



INTEGRATION OF ASSET MANAGEMENT SYSTEMS

ERP + EAM + DCS + WMS + PLC INTEGRATING BUSINESS INTELLIGENCE
Customers Needs Not Satisfied by Any Single System

Suprit Pal Singh

Vice President Projects
Pt Panca Amara Utama

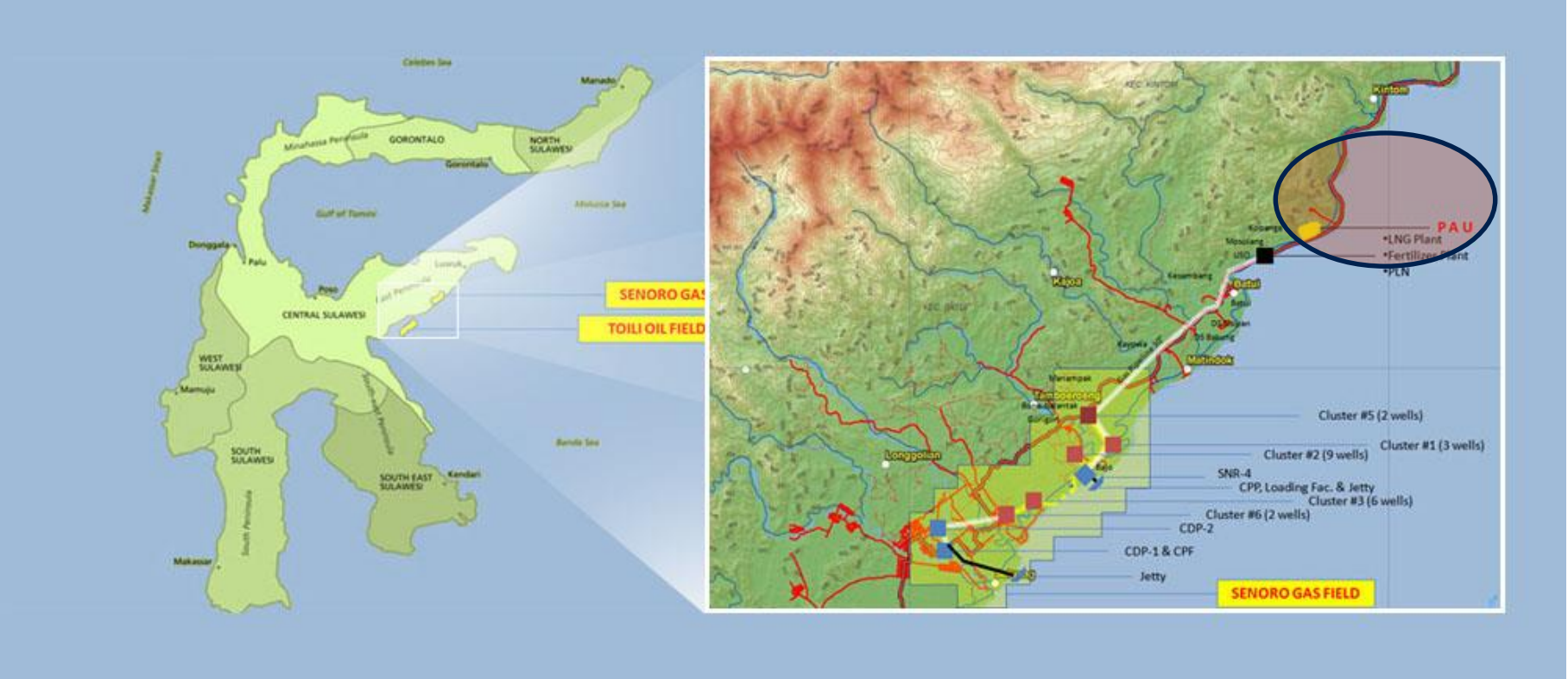


AGENDA

1. Company Introduction
2. Information Technology Opaque Diversity-No Unity
3. The Integration Information & Transparency
4. Do The Systems Speak Same Language ?
5. Data –Data Everywhere – Insite No-Where ☹️
6. KISS – Keep It Simple – One Interface
7. The Beauty of Integrity and Harmony

- PT Panca Amara Utama (“PAU”) is a 700,000 metric tons per annum (MTPA) capacity greenfield ammonia plant in Batui District, Banggai Regency, Central Sulawesi, Indonesia (“Project”).
- Natural gas for the plant will be supplied by Senoro-Toili gas fields, operated by JOB Pertamina-Medco E&P Tomori Sulawesi. Plant is expected to begin operations in first quarter 2018. PT Rekayasa Industri, a national contractor is appointed sole EPC Contractor for the project.
- PAU has received debt financing arranged by the International Finance Corporation (“IFC”, member of the World Bank Group). The syndication includes seven international banks such as ANZ, HSBC, KDB, OCBC, SMBC, Standard Chartered and UOB. IFC also holds an equity position in PAU in the form of a subordinated loan. This represents the IFC’s largest greenfield project funding in Asia over the last decade.
- Technology for the plant has been licensed from Kellogg Brown & Root (USA), and PAU will be the first in the world to apply KBR’s patented KRES + Purifier technology, thereby increasing Indonesia’s access to leading edge Technology.
- PT Panca Amara Utama (PAU) is a 60% subsidiary of Indonesia’s largest private LPG refiner, PT Surya Esa Perkasa Tbk. (ticker: ESSA).
- Yokogawa is DCS and Instruments partner of the Plant.

Company Introduction



Company Introduction



- 1st in Indonesia with 100% LED Lighting.
- 1st in World as DTS Based ammonia Leak Detection System (with Yokogawa)
- 1st in Indonesia with Top End Temp. and Pressure Transmitters from Yokogawa
- 1st in SE Asia with KBR KRES + Purifier Together
- 1st in Indonesia with Super Duplex Sea Water Pumps
- 1st In Indonesia with Under-Insulation Corrosion Resistance Paints on Piping
- 1st in Indonesia with 100% Local EPC and Detailed Engineering (PT Rekayasa Industry)
- One of the Largest IFC (World Bank) funded Project in SE Asia in 100% Private Sector.

Complex Systems Like any Oil & Gas Plant



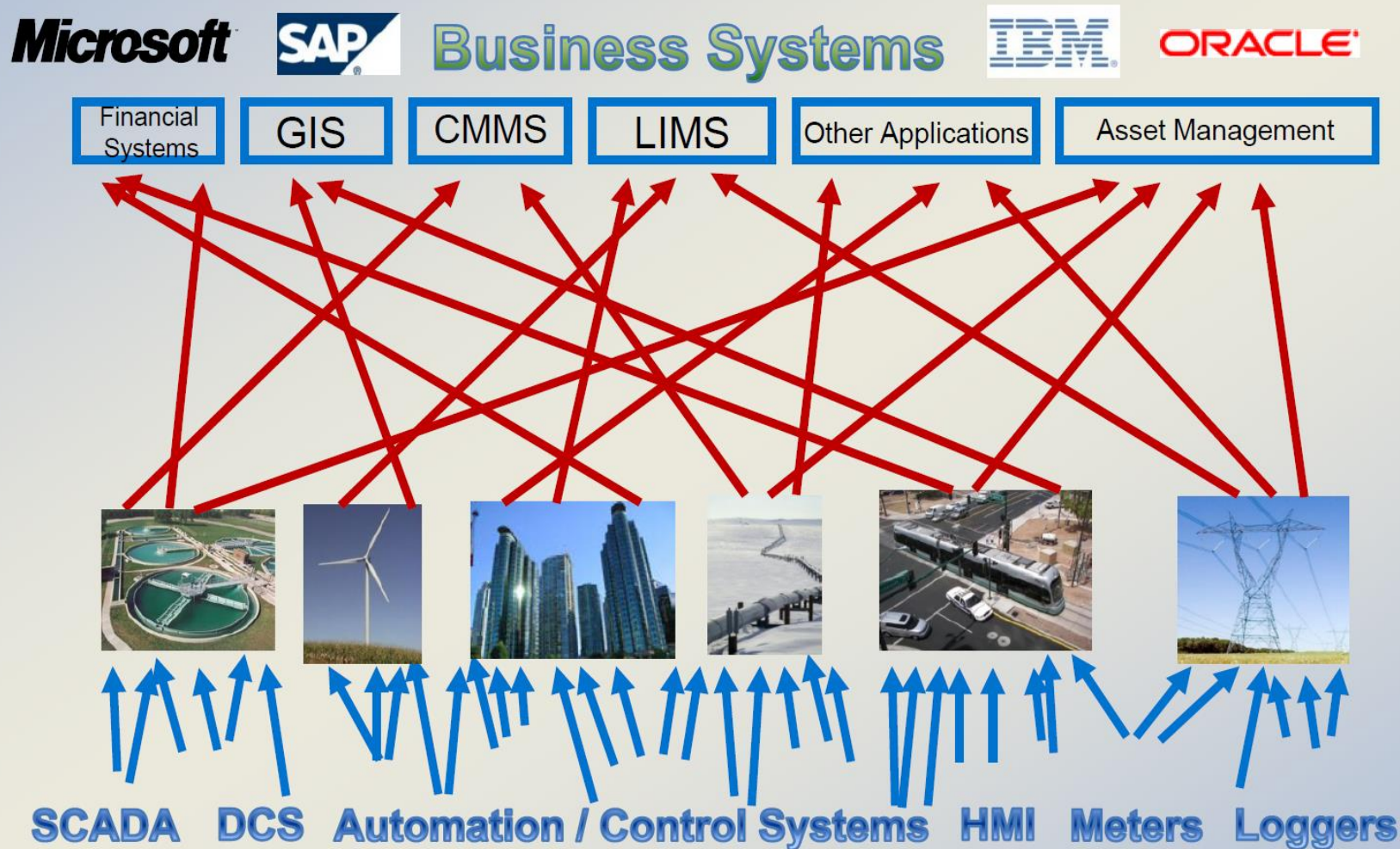
Usual Integration Head Aches

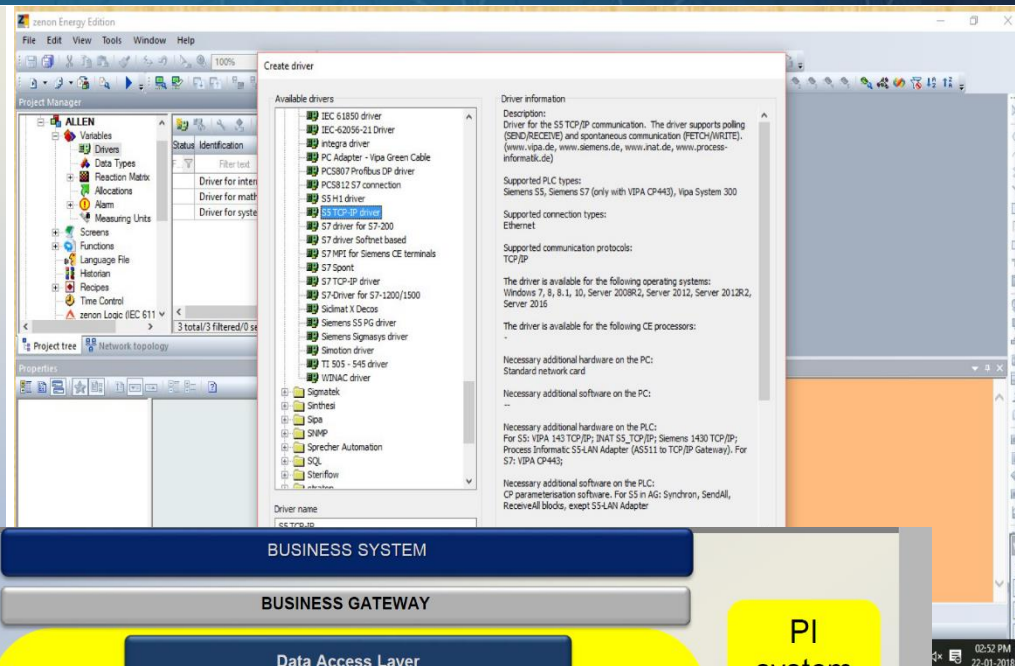
- a) Control Systems DCS
- b) HSE Systems
- c) Utilities not on DCS
- d) Operations Systems not Integrated
- e) Cost Systems Opaque
- f) Production Planning not Integrated
- g) ERP Systems Direct Data Pick up missing
- h) Asset Management Systems Discrete from DCS
- i) Several Metered Data Manually Input for Reports

3000 +/- I/o DCS Systems Yokogawa with Exa Quantum Server
1000 +/- Pressure & Temp Transmitters
1200 +/- Control Valves , 3000 Manual Valves , 300 +/- Pumps , 500+ Motors
10,000 Ton Piping
128 Tons / Day Boilers, Steam Systems , Compressor Systems , 5 Large Critical Pumps
24 Mwe Captive Power Plant , Steam Turbines
Deslination Plant
Sea Water Intake , Chemical Injections , Flow Meters , Catalyst Management
Jetty , Civil Structures , Reactors and Vessels
Cryogenic Tank Storage etc etc.



OPAQUE – HUGE DIVERSITY – NO UNITY !!





The diagram illustrates the PI System Architecture, showing the flow of data from external sources through various layers to the core PI system components.

