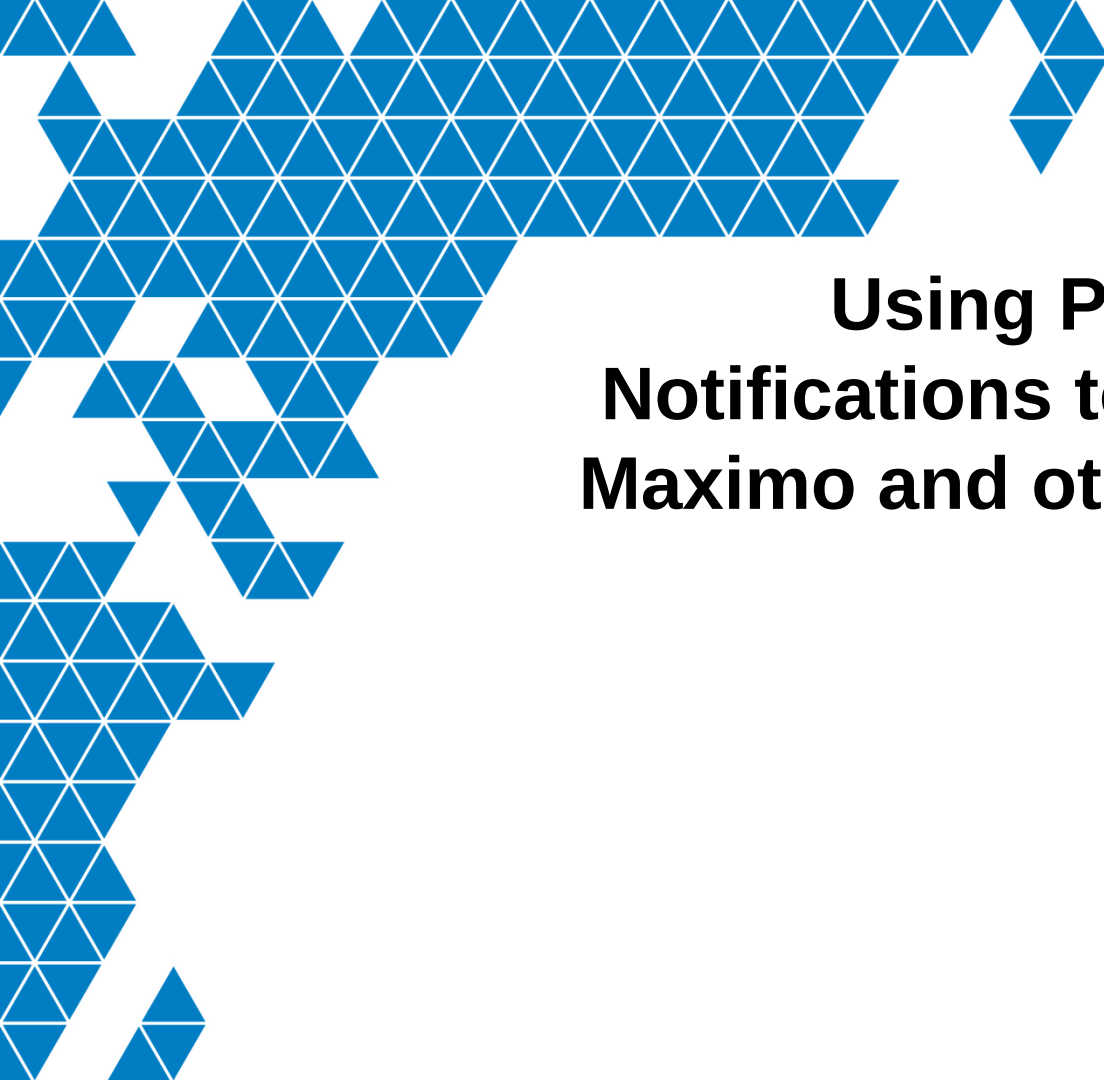




Using PI Data Access and PI Notifications to Integrate with SAP, Maximo and other Line of Business Systems

