

VOYAGE2007



Improving Reliability and Saving Money with Condition Based Maintenance

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A New Generation of Energy

DLL SOLUTIONS, INC.
THE PROCESS INFORMATION SPECIALISTS

About Conectiv Energy

Introduction

- Conectiv selected DLL Solutions, an OSIsoft ISV and SI Partner, to implement this project
 - ▶ Project services include configuring the system for roughly
 - 630 pieces of equipment
 - 450 Measurement position counters
 - ▶ Implement Condition Monitor
 - New DLL Solutions product which abstracts the configuration process, and also calculates the data which drives RLink

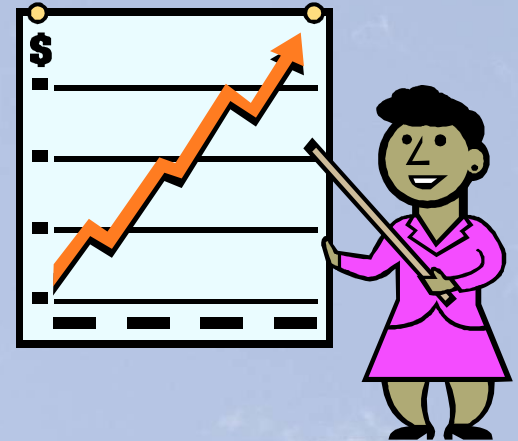
Introduction

Sound Check !



