SAP for UTILITIES
north american conference

Connecting the Real-time World How and Value

Gretchen Schwenzer, PhD

OSIsoft, LLC

eventure

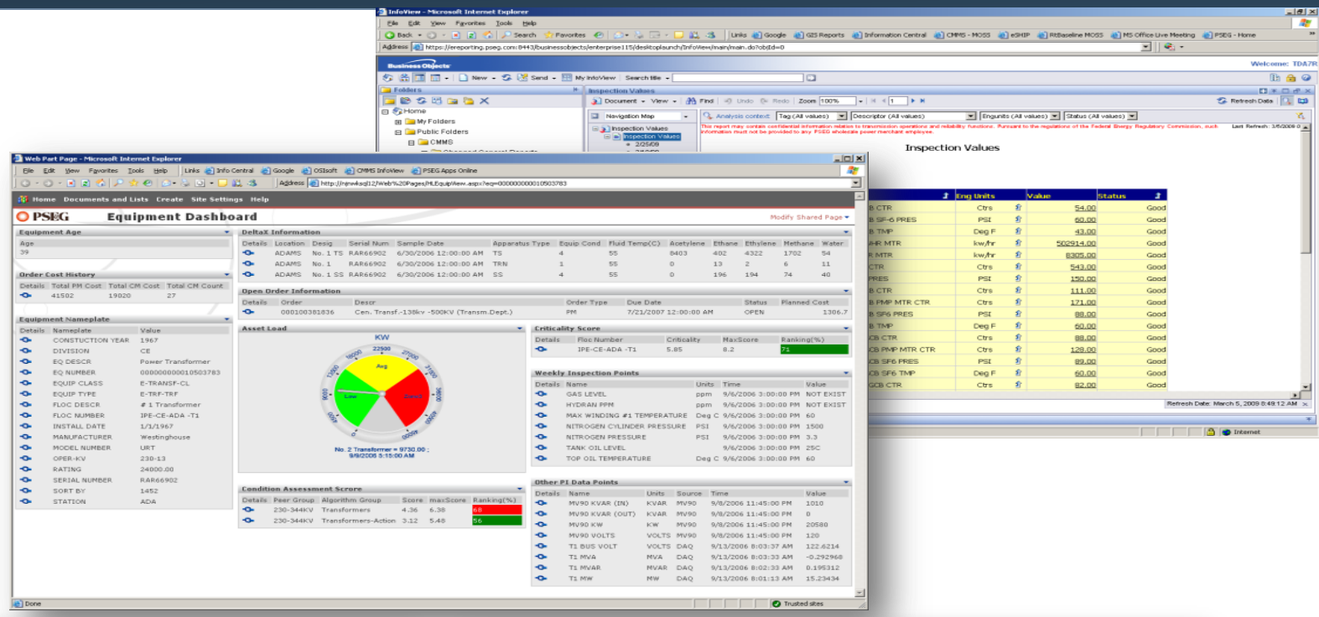
Agenda

- Customer Example Complete Solution
- Getting Started Questions
- Dissecting Alternatives
  - Asset Synchronization
  - Data Collection
  - Calculations
  - Orchestration
  - Visualization

PSE&G: Condition Based Maintenance

"We get a detailed breakdown on equipment costs and man/hours to service that gives us important business benefits. Without the use of the PI System, it would have taken us several months to gather and analyze the information."

Angela Rothweiler, Principal Engineer



Customer Business Challenge

- Providing the highest reliability Power Distribution is requirement
- Minimize Maintenance Costs
- Significant liability risk and system outage potential from old equipment vulnerable to failure

Solution

- Implemented automatic data collection and notifications to SAP PM
- Set up standard business rules for condition based maintenance using the PI System Analytics
- Provided focused view into equipment
- Provided Financial access to data by Business Objects query

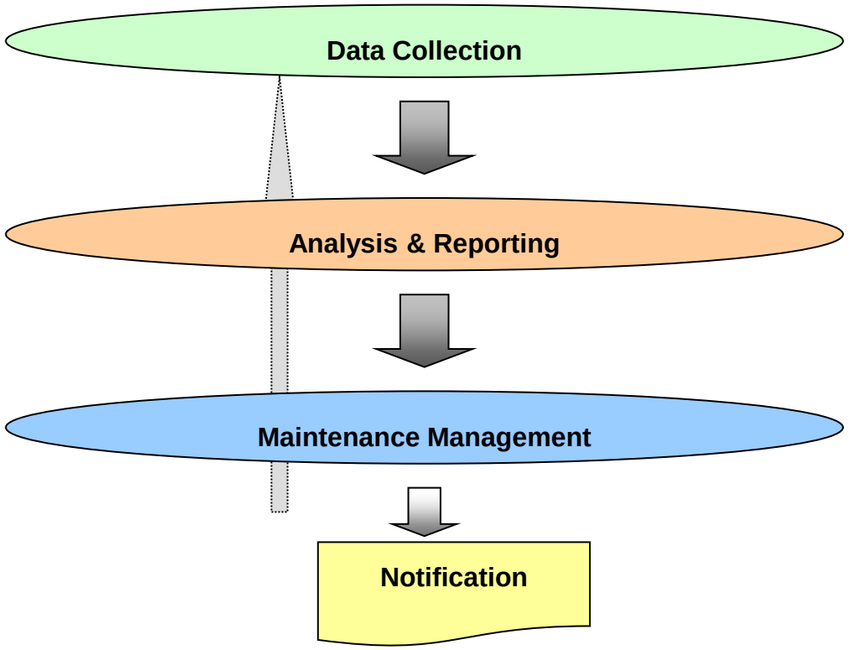
Customer Results / Benefits

- Holds Reliability award for Mid Atlantic States for last 7 years
- Named most reliable Power Company in America
- Focused maintenance expenditures on needed targets

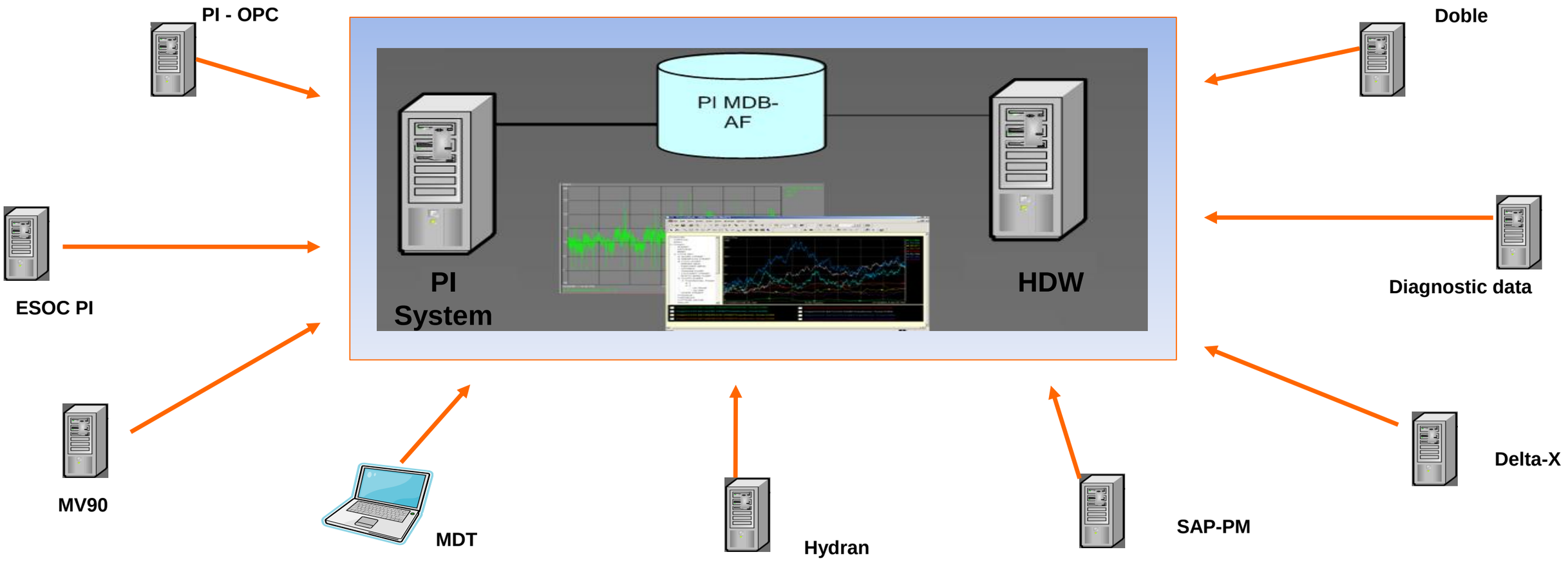
© Copyright 2009, OSIsoft Inc. All rights Reserved.

Functional Areas

- Data Collection
  - SAP Asset Information
  - Time-Series Data Collection Application
  - Diagnostic and Inspection Data
- Asset Analysis and Reporting
  - Condition Assessment
  - Work Prioritization
  - Alerts / Notifications
- Maintenance Management
  - Measurement Points
  - Maintenance Plan Modifications
  - Notifications



Data Collection & Consolidation



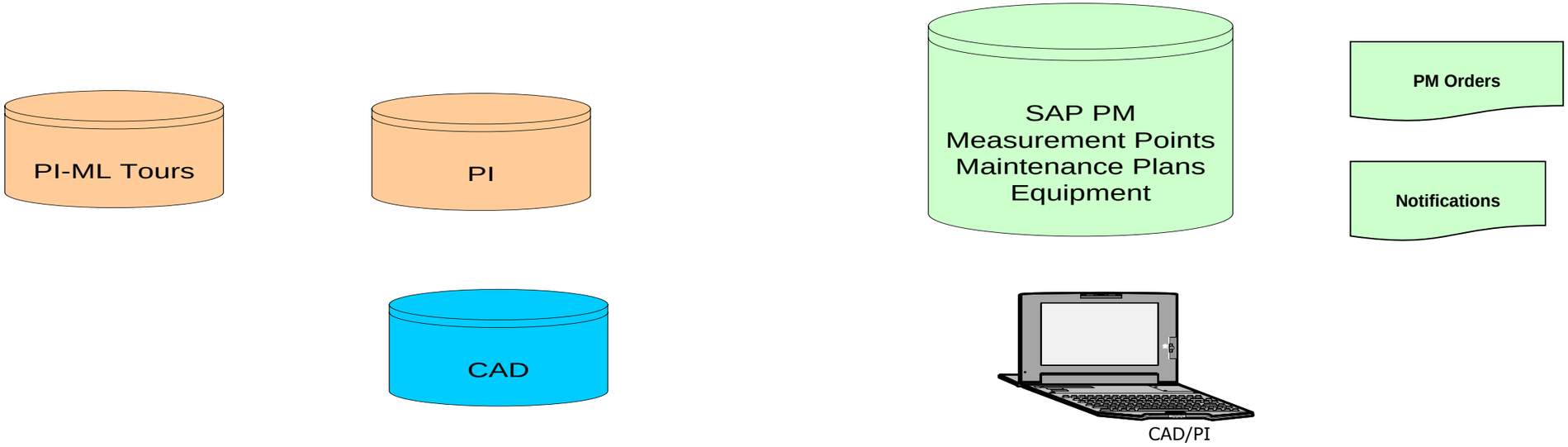
Condition Assessment Overview

- Calculation Structure
  - CA = F1(M1) + F2(M2) + F3(M3) + …
  - Factors driven by data available
  - Example Factors
    - CM Cost & Count for Past 6 Months
    - Operation Count for Past 6/12 Months
    - Gas Analysis – Change over time
    - Average Load over Time
- Peer Groups
  - Apply calculations by peer group
  - Voltage, Class, Type
  - Example Groups:
    - 26KV – 69KV GCB
    - 138KV+ Power Transformer
    - LTC Vacuum Tanks

Criticality

- Calculation Structure
  - CA = F1(M1) + F2(M2) + F3(M3) + …
  - SAP Static Factors
    - Voltage
    - Location
    - Replacement Cost
    - Age
- Peer Groups
  - Apply calculations by Equipment Class
  - Example Groups:
    - Gas Circuit Breaker
    - Power Transformers
- Use as a tie breaker in Condition Assessment evaluation

Substation Inspection Process



- SAP generates inspection order
- CAD Auto-dispatch orders to operators groups
- Operator collects inspection data via PI-ML and sends to PI System
- PI System evaluates data and generates SAP notifications or transfers measurement document to SAP and creates e-mail notifications

Home - CMMS Asset Information - Engineering Desktop - Microsoft Internet Explorer

File Edit View Favorites Tools Help | Links Google Welcome to MyAssistant™ GIS Reports Information Central OAMS SP CMMS - MOSS eSHIP RtBaseline MOSS

Back Search Favorites

Address http://njnwkdev29/Asset%20Managment2/default.aspx

Home Documents and Lists Create Site Settings Help Up to PSE

CMMS Asset Information - Engineering Desktop

Home

Modify S

Documents
- Asset Management
- ProcessBookDisplays
- Drawings for Mobile Units

Pictures

Lists
- Contacts
- Events

Discussions
- General Discussion

Surveys

Announcements

There are currently no active announcements. To add a new announcement, click "Add new announcement" below.

weather forecast newark nj - Google Search

Weather for **Newark, NJ** - Add to iGoogle

60°F
Current: **Partly Cloudy**
Wind: W at 15 mph
Humidity: 44%

Sun	Mon	Tue	Wed
66°F | 42°F	58°F | 51°F	65°F | 43°F	55°F | 41°F

Detailed forecast: The Weather Channel - Weather Underground - AccuWeather

Web Capture last updated at 10/11/2009 11:13 AM

CMMS Asset Information

- IPE Equipment Search
- Mechanical Work Prioritization
- IPE Equipment Characteristics
- DeltaX Gas and Fluid Tests
- Relay Work Prioritization
- ESOC System Load
- Temperature Sensitive Ratings By Circuit & Section
- Temperature Sensitive Ratings Limiting Components

Condition Assessment Summary Reports

- Transformer Action
- LTC Action
- Breaker Action
- Circuit Switcher Action
- Transformer Replacement - Old
- LTC Replacement
- Breaker Replacement
- Transformer Replacment - New
- LTC NEW Action
- Transformer & LTC Action Summary
- Transformer Replacement New By PG
- LTC New Action By Peer Group