Gopal GopalKrishnan
OSIsoft

Production Maintenance Inventory Quality



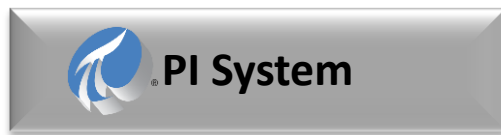
ORACLE

INFOR



MINCOM

Ventyx



PI Data Access

SAP NetWeaver®



Microsoft®
BizTalk® Server



Microsoft®
SQL Server®
Analysis/Reporting Services



ORACLE®



Microsoft®
Silverlight



Microsoft®
SharePoint®



Microsoft®
Visual Studio®



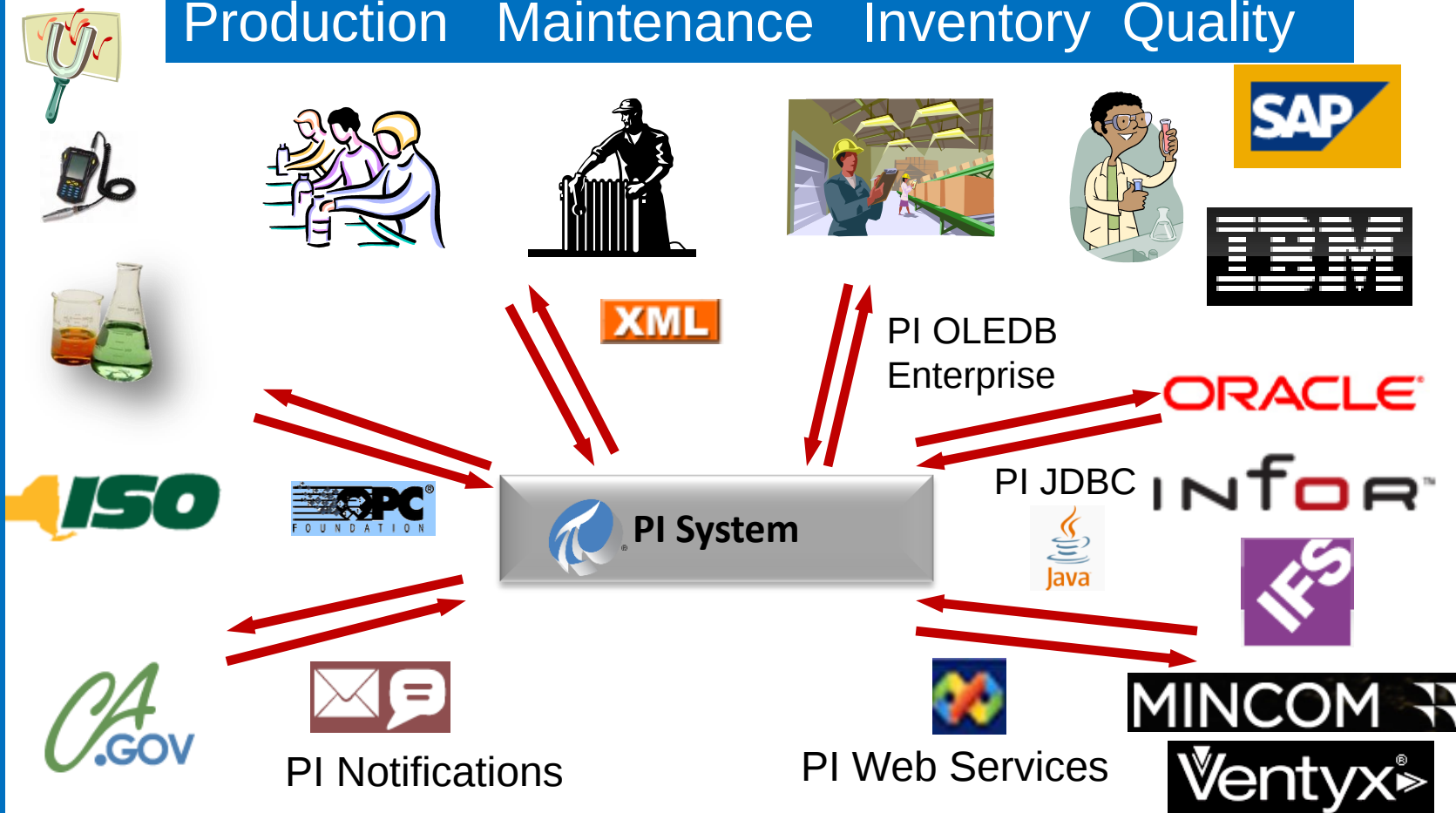
TIBCO
The Power of Now™

PI Data Access family of products



PI System

Production Maintenance Inventory Quality



Use Cases



- Maintenance (Asset Management)
 - IBM Maximo – condition-based maintenance



DTE Energy



- Costing
 - EPS (Enterprise Performance Solutions)

