

Driving Pack Line Productivity with Event Frames

Monica Varner-Pierson & Lauren Vahle



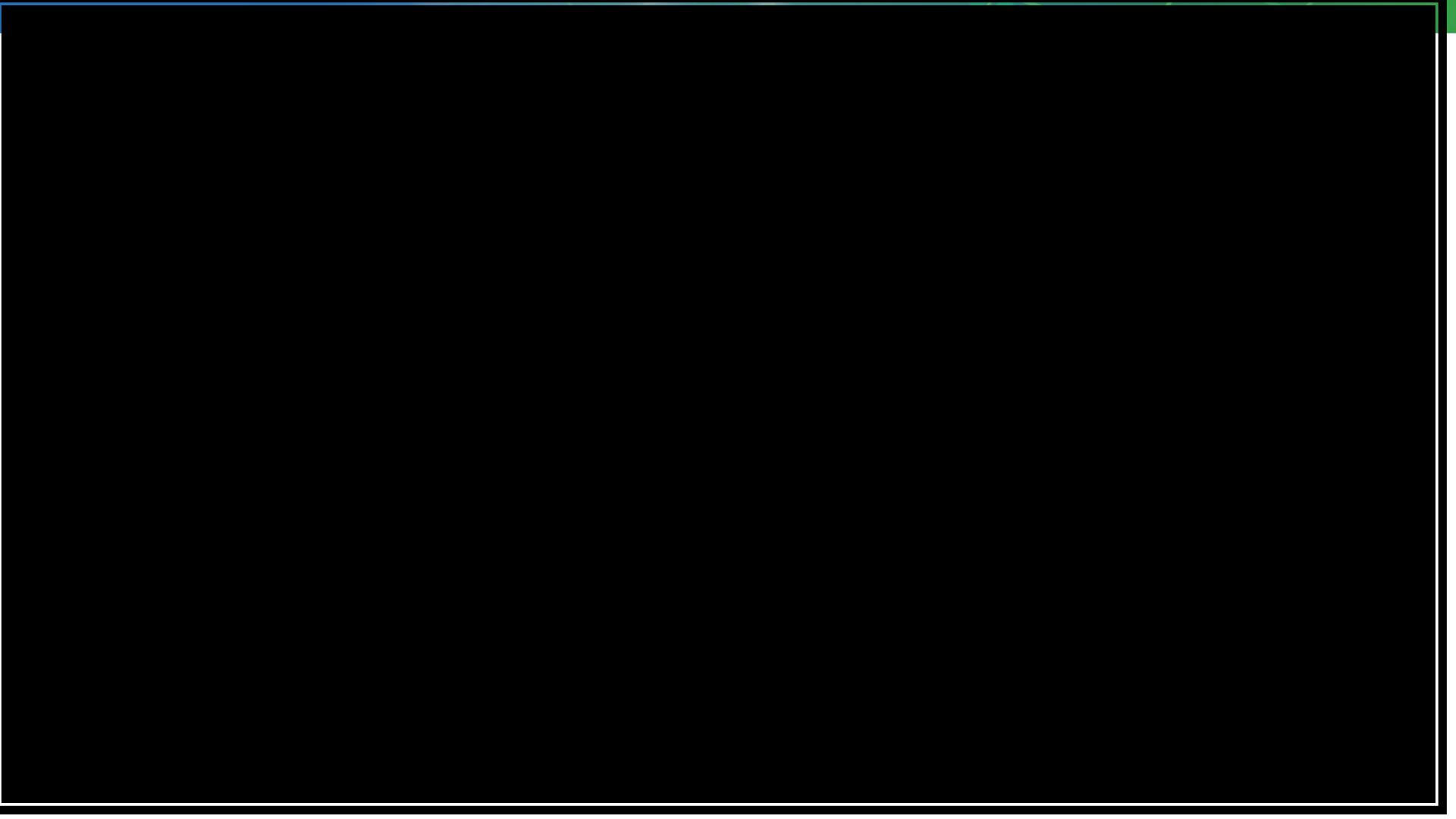
Presenters

Monica Varner-Pierson

- Plant Systems and Controls Manager
- 25+ Years in Technology and Solution Delivery
- Corporate CoE Lead for PI
- Maturity and Alignment across Businesses in product solutions, best practices and architecture standards

Lauren Vahle

- Process Optimization Engineer
- 10+ Years driving production performance and team development
- PI Super User providing support to site level supervisors, engineers and problem solvers



