



Improving Data Quality at Marathon Oil using PI AF and EQM

Presented by: Scott Williams



Agenda

- About Marathon Oil
- What is EQM?
- Problem Background
- Business Challenge
- Solution
- Results Obtained and Business Impact
- Conclusion

About Marathon Oil



- Became an Independent E&P company in 2011.
- Based in Houston, Texas. With international operations in Europe and Africa.
- Our strategy is focused on the lower cost, higher margin U.S resource plays

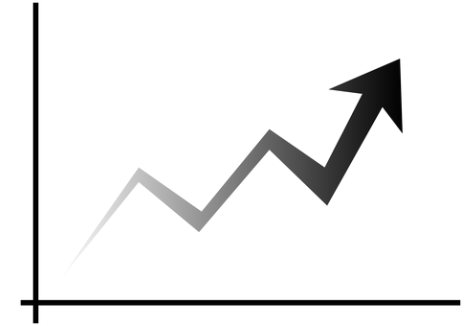
Accelerating operations through digital technology.

About Marathon Oil



PI Growth over the past 5 years

- Increased tag count from 150k to 800k
- Increased use of AF Models
- Over 100 AF Templates
- Use of Event Frames to capture events leading to water and oil haul notification
- Substantial use of PI Analysis and Notifications
- CoreSight and now PI Vision used for dashboards



What is EQM?

Equipment Maintenance Application

- In house developed application
- Designed to solve data quality issues and increase efficiency
- Focus on completion and production stages



Planning

Drilling

Completing

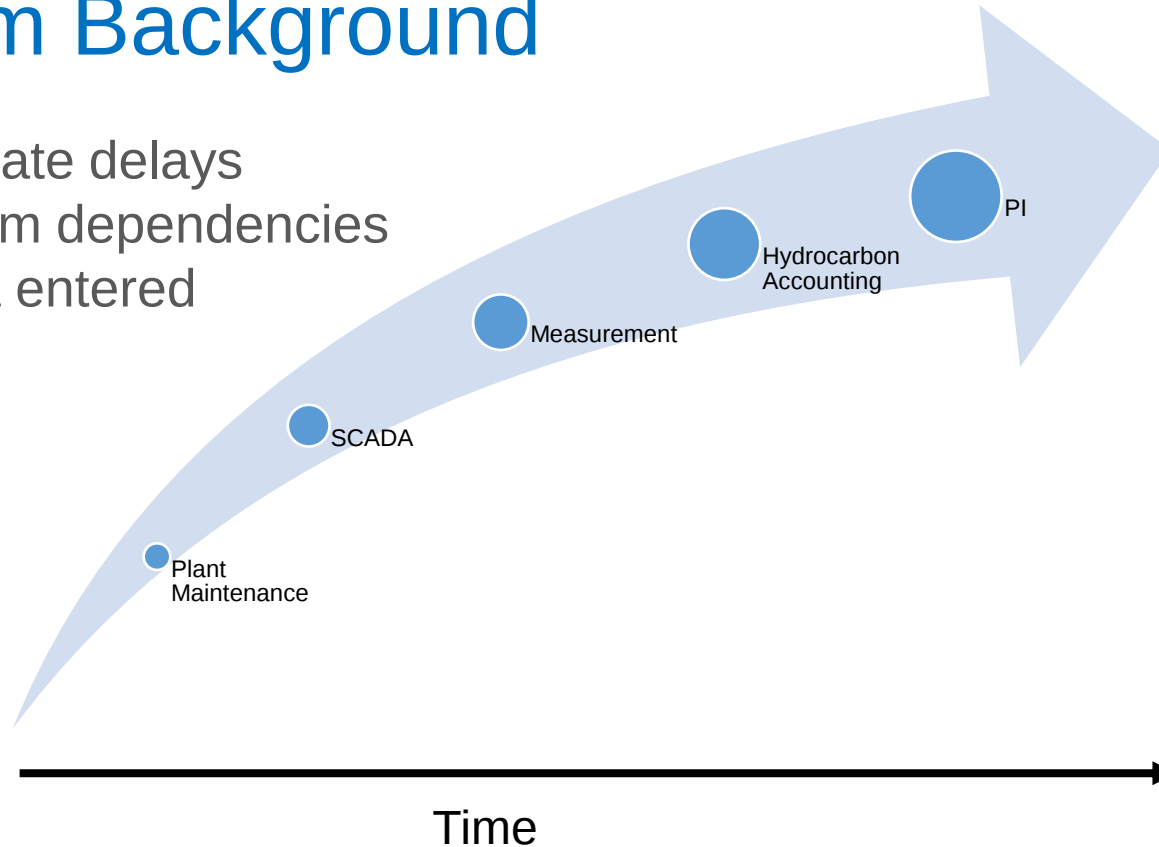
Producing

Problem Background

- Data Quality
 - Updating each system involved manually entering data.
- Data Consistency
 - Inconsistent data across systems
- Efficiency
 - Timing of when each system was updated was inconsistent.
 - Taking days to weeks.

