AVEVA PI WORLD

OPE (Overall Process Effectiveness) analytics for better performance intelligence

Optional Subtitle

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OPE (Overall Process Effectiveness) analytics for better performance intelligence

The Ecolab Clearing Plant outside Chicago, IL had plenty of sensor data but they were not structured for OPE (overall process effectiveness) or OEE (overall equipment effectiveness) analysis.

Join us for this session as we walk through how we used the PI System's function primitives and other AF/EF capabilities for data modeling and then applied the manufacturing context to raw sensor (time-series) measurements and lab quality data to prepare for OPE diagnostics. This upfront data engineering also proved to be critical for PI Vision and BI (business intelligence) displays for visual analytics.

Lastly, we will discuss the insights and business benefits we have seen so far, including the next phase in this ongoing work to incorporate machine learning (ML) for additional analytics.

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Problem Statement

Munchies for the band (Van Halen) in their dressing room…

IT vis-à-vis Process Engineer

IT

… Just give me all the data, let's put it in a data lake and we'll figure it out…

Process Engineer

… Let's decompose the problem into smaller chunks – do a first-cut analysis with tools and resources we already have…

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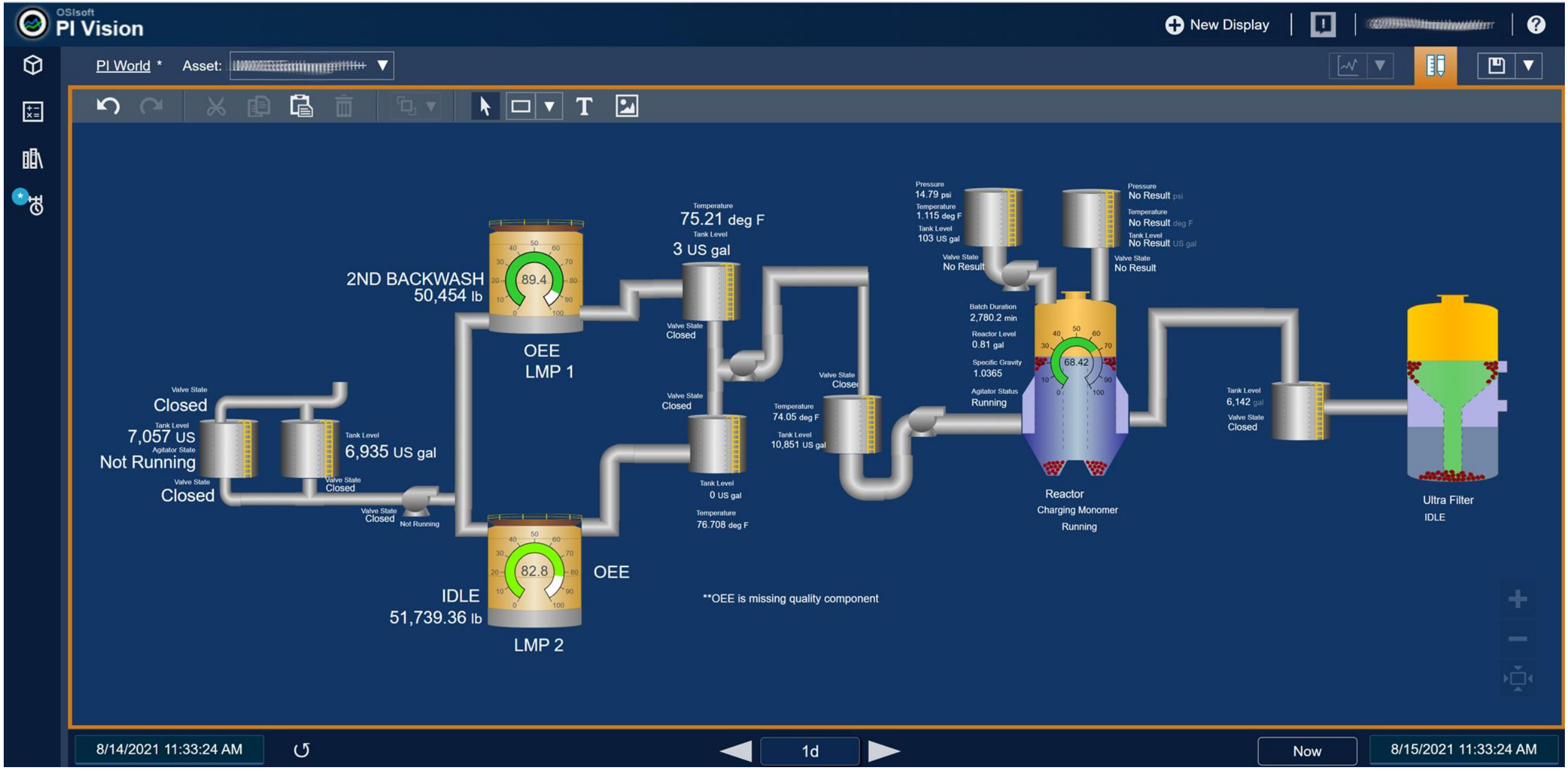

