



**2003**  
OSISOFT USERS CONFERENCE

# ***PI RLINK - New Initiatives in Asset Management with Maximo, Indus, JDEdwards and MIMOSA***

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# *Presentation agenda*

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- *What is RLINK?*
- *RLINK – EAM data flow*
- *Example – Pump1 discharge temperature*
- *RLINK configuration specifics*
- *MIMOSA (Machinery Information Management Open System Alliance) related information*
- *Q & A*

# What is *RLINK*?

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## → *OSIsoft's PI System*

***Real-time Performance Management (RtPM) for the Enterprise***

***PI provides the platform (aka infrastructure/architecture)***

## → → *RLINK*

***Integration tool that comes with PI for integrating real-time data with ERP/EAM systems***

***(ERP is Enterprise Resource Planning)***

***(EAM is Enterprise Asset Management)***

## → → → *RLINK-Maximo, RLINK-Indus, RLINK-JDEdwards*

***Integrates real-time data with EAM (work management modules) for implementing condition-based maintenance (CBM) of plant assets***

# PI RLINK ERP/EAM systems block diagram

ERP/EAM Systems  
MRO Maximo  
Indus PassPort  
JDEdwards OneWorld

## informed decisions

Management & Financial  
Planning & Maintenance  
Production & Operations  
SAP R/3

**PI**system™

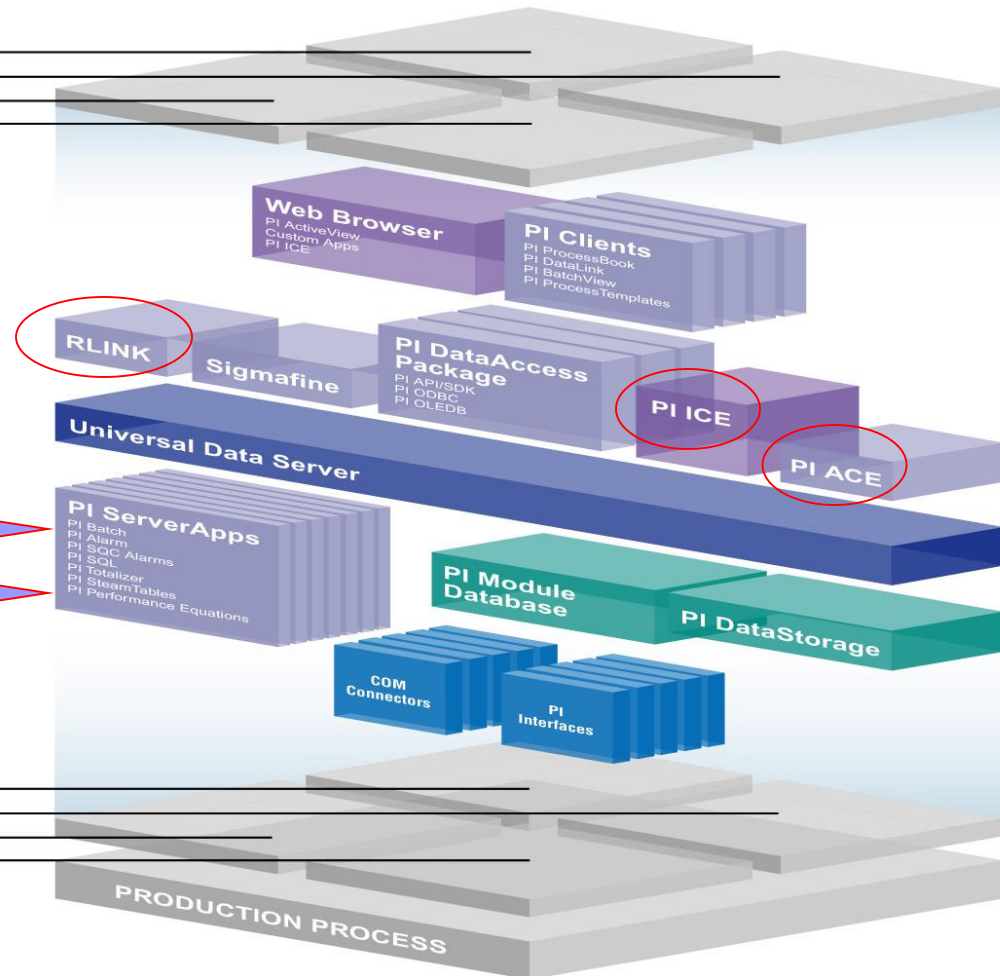


PI Alarm

PI Performance Equations

## operations data

Legacy Information System  
Relational Database  
Advanced Control System  
Lab System