Equipment/Other Reports

PSEG We make things work f

Earnings Releases

Price $31.35
10/09/09 4:03 p.m. ET
Web Capture last updated at 1

Databases

- IPE New Equipment Database (
- JM Transformer Database
- CBM Orders

Asset Management Web Site

- Information Central
- Consolidated Manager
- PSEG Online Applications
- CMMS Web Reports
- NYSE:PEG
- GIS Onelines
- GIS Transmission Ratings

Distribution Circuit Health

Local intranet

Web Part Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help | Links Google Welcome to MyAssistant™ GIS Reports Information Central OAMS SP CMMS - MOSS eSHIP RtBaseline MOSS

Back Search Favorites

Address http://njnwkdev29/Asset%20Managment2/WebPages/LtcsCA-ActionSummaryNew.aspx

PSEG

LTC CA-Action New Summary Report

CA Records

Details	Division	Floc	Floc Descr	Equipment	Equip Descr	Score	Person	Status	Manufacturer	Type	ApprT
	CE	IPE-CE-SDN -1TRX	500-1 Transformer	000000000010505424	Load Tap Changer A (LRS700)	4.8	George	Pending Action	GENERAL ELECTRIC	LRS700	LTC
	CE	IPE-CE-SDN -1TRX	500-1 Transformer	000000000010505425	Load Tap Changer B (LRS700)	4.65	George	Pending Action	GENERAL ELECTRIC	LRS700	LTC
	CE	IPE-CE-SMN -1PM	132-1 Transformer	000000000010023218	Load Tap Changer 132-1	4.5	Mark	OK	WESTINGHOUSE	URT	SS
	CE	IPE-CE-DAY -UNIT 2	Unit Substation - 8002	000000000010023245	Load Tap Changer 8002	4.25	Mark	Pending Action	FEDERAL PACIFIC	TC232	LTC
	CE	IPE-CE-SCO -UNIT 1	Unit Substation - 4001	000000000010502929	Load Tap Changer	4			WESTINGHOUSE	URS	LTC
	CE	IPE-CE-SOS -T2	# 2 Transformer	000000000010503189	Load Tap Changer (URT)	4	George	Pending Action	WESTINGHOUSE	URT	TS
	ME	IPE-ME-HNC -T2	# 2 Transformer	000000000010507167	Load Tap Changer	4	Paul	ok	FEDERAL PACIFIC	550C	LTC
	SO	IPE-SO-BEA -T2	# 2 Transformer	000000000010520911	Load Tap Changer	4			FEDERAL PACIFIC	TC546	LTC
	SO	IPE-SO-MAR -T1	# 1 Transformer	000000000010522897	Load Tap Changer	4	George	Pending Action	GENERAL ELECTRIC	LRT65	LTC
	SO	IPE-SO-SLA -T1LTC	220-1 Transformer Tap Changer	000000000010526193	Load Tap Changer SEL 220-1	3.9	Mark	Pending Action	MOLONEY	SRTMHD	SS
	CE	IPE-CE-GSE -132-7	132-7 Transformer	000000000010501565	Load Tap Changer	3.85	Mark	Needs Review	WESTINGHOUSE	URT	SS
	CE	IPE-CE-SBR -3TRH	220-3 Transformer	000000000010505101	Load Tap Changer 220-3 26Kv	3.75	Mark	No action	MOLONEY	SRTMHD	TS
	CE	IPE-CE-SLI -41HL	H-2234	000000000010012268	Phase Angle Regulator-Load Tap Changer-A	3.25	Mark	Pending Action	WESTINGHOUSE	UVT	LTC
	CE	IPE-CE-SDN -2TRX	500-2 Transformer	000000000010505428	Load Tap Changer B (LRS700)	3.25	George	OK	GENERAL ELECTRIC	LRS700	LTC
	SO	IPE-SO-LAW -T2	# 2 Transformer	000000000010522332	Load Tap Changer	3.25			FEDERAL PACIFIC	TC546	LTC
	SO	IPE-SO-MRO -T1	# 1 Transformer	000000000010525854	Load Tap Changer	3.25	Mark	Pending Action	GENERAL ELECTRIC	LRT200-2	LTC
	ME	IPE-ME-HAW -T2	# 2 Transformer	000000000010507132	Load Tap Changer	3.1	Paul	OK	WESTINGHOUSE	URT	SS
	CE	IPE-CE-GSE -1TRH	220-1 Transformer	000000000010501563	Load Tap Changer	3	Mark	Pending Action	WESTINGHOUSE	UTH	TS
	PA	IPE-PA-KIN -T2	# 2 Transformer	000000000010609461	Load Tap Changer Vacuum	3			GE PROLEC	RMV II	LTC
	CE	IPE-CE-POH -T2	# 2 Transformer	000000000010504695	Load Tap Changer (UVT)	2.8	Paul	Pending Action	WESTINGHOUSE	UVT	LTC
	PA	IPE-PA-HOE -T1	# 1 Transformer	000000000010515759	Load Tap Changer A	2.8	George	Needs Review	ABB	UVT	LTC
	CE	IPE-CE-SBB -3TRX	500-3 Transformer	000000000010608858	Load Tap Changer B	2.75	George	OK	SMIT	M	SS
	CE	IPE-CE-SOS -T2	# 2 Transformer	000000000010503189	Load Tap Changer (URT)	2.65	George	Pending Action	WESTINGHOUSE	URT	SS

Done | Local intranet

File Edit View Favorites Tools Help | Links Google Welcome to MyAssistant™ GIS Reports Information Central OAMS SP CMMS - MOSS eSHIP RtBaseline MOSS

Back Search Favorites

Address http://njnwkdev29/Asset%20Managment2/WebPages/CARemarks.aspx?eq=000000000010505424

Home Documents and Lists Create Site Settings Help Up to PSE&G Delivery

PSEG

Condition Assessment Remarks/Comments

Modify Shared Page

Nameplate

Division	Station Code	Station	Station Type	Floc Descr	Equipment	Equipment Descr	Equipment Type	Construction Year	Serial Number	Manufacturer	Model Number
Central	SDN	DEANS	X	500-1 Transformer	000000000010505424	Load Tap Changer A (LRS700)	E-LTC	1971	D596884	GENERAL ELECTRIC	LRS700

PSEG We make things work for you.

CA Comments

Date	Comment	Person	Status	Due Date
12/10/2008	Request a new DGA sample. Review equipment again once sample is in Delta X and included in Conditional Assessment.	George	Pending Action	01/12/2009
04/06/2009	Status set to OK - new sample on 3/16/09 yielded a score of 1.4	George	OK	
07/10/2009	Request DGA sample for all compartments to confirm Acetylene reading. Have this operated thru neutral. Investigate LTC type.	George	Pending Action	08/10/2009
08/03/2009	Requested a DGA sample to confirm Acetylene reading. This has operated thru neutral. New Score is 3.9. Investigate LTC type.	George	Needs Review	08/12/2009
09/15/2009	Confirm if the LTC can be inspected without draining the main tank. Check if unit is schedule to be out of service. Based on finding decide if it should be inspected (High Acetylene for July 27, 2009 sample)	George	Pending Action	10/15/2009

Done Local intranet

Web Part Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

PSEG

LTC CA New Action Algorithm Details

Modify Shared Page

Nameplate

Oneline	Division	Station Code	Station	Station Type	Floc Descr	Equipment	Equipment Descr	Equipment Type	Construction Year	Serial Number	Manufacturer	Model Number
	Central	SDN	DEANS	X	500-1 Transformer	000000000010505424	Load Tap Changer A (LRS700)	E-LTC	1971	D596884	GENERAL ELECTRIC	LRS700

Content Editor Web Part

- Equipment Home Page
- View and Trend Equipment PI Points
- CA LTC New Action Algorithm Rules

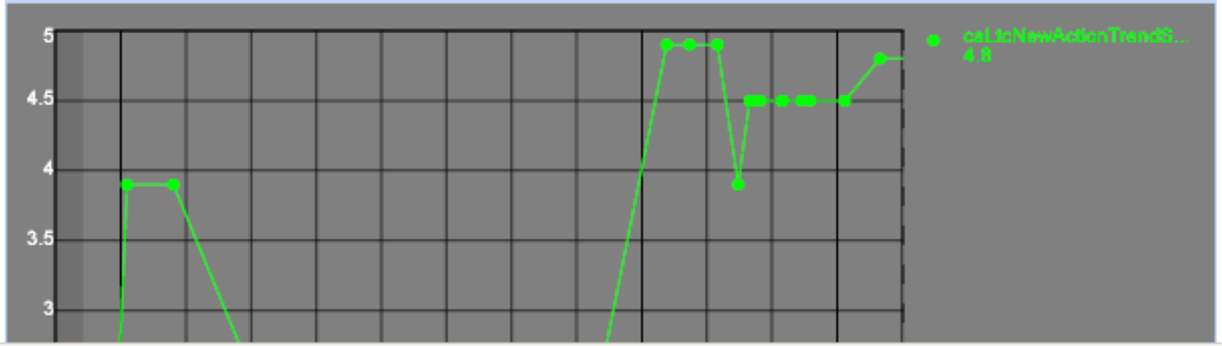
Algorithm Factors

Factor	Raw Value	Case Value	Weight %	Score
Detectable Acetylene	10	10	25	2.5
Gas Rate of Change	3.67	2	15	0.3
High Total Gas	300	10	20	2
High Water	23	0	10	0
Low Dielectric	32.6	0	10	0
LTC Operations	34	0	10	0
LTC THRU NEUTRAL	0	0	10	0

CA Score

Score	maxScore	Ranking(%)	Peer Group
4.8	4.8	100	VACUUM

RtTrend



DeltaX Total Combustible Gas

Details	ApprType	Sample Date	CO	H2	Acetylene	Ethane	Ethylene	Methane	Combustible Gas
	LTC	07/27/2009	199	39	37	7	4	14	300
	LTC	06/11/2009	66	30	27	2	2	4	131
	LTC	03/13/2009	62	23	17	2	2	3	109
	LTC	12/17/2008	58	26	30	3	3	3	123
	LTC	06/26/2008	79	27	28	2	2	3	141

Showing 1 to 5 of 18

DeltaX Water

Details	Apprtype	Sample Date	Fluid Temp (C)	Water
	LTC	07/27/2009	60	23
	LTC	06/11/2009	55	19
	LTC	03/13/2009	49	15
	LTC	12/17/2008	53	17
	LTC	06/26/2008	65	20

Showing 1 to 5 of 18

DeltaX Fluid

Details	Apprtype	Sample Date	Fluid Temp (C)	D877	D1816
	LTC	07/10/2008		47.6	32.6
	LTC	06/13/2002		51.5	
	LTC	06/12/2000		55.4	
	LTC	05/10/2000			36.1
	LTC	07/15/1997			37.1

Done

Local intranet

Web Part Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

PSEG

LTC CA New Action Algorithm Details

Modify Shared Page

Nameplate

Oneline	Division	Station Code	Station	Station Type	Floc Descr	Equipment	Equipment Descr	Equipment Type	Construction Year	Serial Number	Manufacturer	Model Number
	Central	SDN	DEANS	X	500-1 Transformer	000000000010505424	Load Tap Changer A (LRS700)	E-LTC	1971	D596884	GENERAL ELECTRIC	LRS700

Content Editor Web Part

- Equipment Home Page
- View and Trend Equipment PI Points
- CA LTC New Action Algorithm Rules

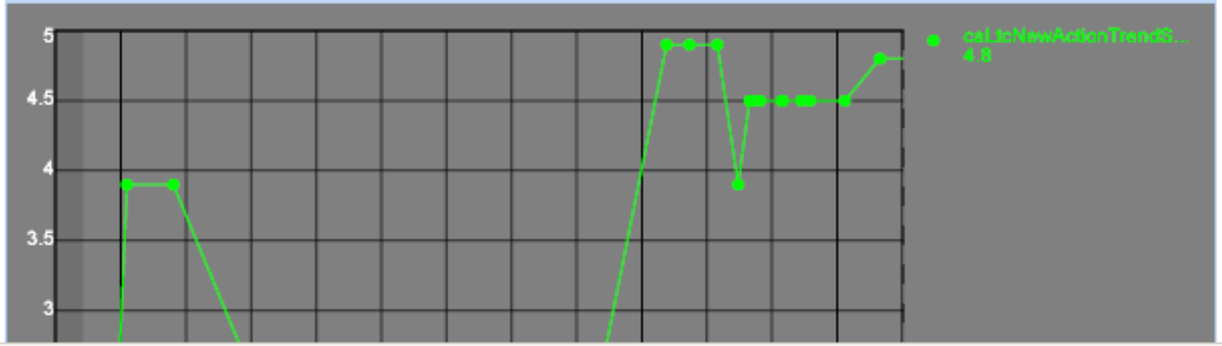
Algorithm Factors

Factor	Raw Value	Case Value	Weight %	Score
Detectable Acetylene	10	10	25	2.5
Gas Rate of Change	3.67	2	15	0.3
High Total Gas	300	10	20	2
High Water	23	0	10	0
Low Dielectric	32.6	0	10	0
LTC Operations	34	0	10	0
LTC THRU NEUTRAL	0	0	10	0

CA Score

Score	maxScore	Ranking(%)	Peer Group
4.8	4.8	100	VACUUM

RtTrend



DeltaX Total Combustible Gas

Details	ApprType	Sample Date	CO	H2	Acetylene	Ethane	Ethylene	Methane	Combustible Gas
	LTC	07/27/2009	199	39	37	7	4	14	300
	LTC	06/11/2009	66	30	27	2	2	4	131
	LTC	03/13/2009	62	23	17	2	2	3	109
	LTC	12/17/2008	58	26	30	3	3	3	123
	LTC	06/26/2008	79	27	28	2	2	3	141

Showing 1 to 5 of 18

DeltaX Water

Details	Apprtype	Sample Date	Fluid Temp (C)	Water
	LTC	07/27/2009	60	23
	LTC	06/11/2009	55	19
	LTC	03/13/2009	49	15
	LTC	12/17/2008	53	17
	LTC	06/26/2008	65	20

Showing 1 to 5 of 18

DeltaX Fluid

Details	Apprtype	Sample Date	Fluid Temp (C)	D877	D1816
	LTC	07/10/2008		47.6	32.6
	LTC	06/13/2002		51.5	
	LTC	06/12/2000		55.4	
	LTC	05/10/2000			36.1
	LTC	07/15/1997			37.1

Done

Local intranet

Web Part Page - Microsoft Internet Explorer

Address http://njnwkdev29/Asset%20Managment2/WebPages/TrendMdbPoints.aspx?eq=000000000010505424

PSEG

Equipment PI Points

Modify Shared Page

Max Value

Time	Max
4/25/2009 2:00:00 PM	8.9998779259621

Min Value

Time	Min
7/31/2009 9:00:00 AM	-8.

