OSIsoft®

REGIONAL SEMINARS 2012

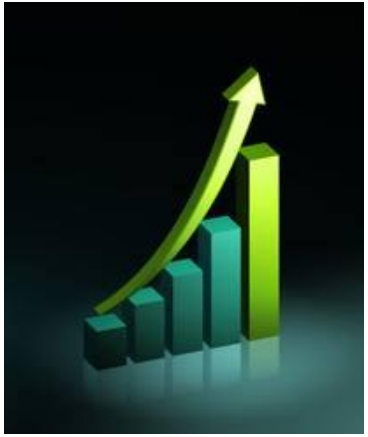
The Power of Data

Creating Value with the PI System in Oil & Gas

"From Tactical to Strategic"

Presented by - Craig Harclerode, O&G Business Development Executive
(Houston, Texas USA)

Outline



- Global Issues and Response Themes
- Strategic PI System Value Trends
  1. Value Chain integration
  2. Infrastructure for MES/Solutions
  3. Asset Reliability and Performance Management
  4. Cyber Security
  5. Business Integration and Intelligence
- Concluding Remarks

OSIsoft O&G/PetChem BD Team

Kelly Sherrill

Upstream BD

- 23 years Exp.
- 2 yr @ OSIsoft
- 21 yrs Amoco/BP
- Enterprise Apps.
- Field of Future
- Solutions Specialist
- BBA New Mexico
- **Houston**

Heathcliff Howland

Midstream BD

- 20 years Exp.
- 8 yrs @ OSIsoft
- Motive Power Focus
- BS ME Maritime Academy
- USCG 3rd Assistant Engineer's license
- **San Leandro**

Craig Harclerode

Downstream BD

- 33 years Exp.
- 6 yrs @ OSIsoft
- 15 yrs Amoco Oil
- 6 yrs Honeywell IAC
- 6 yrs Aspentech
- BS ChE Texas A&M
- MBA Rice
- **Houston**

Sandra Peterson

Chem/PetChem BD

- 27 years Exp
- 1 yr @ OSIsoft
- 7 yrs Honeywell
- 5 yrs Aspentech
- 7 yrs Consulting
- BS ChE Auburn
- MBA Texas
- **Houston**

The Standard in O&G

% Global Capacity Using The PI System

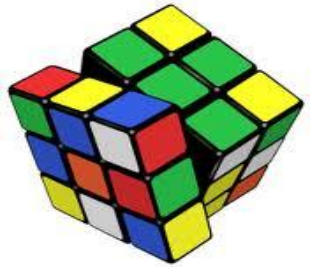
Production 55%	Pipelines 35%	LNG 25%	Manfgn 60%	Biofuels 15%

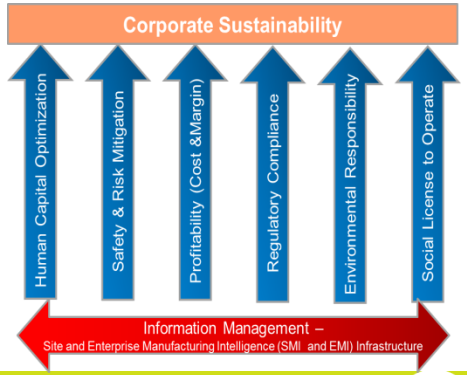
Globally Common Issues in O&G

1. Asset Safety, Reliability and Performance
2. Remote operational awareness and support
3. Knowledge/Availability of Expertise and Collaboration
4. Value Chain Integration & Real-Time Situational awareness
5. Cyber Security

PI System - From Tactical to Strategic

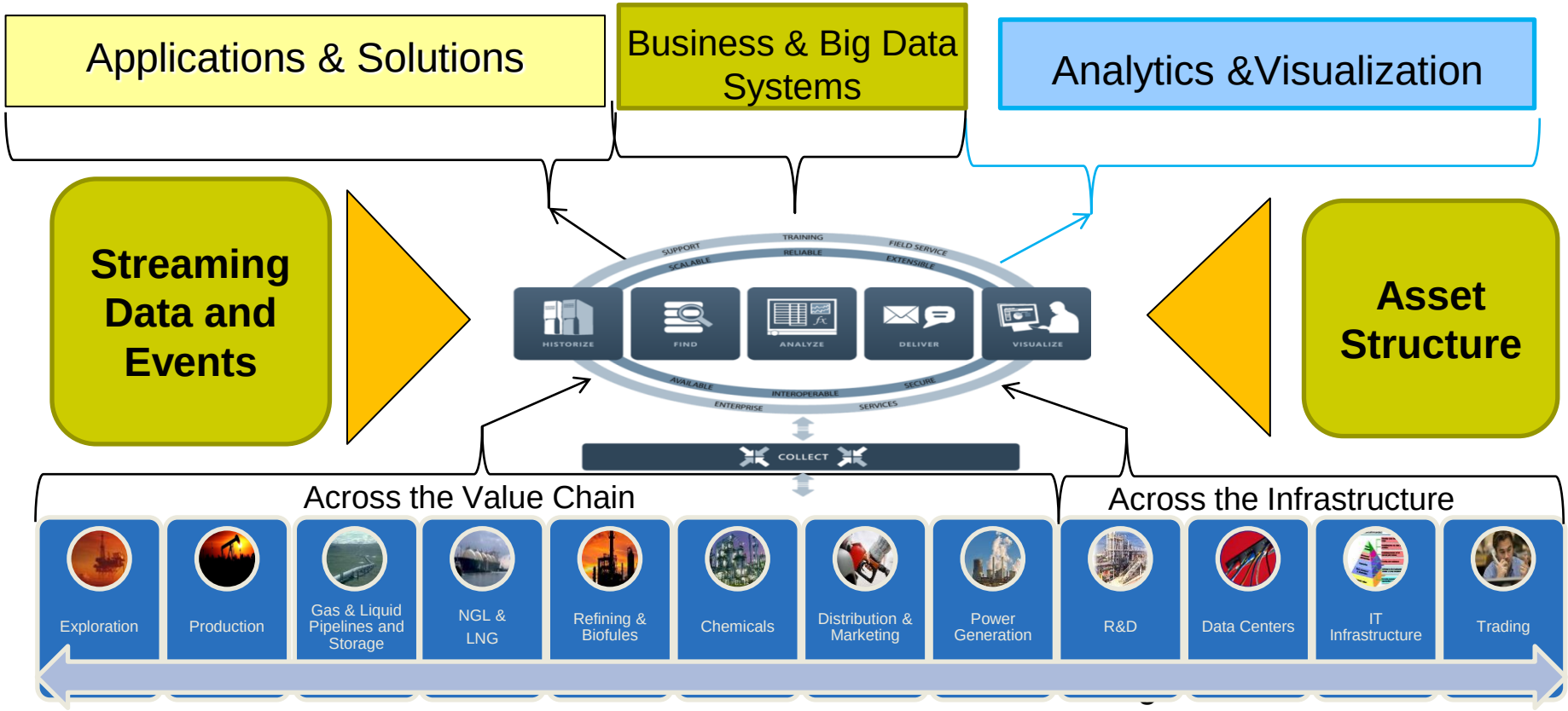
1. Manufacturing & Business Integration and Intelligence
2. Simplification of IT, Applications & Solutions Landscape
3. Remote Monitoring and collaboration – internal and external
4. A key element of Cyber Security strategy
5. Core element in sustainability vision – ability to endure



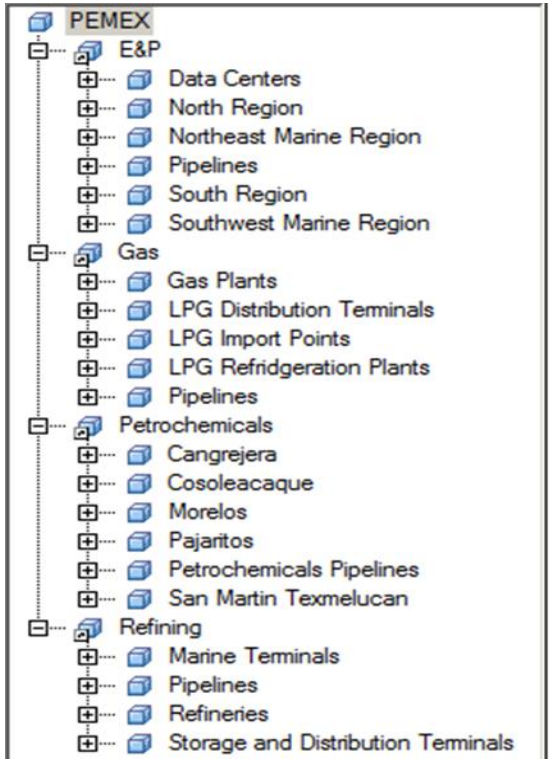


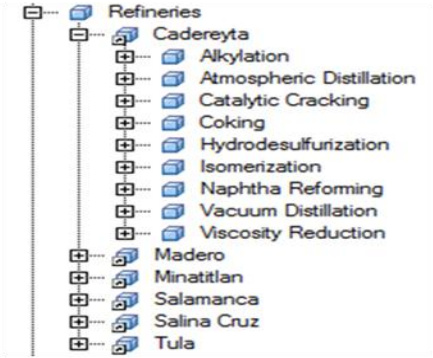
The Real-Time Integrated O&G Value Chain

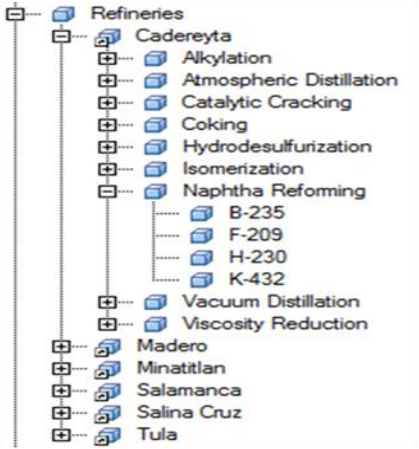
Strategic Integration of the Enterprise Operations

