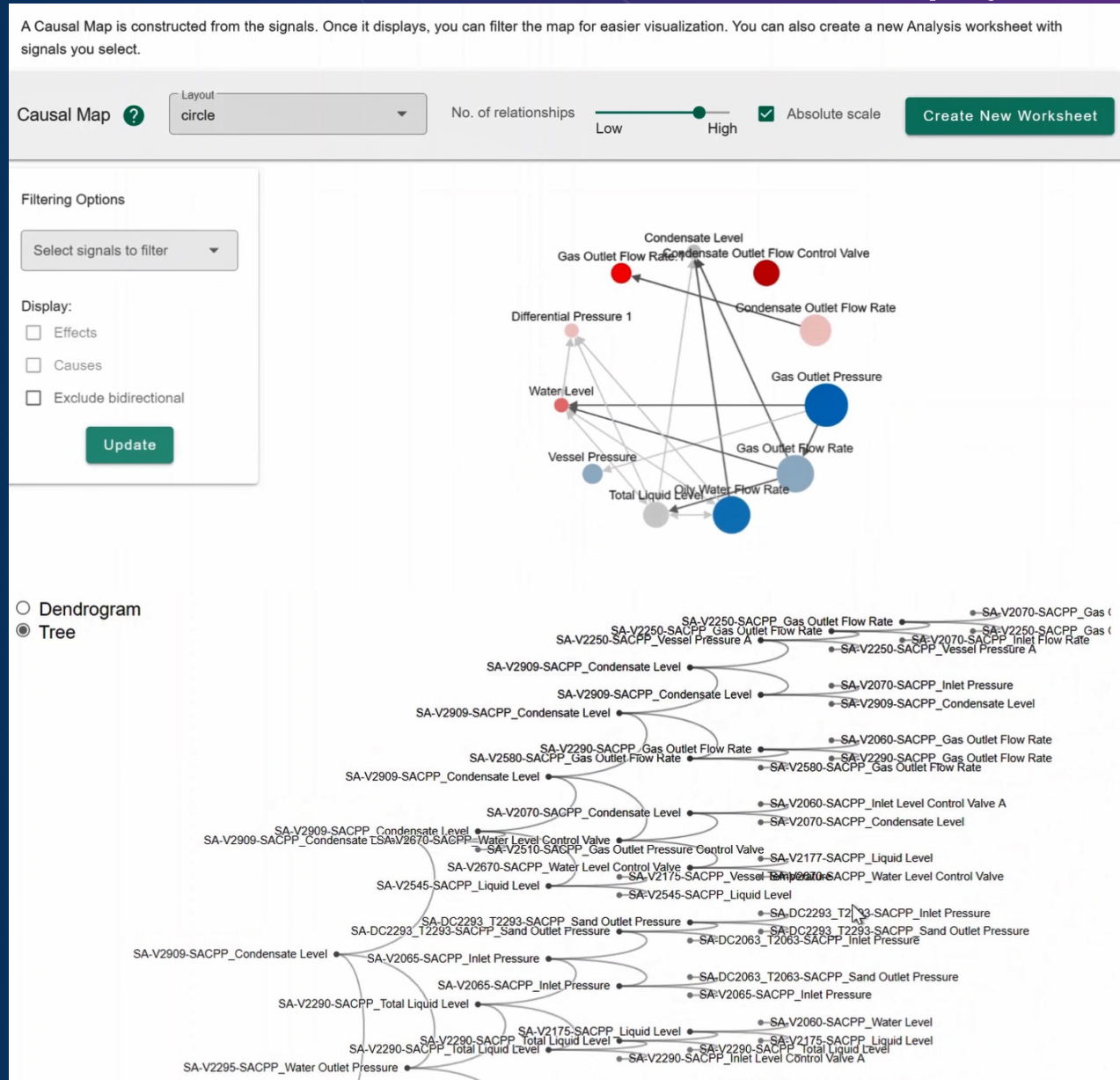
SOLUTION

Seeq ML-Diagnose
Seeq Data Lab

RESULTS

Reduce troubleshooting time from weeks to hours

7 out of 10 cases were solved



Use case 2: Condensate production optimization

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CHALLENGE