Average Value

Time	Average
10/11/2009 11:45:35 AM	4.

Standard Deviation

Time	Standard Deviation
10/11/2009 11:45:35 AM	4.

Archive Values

Time	Value	Status
4/18/2009 7:00:00 AM	4.	Good
4/25/2009 2:00:00 PM	8.	Good
5/9/2009 7:00:00 AM	8.	Good
5/16/2009 6:00:00 AM	0.	Good
5/31/2009 2:00:00 PM	0.	Good
6/6/2009 9:00:00 AM	8.	Good
6/13/2009 6:00:00 AM	8.	Good
6/28/2009 2:00:00 PM	8.	Good
7/3/2009 9:00:00 AM	8.	Good
7/10/2009 12:00:00 PM	8.	Good
7/18/2009 11:00:00 AM	8.	Good
7/26/2009 12:00:00 PM	8.	Good
7/31/2009 9:00:00 AM	-8.	Good
8/7/2009 1:00:00 PM	2.	Good
8/28/2009 2:00:00 PM	2.	Good
9/4/2009 1:00:00 PM	2.	Good

Nameplate

Division	Station	Station Type	Floc Descr	Equipment	Equipment Descr	Equipment Type	Construction Year	Serial Number	Manufacturer	Model Number
Central	DEANS	X	500-1 Transformer	000000000010505424	Load Tap Changer A (LRS700)	E-LTC	1971	D596884	GENERAL ELECTRIC	LRS700

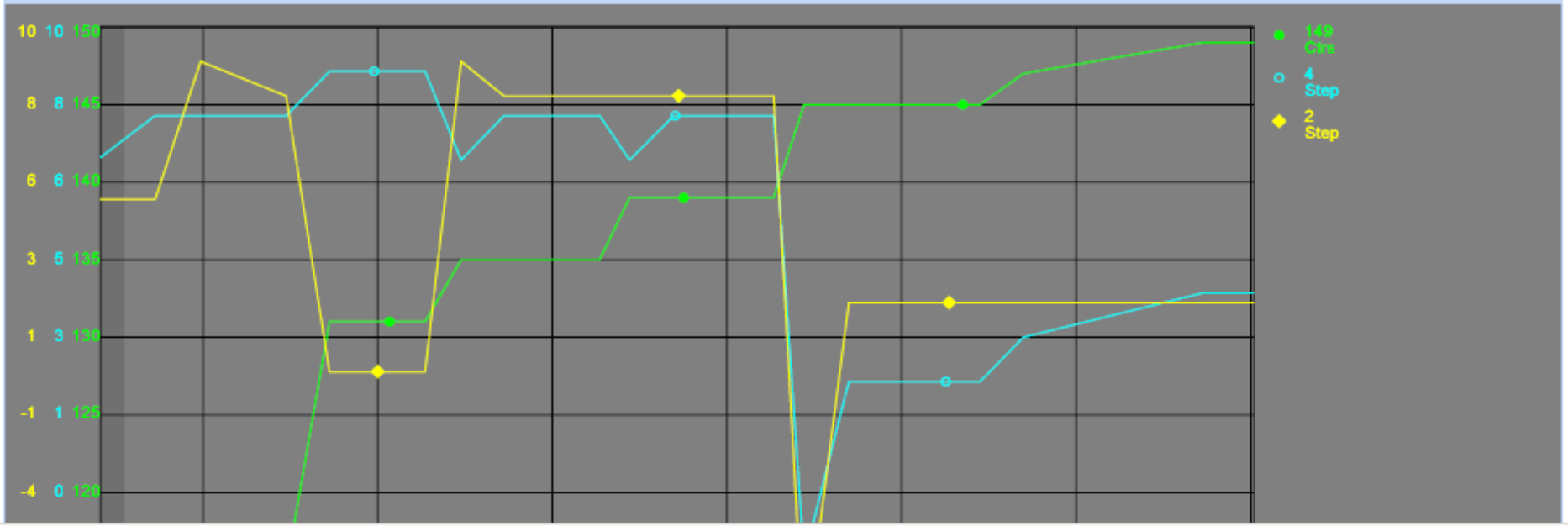
PI Points

Tag Name	Alias	Descriptor	Units	Source	Time	Current Value	Span	Zero
SDN:LTC.R002.M	COUNTER	500-1 LTC A CTR	Ctrs	Inspection	10/3/2009 8:00:00 AM	149	1000	0
SDN:LTC.R022.M	DRAG HAND MAX	500-1 LTC A MAX	Step	Inspection	10/3/2009 8:00:00 AM	4	34	-17
SDN:LTC.R027.M	DRAG HAND MIN	500-1 LTC A MIN	Step	Inspection	10/3/2009 8:00:00 AM	2	34	-17
SDN:LTC.L002.M	TANK OIL LEVEL	500-1 LTC A OIL LVL		Inspection	10/3/2009 8:00:00 AM	25C	4	10

PI Data Time Range

Start Time 4/9/2009 11:45:35 AM End Time 10/11/2009 11:45:35 AM Apply

PI Data Trend



Complete Solution

- Asset Synchronization
- Data Collection and historization
- Standardized calculations
  - Critical Assessment Standardized
- Orchestration
- Portal for Visualization
- Work process to support

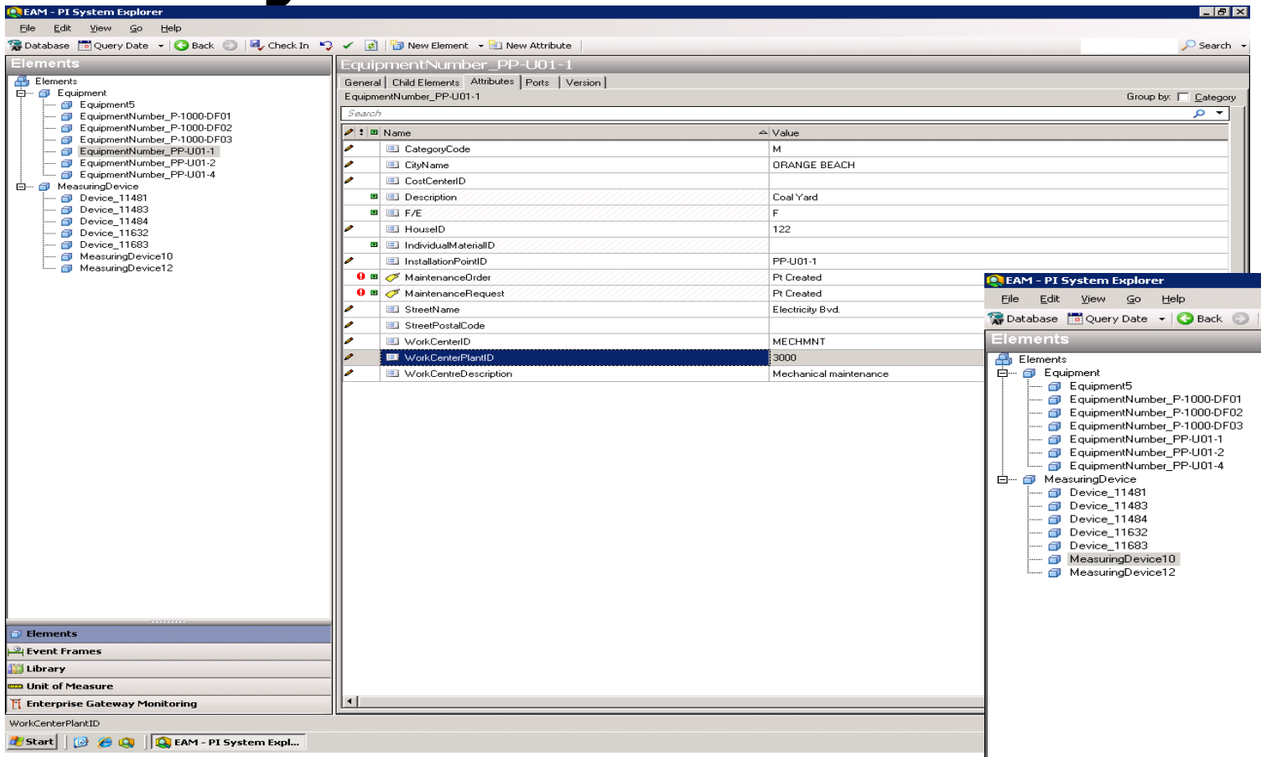
GETTING STARTED QUESTIONS

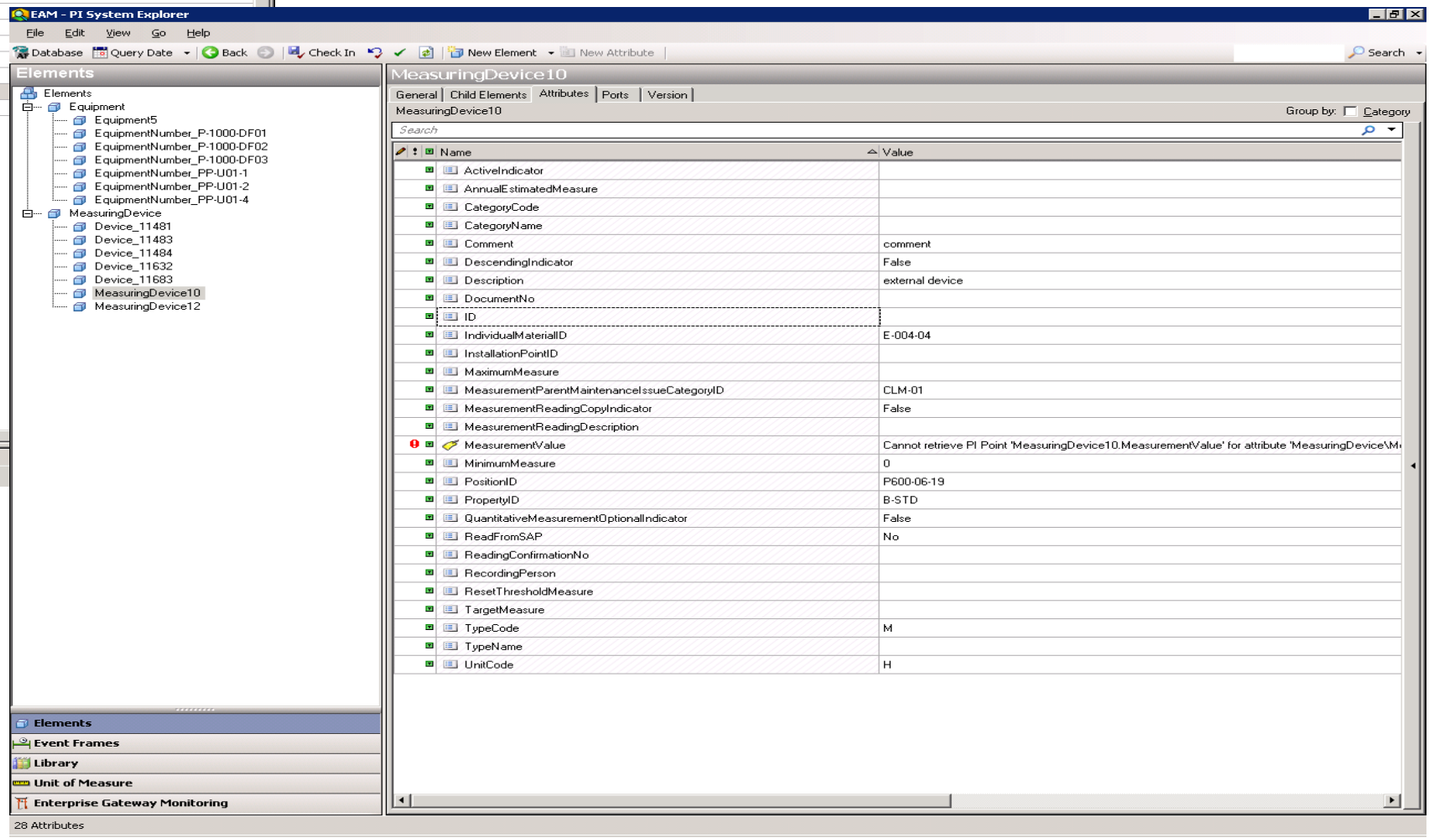
Getting Started Questions

- Are assets constantly changing
- Volume of assets
- Is interest centered around subset of high value assets
- If PI System already exists has a formalized PI Tag naming convention been established
- Does the SAP naming convention allow for desired equipment selection
- What standards for technology are in place
- Are you interested in back-end integration, visualization or both
- What are the business processes around data maintenance
- Is the source of expertise on equipment available