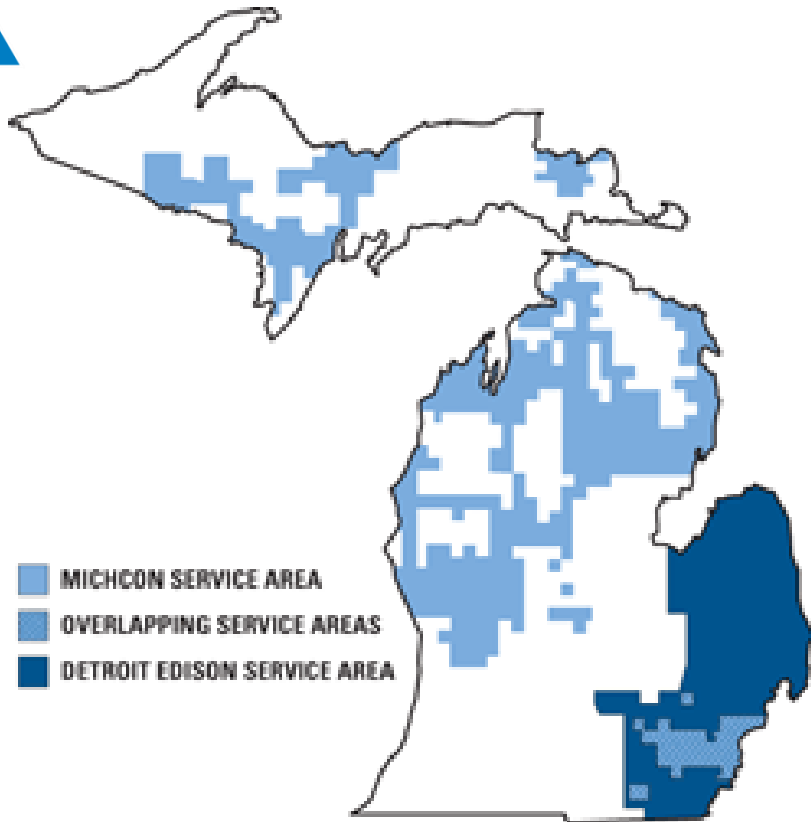


- Quality
 - SAP QM (Quality Management) via MII



Klabin

About DTE Energy - Detroit Edison



DTE Energy Co.

- 10th largest electric utility & 11th largest gas utility
- \$8.6 billion revenue
- 9,800 Employees
- Investing \$1 billion in biomass, solar, wind and other renewable energy

Detroit Edison

- Michigan's largest electric utility with 2.1 million customers
- Over 11,080 MW of power generation, primarily coal fired

Use Case – Maintenance

Sumanth is a maintenance manager and wants to:

- > Cut costs by eliminating unnecessary maintenance tasks
- > Improve equipment availability by doing maintenance before failure

- Current business process



- Calendar based (90 days, 6 months ...) PM (preventive maintenance) tasks

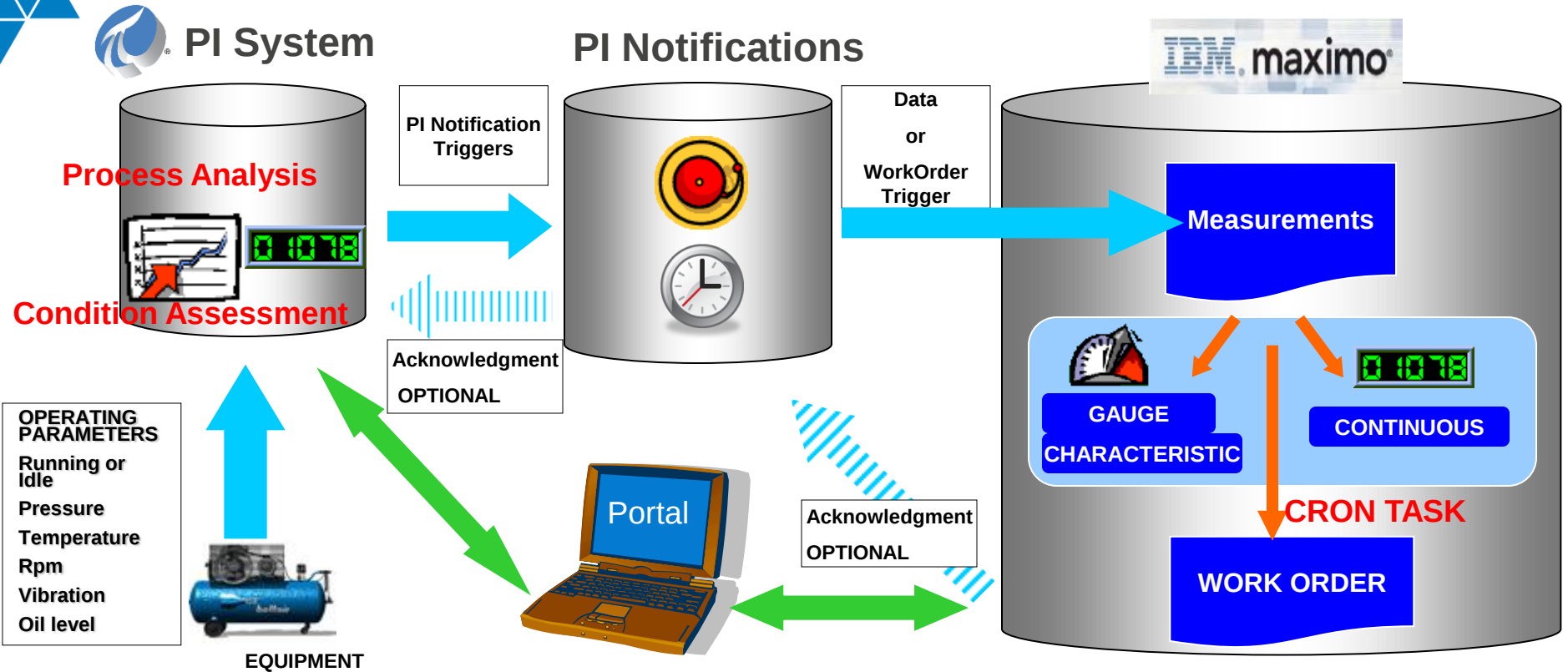
- Reactive maintenance, i.e. maintenance after equipment failure