220+ PI Systems

Across NA, LA, EMEA, and APAC



Cross Functional User Groups

Super Users, Content Developers, IT, R&D, Engineers, Supervisors, CI/M&R



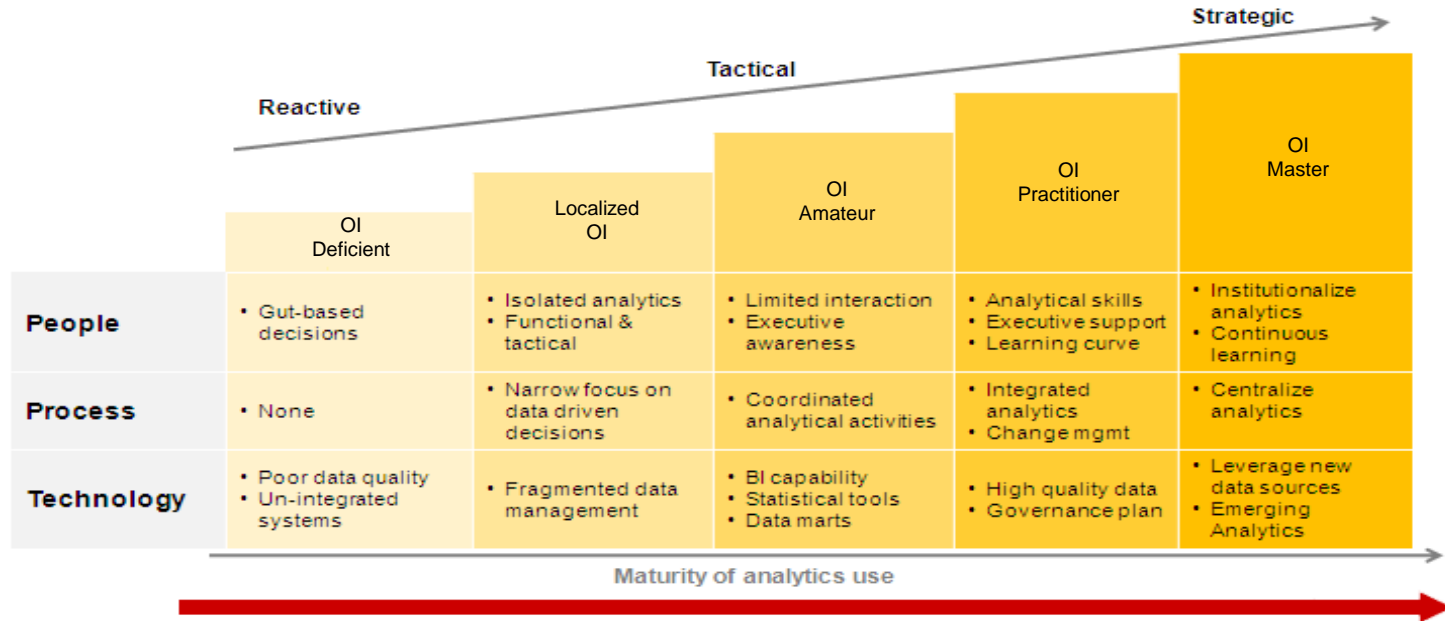
Business Use Cases

Safety, Sustainability, Productivity, Reliability and Continuous Improvement

Complexity Challenges

- Multiple Businesses, Processes & Product Lines Globally
- Execution Strategy Combination of Top Down and Bottom Up
- Diversity in Technology and Business Capability Requirements
- Disperse Data in Multiple Systems by Multiple Methods

