



**HONEYWELL
FORGE**

ENGINEERING OUTCOME-BASED DIGITAL TRANSFORMATION

WITH HONEYWELL AUTONOMY X

NO SHORTCUTS TO SMART: A STEPWISE PATH TO AI-DRIVEN OPERATION

JUNE 2026

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AGENDA

- 1. INDUSTRY CHALLENGES**
- 2. HOW APPROACHING THIS CHALLENGE**
- 3. HONEYWELL'S APPROACH**
- 4. USE CASEs / CASE STUDY**

BUSINESS CHALLENGES | ENTERPRISE INDUSTRIAL DATA

3

01 | MAXIMIZE PROFITABILITY

Inefficiency in achieving production goals & meet market demands due to people & data challenges.

03 | HIGH OPERATING EXPENSES

Delays in resolving operational issues & addressing root cause of process disturbances

05 | DECLINING HUMAN CAPITAL AFFECTS COMPETITIVE ADVANTAGE

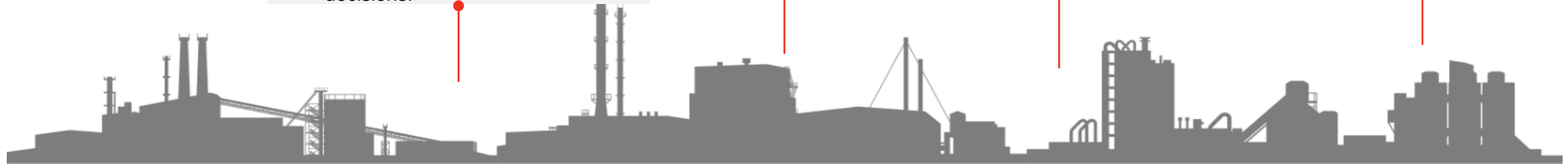
Significant effort utilized for data crunching rather than expediting innovation to secure competitive edge

02 | LACK OF EXECUTIVE OVERSIGHT

Performance management across multiple sites & functional groups leads to suboptimal business decisions.

04 | IMPROVE PLANT SAFETY

Inability to unearth abnormalities & opportunities for improvements with existing OT investments.



DATA & DOMAIN EXPERTISE ARE THE KEY DIMENSIONS OF THE ABOVE CHALLENGES

01 | SILOED SYSTEMS CONCEALS SINGLE VERSION OF TRUTH

02 | DIFFICULTY IN PERFORMING ROOT CAUSE ANALYSIS

03 | INABILITY TO QUICKLY IDENTIFY ABNORMALITIES

04 | TECHNOLOGY LIMITATIONS AFFECTS VALUE OF DATA INITIATIVES

05 | SKILLS GAP - TECHNOLOGY AND DOMAIN EXPERTISE

~70%¹

Digital Transformations fall short of objectives

~16%²

Companies that have achieved their AI targets

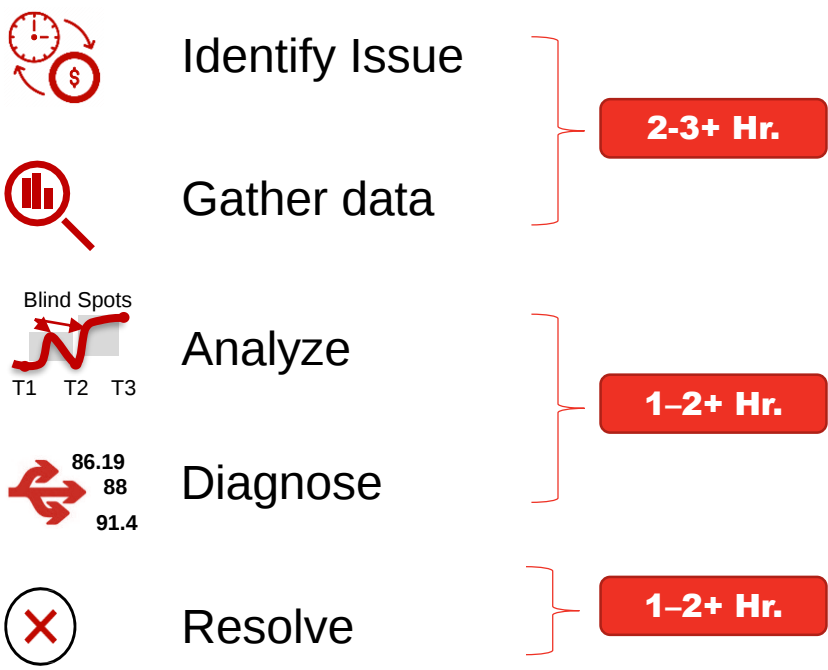
~2%²

Companies have been able to scale their AI pilots

THE PAINSTAKING PATH TO PRODUCTION MAXIMIZATION

From

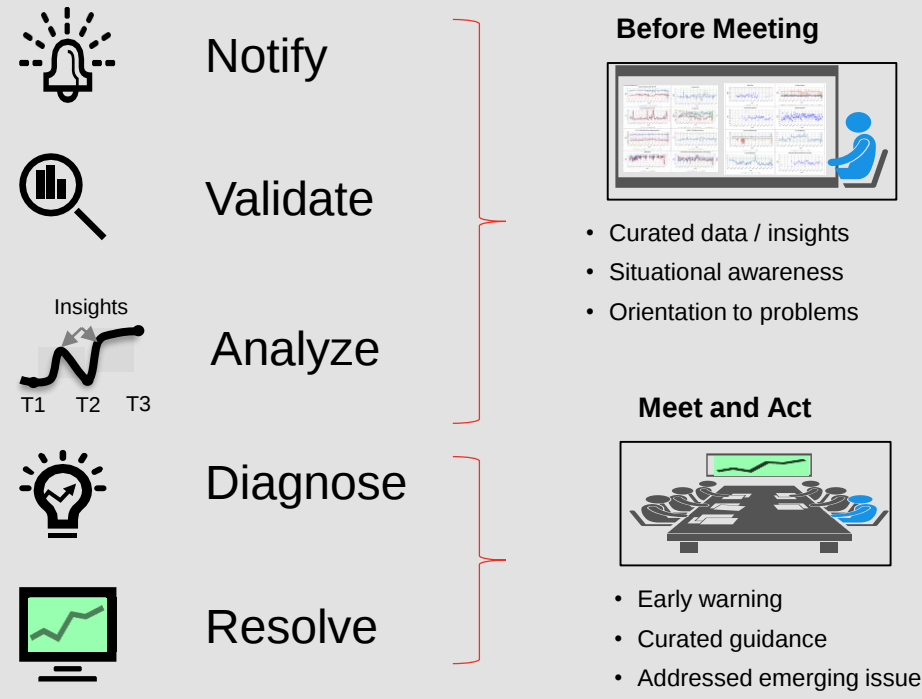
Time lost due to production challenges (e.g., shutdown, reduction in throughput, etc.) have a high opportunity cost



Traditional approaches to issue resolution are time intensive and may not identify the root cause of the problem

To

Accelerated investigation time, accuracy and repeatability to enable real time decision making



“How do I spend less time gathering data and more time optimizing?”