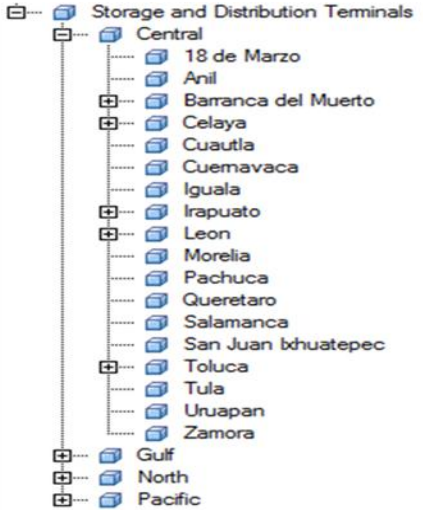


Framework for Enterprise Data & Information









Pertamina Downstream Value Chain

Assets

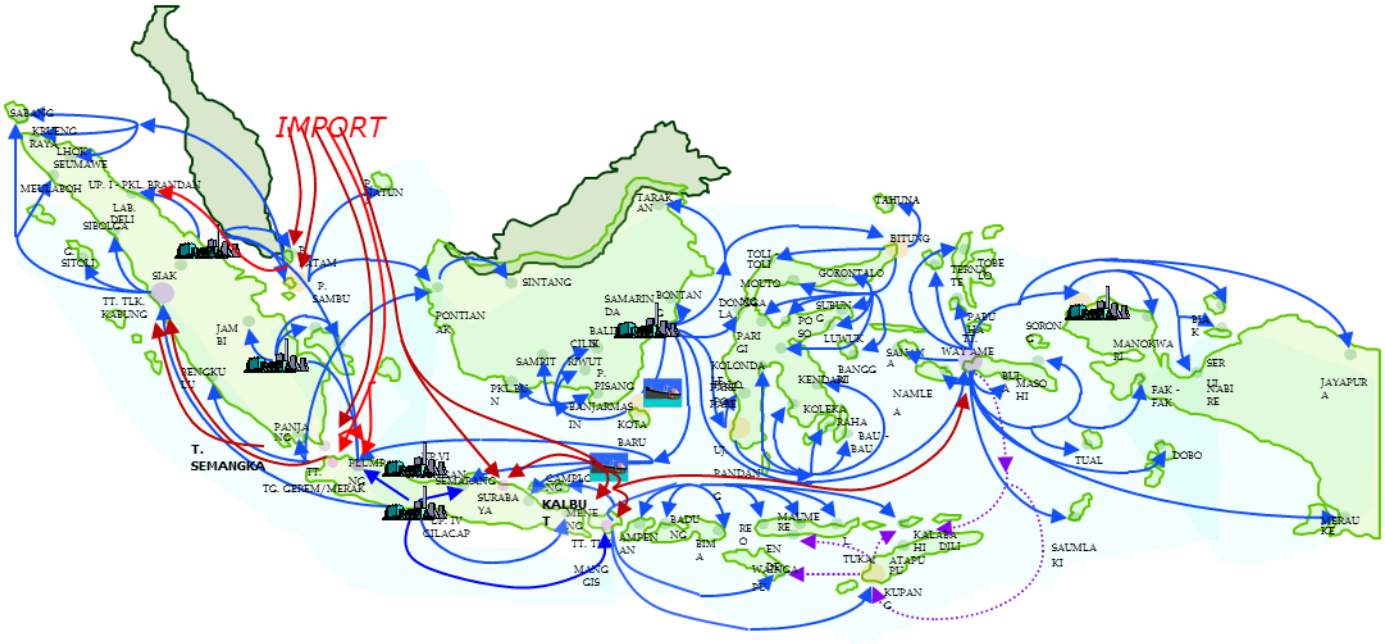
6 Refineries :
1,034 Million bbl/day

120 + Depots

98 Vessels

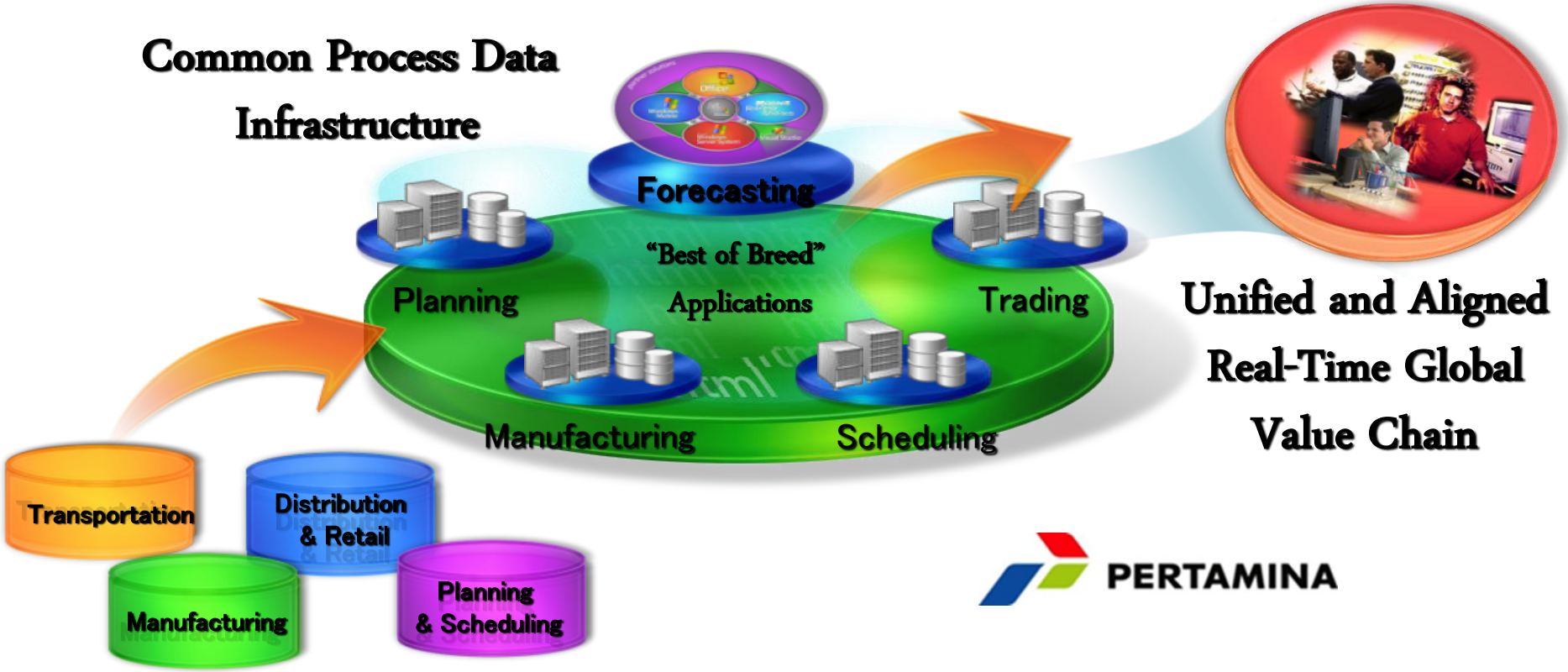
3,400 Fuel Stations

Sales Volume :
1,200 Million bbl/day
(92 % Market Share)

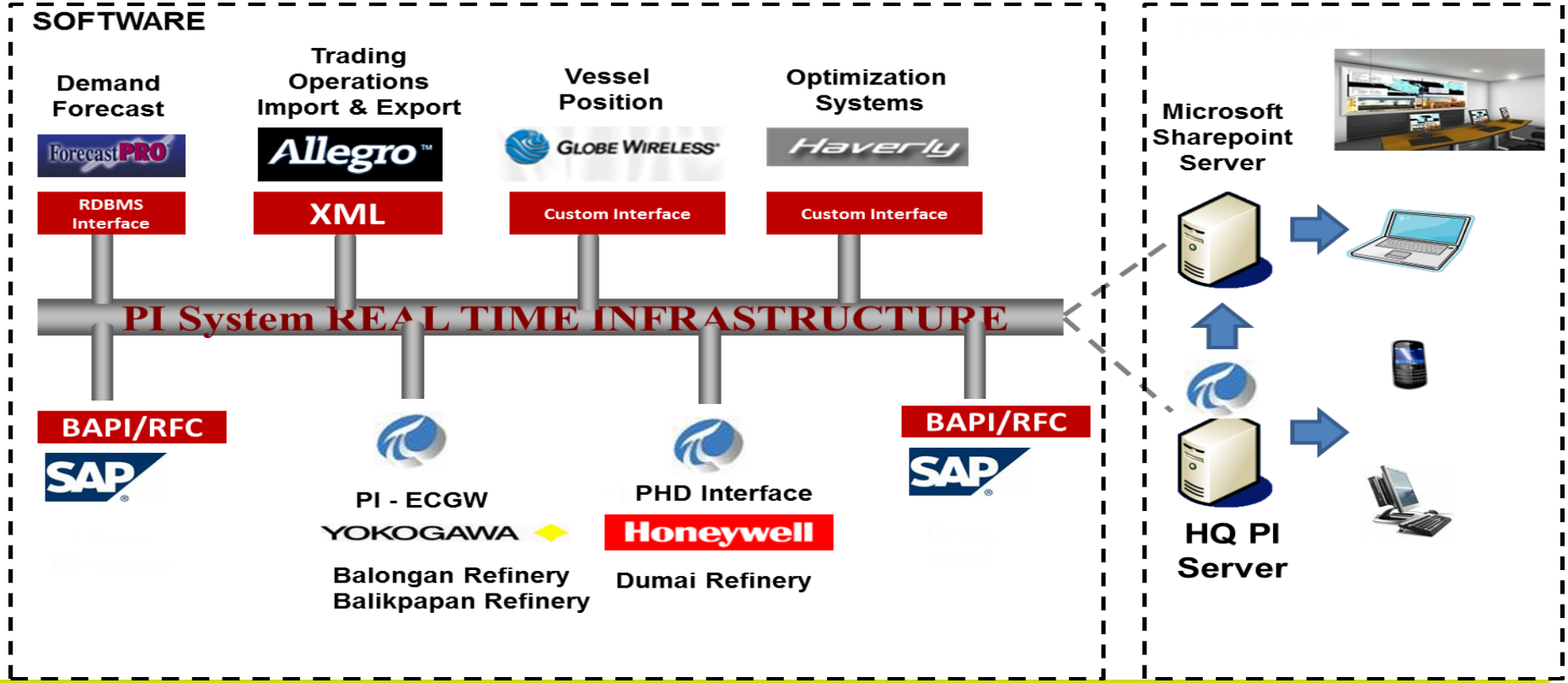


One of the most complex Downstream Supply Chains in the world

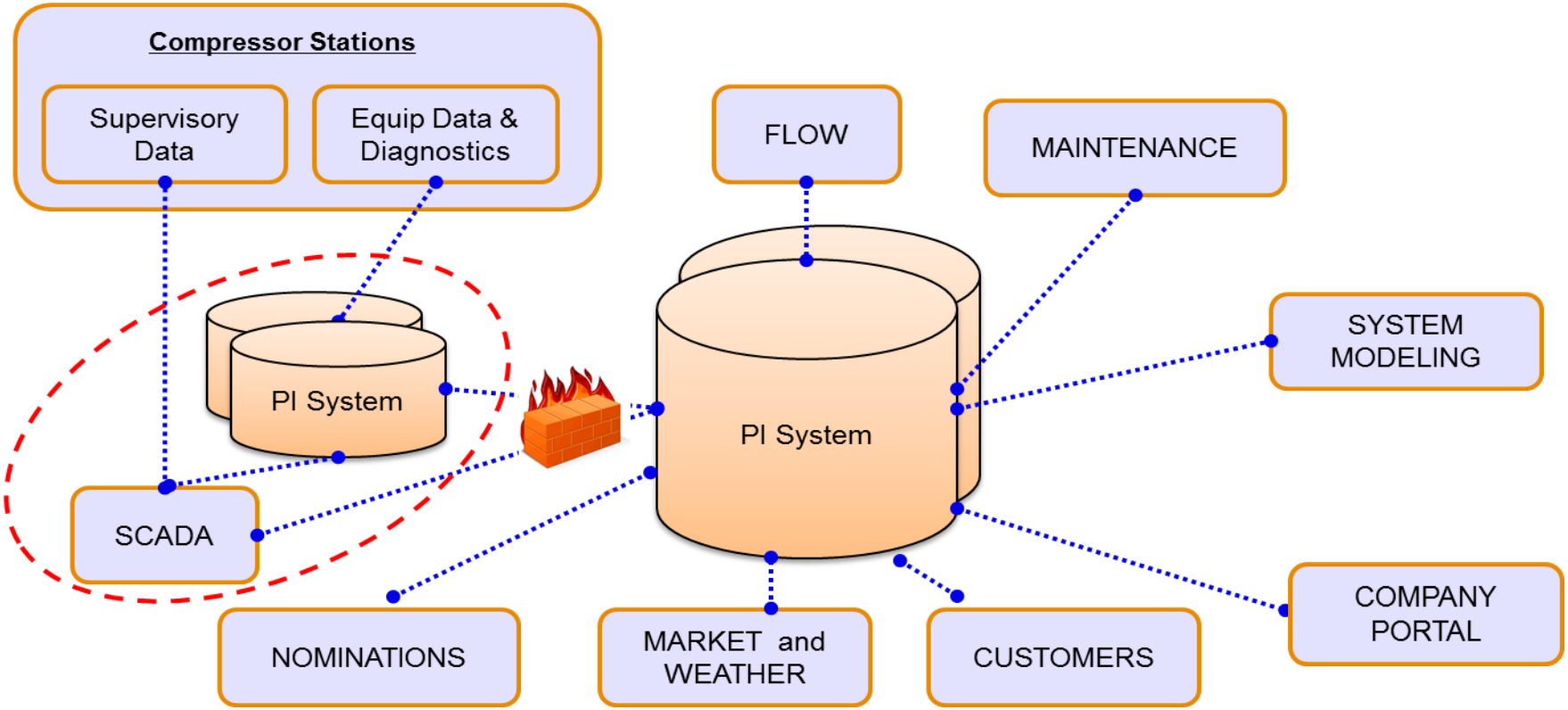
An Enterprise Real-Time Infrastructure is Key to Value Chain Situational Awareness and Optimization



Downstream Value Chain Integration Architecture



Strategic Use of the PI System in Pipelines



NiSource Overview

NiSource Gas Transmission & Storage

15,500
Pipeline Miles

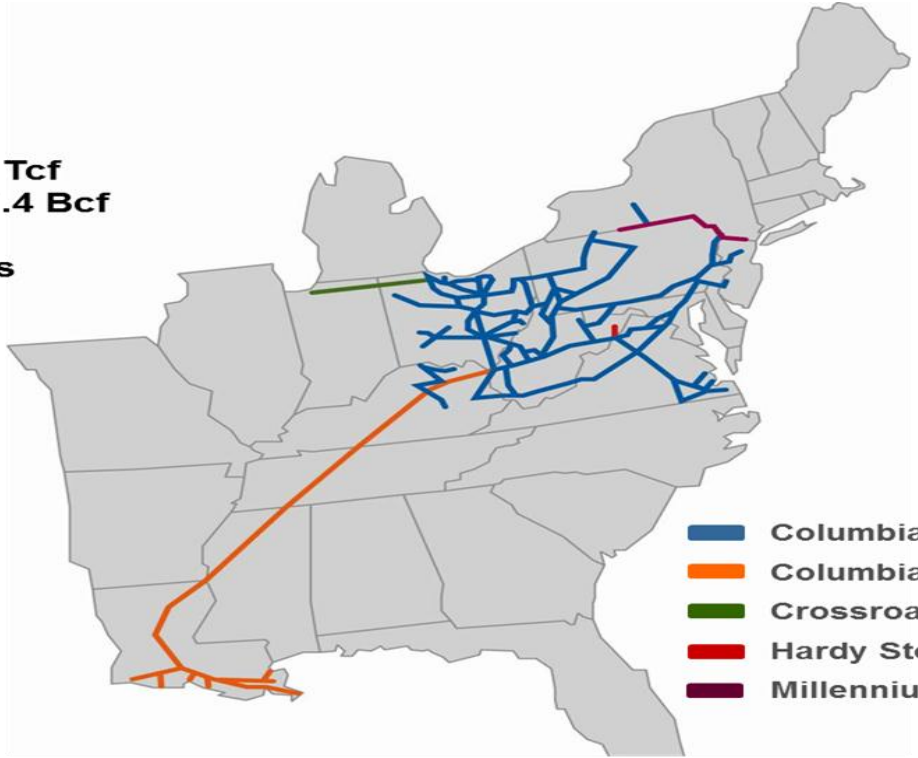
Annual Deliveries: 1.4 Tcf
Peak Day Deliveries: 7.4 Bcf
Serving 40 Markets
Operations in 16 states

37
Storage Fields

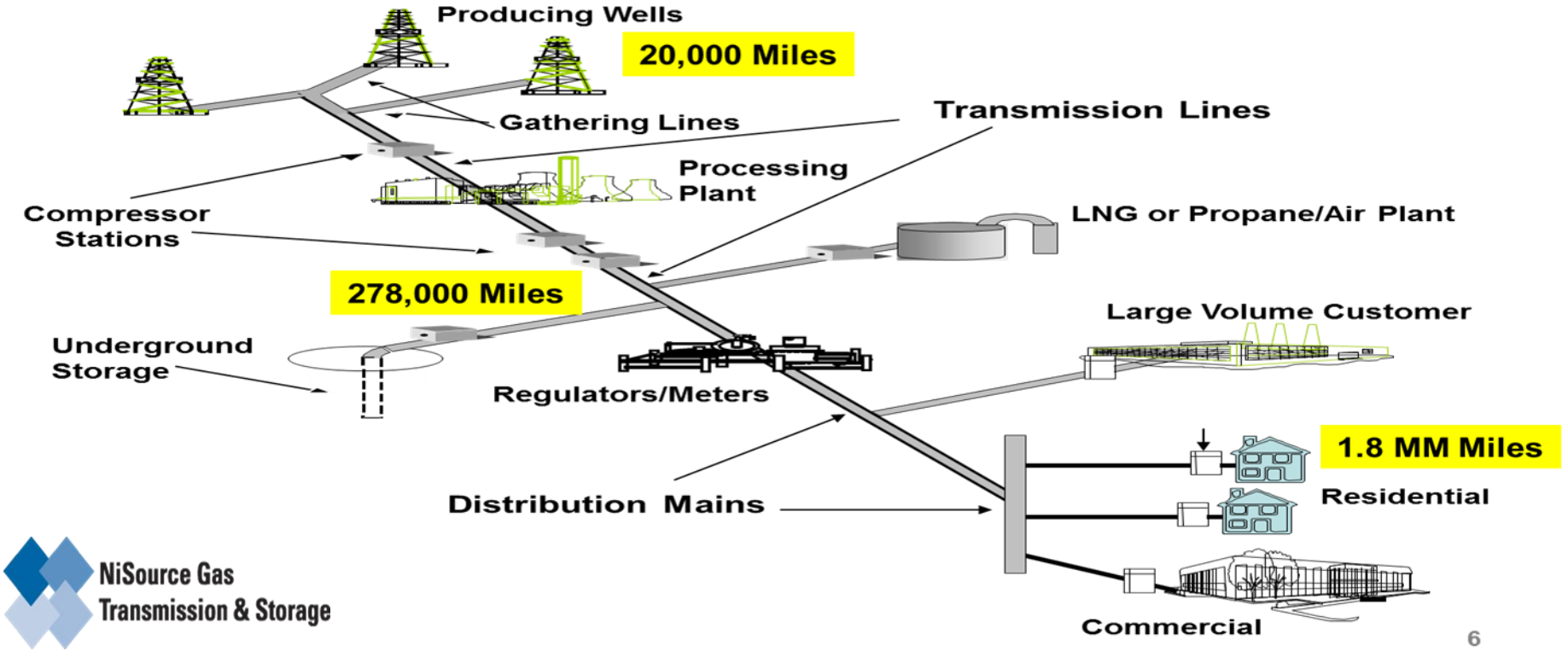
Capacity: 640 Bcf
Daily Delivery: 4.7 Bcf
Working Gas: 280 Bcf