Top Layers:

- BUSINESS SYSTEM** (Dark Blue Bar)
- BUSINESS GATEWAY** (Light Gray Bar)

PI system (Yellow Background):

- Data Access Layer** (Dark Blue Bar)
- Process Book** (Green Bar)
- Data Link** (Green Bar)
- Coresight** (Purple Bar)
- Advanced Computing Engine** (Red Text in Blue Bar)
- HA / Redundancy** (White Text in Blue Bar)
- Notification** (Red Text in Blue Bar)
- PI Asset Framework** (Red Text in Blue Bar)
- PI Archive "Historian"** (White Text in Blue Bar)

Other Data Sources (Blue Boxes):

- Other Data Sources (Data Bases, Tables, Systems, Web, etc.)** (Left)
- Other Data Sources (Data Bases, Tables, Systems, Web, etc.)** (Right)

Interfaces:

- INTERFACES (450+) – DCS, SCADA, PLCs, other data sources** (Gray Bar)

3rd Party Applications:

- 3rd Party Applications (PIMS, ORION, Signatime)** (Orange Bar)

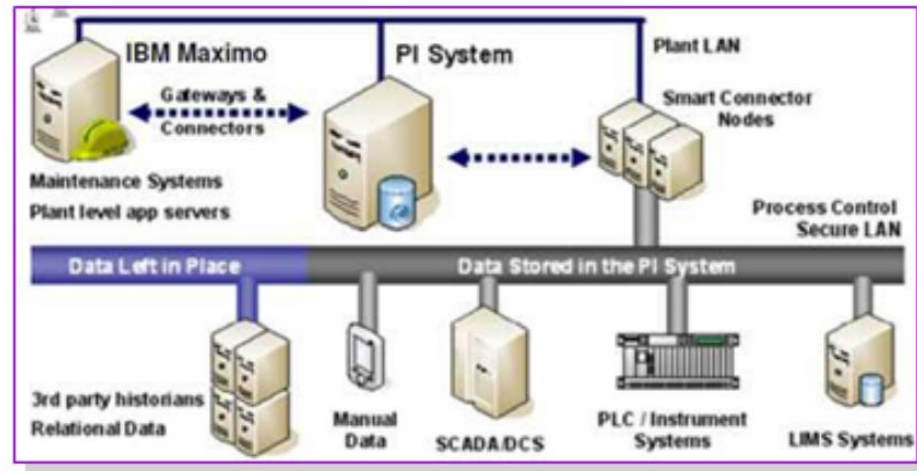
Developed Applications in PI:

- Developed Applications in PI** (Green Bar)

Images:

- Offshore oil rig
- Oil pumpjack
- Offshore oil platform
- Oil tanker ship
- Industrial refinery
- Industrial refinery

- SCADA
 - Operational statistics
 - Power usage
 - Load Management
- DCS
 - Remote Assets
 - Intelligent Componentry
- Real Time Operations & Events
 - OsiSoft
 - Event Capture Systems
 - PLC Systems
- Integration to other Business Applications
 - Financial
 - Spatial
 - Document Management



**Too Much Tag Based Licensing.
Is Deterrent for Big Data & BI or IOT AI Integration**

SEGREGATED SYSTEMS CURENT STATUS – WHY NOT INTEGRATED ?

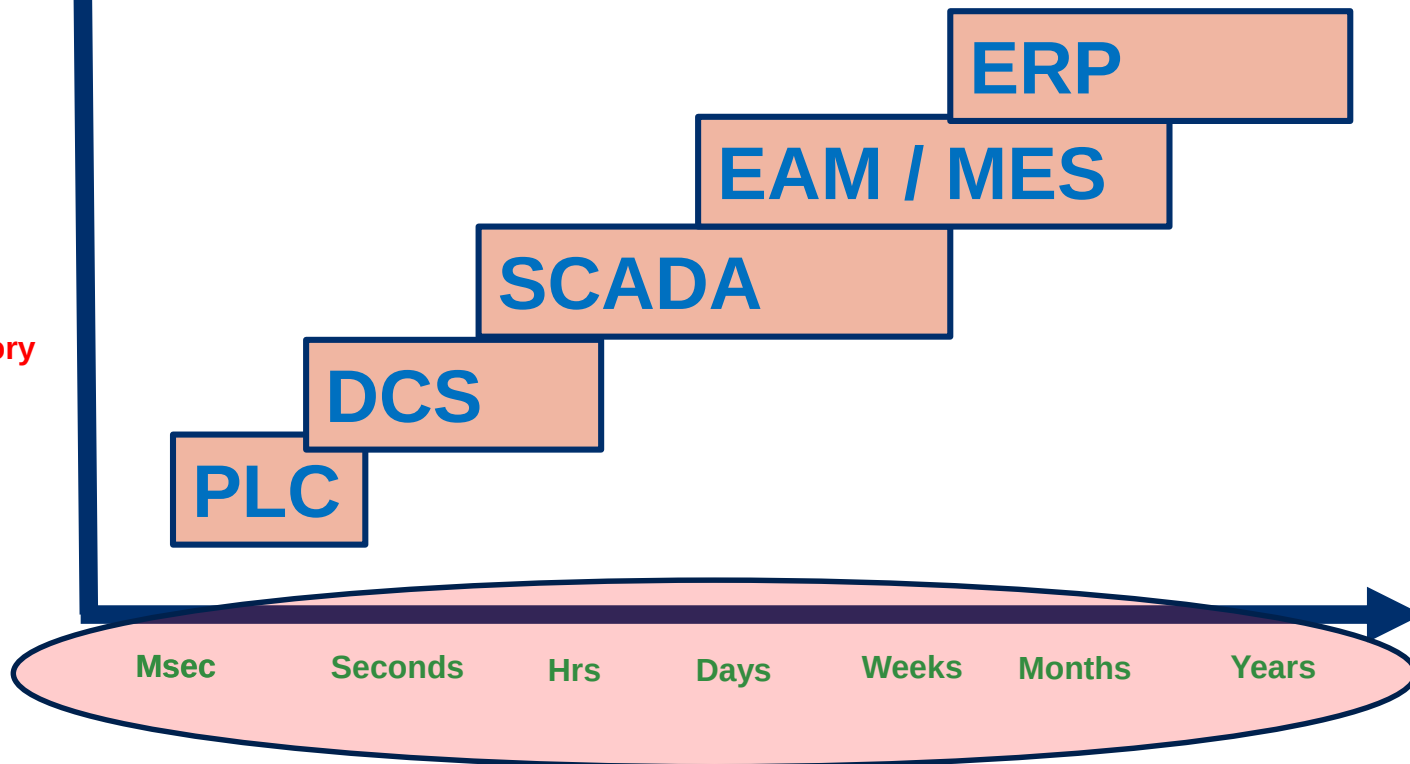
Hierarchy of Current Systems Incorrect ☹
Is Deterrent for Big Data & BI or IOT AI Integration

Planning
Level

Execution
Level

Supervisory
Level

Control
Level





INTERCONNECTED MESH

People, systems and objects can interact with each other in entirely new ways.



INSTRUMENTED

New abilities to measure, sense and see the exact condition of everything.

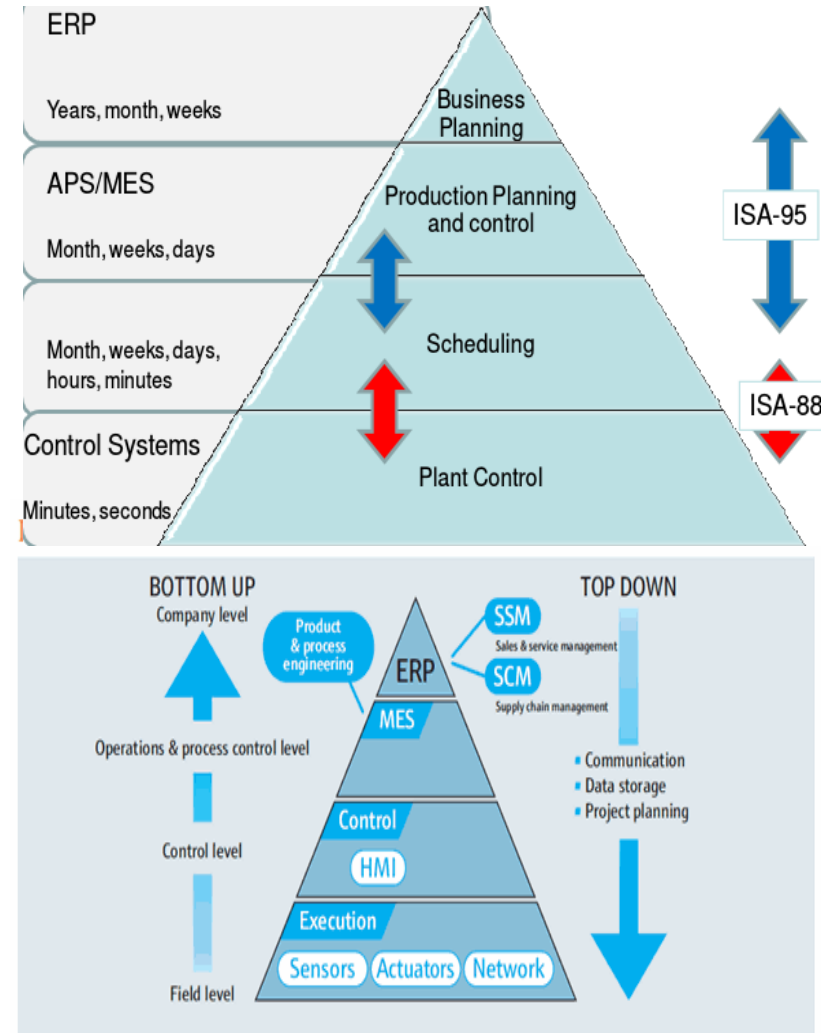
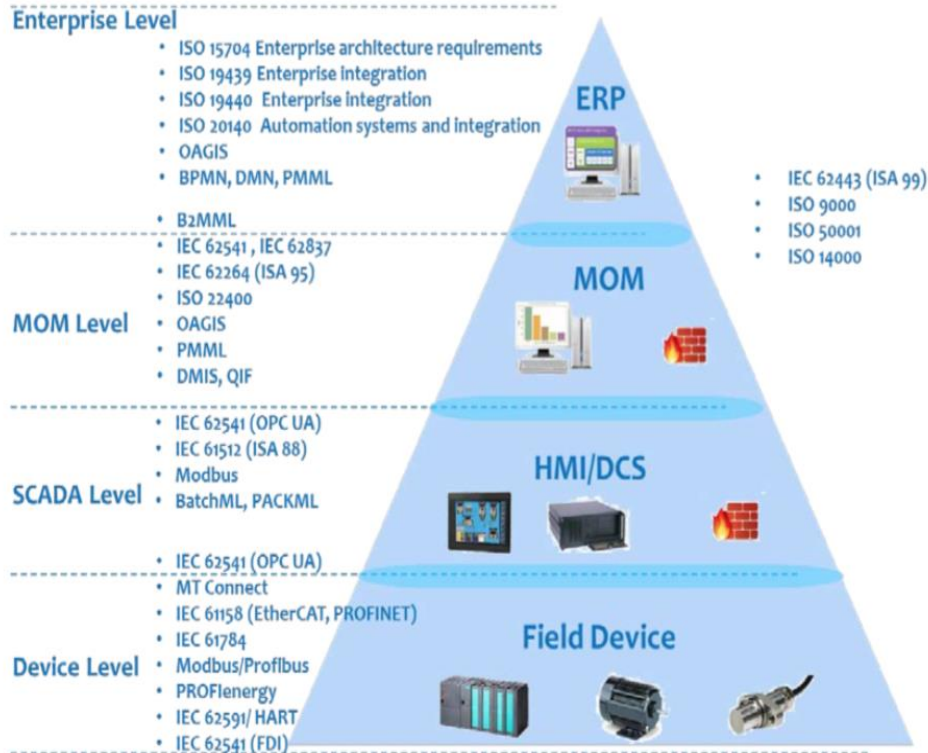


INTELLIGENT

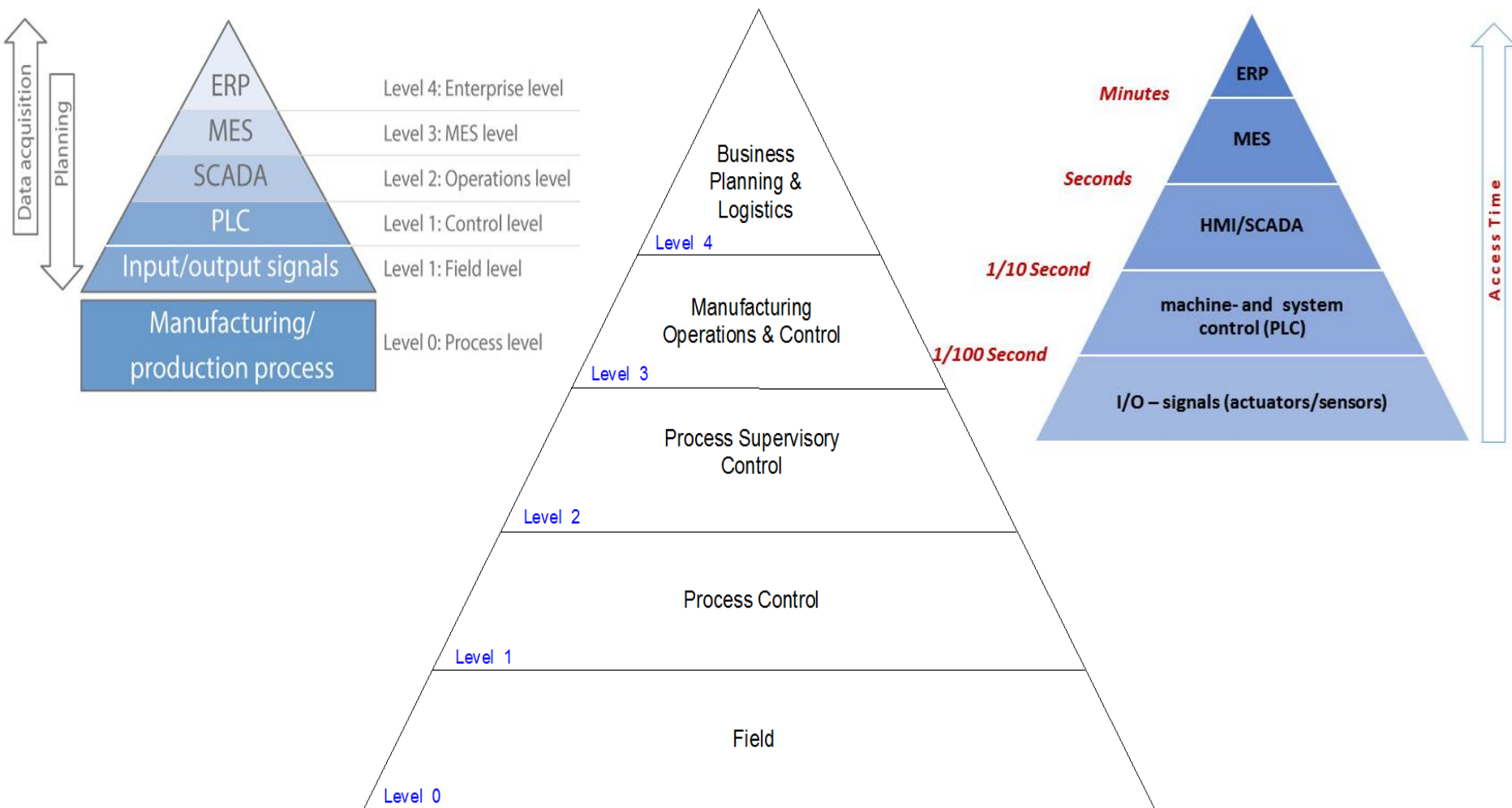
Processes & things can respond to changes quickly and accurately optimizing for future events.