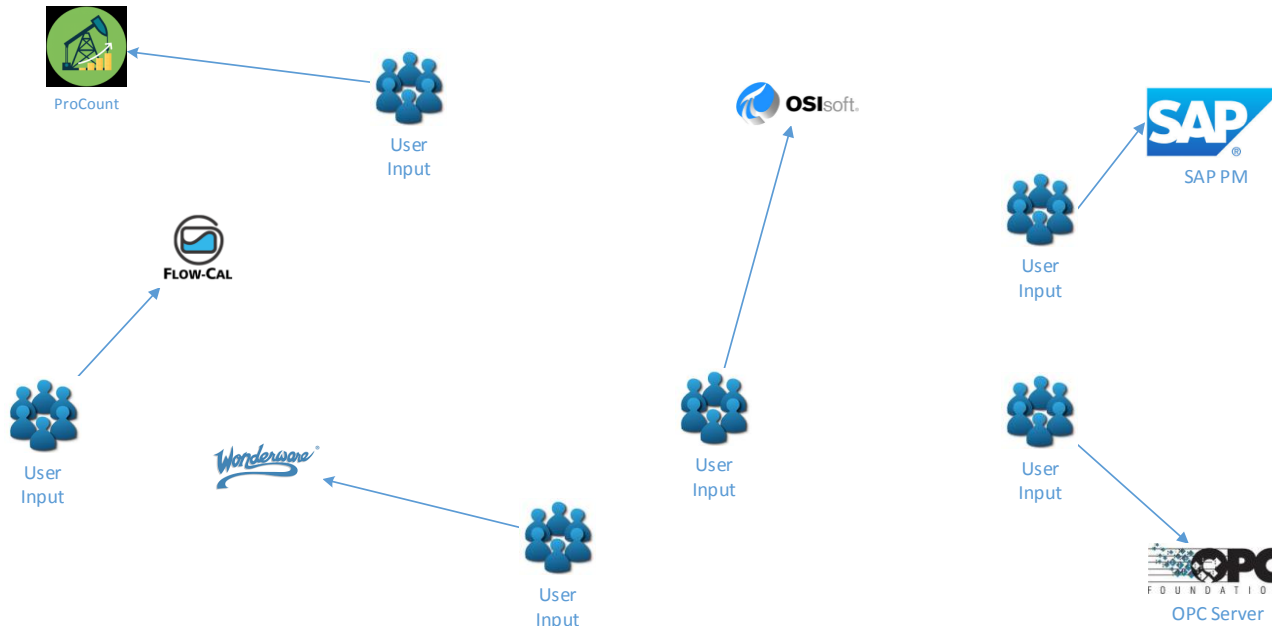
Problem Background

System update delays
Cross system dependencies
Similar data entered



Problem Background

How can we ensure data quality and data consistency across systems when the process looks like this?



Business Challenge



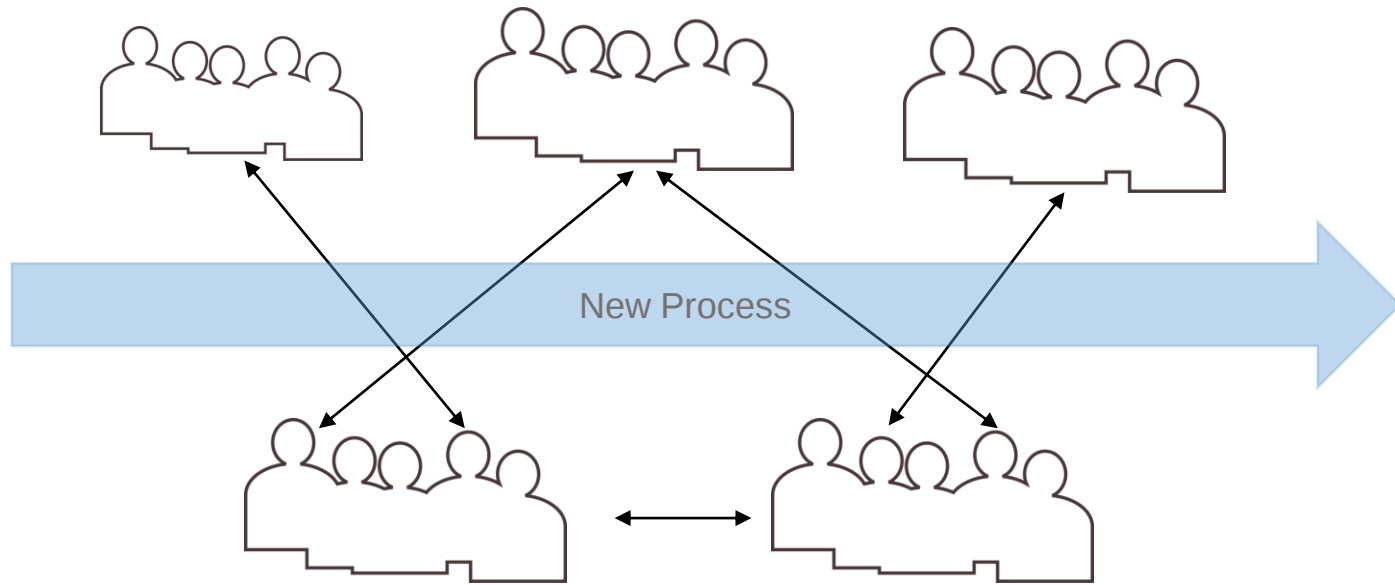
In a lower priced oil market you must reduce costs and increase efficiency:

- Better tools for Operations by combining data from multiple systems
 - More complete view of the well
 - Prioritize operator tasks
- Marathon initiatives resulted in the PI System being the central hub for providing data not only to users but to enterprise systems as well.
 - Increase in AF Models
 - Increase in Tag maintenance

This shift without adequate change in processes caused significant data quality issues.