Unreliable Reid Vapor Pressure online analyzer

Fouling on exchangers

C5+ hydrocarbon is not optimized

Similar problems across other assets

SOLUTION

Data Science Model evaluation and deployment

Calculation in DCS/PI AF

Seeq platform

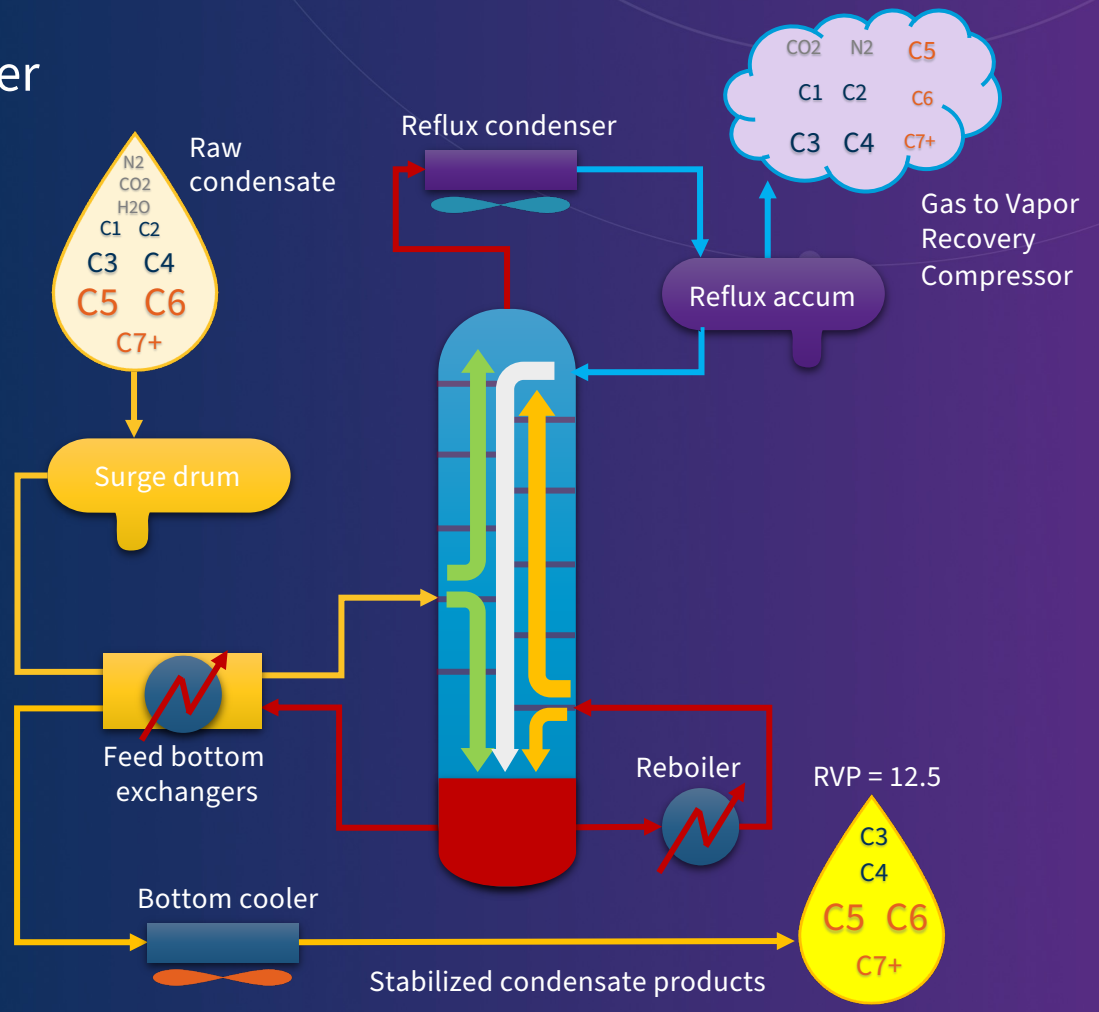
RESULTS

Improvement in RVP modelling accuracy

More accurate HEX cleaning/optimization

Values of C5+ hydrocarbon is captured

Globally optimized process



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