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# Get the Most Out of Your Assets with the PI System and Maximo

Presented by **Paul Bonitz, SFPUC Wastewater**  
**Lisa M. Slaughter, DST Controls**



**San Francisco**  
**Water Power Sewer**  
Services of the San Francisco Public Utilities Commission

# San Francisco Public Utilities Commission



## WATER



*Hetch Hetchy Reservoir*

## POWER



*Solar Panels at Sunset Reservoir*

## WASTEWATER



*North Point Wet Weather Facility*

# About Wastewater Enterprise (WWE)

- The city under The City
  - Wastewater Enterprise (WWE) operates and maintains the sewer system, collects and treats wastewater
  - 1,000 miles of sewer lines
  - 27 pumping stations
  - 3 treatment plants
  - 8 deep water outfalls





# San Francisco Overview



# How much water can we treat?

- Wastewater Enterprise (WWE) has 2 major and 1 standby sewage treatment plants.
  - Southeast Plant (SEP) –treats up to 250 MGD (1G = 3.78L)
  - Oceanside Plant (OSP) –treats up to 65 MGD
  - North Point Plant (NPP) –activated during major rain events, treats up to 150 MGD (during major rain events only)
  - There are 27 sewage collection stations scattered throughout SF which pump flows to these treatment plants

# That's a lot of assets!

- We have over 325,000 assets
  - 310,000 collection system assets
  - 15,000 treatment plant and pump station assets
- Many may be at the end of their expected useful life
- How do we maintain all these assets?
- Implement an asset management program to make more informed capital and maintenance decisions with limited funding

# About the WWE Asset Management Program

- A set of integrated processes that **minimize the life-cycle costs of Wastewater Enterprise assets** at an acceptable level of risk, while continuously delivering established levels of service.
- Strategic Business Plan Goal A Objective 1: “**Optimize the lifecycle of WWE physical assets.**”
- Develop processes to “**minimize the life-cycle costs of Wastewater Enterprise assets.**”



# Condition Based Maintenance (CBM)

- Maintenance is triggered by real-time data
- Much more efficient than performing work on a calendar-based schedule
- Avoids situations where work is performed even though the asset was not used
- Avoids unnecessary maintenance