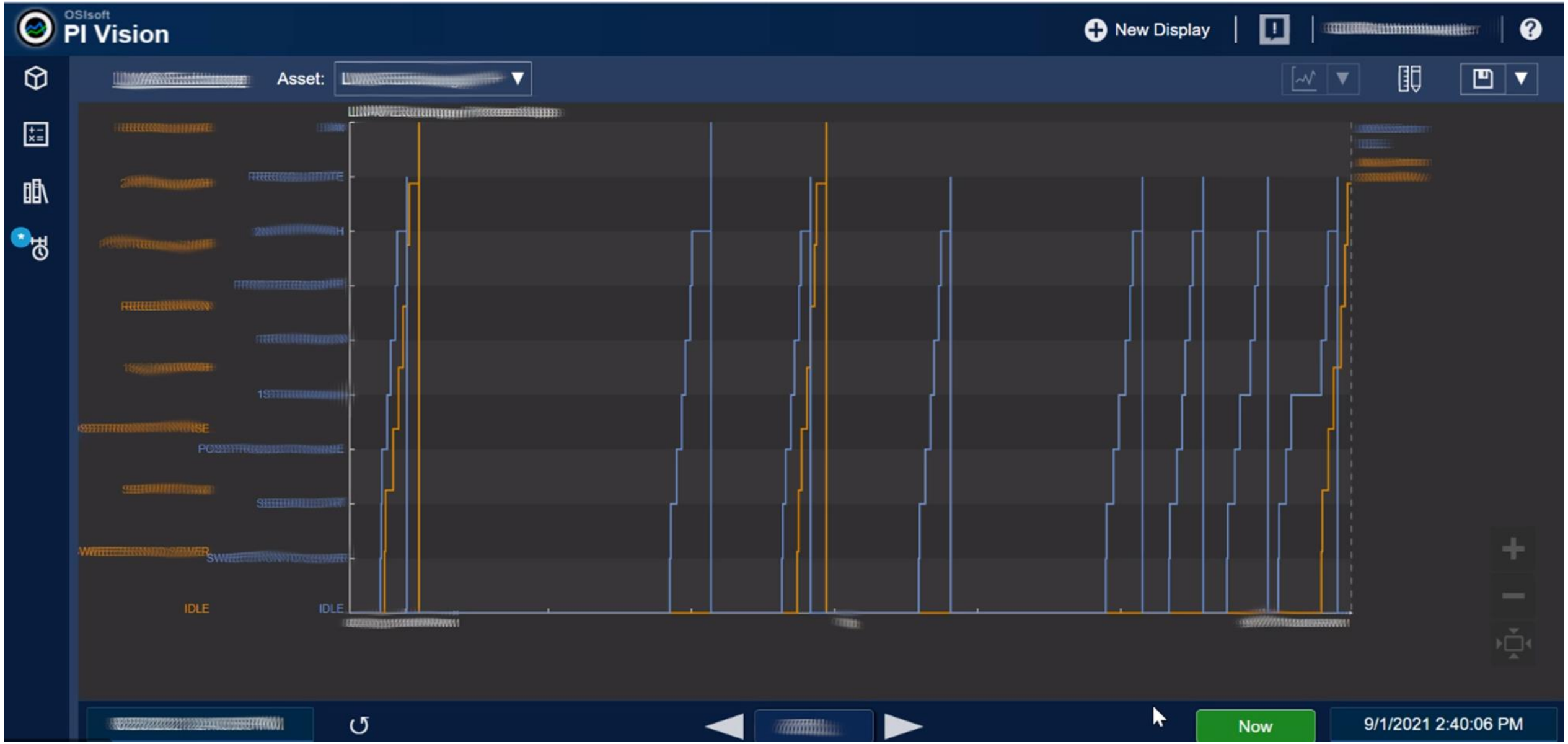

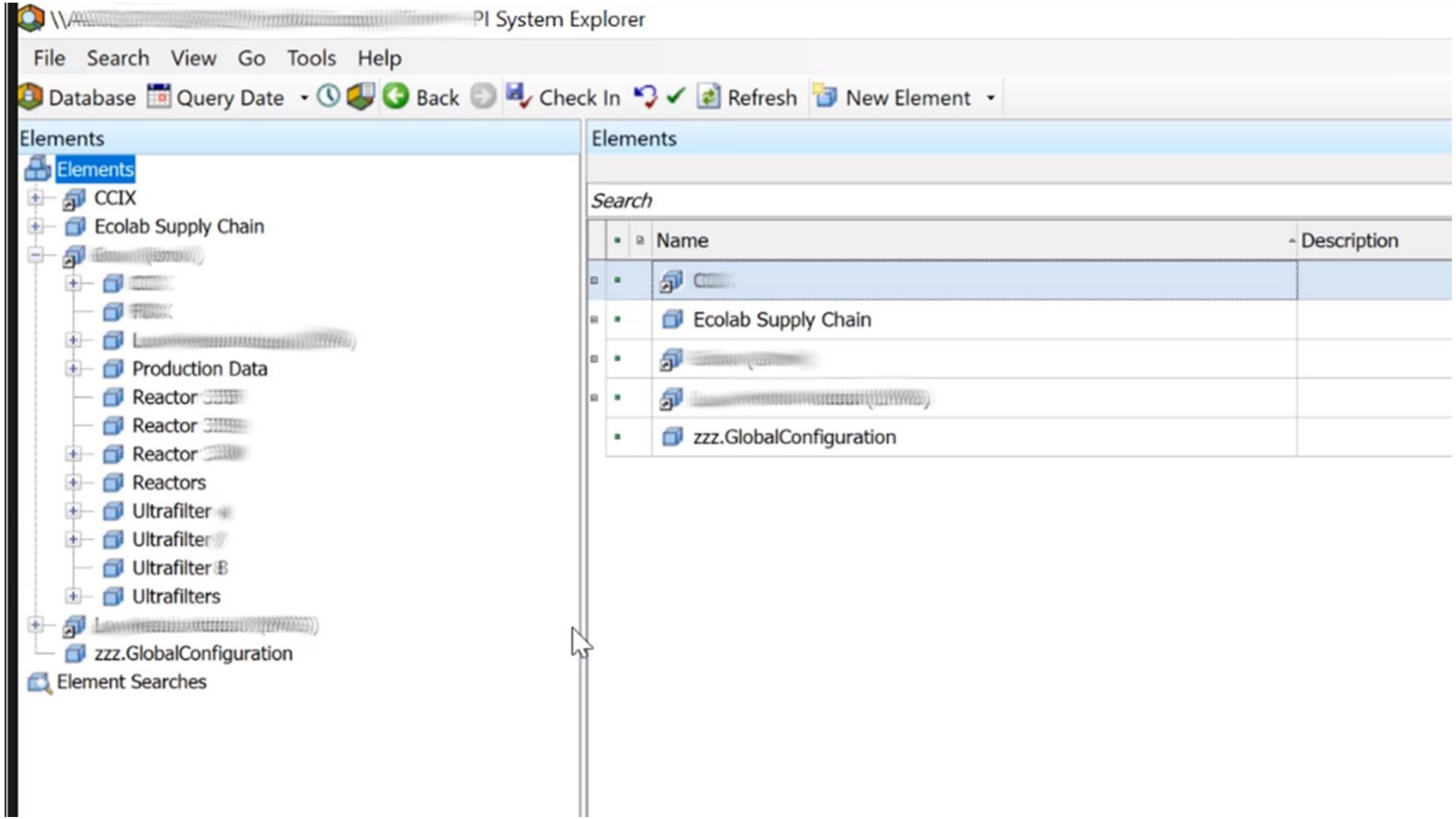

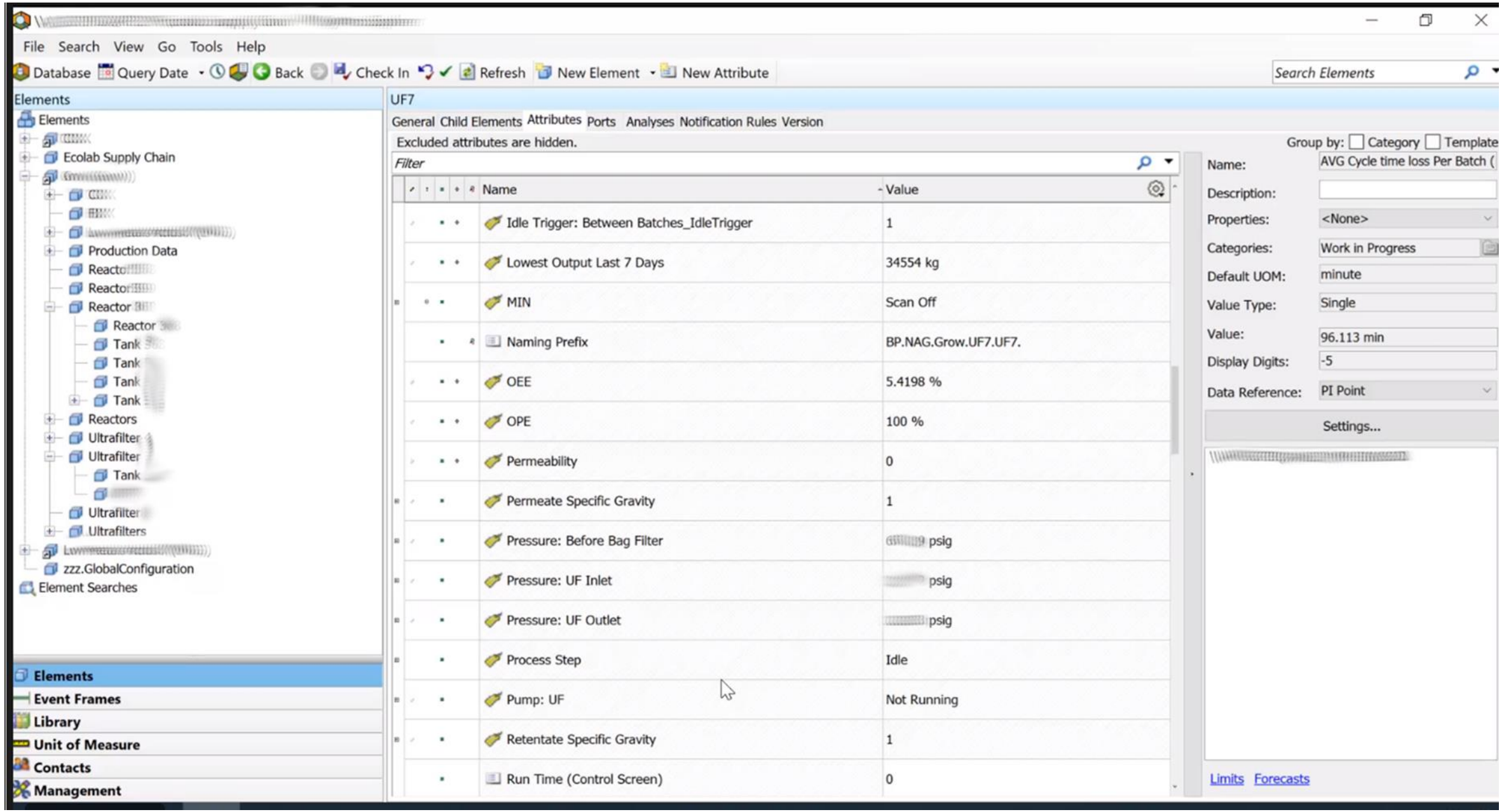

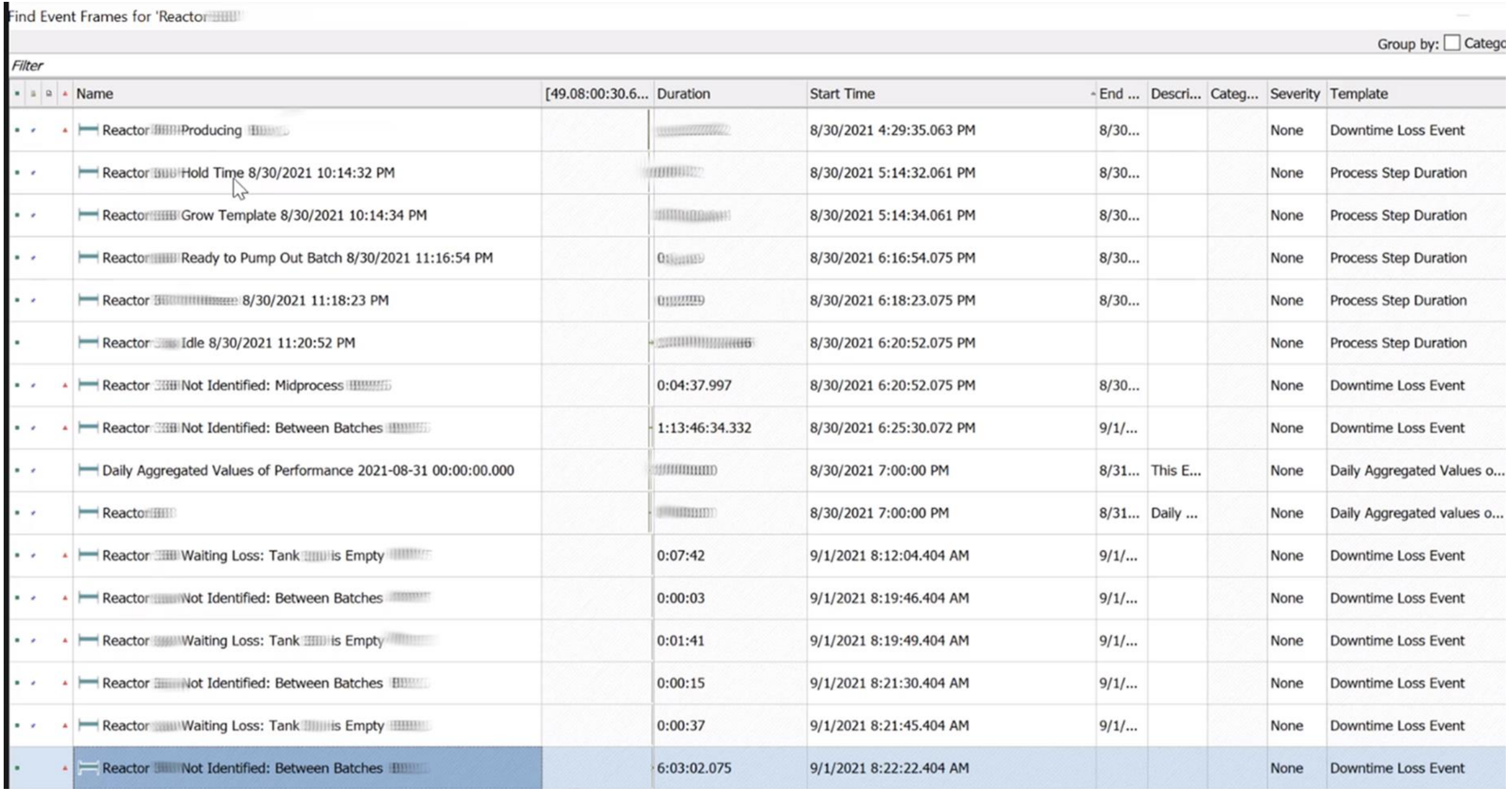

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