Business Challenge

Connecting groups and changing processes

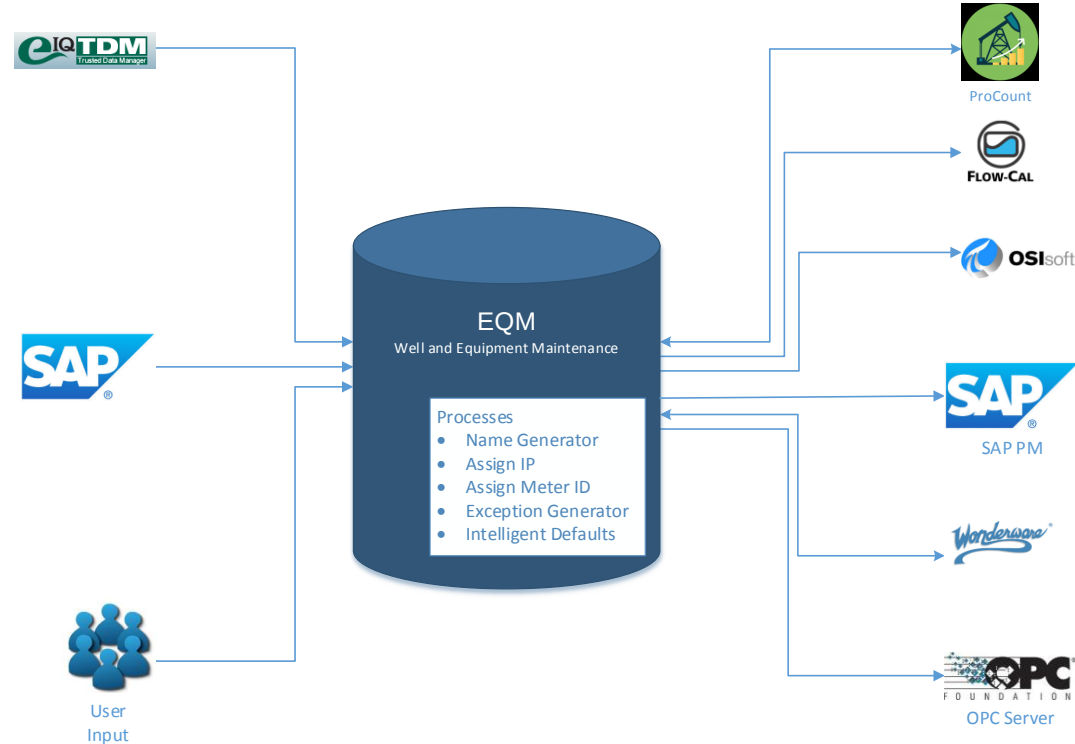


Solution

Reduce - Reuse

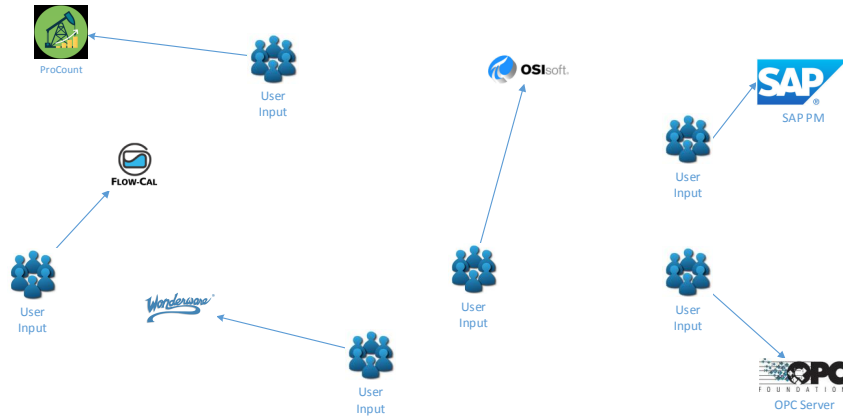
Types of Data

- Well Header
- Tank
- Meter
- Equipment
- Financial (Cost Centers)