STORY OF PYRAMIDS – HIERARCHY X.....:☹



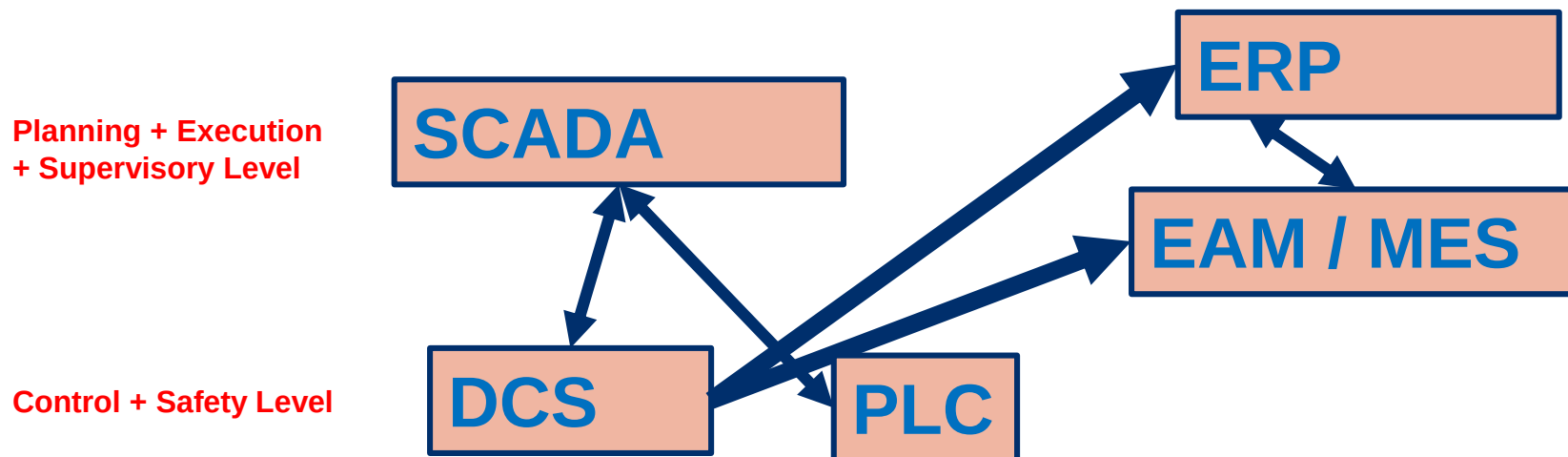
ONLY DIFFERENCE IS TIME – ULTIMATELY ALL IS ONE



MESH SYSTEM – WHY NOT INTEGRATED – FUTURE ?

Integrated System ☺

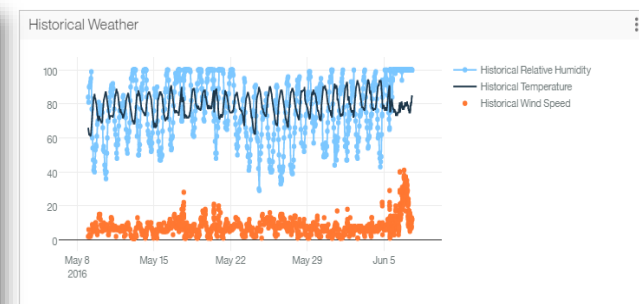
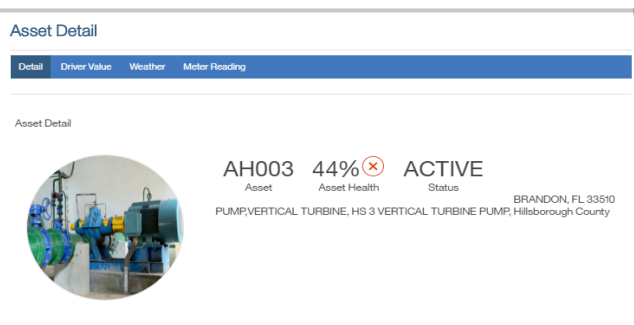
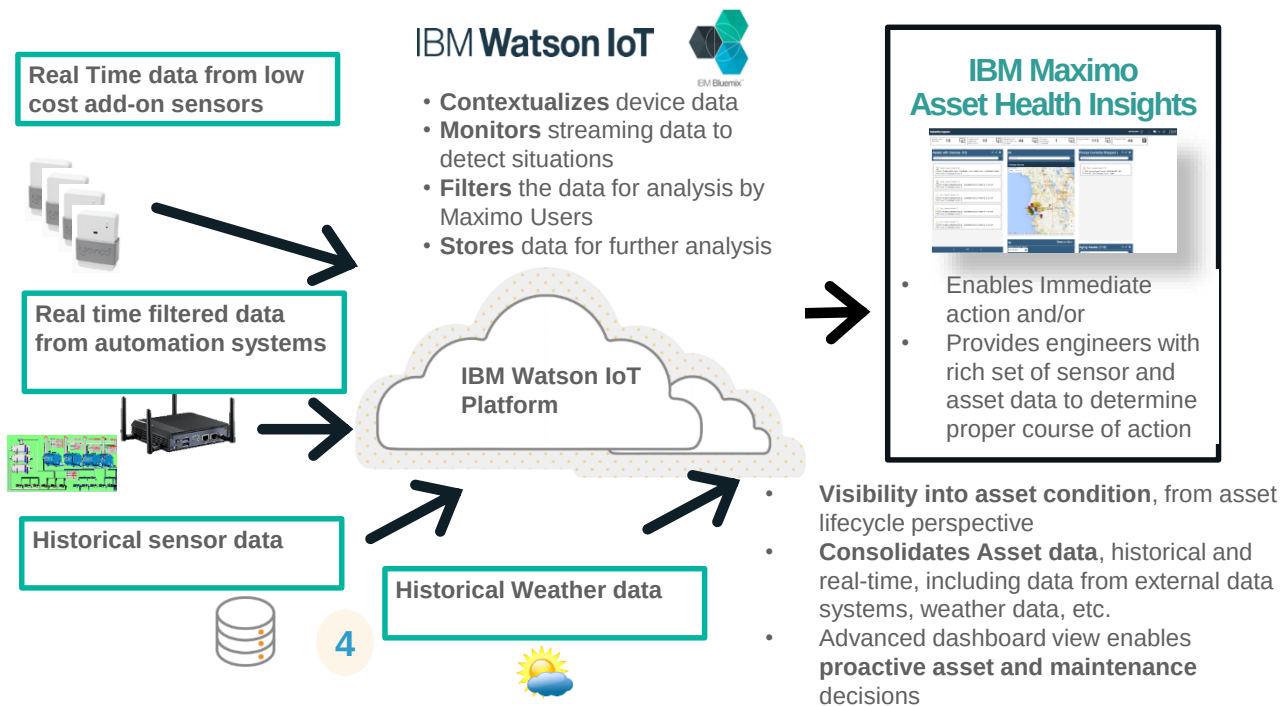
Is Ready for Big Data & BI or IOT AI Integration



Time Integration – Just a Mathematical Function



OPTION TO USE AI/ IoT IBM WATSON



SUBSCRIBER MODELS ARE NOT WHAT WE LIKE ☹

Maximo Asset Health Insights is New Maximo IoT Platform

Subscribe to warnings and notifications for response to Asset issues prior to failure.

Define Asset Health using data from many sources including Maximo and Real-time

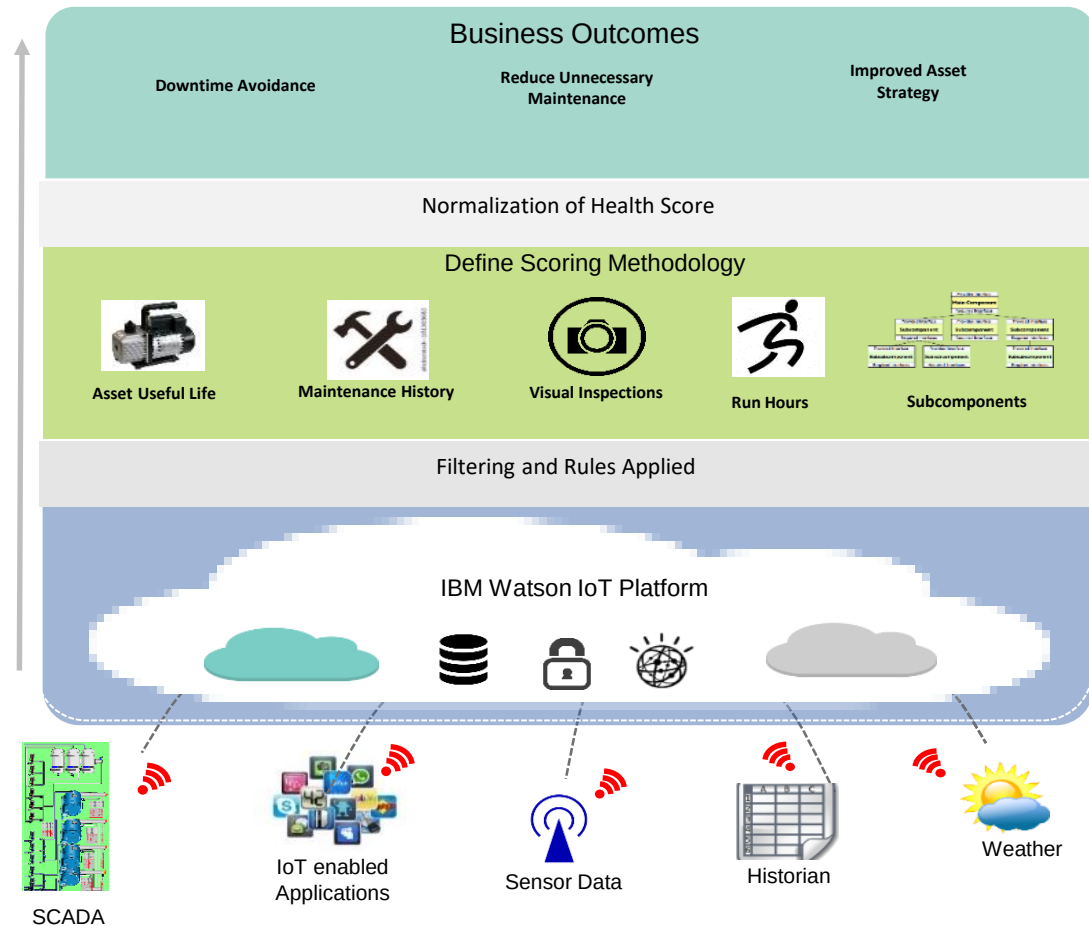
- Remaining useful life
- Maintenance and failure history
- Asset Condition based on real time and historical information

Leverage Historical Weather as a Key Element in determining Asset Health

Minimize unnecessary maintenance based on Asset Health score.

Insights to determine repair vs. replace

**Too Much SUBSCRIPTION
Based AI , IBM Watson is
Good. But...
Do we want Cloud to take Our
Decisions ?
Is Deterrent for Big Data & BI
or IOT AI Integration**

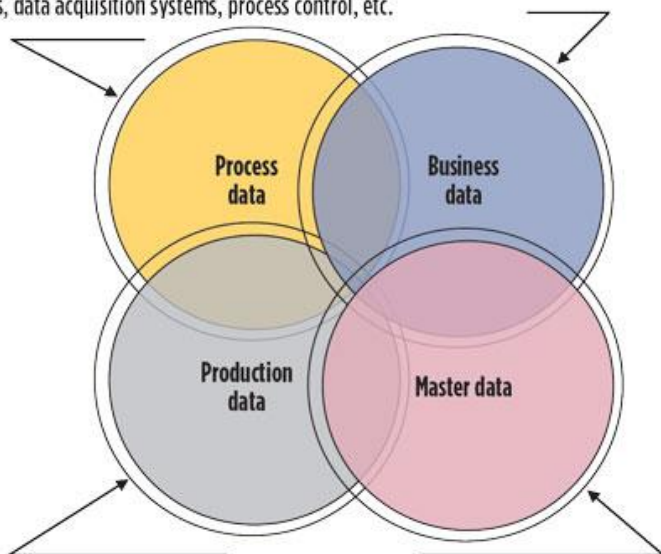


Planned 3Q 2018

TIME IS THE ISSUE – ENGINEERING STATIC DATA ?

Raw data from edge devices, instrumentation and control systems, data acquisition systems, process control, etc.

CRM, ERP, finance, sales, etc.



Processed data from production systems, LIMS, energy, yield accounting, etc.

Governance information, HSE, planning and scheduling, asset data, customer services, etc.

1. Static Data

- Defines the infrastructure and their configuration for process control
- Signal tags to interface with process databases, DCS and higher level controls and optimizers
- Defines feasible paths to use various elements for a transfer process

2. Real-time Data

- Controls and monitors all transfer operations
- Control and Monitors all state and status of field elements (Pumps valves, analyzers, switches, etc.)
- Generates performance and transfer reports at end of the process