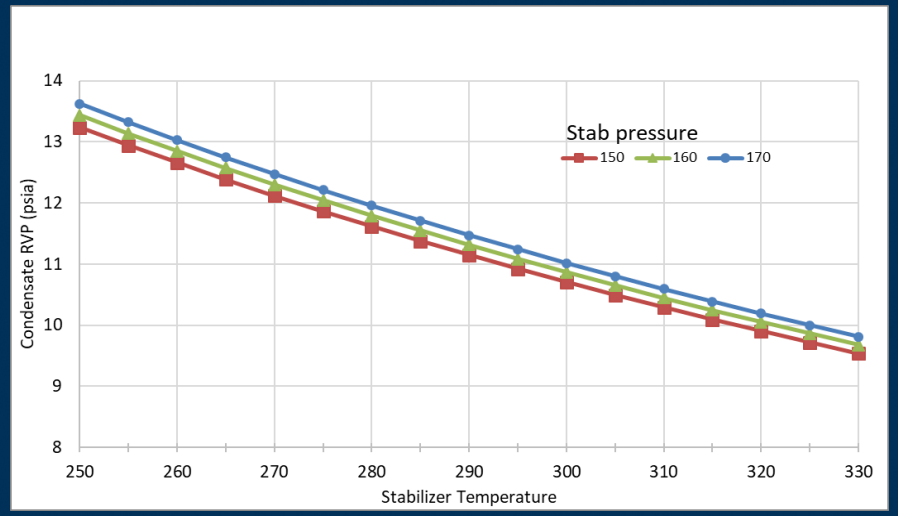
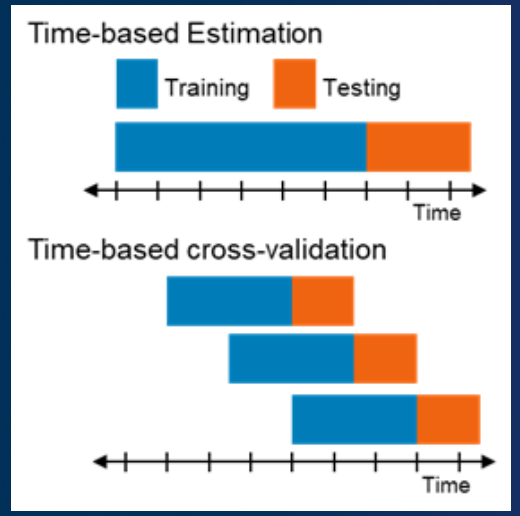
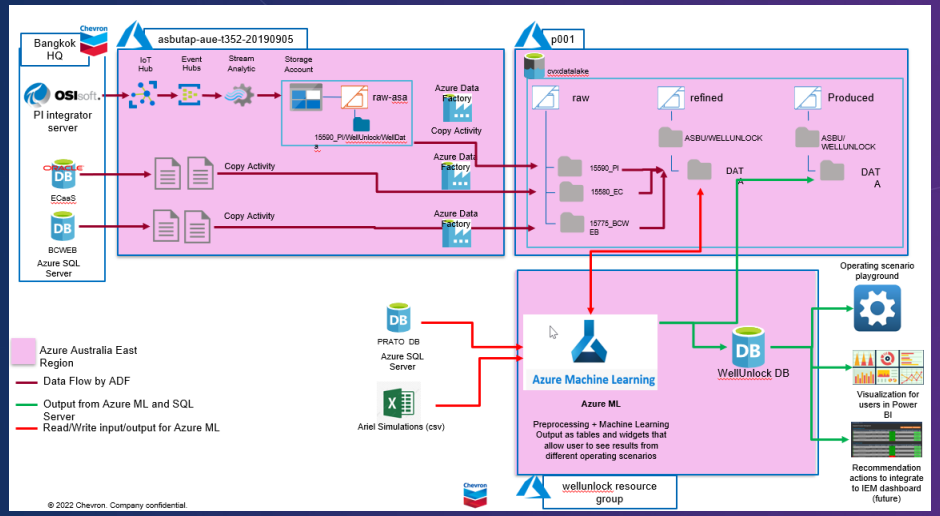
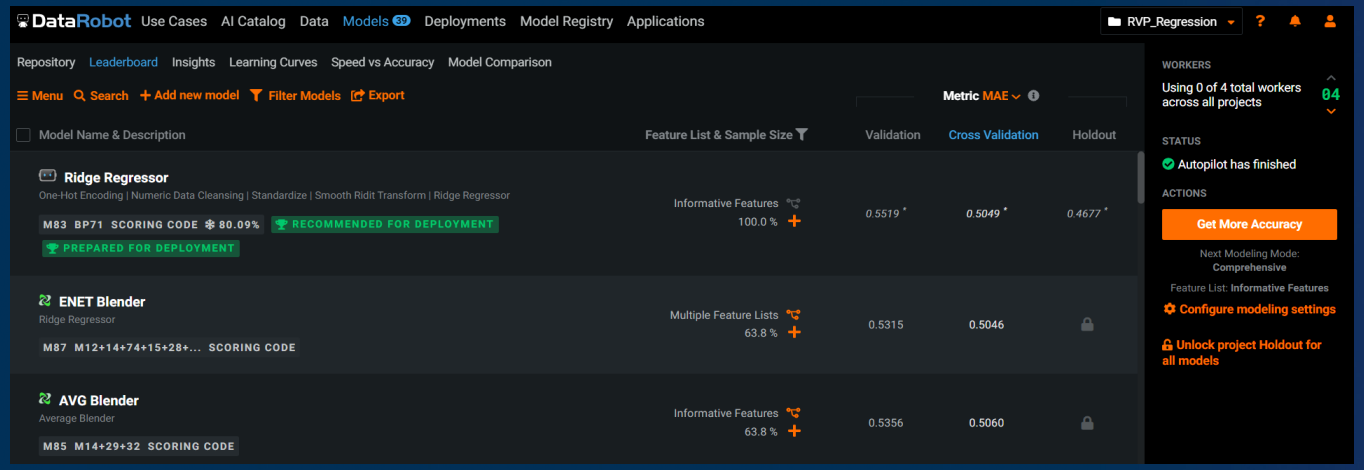
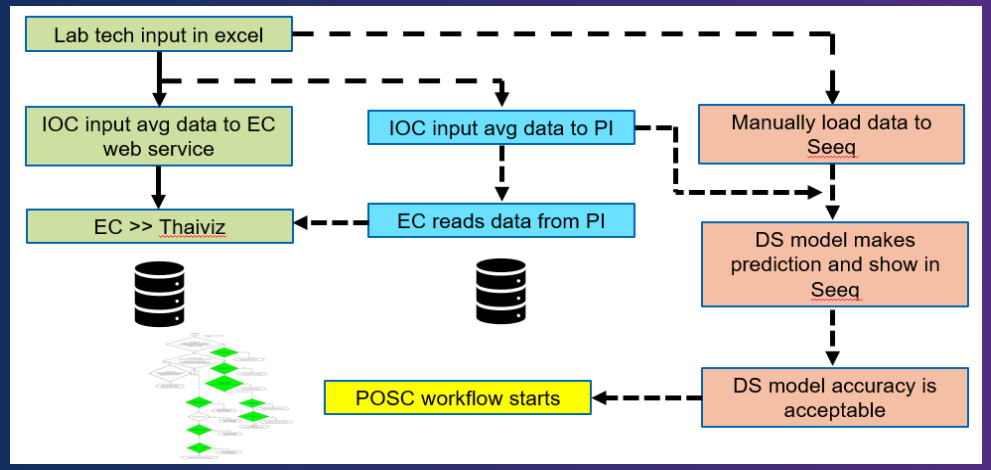
Reid Vapor Pressure (RVP) estimator model