HONEYWELL AUTONOMYX CAPABILITIES

1

OBJECTIVES

- Avoiding the wrong start due to rush to jump start on AI
- Accelerate enterprise level digital and operational transformation for our customers
- Co-designed and tailor-made transformation programs tied to the customer's Corporate KPIs



OUR APPROACH

- Dedicated Enterprise Consulting Practice
- From Strategy to Execution
- Core Energy Verticals
- 4 Enterprise Pillars

ENTERPRISE PILLARS



AI AND AUTONOMOUS

**ADVANCING THROUGH
STAGES OF CONTROL
SYSTEMS MATURITY**



REDUCED OPERATIONAL RISK

**MINIMIZING RISK
THROUGH PEOPLE,
PROCESS, ASSET
MANAGEMENT**



DIGITAL RELIABILITY

**UTILIZING PROCESS AND
OPERATIONS KNOWHOW
TO OPTIMIZE ASSET
PERFORMANCE**



OT CYBERSECURITY

*Leveraging
existing team*

ENABLED BY:

**STRATEGY /
BUSINESS
CONSULTING**

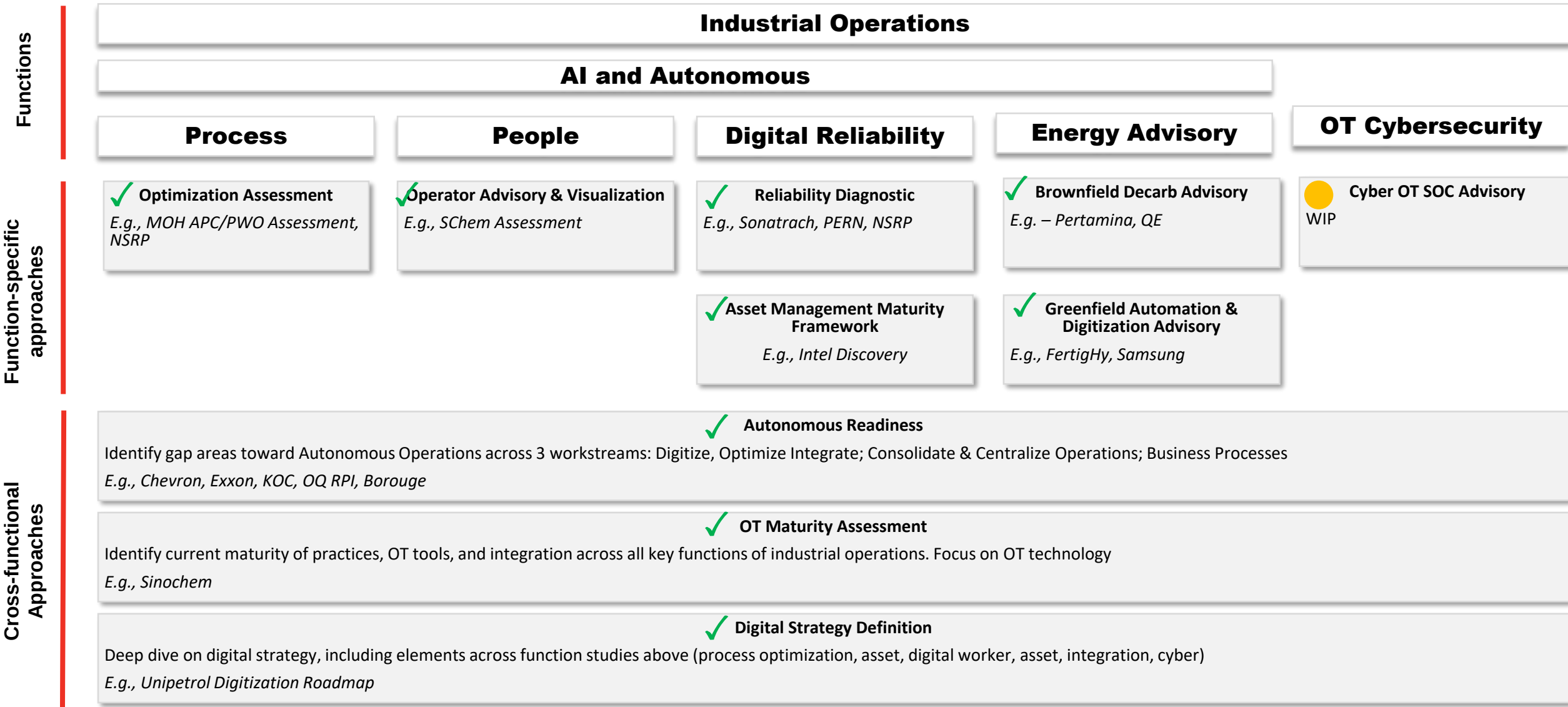
**SOLUTION
ARCHITECTS**

**CONNECTED
SERVICES**

3 YEAR NORTH STAR: \$1BN INCREMENTAL PIPELINE

HONEYWELL AUTONOMYX

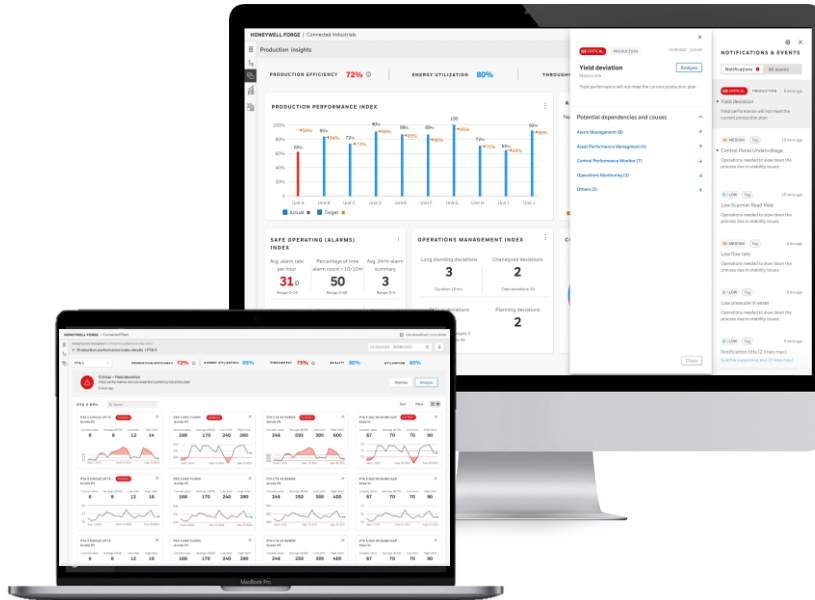
CONSULTING APPROACHES / FRAMEWORKS



HONEYWELL PERFORMANCE+ FOR INDUSTRIALS

For end users in Industrials, we provide an analytics & insights solution that is designed to provide integrated perspectives, guided diagnoses, insight to bad actors, optimized production, and sustained productivity for maximum performance and long-term growth.

SOLUTION



Built in partnership with  Microsoft

CAPABILITIES



Near real-time Performance Management

KPIs, forecasts & dashboard from unit to site to enterprise