- Revised business process

- Usage based instead of calendar
 - Condition-based instead of calendar or reactive

PI to Maximo data flow

(via Maximo Integration Framework)



Usage based maintenance - Types

- Run-hours

- Pulverizer (is Running if Amps > 10)
- Coal feed conveyor
- High pressure service water pumps

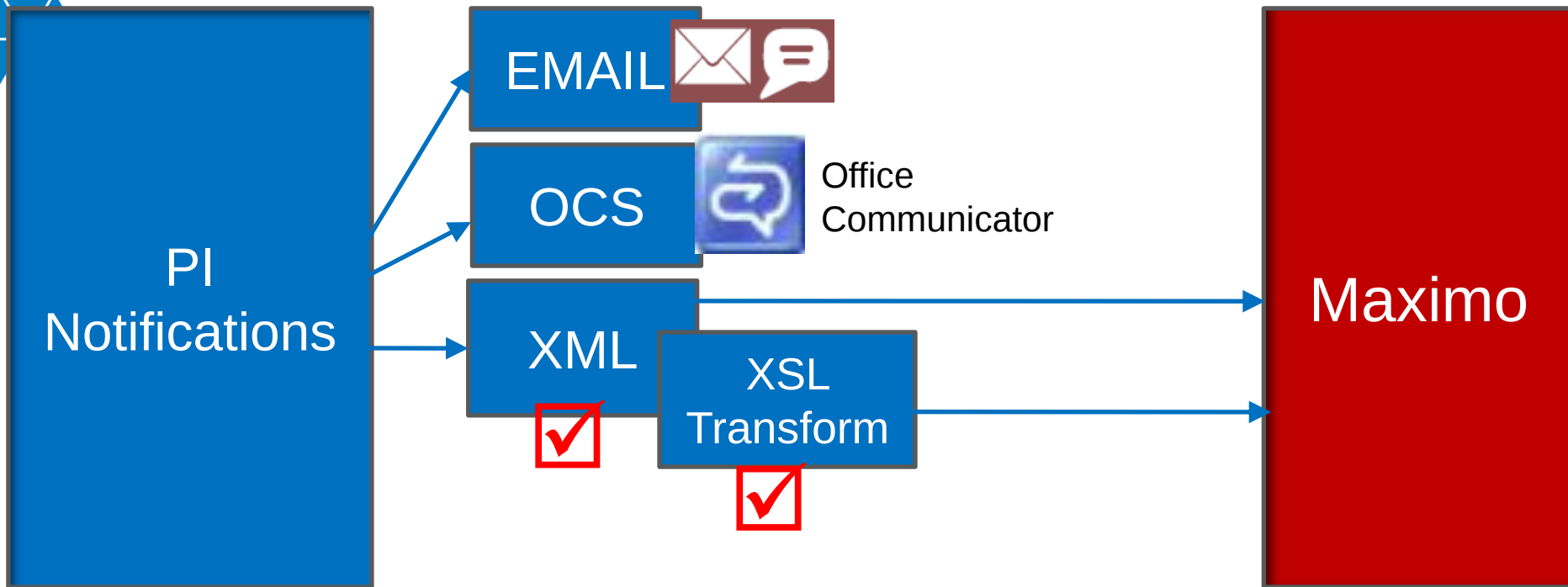
- Run-modes

- number of starts (peaker combustion turbine (CT) blades)
- number of trips

- Run-weight

- tonnage processed (mining industry)
- flow-rate (time-integral) converted to volume (Slurry Pumps)

XML Data Flow



XML Delivery Channel (PI Notifications toolkit – OSIsoft vCampus)

Asset Site
Status Type
Unit / Center Attachments
Related Documents? ☐
Moved? ☐

Details

Parent
Maintain Hierarchy? ☐
Location
Bin
Rotating Item
Condition Code
Meter Group
Usage
Calendar
Shift
Priority

Purchase Information

Vendor
Manufacturer
Installation Date
Purchase Price *
Replacement Cost *
Vendor Manual
Model Number
Asset Legacy #
Budgeted *
Inventory
Remaining Service Life
Year Cost Incurred
Rest. / Mod. Cost

Downtime Modified

Condition-based maintenance

- Failure or performance correlated to a slowly degrading metric



- Temperature (bearings, motor windings, gas circuit breaker etc.)