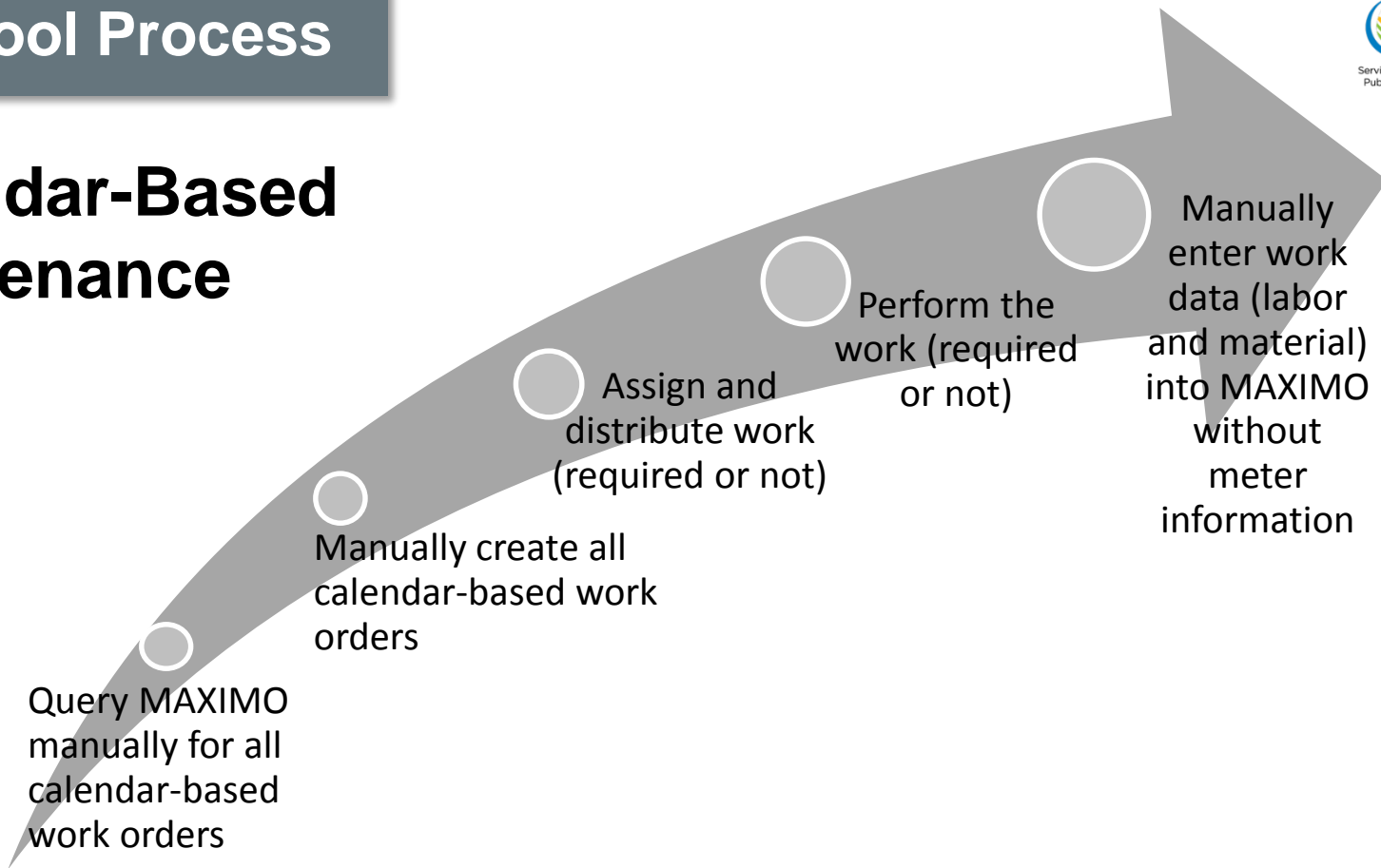
# Benefits of CBM

- Minimizes costs
  - Labor savings (> Wrench Time)
  - Fewer parts required
  - No more time spent manually generating work orders
- Improved business process
  - Reduction in paperwork and administration by generating fewer work orders
  - More accurate data in Maximo

# The Pilot: PI Meter Data to Maximo

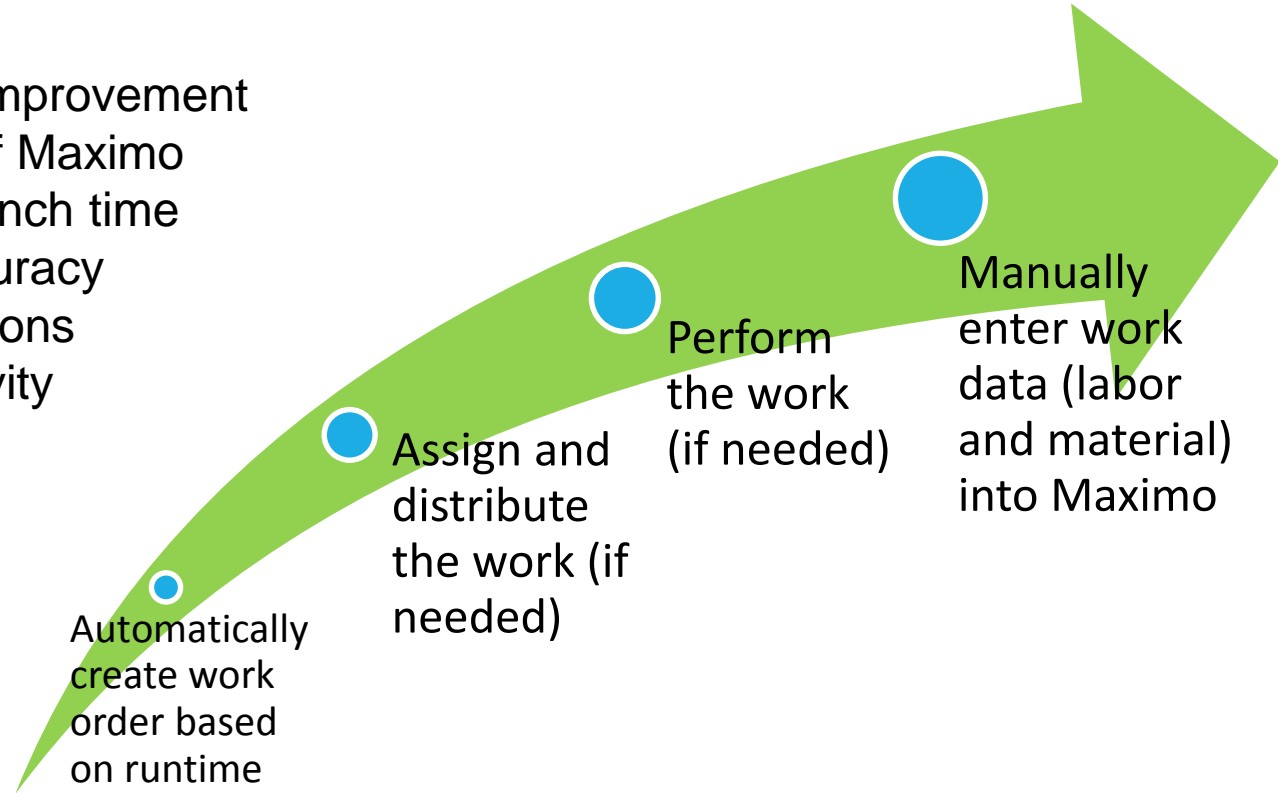
- Asset RunHours already being captured by PI System
- Assets already being tracked by Maximo
- Automatically input PI RunHours data into Maximo
- Automatic work order generation
- 1 Month = 720 hours -> 5 hours
- Quarterly = 2160 hours -> 15 hours
- Semi-Annual= 4320 hours -> 30 hours
- Annual = 8640 hours -> 60 hours
- 1/144 scale pilot as proof of concept