Guided Diagnostics with Root Cause Analysis

Drive in-depth process with proactive alerts



Intelligent Search & Exploratory Analysis

Capture findings, reinforce learnings, improve workflows



AI Assistant

Generative AI based assistant to summarize information and assist troubleshooting



Predictive Analytics for Process Deviations* (under development)

Recommend actions to accelerate root cause

EXPECTED BENEFITS

IMPROVED PLANT THROUGHPUT

- Respond to opportunities with more accurate plant production information by eliminating data silos
- Help increase production by responding faster to production problems (Production KPIs) via root cause analysis & insights

IMPROVED UTILIZATION & AVAILABILITY

- Designed to improve overall uptime by operating closer to plan / closer to limits

REDUCTION IN OPERATIONS DEVIATIONS

- Faster identification of quality problems / off spec production with visibility into production

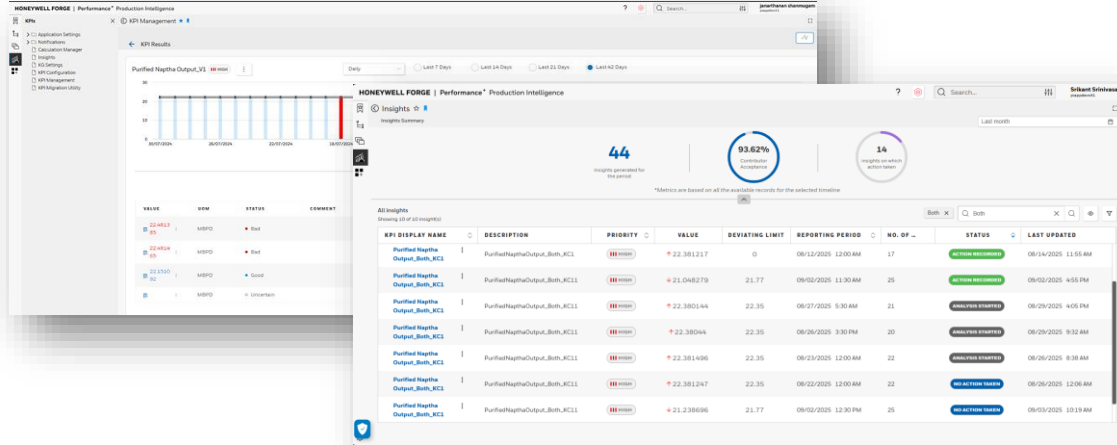
IMPROVED WORKER PRODUCTIVITY

- Helps reduce the cycle time and effort to identify issues, gather information on the issue, contextualize it to the observed problem, resolve them

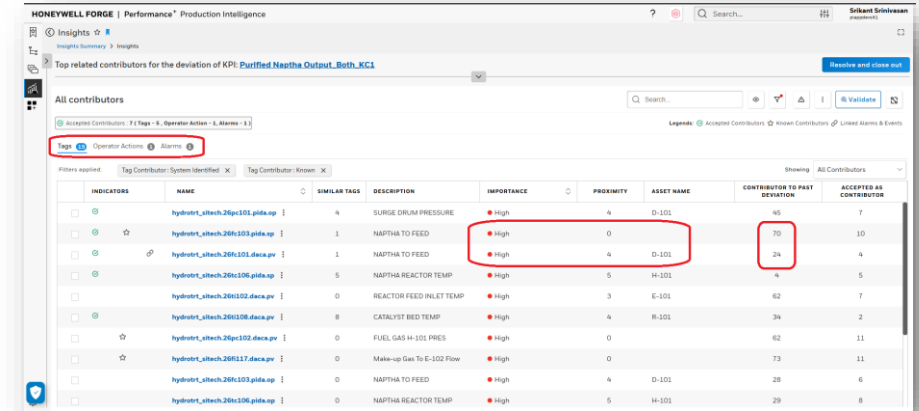
*The Predictive Analytics capabilities are under development for a future Production Intelligence product release.

PROACTIVE GUIDED DIAGNOSIS | ACCELERATED RCA

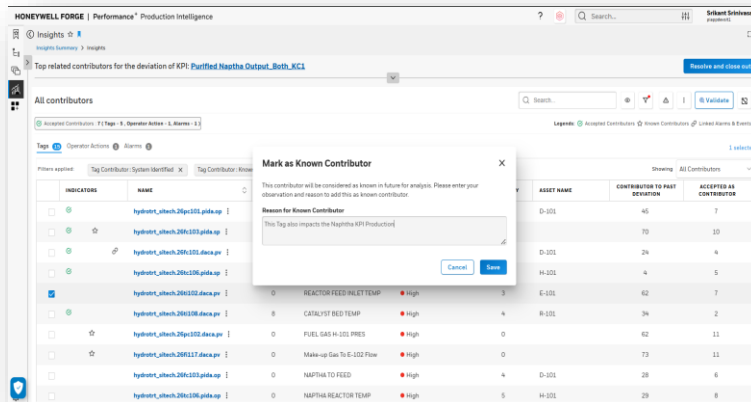
1 Plant and Unit Engineers receive alerts when KPI deviations occur, and insights are available as part of the subscription.