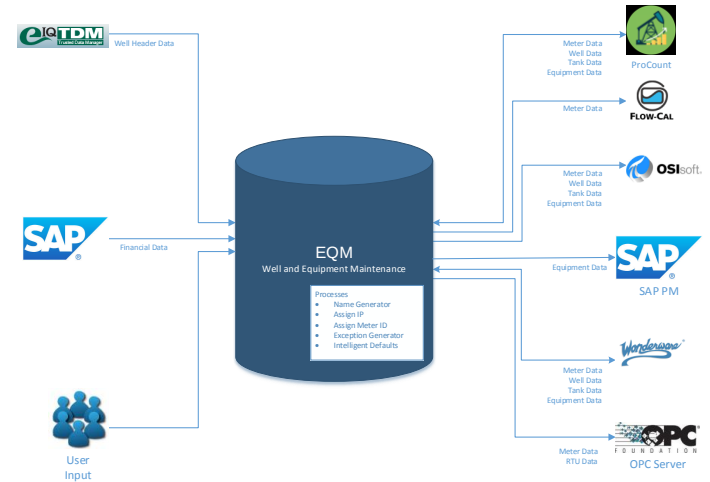


Solution

Before

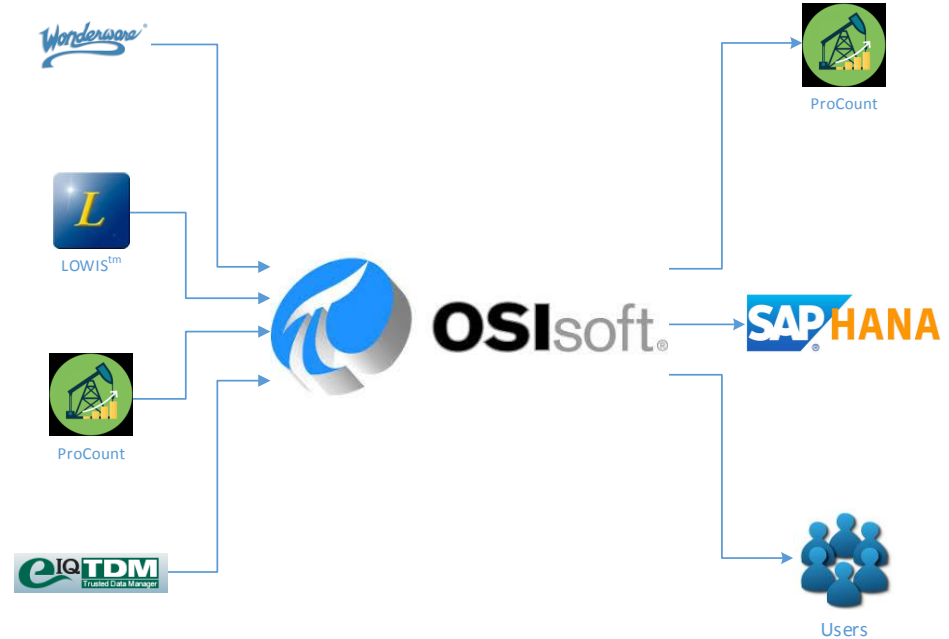


After



PI System – Data HUB

- Using PI to push data to Enterprise systems
 - Use of Integrators to push data to HANA
 - Connecting PI to more systems to aggregate data for users
-
- Custom AF SDK solutions
 - PI Integrator for SAP HANA
 - Spotfire Reports
 - PI Vision Dashboards

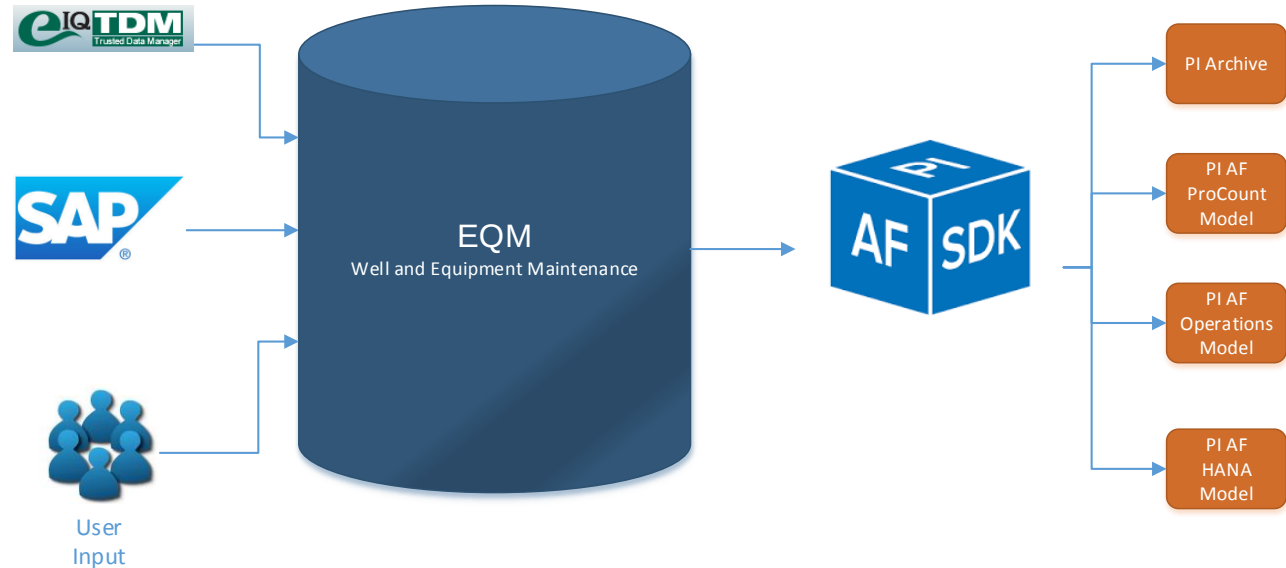


PI System Solution

Fully Automate the maintenance of PI Tags and AF Models

PI Components

- PI AF SDK
- PI Templates
- PI Analytics
- PI Notifications
- PI Vision
- Event Frames



