Turning **insight** into **action**.

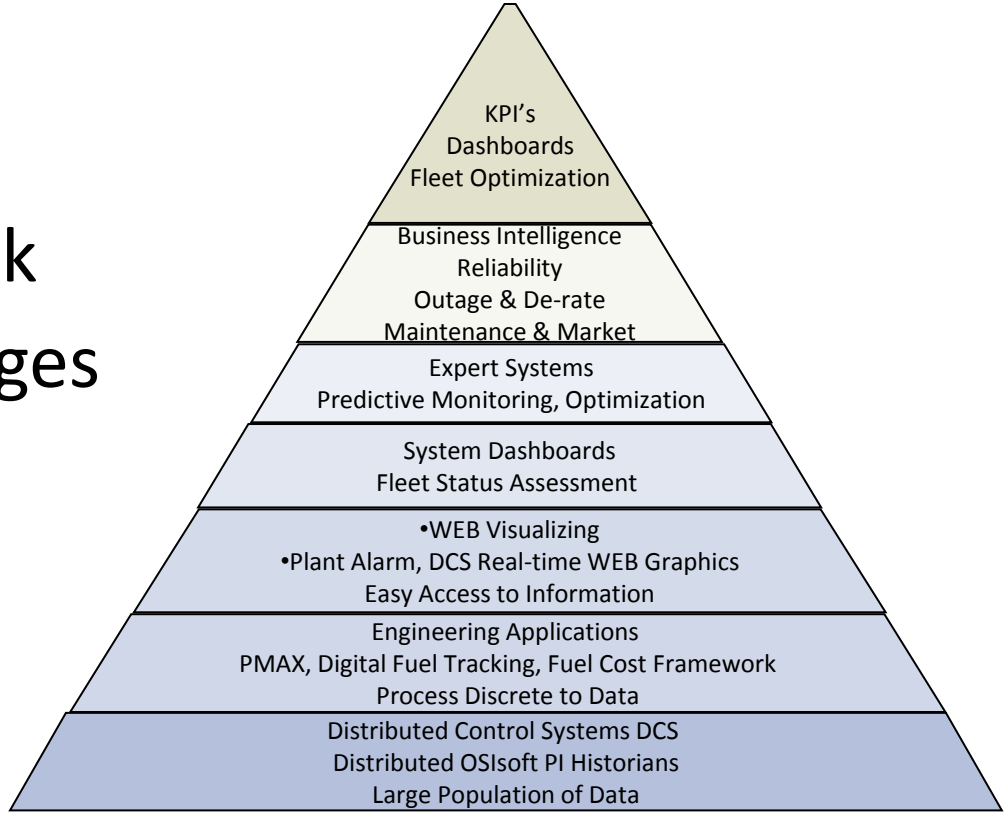
OSIsoft. USERS CONFERENCE 2011

Managing Infrastructure Using the PI System

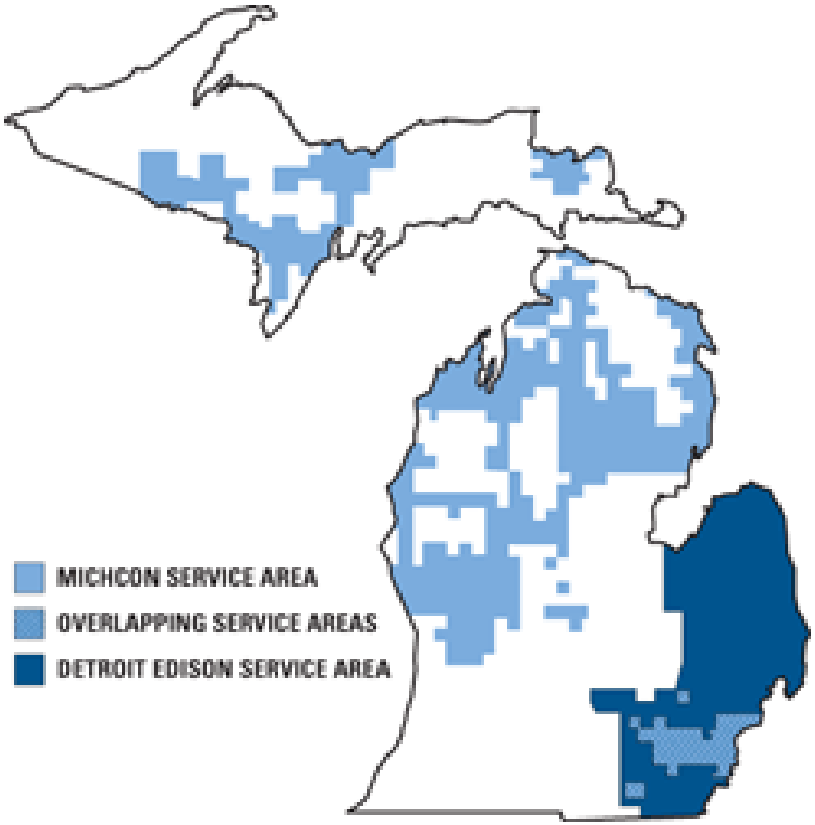
Presented by **Sumanth K. Makunur, Priyanka Gupta**
DTE Energy

Agenda

- About DTE Energy
- Technology Framework
- Infrastructure Challenges
- Solutions
- Benefits
- Questions?