Variation in Maturity



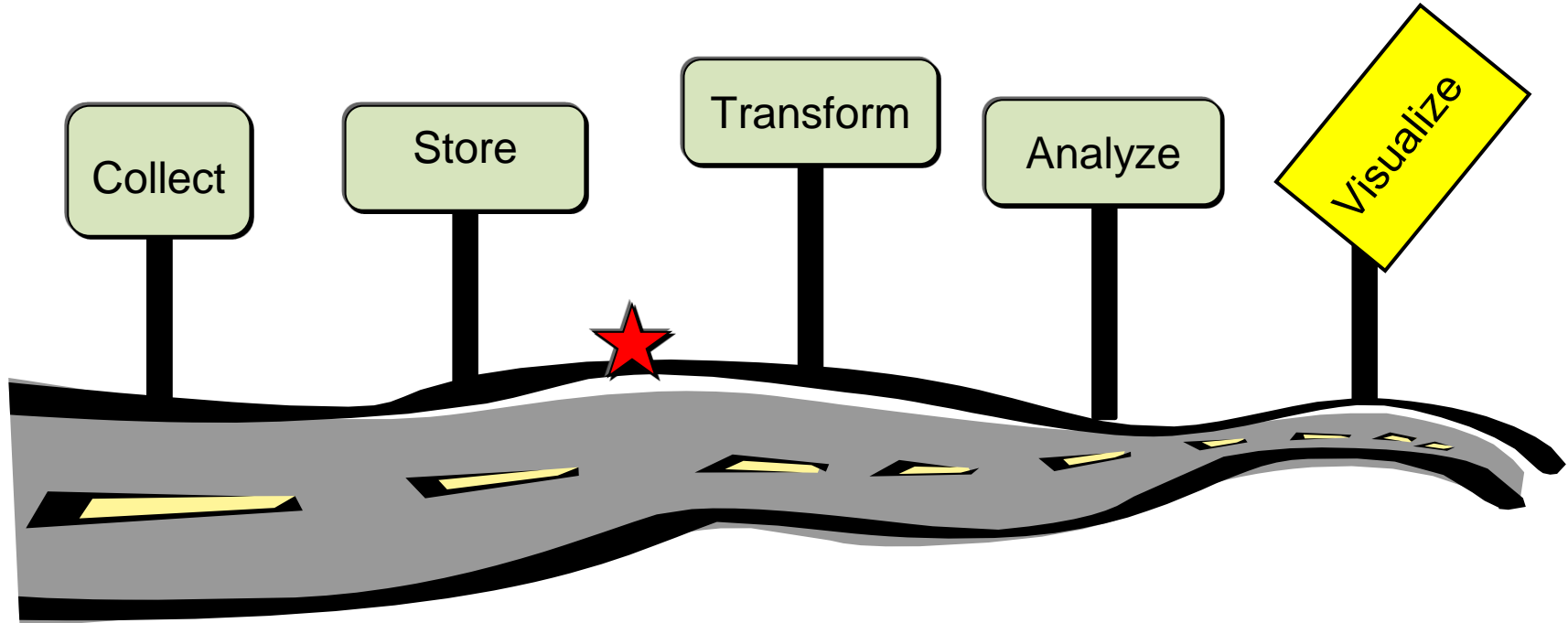
Adapted from "Competing on Analytics – The New Science of Winning"

PI Community of Excellence Collaboration

- Drive Business Priorities
- Provide subject matter expertise and strategic direction
- Define Documents outlining capability requirements, technology best practices, work instructions, tips and tricks
- Responsible for leading and Business Users education of Global Plant Applications with the goal of deriving value
- Explore, evaluate and advise on new or changed capabilities, technology, work practices and policies

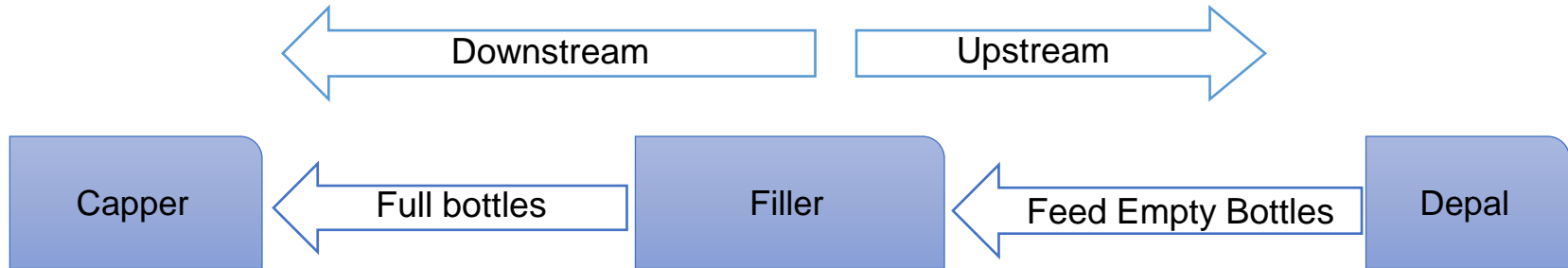
Intelligence Roadmap

Execute on Business Use Cases for Data and Analytics



What We Do

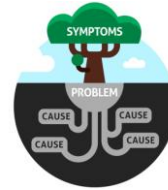
Cargill Global Edible Oil Solutions



What's the Pain Point?



Daily Production Meeting identifies top 3 downtime contributors



Unable to identify root cause



Micro stops (<1 min) are a top 3 contributor to lost production



What data are we missing that could provide insight?

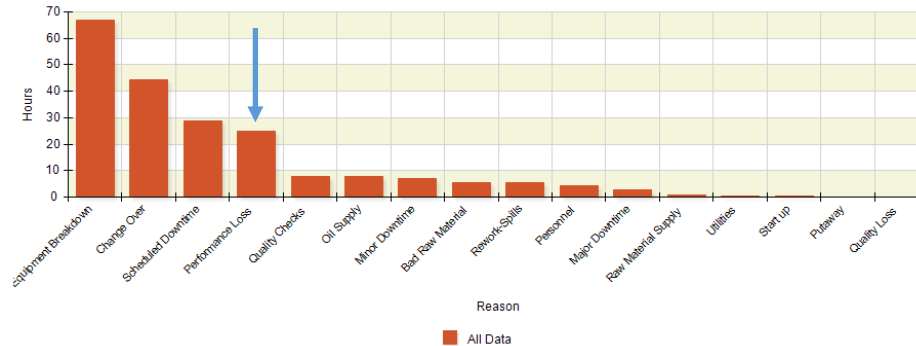


Team investigates known data for Root Cause: Filler rate, conveyor speeds, pump speed, etc