## Calendar-Based Maintenance



# Benefits of CBM

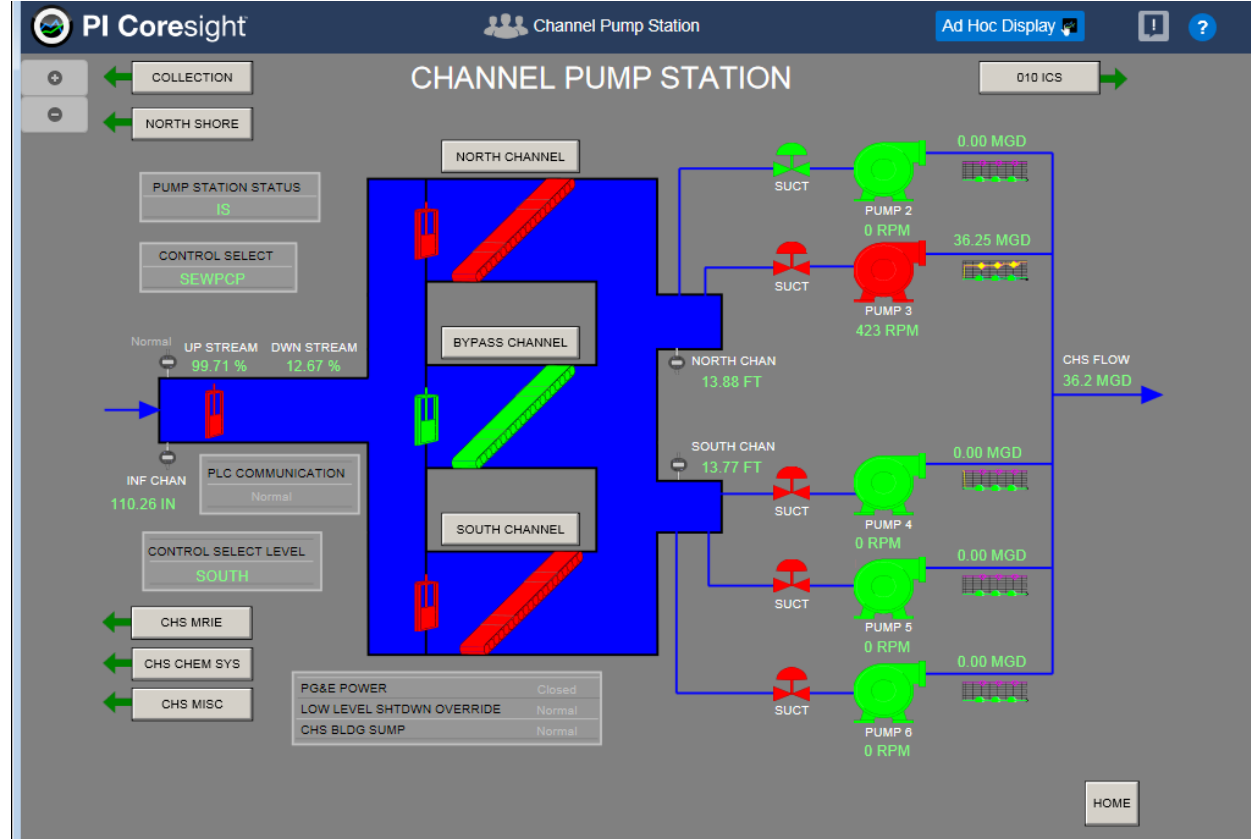
- Business process improvement
- Maximizing value of Maximo
- Increased crew wrench time
- Increased data accuracy
- Streamlined operations
- Increased Productivity