3. Historical Data

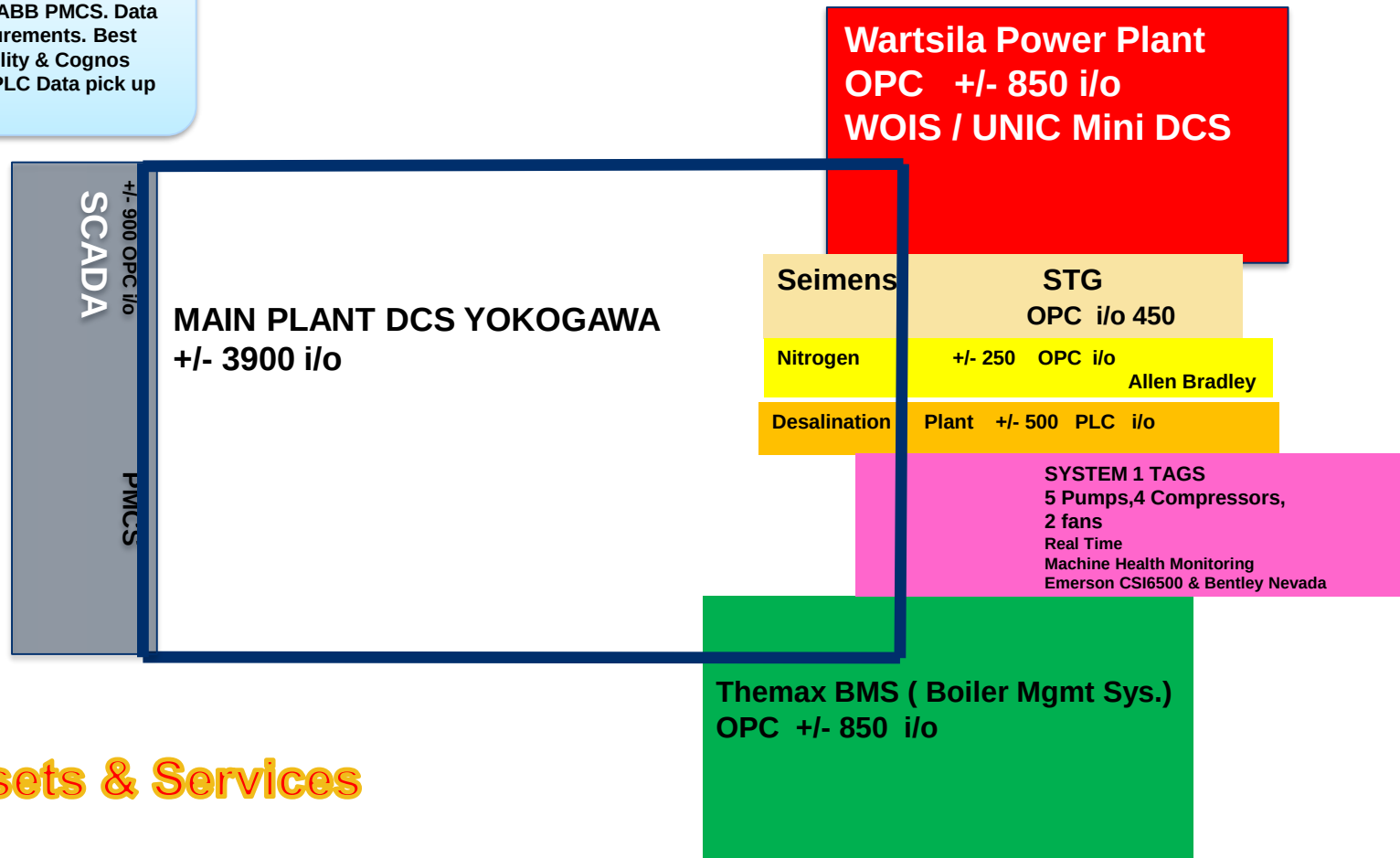
- Collects all real-time data of all tanks inventory, oil movement transfers, Blending operations
- Facilitates in KPI tracking
- Suitable for simulation studies and process improvements
- Makes data available to users online using analytic and dashboard tools

ALL ENGINEERING AND HSE DATA IN MAXIMO READILY AVAILABLE ON DASHBOARD



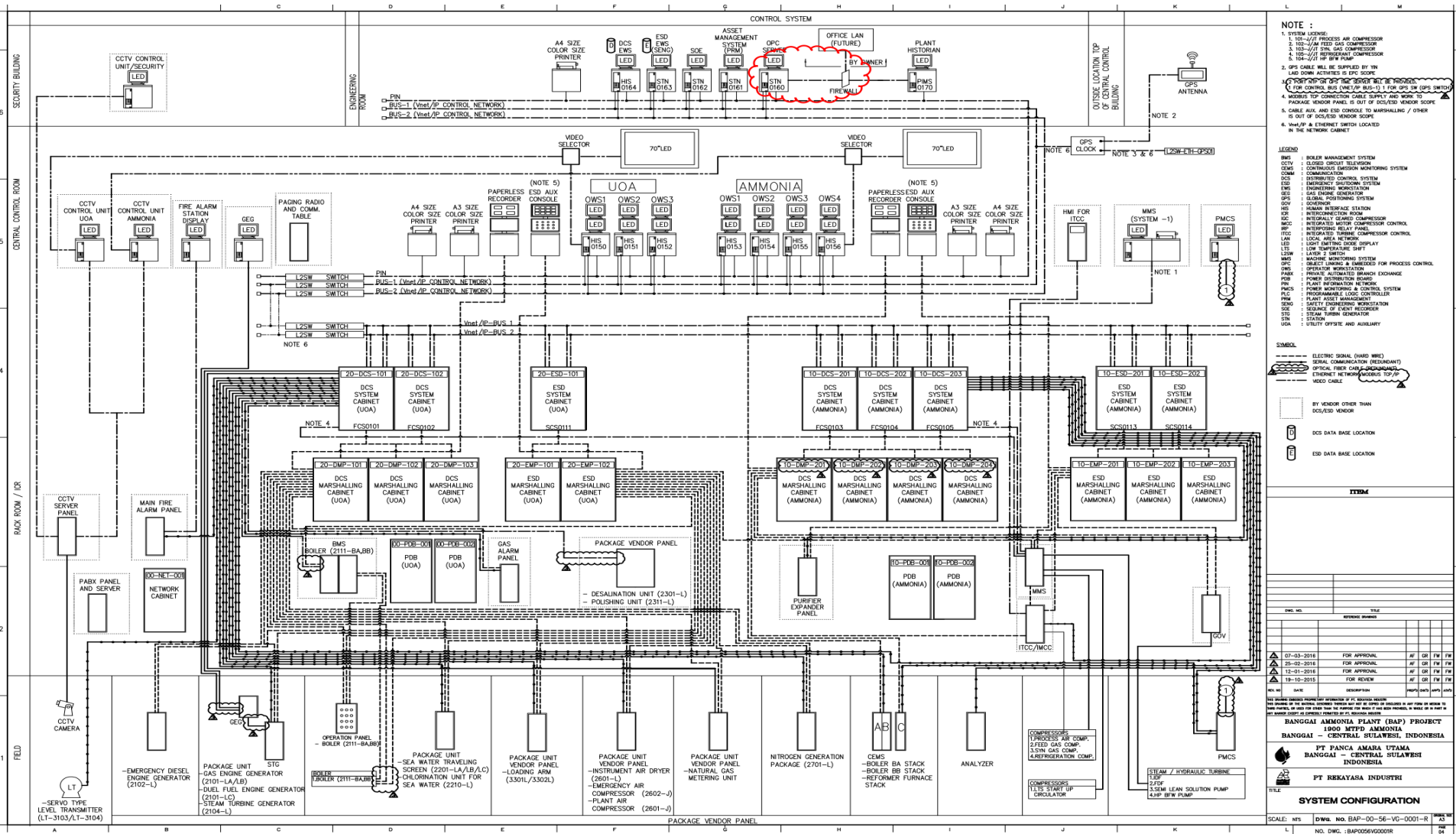
DATA SETS MANAGEMENT MESS

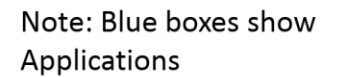
Note : Data sets Available on Exa-Quantum , or OPC or on ABB PMCS. Data overlaps for some measurements. Best set for Work Flow Reliability & Cognos Reporting to be Picked. PLC Data pick up as Exceptions only



P&ID Assets & Services

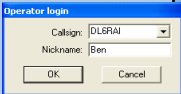
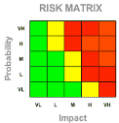
DCS SYSTEM CONFIGURATION-YOKOGAWA



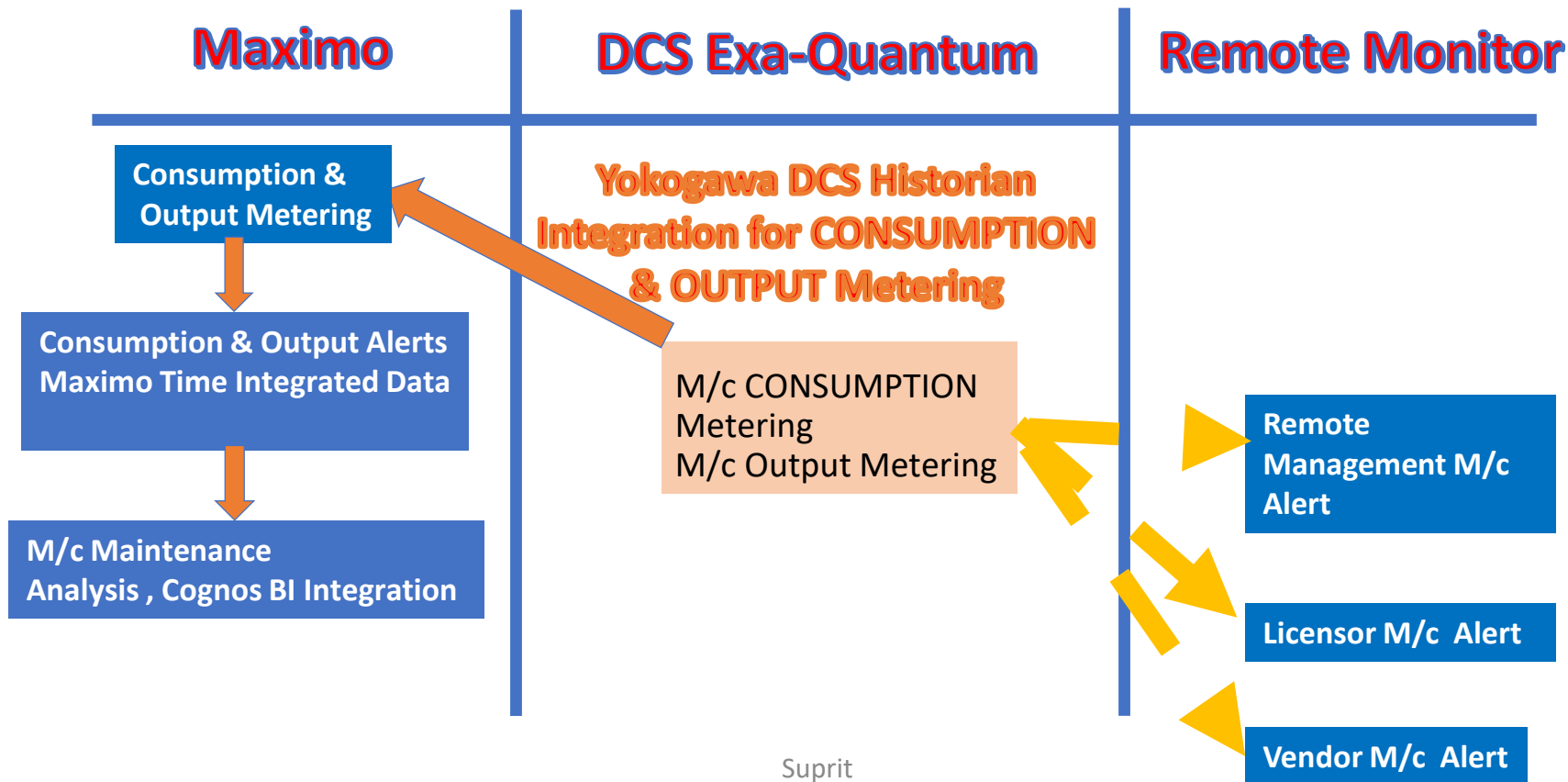


MAXIMO NEW VERSIONS AND ENHANCEMENTS

What is Maximo Health, Safety and Environment Manager?

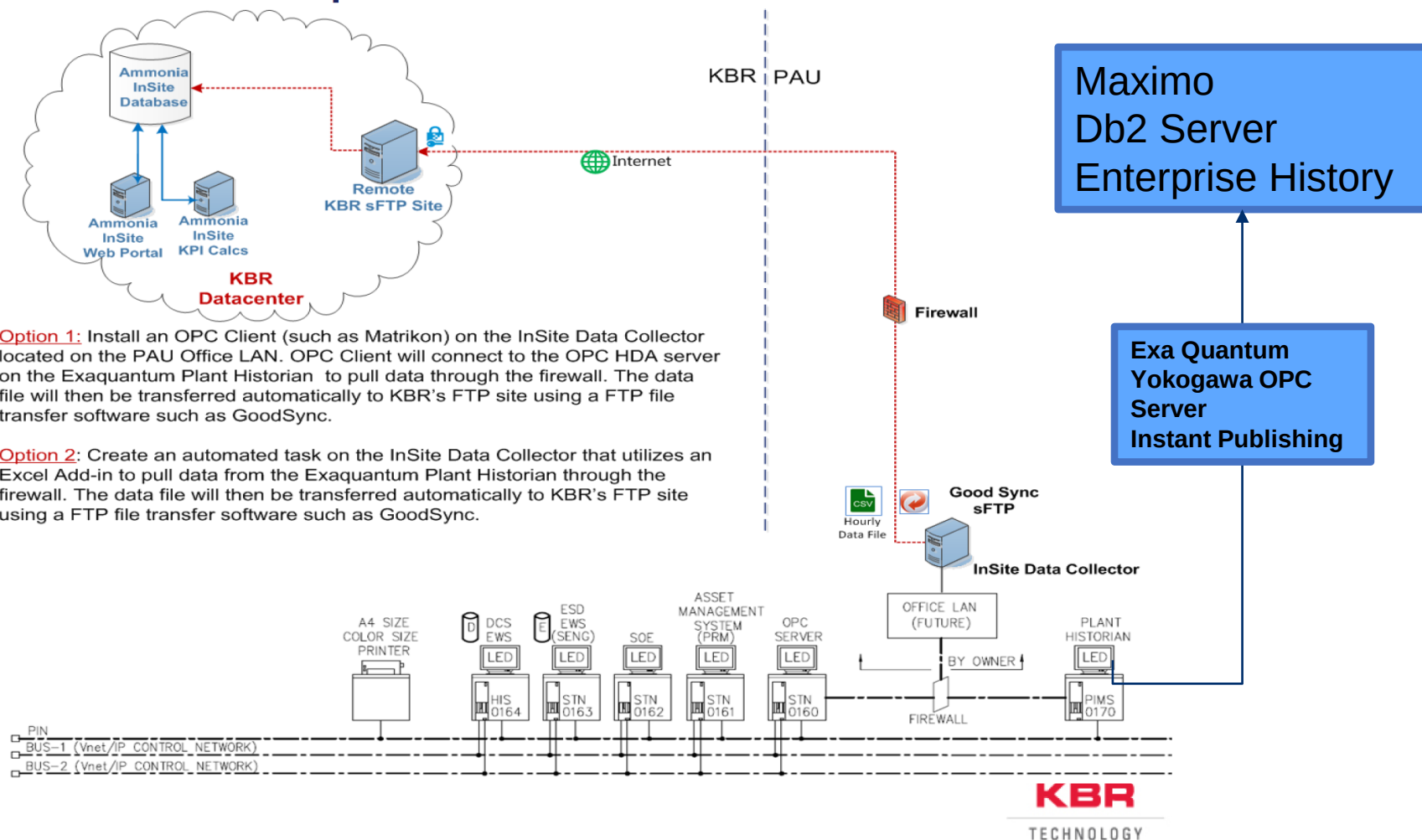
Incident Management 	Operating Procedures 	Competency Management 	Failure Reporting 
Investigations 	Operating Policy 	Operators Log 	Solutions 
Change Management 	Risk Assessment 	Personnel Certification Tracking 	Defect Elimination 
Non-Conformance Management 	Risk Matrix 	Action Tracking 	Bypass Management 
Regulatory Compliance 	Location Profile 	Benefits & Losses 	Certifications 
Preparation Activities 	Improvements 	Lock Out and Tag Out Plan 	Permit to Work 