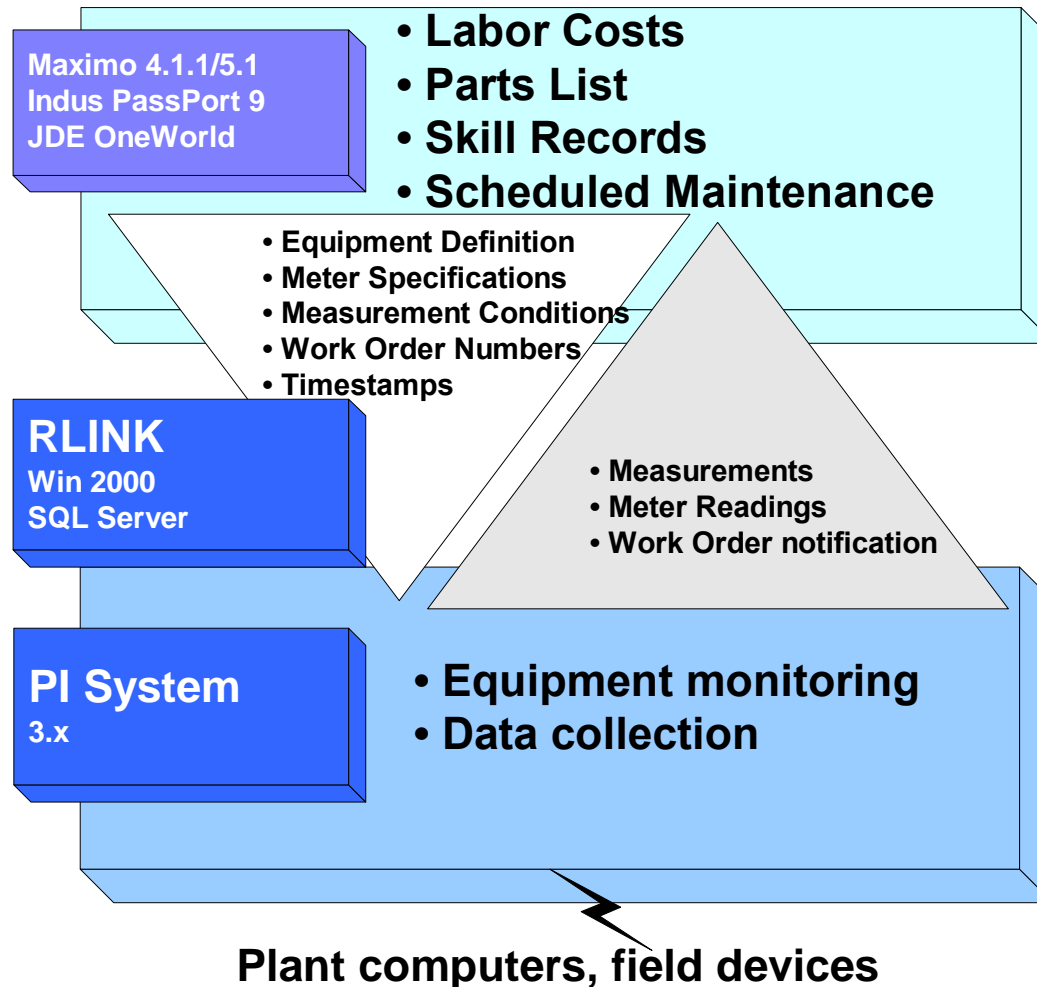


# What does the *RLINK–EAM* interface do?

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- *Making decisions regarding maintenance activities of plant assets requires actual equipment usage and operations data collected on the plant floor*
- *Bi-directional gateway for information exchange between:*  
***Plant floor (PI System) ↔ *RLINK* ↔ ERP/EAM Systems***
- *Allows easy migration of maintenance activities from calendar based to condition-based to better leverage your existing investments in both PI and EAM System*