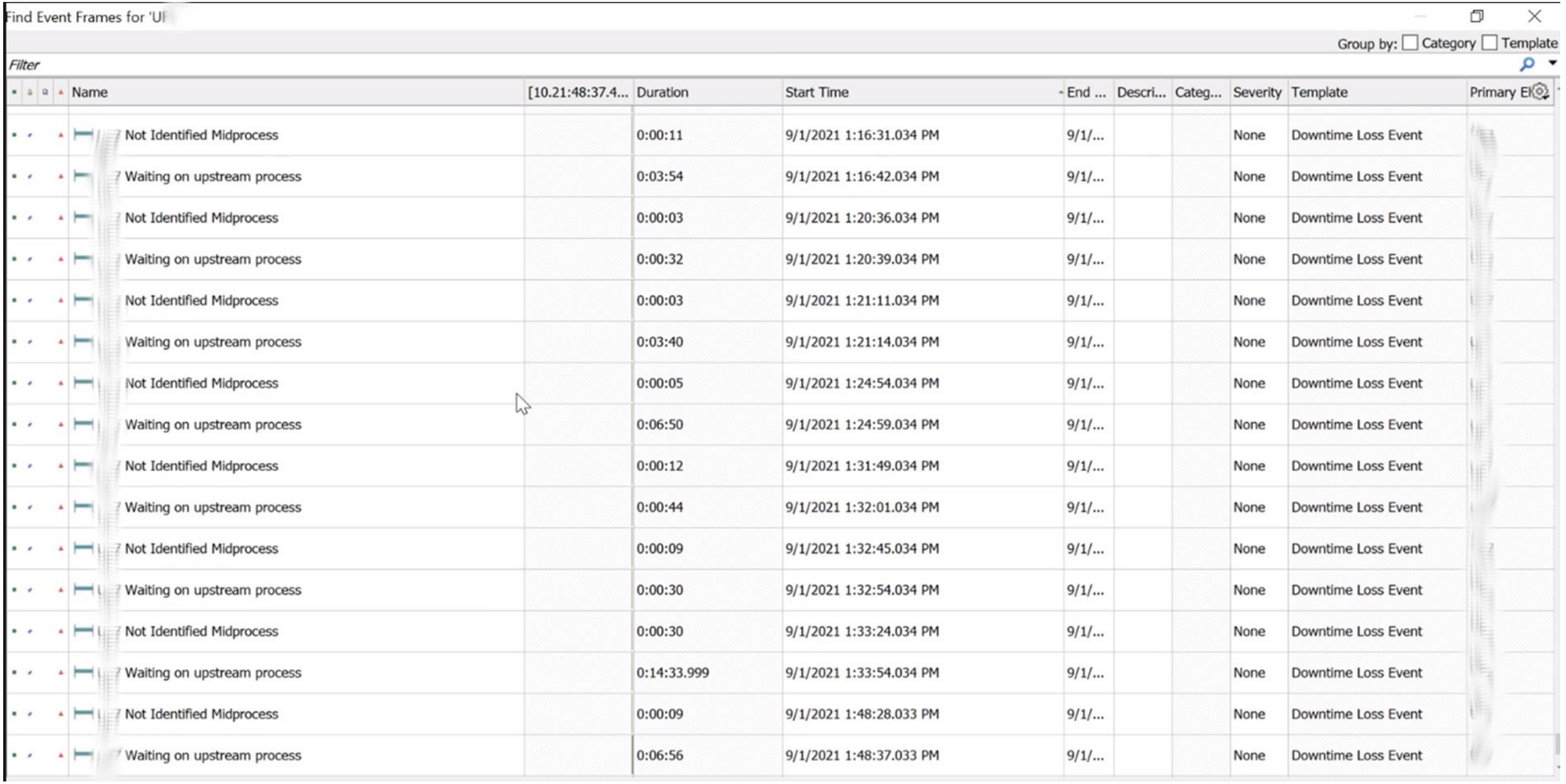

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Not Identified Midprocess		0:00:03	9/1/2021 1:20:36.034 PM	9/1/...			None	Downtime Loss Event	