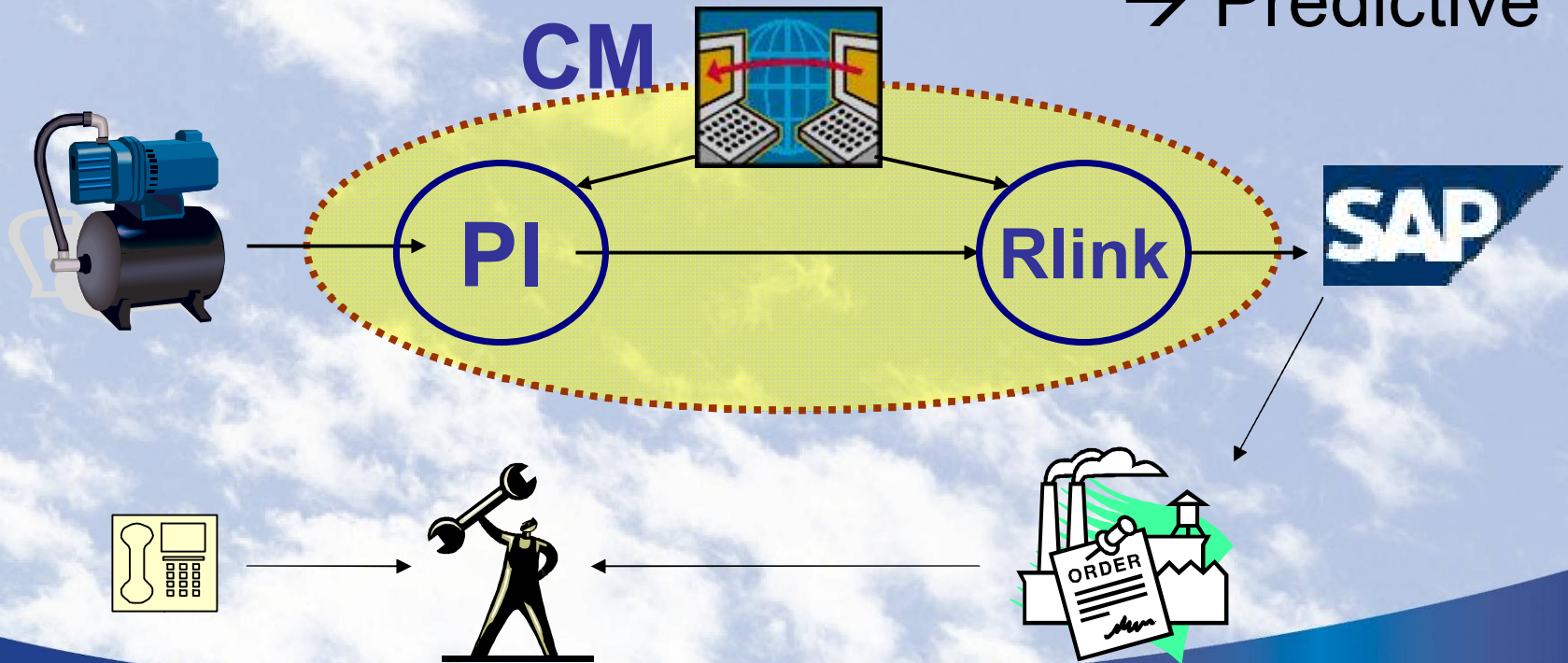
The Business Challenge

- Improving Reliability
- Increasing Availability
- Improving Revenue Stream
- Reducing Costs
- So → What can we control?
 - ▶ Engineering / Asset Design
 - ▶ Operations
 - ▶ Maintenance



The Solution

- Maintenance Approach- evolution from
→ Corrective
→ Preventative
→ Predictive



The Solution

- **Scope – Implementation at two plants**
- **Leveraging existing investments**
 - ▶ **OSIsoft PI System and RLINK**
 - ▶ **SAP/PM**
- **New application from DLL Solutions – CM**
Condition Monitor

The Solution

- **Why this approach?**
 - ▶ **Very user friendly**
 - ▶ **Easy configuration of rules**
 - ▶ **Leverages existing investments**
 - ▶ **Low cost**

DEMONSTRATION

The screenshot displays the 'Condition Monitor' application window. The interface includes a menu bar (File, Edit, Management, Search, Detail Windows, View, Help) and a toolbar with icons for Refresh, Search, View, Enable, Reset, Snoop, Annotate, Validate, and ERP Transactions. Below the toolbar is another set of icons for New, Edit Item, Rename, Copy, Move, and Delete.

The left sidebar contains a 'Navigation' panel with a 'Hierarchy' dropdown and an 'Enter name filter' text box. A tree view shows a list of items: CCNE (selected), EM00, EM03, EM04, EM05, HR00, HR01, HR02, HR03, HR04, HR05, HR06, HR07, HR08, HR41, HR42, HR43, and HR57.

The main content area displays the details for the selected 'CCNE' item. It shows 'ERP Plant' with a sub-entry 'CONE' labeled 'Conectiv Energy'. The title 'Conectiv Energy Test' is prominently displayed. Below this, the 'Condition' is shown as a green checkmark icon, followed by the text 'Normal'. At the bottom, it indicates the data is 'as of 08-Jul-2007 08:17:07'.

Benefits

- **Qualitative benefits:**

- ▶ **Reduce unnecessary maintenance**
 - **Lower material and labor costs**
- ▶ **More effective maintenance program**
 - **Resources focused on most important items**
 - **Reduced F.O.R. = increased revenue**

- **Quantitative benefits:**

- ▶ **IRR = 28.9%**
- ▶ **Payback in 3rd Year**

What's Next

- **Develop additional rules**
- **Extend scope to other facilities**
- **Extend functionality**

Cast Change...

George Kilgbee

Key Feature Requirements

- Normalized Inputs

- ▶ Must perform data quality and validity tests
- ▶ Must be capable of inferring condition, i.e. When the 1 minute average of the 'Motor Amps' tag is greater than 10, consider the motor "Running"
- ▶ Provide ability to minimize false positives
- ▶ Reusable within system