ASSET SYNCHRONIZATION

PI System Data – PI AF Model





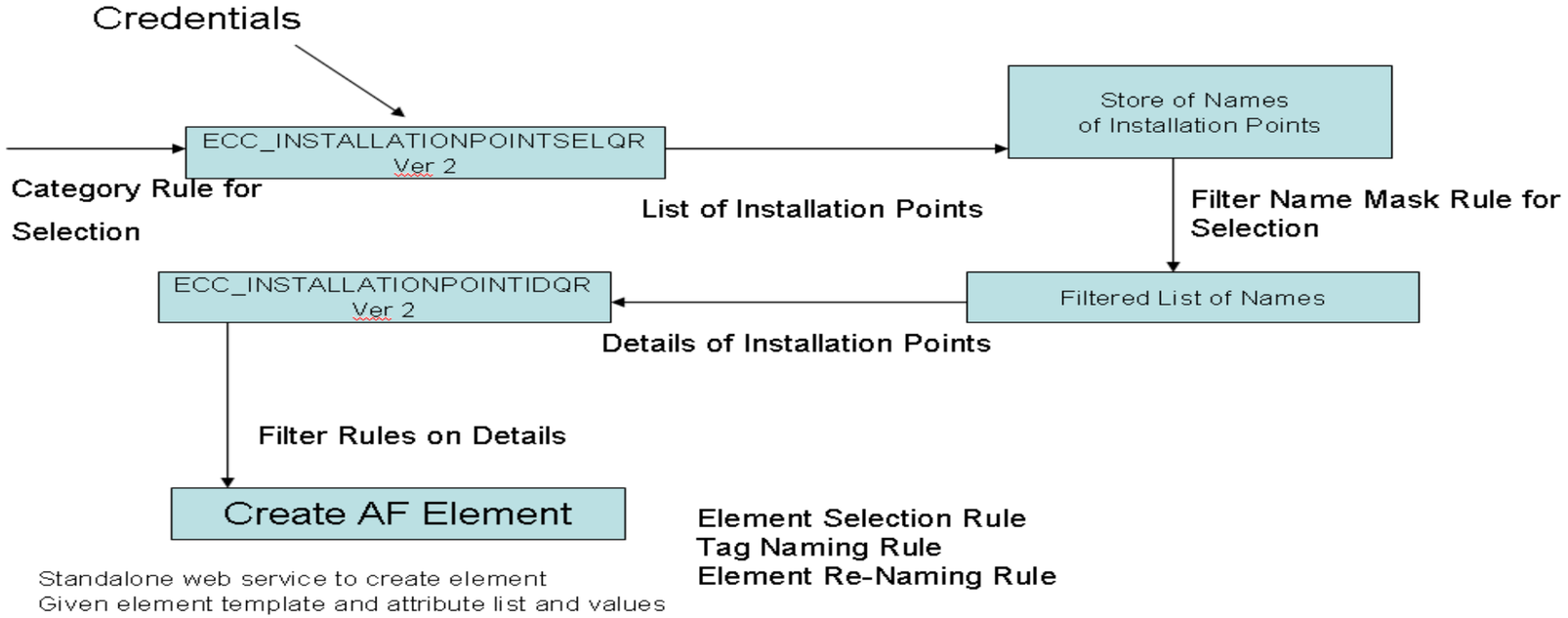
EAM Smart Connector Package – Requires SAP ECC 6.0 EhP3

- IndividualMaterialByIDQueryResponse_In – ECC_INDIVIDUALMATERIALIDQR
- IndividualMaterialsimpleByElementsQueryResponse_In – ECC_INDIVIDUALMATERIALSELQR
- InstallationPointByIDQueryResponse_In – ECC_INSTALLATIONPOINTIDQR
- InstallationPointSimpleByElementsQueryResponse_In – ECC_INSTALLATIONPOINTSELQR
- MaintenanceOrderCreateRequestConfirmation_in – ECC_MAINTENANCEORDERCRTRC
- MaintenanceRequestCreateRequestConfirmation_In – ECC_MAINTENANCEREQUESTCRTRC
- MeasurmentReadingERPCreateRequestConfirmation_In – ECC_MEASURMENTREADINGCREATE
- MeasuringDeviceERPSimpleByElementsQueryResponse_In – ECC_MEASURINGDEVICE001QR
- MeasuringDeviceERPByIDQueryResponse_In – ECC_MEASUREINGDEVICEIDQR
- MeasurmentReadingERPSimpleByElementsQueryResponse_In – ECC_MSMTRDNG001QR
- ParentIndividualMaterialERPSimpleByIndividualMaterialQueryResponse_In – ECC_PARINDIVMATL004QR
- MeasuringDeviceERPCreateRequestConfirmation_In – ECCMSRGDVCECRTRC
- SubordinateIndividualMaterialERPByIndividualMaterialQueryResponse_In – ECC_SUBORDINDIVMATL004QR
- UnitOfMeasureByDimensionQueryResponse_In – ECC_UNITOFMEASUREBYDIMQR

Installation Points or Functional Locations

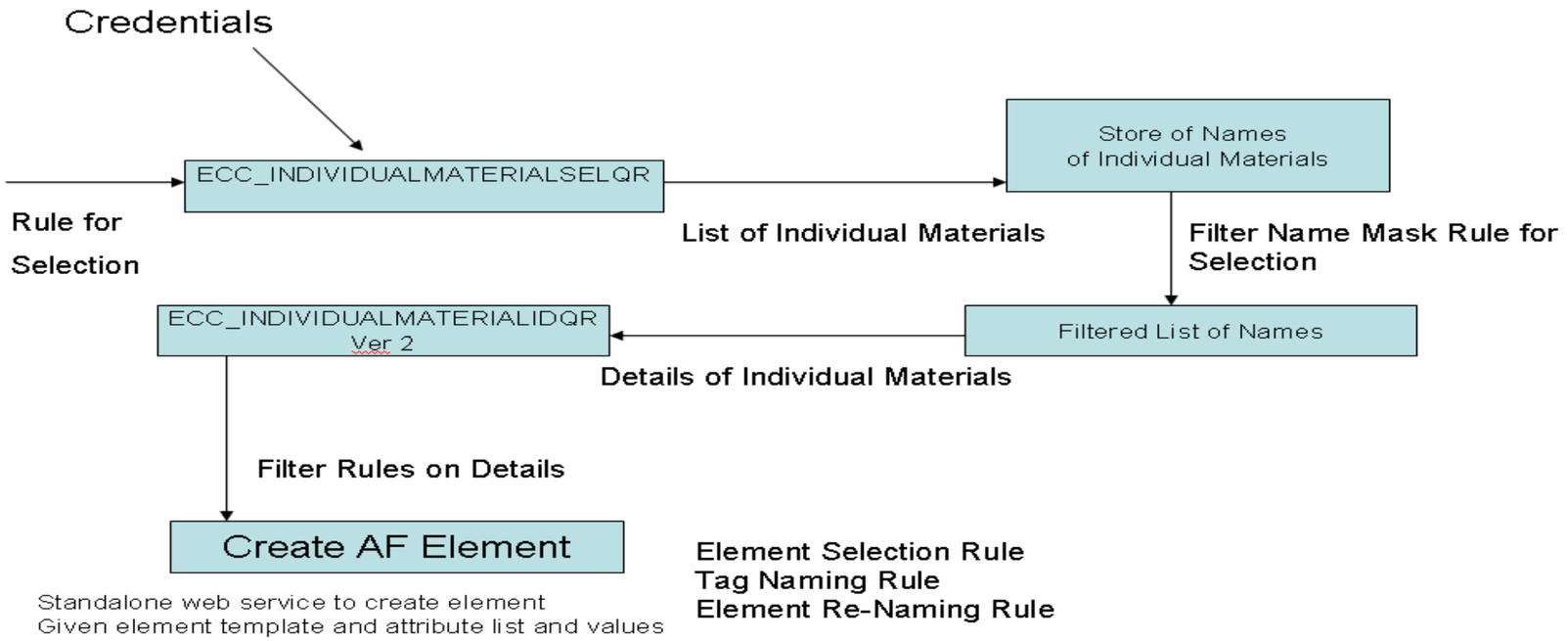
1

Installation Points (Alias Functional Locations)



Individual Materials or Equipment

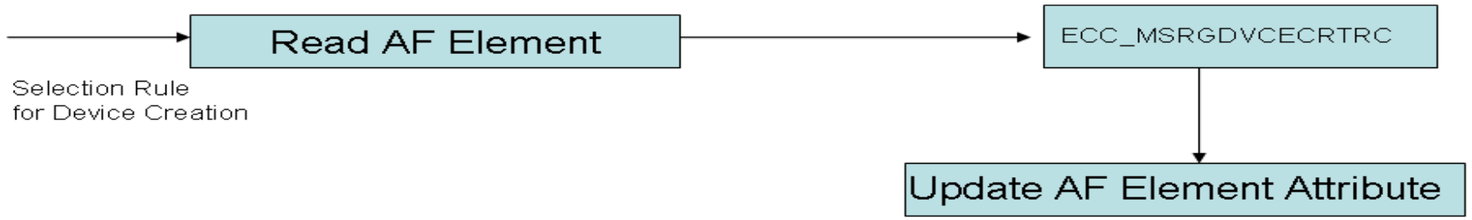
Individual Materials (Alias Equipment)



Measuring Devices

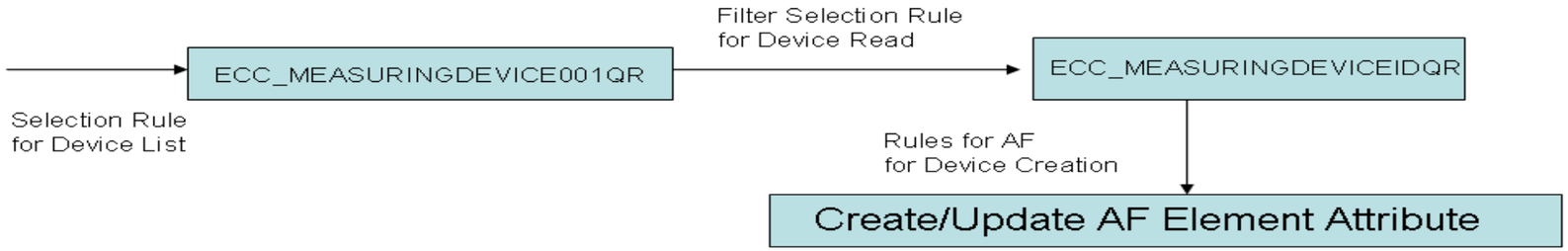
3

Measurement Devices – Create in SAP from AF

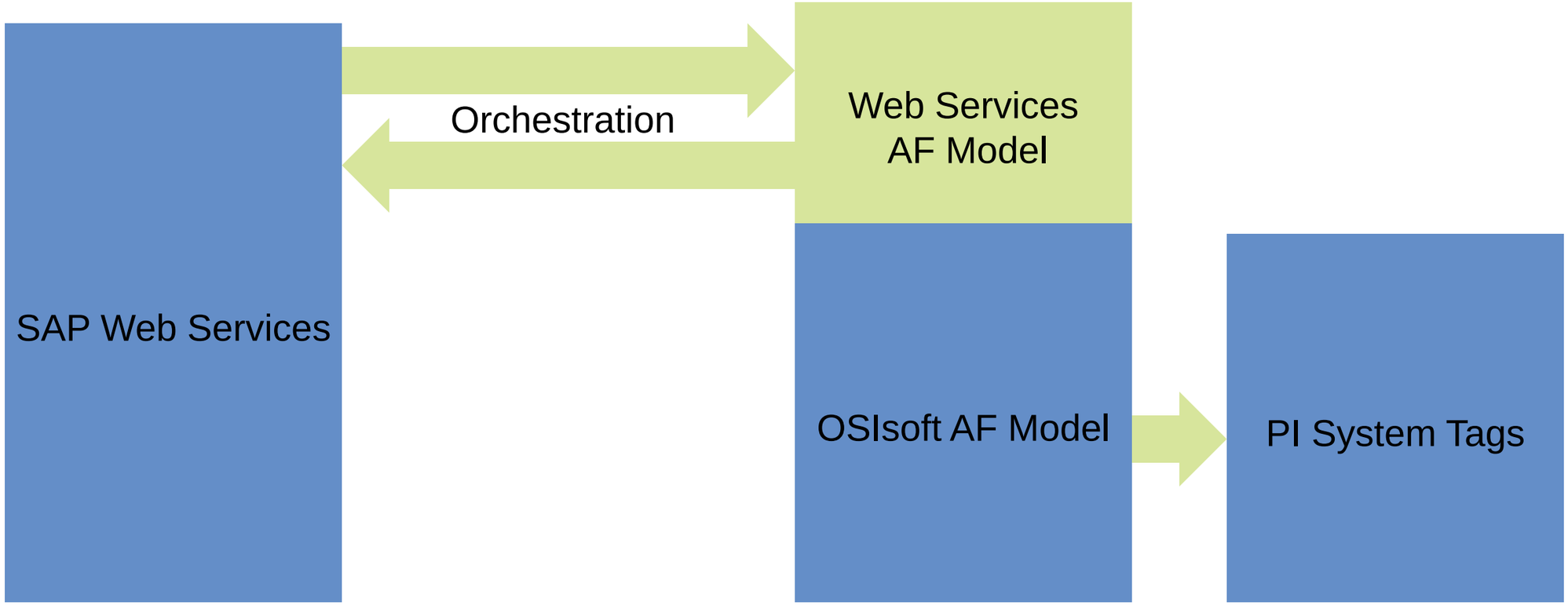


4

Measurement Devices Create in AF from SAP



Components for Asset Synchronization



Custom Development

SAP BAPI – no support for meter info

- BAPI_FUNCLOC_GETDETAIL
- BAPI_FUNCLOC_GETLIST
- BAPI_EQUI_GETDETAIL
- BAPI_EQUI_GETLIST

DATA COLLECTION AND HISTORIZATION

Interfaces

- 400+ Interfaces
- Manual Data Collection
- Tag Naming Convention – Standardize on something that adapts to equipment easily

STANDARDIZED CALCULATION

PI Totalizers

Name & Type | Sampling | Results | Archive | Security | System | Options | Summary

Name: 02F100.TOT.SHIFT

Description: Total Flow when Equipment is up

SourceTag: 02F100

Eng Units: Gallons

Point Type: Float32 Digital Set:

Totalizer Type

- (●) Summary Calculation
- ( ) Count Events

Block | Time Weighted | Total

Name & Type | Sampling | Results | Archive | Security | System | Options | Summary

- (●) Whenever a new source tag event occurs (Natural)
- ( ) Periodically
  - (●) Interpolate ( ) Extrapolate
  - Start schedule at 0 Minute(s) after midnight
  - Sample every: 2 Minute(s) [✓] Vary w/ DST
- ( ) Whenever the event expression changes

[✓] Filter the source data with the following expression:

('EQUIPMENTSTATUS'='Running')

Name & Type | Sampling | Results | Archive | Security | System | Options | Summary

Write final results

- (●) After a time period elapses
- ( ) Based on a trigger event
- ( ) After a number of source events
- ( ) Continue forever (interim results ONLY)

Details

Start schedule at: 7 Hour(s) after midnight

Results every: 8 Hour(s) [✓] Vary w/ DST

Write interim results

- ( ) Stamped one second after start
- (●) At source time (ramp)
- ( ) Projection based on source value
- ( ) Projection based on average
- ( ) Do not write interim results

Performance Equations

General | Equation | Scheduling | Security | Archive | Classic | System

Name: Boiler Feed Pump #1.RunTime(PE)

Descriptor: Pump Run Time

Point class: classic

Point type: Float32 Digital set:

Eng Units: Hours

Extended Descriptor: TimeEQ('Boiler Feed Pump #1','*-8h','*','Running')/3600

General | Equation | Scheduling | Security | Archive | Classic | System

Event tag:

Equation: TimeEQ('Boiler Feed Pump #1','*-8h','*','Running')/3600

Evaluate 3.875

	Timestamp:	Value:
Snapshot:	4/8/2010 7:00:00 AM	3.8833

General | Equation | Scheduling | Security | Archive | Classic | System

The scheduling type determines when a calculation will be evaluated.