- Pressure or DeltaP (Heat-exchanger plugging, Filters, Nitrogen cylinder low pressure, GCB low pressure)

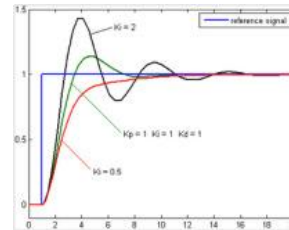


- Vibration, amplitude (need to interpret along with operations data in the PI System)



- Level (Transformer oil tank level too low)

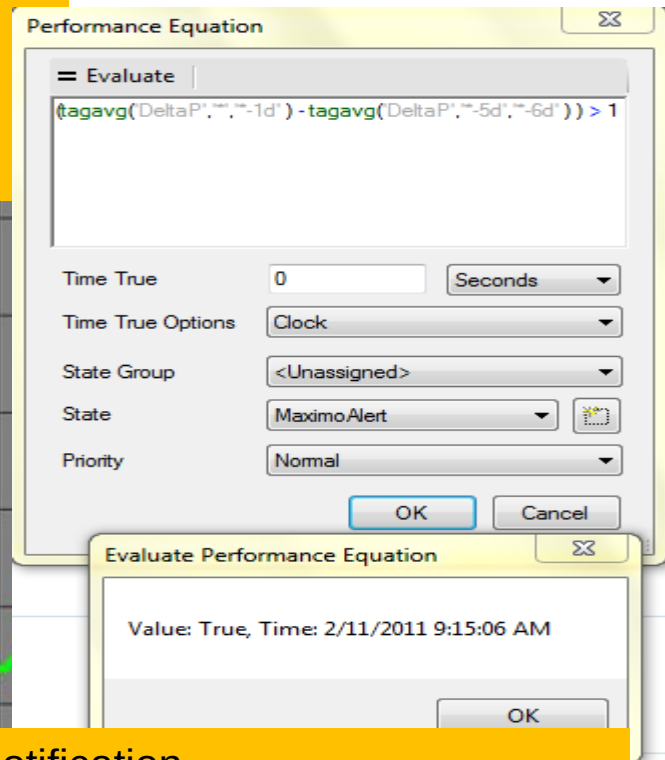
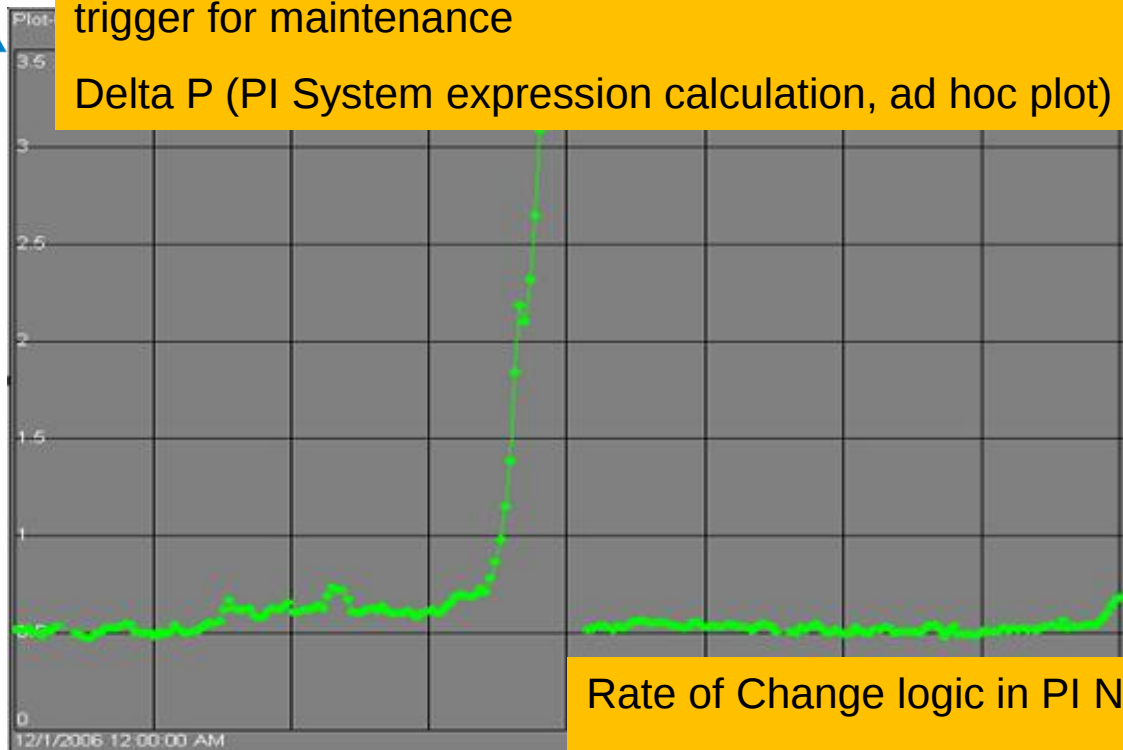
- Instrument drift
- Process control loop health