106
Compressor Stations

Horsepower: 1,100,000



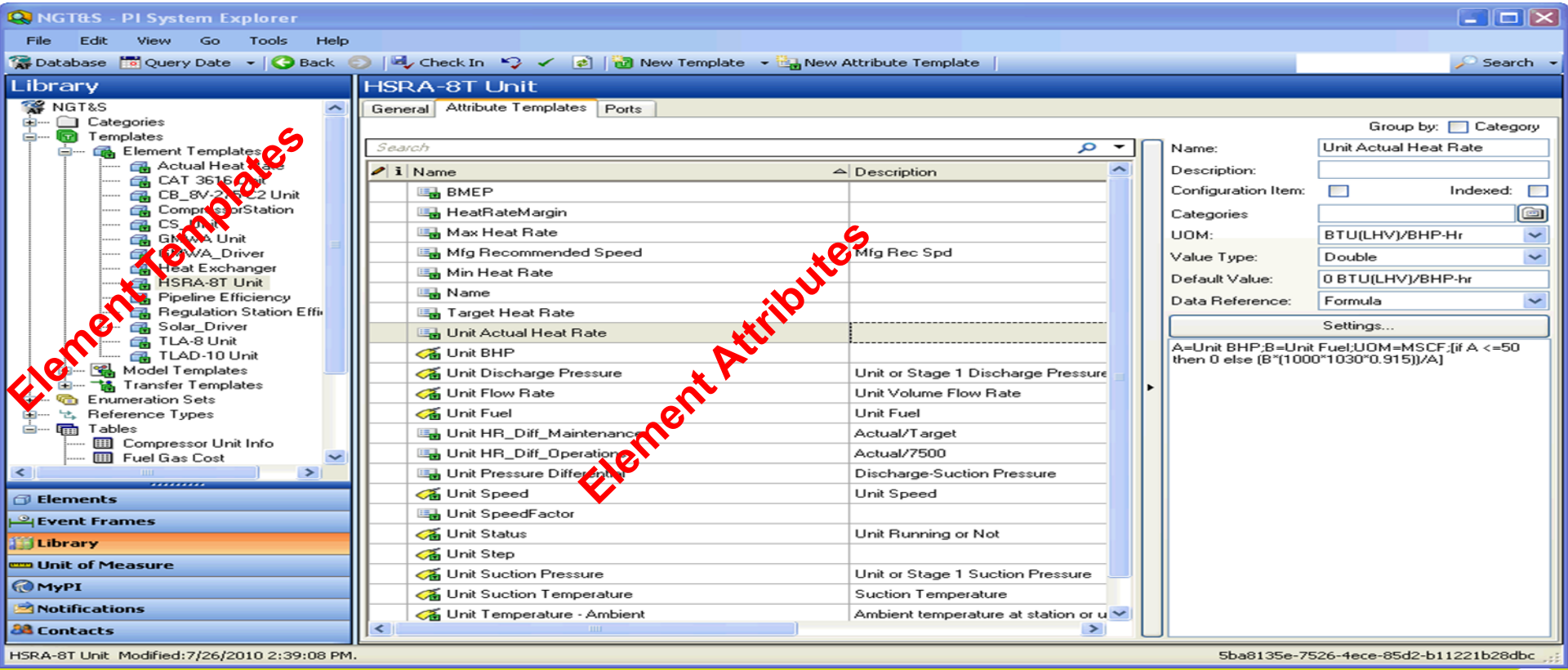
“From Well Head to Burner Tip”