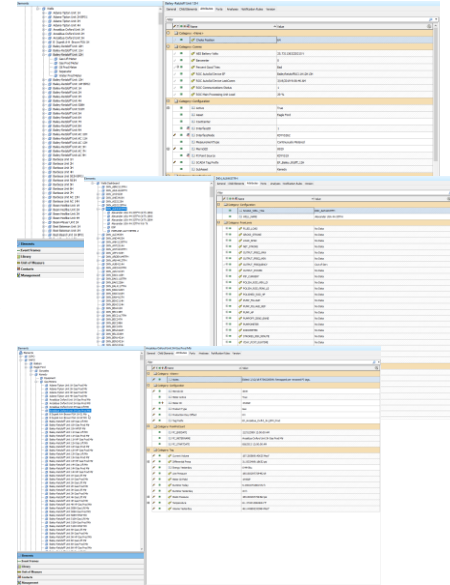
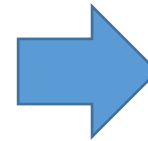
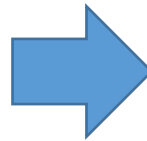
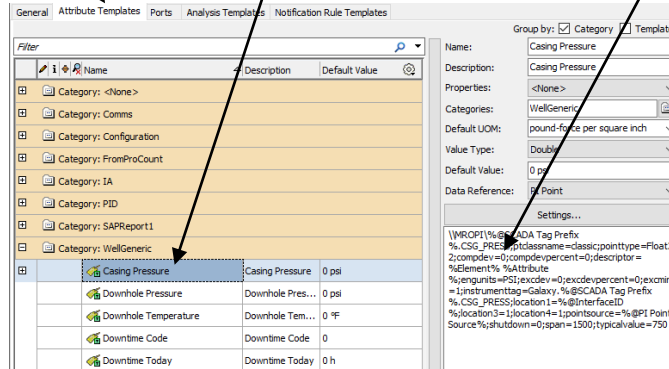
AF Template + AF SDK = PI Asset Creation

AF Template

AF Attribute

Configuration - Tag Creation Config

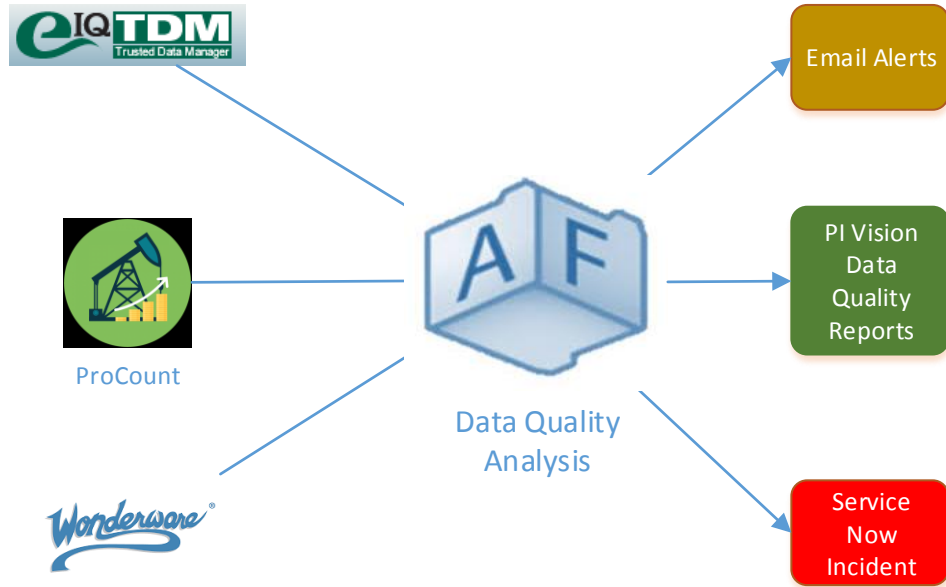
PI Assets Created



PI Analytics + PI Notifications = Action

Use PI AF Analytics and Notifications to check and alert on data consistency

- Data Quality Reports check critical data points across systems
- KPIs measure performance
- Notify groups on lower priority issues
- Generate trackable incidents on higher priority issues



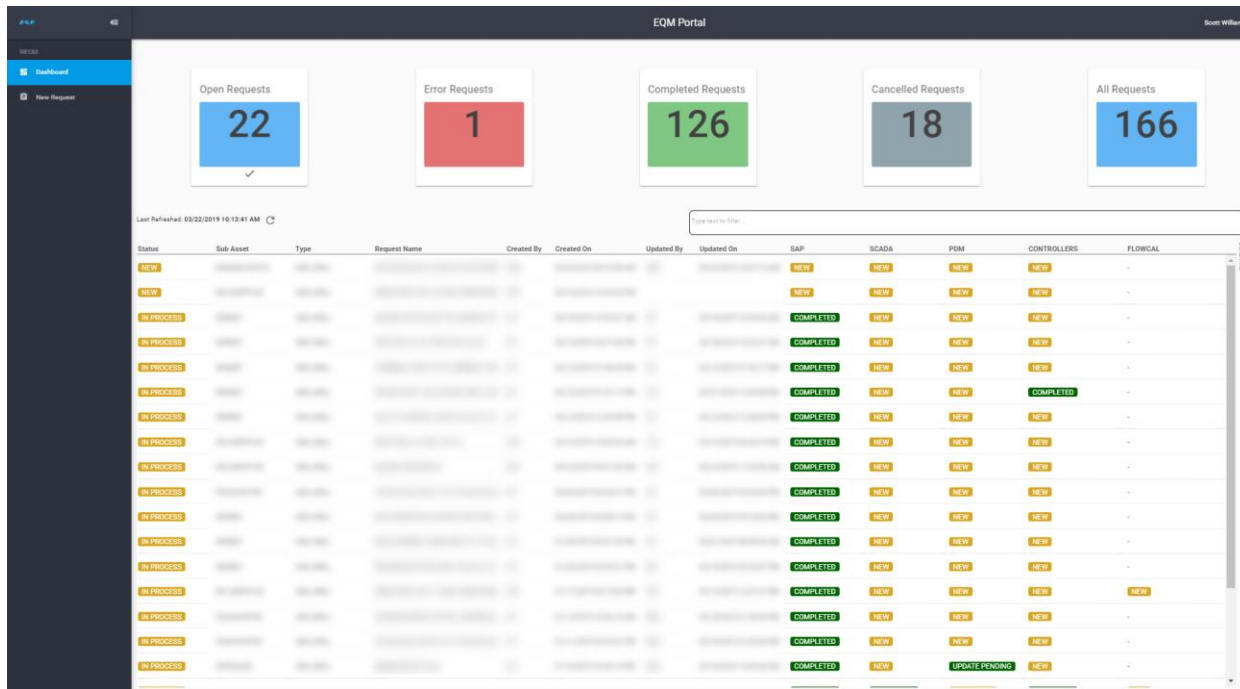
Focus Changed from Maintenance to Data Quality