DCS ExaQuantum as Main PIVOT

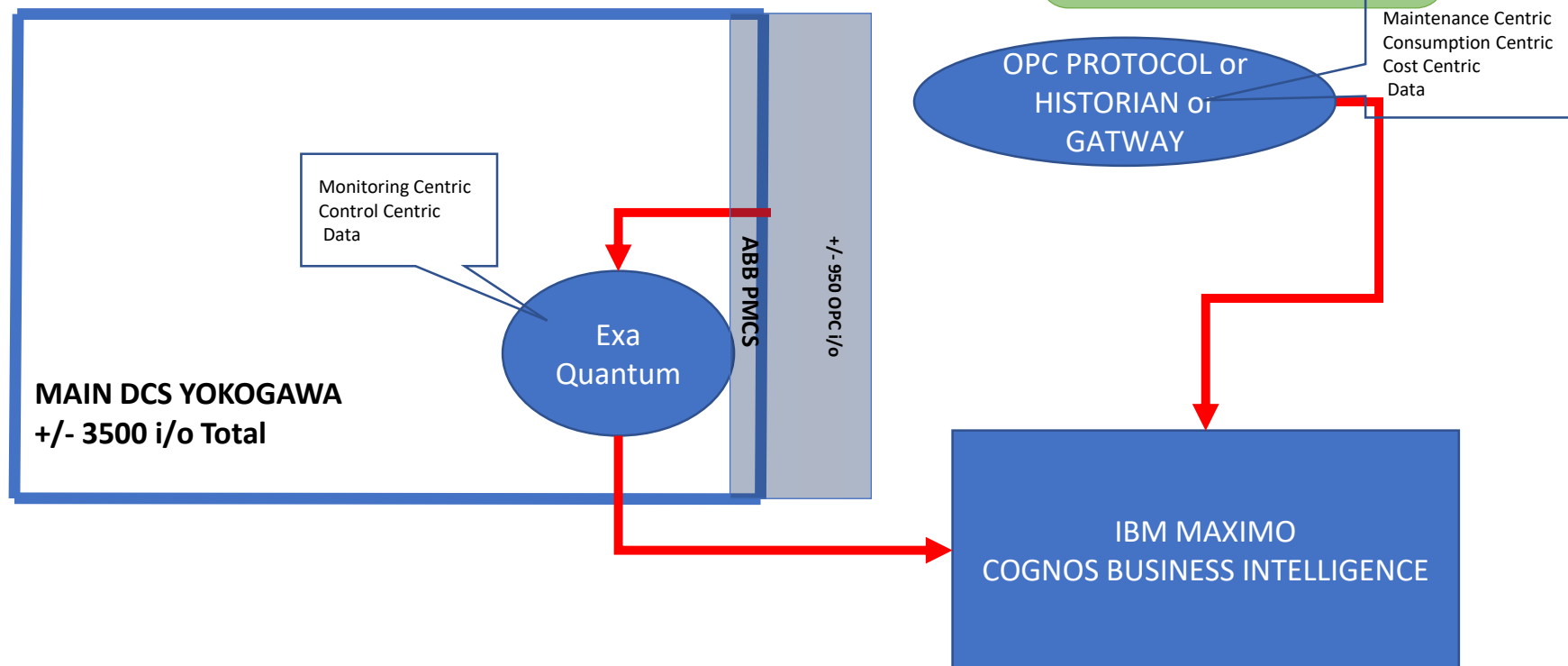


Suprit

Proposed Data Collection



PMCS DATA SETS MANAGEMENT



PMCS POWER MANAGEMENT & CONTROL SYSTEMS

Maximo

Maximo Plant Wide Data
Plant Operations Server Data
Base
Data Integration
Maintenance Work Orders
Operations Weekly /
Daily Snap Shot

Power Analysis
Area Wise Power consumptions
Power Outputs
Parasitic Losses Reporting
Cognos BI Integration & Analysis

SCADA PMCS

Data Integration

SLD Bus Total Up-Time
Power Data
Parasitic Losses
KwHr Historian

Note : All Power Breaker Tags Exist on
ABB Mini DCS System which is called
PMCS (Power management and Controls
System) . Some Tags exist Parallel on
Yokogawa DCS also.