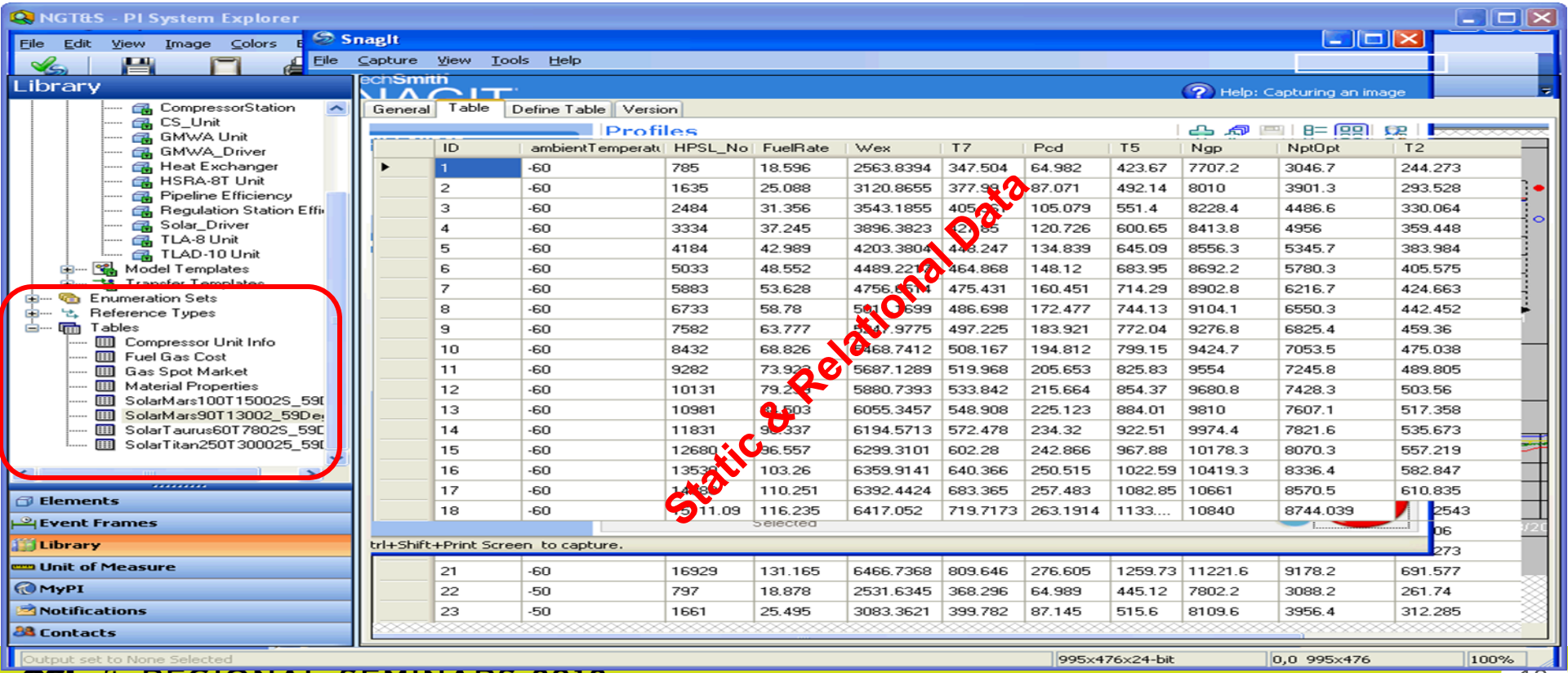
NiSource Gas Transmission & Storage

PI-AF Templates – Knowledge, Governance, and Leverage

Calculation of Compressor Heat Rate

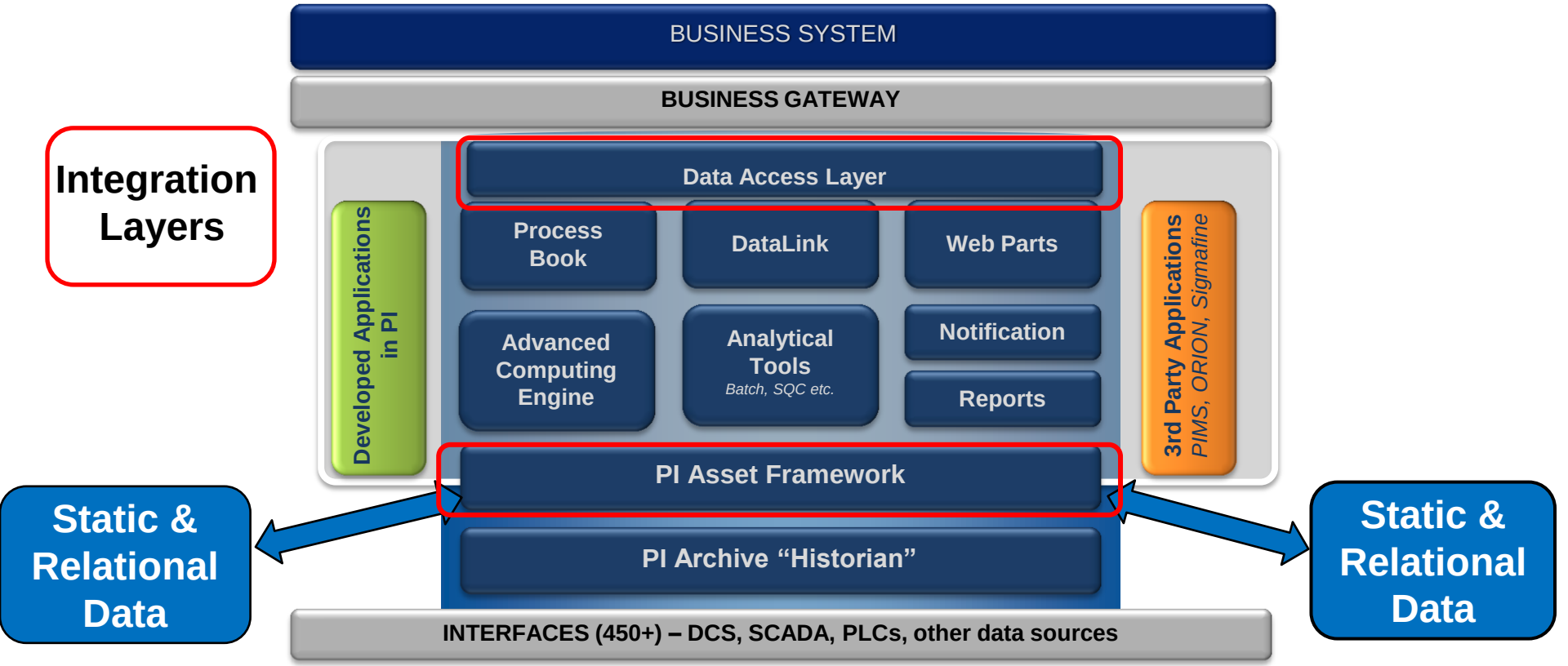


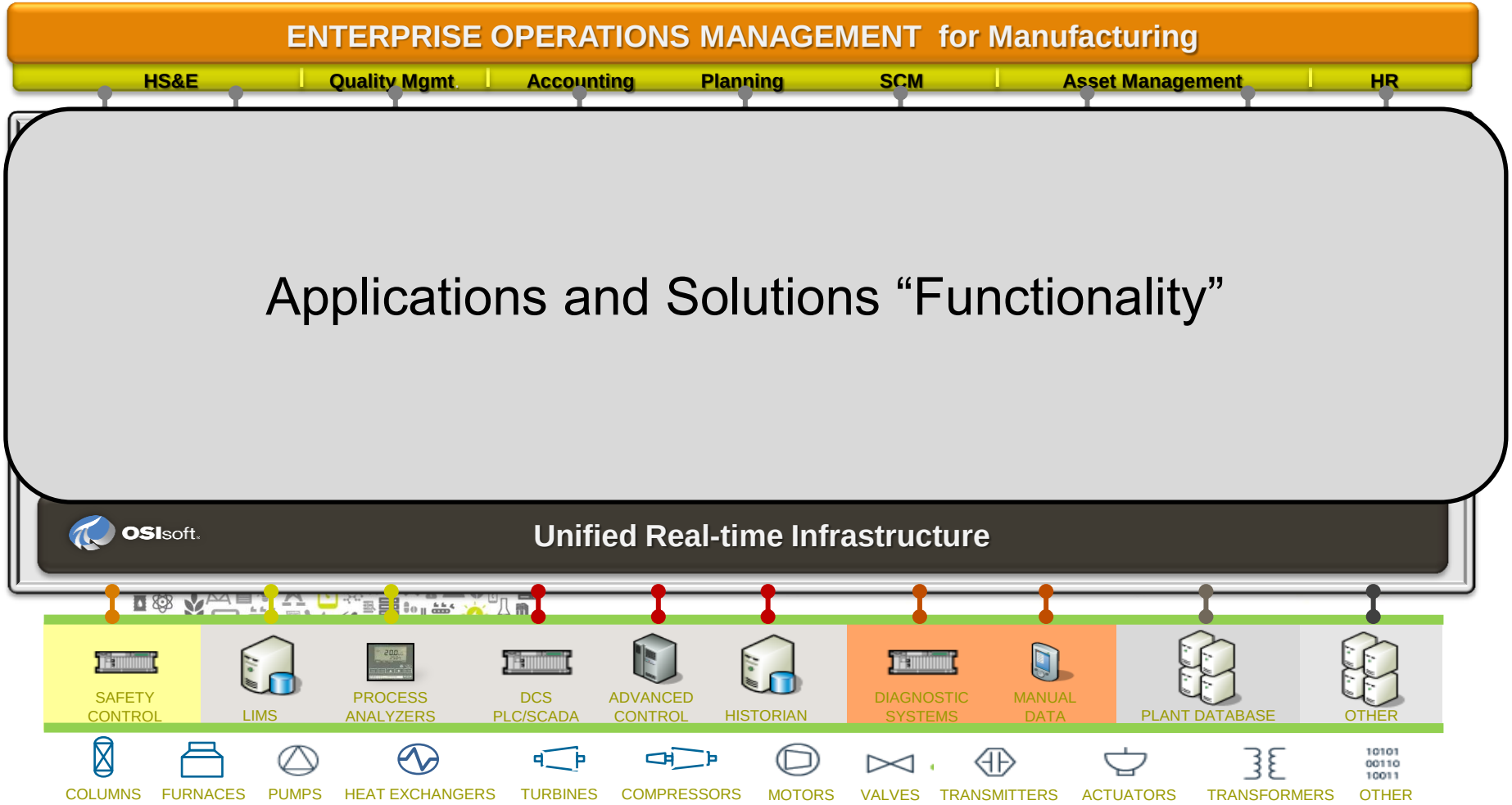
PI-AF Integration



Infrastructure for MES & Solutions

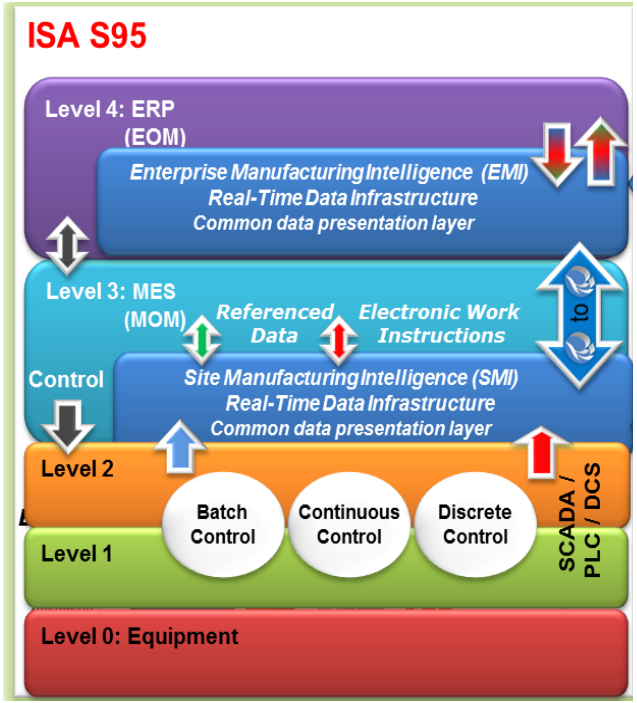
PI System - an Integration and Applications Infrastructure





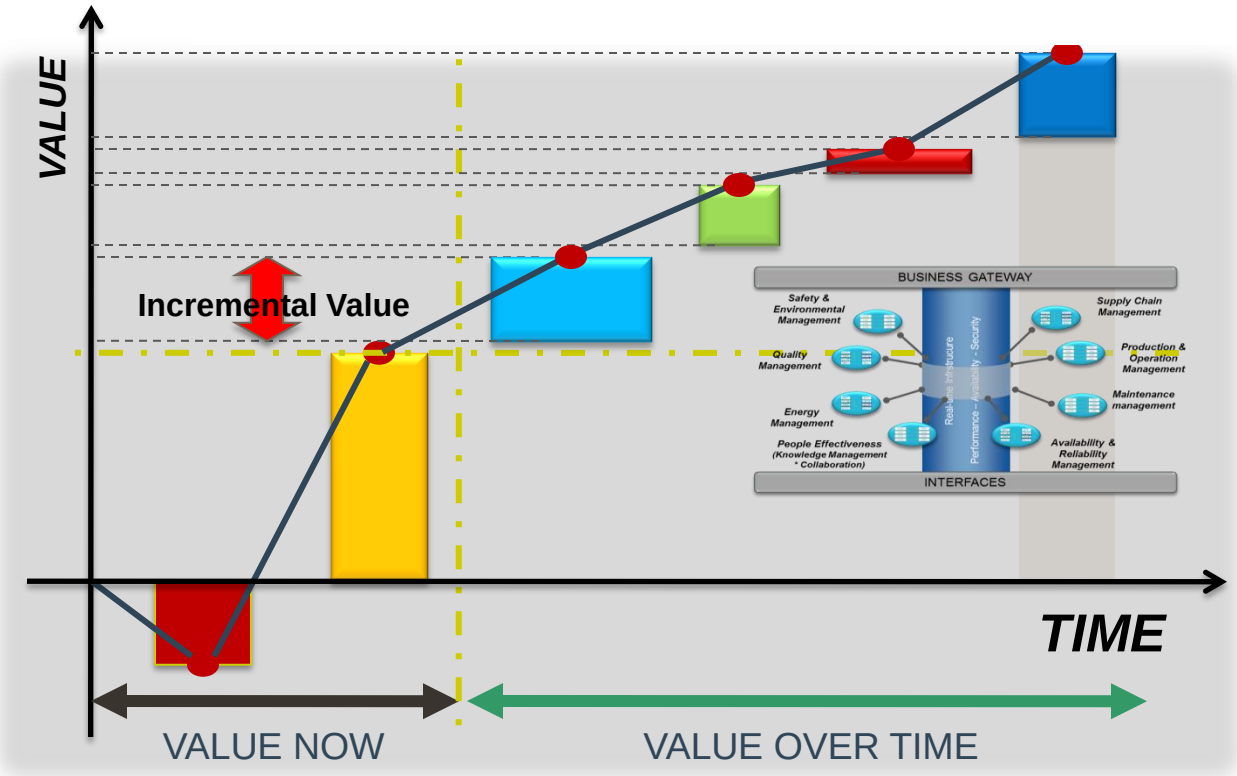
Common Data Presentation Layer

- Aggregation
- Normalization
- Contextualization
- Analysis
- Visualization
- Propagation



Evolutionary Approach to MOM and EOM

Starting with a PI System Infrastructure – „Best of Breed“



Performance Management

Environmental Reporting

Equipment Health Mgmt.

Operations Management

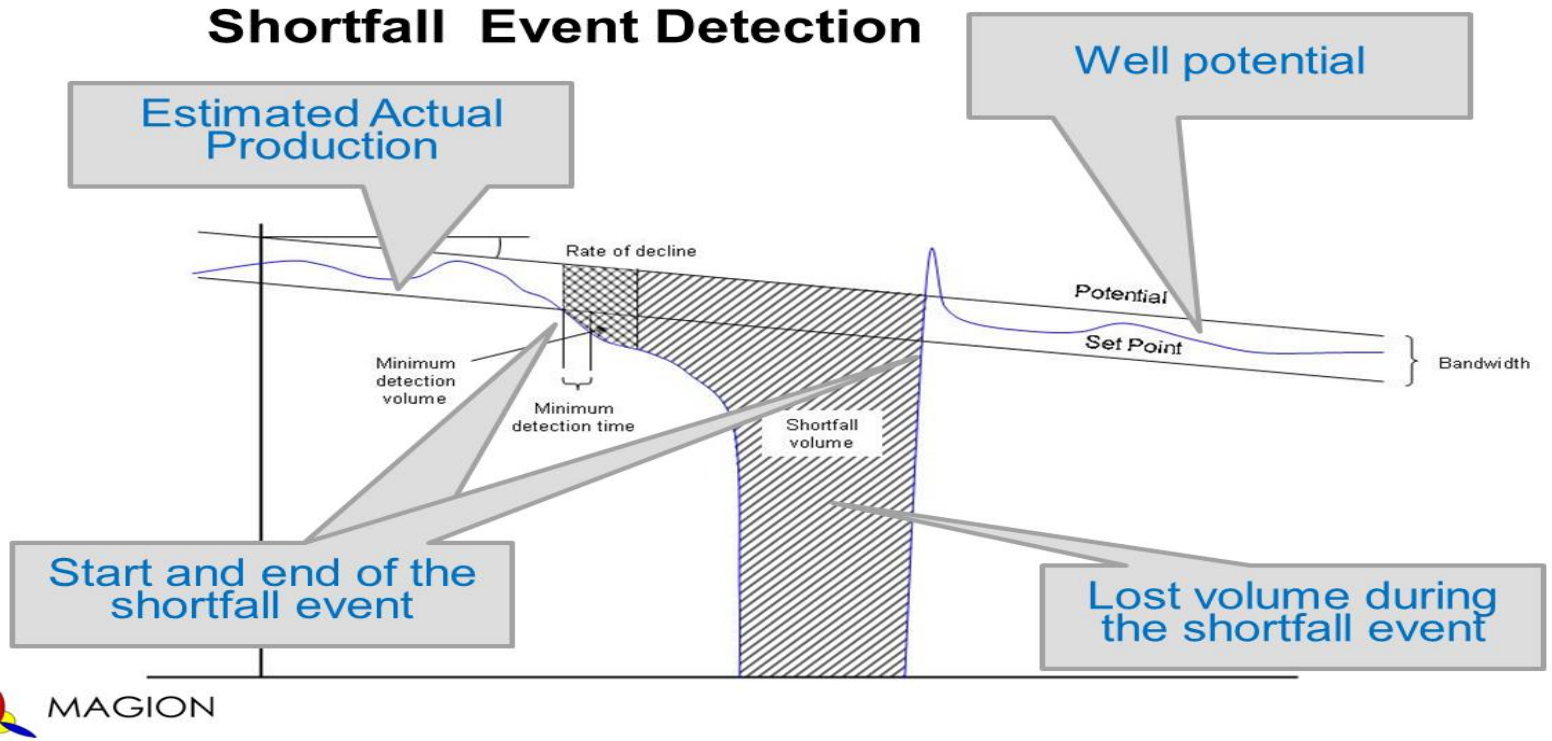
Infrastructure Configured Applications

Infrastructure „Out of the box“ value

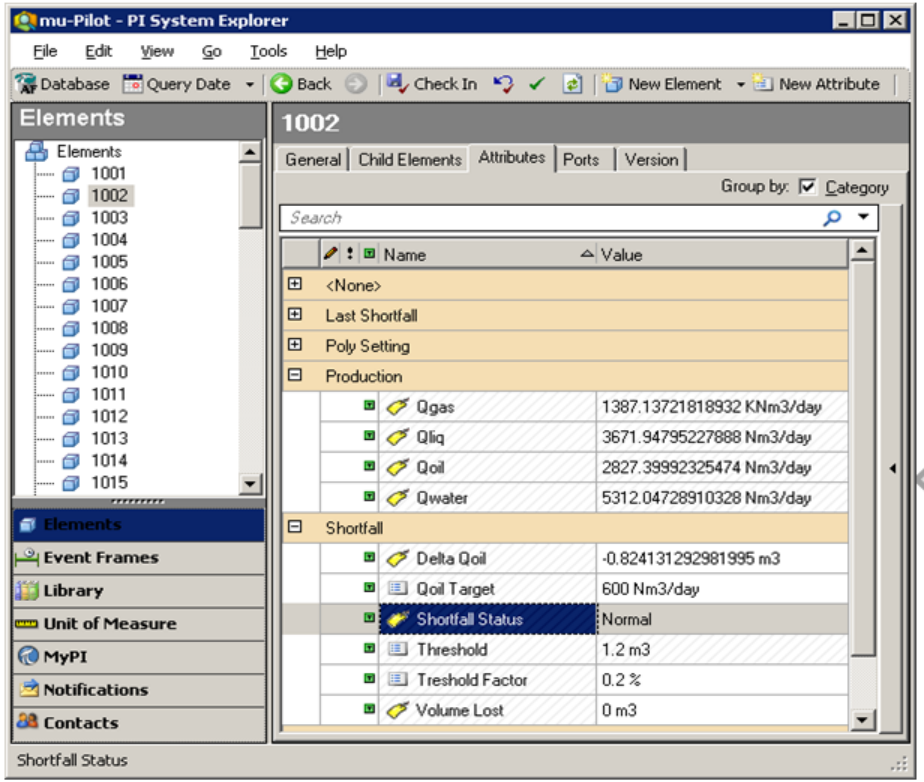
Infrastructure Installation

Lower Risk
Lower Cost

Application - Production Shortfall Event Detection

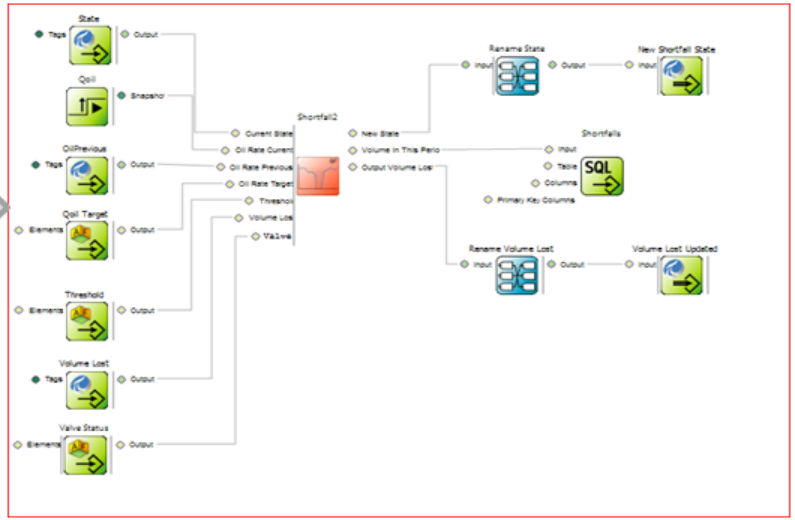


Infrastructure for Applications



Potential is retrieved from production database.

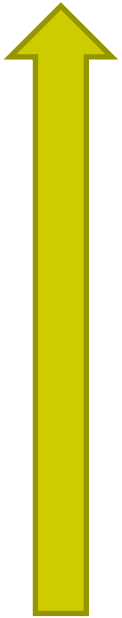
Shortfall calculation is a state machine triggered with each rate estimation.