# PI ↔ Rlink ↔ EAM data flow



# Case Study: Pump Lubrication PM

***PI monitors pump starts/stops and RLINK notifies EAM to generate a WO when pump run-time accumulates to 2000 hours (approx. 24 hours/day \* 90 days)***

Before RLINK	After RLINK
<ul style="list-style-type: none"><li>✗ Lubrication PM was auto-scheduled and was done every 3 months of calendar time</li><li>✗ EAM was unaware of pump usage and automatically generated a WO even if the pump was on standby for most of those 3 months</li></ul>	<ul style="list-style-type: none"><li>✓ Lubrication PM is done every 3 months of pump run-time</li><li>✓ EAM generates a WO based on actual pump usage</li></ul>

**NOTE: With RLINK, you can also implement logic such as “3 months of run time or 6 calendar months whichever comes first”**

## Case Study: Analyzer recalibration PM

***PI monitors the drift between two analyzers and RLINK notifies EAM to generate a WO for recalibration when the drift exceeds 1%***

<i>Before RLINK</i>	<i>After RLINK</i>
<p>✗ Operator continuously monitored the analyzer readings on a CRT in the control room. When the drift exceeded 1%, he <u>manually</u> entered the necessary information in EAM to generate a WO.</p>	<p>✓ PI monitors the analyzer readings and when the drift exceeds 1%, a notification is <u>automatically</u> sent to EAM to generate a WO</p>



# Case Study: Filter change PM

***PI monitors pressure difference across the filter and RLINK notifies EAM to generate a WO when reading exceeds 3 psi***

Before RLINK	After RLINK
<ul style="list-style-type: none"><li>✗ <i>FilterChange PM was auto scheduled and was done every six (6) months - calendar time</i></li><li>✗ <i>EAM automatically generated a WO even if at that time the filter performance was satisfactory</i></li></ul>	<ul style="list-style-type: none"><li>✓ <i>FilterChange PM is done only when the deltaP across the filter exceeds 3 psi</i></li><li>✓ <i>EAM generates a WO based on actual operating condition of the filter, and only when necessary</i></li></ul>

# Other Examples

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- Pump lubrication PM based on actual motor run-time, say 2000 hours
- Analyzer re-calibration PM based on actual drift exceeding 1%
- Filter change PM based on measured pressure differential across the filter exceeding allowable limits
- Heat-exchanger cleaning cycle PM based on calculated fouling factors
- Detailed equipment inspection based on vibration readings exceeding a threshold

# ***EXAMPLE: PUMP1 discharge too hot PM***

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- ***Equipment***

***PUMP1***

- ***PM***

***PUMPHOT PM***

- ***TEMP1 Temperature***

***Maximo MeasurePoint***

***Indus PassPort Operating Factor***

***JDE OneWorld Meter***

***PI Tag: TI204.PV      Pump discharge temperature***

- ***Trigger Condition***

***When discharge temperature exceeds 100 (deg F), generate a WO***

# Maximo Screen <<PM>>

*PM PUMPHOT defined for PUMP1 Work Type is EM=Emergency, Work Priority=1 and Status=APPR (pre-approved)*

**Preventive Maintenance**

File Edit View Actions Insert Navigate Setup Help

PM Frequency Job Plan Sequence PM Hierarchy Master PM Linked Documents

PM **PUMPHOT** Service pump discharge overheat Master PM? **N**

Location

Equipment **PUMP1** Centrifugal pump (100gpm)

Route

**Details**

Next Job Plan

Supervisor

Crew

GL Account

Interruptible? ☐

Work Order Status **APPR**

WD Priority **1**

Work Type **EM**

Storeroom

Lead Time Active? **N**

Lead Time (Days)

**Source**

Master PM

Override Master PM Updates? **N**

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# Maximo Screen <<Equipment → Condition Monitoring>>

**Measurement Point TEMP1 for equipment PUMP1 and measurement condition (Action Limits) associated with PUMPHOT PM**

**Condition Monitoring**

File Edit View Actions Insert Navigate Setup Help

Measurement Point Linked Documents

Point 1101A Discharge Temp Excessive

Equipment PUMP1 Centrifugal pump (100gpm)

Location REACTOR Reactor room

Point Name TEMP1

**Details**

	Warning	Action
Upper Limits	90.000	100.000
Lower Limits	10.000	0.000
Unit of Measure	°C	

PM PUMPHOT Service pump discharge overheat

WO Priority 1

**Measurements**

Date/Time	Measurement
-----------	-------------

**History**

Work Order	Date	Memo
------------	------	------

**NOTE:**

Measurement condition definition is typically OPTIONAL in the EAM system.

