



splunk®

Digital Transformation in Manufacturing

How to Adopt Machine Learning Without Costly Tech Migrations

Brian Bates | Greg Baumgardner

Stimson Lumber Co.

Stinson Emitter 35.
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Speakers

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- Stimson Lumber Co.
 - Portland OR
 - Engineering Manager
 - Splunker since 2015



► Greg Baumgardner

- Stimson Lumber Co.
 - Portland OR
 - IT Director
 - Splunker since 2017



Stimson Lumber Co.

Portland Ore.

- ▶ 160+ year family run, private company | 500,000+ acres managed forest lands
- ▶ Operations spanning the Pacific Northwest
- ▶ Seven manufacturing operations, six sites, rural locations
 - Stud milled lumber | Structural timbers | Hardboard panels
- ▶ Participant and supporter of Sustainable Forestry Initiative® (SFI)



Problem? What Problem?

Background



Problem Statement

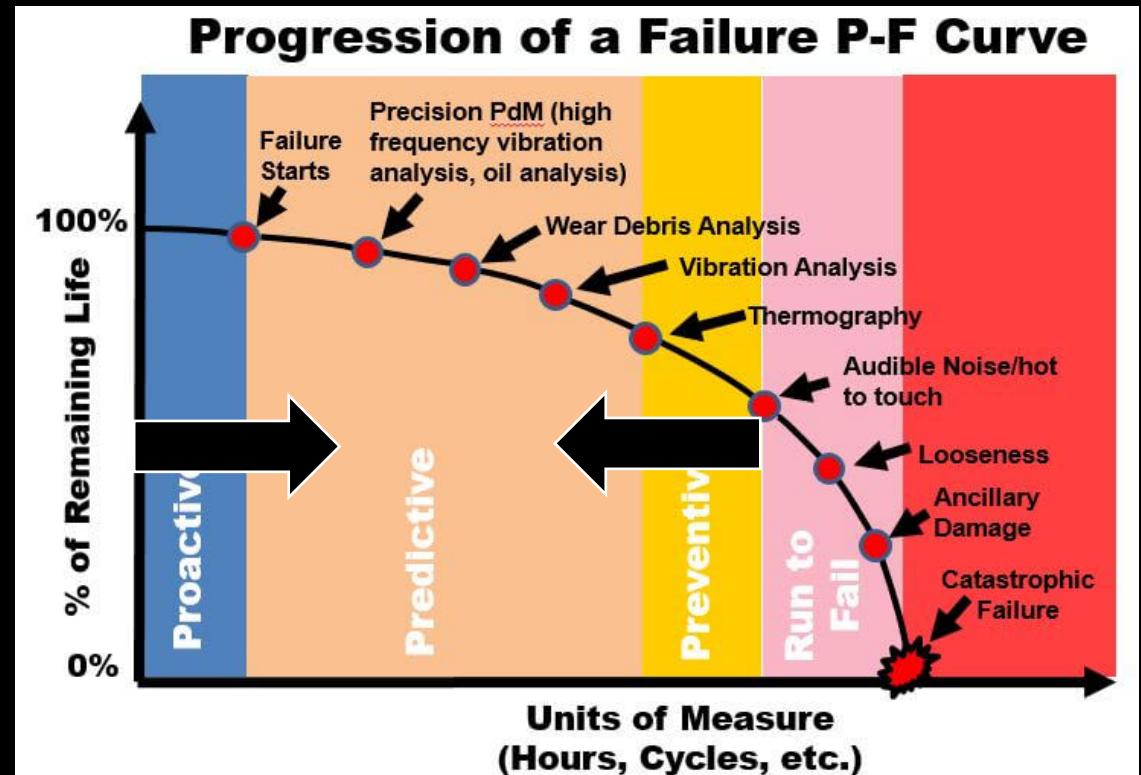
Our executive directive

- ▶ Pursue an analytics strategy to generate value as soon as possible while aligning with the company initiative of maintenance standardization and focusing on these core objectives:
 - Improve quality
 - Decrease unscheduled equipment downtime
 - Increase production volume

Industrial Battleground

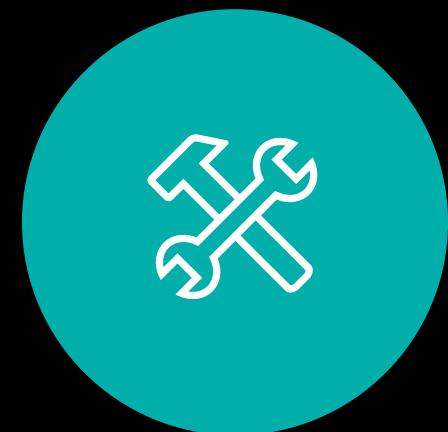
It's a jungle out there!