Event-based scheduling

Event tag:

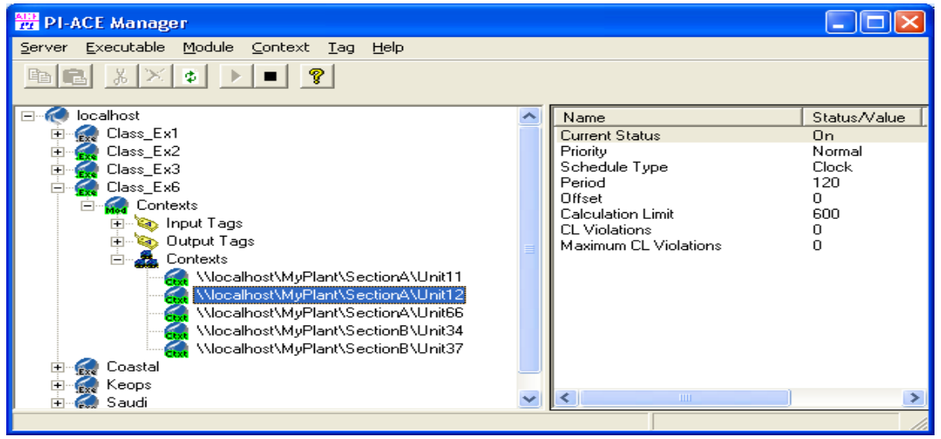
Set timestamp of resulting expression to:

Clock scheduling

Scan class: 8

PI ACE (Advanced Computing Engine)

- Totalizers and Performance Equations on a tag by tag basis
- Features:
  - Structure helps to organize computations
  - Calculations are programmed and thus can have any level of complexity and access information external to PI System
  - Scheduler for triggering of calculations



OEE

- Comprised of three data points
  - Availability =
    - (Operating time – Downtime) / Total Operating Time
  - Performance =
    - Total Output / Potential Output
  - Quality =
    - Good Output / Total Output

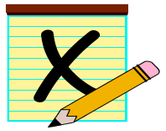
OEE is then calculated by multiplying those factors:
OEE = Availability*Performance*Quality

DATA ORCHESTRATION AND TRANSPORT

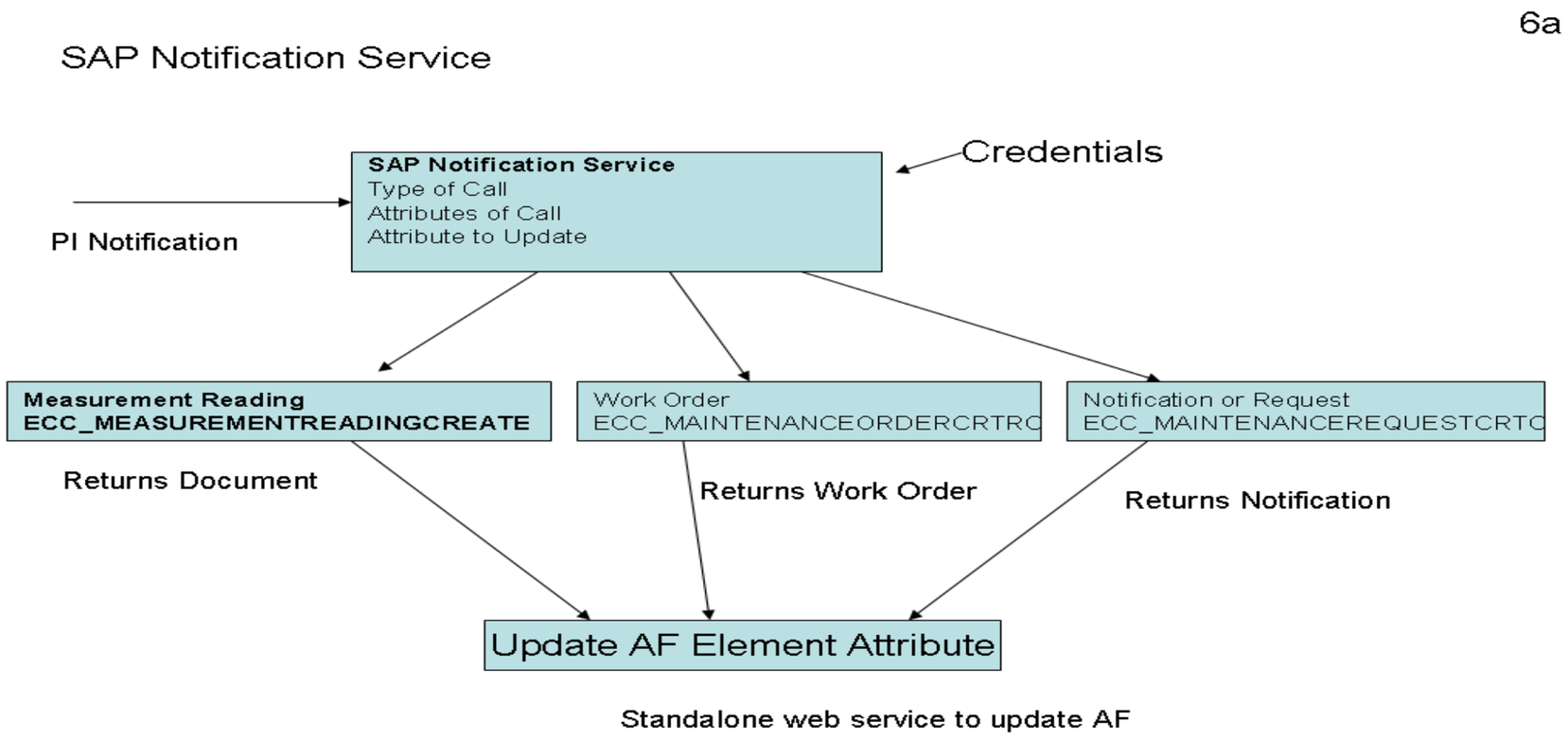
Orchestration Mechanisms

- PI System data/events
  - Push

vs. Pull

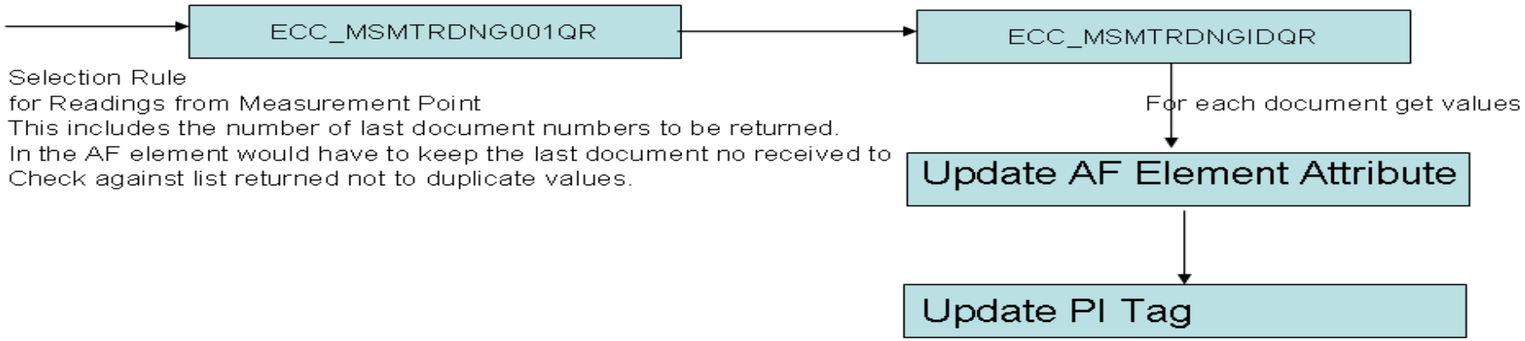
- Middleware - Messaging/Orchestration between systems
  - None 
  - Microsoft BizTalk
  - SAP-PI System
  - SAP MII (and PCo)
  - . . . . . .

Notifications

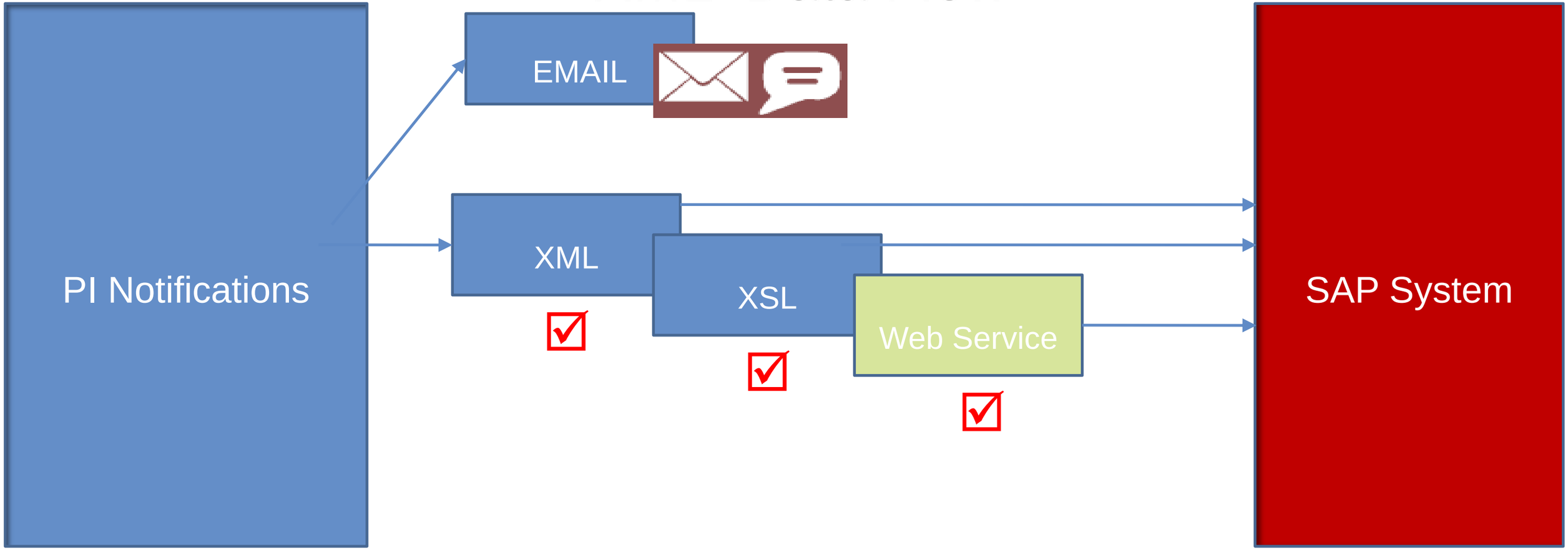


Retrieve measurement Readings from external system into PI System

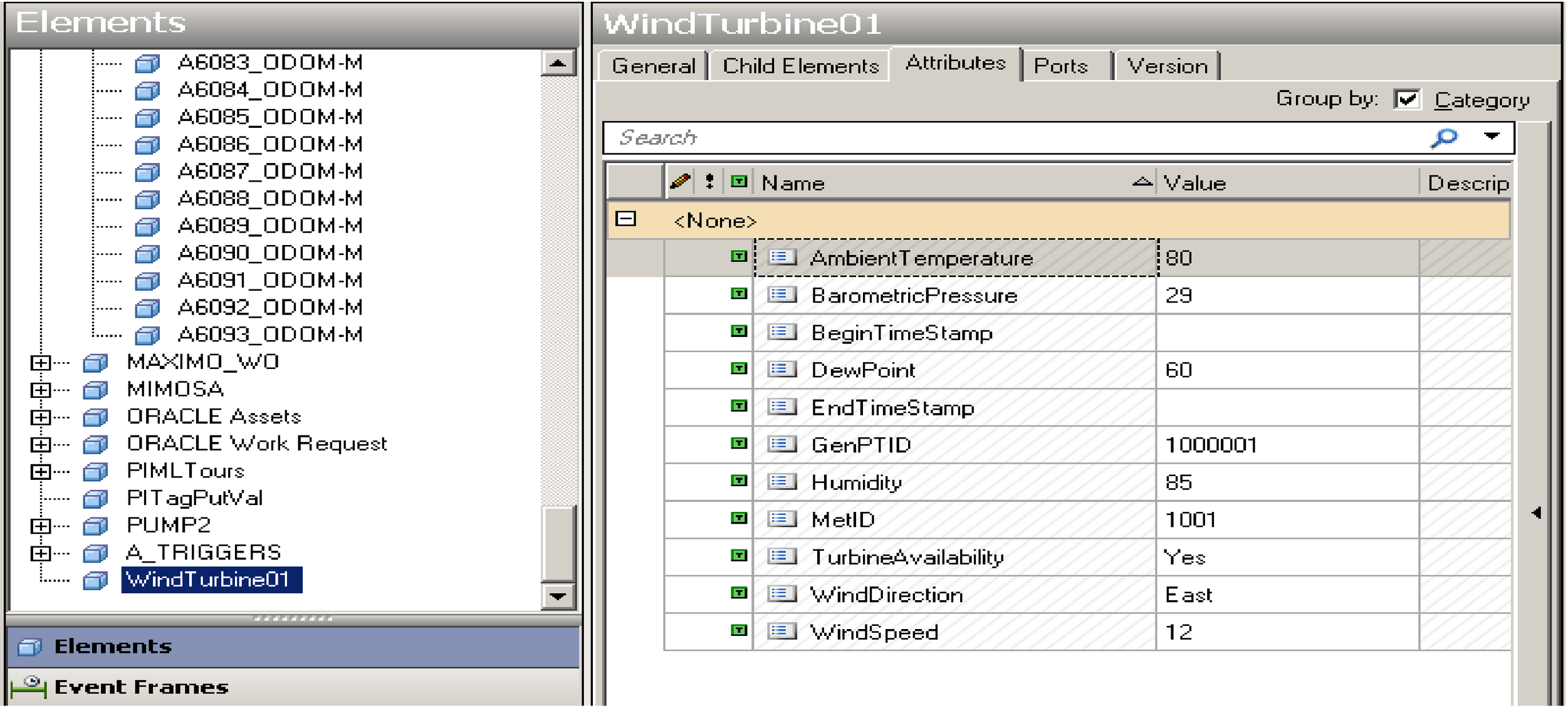
Measurement Point Readings



XML Data Flow



XML Delivery Channel (PI Notif. toolkit – vCampus)



Wind Turbine Element instance for NY ISO reporting

Notifications

New

- MotorAlert (Motor2)
- New Notification21 (23972 : Motor- 10hp/17
- New Notification28
- New Notification31
- PIPutVal (PITagPutVal)
- Tivoli4 (TRIGGERS)
- Trigger11PM_Meter1 (11430_RUNHOURS
- WindingTisHigh (Motor1)
- WindingTisHigh2 (Motor2)
- New Notification33 (11470_RUNHOURS)
- HiVibration (1)
- MaximoMeter (4)
  - MaximoMeter2 (11430_O-PRESSUR)
  - MaximoMeter7 (11430_RUNHOURS)
  - MaximoMeter8 (11430_RUNHOURS)
  - MaximoMeter9 (11450_O-PRESSUR)
- NY_ISO_Wind_30sec (1)
  - NY_ISO_Wind_30sec (WindTurbine01)

Elements
Event Frames
Library
Unit of Measure
MyPI
Notifications
Contacts

NY_ISO_Wind_30sec

Overview | Trigger | Content | Subscriptions | History

Target: \\GDELL610\AF\WindTurbine01 — Select A Target...