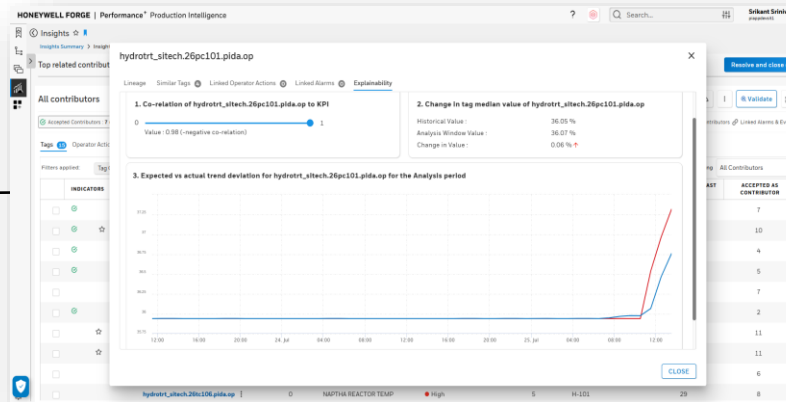
2 For each KPI deviation, the AI/ML algorithm provides the list of potential contributors as well as contextual information like its proximity from the unit, confidence & # of occurrences it was linked to previous deviation



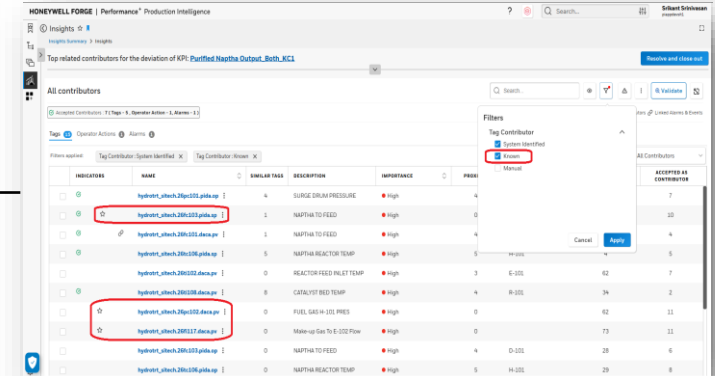
5 Users have the option to mark additional contributors as known ones with valid rationale for future Insight generation



4 Users are presented with the explainability of the Insights taking into consideration about correlation, tag value variations.

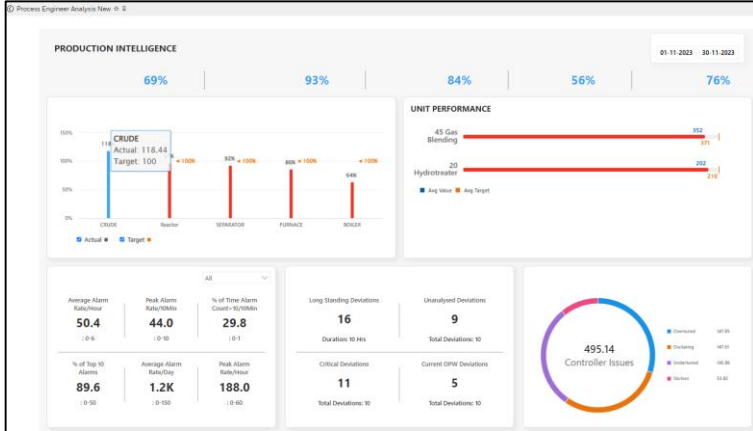


3 User based tacit / known contributors configured, are considered & indicated as part of insights generation if part of top ranked ones and clarified if they are not attributed as top ranked ones

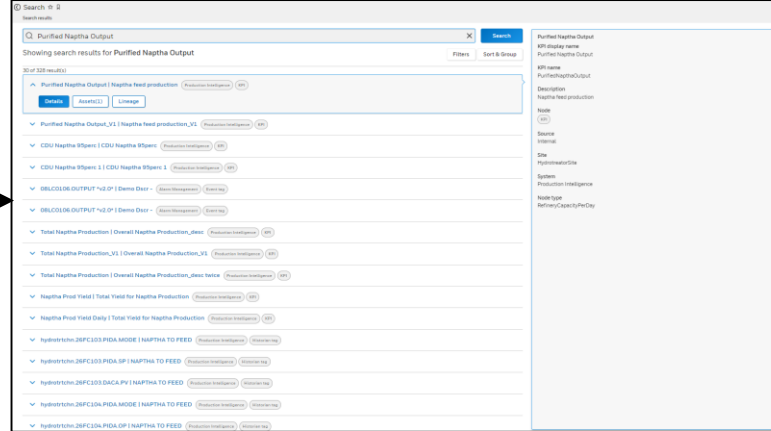


INTELLIGENT SEARCH & EXPLORATORY ANALYSIS

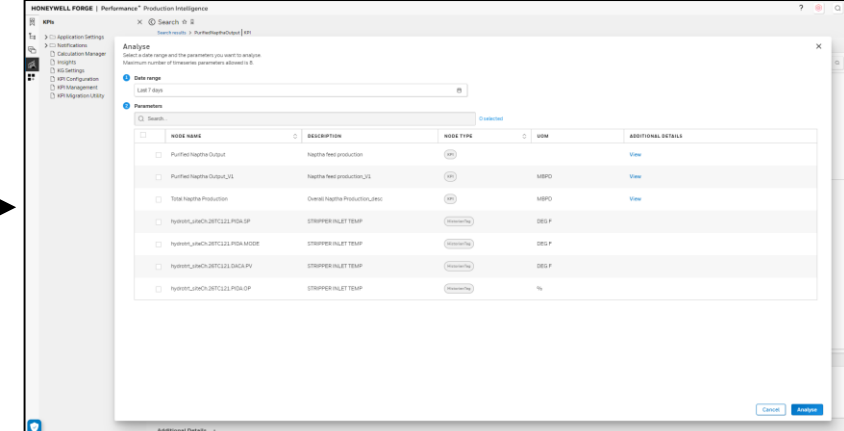
1 *Process Engineer intends to analyze a process upset on a unit (debutanizer)*