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 renewables

Detroit Edison

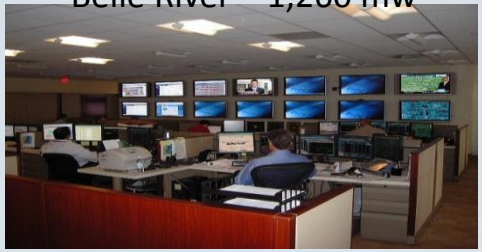
- Michigan's largest electric utility with 2.1 million customers
- Over 11,080 MW of power generation, primarily coal fired

Plants & Performance Center

Monroe – 3,135 mw

Belle River – 1,260 mw

Trenton Channel - 730 mw



Performance Center – 11,588 mw

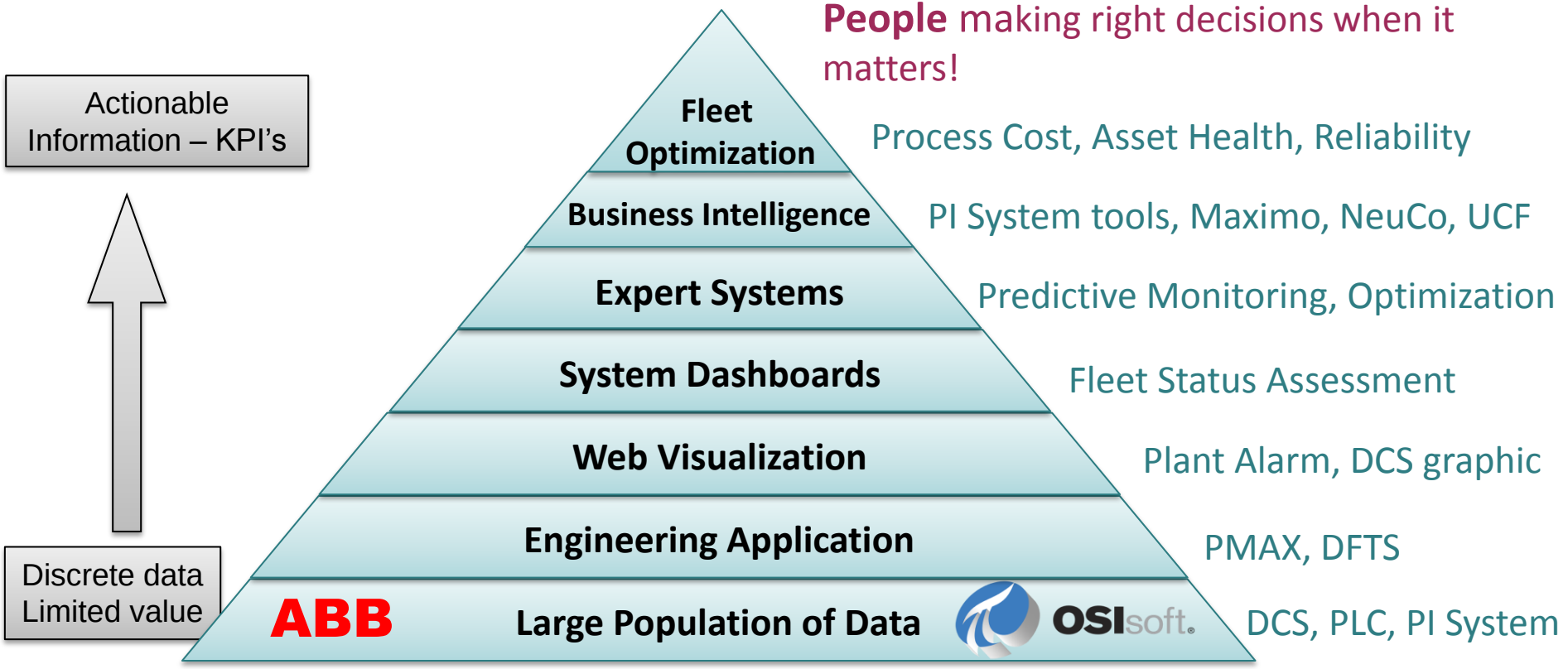
River Rouge - 527 mw

Greenwood – 785 mw

Expanding Renewable Portfolio

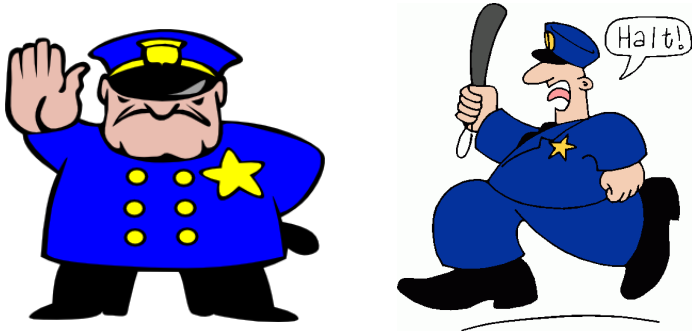
Generating Unit	Capacity Unit	Capacity Plant
Belle River 1	625	
Conners Creek		**235**
Fermi 2	**1110**	**1110**
Greenwood 1	**785**	**785**
Harbor Beach 1	**103**	**103**
Monroe 1	770	
Monroe 2	795	
Monroe 3	795	
Monroe 4	775	
Monroe		**3135**
River Rouge 2	247	
River Rouge 3	280	
River Rouge		**527**
St Clair 1	150	
St Clair 2	162	
St Clair 3	168	
St Clair 4	158	
St Clair 6	321	
St Clair 7	450	
St Clair		**1409**
Trenton Channel 7A	124	
Trenton Channel 8	122	
Trenton Channel 9	520	
Trenton Channel		**766**
Peakers	**1224**	**1224**
Totals:	**10554**	**10554**

Control and Technology Framework



Business Challenge

Who is watching the watchman?