- Usability

- ▶ Allow less-technical persons to create reliable counters for SAP

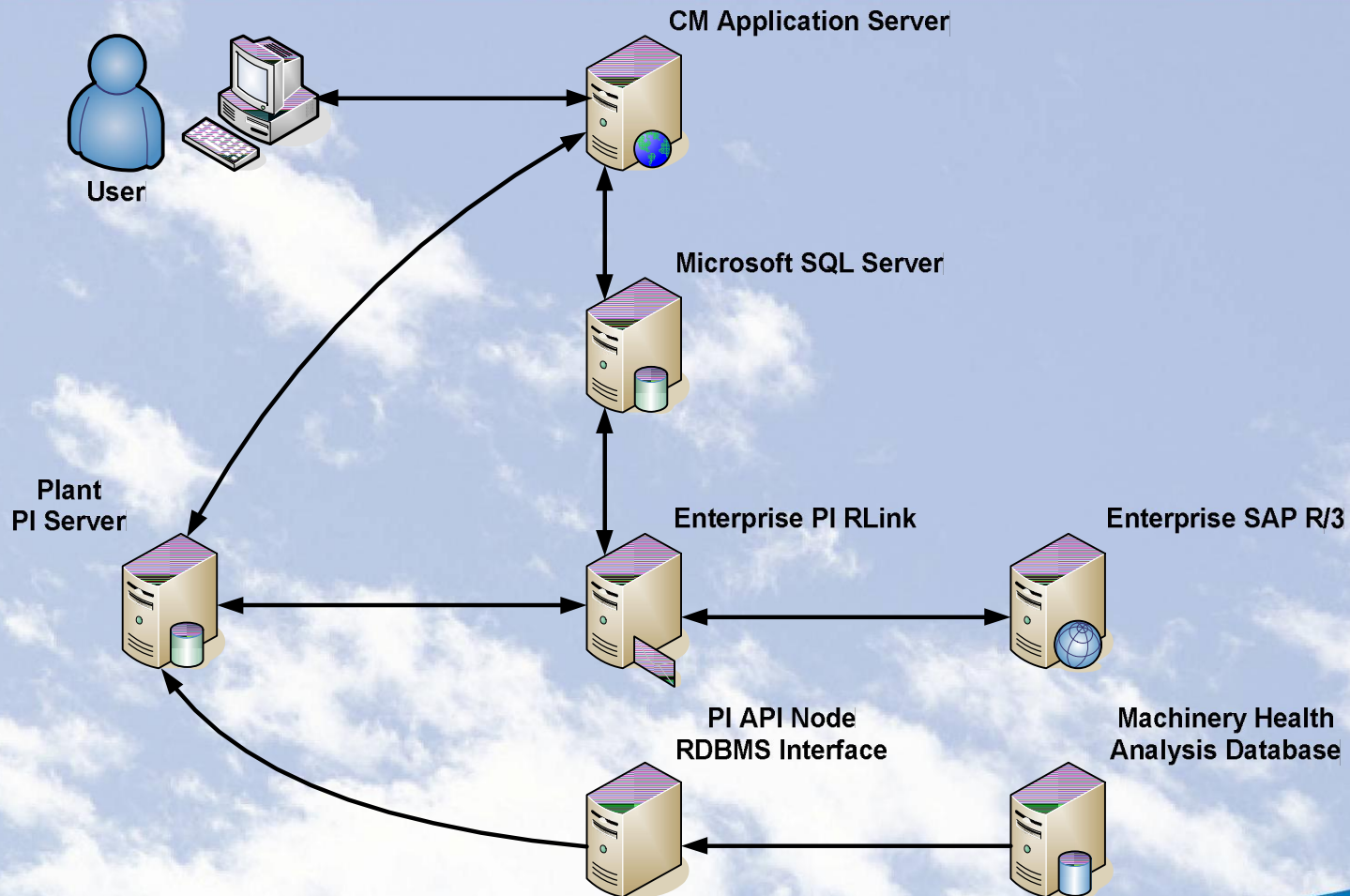
- Maintainability

- ▶ Should be adaptable to PI Notifications, AF 2.0 and beyond

Implementation Goals

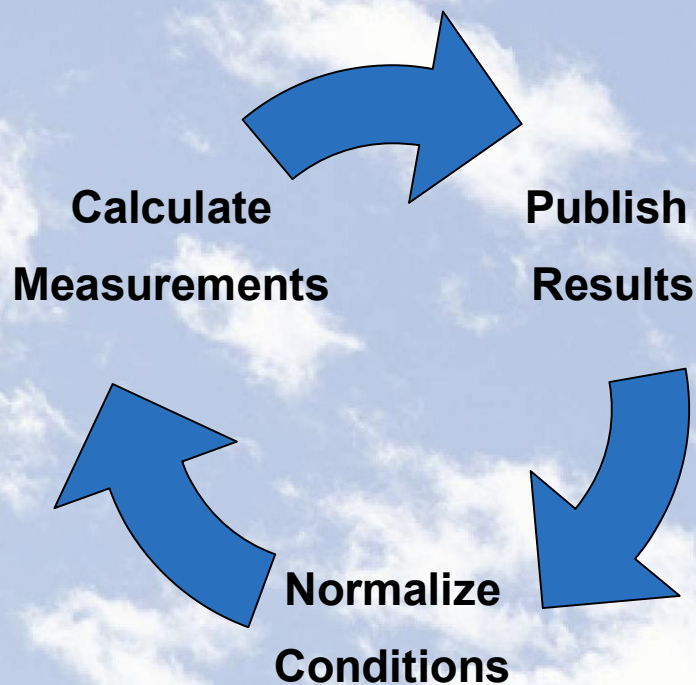
- Leverage existing investment in PI and RLink
 - ▶ PI contains all of the data
 - ▶ RLink does all of the SAP communication
- Fewer steps to a more consistent outcome
 - ▶ CM consolidates the various configuration steps required of the underlying systems and orchestrates everything
 - ▶ cmServer automatically handles data quality and staleness issues
- Simplification leads to broader use
 - ▶ Reducing the amount of effort and information required to make new (and reliable) counters will keep users coming back
- More data driven maintenance reduces costs