Waiting on upstream process		0:00:32	9/1/2021 1:20:39.034 PM	9/1/...			None	Downtime Loss Event	
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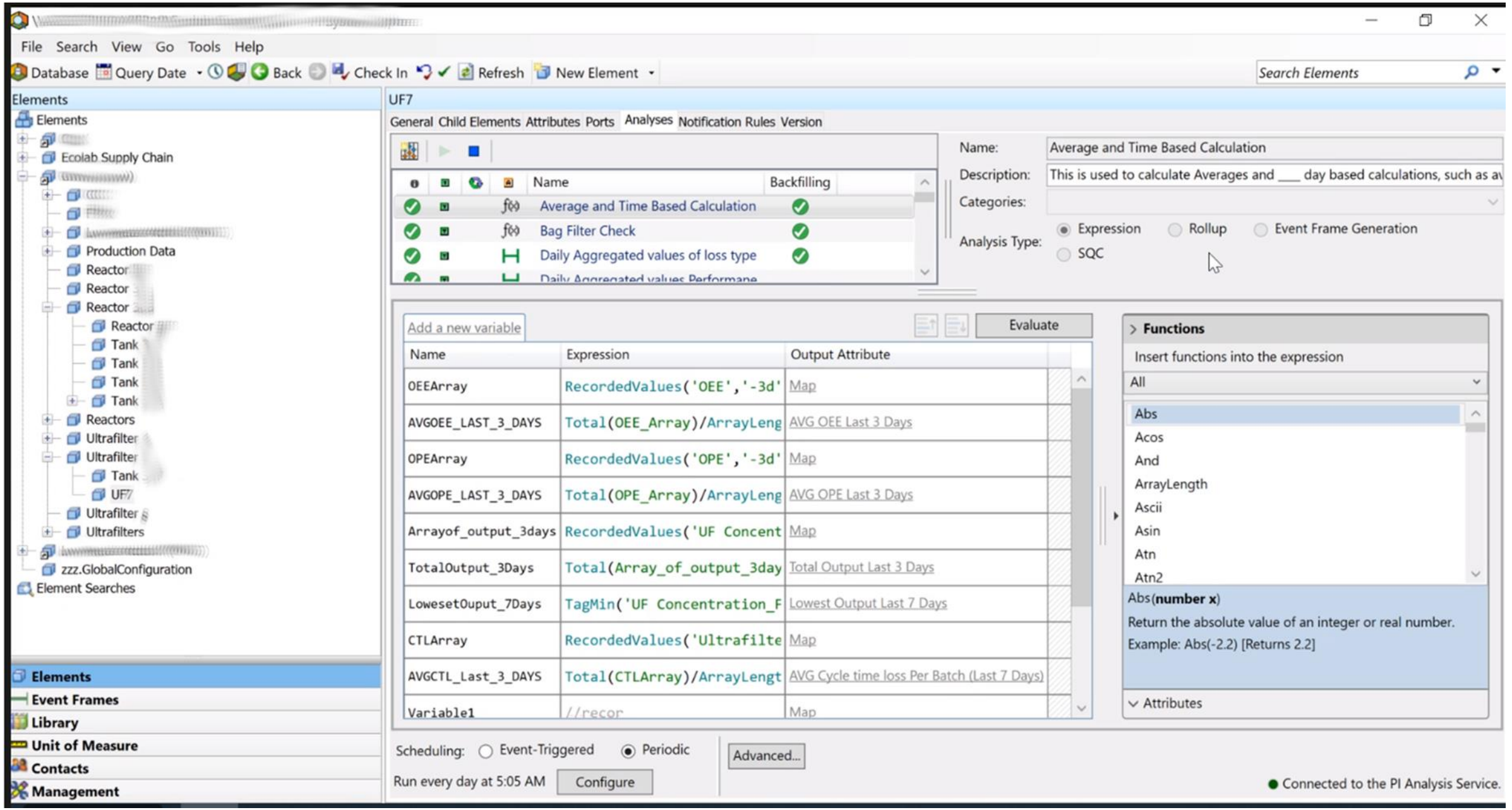