Management of Infrastructure that supports key business functions.

Infrastructure Components

- DCS servers and workstations 116
- PI System HA servers 22
- PI Interface servers – PI API, PI OPC DA, etc. 57

195

Infrastructure Components

- Thermal Performance Calculation Engine – PMAX 7
- Digital Fuel Tracking Systems 3
- Alarm Management - ProcessGuard 24
- Notification - PI Notifications/E-notification 3
- Mobile Operator rounds – IntelaTrac 3
- Continuous Emissions Monitoring Systems 64
- Electronic Protection Tagging system 7
- DCS Engineering Tool 24
- Backup 9
- Misc 36

180

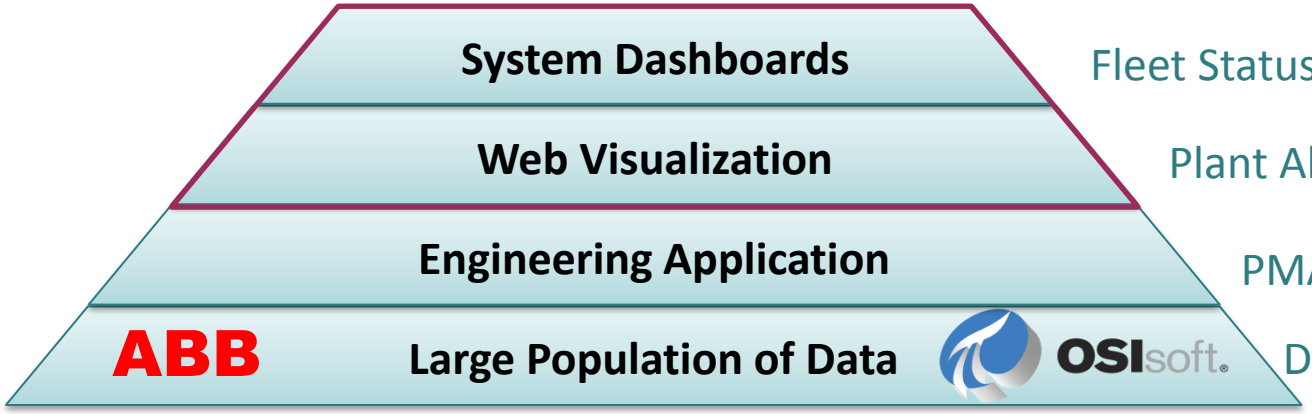
PMAX, DFTS

DCS, PLC, PI System

Infrastructure Components

- Web Servers 4
- Web Visualizing Portal servers 12
- PI WebParts 1

17



Fleet Status Assessment

Plant Alarm, DCS graphic

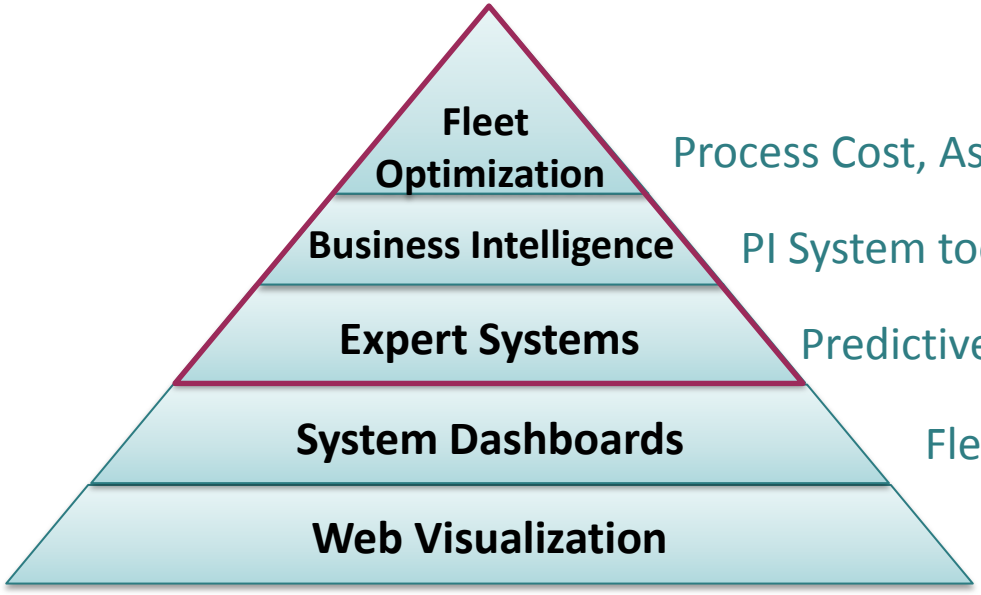
PMAX, DFTS

DCS, PLC, PI System

Infrastructure Components

- Predictive Monitoring System – SmartSignal 4
- Neural Network Optimization System - Neuco 5