Downtime Tracking

Downtime events > 1 minute are captured with context

Downtime events < 1 minute (Micro Stops) are put into a generic bucket for Performance Loss



Problem Statement

- Production Line A runs an average of 6 hours per week (36 hours per month) of performance loss
- Performance Loss for this line is consistently one of the top three Downtime reasons in the daily production meeting
- We do not have enough information available to identify a root causes



Data Collection

Filler Program Steps

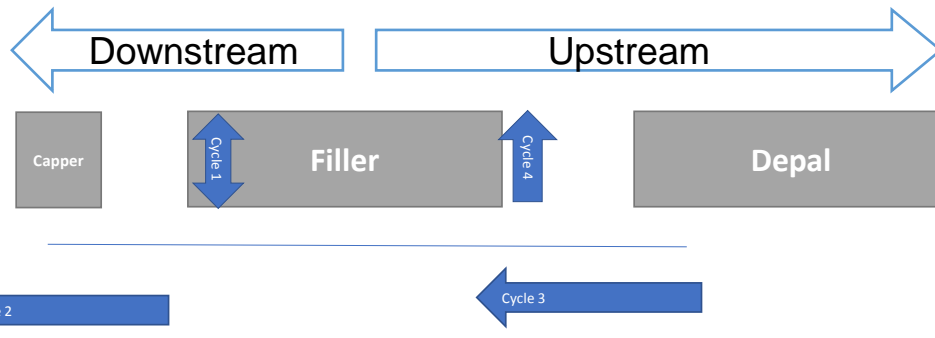
1. Boxes stop
- 2 – 4. Transition
5. Fill
6. Skipped
7. Fill reads up
- 8 – 10. Travel

_FILLER_CYCLE1_TIME

_FILLER_CYCLE2_TIME

_FILLER_CYCLE3_TIME

_FILLER_CYCLE4_TIME



Event Count: 3410

Server: Tagname:

Start Time: 3/22/2019 ☒ End Time ☐ Event Count

Merge Type: Replace Duplicates Boundary

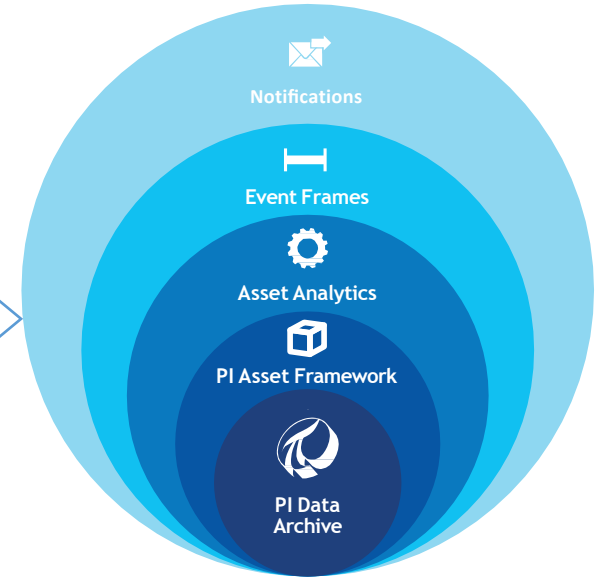
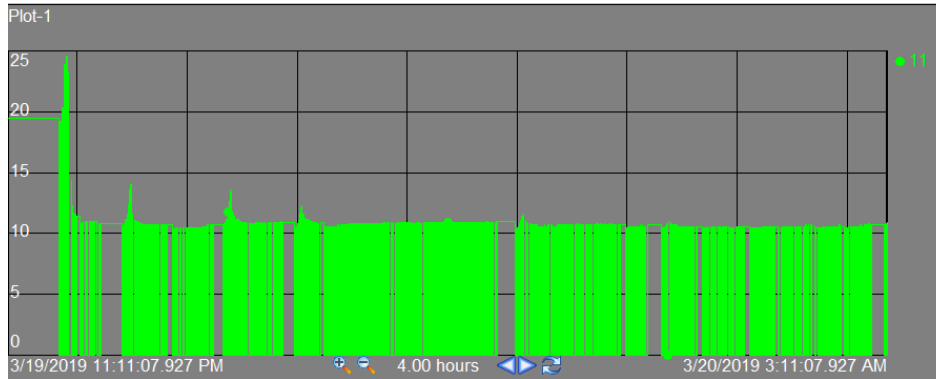
Show Filtered: Show Filtered ☐ Use St

Filter Expression:

Value	Event Time	Que
10.5	3/22/2019 12:37:35 AM	
0	3/22/2019 12:37:40 AM	
10.2	3/22/2019 12:37:55 AM	
0	3/22/2019 12:38:00 AM	
10.2	3/22/2019 12:38:10 AM	
0	3/22/2019 12:38:15 AM	
10.3	3/22/2019 12:38:30 AM	
0	3/22/2019 12:38:35 AM	
10.3	3/22/2019 12:38:50 AM	
0	3/22/2019 12:38:55 AM	
10.3	3/22/2019 12:39:05 AM	
0	3/22/2019 12:39:10 AM	
10.3	3/22/2019 12:39:25 AM	
0	3/22/2019 12:39:30 AM	
10.3	3/22/2019 12:39:40 AM	
0	3/22/2019 12:39:50 AM	

How to Organize Data

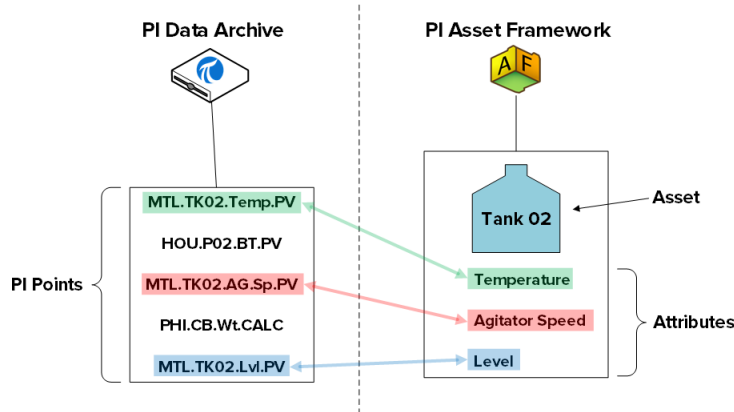
Cycle 1 length (Fill Time)



PI Server

Tools used: PI Asset Framework

The data is organized under assets



The screenshot shows the PI Asset Framework software interface. The left pane displays a tree view of the 'Elements' hierarchy, including 'Fullerton', 'Packaging', 'Animal Fat', 'JIB A', 'OLE', 'OLE Filler', 'Shortening', 'Votation', 'Refinery', and 'Element Searches'. The right pane shows the 'Jib A Filler' asset details, including a 'Filter' table and a 'Table' of data.

Filter		
	Name	Value
Category: Machine Information		
	1 Filler Cycle Time	11.3
	2 Filler Release	1.1
	3 Raw Material Feed	4.7
	4 Oil Delay	0
	Fill Cycle Steps	0
	Fill Cycle Time	0
	Total Cycle Time	18
Category: Oil Information		
	Oil Temperature	59.239749908447266
	Source Tank	301
Category: Operator Info		
	Shift	1
	Shift Hour	10 h
Category: Product Information		
	Product Code	100PKG0005

Tools used: Event Frames

Library

- Fullerton Packaging
 - Templates
 - Feed Pump
 - Filter
 - PPM Tracking
 - Source Tank
 - VW Pump
 - VW Tank
 - Event Frame Templates
 - 1. Fill Cycle Time EF Template**
 - 2. Copper Delay EF Template
 - 3. Pack Material Delay EF Template
 - 4. Oil Delay EF Template
 - Model Templates
 - Transfer Templates
 - Enumeration Sets
 - Reference Types
 - Tables
 - Table Connections
 - Categories
 - Analysis Categories
 - Attribute Categories
 - Element Categories
 - Reference Type Categories
 - Table Categories

1. Fill Cycle Time EF Template

General: Attribute Templates

Filter: Name Description Default Value

Category: <None>	Name	Description	Default Value
	Cycle time		
	Product Code		
	Pump Status		
	Shift		
	Shift Hour		

Elements

- Fullerton
 - Packaging
 - Animal Fat
 - JIB A
 - Jib A Filler
 - OLE
 - OLE Filler
 - Shortening
 - Votation
- Refinery
- Element Searches

Jib A Filler

General Child Elements Attributes Ports Analyses Notification Rules Version

Name	Backfilling
1. Fill Cycle Time	✓
2. Copper Delay	✓
3. Pack Material Delay	✓
4. Oil Delay	✓
Shift Hour	✓