PI monitors this measurement for trigger conditions configured in PI and RLINK internally maintains the trigger condition to Model WO mapping



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# RLINK Screen <<PM Configuration→Alarm PointGroup>>

**TEMP1 Xreferenced and PI Tag “ms-01” and PI Alarm Tag “ms-01-pialm” included in the PointGroup**

**RLINK-PM Config**

Base Plant  
Plants  
BASE BASE Plant  
SAMP Sample Plant  
Unit  
Point Group  
ALARM  
5\*TEMP1\*ALARM\*\*  
6\*METER1\*ALARM\*\*  
EQUIP  
Equipment  
Point Group Groups  
Plant group  
Equipment group  
Equipment Types  
General

Purge System Parameter PB Application Menu  
Equipment Point Group Groups Unit  
Plant Point Group Class

Modify

Plant id SAMP Plant Description Sample P  
Group no 5 Group type ALARM Owner dbo  
Description TEMP1  
Resource  
Material id  
Class Equipment 2 Centrifugal Pump  
Application id  
Process book

	Tag id	Tag alias	Order	Server	Applic
1	ms-01	VALUE	1	piserver2	
2	ms-01-pialm	ALARM	2	piserver2	
3	ms-01_not	NOTIFICATION	3	piserver2	
4	ms-01_notify_type	NOTIFY_TYPE	4	piserver2	
5	ms-01_notify_priority	NOTIFY_PRIORITY	5	piserver2	
6	ms-01_notify	NOTIFY	6	piserver2	
7	ms-01_doc	DOCUMENT	7	piserver2	

PI Module Copy Search Apply Clear PI Tag

**PI measurement value Tag**

**Corresponding PI Alarm Tag**

**OPTIONAL PI tags used for information exchange with EAM System**



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# PI SMT Screen

**Alarm point definition shows AlarmTag “ms-01-pialm” and SourceTag “ms-01”**

Microsoft Excel - Book1.xls

File Edit View Insert Format Tools Data Window PI-SMT Help Send

B2 = ms-01-pialm

	A	B	C	D	I	Y	Z	AJ	AK	AM	AT	AU	AW	AX	AY
1	Select (x)	Tag	action1	action2	autoack	descriptor	DigitalSet	pointsource	pointtype	PtClassName	SourceTag	span	step	test1	test2
2	x	ms-01-pialm	Hihi 2	High 1	yes	Alarm for ms-01	pialarm33	@	Digital	Alarm	ms-01	200	0	gt(100)	lt(0)
3															
4															
5															
6															
7															
8															
9															

Sheet2 (2) Sheet2 Sheet1

Ready

**Note: PI SMT is an Excel based add-in for defining PI Tags and PI Alarm Tags**

# PI RLINK EAM field name mappings

<i>Item</i>	<i>Name in Example</i>	<i>Maximo</i>	<i>Indus</i>	<i>JDEdwards</i>	<i>RLINK and PI</i>
Equipment	PUMP1	Equipment	*UTC_ID or Segment_ID	Asset_ID	RLINK Equipment Alias
PM WO template	PUMPHot	PM	Model WO_ID	WO Service Type	RLINK PointGroup field
Measurement	TEMP1	MeasurePoint	Operating Factor	Meter	RLINK PointGroup field and PI Tag "ms-01"
Rule	TEMP1 condition	Measurement Condition refers to PUMPHot PM internally in Maximo	Trigger Condition	Meter Reading condition	RLINK PointGroup and PI AlarmTag "ms-01-pi-alm" "test1" condition

\*UTC = Uniquely Trackable Commodity

**Note: RLINK includes a bulk load utility to map RLINK and EAM items**



# *PI RLINK-EAM Demo ScreenCam*

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This demo shows the  
RLINK-Maximo interface

Go to the screen cam  
available separately as a  
media (“.avi”) file:

RLINKMaximoDemo.avi

# Maximo Screen <<Equipment → MeasurementPoint>>

**Measurement Point updated (via the RLINK interface),  
new reading (110 deg C) is above the Action Limit**

**Condition Monitoring**

File Edit View Actions Insert Navigate Setup Help

Measurement Point Linked Documents

Point: 1101A Discharge Temp Excessive

Equipment: PUMP1 Centrifugal pump (100gpm)

Location: REACTOR Reactor room

Point Name: TEMP1

**Details**

	Warning	Action
Upper Limits	90.000	100.000
Lower Limits	10.000	0.000
Unit of Measure	°C	

PM: PUMPHOT Service pump discharge overheat

WO Priority: 1

**Measurements**

Date/Time	Measurement
2/12/2003 2:13 PM	110.000

**History**

Work Order	Date	Memo

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# Maximo Screen <<Work Order>>

**WO Generated for PUMP1 for TEMP1 measurement condition using PUMPHOT as the template PM WO via RLINK**

The screenshot displays the Maximo Work Order screen. The sidebar on the left lists various modules, with 'Work Orders' highlighted. The main area contains the following sections:

- Work Order Details:** Includes fields for Work Order (1055), Location (REACTOR), Equipment (PUMP1), Reported By, Status (WAPPR), GL Account, Service pump discharge overhear, Reactor room, Centrifugal pump (100gpm), WO Priority (1), Loc/Eq Priority, Equipment Up? (Y), Reported By Date (2/12/200), Work Phone, Warranty Date (5/25/200), Status Date (2/12/200), Charge to Store? (N), and Work Type (EM).
- Job Details:** Includes fields for Job Plan, Safety Plan, PM (PUMPHOT), and Service Contract.
- Scheduling Information:** Includes fields for Start (Target, Scheduled, Actual) and Completion (2/12/2003 12:00 A), Estimated Duration (0:00), Remaining Duration, Crew, and Interruptible?.
- Responsibility:** Includes fields for Supervisor, Labor Group, Lead Craft/Person, and Modified (By: RLINKUSE, Date: 2/12/200).

# ICE Screen (RLINK PM TagSearch webpart)

**Drag 'n drop tags from the tag list in the RLINK PM TagSearch web part to a PI Trend web part**

The screenshot shows the RLINK PM TagSearch web part interface. The left panel displays a list of tags, including 15-BM-11, E1010, EX1-101, PM1-CE1-RX1, and PUMP1. Below this is a table for Equipment & Alarm Info, showing Group Description, Group Type, and Equipment Name. The right panel features a process diagram with various equipment and a table of values for different parameters. A red circle highlights the tag list, and a red arrow points from it to the trend graph.

**RLINK PM TagSearch web part based on equipment**



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# ICE Screen (RLINK PM Alarm Tracking webportal)

**Shows the alarm history for one or more equipments and the actual measurements generating the alarm. WO history and their statuses (updated in real-time via a SQL query) for PUMP1 are listed.**

The screenshot displays the 'PM Alarm Tracking' web portal in a Microsoft Internet Explorer browser. The browser address bar shows the URL: <http://schwenzerlaptop/Dashboard/dashboard.asp?DashboardID=http://schwenzerlaptop/DAVCatalog/ICE/Public/Dashboards/pm/>.

The main interface is divided into several sections:

- PM Alarm Tracking Header:** Includes a 'PM Tag Search' dropdown and a 'PM Alarm Tracking' dropdown.
- Search Filters:** 'Plant' is set to '1101 1101' and 'Unit' is '1 Entire plant'. A 'Go' button is present.
- Functional Location:** Set to 'PUMP1' with a 'Y' status indicator.
- Alarm Details Table:** A table with columns: Date Time (mm/dd/yyyy), Measurement Point, Functional Location, Notification, and Short Text. It lists four alarm events for PUMP1, all occurring on 01/08/2003 at various times, with measurement point '7'.
- Alarm Values Table:** A table with columns: Recorded value, Unit, Catalog, Code Group, and Valuation Code. It shows a recorded value of '55'.
- Tag Info.. Table:** A table with columns: Tag ID and Tag Alias. It lists various tags including '2423-WIYS004C.DOC', '2423-WIYS004C.noti', 'RLINK\_X', 'RLINK\_1\_priority', 'RLINK\_M2\_notify\_type', and '2423-WIYS004C.VL'.
- Maximo Work Orders Section:** A table with columns: Work Order, description, eqnum, and s. It lists three work orders for PUMP1: '1015 Service Pump (1000 ticks)', '1016 Service Pump (1000 ticks)', and '1017 Pump discharge temp'. Each work order has a status of 'APPR'.
- Queries Section:** A section for queries, currently empty.