[illegible][illegible]

DEMO

EQM

EQM Dashboard



EQM New Request

EQM Portal

Scott Wilson

EQM

Dashboard

New Request

Add New Equipment

PARENT FUNCTIONAL LOCATION

TDM WELLS

WELL EQUIPMENT

CPE EQUIPMENT

REVIEW & CREATE

PREVIOUS

NEXT

Select Parent Functional Location

Do you want to create a new Pad? No

Search Well Pads

RESET

SEARCH

Line ID	Plant Name	Type	Parent Line ID	Parent Line Desc	Mainline PL	Plant Name	Cost Center	Cost Center Desc	Asset Location	Notes	Plant version	ABC Indicate for inclusion
1	Superior Plant	Well Equipment	1	Superior Plant	1	Superior Plant	1	Superior Plant	1			
2	Superior Plant	Well Equipment	2	Superior Plant	2	Superior Plant	2	Superior Plant	2			
3	Superior Plant	Well Equipment	3	Superior Plant	3	Superior Plant	3	Superior Plant	3			
4	Superior Plant	Well Equipment	4	Superior Plant	4	Superior Plant	4	Superior Plant	4			
5	Superior Plant	Well Equipment	5	Superior Plant	5	Superior Plant	5	Superior Plant	5			
6	Superior Plant	Well Equipment	6	Superior Plant	6	Superior Plant	6	Superior Plant	6			
7	Superior Plant	Well Equipment	7	Superior Plant	7	Superior Plant	7	Superior Plant	7			
8	Superior Plant	Well Equipment	8	Superior Plant	8	Superior Plant	8	Superior Plant	8			
9	Superior Plant	Well Equipment	9	Superior Plant	9	Superior Plant	9	Superior Plant	9			
10	Superior Plant	Well Equipment	10	Superior Plant	10	Superior Plant	10	Superior Plant	10			
11	Superior Plant	Well Equipment	11	Superior Plant	11	Superior Plant	11	Superior Plant	11			
12	Superior Plant	Well Equipment	12	Superior Plant	12	Superior Plant	12	Superior Plant	12			
13	Superior Plant	Well Equipment	13	Superior Plant	13	Superior Plant	13	Superior Plant	13			
14	Superior Plant	Well Equipment	14	Superior Plant	14	Superior Plant	14	Superior Plant	14			
15	Superior Plant	Well Equipment	15	Superior Plant	15	Superior Plant	15	Superior Plant	15			
16	Superior Plant	Well Equipment	16	Superior Plant	16	Superior Plant	16	Superior Plant	16			
17	Superior Plant	Well Equipment	17	Superior Plant	17	Superior Plant	17	Superior Plant	17			
18	Superior Plant	Well Equipment	18	Superior Plant	18	Superior Plant	18	Superior Plant	18			
19	Superior Plant	Well Equipment	19	Superior Plant	19	Superior Plant	19	Superior Plant	19			
20	Superior Plant	Well Equipment	20	Superior Plant	20	Superior Plant	20	Superior Plant	20			
21	Superior Plant	Well Equipment	21	Superior Plant	21	Superior Plant	21	Superior Plant	21			
22	Superior Plant	Well Equipment	22	Superior Plant	22	Superior Plant	22	Superior Plant	22			
23	Superior Plant	Well Equipment	23	Superior Plant	23	Superior Plant	23	Superior Plant	23			
24	Superior Plant	Well Equipment	24	Superior Plant	24	Superior Plant	24	Superior Plant	24			
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27	Superior Plant	Well Equipment	27	Superior Plant	27	Superior Plant	27	Superior Plant	27			
28	Superior Plant	Well Equipment	28	Superior Plant	28	Superior Plant	28	Superior Plant	28			
29	Superior Plant	Well Equipment	29	Superior Plant	29	Superior Plant	29	Superior Plant	29			
30	Superior Plant	Well Equipment	30	Superior Plant	30	Superior Plant	30	Superior Plant	30			
31	Superior Plant	Well Equipment	31	Superior Plant	31	Superior Plant	31	Superior Plant	31			
32	Superior Plant	Well Equipment	32	Superior Plant	32	Superior Plant	32	Superior Plant	32			
33	Superior Plant	Well Equipment	33	Superior Plant	33	Superior Plant	33	Superior Plant	33			
34	Superior Plant	Well Equipment	34	Superior Plant	34	Superior Plant	34	Superior Plant	34			
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41	Superior Plant	Well Equipment	41	Superior Plant	41	Superior Plant	41	Superior Plant	41			
42	Superior Plant	Well Equipment	42	Superior Plant	42	Superior Plant	42	Superior Plant	42			
43	Superior Plant	Well Equipment	43	Superior Plant	43	Superior Plant	43					