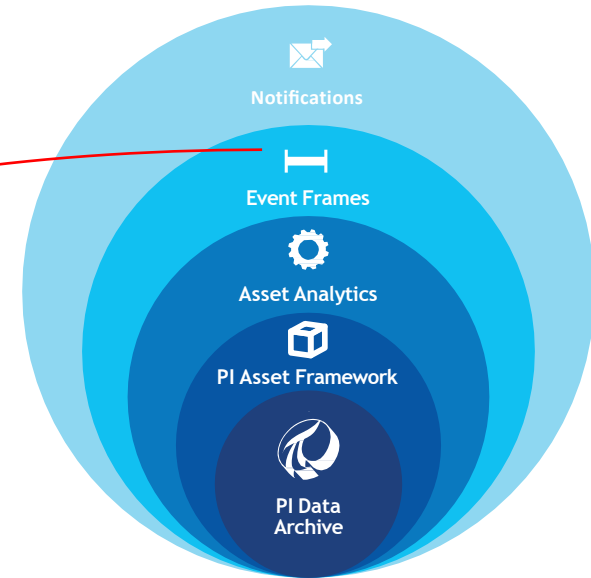
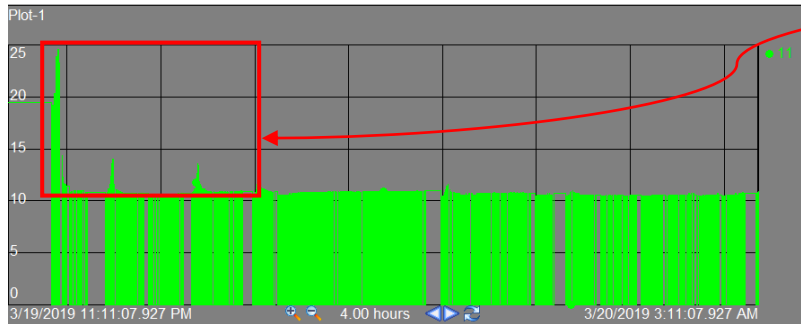
Event Frame Template: 1. Fill Cycle Time EF Template

Name	Expression
StartTrigger	'1 Filler Cycle Time' > 14
EndTrigger	Type an expression (optional)

[Add a new expression](#)

Value of Event Frames

Cycle 1 length (Fill Time)



PI Server

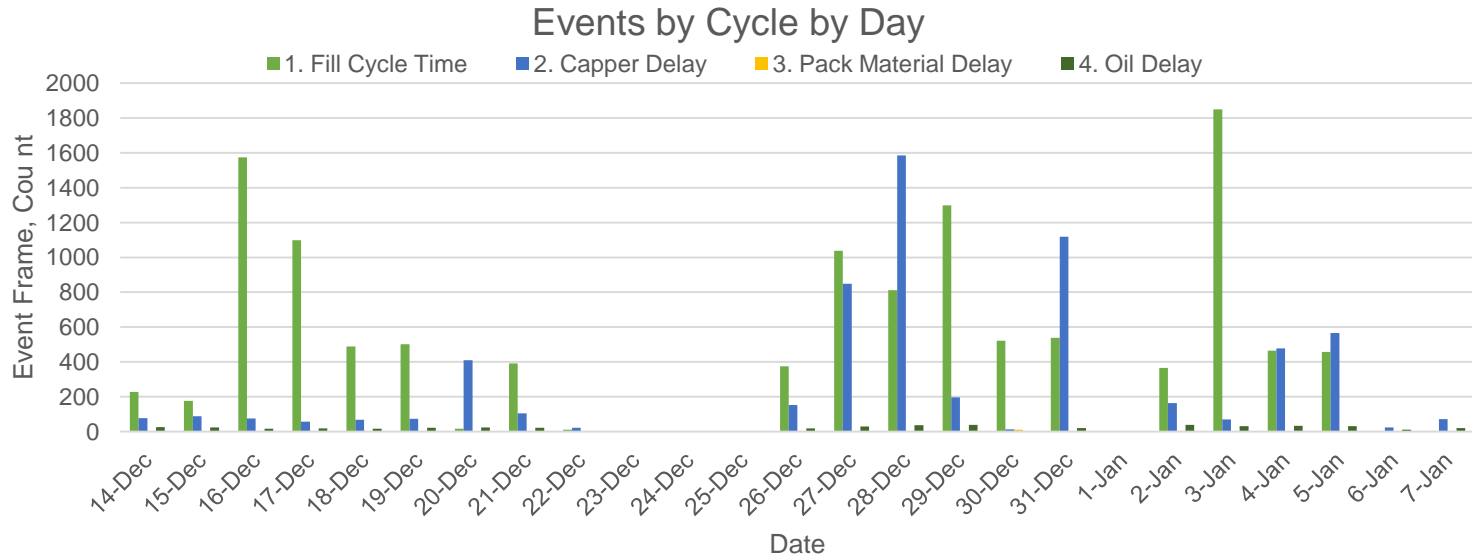
Value of Event Frames

- Quantify events
- Capture significant attributes at time of event
- Allows analysis in PI DataLink

The screenshot displays the PI DataLink interface. On the left, the '1. Fill Cycle Time EF Template' window is open, showing a list of attributes: Cycle time, Product Code, Pump Status, Shift, and Shift Hour. The 'Product Code' attribute is selected, and its value is 'Product Code running'. The 'Shift' attribute is also selected, and its value is '6:00-2:00, 2:00-10:00, 10:00-6:00'. The 'Shift Hour' attribute is also selected, and its value is 'ue'. The 'Performance Loss Data Link Dashboard.xlsx' Excel file is open in the background. The Excel file contains a table with event data. The table has columns for Event name, Start time, End time, Duration, Event template, Primary element, and Product Code. The data is as follows:

Event name	Start time	End time	Duration	Event template	Primary element	Product Code
2. Capper Delay 2019-02-11 00:32:07.000	11-Feb-19 00:32:07	11-Feb-19 00:32:17	0 0:00:10	2. Capper Delay EF Template	Jib A Filler	100PKGNO0000
2. Capper Delay 2019-02-11 00:47:17.000	11-Feb-19 00:47:17	11-Feb-19 00:47:22	0 0:00:05	2. Capper Delay EF Template	Jib A Filler	100PKGNO0000
2. Capper Delay 2019-02-11 00:49:12.000	11-Feb-19 00:49:12	11-Feb-19 00:49:17	0 0:00:05	2. Capper Delay EF Template	Jib A Filler	100PKGNO0000
2. Capper Delay 2019-02-11 00:59:52.000	11-Feb-19 00:59:52	11-Feb-19 01:00:02	0 0:00:10	2. Capper Delay EF Template	Jib A Filler	100PKGNO0000

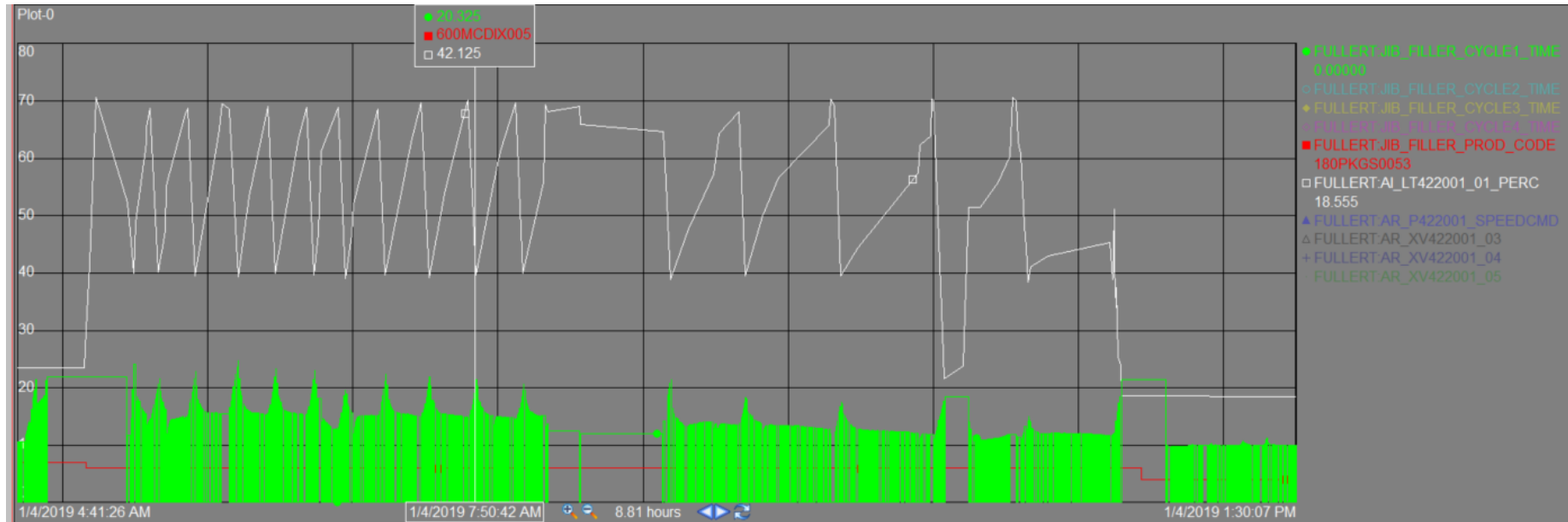
Results



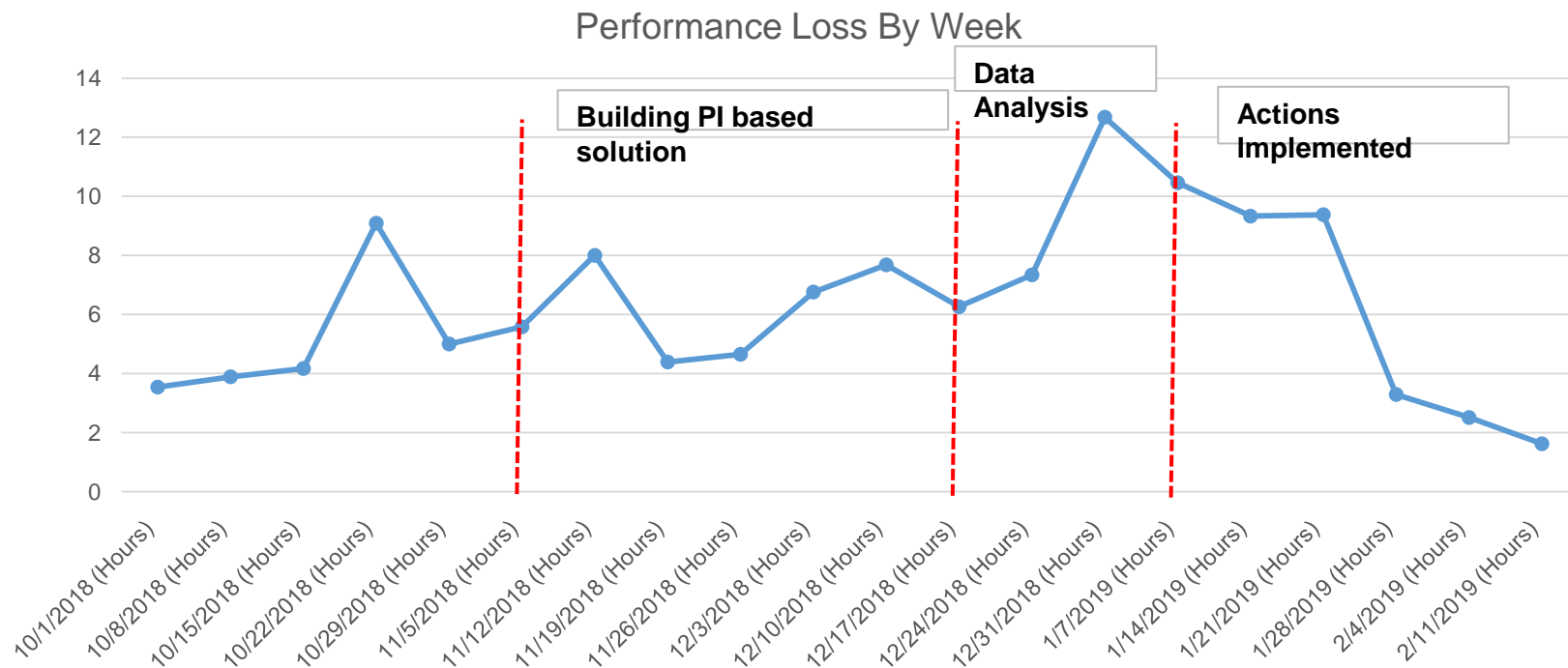
Key Take Aways:

- Minimal performance loss impacts from Cycles 3 and 4
- Major delays occurring during the Oil fill (cycle 1) and Capper delays (cycle 2)
- Example: 16-Dec we had nearly 1600 microstops related to the JIB being filled with Oil

Results

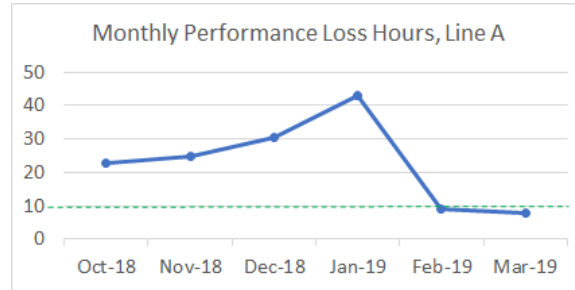


Results



Value Realized

- **Line Performance Loss Improvement of 100%+**