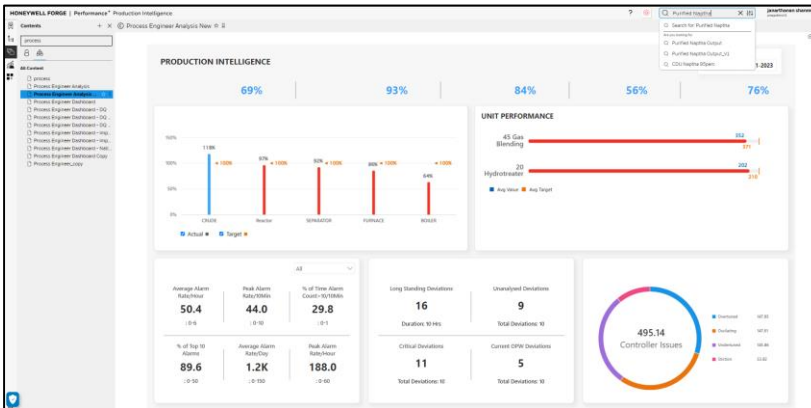
③ **The System presents all results related to Debutanizer and categorizes the results**



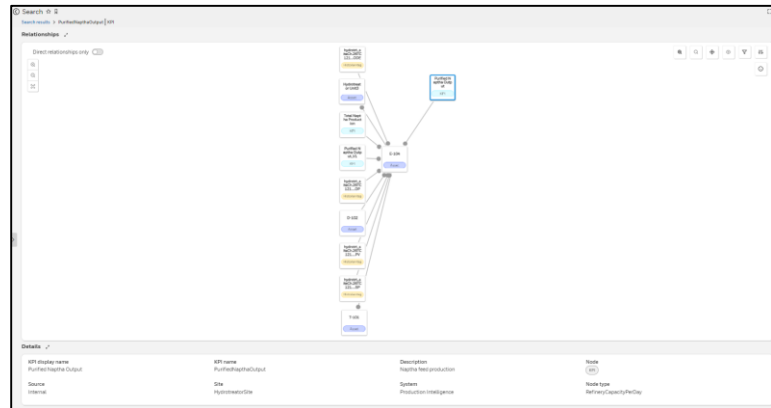
5 The data lineage (from all the OT systems) helps the PE to understand the relationships and to diagnose the parameters that influence the process upset



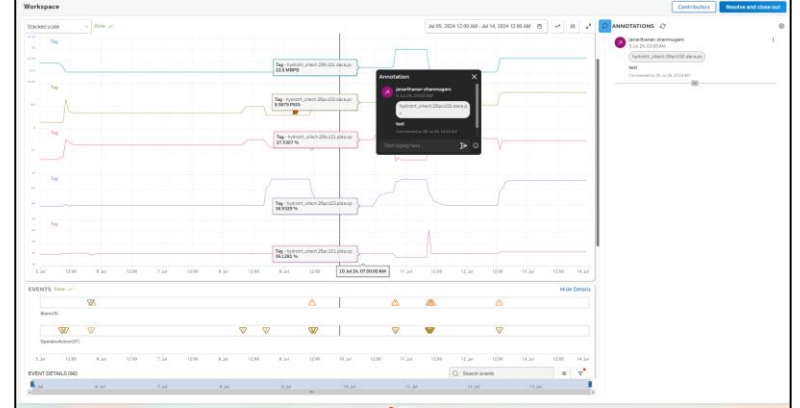
2 PE searches about debutanizer to understand the holistic contextualized information about the unit



4 System presents all OT data - KPI's , Alarms, events, tags OM deviations etc. Leverage “explore relationships” feature to understand the data lineage to aid the diagnosis.



6 Having identified the cause of the upset, PE can use the information for completing the report out as part of RCA, update SOP etc.



PRODUCTION ENGINEER INTELLIGENT AI ASSISTANT

Generative AI based models to convert natural language-based prompts into structured queries for insights

PRODUCTION ENGINEER PROMPT

Built on the AI Large Language Model (LLM) Intelligent Assistant AI surfaces relevant information related to KPIs, assets, and tags.

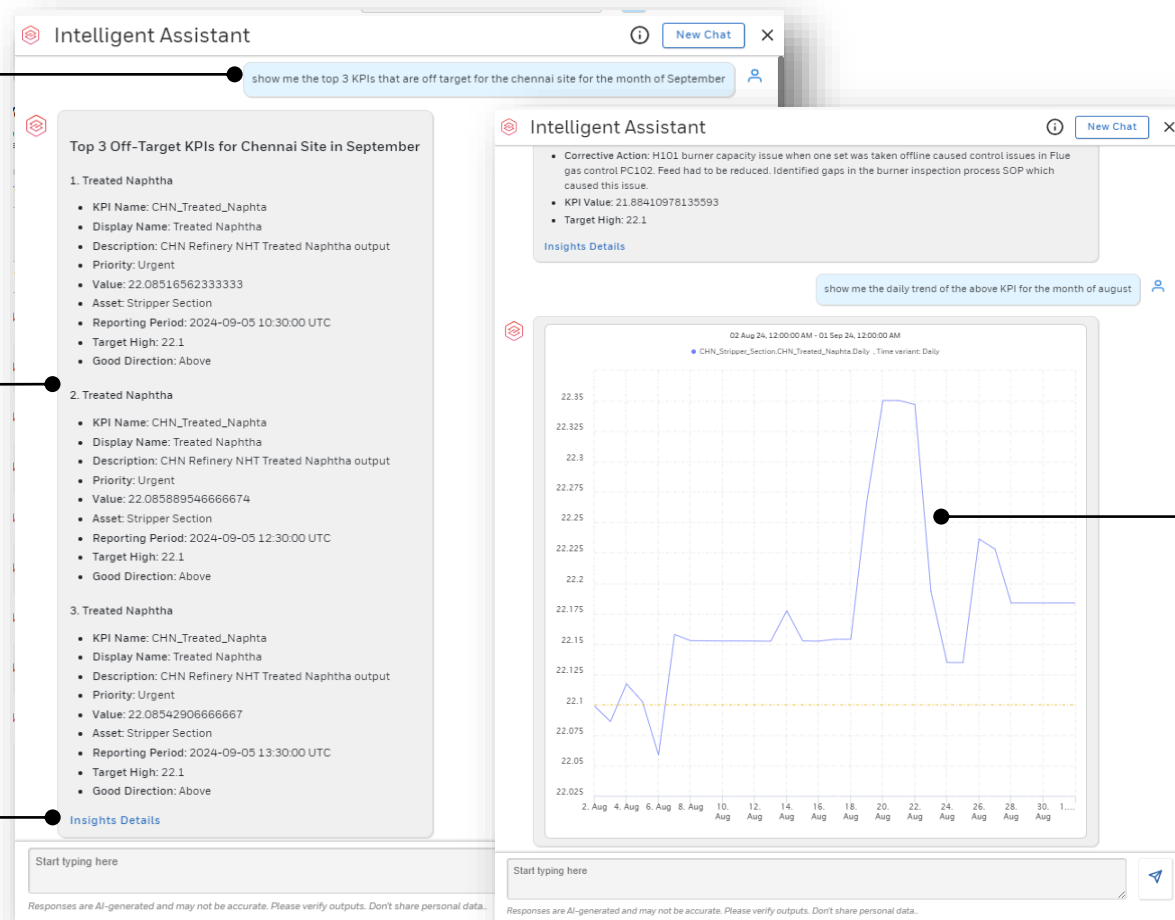
CONCISE SUMMARY

Responds to queries related to the KPI configuration, deviation, and insights.