- ▶ Either run to failure and react or prevent by changing on interval.
 - ▶ Enhanced thermography program over the last several years.
 - ▶ Honing in on the PdM zone.
 - ▶ Knowing is half most of the battle!



Stimson Lumber and Machine Learning

Why we want big data



Downtime is Expensive



Improving Operational Efficiencies



Discovering New Potentials

What we need..

- We need to mature the maintenance strategy
 - Skilled labor remains a constraint
 - Greater visibility to asset condition
 - Leverage existing data
 - Automated decision making
 - Extended service intervals decreases cost
 - Knowing when large assets need to be replaced save down time during procurement
 - Converting unscheduled downtime to scheduled increases labor and machine efficiencies

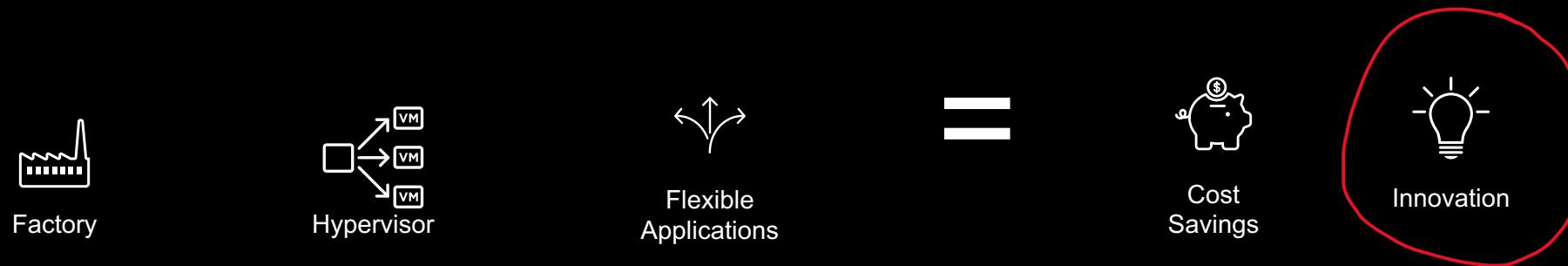
Traditional Mindset

What are the issues with that?

- ▶ Migrate entire industrial control system
- ▶ Consolidate data to use custom ML software
- ▶ Then develop ML/AI techniques to discover benefits
- ▶ Thank you for calling tech support.
Please wait.....
- ▶ ICS migrations shouldn't be a requirement to enable ML/AI benefits
- ▶ We need to integrate ML/AI now
 - Teams are lean
 - Multiple OEMs, protocols
 - Flexible and scalable