- **Site Level Training for Engineers on use of tools**
- **Replicable across sites with minimal implementation time (2-4 hours set up for brand new user)**

Thanks for joining us!



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Questions?

Please wait for
the **microphone**

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name & company



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THANK YOU

OSIsoft. PIWorld

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TAPADH LEIBH 고맙습니다
BAЯPЛAЛAА MISAOTRA ANAO
DZIĘKUJĘ CI NGIYABONGA TEŞEKKÜR EDERIM GRACIES
OBRIGADO شڪرا SALAMAT
DANKON TANK TAPADH LEAT
DANKIE TERIMA KASIH
СПАСИБО
KÖSZÖNÖM
PAKMET CIZGE
GO RAIBH MAITH AGAT
БЛАГОДАРЯ GRACIAS
MAHADSANID
ТИ БЛАГОДАРАМ
TAK DANKE
RAHMAT
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CẢM ƠN BẠN
WAZVIITA
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DANK JE
ΕΥΧΑΡΙΣΤΩ GRATIAS TIBI
AČIŲ SALAMAT MAHALO IĀ 'OE TAKK SKALDU HA
GRAZZI PAKKA PĒR
PAXMAT CAĞA
SIPAS JI WERE TERIMA KASIH
UA TSAUG RAU KOJ
ТИ БЛАГОДАРАМ
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