Can also respond to queries about a group of KPIs and the selected period.

ACCELERATED ROOT CAUSE ANALYSIS

Provides summary reports with details to quickly provide insights for issue resolution



PROCESS TREND ANALYSIS

Queries data sources including process historian, timeseries data, asset relationships and KPI deviation causes enabling the user to visualize and trend KPI performance

RECENT SUCCESSES

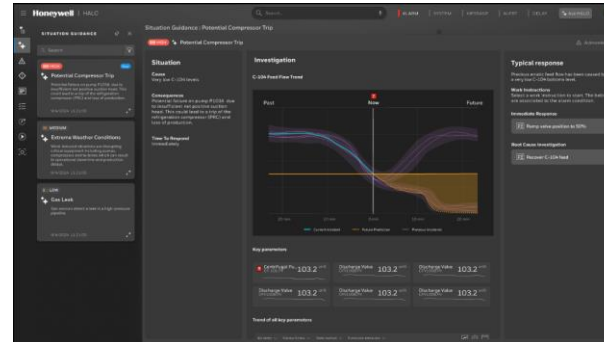
CHEVRON: AI ALARMS ASSISTANT

CHALLENGES



- **New / Early Career Operators** – Skills gap to handle critical alarms
- **Loss of Profit** due to Unscheduled downtime, lowered Operational throughput due to human errors
- Need to improve alarm handling – **consistent and accurate handling** of alarms

APPROACH



Experion Operations Assistant

Experion R520

Alarms Ux

KG & SLM – to contextualize

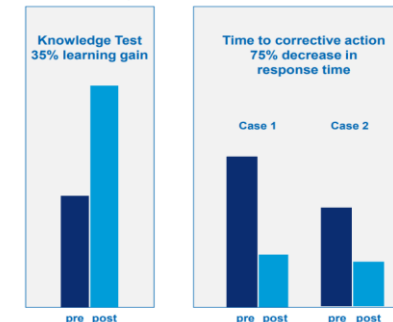
Focussed on Assistance

OUTCOME OF STRATEGIC COLLABORATION



DANA/HALO Testing Outcomes

Quantitative Results



Qualitative Results

- **Initial impressions were positive:** The tool was seen as useful and informative, showing uncommon alarms and being easily accessible on the console. It supported troubleshooting, especially when experienced personnel weren't available.
- **Learning to use the tool was straightforward:** Users reported little to no difficulty in learning it.
- **Most useful features included** historical corrective actions and trends: Past operator actions and response options helped users confirm or adjust decisions, reducing uncertainty. Multiple alarm-handling options and location highlights were also appreciated.
- **Suggestions for improvement** focused on broader access and interface adjustments: Participants wanted guidance for all alarms, including cleared ones, and historical data for all control points.

RECENT SUCCESSES

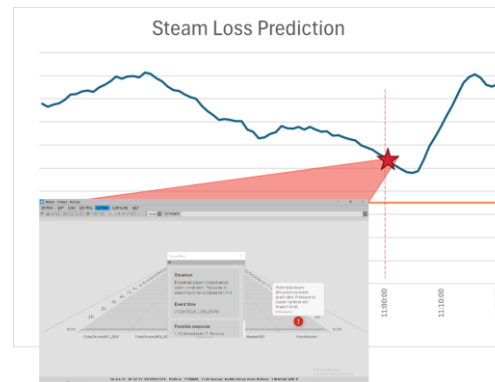
TOTAL PORT ARTHUS: ML PREDICTIONS USE CASE

CHALLENGES



- **Steam Disturbance** caused **unscheduled shutdown** of DCU—causing flaring and fines
- **Loss of Production and profit Opportunities**
- Skill gaps in Operators caused different operators to react differently causing the improper shutdown & flaring

APPROACH



Experion Operations Assistant

Experion R530

HALO Runway

Python Engine

ML Models

OUTCOME OF STRATEGIC COLLABORATION



Total Reported

- 5-10 minutes early prediction of steam disturbance
- This gives enough warning for operators to take corrective actions
- Reduction is steam related events and minimal flaring

USE CASE 1: ABNORMAL SITUATION PREDICTION FOR A DELAYED COKER UNIT

PROBLEM / NEED

- Coker units convert residual streams to higher-value products and improve refinery economics overall
- Coker units have a high number of sensors and potential alarms, and different abnormal situations can arise. Common problems include heater fouling, coke drum foaming, product quality, drill stem breakage, etc.
- Operators can be overloaded with a lot of unnecessary alarms and are not able to quickly prioritize which alarms are critical to assess. Compounded minor issues can lead to abnormal situations that lead to failures and downtime.

SOLUTION

- Use historical data to build relationships to connect unit performance to the triggers for the alarms that have occurred
- Identify complex abnormal situations and provide guidance to fix before a deviation occurs
- Update the model to comply with the new hardware specifications, if an asset is upgraded or added to the process