The Big Picture



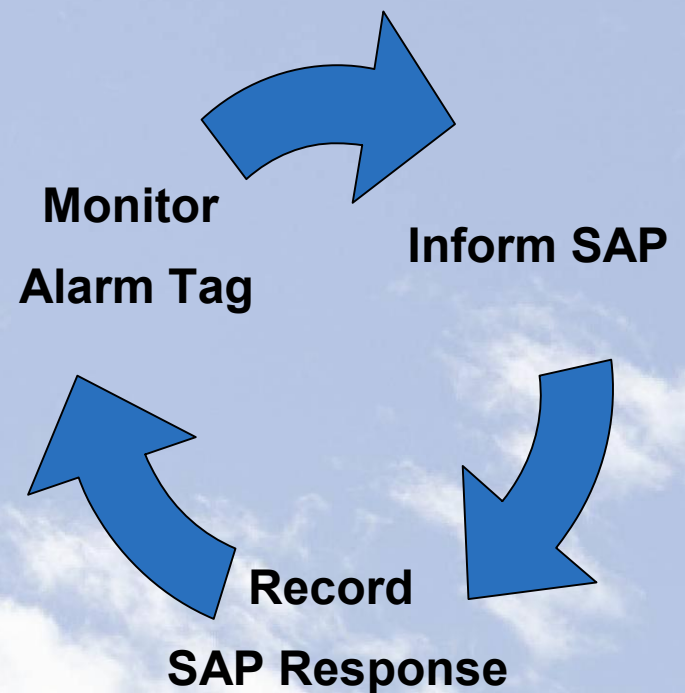
The Circle of Life

Condition Monitor Server



PI Data

RLink



Configuration Items

- Source
 - ▶ Encapsulates the definition of equipment specific counters or conditions
 - Condition example: When the 'Motor Amps' one minute average is greater than 10, report the motor as "Running"
 - Counter example: Make a "TotalFlow" counter available for "Pump X" which is based on the "Total" of the 'Pump Flow' tag multiplied by 24.
- Measurement
 - ▶ References 1 Condition Source and/or 1 Counter Source
 - ▶ When the Condition is TRUE, calculate the Counter
 - E.g. When the pump is "Running" calculate the "TotalFlow"
- Rule
 - ▶ The tag level interfacing to RLink and SAP
 - ▶ E.g. When my measurements total to 100, send a Measurement Document to SAP