Asset Safety, Reliability, and Performance Management

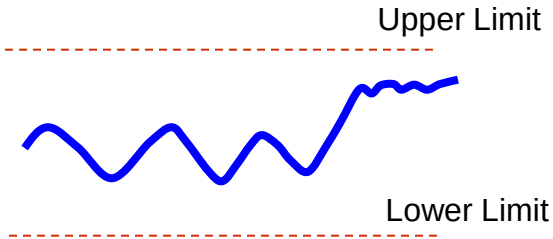
Evolutionary Asset Reliability Strategies

Strategic	• Internal Collaboration • External Collaboration
Predictive	• Alert & notification • Predictive analytics
Proactive	• Operations Equipment Effectiveness(OEE) • Conditioned Based Maintenance (CBM)
Reactive	• Improved Response • Incident Investigation

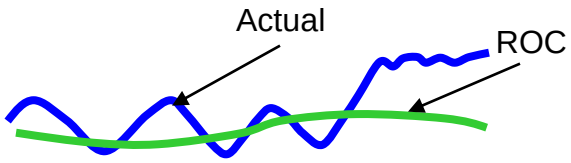


The PI System infrastructure enables an evolutionary approach to asset maintenance model based on budgets & organizational readiness

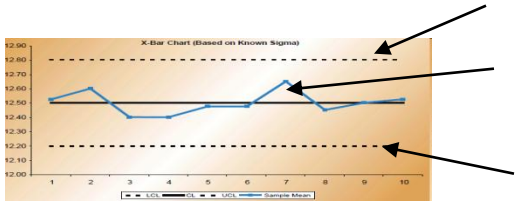
Traditional Conditioned Base Maintenance



Engineering Limits



Rate Of Change (ROC)



Statistical Quality Control (SQC)

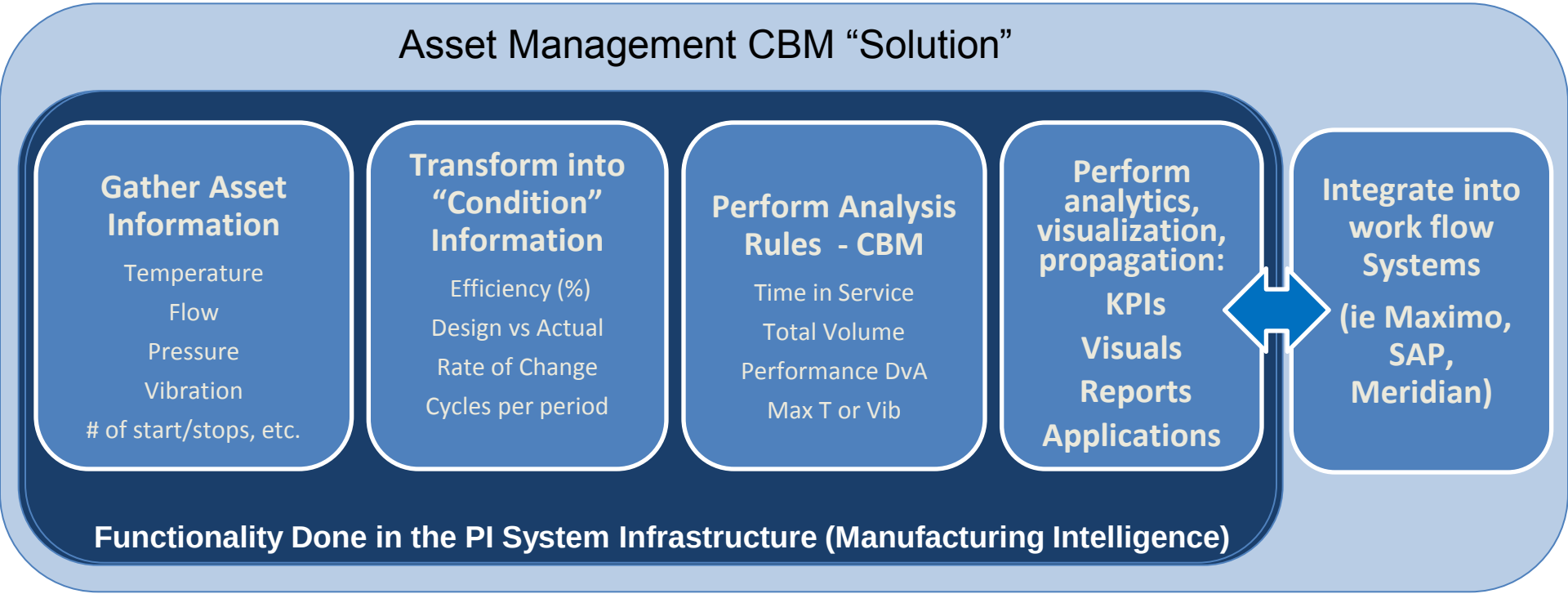
Events → # of occurrences in time window ‘t’ → Exceptions

Event Analyzer

Data Used

- Trends
- Fluid analysis raw data
- Events (frequency of events)
- Real time streaming data (if available)

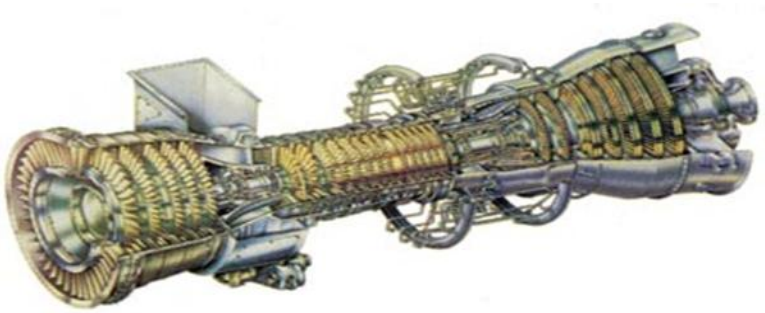
Decomposition of a Conditioned Based Maintenance Solution



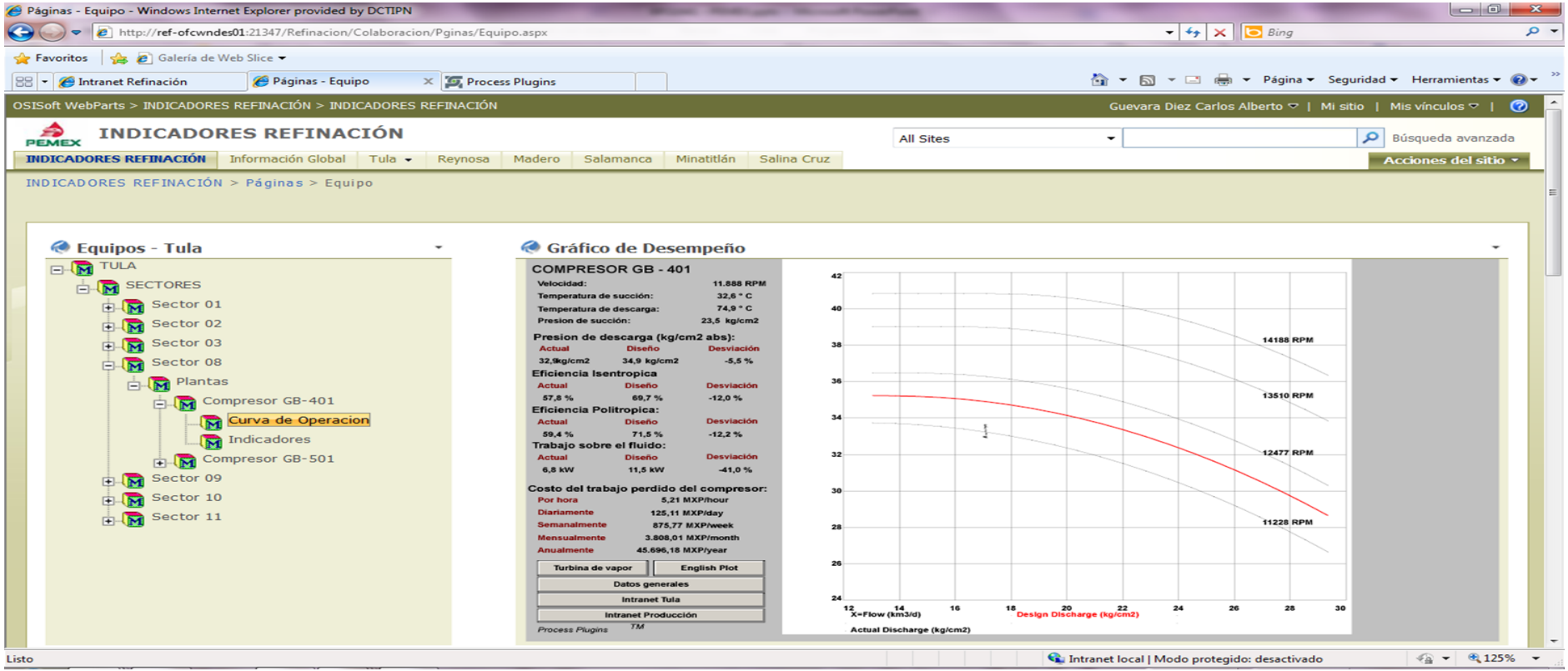
Leveraging the PI System for Asset Reliability

Thermodynamic Performance Monitoring of:

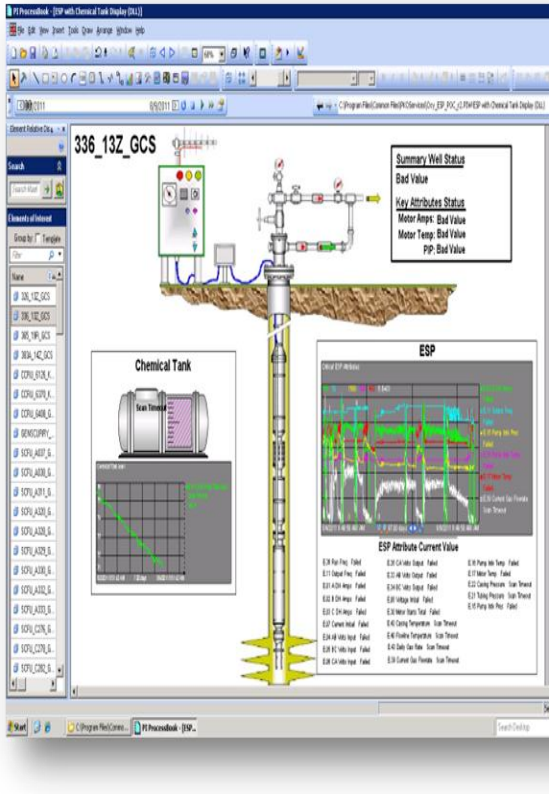
- Steam Turbines
- Gas Turbines
- Towers
- Compressors
- Heat exchangers
- Furnaces
- Pumps
- Wells

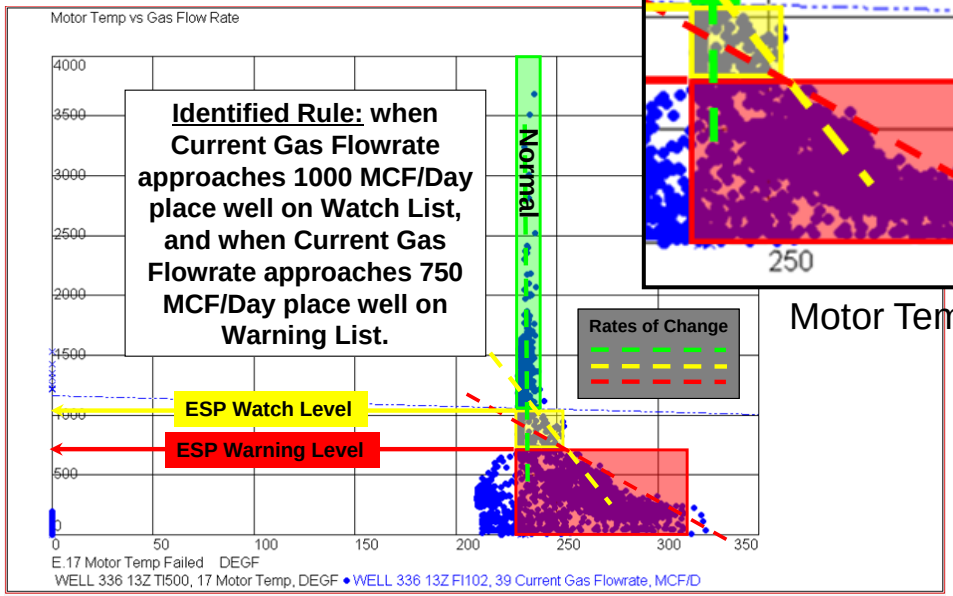


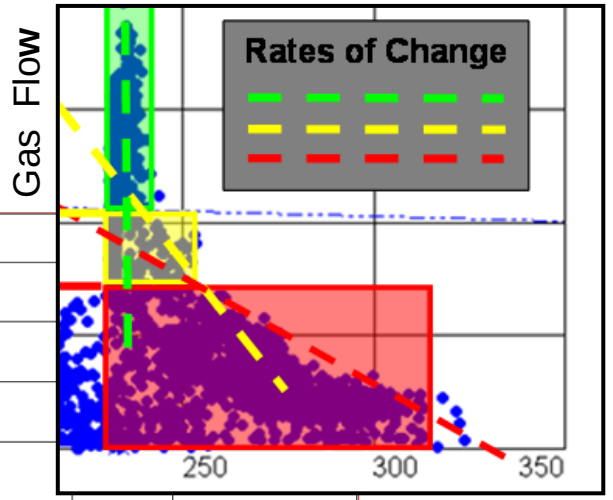
Real-Time Compressor Performance Monitoring