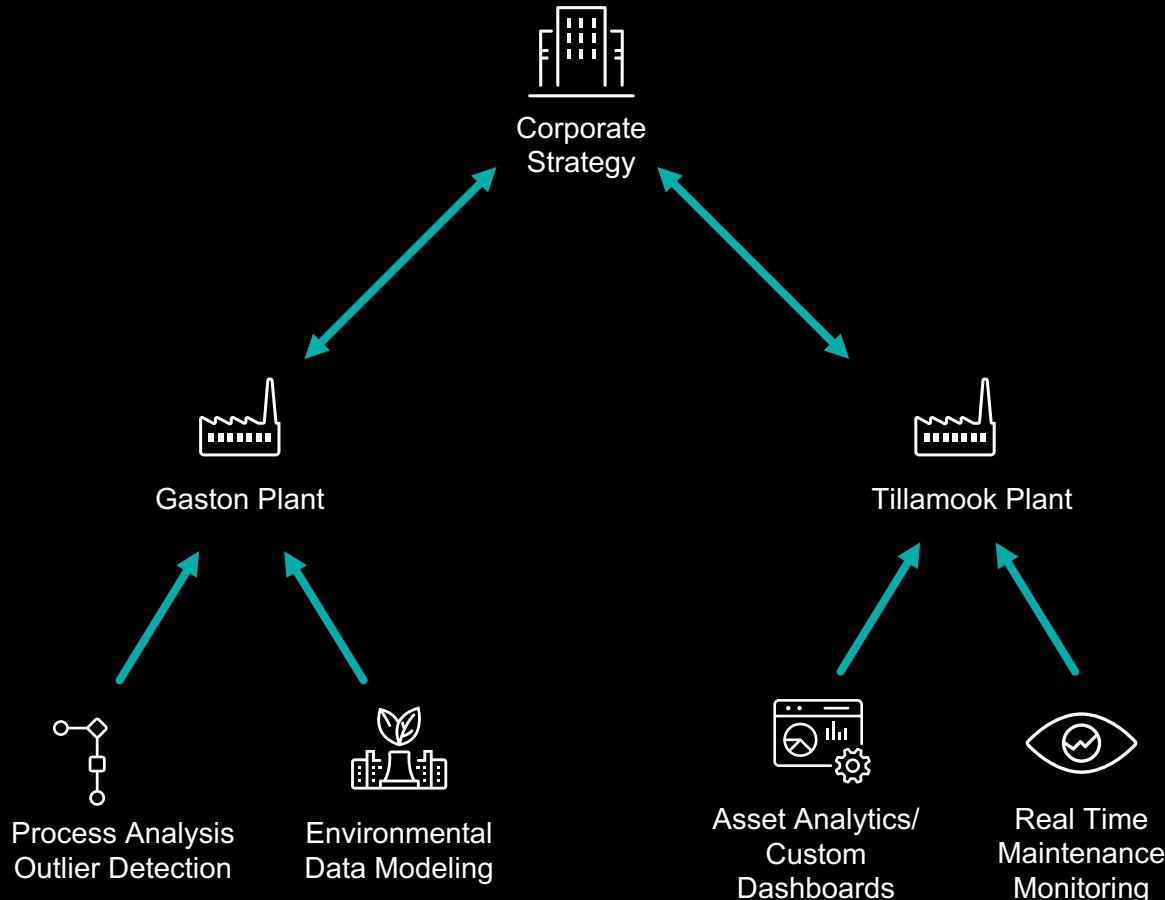
Our Thought Process

What works for our team...