Boiler convection tubes plugging

Rapid rate of change of Delta P over several days is a trigger for maintenance

Delta P (PI System expression calculation, ad hoc plot)



Rate of Change logic in PI Notification

$(\text{Current 24 hour AVG} - \text{yesterday's 24 hour AVG}) > 0.2$

Savings with usage based strategy - Pulverizer

A	B	C	D	E	F	G	H	I	J				
PI TAG		DELIMITER FOR RUNNING OR NOT		Frequency	START DATE	FINISH DATE	RUNNING VARIABLE	HOW IS THE CURRENT PM GENERATED	overestimate variable by				
2M1009:AMP	02M1009	'2M1009:AMP'>10	>10				299.35	USE EXCEL AND MANUAL COUNT TO FIND OUT WHEN A PULVERIZER IS ABOUT TO HAVE RUN 4000 HOURS	82.0%				
2M1010:AMP	02M1010	'2M1010:AMP'>10	>10				273.68	USE EXCEL AND MANUAL COUNT TO FIND OUT WHEN A PULVERIZER IS ABOUT TO HAVE RUN 4000 HOURS	75.0%				
2M1011:AMP	02M1011	'2M1011:	PMNUM	pm desc			FR	FREQUENT	CRAT	LAB	CREWID	JPNUM	jp descri
			10001951	YELLOW MILL COAL PULVERIZER LUBE OIL PUMP(01P100			2 MONTHS		OPER	1 OPS1	20003380	MILL CO	
			10002250	YELLOW COAL MILL DAMPER OIL CHANGES, OUTAGE OF			1 YEARS		OPER	6 OPS5	20058889	COAL M	
			10002544	YELLOW COAL PULVERIZER, CLEAN AFTER 6000 HR. INS			6 MONTHS		OPER	2 OPS6	20003425	COAL P	
			10002680	CALIBRATE MOTOR CURRENT INDICATION (PERIODIC) 4			4 YEARS		ENG	2 PERT	20038712	CALIBR	
2M1012:AMP	02M1012	'2M1012:	10002812	YELLOW COAL MILL DRIVE GEAR GREASING SEMI-ANNU			6 MONTHS		OPER	0.5 OPS5	20058888	COAL M	
			10004420	YELLOW COAL MILL 6000 HR LUBRICATION, OUTAGE OF			3 MONTHS		OPER	4 OPS5	20058891	COAL M	
			10005953	YELLOW COAL MILL DAMPER LUBE CHECKS, QUARTERL			3 MONTHS		OPER	2 OPS5	20058887	COAL M	
2M1013:AMP	02M1013	'2M1013:	20014282	OBTAIN OIL SAMPLES FROM ALL WEST SIDE COAL MILLS			0 MONTHS		OPER	1 OPS1	21042975	COAL M	
			20014293	ROD OUT WITH BRUSH AND BLOW BACK PITOT TUBES			0 DAYS		TECHI	2 INST	20002673	ROD OL	
			20014295	COAL MILL DAMPER LUBE CHECKS			3 MONTHS		OPER	2 OPS1	20058887	COAL M	
			20014296	COAL MILL, 6000 HR LUBRICATION			2 YEARS		OPER	4 OPS5	20058896	GRAY C	
			20014297	OBTAIN 1 120CC OIL SAMPLE FROM SAMPLE TAPS AT OIL			0 MONTHS		OPER	1 OPS1	21000063	TAKE O	
			20014298	OBTAIN 1 120CC OIL SAMPLE FROM THRUST BEARING O			0 MONTHS		OPER	1 OPS1	21000063	TAKE O	

Maintenance: 160 PM hours per pulverizer per year; 16 pulverizers per site, 6 sites

Actual run hours: 80% based on PI data, implies a 20% savings

Projected savings: 480+ PM hours (approx. \$25,000 at \$50/hour) per year per site
equals \$150,000 for 6 sites



Benefits of using PI System data in Maintenance

- Save maintenance \$\$
 - Reduce equipment downtime
 - Catch equipment failures before they happen
 - Improve reliability
- 

Use cases



- Maintenance (Asset Management)
 - IBM Maximo – condition-based maintenance



DTE Energy



- Costing
 - EPS (Enterprise Performance Solutions)



RockTenn



- Quality
 - SAP QM (Quality Management) via MII



Klabin

About RockTenn



- Headquartered in Norcross, GA, Sales \$3 Billion, 10,000 + employees
- One of North America's leading producers of
 - Paperboard
 - Containerboard
 - Consumer and Corrugated Packaging
 - Merchandising displays
- Production facilities concentrated in North America
 - 11 Recycle Paperboard Mills
 - 1 Recycle Container-board Mill
 - 1 Bleached Board Mill
 - 90+ Converting Plants





Use Case – How much does it cost?