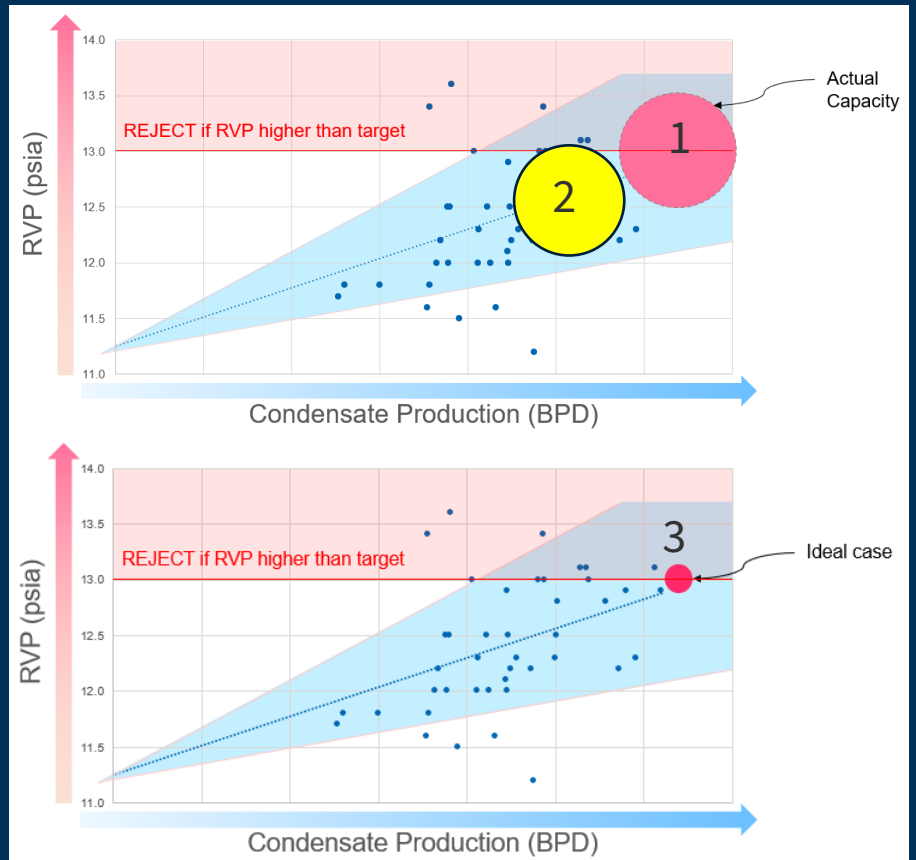


Reduce deployment time from 6 – 9 months to weeks

Condensate optimization

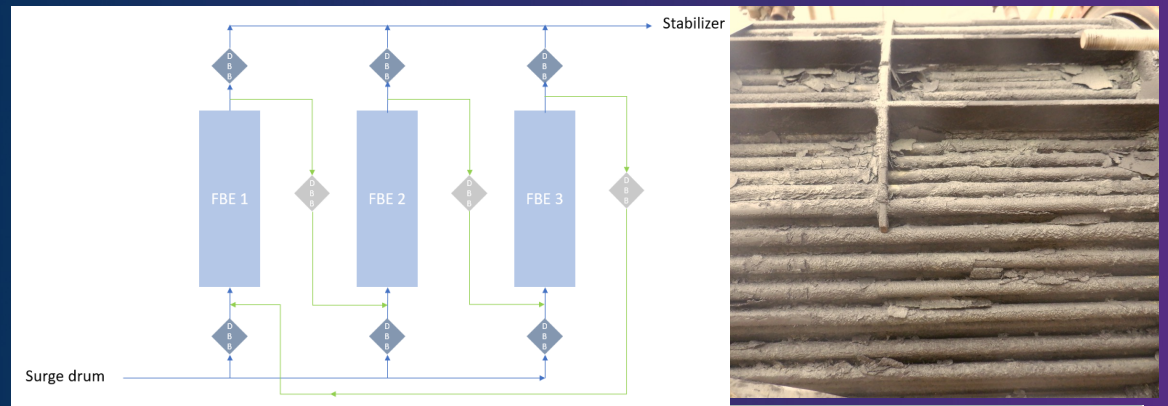
C5+/RVP control

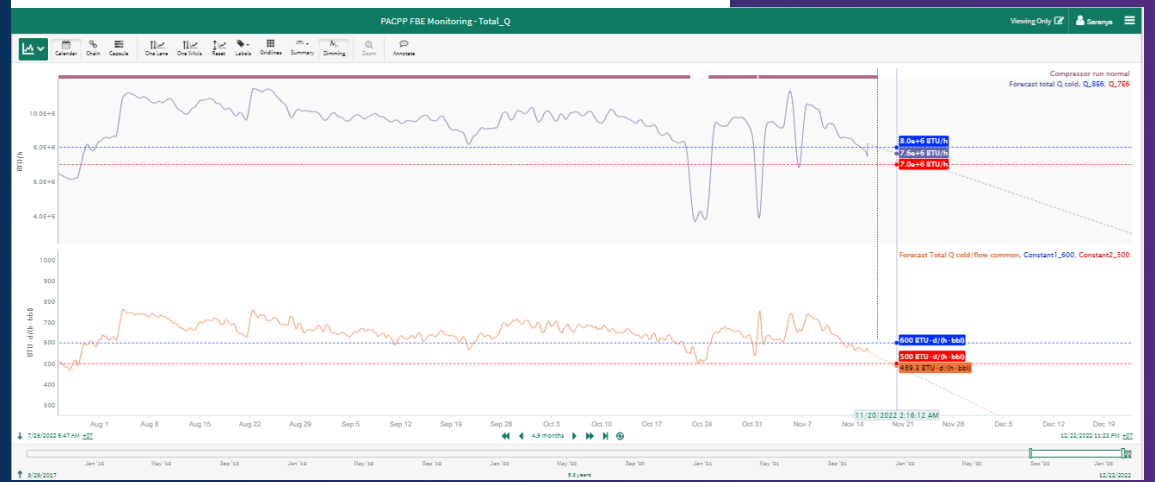
High variation due to poor control
Maximize C5+ in condensate while maintaining RVP specification