Real Time System

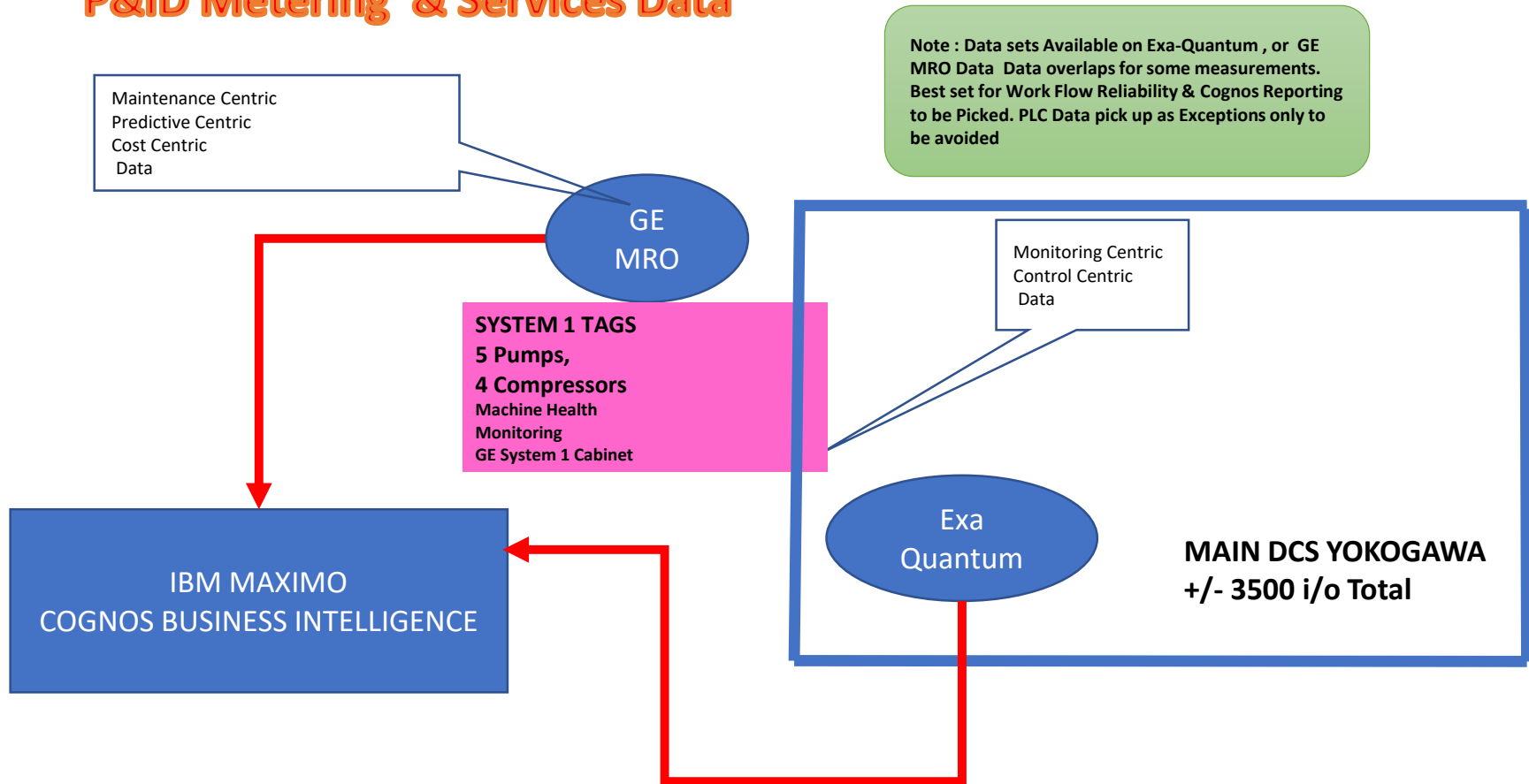
Granular Breaker Power Data

Area Wise Amalgamation

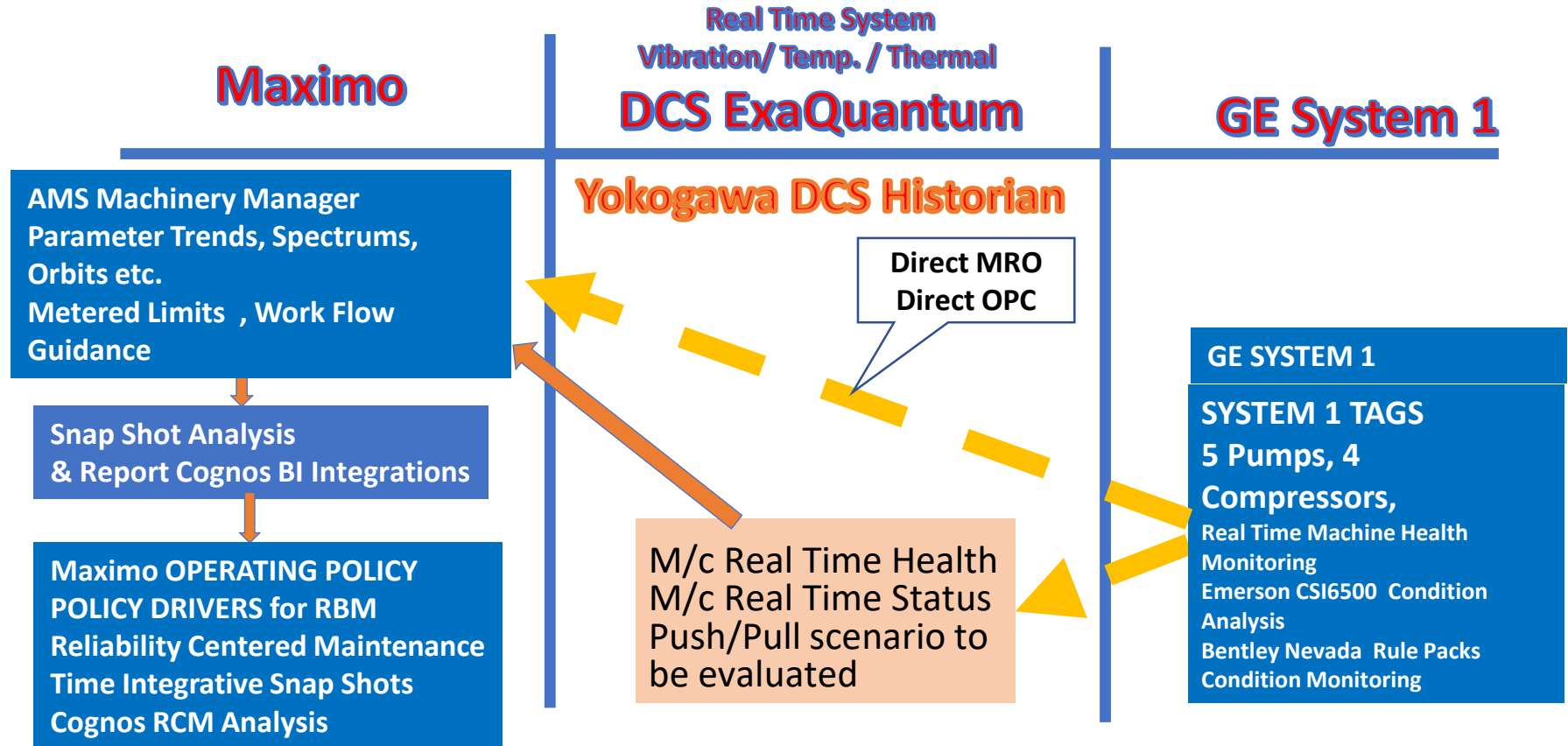
Historical / Intermittent Trends

GE SYSTEMS DATA SETS MANAGEMENT

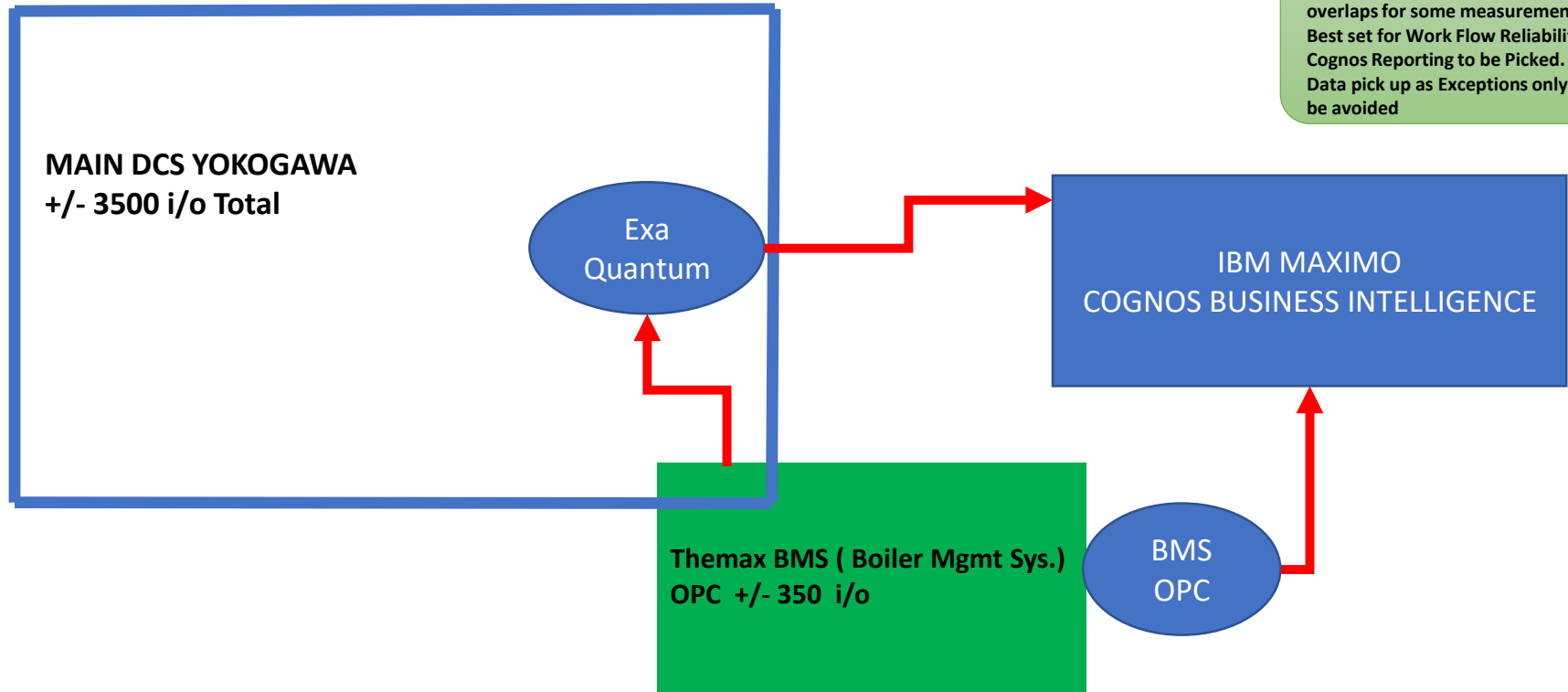
P&ID Metering & Services Data



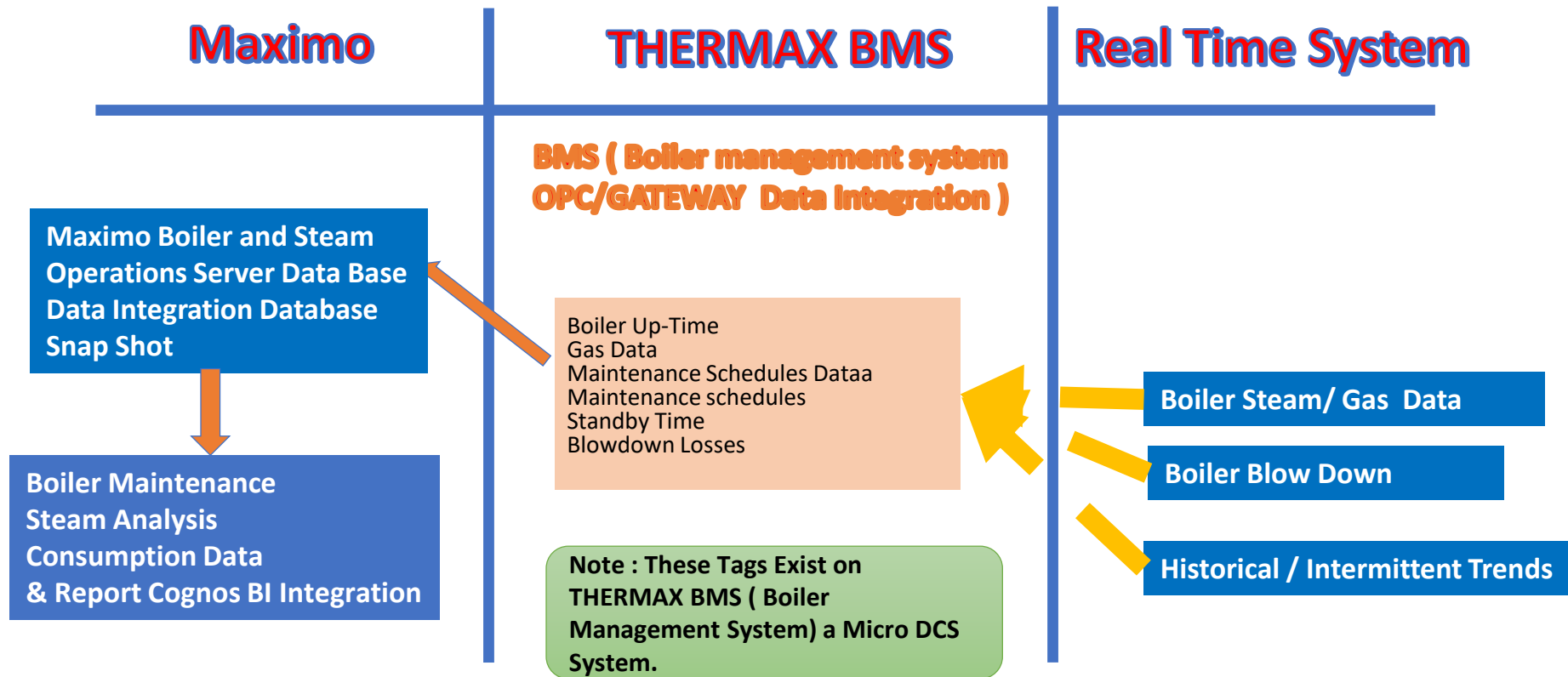
REAL TIME CONDITION MONITORING ADDED



THERMAX DATA SETS MANAGEMENT

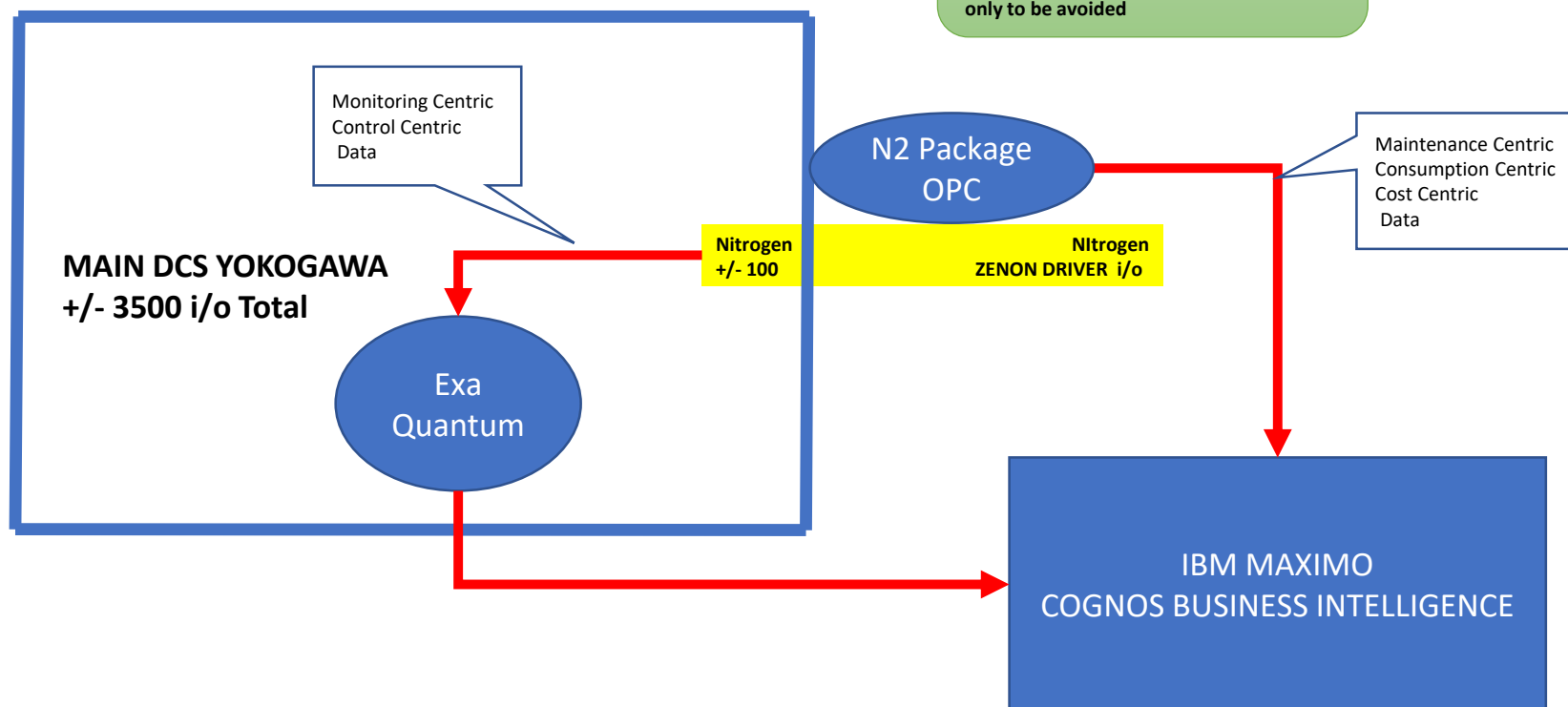


Note : Data sets Available on Exa-Quantum , or Themax. Data overlaps for some measurements. Best set for Work Flow Reliability & Cognos Reporting to be Picked. PLC Data pick up as Exceptions only to be avoided



N2 PLANT DATA SETS MANAGEMENT

Note : Data sets Available on Exa-Quantum , or Air Liquide OPC Data overlaps for some measurements. Best set for Work Flow Reliability & Cognos Reporting to be Picked. PLC Data pick up as Exceptions only to be avoided



Maximo

Maximo Plant Wide Data
Plant Operations Server Data Base
Data Integration
Consumption & Costs
Maintenance Work Orders
Operations Weekly /
Monthly Snap Shots

Nitrogen Services Analysis
& Cognos Integration

Nitrogen Plant @ OPC Available

Data Integration Air Liquide OPC Data

Up-Time/ Dn-Time
Consumptions Data
Maintenance Data
Longterm Anamoly Metering
N2 Output Metering

Note : Only For Important Tags not
on Yokogawa DCS , these Tags Exist
on Air Liquide Integrated PLC
Control System.

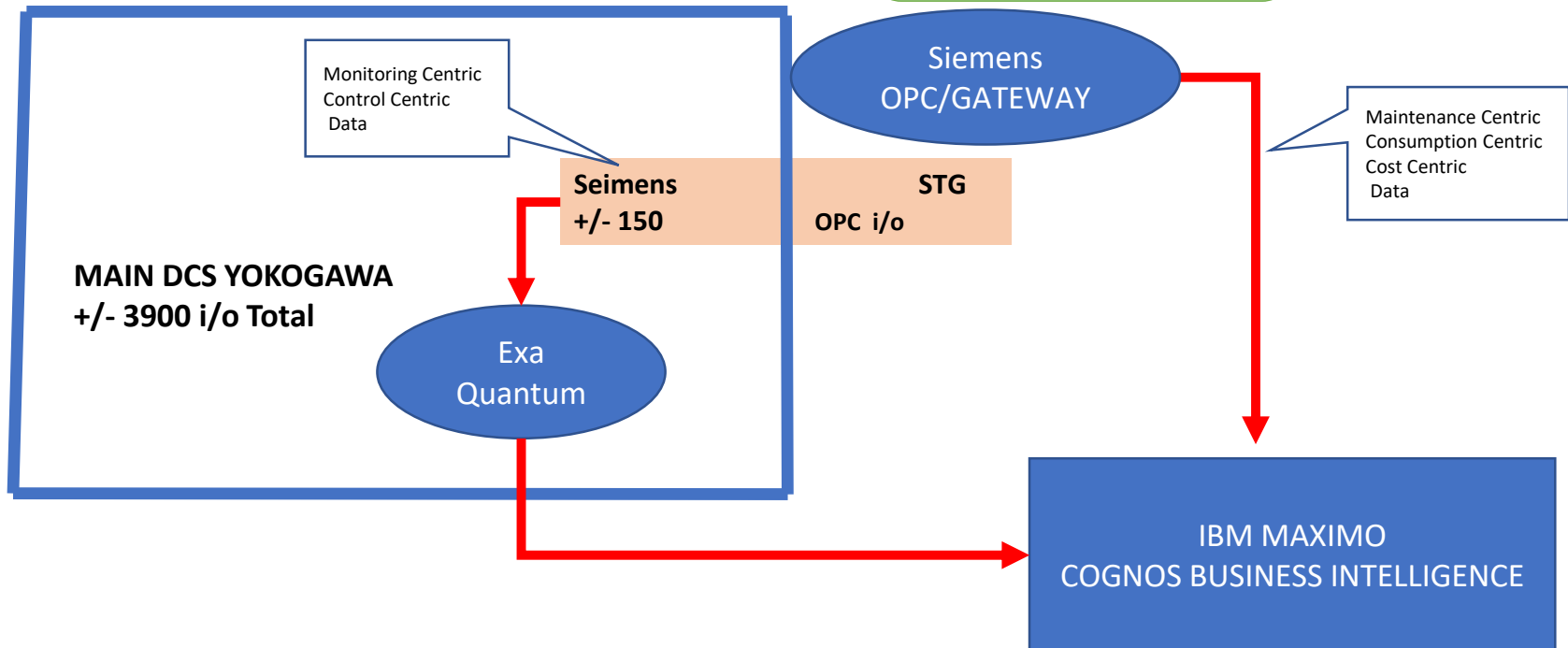
PLC System

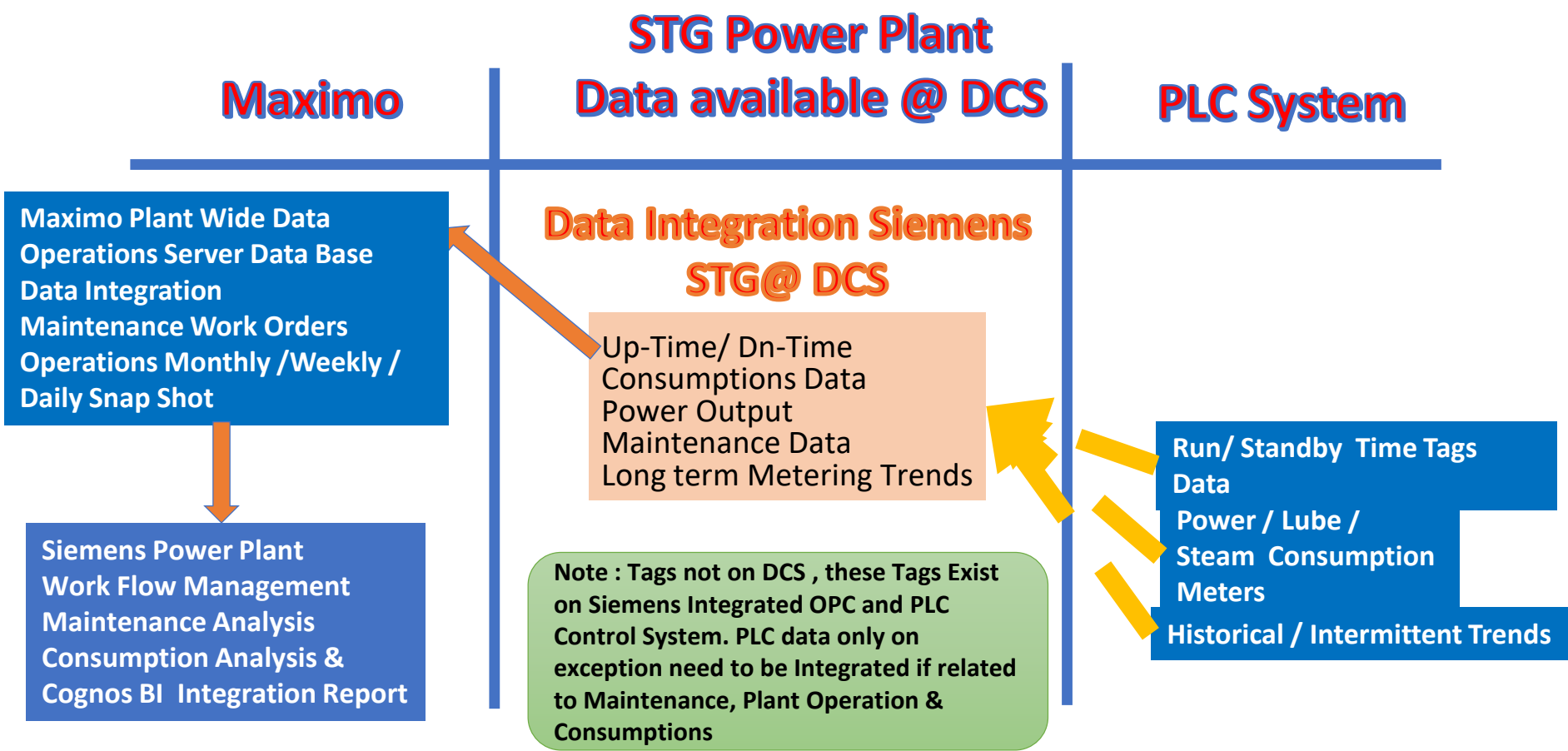
Run/ Standby Time Tags
Data
Power / Chemicals
Consumption Meters