Electrical Submersible Pumps - CBM



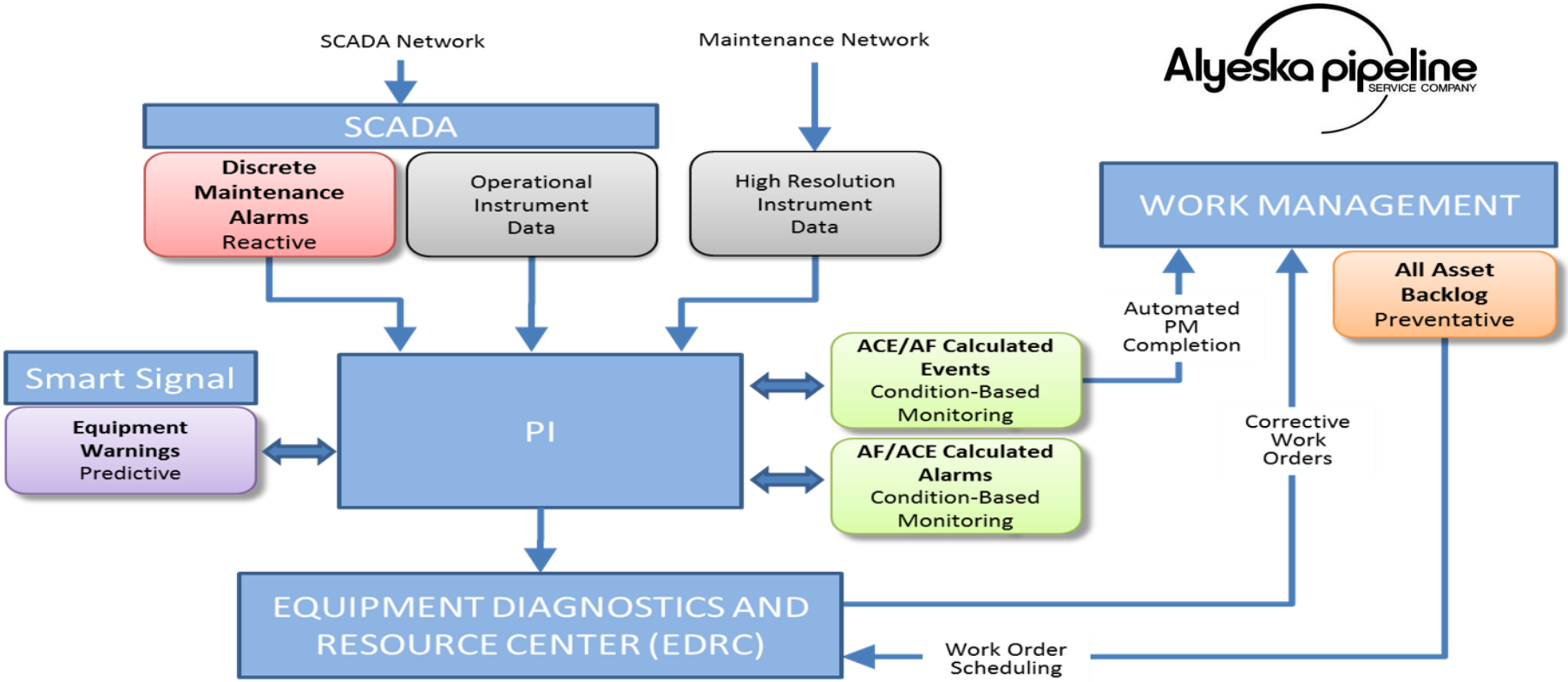




ALYESKA PIPELINE

- 800 miles long
- 48” diameter pipe
- 5 Pump Stations
- Marine Terminal
- 1.4 Million bpd operating capacity
- Logistics & Operations centers in Valdez, Anchorage, and Fairbanks

Strategic Use of the PI System - RCM

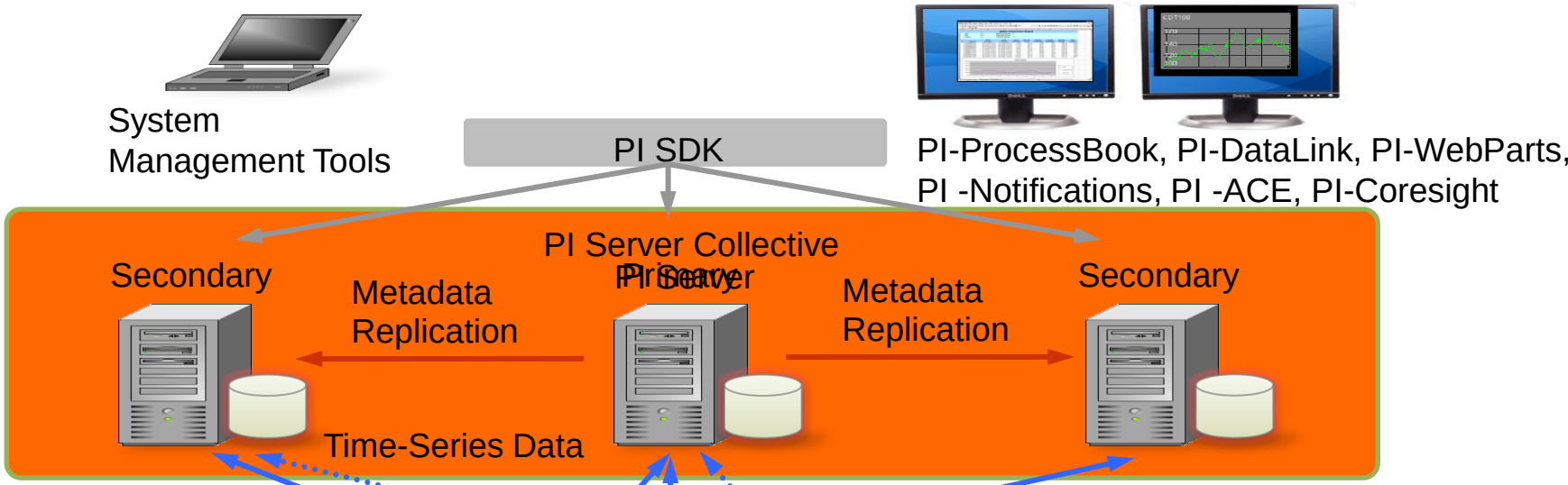


Cyber Security

Cyber Security Threats Are Growing

- Iran Nuclear Program (Stuxnet)
- Shamoon virus Aramco & RasGas
- Growing Momentum for critical infrastructure “protection”
- IT and OT “Ownership” Exacerbate Response
- PI System - provide “safe harbor” for real-time data & events

PI System High Availability Architecture



Flexibility to Address:

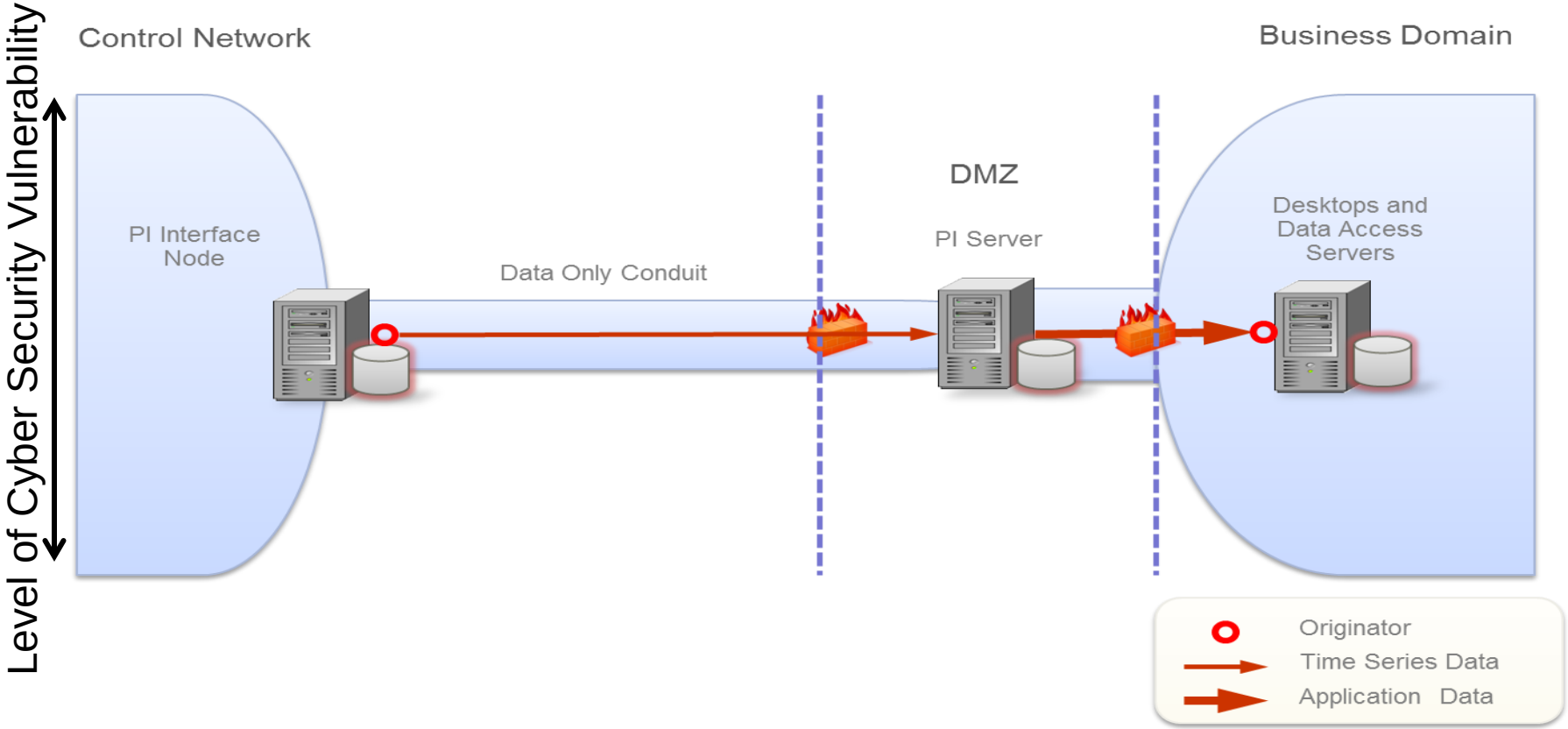
- Availability & Reliability
- Cyber Security
- Backup Strategy
- PI System "Ownership"
- Augmentation of DCS & SCADA

PINET3 Protocol

- Design for purpose interface
- Not a control protocol (no reliance on DCOM vulnerabilities)
- Inherently more reliable than OPC
- Simplifies firewall rules

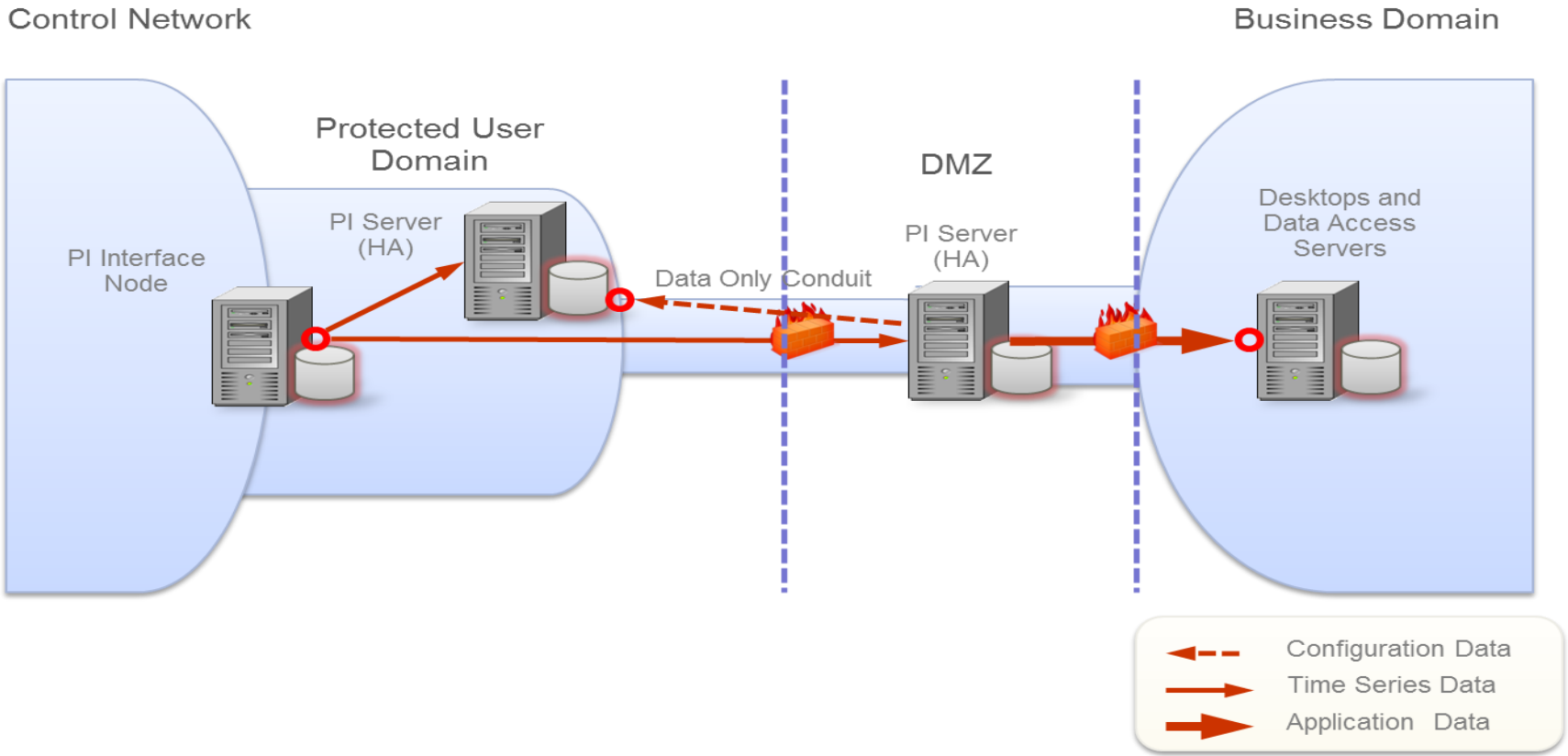
Pattern 1: PI Server in DMZ

(Pattern 0 is no DMZ or Firewall –minimally recommended)