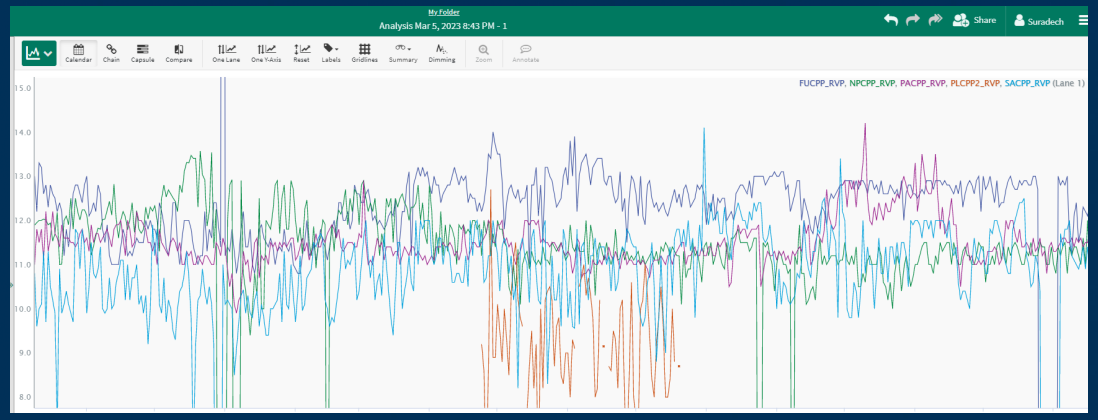
Heat exchangers

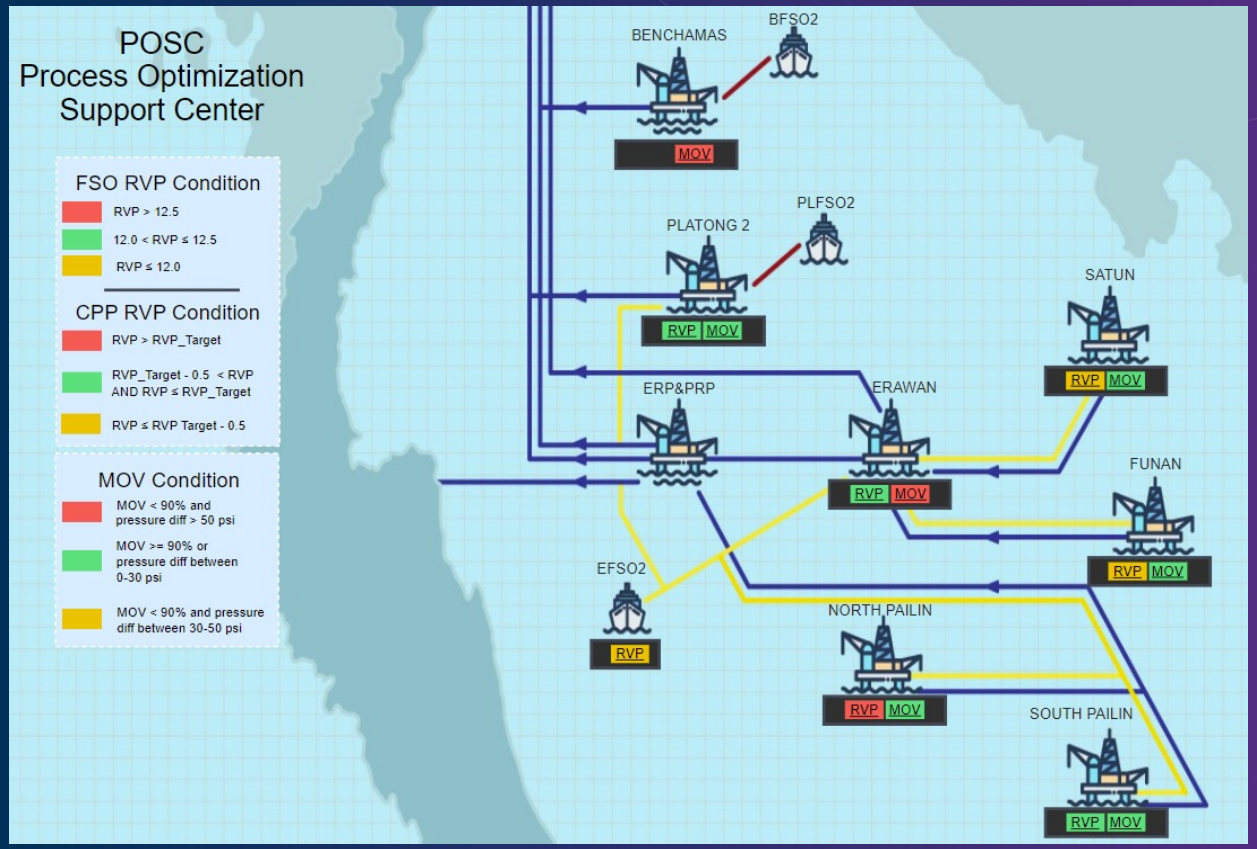
Coating/Fancy tube design
Piping modification: Parallel to Series operation