Implementation

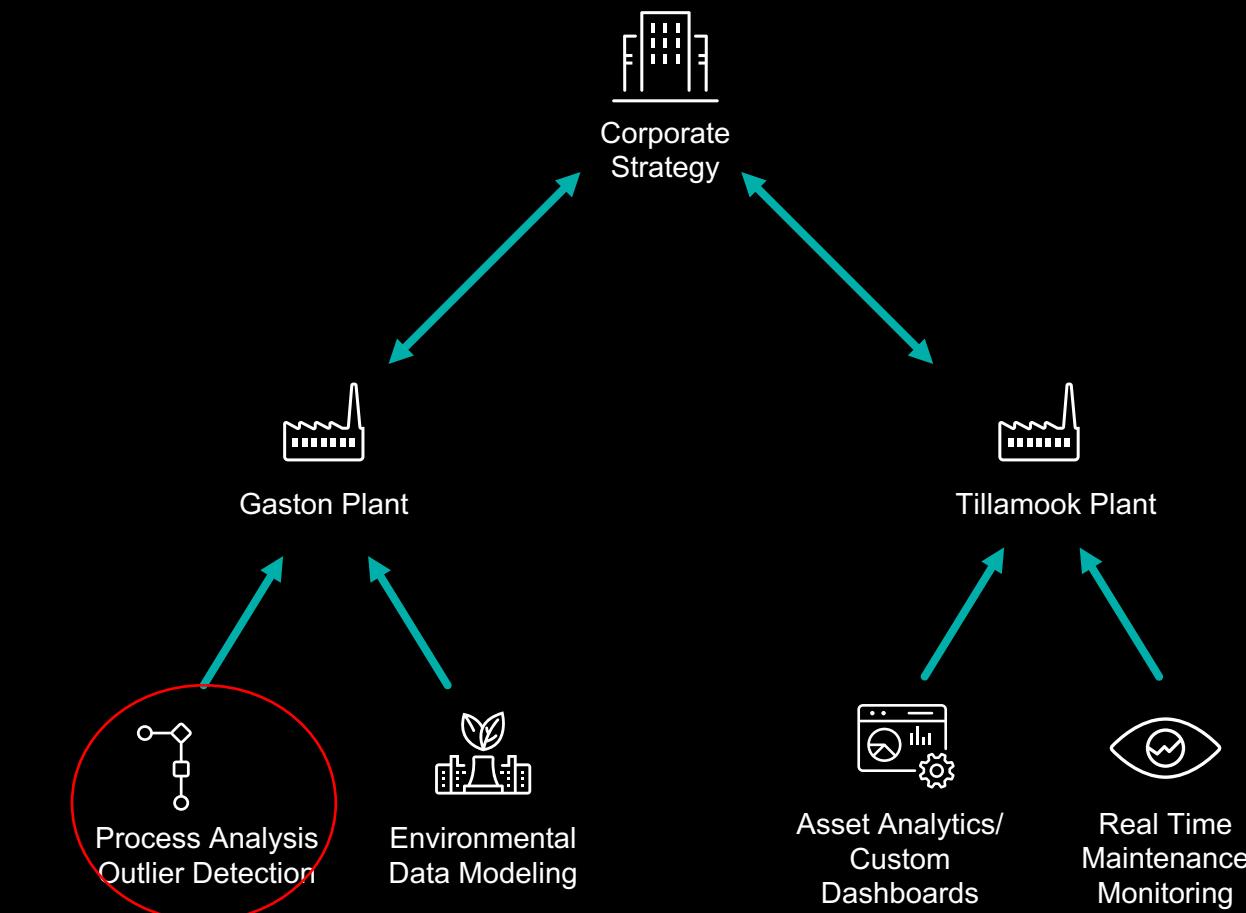
Pilot program in several sites



- ▶ Real time asset monitoring – detection before thermography, automatically
- ▶ Analytics and dashboards correlating information faster
- ▶ Detecting outliers autonomously and measuring their impact with data
- ▶ Maintenance teams react faster and better prioritize continuous improvement

Increase Production Volume