Conditions

New Condition

Rule	Configuration	Time True	Result	Priority
PerformanceEqu...	True			

Periodic Time Rule Configuration

Interval: (•) Periodic ( ) Daily ( ) Monthly

Begin at: 00 — Frequency: 30 Second(s)

Duration: 30 Second(s)

OK | Cancel

Time Rule: Periodic ...

Options

[ ] Notify only on change in status

Resend Interval: 0 Seconds

Non Repetition Interval: 0 Seconds

Notification – Periodic – every 30 seconds

AF - PI System Explorer

File View Go Tools Help

Database Query Date Back Check In

Notifications

New

- MotorAlert (Motor2)
- New Notification21 (23972 : Motor- 10hp/1
- New Notification28
- New Notification31
- PIPutVal (PITagPutVal)
- Tivoli4 (TRIGGERS)
- Trigger11PM_Meter1 (11430_RUNHOURS
- WindingTisHigh (Motor1)
- WindingTisHigh2 (Motor2)
- New Notification33 (11470_RUNHOURS)
- HiVibration (1)
- MaximoMeter (4)
  - MaximoMeter2 (11430_O-PRESSUR)
  - MaximoMeter7 (11430_RUNHOURS)
  - MaximoMeter8 (11430_RUNHOURS)
  - MaximoMeter9 (11450_O-PRESSUR)
- NY_ISO_Wind_30sec (1)
  - NY_ISO_Wind_30sec (WindTurbine01)

Elements
Event Frames
Library
Unit of Measure
MyPI
Notifications
Contacts

NY_ISO_Wind_30sec

Overview | Trigger | Content | Subscriptions | History

Subscriptions (0 Required acknowledgments)
Gopal Gopalkrishnan - XML_Meter

Include Trigger Input

Attribute Value

- \\GDELL610\AF\WindTurbine01|GenPTID
- \\GDELL610\AF\WindTurbine01|MetID
- \\GDELL610\AF\WindTurbine01|WindSpeed
- \\GDELL610\AF\WindTurbine01|WindDirection
- \\GDELL610\AF\WindTurbine01|BarometricPressure
- \\GDELL610\AF\WindTurbine01|AmbientTemperature
- \\GDELL610\AF\WindTurbine01|DewPoint
- \\GDELL610\AF\WindTurbine01|Humidity
- \\GDELL610\AF\WindTurbine01|BeginTimeStamp
- \\GDELL610\AF\WindTurbine01|EndTimeStamp

Notification – Content includes XML requirements

C:\NYISO\NY_ISO_30sec_2010Apr09_111000_9307.xml - Windows Internet Explorer

File Edit View Favorites Tools Help

C:\NYISO\NY_ISO_30sec_2010Apr09_111000_9307.xml

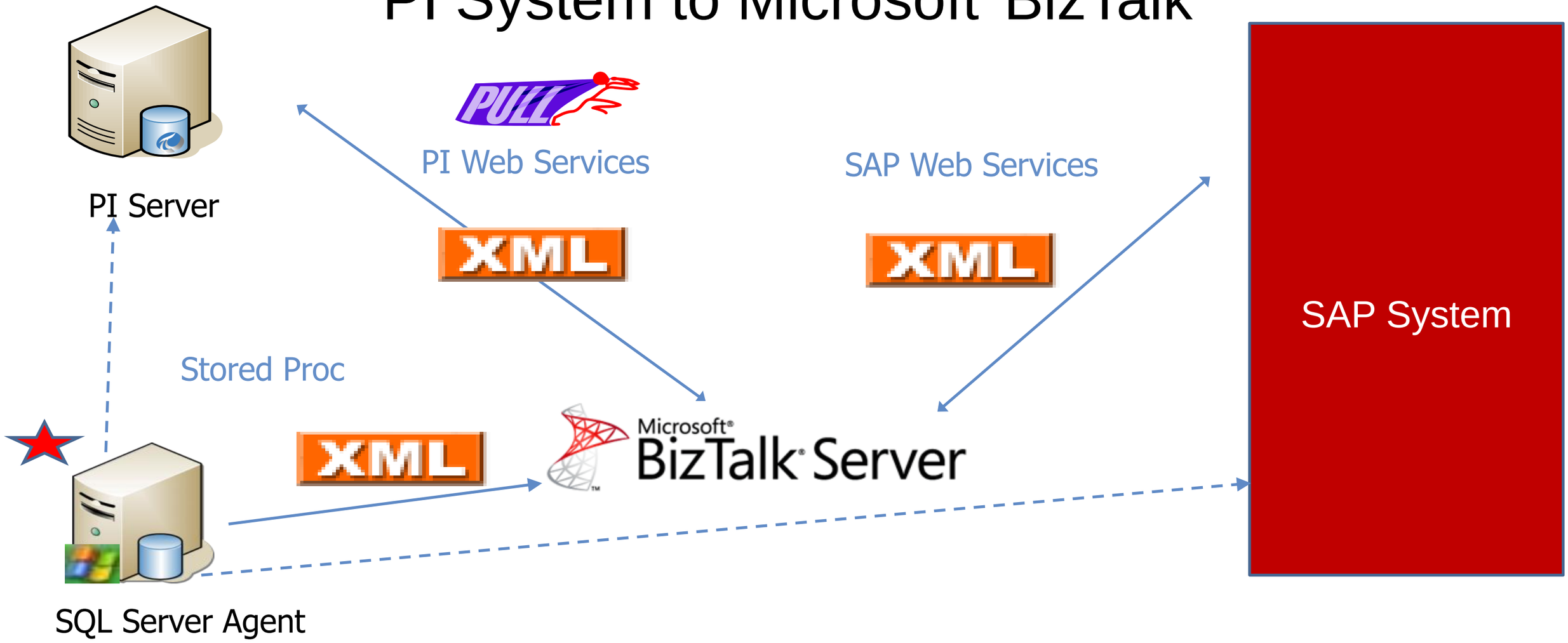
C:\NYISO\NY_ISO_30sec_2... C:\NYISO\NY_ISO_30sec...


```
- <Notification>
    <NotificationName>NY_ISO_Wind_30sec</NotificationName>
    <NotificationDescription />
    <NotificationState>OutsideControl</NotificationState>
    <StartTime>4/8/2010 11:36:00 PM</StartTime>
    <EndTime>1/1/1970 12:00:00 AM</EndTime>
    <TriggerTime>2010-04-09T15:10:00Z</TriggerTime>
    <GenPTID>1000001</GenPTID>
    <MetID>1001</MetID>
    <WindSpeed>12</WindSpeed>
    <WindDirection>East</WindDirection>
    <BarometricPressure>29</BarometricPressure>
    <AmbientTemperature>80</AmbientTemperature>
    <DewPoint>60</DewPoint>
    <Humidity>85</Humidity>
    <BeginTimeStamp />
    <EndTimeStamp />
  </Notification>
```