EQM New Request

The screenshot shows the 'EQM Portal' interface for 'Add New Equipment'. The user is 'Scott Williams'. The form has a progress bar with five steps: PARENT FUNCTIONAL LOCATION, TDM WELLS (current step), WELL EQUIPMENT, CPE EQUIPMENT, and REVIEW & CREATE. A 'CANCEL' button is in the top right. The main area is titled 'Search and Select the TDM Wells' and contains a search bar with 'RESET' and 'SEARCH' buttons. Below the search bar is a table of TDM Wells. To the right of the table is a sidebar with details for the selected item: 'Superior Plac: USDF-413-PAD-7339 (PaE) Well Equipment: TDM Wells(2)'. Navigation buttons 'PREVIOUS' and 'NEXT' are at the bottom.

EQM Portal Scott Williams

ADD NEW EQUIPMENT

PARENT FUNCTIONAL LOCATION TDM WELLS WELL EQUIPMENT CPE EQUIPMENT REVIEW & CREATE

← PREVIOUS NEXT →

Search and Select the TDM Wells

Search

RESET SEARCH

Well ID	Well Name	Well Type	Well Status	Well Location	Well Depth	Well Diameter	Well Completion Date
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01
USDF-413-PAD-7339	Superior Plac	Well Equipment	Active	USDF-413-PAD-7339	10000	12	2019-01-01

Superior Plac:
USDF-413-PAD-7339
(PaE)
Well Equipment:
TDM Wells(2)

← PREVIOUS NEXT →

EQM New Request

EQM Portal Scott Williams

ADD NEW EQUIPMENT

PARENT FUNCTIONAL LOCATION TOM WELLS WELL EQUIPMENT OPE EQUIPMENT REVIEW & CREATE

← PREVIOUS NEXT →

Cancel

Select Well Equipment

Do you want to use an existing Well from SAP as template? ☒ Yes

Search and Select an existing SAP Well - (Selected: USEF-297-35946)

Search

RESET SEARCH

Plant ID	Plant Name	Type	Parent Plant ID	Parent Plant Name	Master ID	Plant Name	Plant Center	Plant Center Name
USEF-297-35946	USEF-297-35946	WELL COMMUNICATIONS	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	RADIO EQUIPMENT	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	SWITCH, UNKNOWN	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	WELL METERS	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	METER, GAS LIFT	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	METER, GAS PRODUCTION	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	METER, OIL PRODUCTION	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	METER, WATER PRODUCTION	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	SEPARATOR, TEST SKID	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	SOLUBLES, FUEL GAS	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	SEPARATOR, LEVEL CONTROLLER	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	SEPARATOR, LEVEL CONTROLLER	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	SEPARATOR, SWITCH, LEVEL HIGH	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946
USEF-297-35946	USEF-297-35946	SEPARATOR, SWITCH, LEVEL HIGH	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946	USEF-297-35946

← PREVIOUS NEXT →

EQM Data Entry

EQM Portal Scott Williams

Add New Equipment Completed Completed Completed Completed

SCADA (Feb 4, 2019 9:12:55 AM) SAP (Feb 7, 2019 12:08:04 PM) PDM (Feb 7, 2019 9:01:04 PM) CONTROLLERS (Feb 4, 2019 9:28:35 AM)

PROCOUNT

METER THEORETICAL Completed

METER WATER COMP Completed

METER THEORETICAL Completed

METER WATER COMP Completed

CTB Completed

BURNER MANAGEMENT SYSTEM Completed

TDM Well Header

TDM Well Name: [REDACTED] Asset/Subasset: [REDACTED] Producing Method / Status: [REDACTED] Operator: MARATHON OIL COMPANY

MUWI: [REDACTED] Platform/Facility: [REDACTED] API: [REDACTED] Location (Lat/Long): [REDACTED]

Prospect Area: [REDACTED] Field: [REDACTED] Country/State: [REDACTED] Cost Center: [REDACTED]

WELL (Feb 1, 2019 3:01:04 PM)

API Producing Interval: [REDACTED] Well Purpose: [REDACTED]

Stop: [REDACTED] Development: [REDACTED]

Producing Status: [REDACTED] Subasset: [REDACTED]

Completed/Awaiting production: [REDACTED] Subasset: [REDACTED]

Interlock ID: [REDACTED] Drawn: [REDACTED]

14581: [REDACTED] Allocation Template: [REDACTED]

Accounting Team: [REDACTED] Field Platform/Facility: [REDACTED]

IBM: [REDACTED] Well: [REDACTED]

VP: [REDACTED] Well: [REDACTED]