9



Process Cost, Asset Health, Reliability

PI System tools, Maximo, NeuCo, UCF

Predictive Monitoring, Optimization

Fleet Status Assessment

Plant Alarm, DCS graphic

Infrastructure Summary

- Total Hardware **632**
- Critical – 24x7 availability **314**

Process Control and Technology Group composition

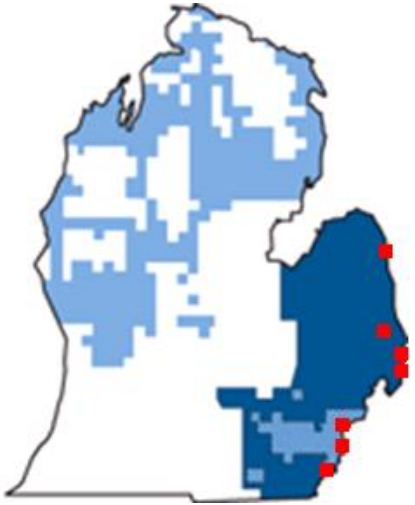
- 20 people
- Group divided into Engineering & Reliability
- Engineers are Subject Matter Experts (SME) for systems
- Site Engineer/Technician is 1st line of support
- SME is 2nd line of support
- Vendors are 3rd line of support

What is Infrastructure Management?

- Reliability
- Preventive Maintenance
- Asset Management
- Accurate Asset Replacement Cycle
- Regulatory Compliance
- Alignment with Business Needs
- Reduce O&M Cost
- Improve Productivity

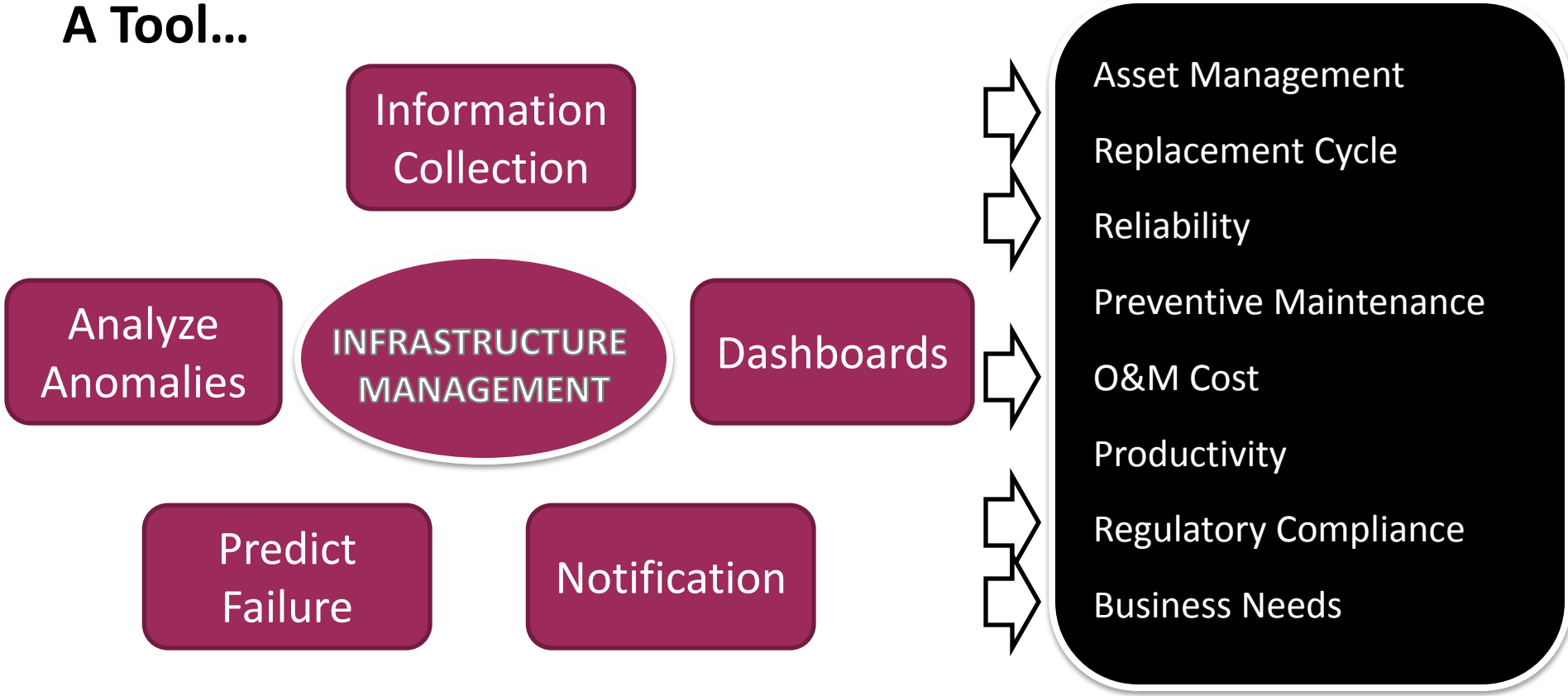
Challenges to Infrastructure Management

- Large Number of servers/ workstations
- Multitude of applications
- Equipment spread across various sites
- NERC-CIP Compliance
- Environmental Compliance
- Few resources to maintain infrastructure
- Budget Constraints