Two yellow callout boxes highlight specific areas:

- Alarm history and measurements:** Points to the 'Alarm Details' and 'Alarm Values' tables.
- WO history and status:** Points to the 'Maximo Work Orders' table.

# ***RLINK Key features***

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- ✓ *Maintain a Xref amongst PI Points and EAM Equipment/Asset meters and WO templates*
- ✓ *Update meter readings based on PI triggers*
- ✓ *Auto-generate Work Orders based on PI triggers*
- ✓ *Monitor Work Order status and reset PI trigger when a WO is closed-out*
- ✓ *PI ICE RLINK web parts to display PI triggers and WO status along with operational history, and other supporting data for an equipment*

# System Requirements

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- *PI System 3.x*
- *RLINK*
  - *Windows 2000*
  - *SQL Server*
- *Maximo*
  - *Maximo 4.1.1 or 5.1*
  - *Maximo SDK for Business Components*
- *Indus PassPort*
  - *PassPort 9 or higher*
  - *Indus Connector for CBM*
- *JDEdwards OneWorld*
  - *B73.2, B73.3 (Xe) and higher*

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INTERNATIONAL  
PRODUCT PARTNER

  
**J D E D W A R D S**  
BUSINESS PARTNER

# Other Supporting PI Software

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## ➤ Calculation

- *PI PE (Performance Equations)*
- *PI ACE (Advanced Calculation Engine)*

## ➤ Equipment hierarchy, Multi-site tag aliasing, Rules storage

- *PI ModuleDB (Module Database)*

## ➤ Browser based display, graphics, reports and analysis

- *PI ICE (Interactive Configurable Environment)*

## ➤ Equipment inspection, operator rounds, PDAs

- *PI ML (Manual Logger and Handheld Terminal interface)*

## ➤ GUI

- *PI PB (ProcessBook)*



# ***MIMOSA - Machinery Information Management Open System Alliance***

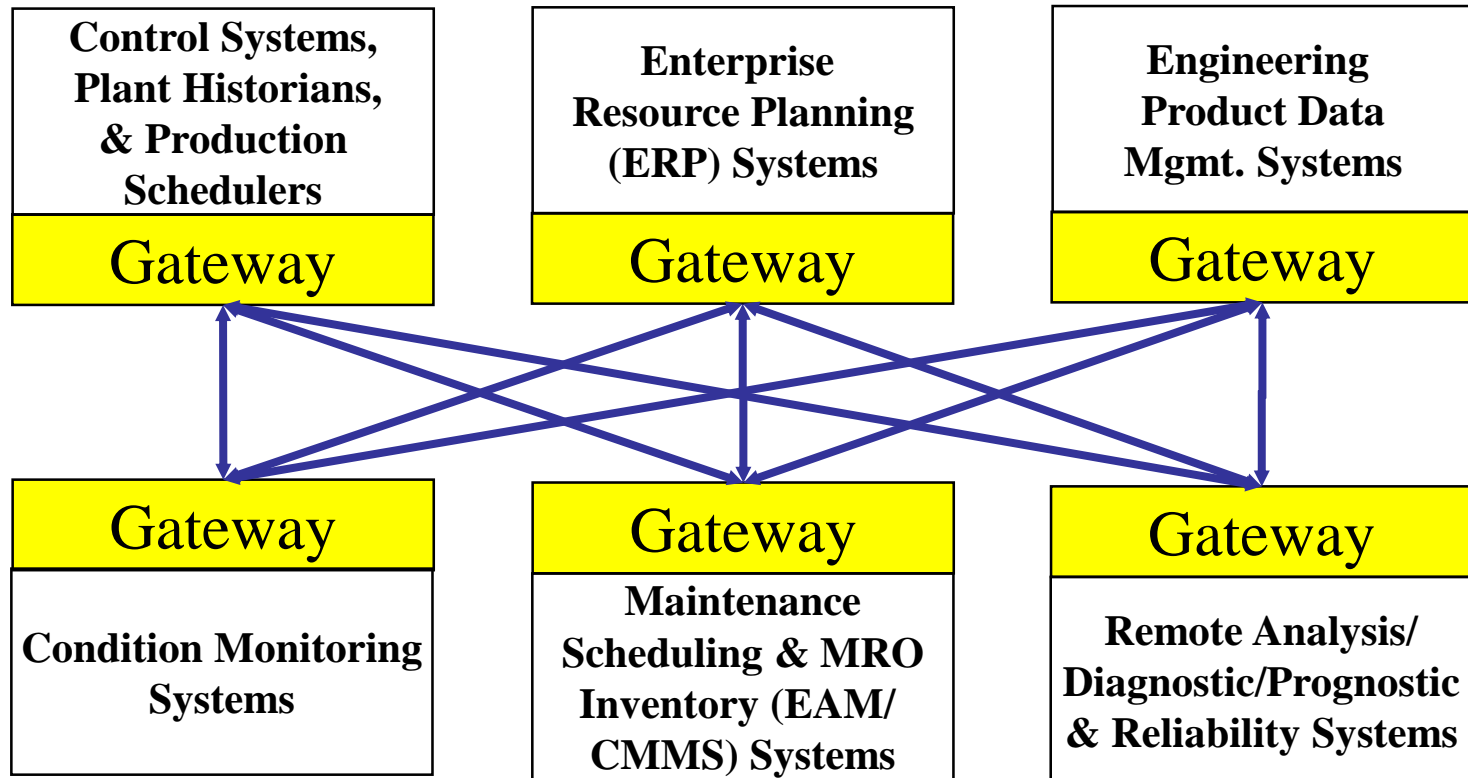
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- *Published XML Schema for information exchange between Real-time data repository (PI) and EAM systems.*
- *When an EAM is MIMOSA compliant (such as Indus PassPort), RLINK uses XML based data exchange*
- *OSIsoft is a MIMOSA member and on the Technical Committee*
- *More info at [www.mimosa.org/osa-eai](http://www.mimosa.org/osa-eai)*

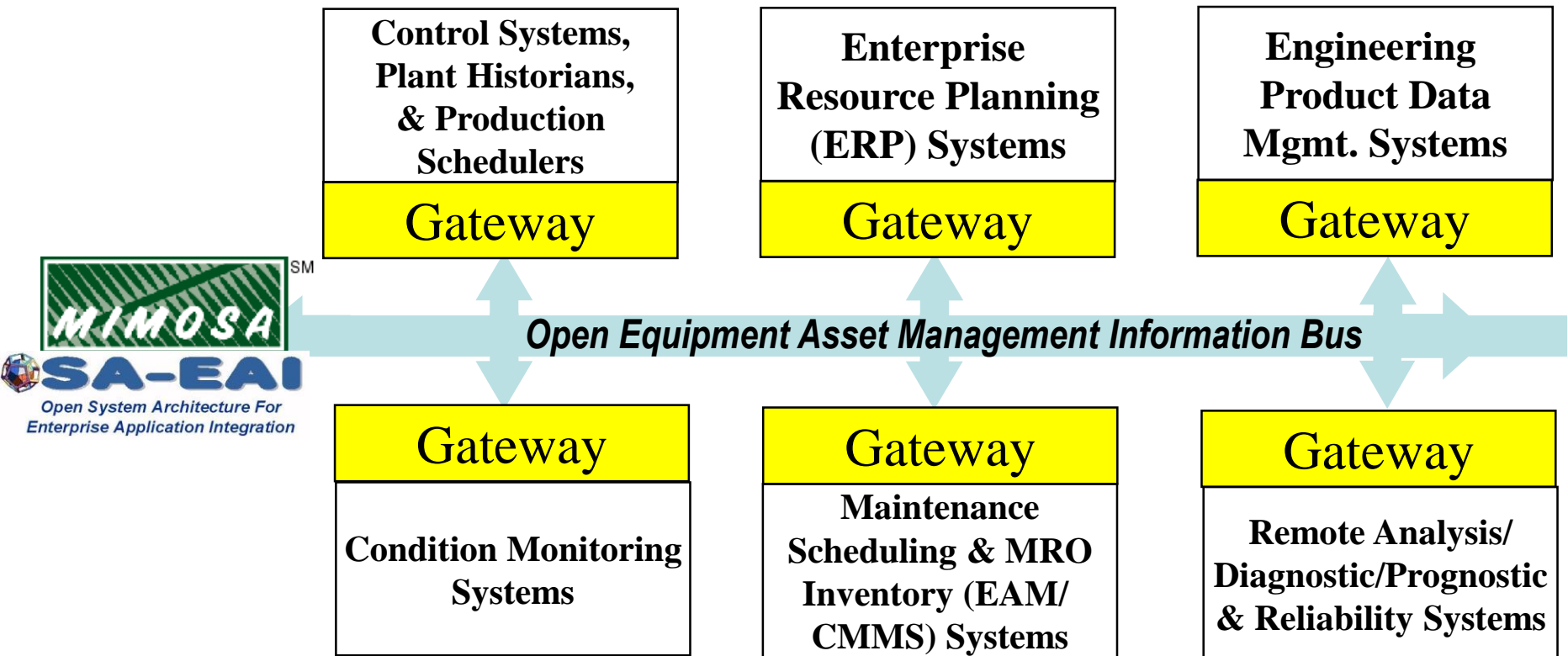
## ***MIMOSA's Open System Architecture For Enterprise Application Integration (OSA-EAI)***