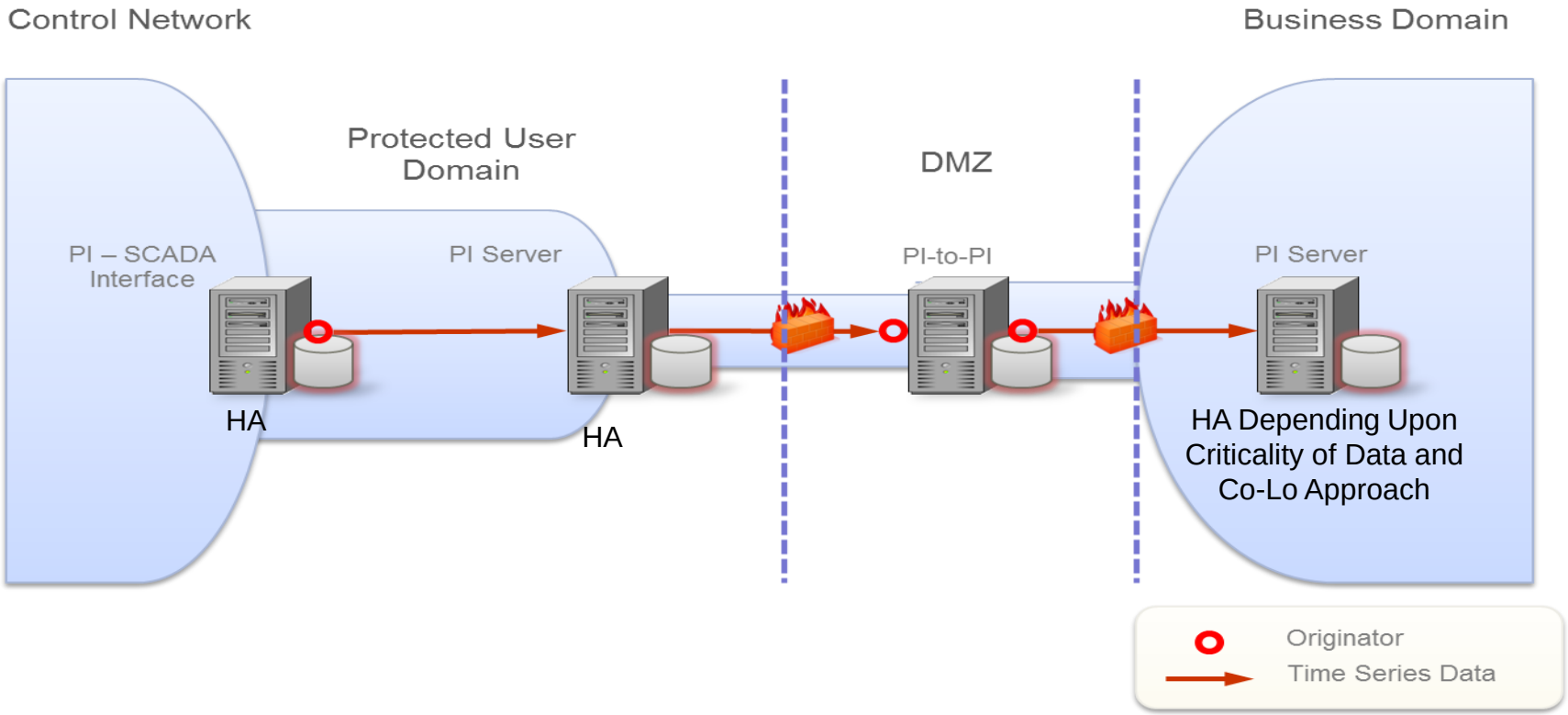
Pattern 2: PI High Availability

Recommend move to Pattern 2 or 3 once the system is mission critical to the business

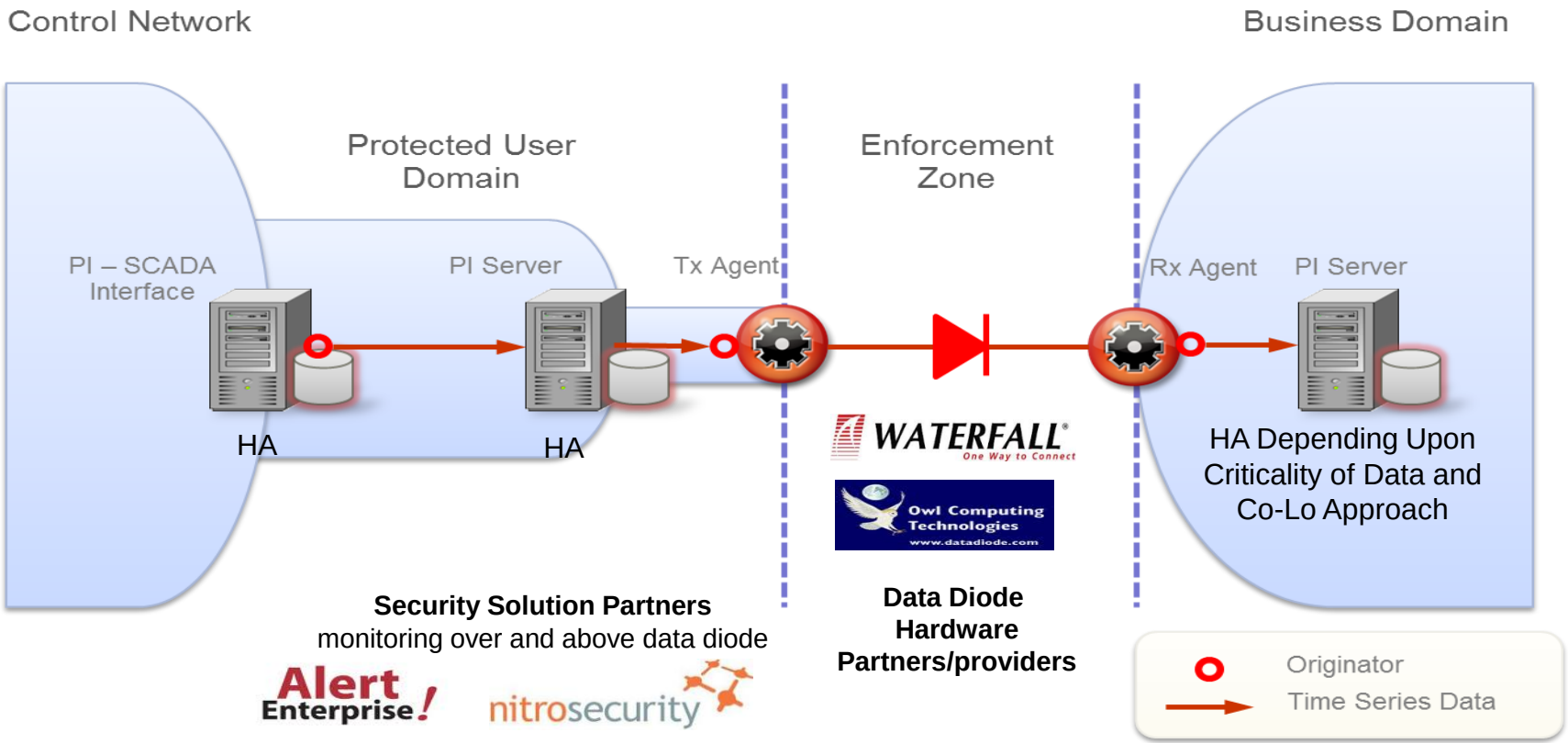


Pattern 3: PI to PI Interface

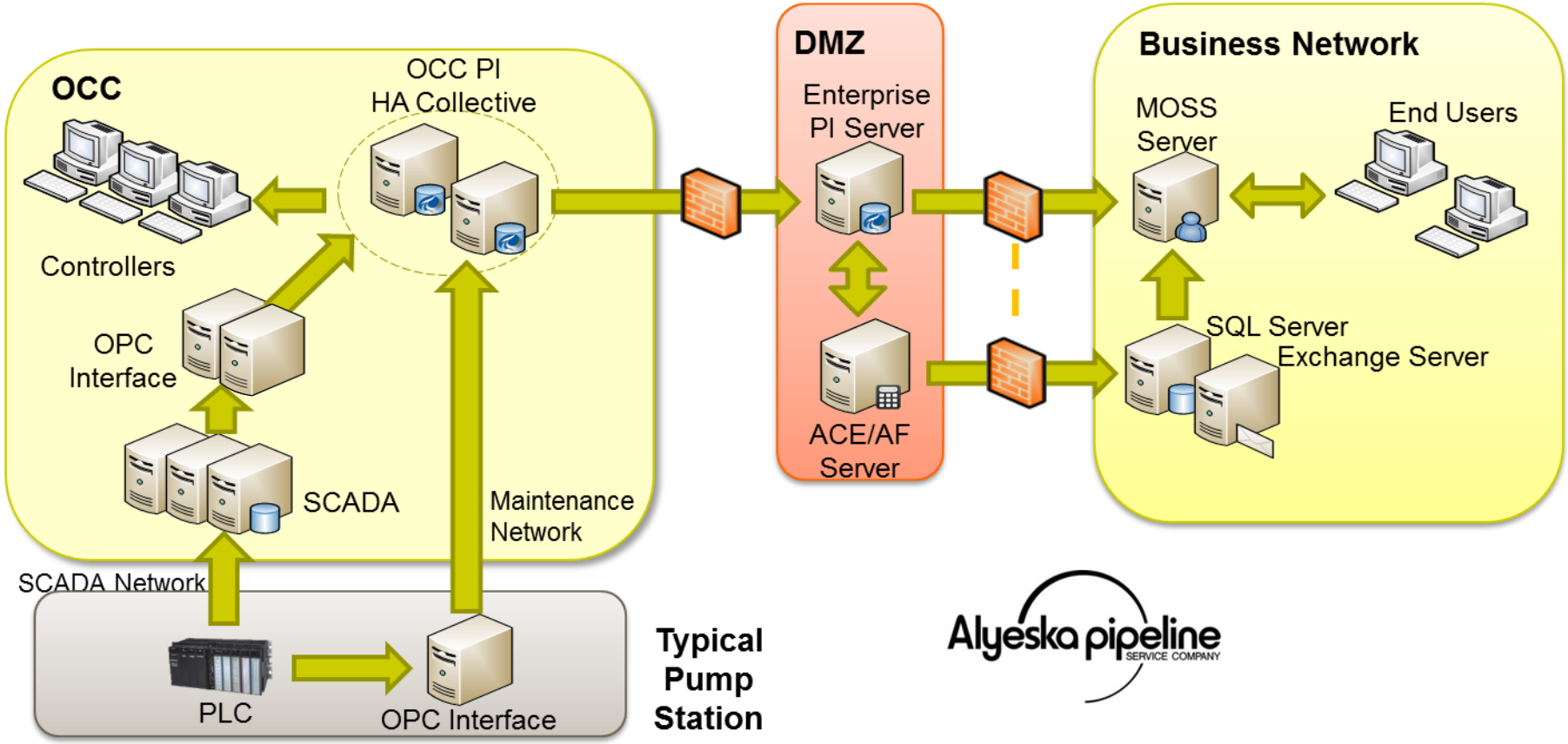
Very popular and proven for compliance, fleet deployments



Pattern 3+: Absolute Enforcement



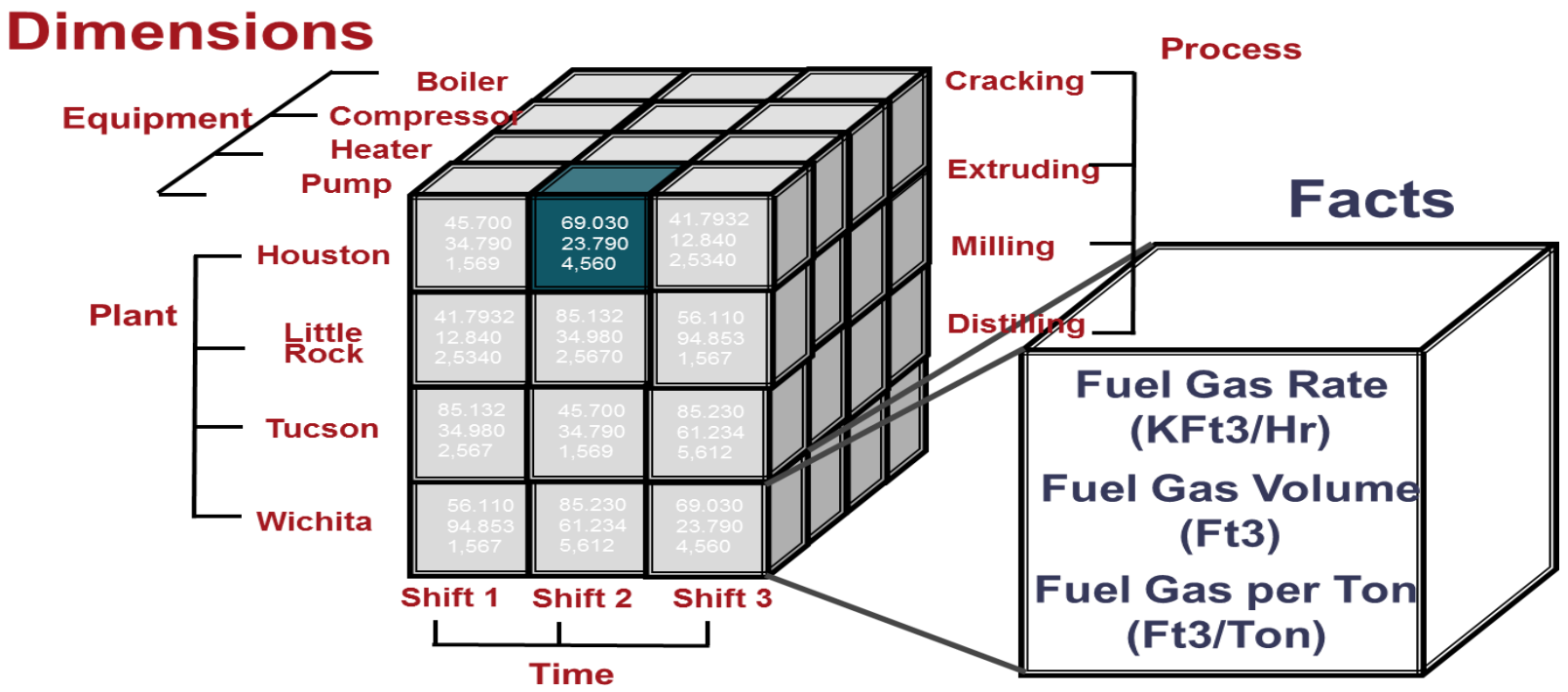
PI System and Cyber Security (Pattern 2)



Business Integration and Intelligence (BII)