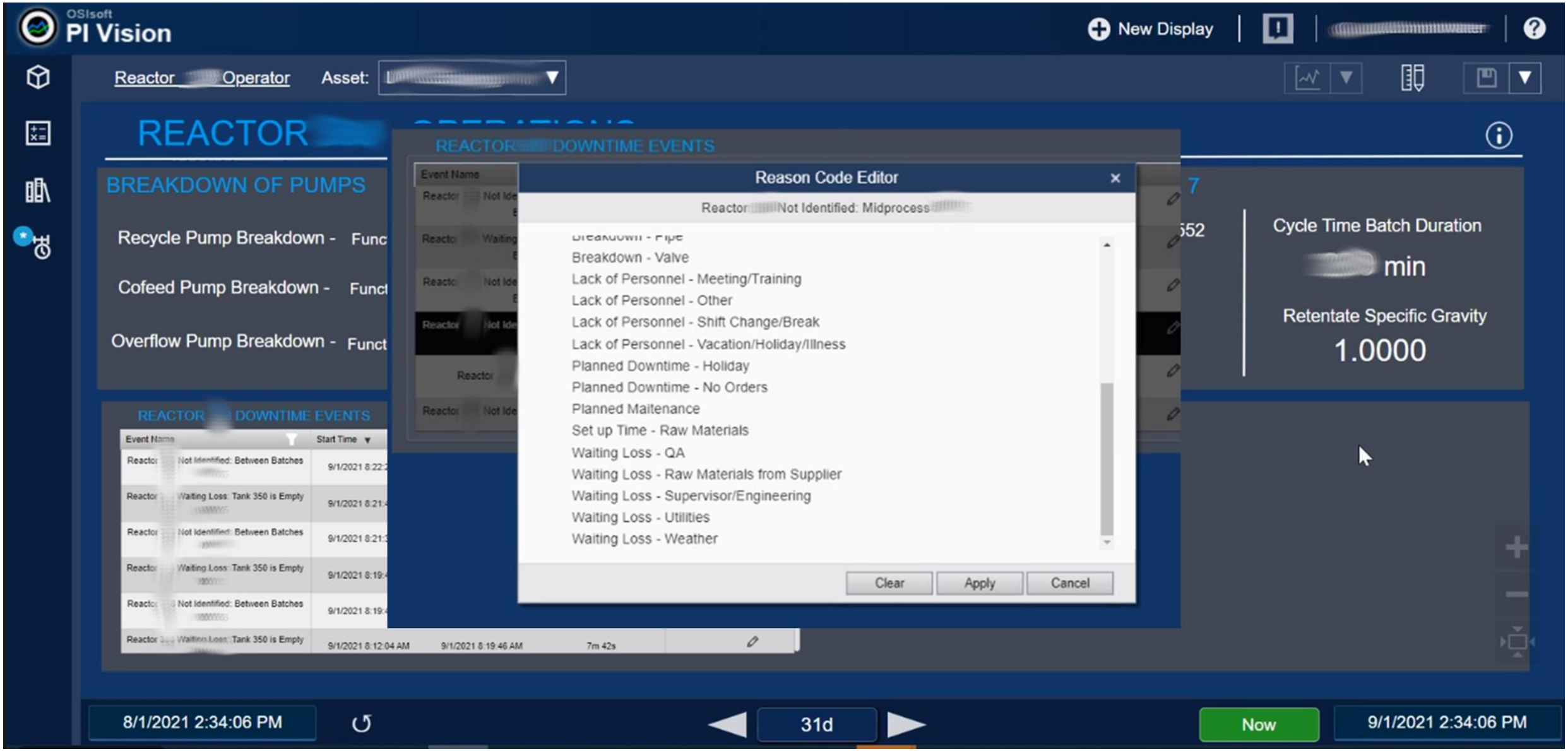

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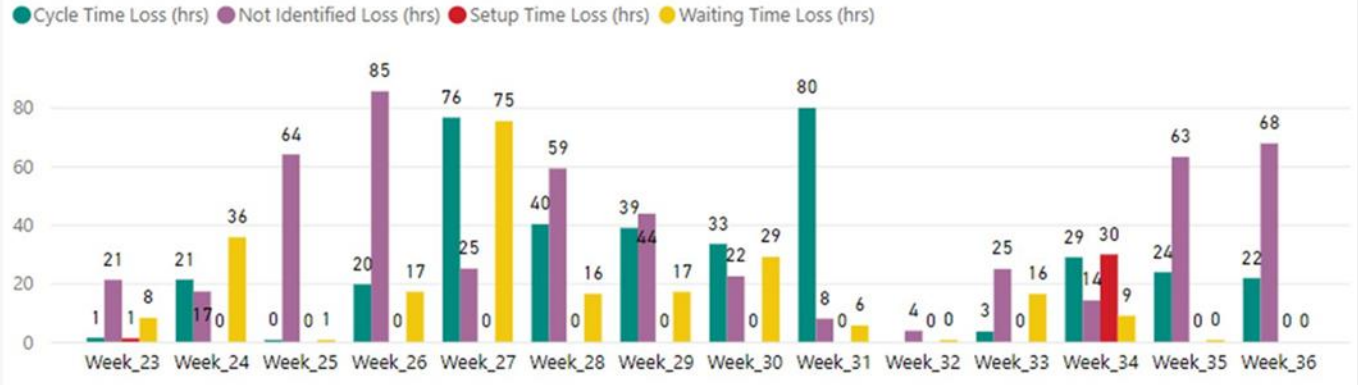
Not Identified Loss	Waiting Loss	Set Up Time Loss	Cycle Time Loss
519 hrs	230 hrs	31 hrs	389 hrs

Unit Operation: R[redacted]

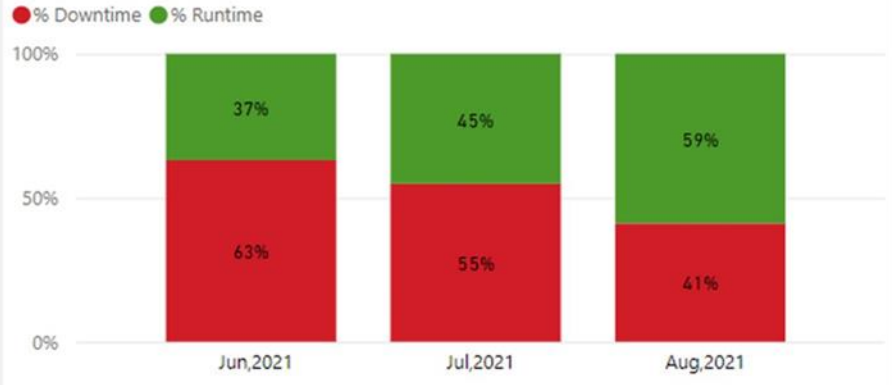
Last 3 Months (...