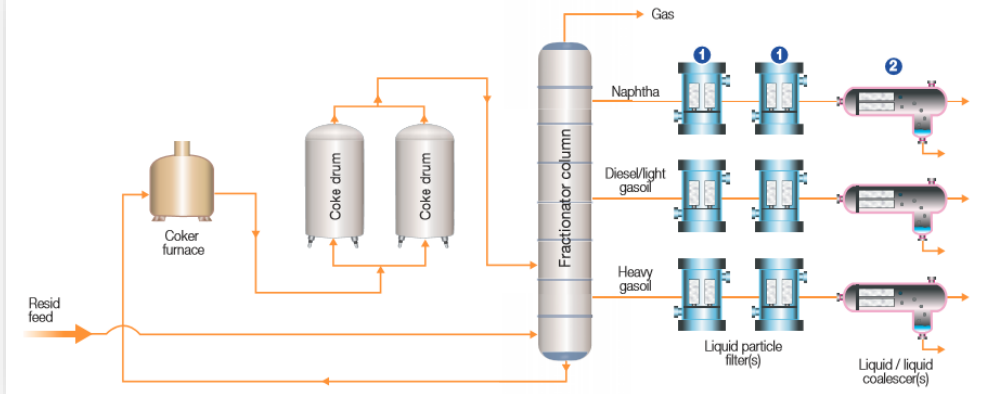
RESULTS / LESSONS

- Predicted alarms and violations
- Optimized production performance
- Improved ability to meet coker unit production quotas
- Reduced reliability issues

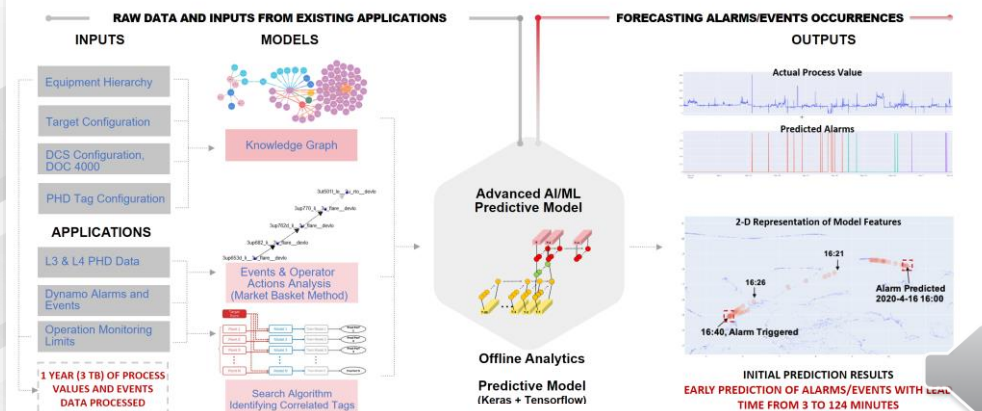


**INCREASED
UTILIZATION AND
AVAILABILITY**

Process Flow Diagram



Predicting Alarms and Limit Violations



USE CASE 2: RESOLVING CDU YIELD DEVIATIONS IN APAC REFINERY

PROBLEM / NEED

The customer faced persistent yield deviations in CDU2 and VDU2 units, impacting efficiency and profitability.

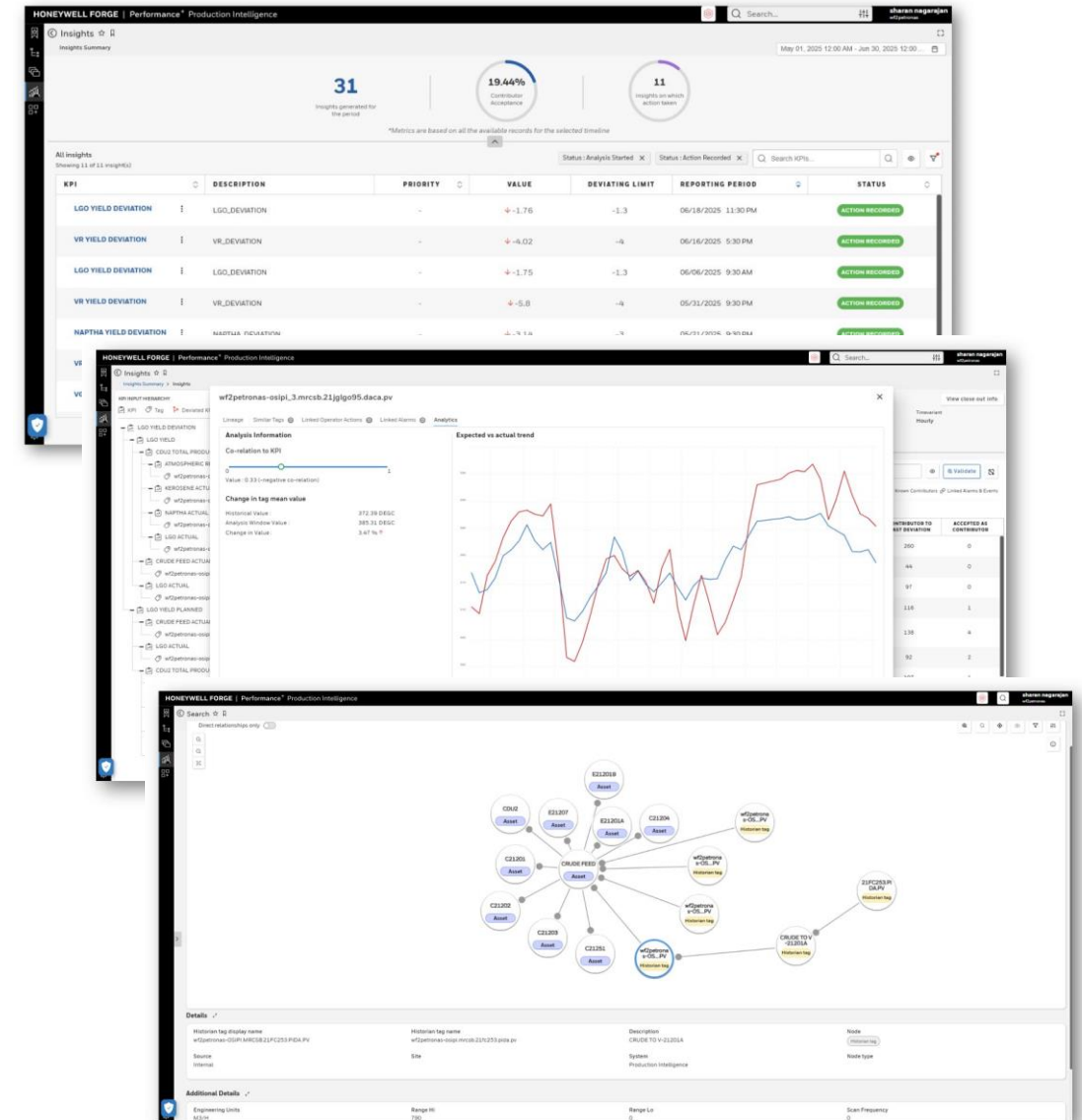
- **Operational Challenges:** Disconnected OT systems limited data visibility; no real-time alerts delayed responses; manual RCA was slow and inconsistent; no structured approach to upsets or crude changes; engineers lacked a unified KPI dashboard.
- **Administrative Challenges:** High costs and vendor lock-in risks; costly sensor-to-system connectivity.