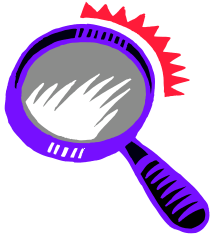
Solutions for Infrastructure Management

A Tool…



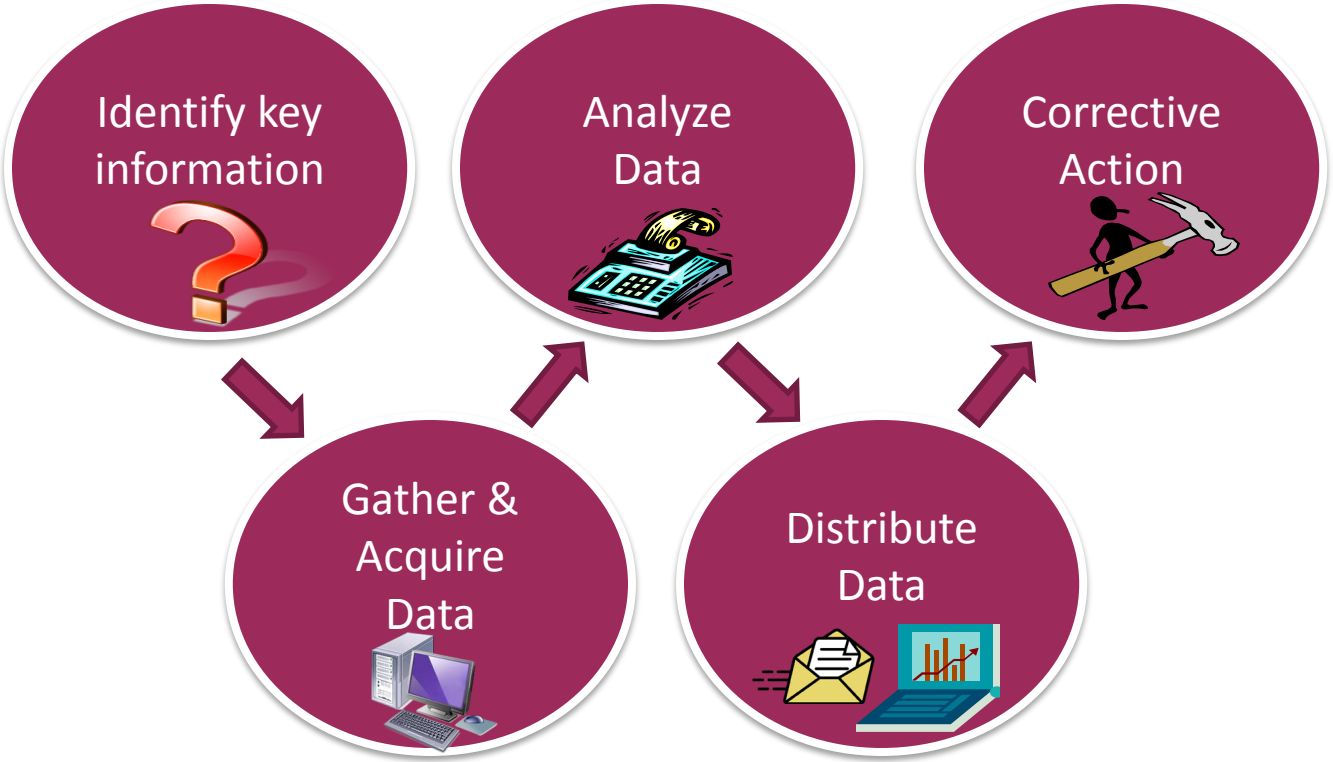
Enterprise Agreement

- Managed PI Services
- PI MCN Health Monitor tools available
- OSIsoft's NOC monitors our PI System architecture
- Our effort monitors our entire architecture
- These two complement each other to achieve our business objectives



…..Let's see some details

Process Overview



PI Server

PI Interfaces

PI ACE

PI WebParts

PI ProcessBook

PI Notifications

Step 1 – Identify Key Information

- Inventory
- Business function of system
- Modes of system failure
- Advance warning factors