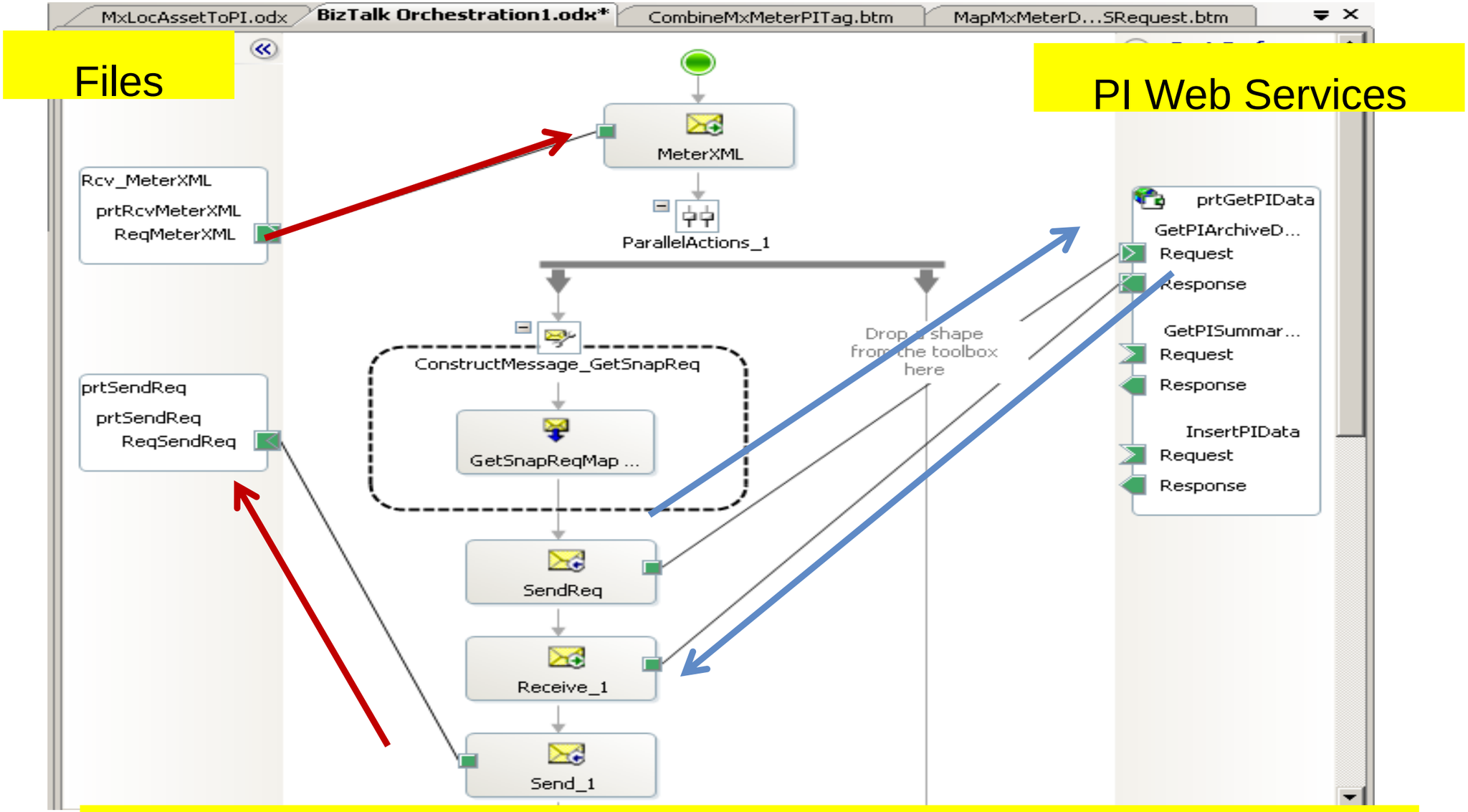

Done My Computer 100%

Notification –XML file

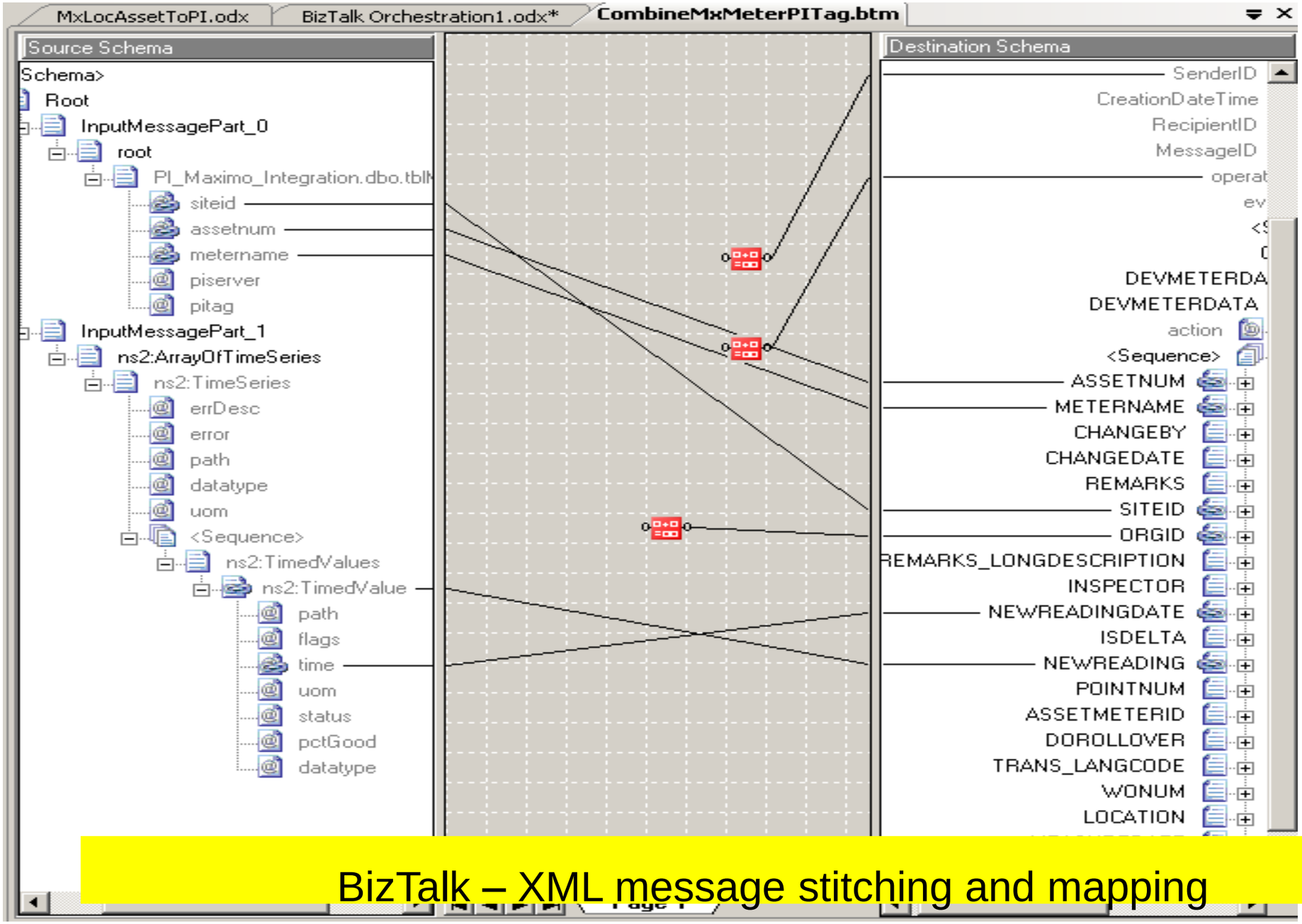
PI System to Microsoft BizTalk



PI Web Services



BizTalk – Messaging and Orchestration – 1/2



BizTalk – XML message stitching and mapping

Measurement Doc to SAP

- PI Notifications - XML
- Microsoft SAP adapter
- BizTalk *

* PI Notif. can also directly call a SAP web service

AF - PI System Explorer

File Edit View Go Tools Help

Database | Query Date | Back | Check In | New Element | New Attribute | Search

Elements

- A6088_ODOM-M
- A6089_ODOM-M
- A6090_ODOM-M
- A6091_ODOM-M
- A6092_ODOM-M
- A6093_ODOM-M
- MAXIMO_WO
- MIMOSA
- ORACLE Assets
- ORACLE Work Request
- PIMLTours
- PITagPutVal
- PUMP2
- SAP_MeasPoint1
- SuperElement
- VENTYX_UsageReading
- WindTurbine01
- SAP_GoodsMvmt

Elements | Event Frames | Library | Unit of Measure | MyPI | Notifications | Contacts

SAP_MeasPoint1

General | Child Elements | Attributes | Ports | Version

Group by: Category

Search

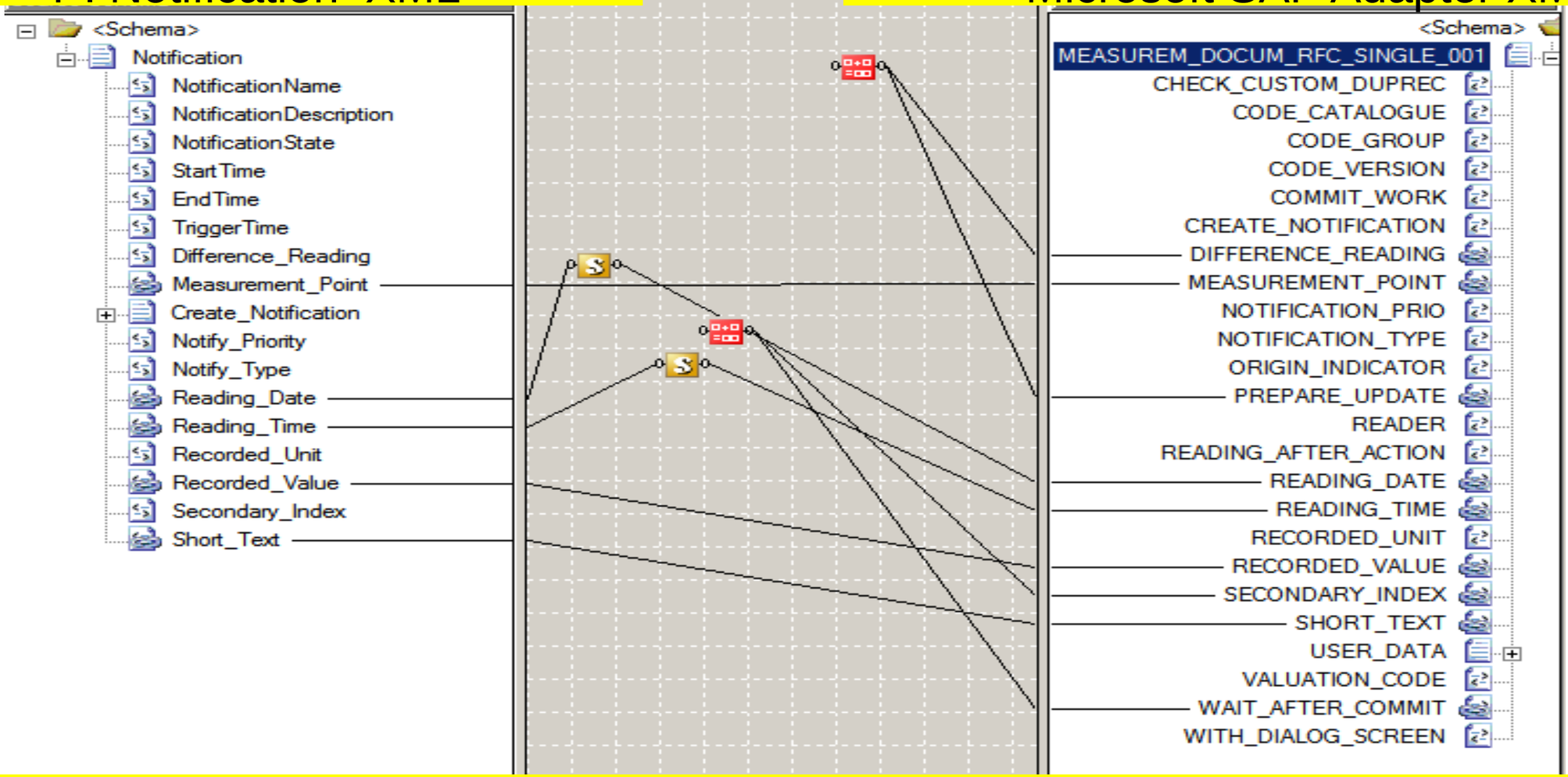
Name	Value	Description
<None>		
Active	YES	YES/NO
Trigger	ON	ON/OFF
SAP_MEASPOINT_Info_To_SAP		
Create_Notification		X = Create PM notification
Difference_Reading	X	X or Blank
Measurement_Point	11459	Measuring point (Primary key)
Notify_Priority		Notification priority importance
Notify_Type	M2	Default=M2 (M1, M2, M3)
Reading_Date	4/21/2010 2:40:43 PM	Date of the measurement
Reading_Time	4/21/2010 2:40:43 PM	Time of the measurement
Recorded_Unit		Unit of measurement for
Recorded_Value	17	Measurement reading in unit
Secondary_Index		Secondary index: Item No. of Me
Short_Text		text for measurement

Recorded_Value

PI AF – SAP Measurement Point 11459

PI Notification XML

Microsoft SAP Adapter XML



RFC call Measurem_Docum_RFC_Single_001

Measuring points Edit Goto Extras Environment System Help

Display Measuring Points: Overview

Maintenance plans | Measurement documents | Last measurement document...

Functional location 3000-LRP-FL-01

Description

Last Measurement Document for Key Date 31.12...

MeasDocument	1026135
Measuring point	11459
MeasPosition	LRP-PT-01

Document data

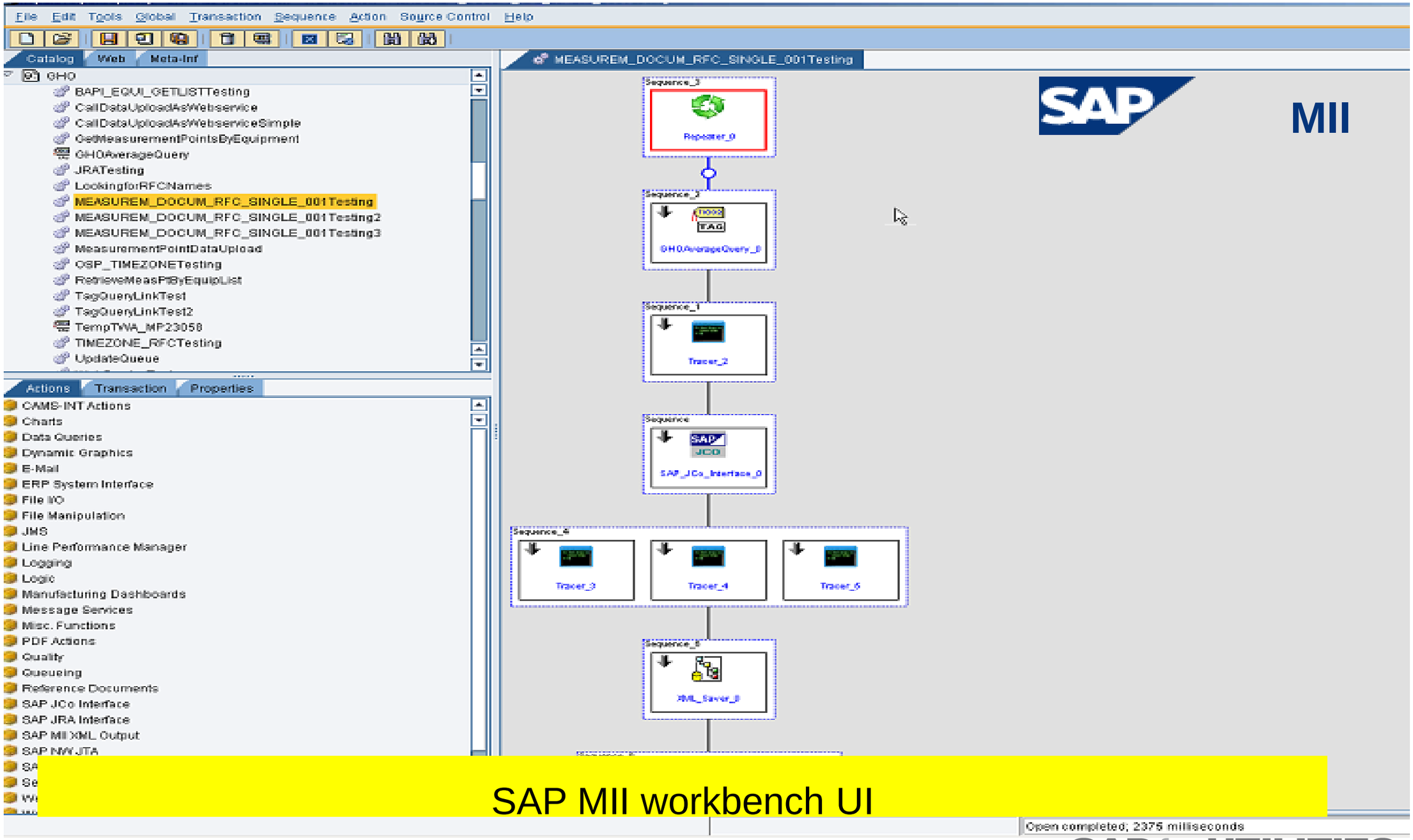
MeasurementTime	20.04.2010 / 21:18:29
Counter reading	489.000
Difference	6.000
TotalCtrReading	489.000

Measuring points

MeasPoint	Description of	ounter	Unit
11459	Film Length		mm
11460	Thickness of f		mm
11461	Thickness of f		mm
11479	Speed		m/s
11498	LRP-PT-05	M_PT_LENGTH	m
	Length		

SAP BAPI’s supporting notifications and work orders

MEASUREM_DOCUM_RFC_SINGLE_001
MEASUREM_DOCUM_RFC_SINGLE_002
MESUREM_POINT_RFC_SINGLE_002
MEASUREM_DOCUM_READ_INTERVAL
BAPI_ALM_ORDER_MAINTAIN
BAPI_ALM_ORDER_GET_DETAIL
BAPI_ALM_ORDERHEAD_GET_LIST
BAPI_ALM_NOTIF_CREATE
BAPI_ALM_NOTIF_DATA_MODIFY
BAPI_ALM_NOTIF_LIST_EQUI
BAPI_ALM_NOTIF_LIST_FUNCLOC



SAP MII

SAP MII workbench UI

Tag Query – Business Logic Services

- Tag Query (limit 128 tags)
  - Fixed number of tags – map directly to each tag property
    X122Pressure → TagName.1, etc.
  - Variable number of tags – map comma separated variable list to TagNames property

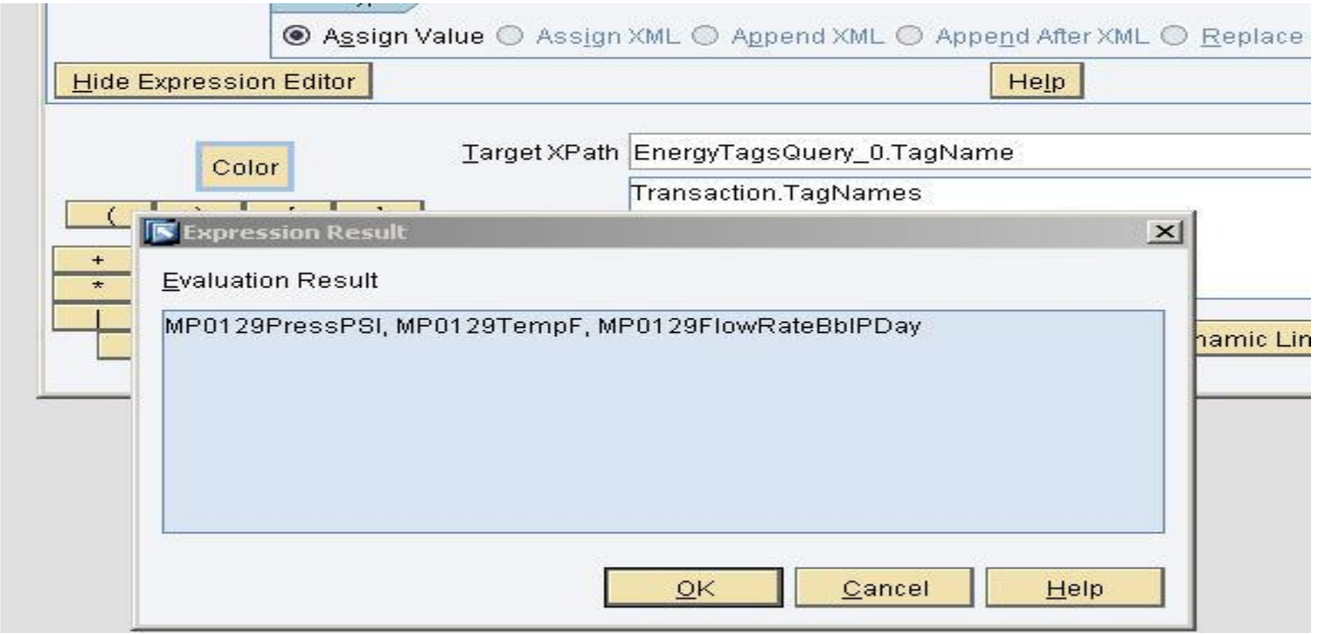
- PCo Read Query (1024 tags) available with PCo 2.1 and MII 12.2
  - Can be expanded to multiples of 1024 tags
  - Can also retrieve meta data from each tag.