# Channel Pump Station (CHS)

- It is a dry and wet weather pump station, which operates 24/7
- Dry weather flows average 40 MGD with a maximum wet weather capacity of 103 MGD



# The Solution



Asset Framework

AF SDK

PI-Maximo  
Data Bridge

REST  
API

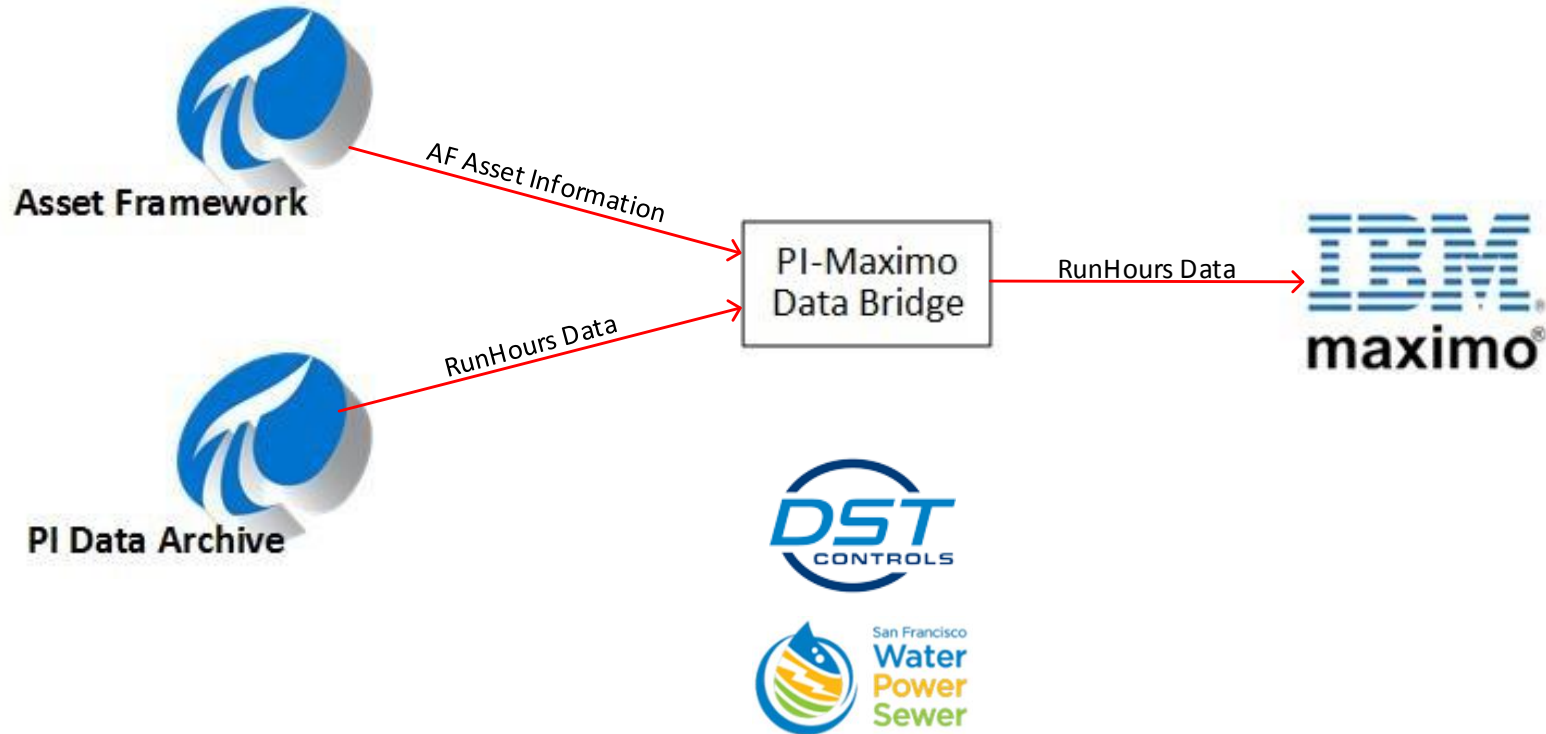
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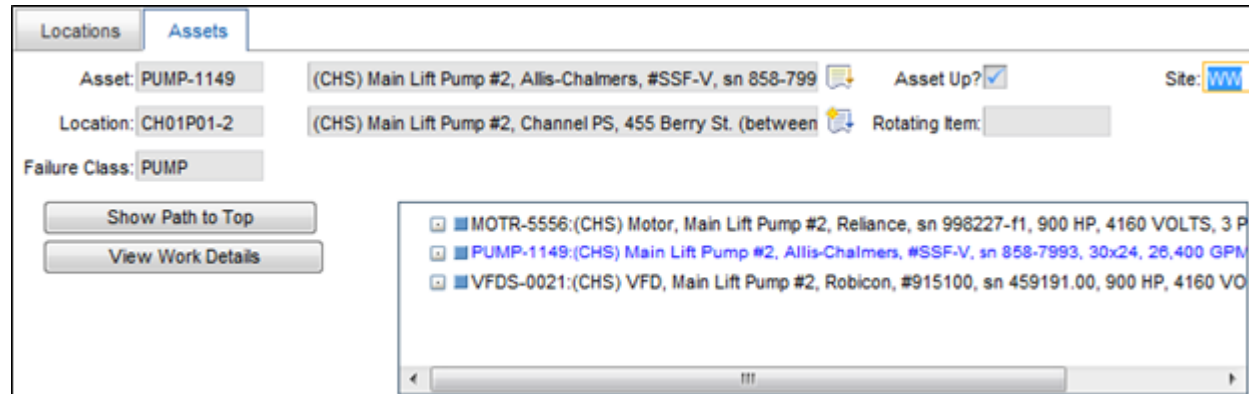
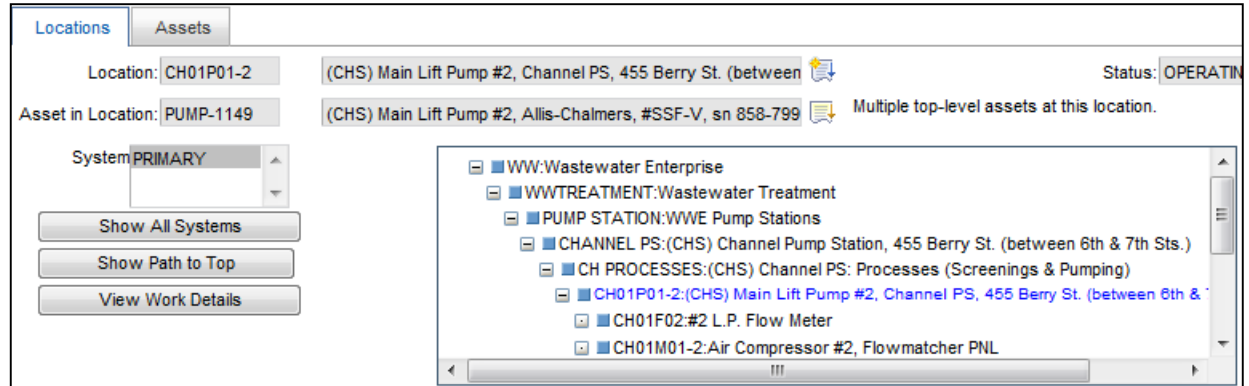
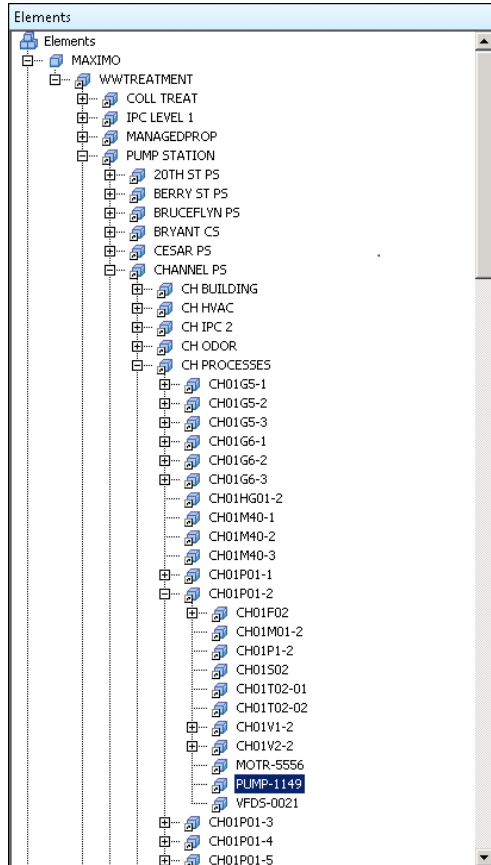
PI Data Archive