6/1/2021 - 8/31/2021

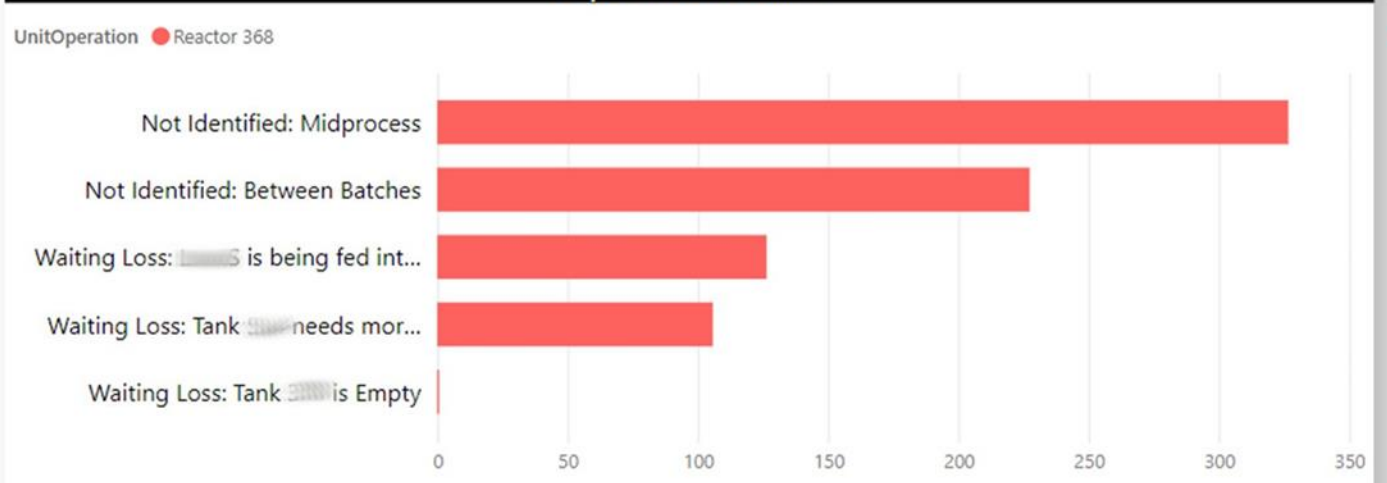
Downtime Loss (hrs) by week



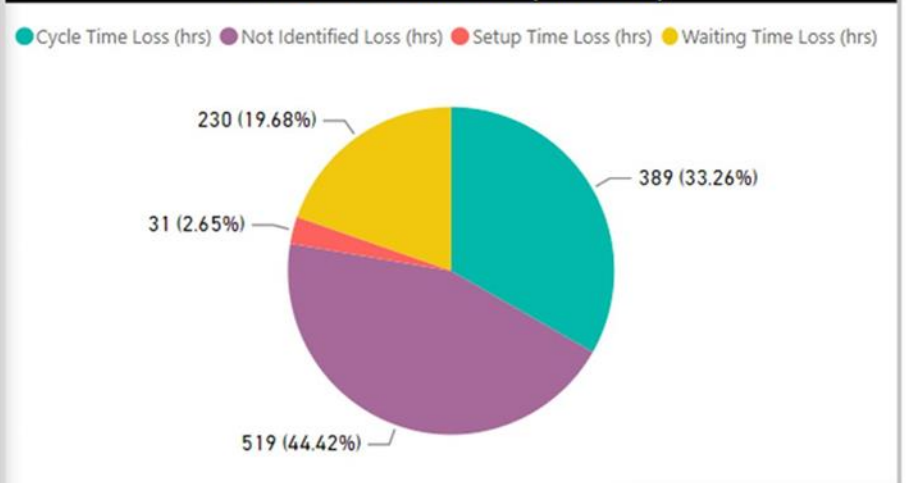
% Downtime Vs % Runtime



Top Reason Codes



% Loss Distribution (in hours)