Normalized Sources

- Each source normalizes the data from a known “raw” PI tag based on configured metrics, into either a Condition or a Counter
- Examples:
 - ▶ Running
 - ▶ LoadedOperation
 - ▶ AverageDP
 - ▶ TotalFlow

Create Source

Source Information

Equipment Group: EM00 (Edge Moor Common) ▼

Equipment: 111222 (Auxiliary Lube Oil) ▶ ▼

Name: Running

Source Type: Condition ▼

Data Conditioning

Test Type: EqualTo ▼

Lower Boundary: ☐ Auto ▼

Upper Boundary: ☐ Select upper bound ▼

PI Tag Information

Raw Tag: cdm158 🔍 ▼

Multiplier: 1.0000

Value Type: Interpolated ▼

Stale After: 01:00:00

Minimum Quality: 80.0000

Data Window: 00:01:00

Buttons: Validate, Create, Cancel

Quick Rules

- Fill in a few blanks to define a new counter for SAP
 - ▶ Measurement Position
 - ▶ Source Condition and/or Counter
 - ▶ Calculation Mode and Multiplier
 - ▶ Transaction increments

Quick Rule

Rule Information

Equipment Group:

Equipment:

System/Subsystem: ERP Counter Code:

Description:

Measurement Position:

Measurement Information

Inputs

Condition Source: Counter Source:

Output Processing

Counter Calculation Mode: Counter Multiplier:

Action Information

Send Measurement Documents

Every units -OR- At Least Every

☒ Incremental Value? ☐ Keep Document Number in PI?

☒ Send Email?

Condition Monitor User Interface

- Automatic software updates
- Gets all required configuration from web services
- Active Directory-based security

The screenshot displays the Condition Monitor application interface. On the left, a navigation pane shows a hierarchy of equipment, including EM00 (Edge Moor Common), EM03 (Edge Moor Unit 3), 100149 (3A MILL), 100149CN (3A Mill Condition Time), 100149CN.PressurizedHours (3A Mill Condition Time), 100149CP (3A Mill Coal Processed), 100149CT (3A Mill Oil Analysis), EM04 (Edge Moor Unit 4), EM05 (Edge Moor Unit 5), HR00 (Hay Road Common), and various Hay Road units (HR01 to HR08, HR41 to HR43, HR57, HR85). The main pane shows the selected equipment, 100149CP, with a status of 'Normal' and a counter of '59.6 out of 100'. A 'Summary of Rule' section explains the condition logic: 'When the sum of the measurement counters reaches 100, or at least every 4.0 days: ++ Create a measurement document for the incremental amount since the last document'. An 'ERP Transactions' table at the bottom lists recent measurements.

MeasurementPosition	DocumentKey	PIReadingTimestamp	RecordedValue	Diff	CreateNotification
EM0301DP100149CP	2562	05-Jul-07 22:54:36	100.3286	<input checked="" type="checkbox"/>	<input type="checkbox"/>
EM0301DP100149CP	2508	05-Jul-07 09:22:34	488.5513	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Project Challenges

- Identifying all the desired equipment-specific items to be configured
 - ▶ Measuring Points
 - ▶ Conditions, Counters, Rules
- Matching raw PI tags to sources
- Finalizing approach to maintenance and counters in SAP



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***Thank
You***

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VALUE NOW, VALUE OVER TIME