Todd is a Production Engineer and wants to:

- Know how much the paper Grades and Calipers cost to manufacture
- Have better insight into product pricing
- Have all this information right away and calculated for me!

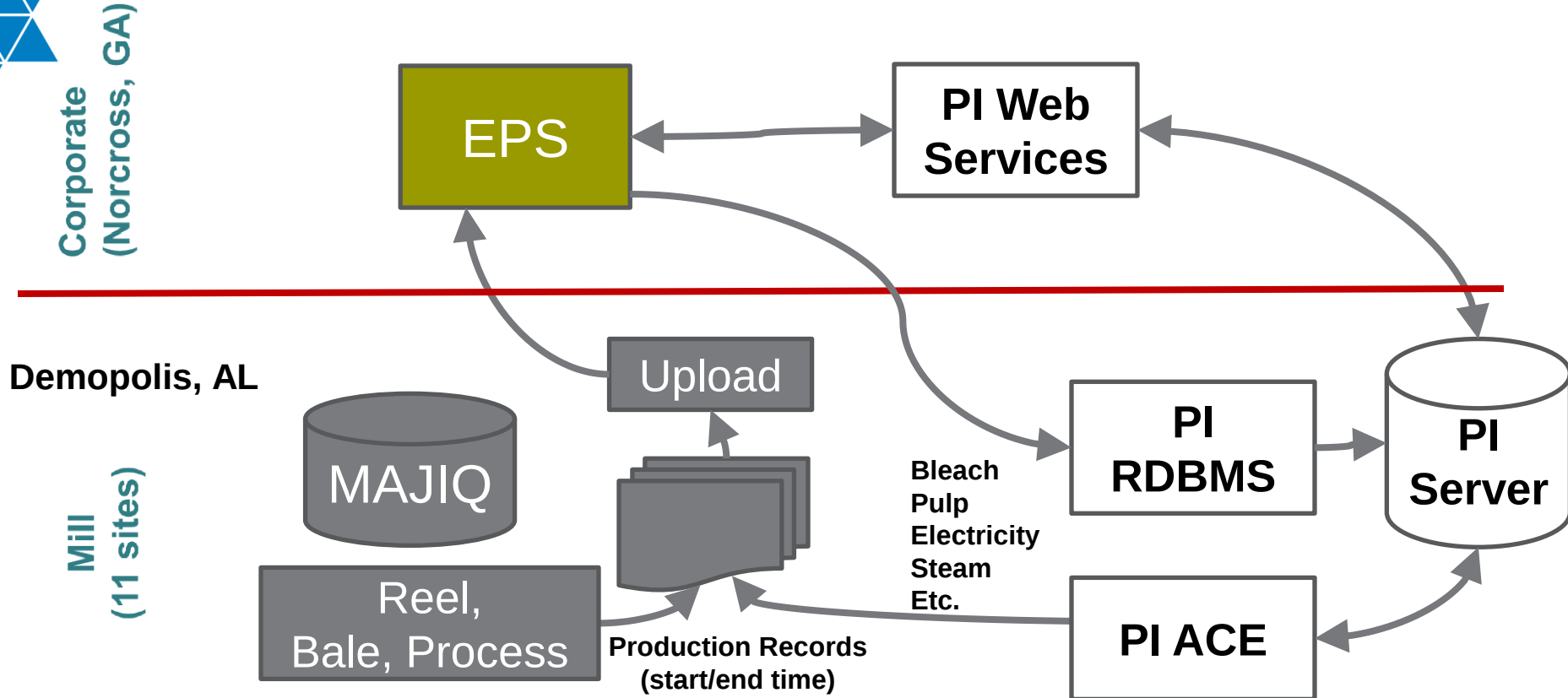
Problem - data is now in different systems and is not integrated. Where is it?

- Production data, component flows, and production statistics - PI System
- Production records - Majiq (paper roll tracking system)
- Quality data - Stand-alone relational database
- Other cost data - J.D. Edwards ERP (overhead, labor etc.), Material pricing

Solution

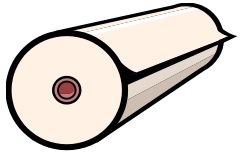
- EPS (Enterprise Performance Systems) Cost Management Suite
 - PI System software to integrate PI System data, Majiq data, and other cost data
- 

Data Flow: Production Costing



Costing Data Structure

Based on Production



- Reels, Rolls, Pulp Bales
- Utility Production – Steam Generation, Electricity
- Pulp Production, ClO_2 Production

Tied to Consumption of raw materials – by Recipes



- ClO_2 (chlorine dioxide) - Tag
- NaClO_3 (sodium chlorate) - Tag
- H_2SO_4 (sulfuric acid) - Tag
- Etc.