Step 1 – Identify Key Information

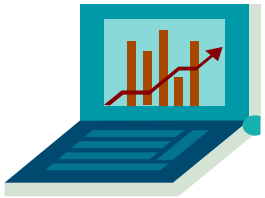
Operating System

- Processor usage
- Hard-disk space
- Memory usage
- Network usage

Hardware

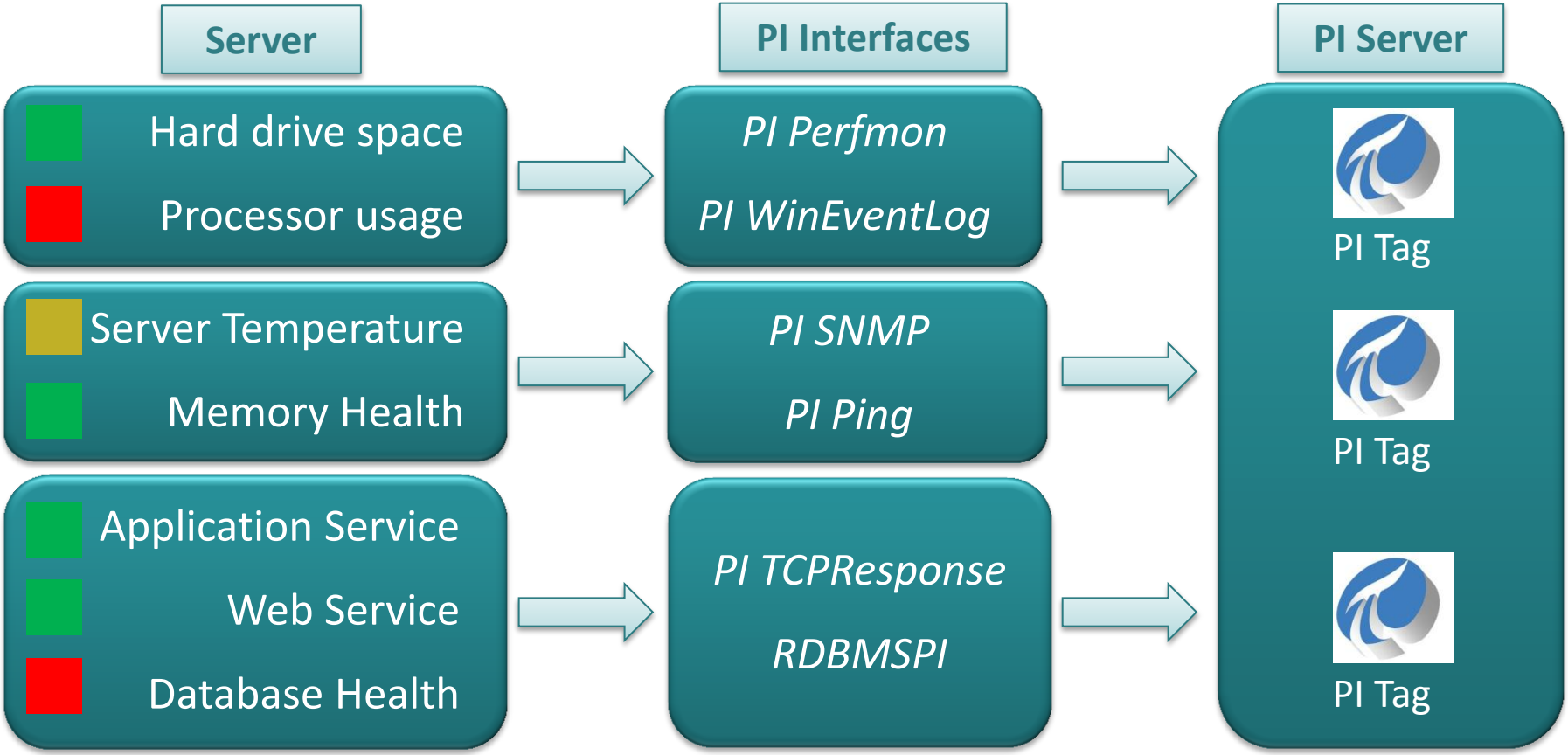
- Physical disk status
- Temperature
- Fan Status
- Power Supply