# Equipment Asset Management - Problem



# Equipment Asset Management - Solution



# ***Equipment Asset Management – Solution***

## ***MIMOSA OSA-EAI Interface (XML Schemas)***

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### **MIMOSA OSA-EAI Interface (XML Schemas)**

- **Packaged Technology Interfaces for Loosely-Coupled Application Integration**
- **Specifications packaged for Interoperability of:**
  - **Asset Registries**
  - **Work Management Systems**
  - **Diagnostic / Health Assessment Systems**
  - **Process Data Historian Systems**
  - **Dynamic Vibration / Sound Data Historian Systems**
  - **Sample Test Data Historian Systems**
  - **Binary / Thermography Data Historian Systems**
  - **Reliability Database Systems**
- **Designed to Exchange Data Which Is Normally Stored in a Database**

# MIMOSA – XML document for WO request

8009-WO-InGood.xml - XML Notepad	
File Edit View Insert Tools Help	
Structure	Values
create_sg_rfw_req	
header	
session_id	TestIndus 8009
include_non_active_rows	0
include_all_site0_rows	0
include_row_info_columns	0
include_lc_info_columns	0
lcinfo	
attr_name	String
value	String
param	
lcinfo	
attr_name	String
value	String
sg_req_for_work	
segment_site	969956879
segment_id	0000000045
gmt_requested	2003-02-11T09:30:47-05:00
req_by_agent_site	0
req_by_agent_id	032003
ordering_seq	0
wm_type_db_site	0
wm_type_db_id	0
wm_type_code	01
task_db_site	0
task_db_id	0
task_type_code	0
to_agent_site	0
to_agent_id	032003
priority_type_code	01
sol_pack_db_site	0
sol_pack_db_id	0
sol_pack_id	00000049
rec_segment_site	0
rec_segment_id	0
rec_gmt_recomm	2003-02-25T09:30:47-05:00
rec_by_agent_site	0
rec_by_agent_id	032033
work_req_db_site	0
work_req_db_id	12345
work_req_id	456456
abbrev	Indus Test abbrev title
name	Indus Test name title
gmt_last_updated	2001-09-11T09:30:47-05:00



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# ***RLINK installations using condition-based monitoring (CBM) techniques***

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## ***Partial list of RLINK installations***

- ***Dow Corning, Bryan Sower, UC2002 presentation focusing on a OEE (Overall Equipment Effectiveness) initiative at Dow Corning***
- ***PSE&G, Angela Rothweiler et. al., UC2002 presentation on the use of PI and RLINK for CBM (condition based monitoring) implementation for electrical transmission & distribution assets***

**NOTE: Above installations use SAP-PM as their work management system**

# ReCap

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- ✓ What is RLINK?
- ✓ RLINK – EAM data flow
- ✓ Example – Pump1 discharge temperature
- ✓ RLINK configuration specifics
- ✓ MIMOSA (Machinery Information Management Open System Alliance) related information
- ✓ Q&A

# Questions?

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Q & A



# *Thank you*

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