EPS Cost Management Suite

RockTenn Company - Demopolis - Version 3.0

Maintenance	Export	PCM Analysis	RTC Analysis	System	Reports	Interfaces	Logoff	Help
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Basic Data

Pricing Data

Recipe Data

Analysis Data

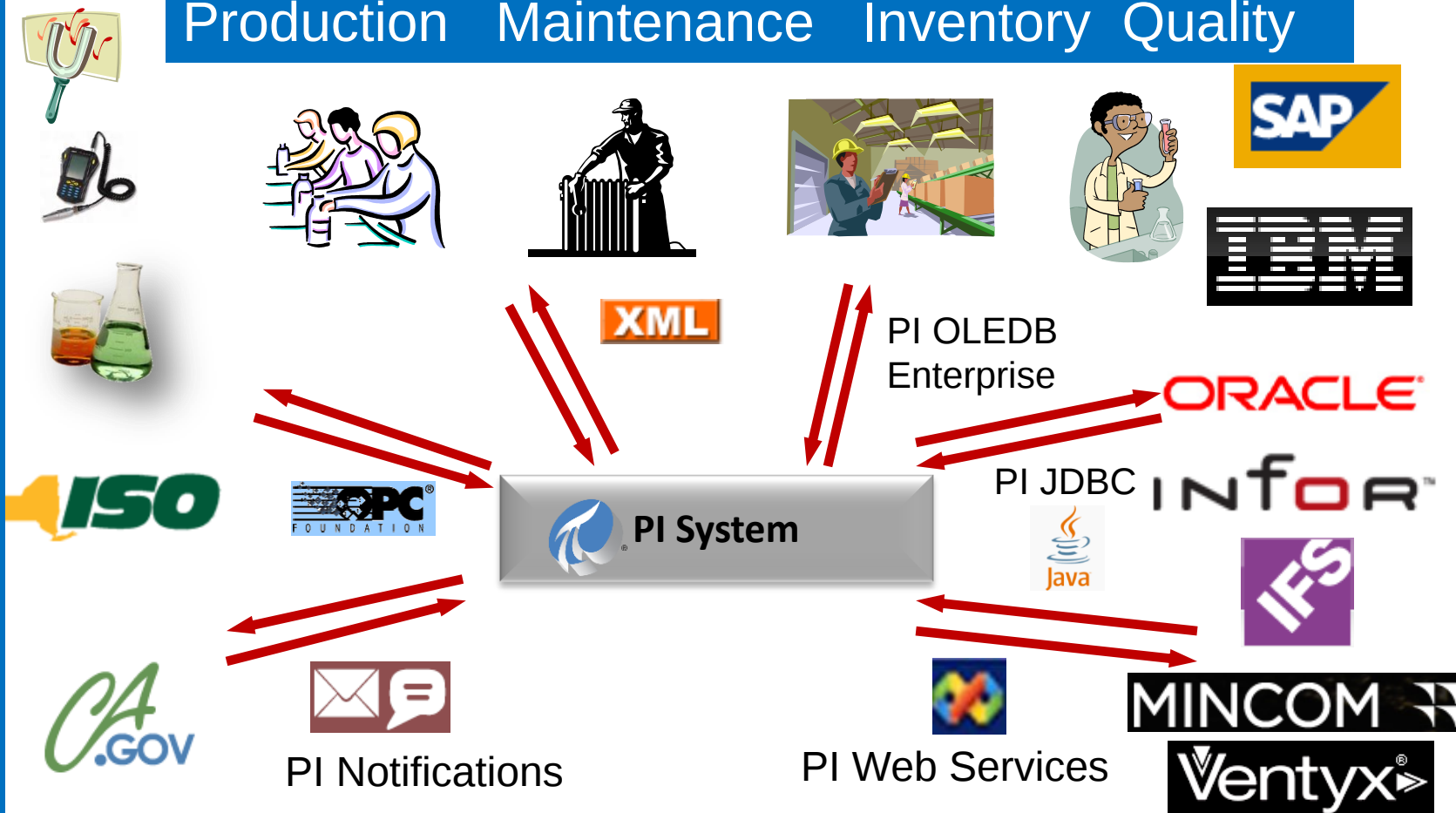
Multi Recipe Update



Results and benefits (work in progress)

- **Better Visibility** into cost data to control costs
 - Data is available to PI System client software real time
 - Operators use PI ProcessBook and PI DataLink
 - Data is available through EPS and external reporting
 - Allows the Mill and Finance to concentrate on grade margin to develop opportunities.
 - Time previously spent on manual costing process now reallocated
 - What if analysis is possible (e.g., chemical costs change)
- 

Production Maintenance Inventory Quality





Take aways + Q&A

- Use PI System tools for Line-of-Business integration
 - PI Data Access, PI Notification, and others
 - It doesn't have to be a big project – you can start small
 - Other resources - OSIsoft vCampus
 - Talk to other PI System users already doing this
- 



Thank you