A smooth process is a happy process



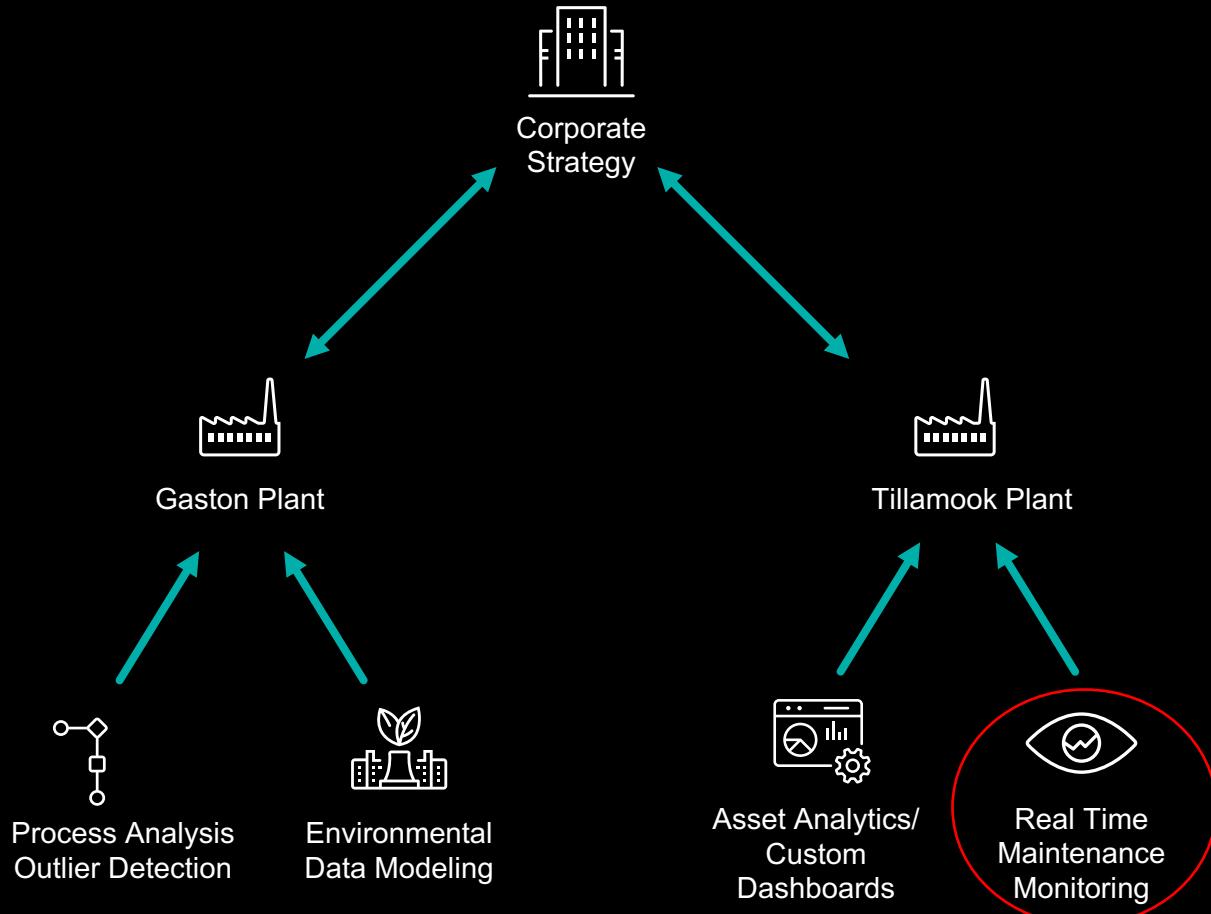
- ▶ Constant monitor on compressed air
 - Most process steps rely on centralized CDA system (Clean Dry Air)
 - Variation in the trunk line pressures can be caused by certain combinations of pneumatic actions.
 - These variations can cause slow or incomplete movements which in turn causes lumber to jamb in the transport lines.