NAPD: [REDACTED] Well: [REDACTED]

Temperature: [REDACTED] S - Unassigned: [REDACTED]

Producing Method/Interface Type: [REDACTED] Team: [REDACTED]

Flowing: [REDACTED] Team: [REDACTED]

Facility Type: [REDACTED] Team: [REDACTED]

Central Tank Battery Well: [REDACTED] Team: [REDACTED]

Field: [REDACTED] Location: [REDACTED]

Measurement Type: [REDACTED] Location: [REDACTED]

Country/State: [REDACTED] Location: [REDACTED]

Disposition Code: [REDACTED] Prospect: [REDACTED]

Unassigned: [REDACTED] Prospect: [REDACTED]

SAVE COMPLETE

EQM – Error Checking

The screenshot shows the 'EQM Portal' interface for 'Add New Equipment'. The top navigation bar includes 'Dashboard' and 'New Request'. The main content area displays a list of equipment items with their status. The 'METER, PIPELINE LACT' item is highlighted, and its details are shown on the right.

Equipment Name	Status
HEATER TREATER, BULK	Completed
HEATER TREATER, TEST	Completed
METER, GAS, 3RD PARTY	Completed
METER, LACT	Update Error
METER, LACT	Update Error
METER, LACT	Update Error
TANK, 1, STEEL, OIL, #2000, DIVERT	Completed
TANK, 1, STEEL, WATER, PERMISSIVE	Completed
TANK, 2, STEEL, OIL, #3000, PERMISSIVE	Completed
TANK, 2, STEEL, WATER, PERMISSIVE	Completed
TANK, 3, STEEL, OIL, #3001, PERMISSIVE	Completed
TANK, 3, STEEL, WATER	Completed
TANK, 4, STEEL, OIL, #3002, PERMISSIVE	Completed
TANK, 5, STEEL, OIL, #3003, PERMISSIVE	Completed

Details for 'METER, PIPELINE LACT' (Mar 21, 2019 7:27:52 AM):

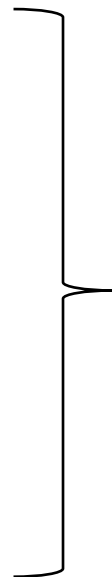
- Equipment Name: PIPELINE LACT METER 3
- Description: [Redacted]
- Parent Name: [Redacted]
- Interface Role: [Redacted]
- Measurand ID: *

Buttons: SAVE, COMPLETE

EQM Results

Impact

5	Applications Integrated
4066	Pieces of Equipment Created Across the 5 Applications
152,932	Data Points Created Across the 5 Applications
~90%	Manual Data Entry Reduction
>20%	Reduction in Data Quality issues



=

Higher Efficiency
Increased Data Quality
Improved Data Consistency

Marathon Oil Company

Improving Data Quality using PI AF and EQM



CHALLENGE

Increase process efficiency, improve data quality and reduce time for system updates

- Poor data quality
- Inconsistent timing of data entry across systems
- No Data quality checking

SOLUTION

EQM increased efficiency and data quality by reducing data entry and improved the speed by which systems were updated by reusing data

- PI Templates were used to maintain consistency in Tag creation
- PI AF SDK allowed the complete automation of multiple AF models
- PI Analysis provided the ability to perform Data Quality checks across systems

RESULTS

Time for all systems to be updated was reduced from days to hours while data quality improved due to reduction in manual data entry and the addition of cross system analysis

- 5 Systems integrated
- Overall manual data entry reduced by 90%
- >20% Reduction in Data Quality Issues

Contact Information



- Scott Williams
- Consulting SCADA Specialist
- Marathon Oil Company
- scottwilliam@marathonoil.com

Questions?

Please wait for
the **microphone**

State your
name & company



Please remember

TO DOWNLOAD
APP, SEARCH
OSISOFT



Download on the
App Store



GET IT ON
Google Play



THANK YOU

OSIsoft.
PIWorld

謝謝 KEA LEBONA
TAPADH LEIBH 고맙습니다
БАЯРЛАЛАА MISAOTRA ANAO
DZIĘKUJĘ CI NGIYABONGA TEŞEKKÜR EDERIM GRACIES
OBRIGADO شڪرا
DANKON TANK TAPADH LEAT SALAMAT
DANKIE TERIMA KASIH
KÖSZÖNÖM
СПАСИБО
PAKMET CIZGE
GO RAIBH MAITH AGAT
БЛАГОДАРЯ GRACIAS
ТИ БЛАГОДАРАМ
MAHADSANID
TAK DANKE
RAHMAT MERCI
HATUR NUHUN
CẢM ƠN BẠN
WAZVIITA
FALEMINDERIT
DANK JE ΕΥΧΑΡΙΣΤΩ GRATIAS TIBI
AČIŮ SALAMAT MAHALO IĀ 'OE TAKK SKALDU HA
GRAZZI PAKKA PĒR PAXMAT CAĞA
SIPAS JI WERE TERIMA KASIH
UA TSAUG RAU KOJ
ТИ БЛАГОДАРАМ
СИПОС
MULTUMESC
FAAFETAİ
ESKERRIK ASKO
HVALA ХВАЛА ВАМ
TEŞEKKÜR EDERIM
HVALA
DZЯКУЙ
DI OU MÈSI
ĐAKUJEM
MATUR NUWUN
GRAZIE