# The Solution: Data Flow



# The Solution: Mapping Asset Framework to Maximo



# The Pilot: Asset Framework (AF) Side

The screenshot displays the MAXIMO - PI System Explorer application. The title bar reads "\\AF\\MAXIMO - PI System Explorer". The menu bar includes File, Search, View, Go, Tools, and Help. The toolbar contains icons for Database, Query Date, Back, Check In, Refresh, New Element, and New Attribute.

The left sidebar shows a tree view under "Elements" with sub-items: Pump-1149, Pump-1150, Pump-1151, Pump-1152, and Element Searches. Below this are sections for Elements, Event Frames, Library, and Unit of Measure, with a status bar indicating "1 Attribute".

The main window is titled "Pump-1149" and has tabs for General, Child Elements, Attributes, Ports, Analyses, and Version. The "Attributes" tab is active, showing a table with columns "Name" and "Value". A filter is applied, and the table contains one entry: "RunHours" with a value of "10017.19 h".

On the right, the "Group by:" options are "Category" and "Template". The attribute configuration fields are as follows:

- Name: RunHours
- Description: (empty)
- Properties: <None>
- Categories: (empty)
- Default UOM: hour
- Value Type: Single
- Value: 10017.19 h
- Data Reference: PI Point

Below these fields is a "Settings..." button and a text box containing the path: \\wweppi01\\SM3CHS\_CTRL:CH\_P2\_RTC.RO01.



# The Pilot: Maximo Asset Management Side

**Assets**

Find:  Select Action

List Asset Spare Parts Safety Meters Specifications Relationships Work

Advanced Search Save Query Bookmarks

Assets Filter 1 - 4 of 4

Asset	Description	Location
<input type="text"/>	<input type="text" value="chs"/>	<input type="text"/>
<u>PUMP-1149</u>	CHS Main Pump #2	CH01P01
<u>PUMP-1150</u>	CHS Main Pump #3	CH01P01
<u>PUMP-1151</u>	CHS Main Pump #4	CH01P01
<u>PUMP-1152</u>	CHS Main Pump #5	CH01P01

☐ Select Records

# The Pilot: Maximo Asset Management Side

Assets Bulletins: (0) [Go To](#)

Find:  Select Action

List Asset Spare Parts Safety **Meters** Specifications Relationships Work

Asset: PUMP-1149 CHS Main Pump #2 Site: BEDFORD

Meter Group:  [»](#)