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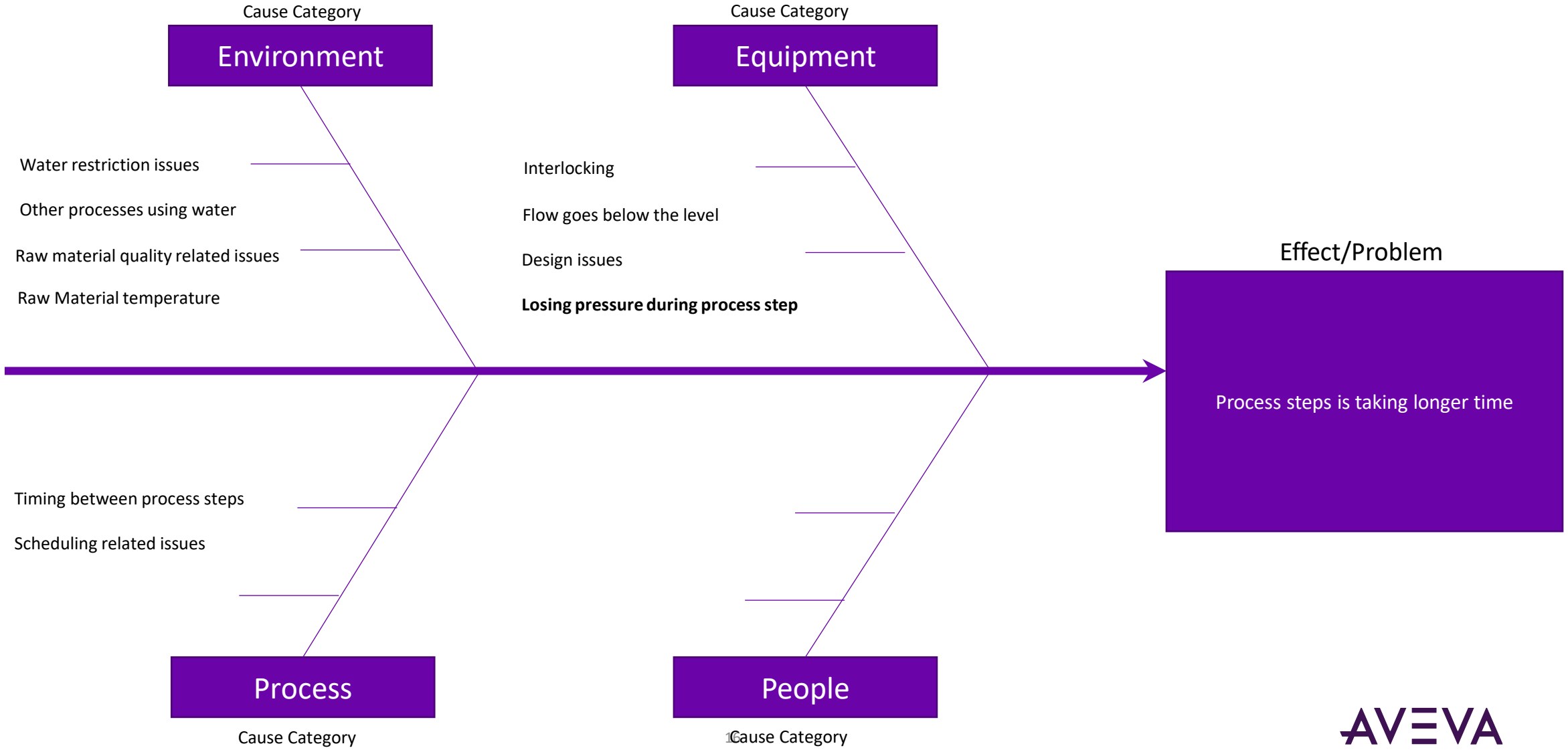
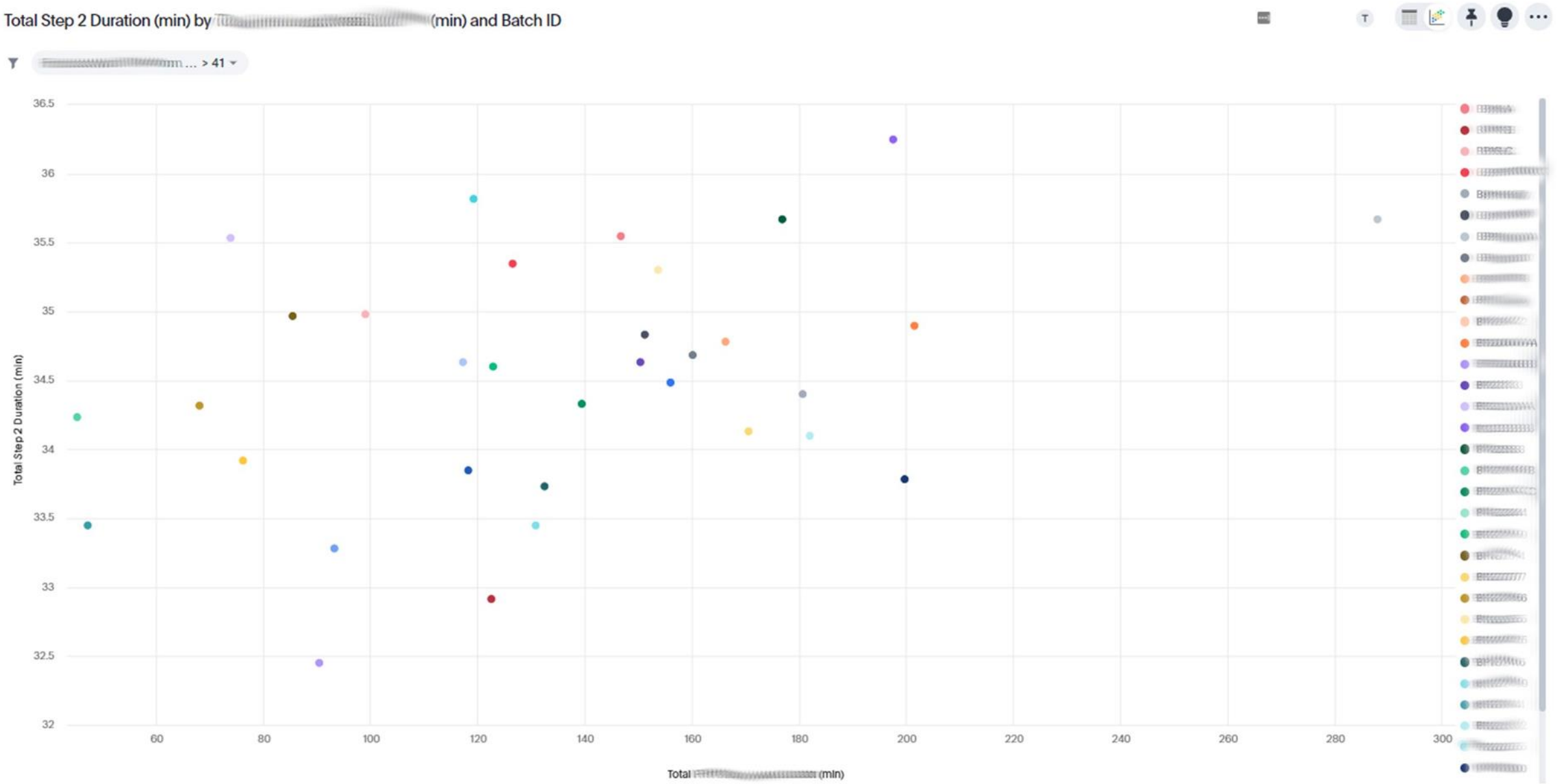
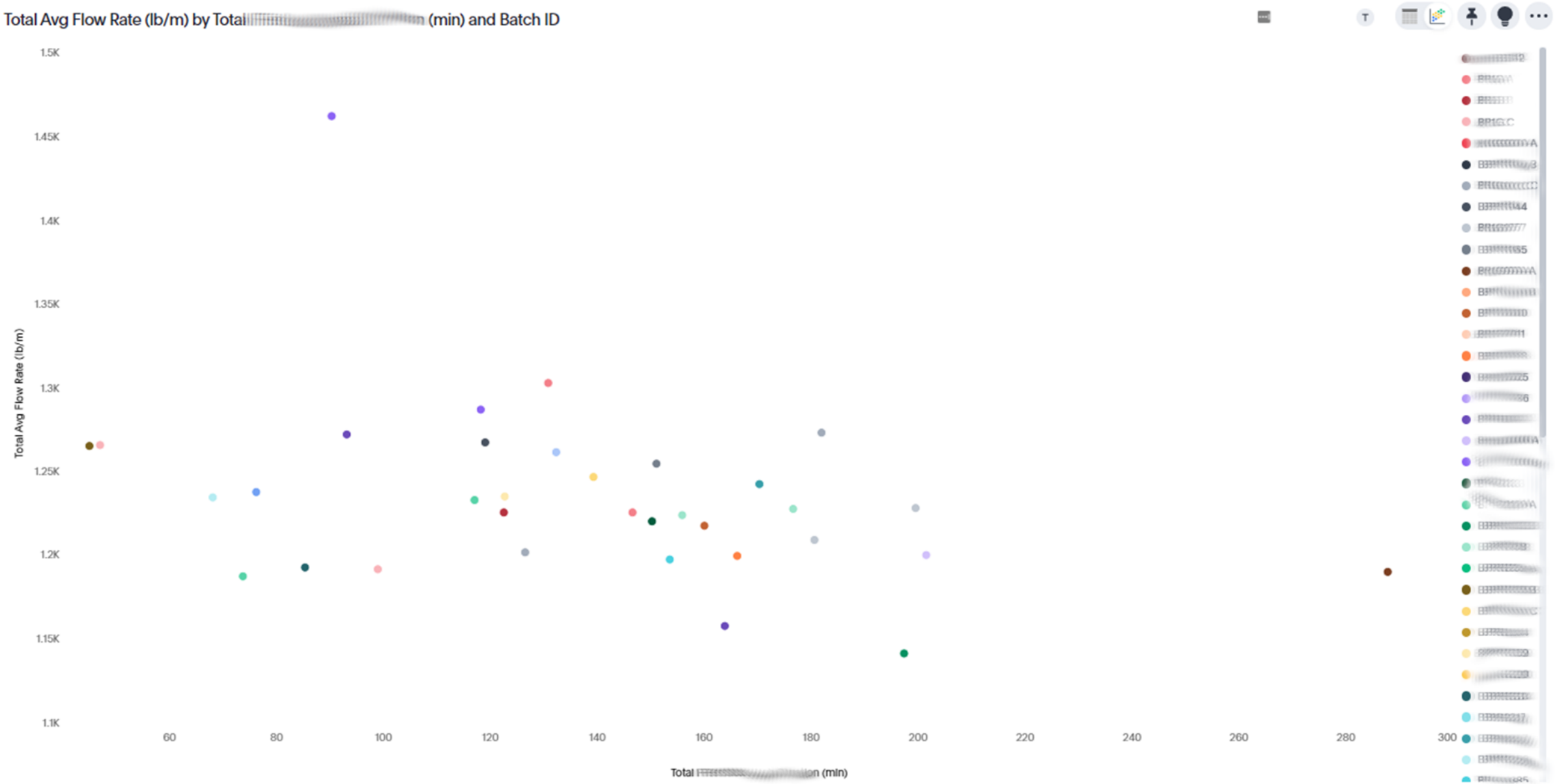
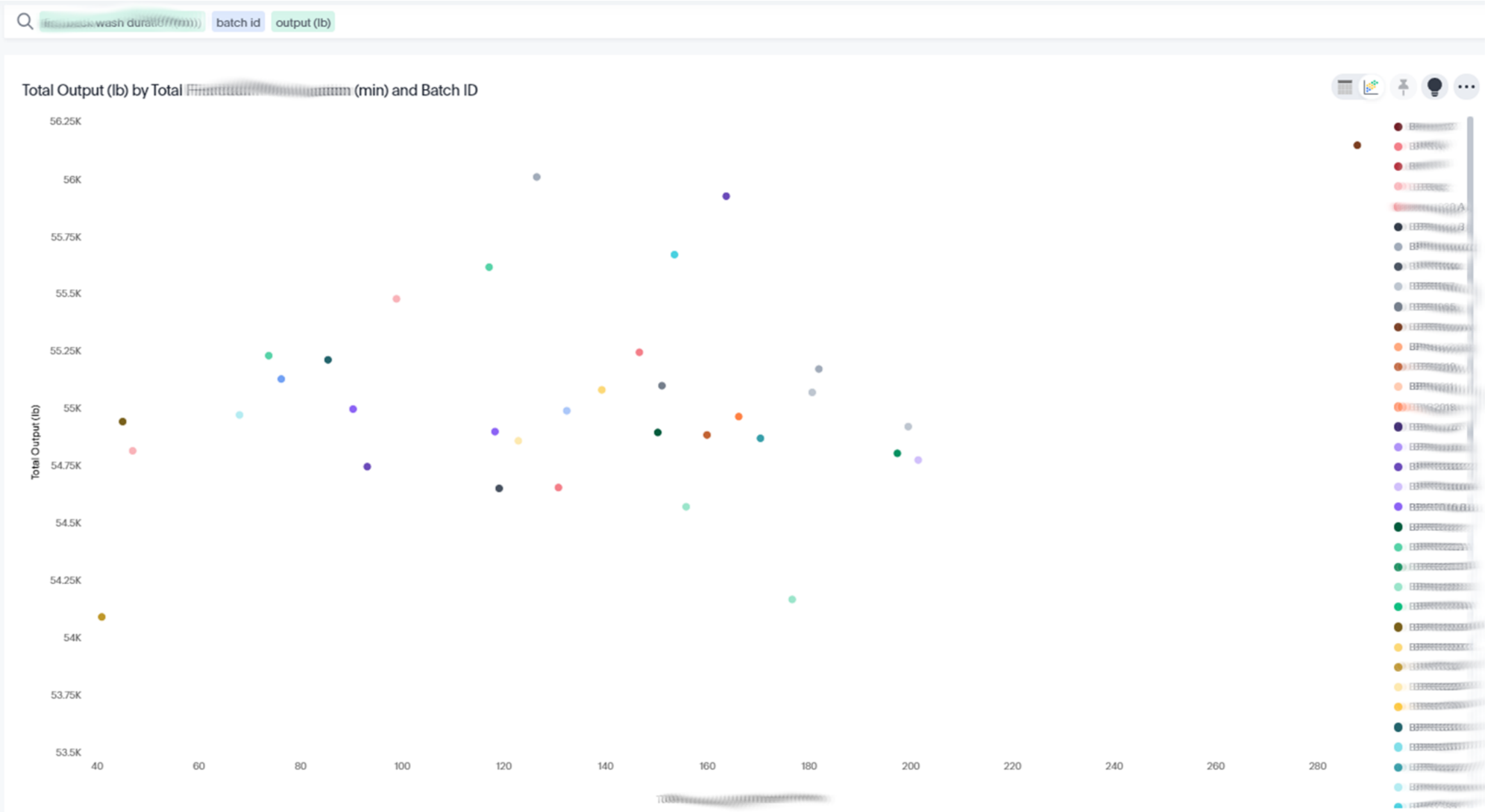
Cause and Effect