J

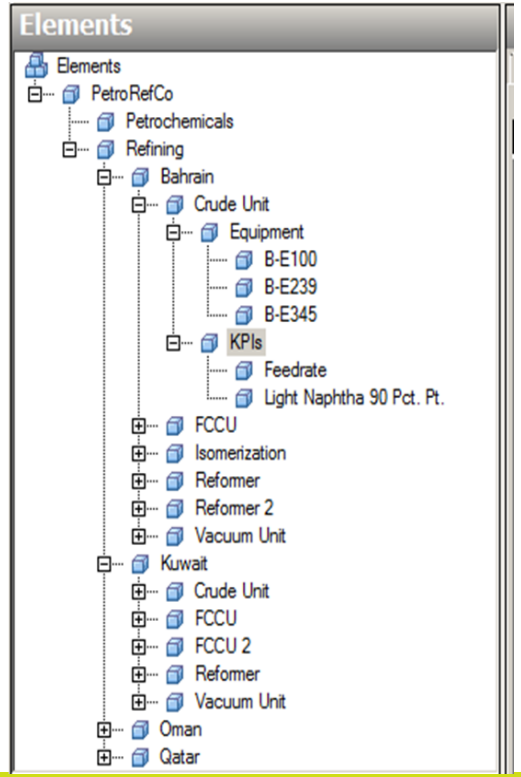
Multidimensional Analysis



Operational Context

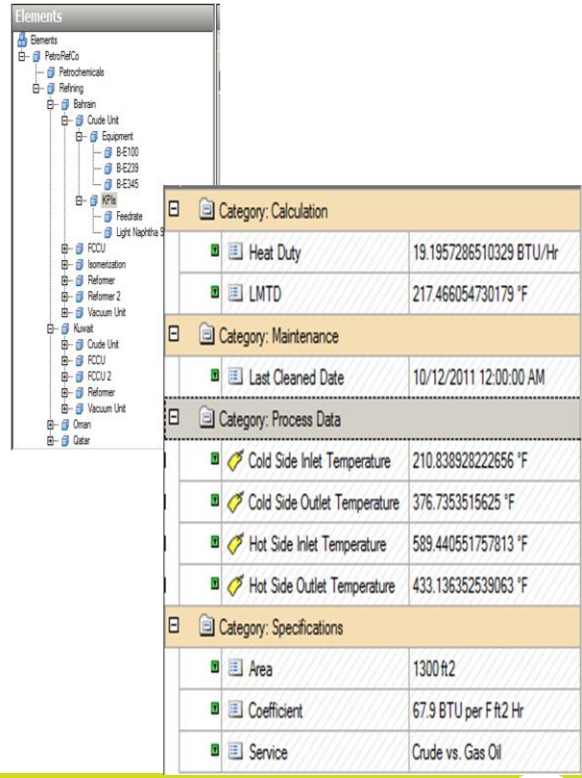
Asset Hierarchy

- Refinery
- Process
- Equipment
- KPI's

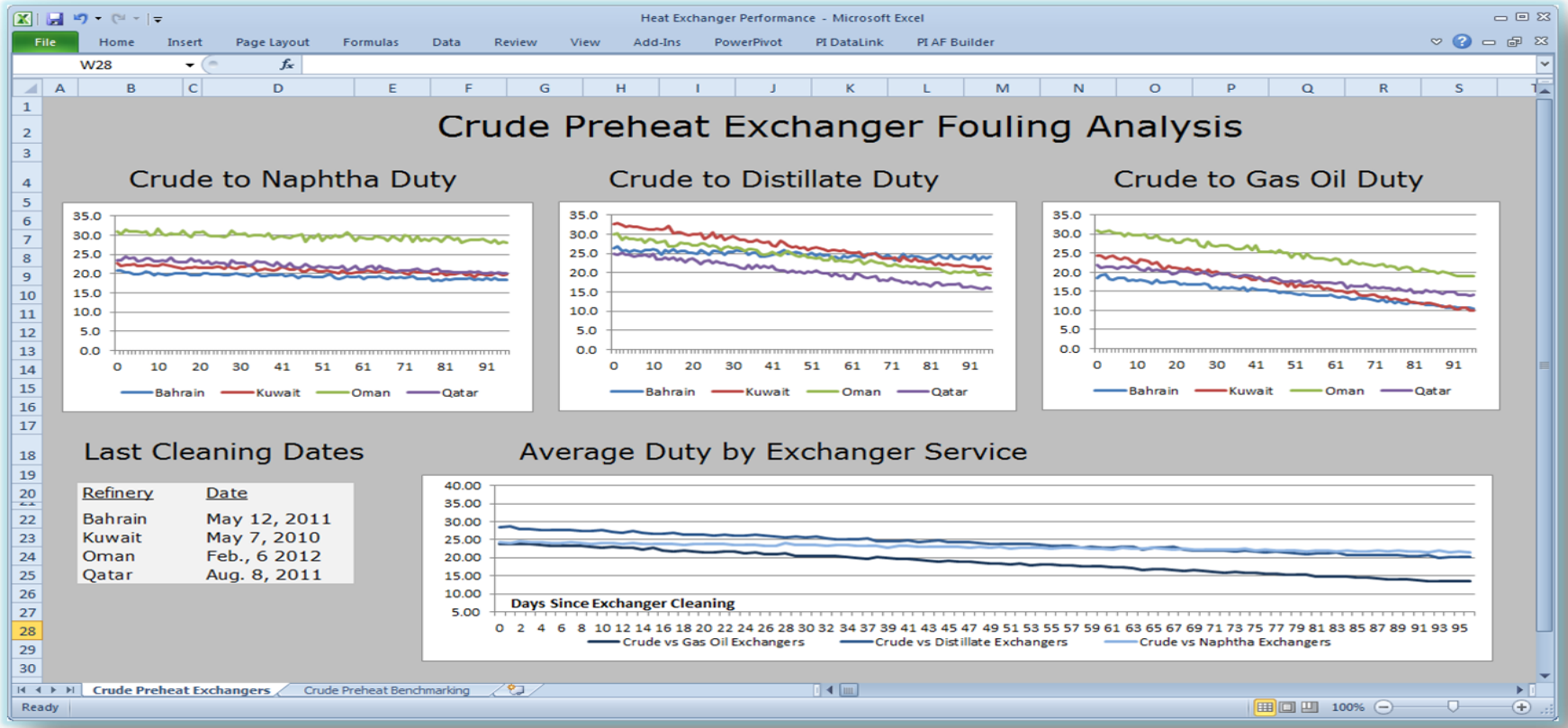


Asset Attributes

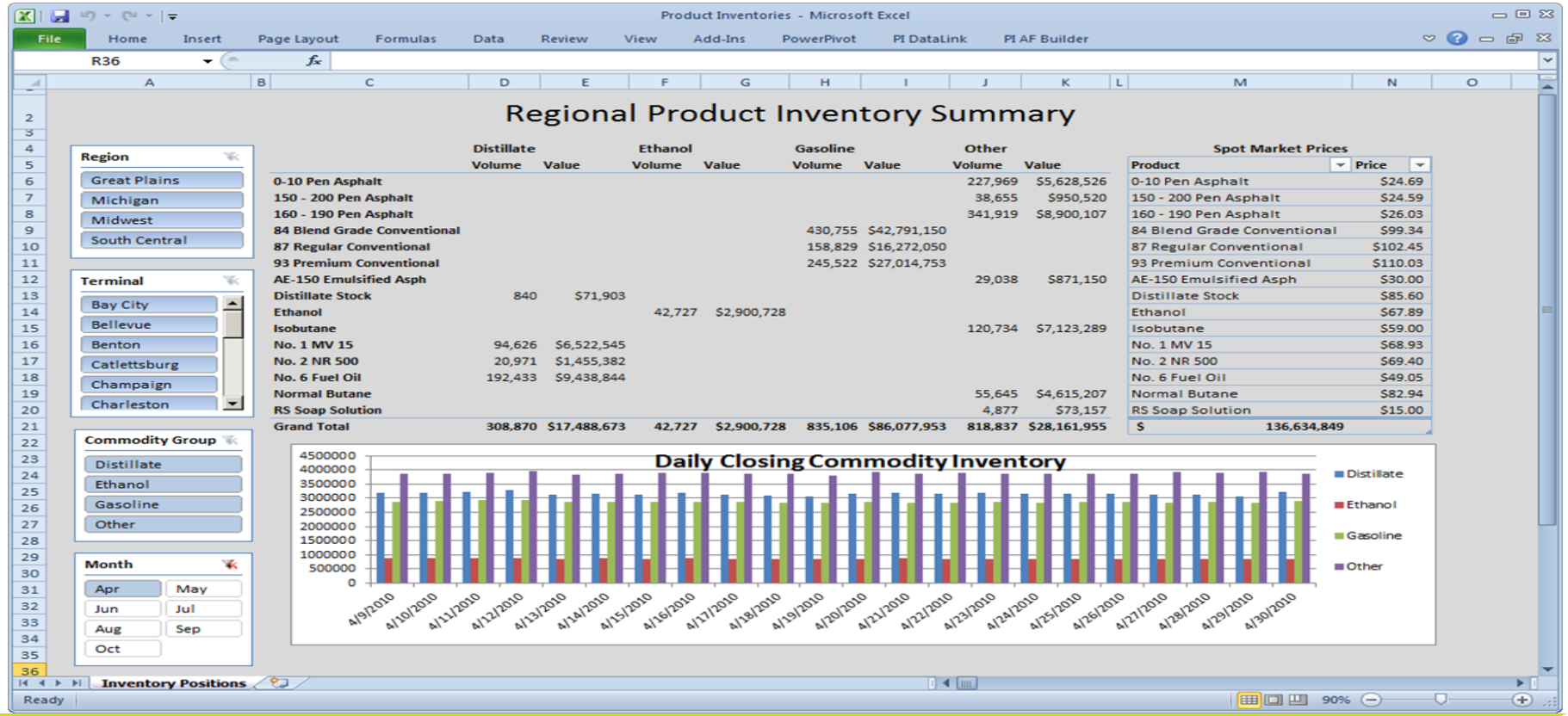
- Process Data
- Calculations
- Equipment Specifications



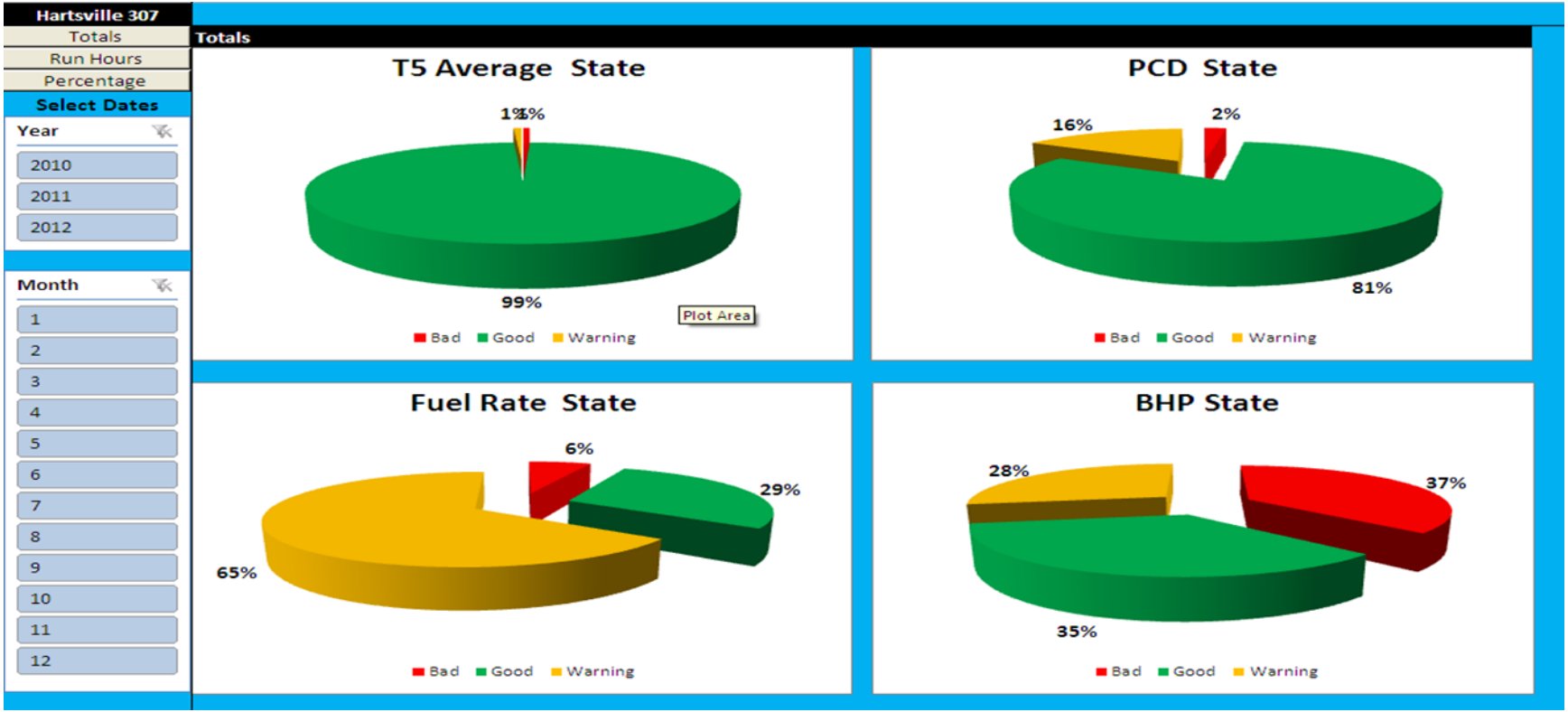
Crude Preheat Exchanger Fouling Analysis



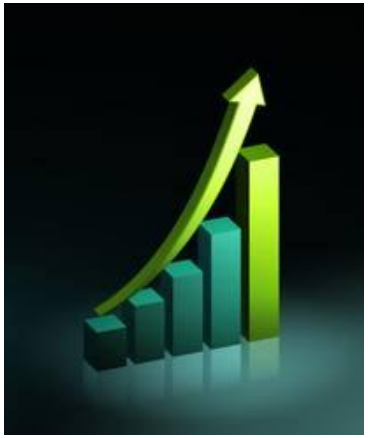
Product Inventory BI



NiSource Example of PI-AF Based BI



From Tactical to Strategic



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- Strategic PI System Value Trends in O&G
  1. Value Chain integration
  2. Infrastructure for MES/Solutions
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THANK YOU

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