Historical / Intermittent Trends

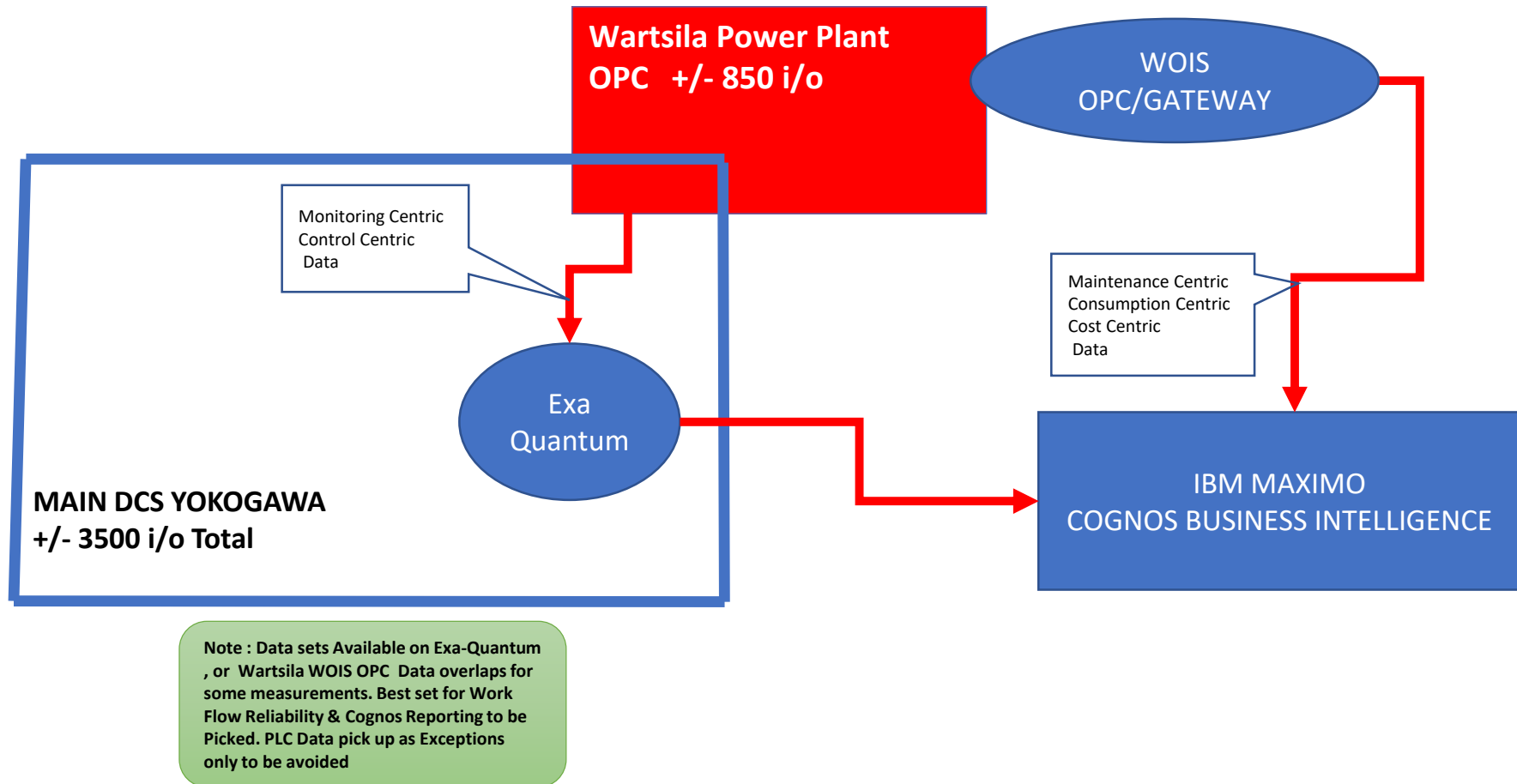
SIEMENS DATA SETS MANAGEMENT

Note : Data sets Available on Exa-Quantum , or Siemens OPC Data overlaps for some measurements. Best set for Work Flow Reliability & Cognos Reporting to be Picked. PLC Data pick up as Exceptions only to be avoided





GEG/DFEG DATA SETS MANAGEMENT



CAPTIVE POWER PLANT INTEGRATION

Maximo

Maximo Plant Wide Data
Plant Operations Server Data Base
Data Integration
Maintenance Work Orders
Operations Weekly / Daily Snap Shot

GEG/DFEG Power Plant

**Wartsila Data
Integration with WOIS/
OPC or GATEWAY**

Up-Time/ Dn-Time
Consumptions Data
Power Output
Maintenance Data

Note : These Tags Exist on Wartsila
WOIS Mini DCS System and can be
OPC Pick up

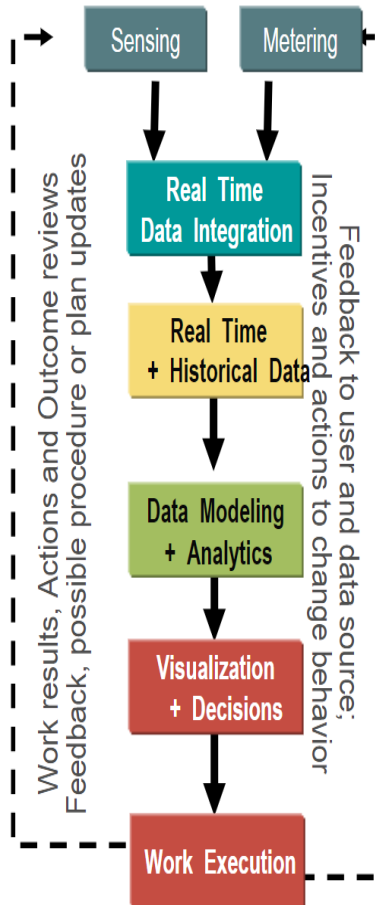
PLC System

Run/ Standby Time Tags
Data
Power/ Lube/ Diesel
Consumption Meters

Historical / Intermittent Trends

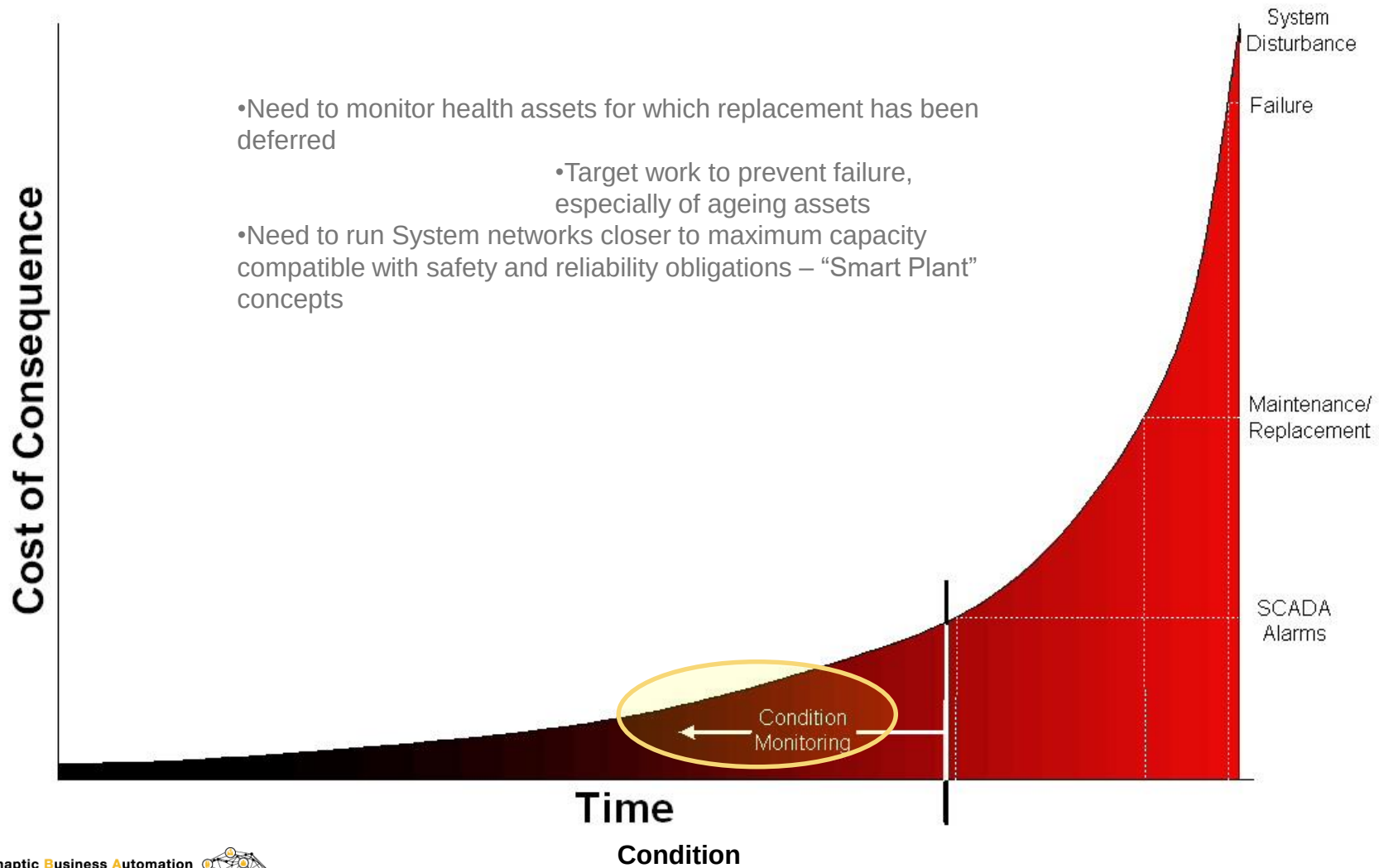
Asset performance management is much more than just an EAM application

- ## Work underway to leverage predictive analytics within Maximo Asset Health



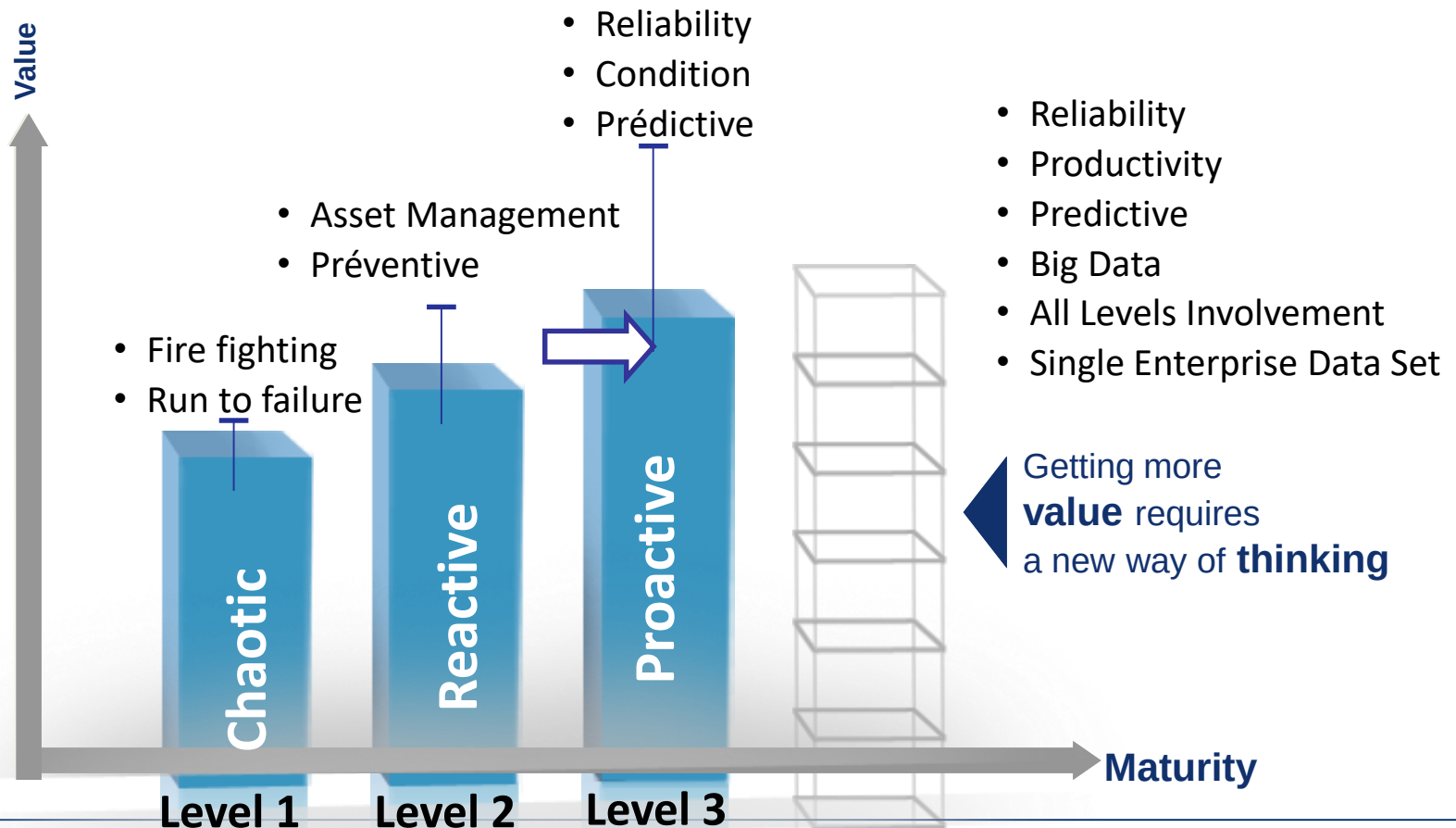
- Real-time monitoring of data
- Detection of issues within the Plant
- Predictive models
- Anticipate and circumvent outages
- Automate and optimize processes and improved decision support

What Are We Trying to Achieve ?