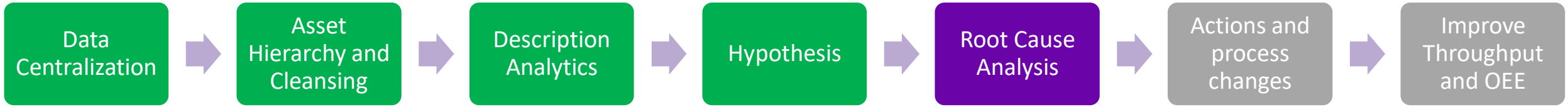








Our Journey


Data Centralization
Asset Hierarchy and Cleansing
Description Analytics
Hypothesis
Root Cause Analysis
Actions and process changes
Improve Throughput and OEE

Takeaways

- Fit-for-Purpose analytics - Engineered vis-à-vis AI/ML
- Ratio : Count of Engineered analytics to AI/ML analytics
- PI Dev Club FAQ (PI sandbox environment)

Other Resources

lessons-of-simplicity-in-iiot-analytics-for-operations-and-maintenance-om (blog – 10-minute read)

Analytics for industrial sensor data in the PI System (3-part series, recording and slides)

Layered approach to maintenance/reliability (blog + workshop intro)

Industrial IoT time-series data engineering - a layered approach to data quality (blog + workshop intro + recording)

PI System 101 (webinar recording – 1 hour)

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