- ▶ Outliers are automatically recorded with the ML Took Kit, timestamped and populated in a SQL table.

- ▶ Downtime reports are correlated during continuous improvement meetings to investigate the need for upgrades to the system or improvements in sequencing.

Reduce Unscheduled Equipment Downtime

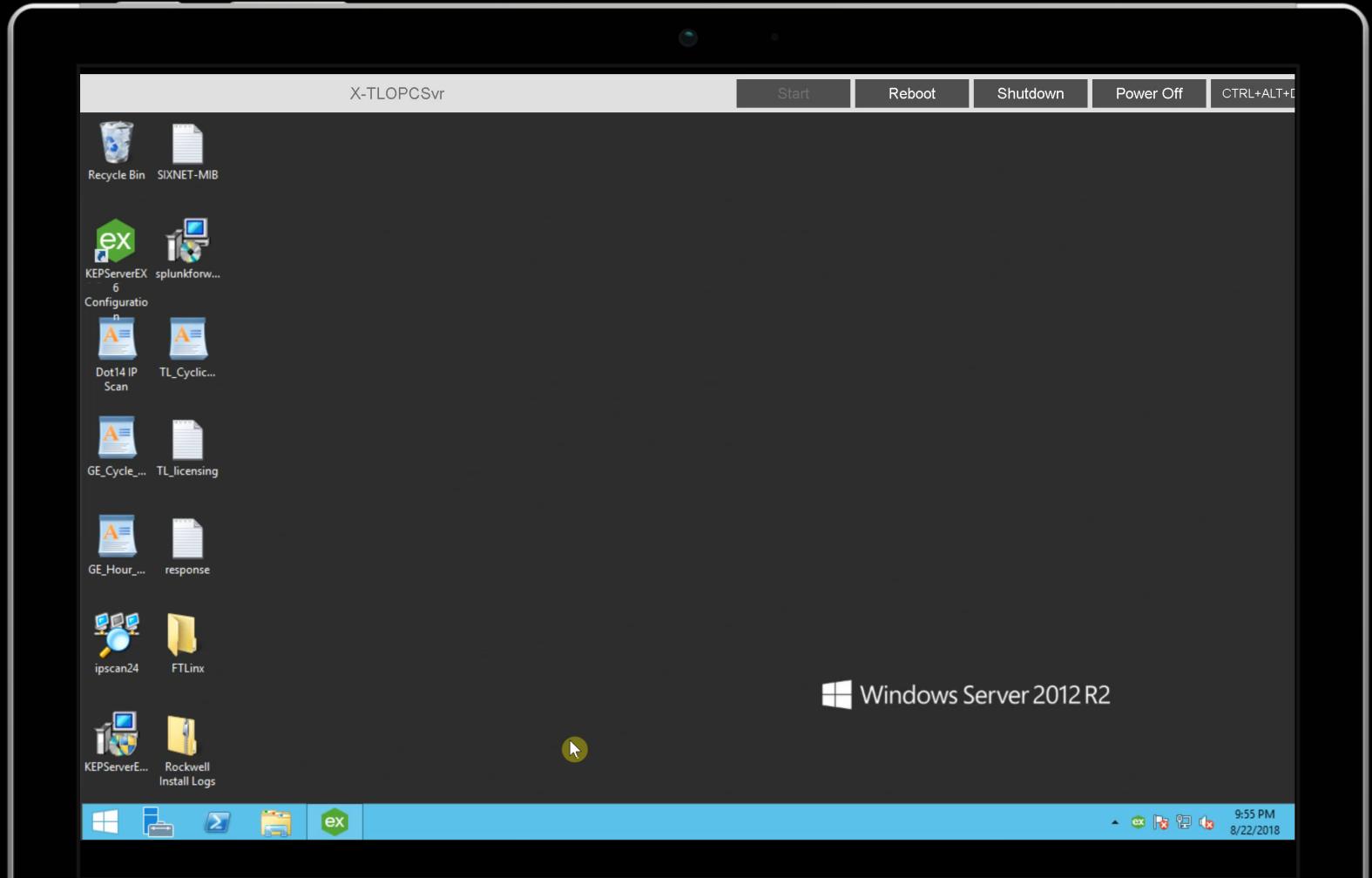
Tillamook Real Time Monitoring



- ▶ Real time monitoring VFD amperage changes
 - Measuring the change in VFD (Variable Frequency Drive) amperage draw may indicate an increase in mechanical drag – failing components
 - VFD amperage levels are recorded and displayed on a dashboard for real time investigation during erratic behavior of rotating assembly
 - Upper and lower ranges are calculated for later correlation
- ▶ Using DB Connect and ML Took Kit apps, the change in maximum and minimum amperage draws are logged and assessed
- ▶ We're looking for pattern in assemblies that wear faster than the expected PM schedule, reducing the corrective maintenance time.

Getting the Data

Tillamook Pilot



- ▶ Kepware extracting PLC values and forwarding to Splunk
- ▶ Visualizing and isolating exactly what needs to be analyzed in sawmill data.

Analysis

Tillamook Pilot

The screenshot shows the Splunk 7.0.0 Home page. On the left, there's a sidebar with various app icons: Search & Reporting, Production Summary, Splunk Add-on for Mobile Access, Splunk DB Connect, and Splunk Machine Learning Toolkit. The main content area features a "Explore Splunk Enterprise" section with a "Product Tours" window showing "FlashBack Express 5 Recorder" and "File Tools Scheduling Window Help". Below this, there's a "License Usage - Previous 30 Days" chart. The chart has dropdown menus for "License Masters" (set to "TLSPLSvr"), "Pool" (set to "All Pools"), and "Split By" (set to "No split"). At the bottom of the chart, there's a "Daily License Usage" section with a radio button for "Show stack/pool size overlay?". The radio button is selected, with "Yes" checked and "No" unselected.

- ▶ Uploading hourly (or whenever possible) data to SQL
- ▶ Extraction for analysis

End Result

Planning for maintenance – keeping things running

The screenshot shows the Splunk 7.0.0 interface. The top navigation bar includes tabs for 'Start', 'Reboot', 'Shutdown', and 'Power Off'. Below the navigation is a browser-like address bar showing 'localhost:8000/en-US/app/launcher/home'. The main content area displays the 'Explore Splunk Enterprise' dashboard with sections for 'FlashBack Express 5 Recorder' and 'Splunk Apps'. A modal window titled 'License Usage - Previous 30 Days' is overlaid on the screen, showing settings for 'License Masters' (selected as 'TLSPLSvr'), 'Pool' (selected as 'All Pools'), and 'Split By' (set to 'No split'). The modal also contains a 'Daily License Usage' section with a 'Show stack/pool size overlay?' toggle, which is set to 'Yes'.

- ▶ Visualizing the wear
- ▶ Predicting the time to failure
- ▶ Getting more items on the schedule