Meters [Filter](#) 1 - 1 of 1

Sequence	Meter	Description	Meter Type	Unit of Measure
1	RUNHOURS <a href="#">»</a>	Run Hours	CONTINUOUS	HOURS <a href="#">🔍</a>

Meter Details

Sequence:

Meter: RUNHOURS [»](#) Run Hours [📄](#)

Meter Type: CONTINUOUS

Unit of Measure: HOURS [🔍](#)

Active? ☒

Last Reading:  [🔍](#)

Last Reading Date:  [📅](#)

Last Reading Inspector:  [»](#)

Remarks:

- A RUNHOURS meter is created for each pump

# Results of the Pilot

Work Order Tracking

Bulletins: (0) Go To Reports Start Center Profile Sign Out Help IBM

Find: Select Action

List Work Order Plans Assignments Related Records Actuals Safety Plan Log Failure Reporting Specifications

Advanced Search Save Query Bookmarks

Work Orders Filter 1 - 20 of 42 Download

Work Order	Description	Location	Asset	Status	Scheduled Start	Priority	Site
	Main Lift Pump #3						=BEDFORD
<a href="#">1216</a>	CHS Main Lift Pump #3	CH01P01	PUMP-1150	WSCH			BEDFORD
<a href="#">1217</a>	Main Lift Pump #3	CH01P01	PUMP-1150	WSCH			BEDFORD
<a href="#">1220</a>	CHS Main Lift Pump #3	CH01P01	PUMP-1150	WSCH			BEDFORD
<a href="#">1221</a>	Main Lift Pump #3	CH01P01	PUMP-1150	WSCH			BEDFORD
<a href="#">1224</a>	CHS Main Lift Pump #3	CH01P01	PUMP-1150	WSCH			BEDFORD

- Fast roll-out compared to other SFPUC projects: Began to automatically generate Maximo work orders 6 weeks after kick-off meeting.

# Results of Pilot

Asset Name	# of PMs: Scheduled Basis	# of PMs: Conditional Basis	# of unnecessary PMs Avoided
PUMP-1149	28	0	28
PUMP-1150	28	12	16
PUMP-1151	28	0	28
PUMP-1152	28	21	7
<b>Totals</b>	<b>112</b>	<b>33</b>	<b>79</b>

- Over the 28-month simulation, 79 sets of unnecessary monthly Preventative Maintenance procedures were identified.
- Each set of monthly maintenance procedures costs approximately \$2100.00
- This equals an annual savings of \$71,100.00 for only four assets!

# Pilot Next Steps

- Connect to SFPUC's Maximo Test Environment
- Meet with Operations and Maintenance: organizational change
- PI-Maximo Data Bridge is ready to work with more assets, no changes needed
- Complete expansion of AF with Maximo Hierarchy
- Connect all DCS RunHour meters to Maximo



# The Future

- Expand to all assets and all maintenance
  - 100 main pumps = \$1,777,500.00 annually
  - This is around 38,000 hours of labor that is available for other work
- Trigger work orders based on other conditions such as temperature or vibration
- Other Maximo-based actions can be performed on PI System data, such as asset replacement forecasts using dashboard with all lifecycle costs and budget data
- Generate all Work Orders automatically; paperless
- Power of Data: Provide the key/critical information to the decision makers.

# Summary

## COMPANY and GOAL

The SFPUC Wastewater Asset Management Group wants to implement CBM to optimize asset lifecycles in order to reduce costs



## CHALLENGE

Maximo Asset Management does not aggregate real-time data.

## SOLUTION

Create a software utility that extracts data from the PI System and writes it to Maximo

- Leverage out-of-the-box technologies
- AF SDK
- Maximo REST API

## RESULTS

A 1/144 scale pilot indicated annual labor savings of \$71,100.00 across only four assets

- Translates to 1500+ hours of labor that can be redirected to other work
- Full scale solution promises millions of dollars in savings

# Contact Information

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## Questions

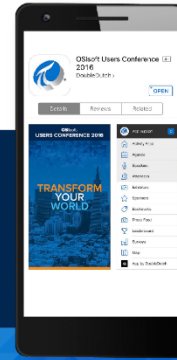
Please wait for the **microphone** before asking your questions



State your **name & company**

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감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado



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