Tag Query - BLS

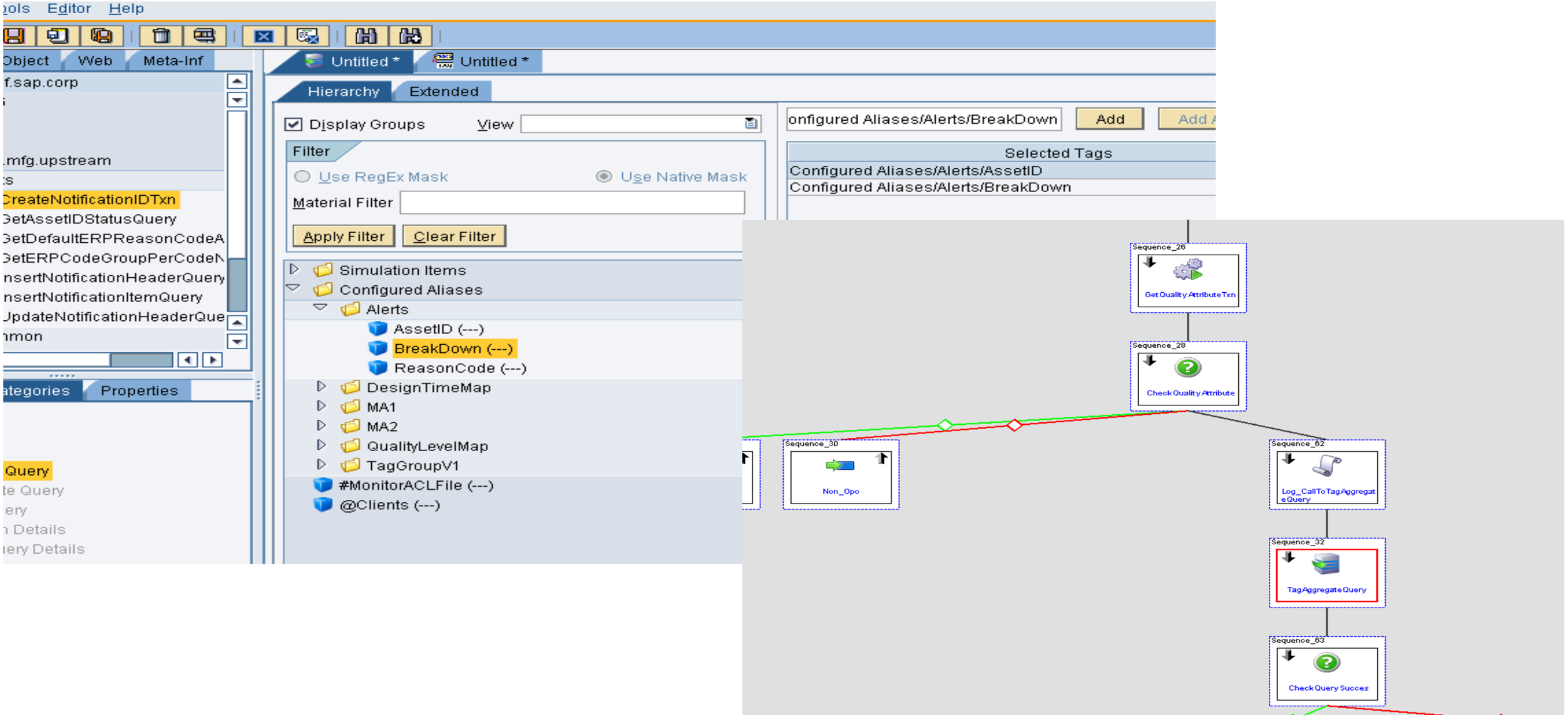
Persistent

TagName.11

Object	Property	XPath	Expression
EnergyTagsQuery_0	Server		Transaction.ServerName
EnergyTagsQuery_0	QueryStartDate		Transaction.SD
EnergyTagsQuery_0	QueryEndDate		Transaction.ED
EnergyTagsQuery_0	Mode		Transaction.Mode
EnergyTagsQuery_0	Method		Transaction.Method
EnergyTagsQuery_0	TagName.1		Transaction.TagName1
EnergyTagsQuery_0	TagName.2		Transaction.TagName2
EnergyTagsQuery_0	TagName.3		Transaction.TagName3



PCo Query - BLS



PCo Sign up for PI System Event Notification

Plant Connectivity Management Console

File View Tools Help

Source Systems

Matrikon_HDA
MII_Alerts_Source
MII_DesignMap_Matrikor
MII_DesignTimeMap_Sor
MII_QualityMap_Source
QualityMap_MA1
QualityMap_MA2
test
Test Kepware Agent
TestDASource

Destination Systems

MAA_AlertDest
MII_Alerts_Destination
rk_test
SimDest
vmw3225

Agent Instances

- Agent1
- EventNotifications
  - Demo1
- MII_Alerts_Agent
  - MII_Alerts_Notification_DownTime
  - Simnot
- MII_Design_Agent
- MII_DesignMap_Matrikon_P7Agent
- MII_P4Agent
- MII_P5Agent
- MII_P6_Agent
- MII_QualityMap_P1Agent
- MII_QualityMap_P2Agent
- MII_QualityMap_P3Agent
- Test Kepware Agent

MII_Alerts_Source-> EventNotifications-> Demo1

Trigger | Output | Reliability | Destinations

☑ Enabled

Trigger Type: OnTrue

Trigger Expression: stringif(BreakDown==true&&ReasonCode>=500, true, false)

Expression Editor

( ) > < >= <= == != && || + - * / % ^ & !

Expression: stringif(BreakDown==true&&ReasonCode>=500, true, false)

Conditional Expression: if(condition, onTrue, onFalse)

Function: abs(value)

Subscription Item: AssetID

Validate Debug OK Cancel

Types of orchestration to be developed

- Creating a Measurement Value
- Creating a Notification
- Creating a Work Order
- Monitoring status and blocking further notifications and work orders while open requests exist
- Creating, updating and deleting Equipment or Functional Locations
- Creating Measurement Points
- Mapping measurement points to tags
- Reading a value from PI System

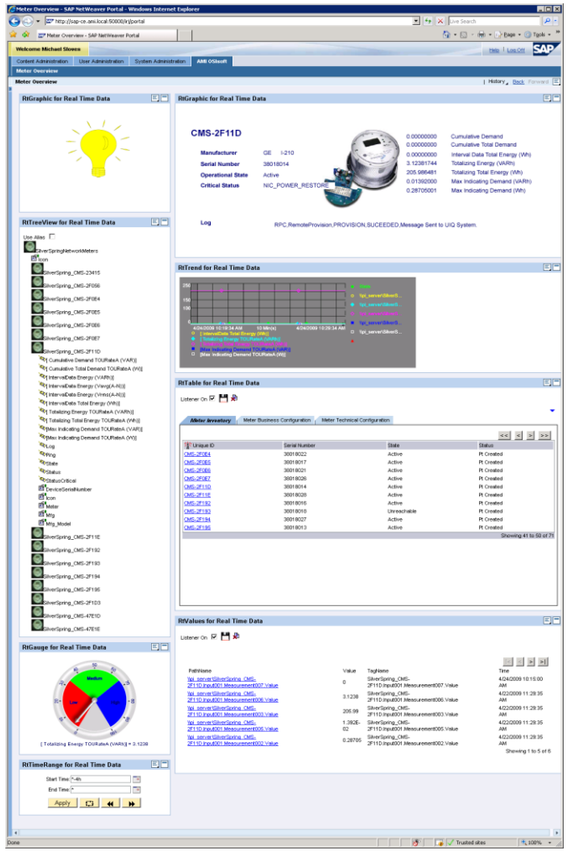
Orchestration and Transport

- ✓Data Access methods - you choose
- ✓Push vs. Pull from PI System - you choose
- ✓Middleware vs. No Middleware - you choose

VISUALIZATION

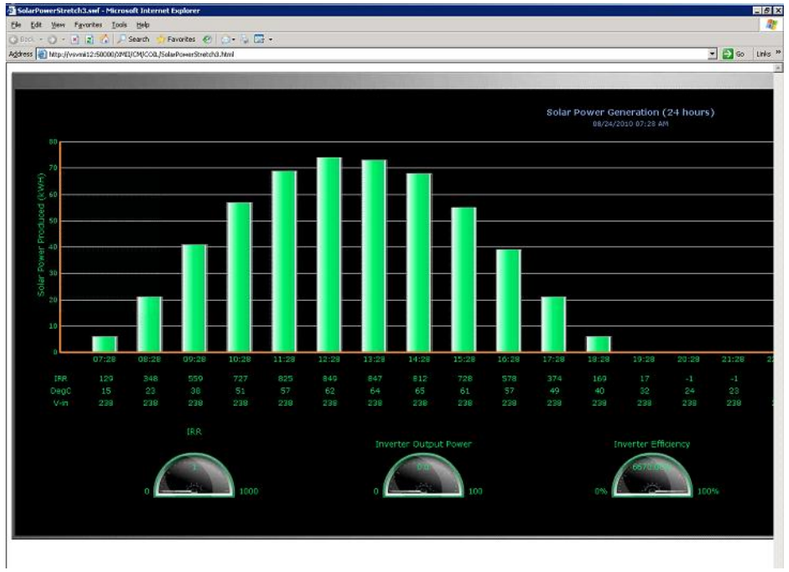
SAP Enterprise Portal

- OSIsoft RtPM Business Package
  - Real-time PI System Information 15 sec updates
- Visual Composer
  - Access to SAP transactional information via BAPI's and web services from SAP.
  - Other SAP development tools such as Web Dynpro etc
- Cross Application development with eventing
- Business Objects
  - Business Warehouse information
  - PI System data via web services – data flattening
  - Aggregated PI System data transferred to Business Warehouse
- Generic Portal Functions



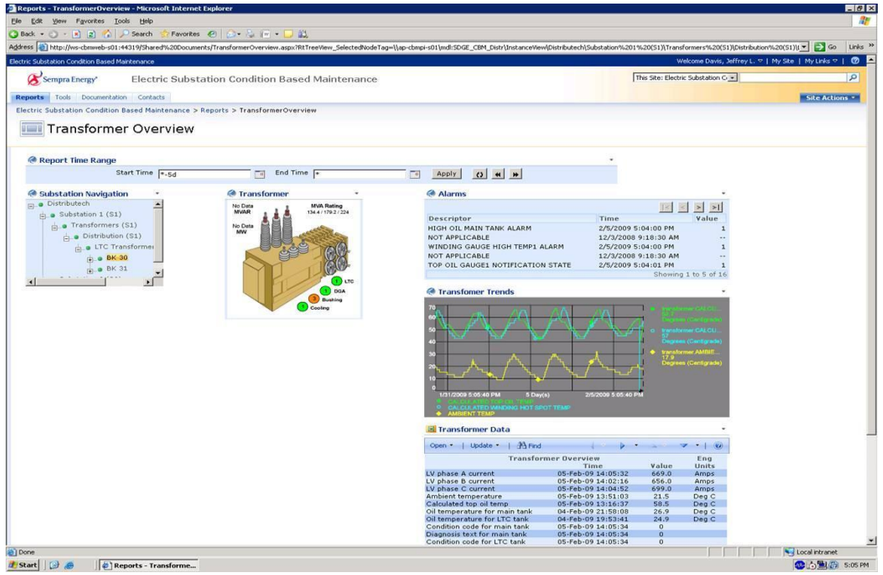
SAP MII

- SAP Information
- Plant and 3rd party information with MII components
- Cross application visualization development
- Xcelsius visualization integrated



Microsoft SharePoint Portal

- OSIsoft PI WebParts
  - Real-time PI System Data 15 sec updates
- Business Objects
  - Business Warehouse information
  - PI System data via web services – data flattening
  - Aggregated PI System data transferred to Business Warehouse
- Custom Parts using web services
  - Access to SAP information
- Microsoft toolset
- Generic Portal Functions



Summary

- What does it take to put in a complete solution
  - Data Gathering and operational rules
  - Select your Architecture
  - Make it part of business process
- Questions to ask getting started

SAP for UTILITIES
north american conference

Gretchen Schwenzer

OSIsoft, LLC

gretchen@osisoft.com

eventure