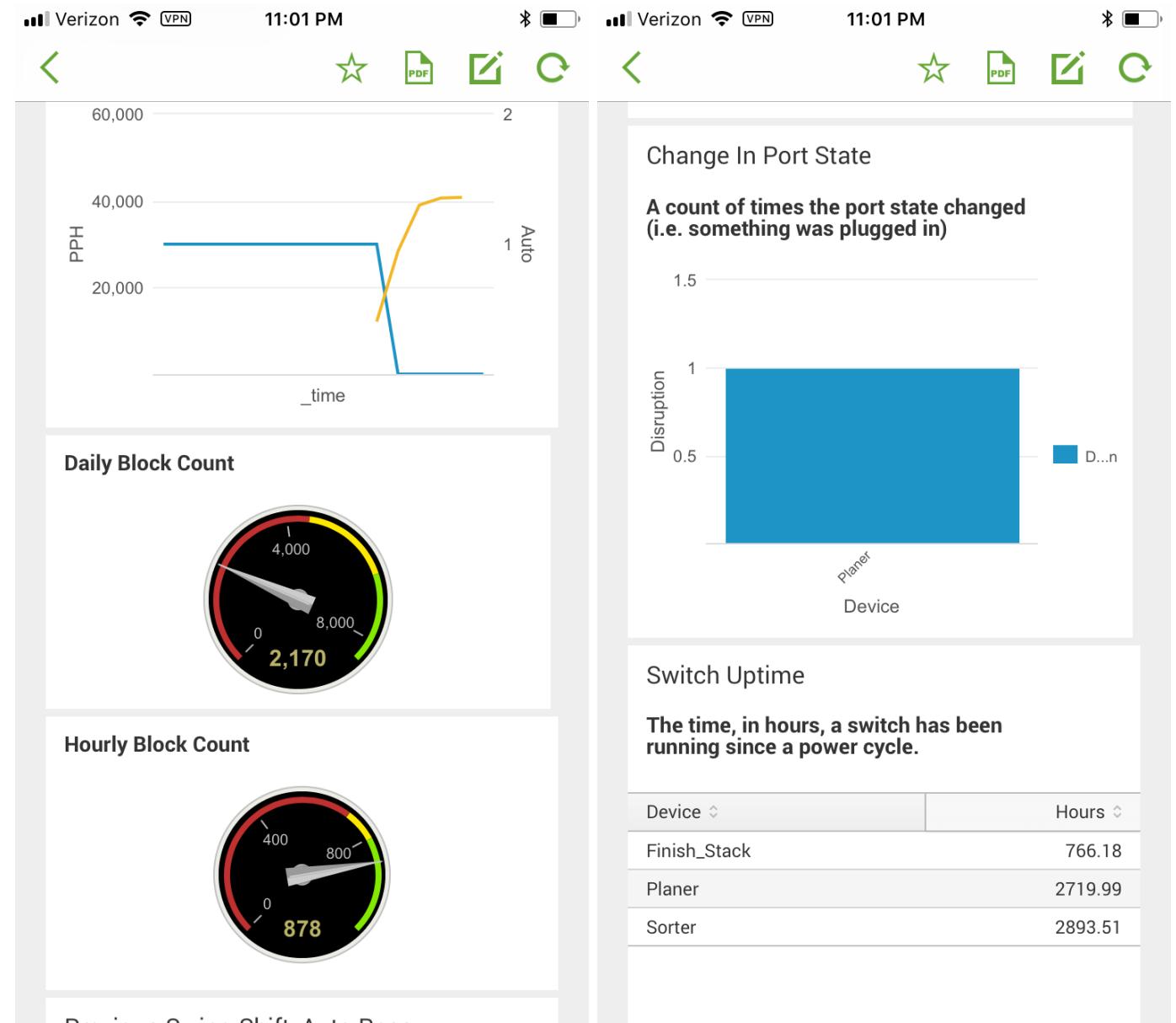
What the future looks like

This is where the subtitle goes

- ▶ Continue gathering data and analyzing for a predictive function
 - ▶ Continue the rapid deployment of IIOT in vibration and temperature
 - ▶ Continue experimenting with PLC – Big Data relationships
 - ▶ Reduce data consumption at indexer
 - ▶ Learn, learn, learn!