Application

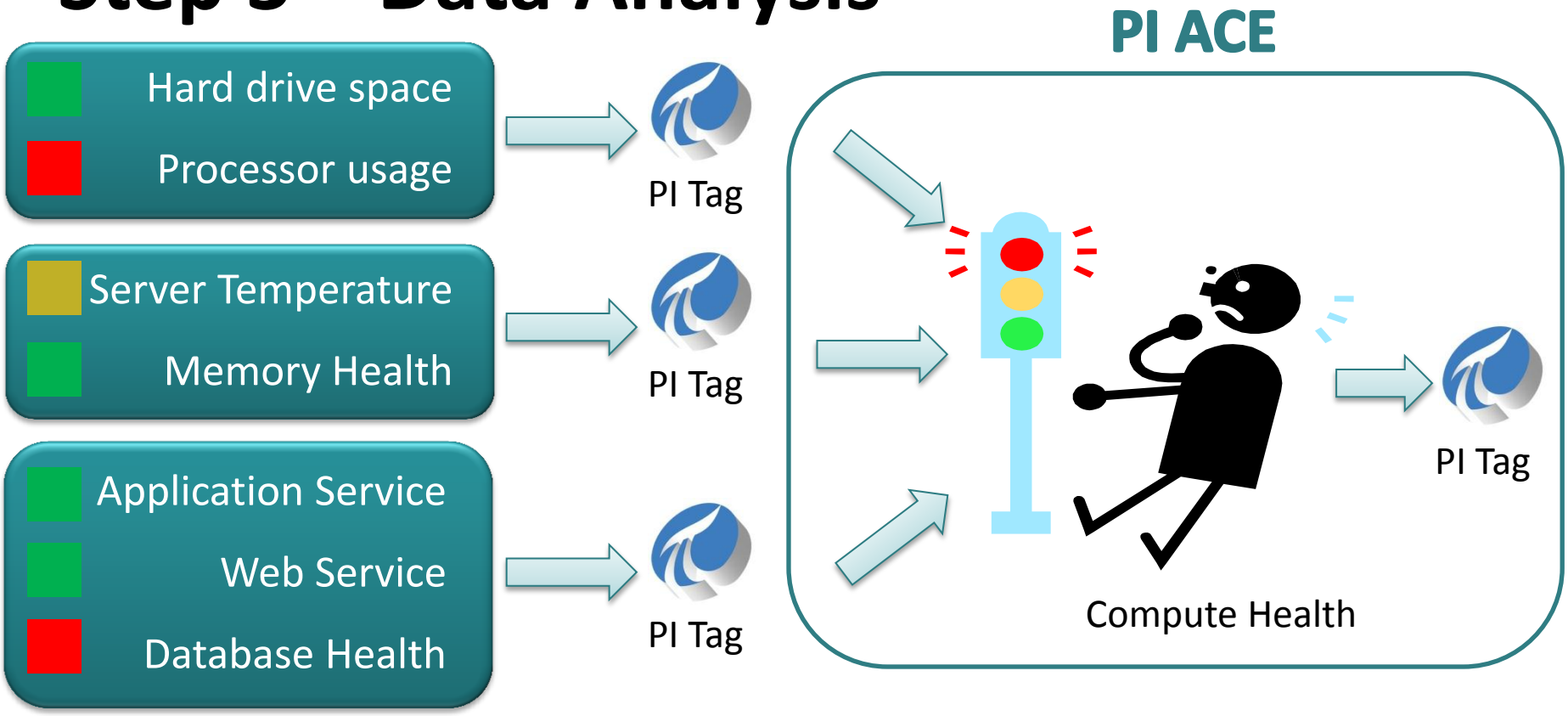


- Application Service
- Web page
- Database
- Backup

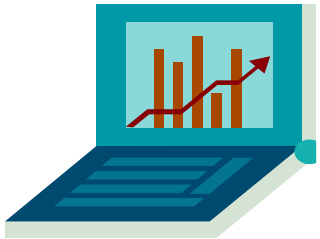
Step 2 – Data Acquisition

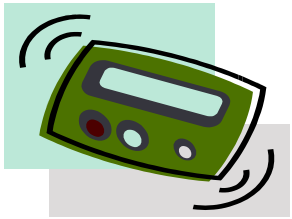


Step 3 – Data Analysis



Step 4 & 5 – Distribute, Notify, and Rectify





Distribute Data

Notification

Acknowledgement

Escalation

Facilitating Corrective Action

Steps Summary

1. Key Information Identification 
2. Data Acquisition 
3. Data Analysis 
4. Notification 
5. Corrective Action 

Example 1 – Application Server Failure

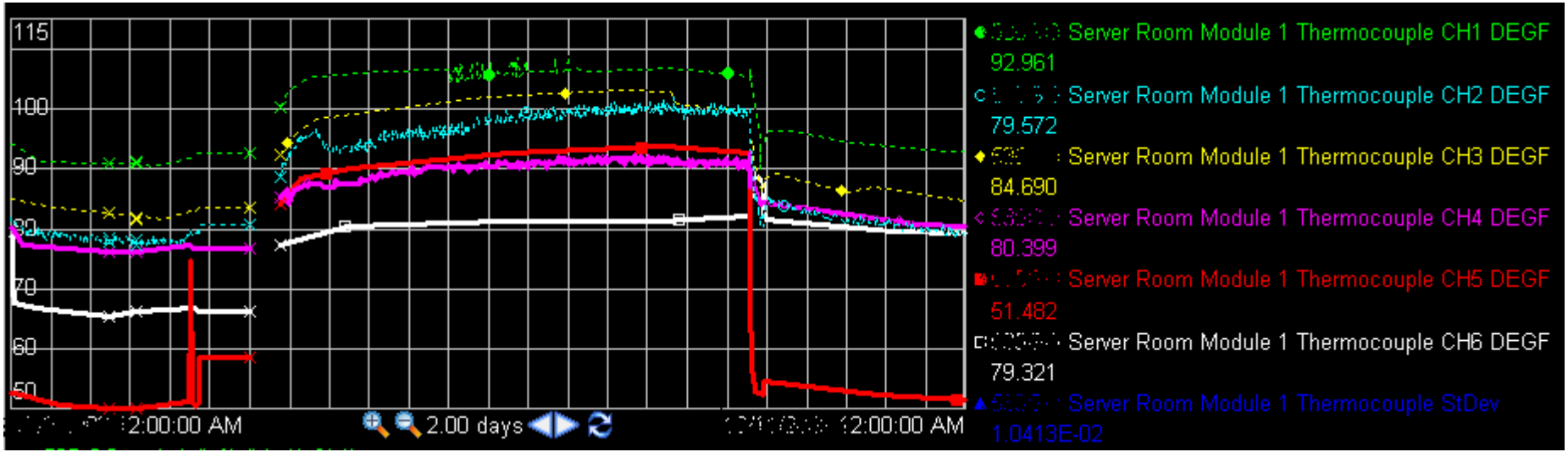
- Emission Monitoring System had 21 Failures since July 2009
  - 15 Disk Failure
  - 3 Pending Disk Failure
  - 3 Servers Offline
  - Numerous Low Disk Space Warnings

- PI History – Installed at the same time
- PI History – Operating under high temperatures
- Server reside in Corrosive Environment
- Currently replacing Hard Disks