Globally optimized condensate production





Use case 3: Desander Hydrocyclone Monitoring

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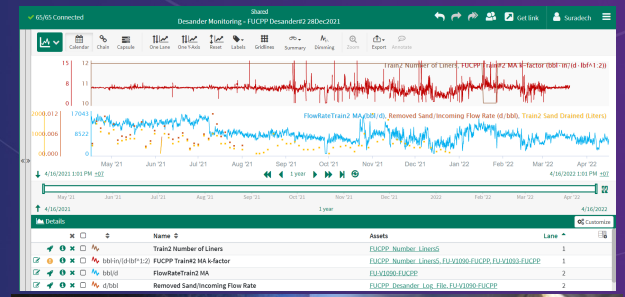
CHALLENGE

Bad performance of desander
Repetitive damage on water injection pumps

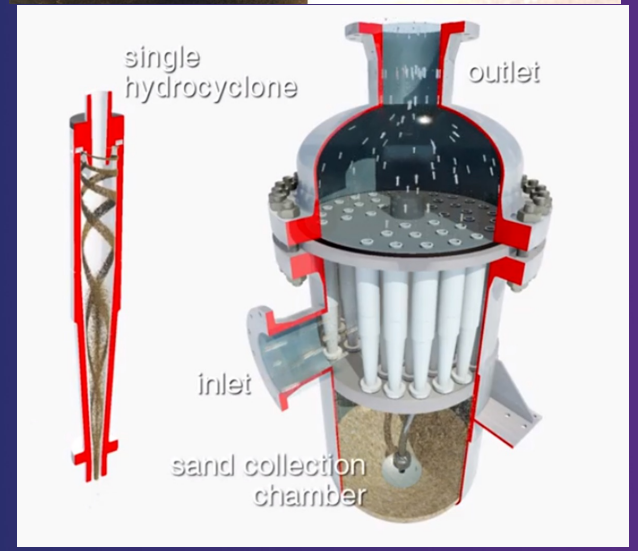


SOLUTION

Monitor the variance of k – cyclone design factor

Capacity = k $(dP)^{0.5}$ x number of liners

Investigate events with high variance



RESULTS

Extend PM time of the pumps from 2 months to 6 – 12 months

Apply similar solution to other assets

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Key takeaways

Our challenges are unique. Digital tools can be helpful.

Characteristics good digital tools are:-

- Customizable by users
- Adaptable over time
- Rely on frontline's experts
- Focus on the problems – not the technology
- What gets measured, gets done

Challenges come with opportunities – let's capture them!


Questions?
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