HOW PRODUCTION INTELLIGENCE HELPS

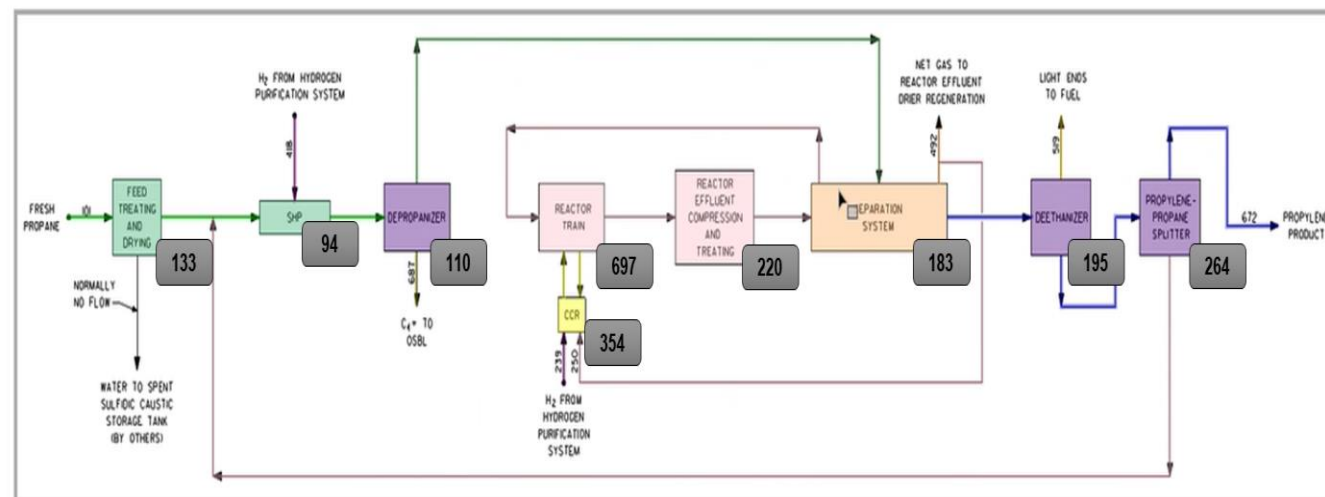
- The solution uses AI/ML and a knowledge graph for rapid, automated root cause analysis, providing actionable insights through a single view accessible to operators, engineers, and leadership. This streamlined the detection, diagnosis, and resolution of process issues.

BENIFITS

- **Financial Impact:** Potential USD 1.4–1.6M in 2023 and USD 1.1–1.4M in H1 2025.
- **Operational Efficiency:** Faster detection and response; Consistent RCA and better decisions; AI/ML links contributors by timing and proximity.
- **Cultural Shift:** Data-driven teams and cross-functional collaboration.



USE CASE 3: IMPROVING PROPYLENE THROUGHPUT | UOP OLEFLEX PROCESS



Propylene Business

- Propylene demand expected to increase to **165 MTPA** from 109 MTPA ; **50%** increase in production capacity in next 5 years ¹
- **Oleflex process is economically efficient v/s conventional cracking technology** ²
 - **90%** conversion of feedstock v/s 50-70%
 - **35%** reduced energy consumption
 - **30 %** reduced water consumption

Operational Challenges

- Complex process (see schematic above) with multiple KPI's - Propylene Throughput, Propane Consumption, Steam Consumption
- Requires SME to troubleshoot KPI deviations. SME expertise and availability are on a continuous decline.
- In absence of a rapid RCA, Operations are forced to compensate for KPI deviations by adopting sub optimal operating practices
- For example, “Propylene Throughput” reduces, the Operations Team will
 - Consume additional Propane feed to meet the production target
 - This will result in overutilization of the equipment.

¹ <https://www.plastemart.com/plastic-technical-articles/50-percent-increase-in-global-propylene-production-by-2030-leads-to-shift-in-historical-supply-relationships/2163>

² <https://uop.honeywell.com/en/news-events/2017/05/oriental-energy-company-ltd-starts-propylene>;

² UOP Oleflex™ Process Customer Testimonial | Olefins Solutions | Honeywell | (youtube.com)

² <https://dspace.library.uu.nl/bitstream/handle/1874/21674/NWS-E-2006-3.pdf?sequence=1>

BENEFITS

Estimated benefits based on

Optimal Feedstock Consumption

A

- Average Yield of Oleflex unit is 87%
- For a 525,000 MT Capacity of Oleflex requires 603,000 MT of Propane
- For a 1-1.5% drop in yield (annually) , the operations team will have to increase 7000 - 7500 Tonnes of feed to meet the production target.
- This additional cost of feed (propane) results in Gross margin impact of \$ 3.3M to maintain the same production target

Minimize Turnarounds

B

- Additional feed processing leads to equipment degradation resulting in increase in frequency of turn arounds
- 3-4 turnarounds over the 7-year period for the Oleflex unit owing to inefficiencies.
- Average each turnaround costs \$ 10M.

Production Intelligence maximizes benefits by

C

- Oleflex unit real-time performance monitoring
- Automated Root Cause Analysis process
- AI/ML powered Guided Diagnosis to identify root causes
- Data driven approach to uncover new root causes
- Knowledge Capture & Reinforced learning to improve recommendations

~ \$2.2M

Reduction in additional feedstock

~ 60 %

Reduction in RCA efforts

~30%

Reduction in turnaround over 7 years

THE HONEYWELL ADVANTAGE



Purpose-built for Process Engineers

Domain-specific and built for process engineers



Pre-packaged with Scalable Analytics

Scalable use cases with pre-built models for scale



Insights do not require Data Science Expertise

Pre-packaged analytics to deliver insights without Data Science expertise



Built with Honeywell's own Industrial Heritage

Products built and tested using Honeywell's own production facilities



Pre-built with OT Specific Data Connectors

Out-of-the-box connectors for multiple OT applications



Vendor Agnostic

Source agnostic, open and interoperable

DOMAIN SPECIFIC OUTCOME-ORIENTED SOFTWARE

For more details, please visit

<https://process.honeywell.com/us/en/products/industrial-software/operational-excellence/honeywell-forge-production-intelligence>