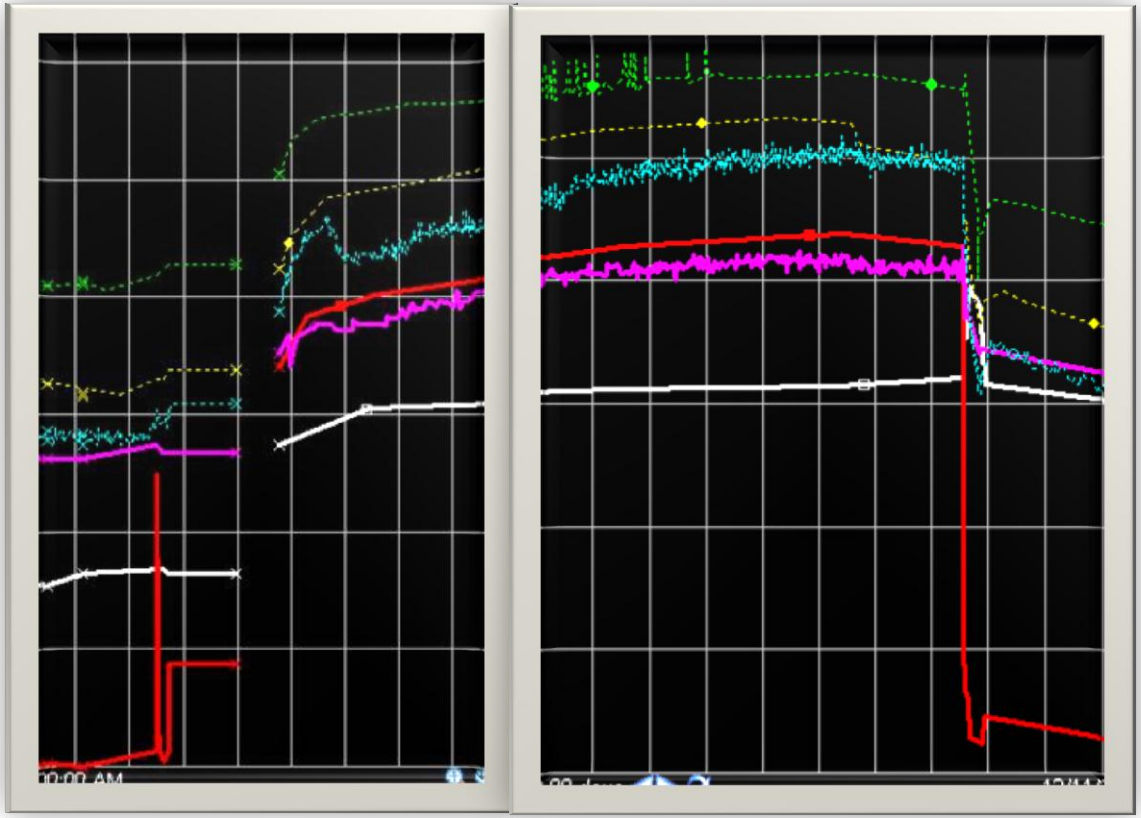
Example 2 - Server Room Temperature

- Room temperature monitored using *PI OPC DA Interface*, *PI Performance Equations* and *PI Notifications*
- Power Outage, Chiller Out of Service – 15 °F jump
- No Physical access to building
- Action - Shutdown Dev/Redundant servers
- Monitor temperature from home

Example 2 - Server Room Temperature



Example 2 – Server Room Temperature



Compliance

- Monitoring all Critical Assets within Electronic Security Perimeter (ESP)
- Logging Access of Assets in PI Server
- Notifying and Escalating all potential non-compliance instances
- Generate Reports and Display Information

Benefits

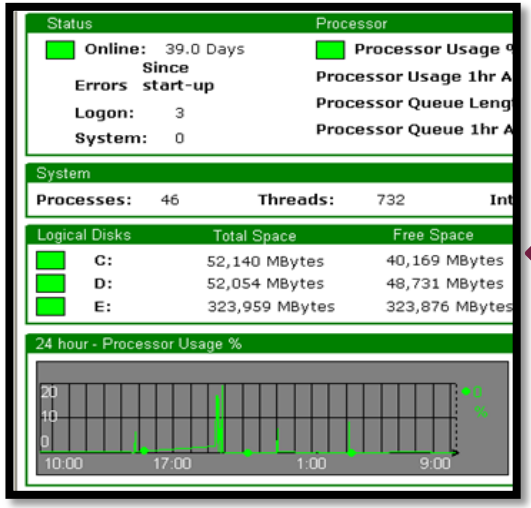
- Remote Monitoring and Notification
- Advanced Notification provides increase lead time
- Increased Hardware Availability
- YTD Infrastructure Reliability 99.8%

Future Plans

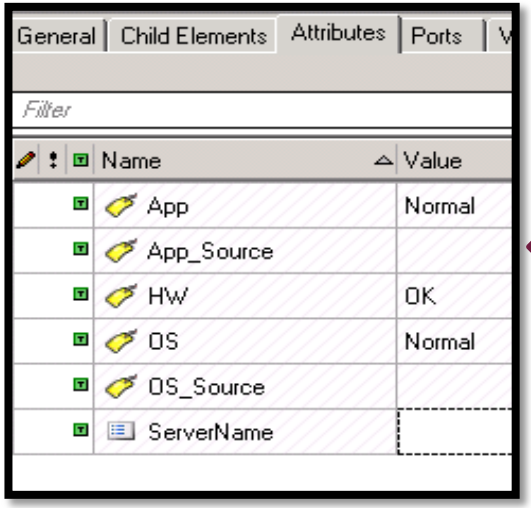
- Utilize PI AF – PI Module Database Synchronization
- Monitor Network
- Expand this to monitor remaining systems, and possibly to other BU's
- Improve Monitoring System

Future Plans

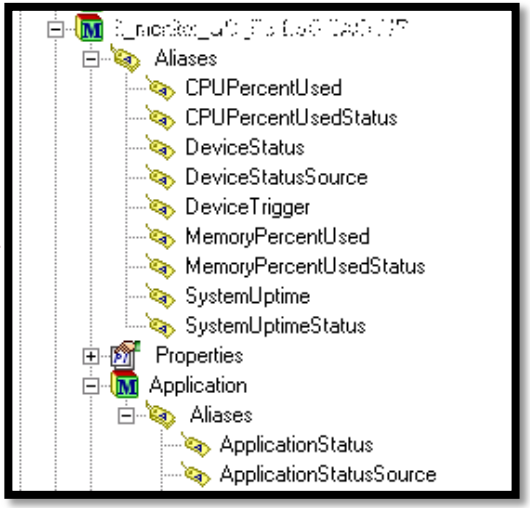
Display



Notification



PI Module Database (PI ACE)



Questions

- Contact

Sumanth Makunur
makunurs@dteenergy.com

Priyanka Gupta
guptap@dteenergy.com

Thank you

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