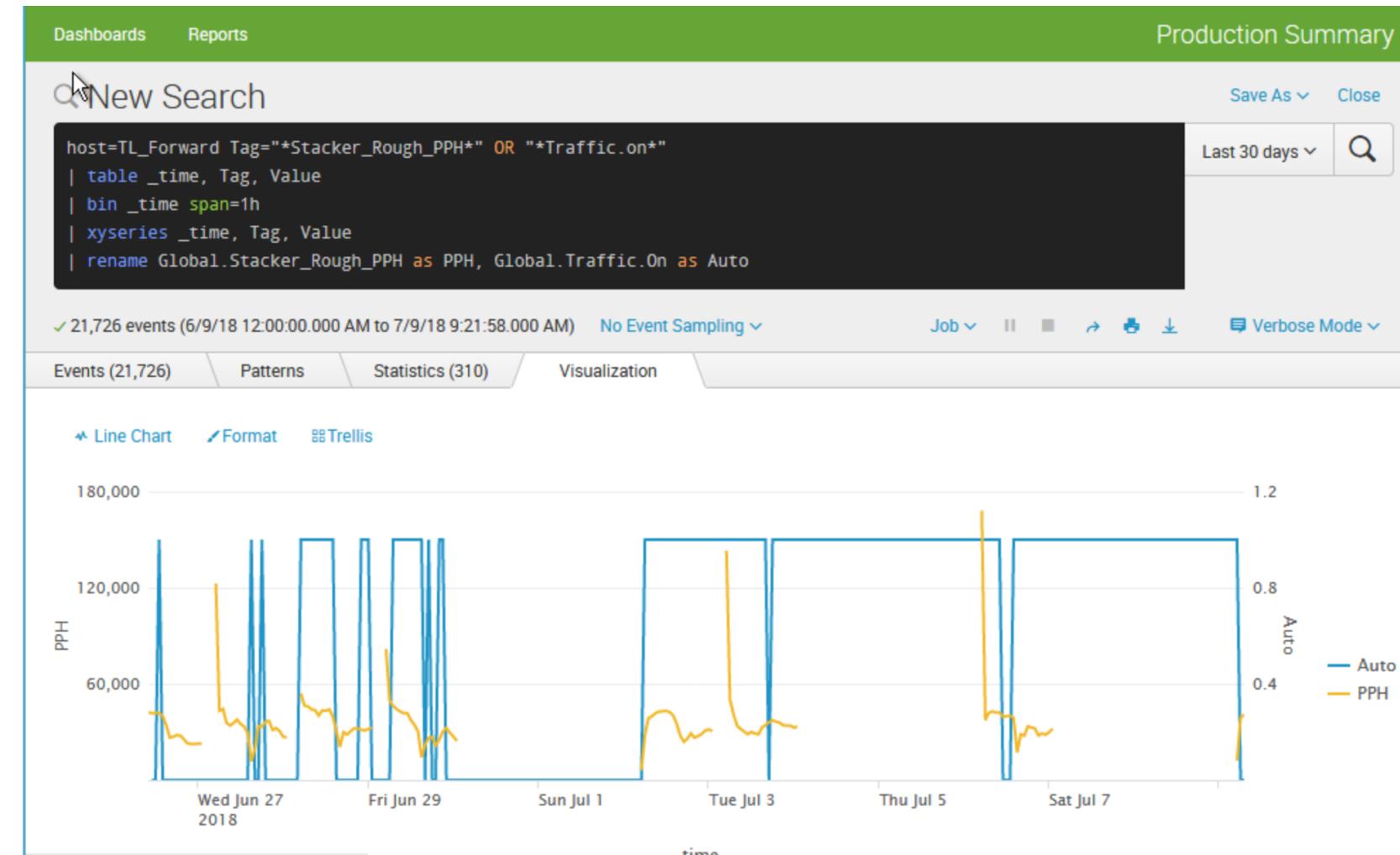
Mobile Data

Plant & Device OEE



Ramp of Operator-less Stations

Visualizing Production with Auto



Dark Sky API

Correlating weather with operations

Correlating weather with operations

interestingFields
currently.apparentTemperature 25
currently.cloudCover 19
currently.dewPoint 25
currently.humidity 18
currently.icon 4
currently.nearestStormBearing 17
currently.nearestStormDistance 1
5
currently.ozone 24
currently.precipIntensity 4
currently.precipProbability 4
currently.pressure 24
currently.summary 4
currently.temperature 25
currently.time 25
currently.uvIndex 8
currently.visibility 16
currently.windBearing 24
currently.windGust 23
currently.windSpeed 24
hourly.data().apparentTemperature
100+
hourly.data().cloudCover 68
hourly.data().dewPoint 100+
hourly.data().humidity 38
hourly.data().icon 5
hourly.data().ozone 87
hourly.data().precipIntensity 29
hourly.data().precipProbability 10
hourly.data().precipType 1
hourly.data().pressure 100+

```
host = FGBBatesSVRVM index = main linecount = 1 source = rest://Weather_Tillamook sourcetype = _json splunk_server = FGBBatesSVRVM
```

Key Takeaways

Industrial ML

1. Machine learning benefits do not require complete ICS retrofit!
2. Close the IT/OT gap – don't perpetuate it!
3. Go forth and explore ideas – the resulting innovation is the immediate return!

Questions?

Thank You

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