Asset Management Maturity Levels

Strategic aim is to be the foremost INTERNATIONAL company – BE much ahead in EAM Maturity as compared to global landscape. Start Ab –Initio at a Maturity Level 2 and aspiring to go beyond Level 3 and Interconnected Meshed Enterprise Asset as well as Productivity Management



Real time and
Historical Sensor
data



Asset
STATIC
DATA
Information



Asset Health

Condition data is enhanced when combined with contextual information to give a more perfect picture of Asset Health

- Real time sensor data from the equipment via individual sensors (add-on or embedded)
- Real time sensor data or alerts from SCADA systems combined with DCS Historian Data
- DCS Historical trends of sensor data from historian or other data repository
- Inspection data that might include measurements, observations, photos gathered manually or from mobile devices
- Maintenance history of the asset
- Related information such as environmental (temp, humidity, etc.), weather, usage, output

Maximo condition triggers can be enhanced with link to SCADA Systems or DCS System

- Software product that provides connectivity to Control Systems (SCADA, PLC, BMS) via a wide range of industry standard protocols such as OPC, BacNet, COPADATA , OSI Soft etc.
- Enables mapping of sensors to assets in Maximo
- Allows data from control systems to be sent to Maximo's Condition Monitoring module
- Includes MQTT Integration to enable:
 - Possibility of using IBM Message Sight for efficient and secure remote site connectivity
 - Possibility for providing data to the IBM Watson IoT Platform
- Ability to define simple rules for notifications or for creating Maximo work orders/service requests

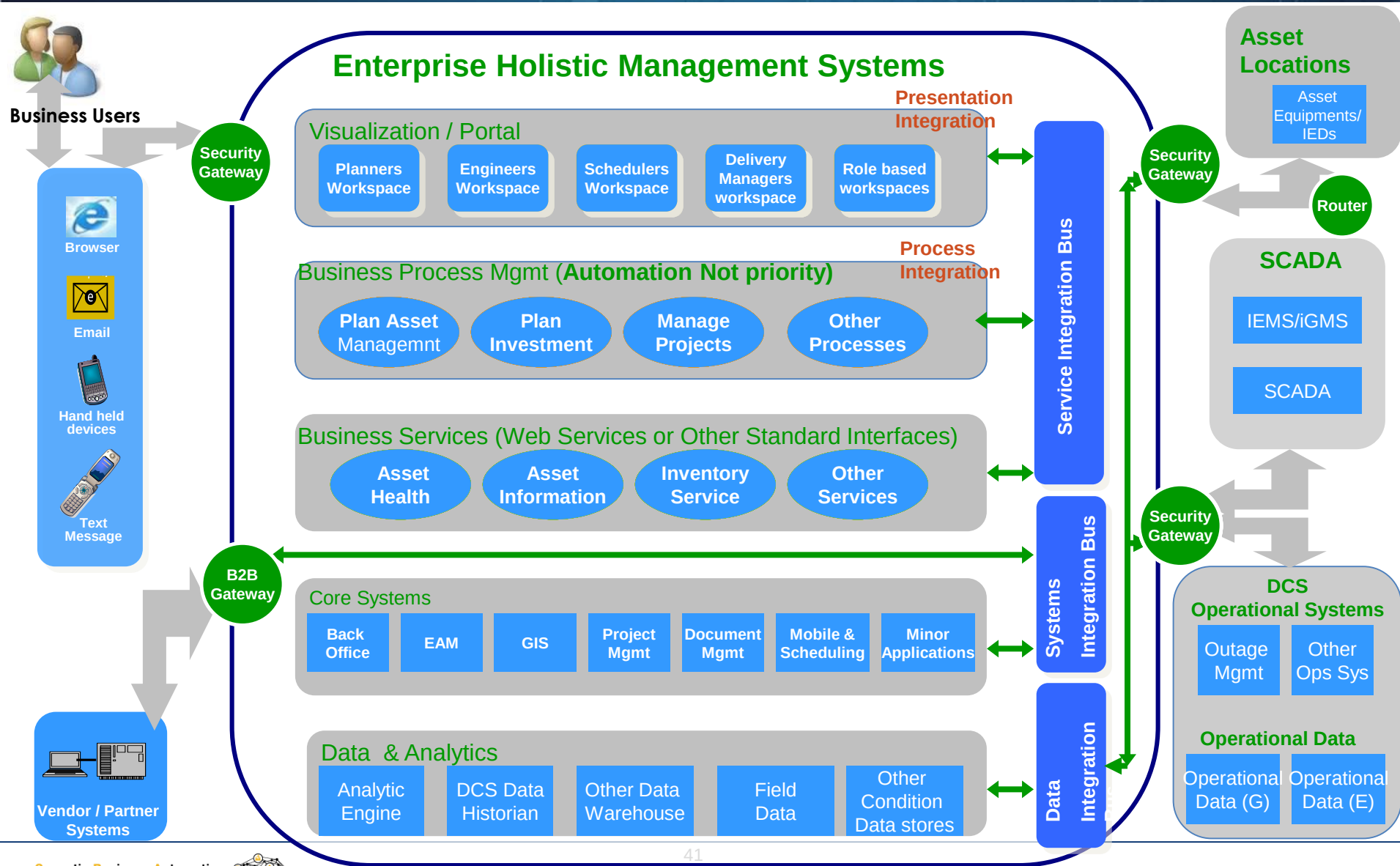
Reduces need for physical inspections or meter readings

Rapid connection of SCADA information into Maximo

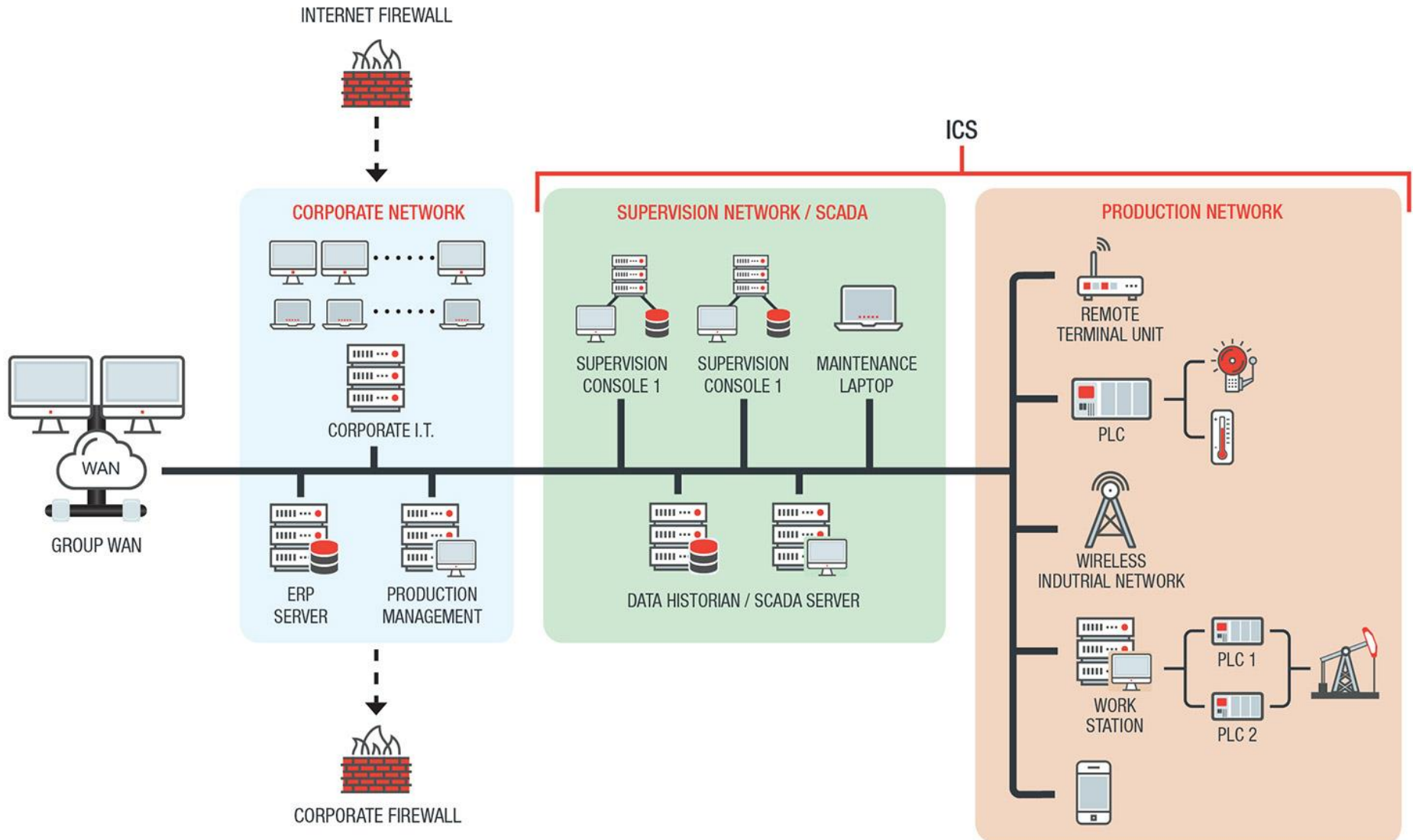
Data can be used for trend analysis to optimize preventive maintenance

Highly scalable, capable of measuring millions of data points across multiple sites

INTEGRATION – HARMONY - HOLY GRAIL ?



EVERYTHING CONNECTED IS OUR FUTURE

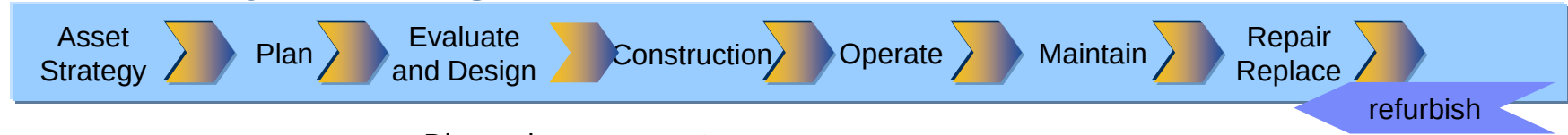




Innovation and Partnerships Go Together
Single Integration Solutions not Available Currently
Efforts are Collaborative and Teams are Essential
Bringing Together Ideas is Progress , DATA has to be brought together also.
Big Data Analysis needs Data integration and Interchange

MAXIMO OUT OF BOX CAPABILITY (SPARE SLIDE)

Asset Lifecycle Management



- Some of the Assets can be refurbished and brought back into AM Lifecycle

- Total lifecycle costing
- Performance improvement analysis

- EAM Solution
- Condition/ time based maintenance

- Asset performance management
- Total asset visibility

- Disposal management assessment

- Asset management strategy development
- Performance management and KPI development

- Policies and standards development
- Portfolio asset management planning

- Capital program assessment model
- Computer Aided Facilities Planning

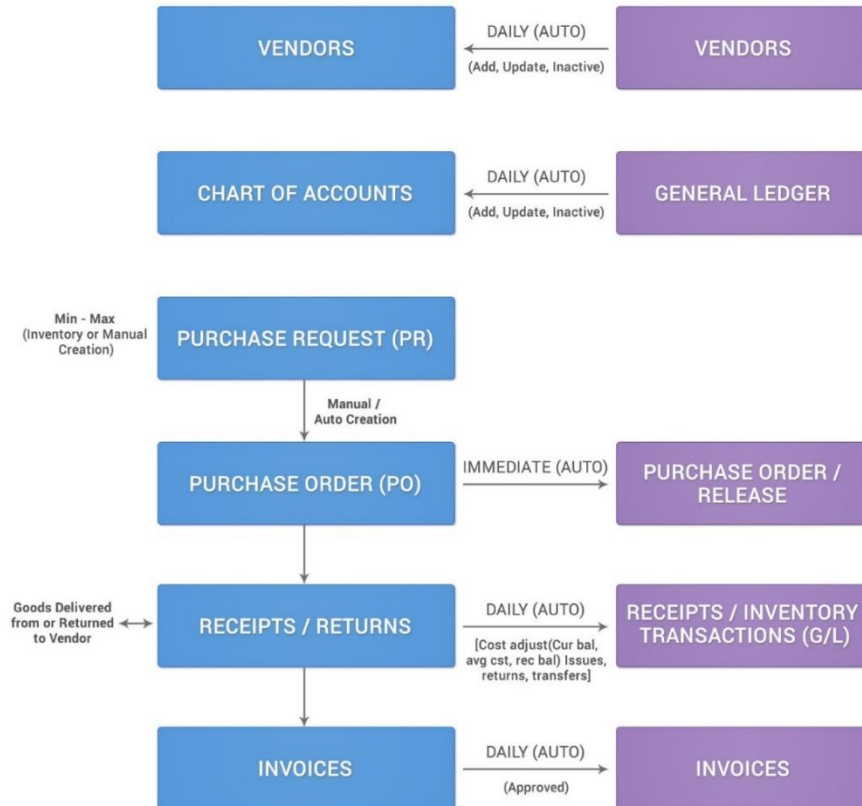
- Capital project management
- Procurement/project delivery Strategy



ERP AND EAM (SPARE SLIDE)

MAXIMO

MS DYNAMICS



Business Functions



Level 4
Business
Planning &
Logistics



Level 3
Manufacturing
Operations



Level 2
Plant Floor
Control

MESA WHITE
PAPER

Data Flow – ERP & MES



MESA WHITE PAPER

Most companies are aware of wasted work efforts and seek to eliminate it

Traditional preventive maintenance embraces a time based approach

- Consuming expensive resources
- Potentially introducing failure by disrupting stable systems

40% of preventive maintenance costs are spent on assets with negligible affect on uptime ¹

30% of preventive maintenance activities are carried out too frequently ²

45% of all maintenance efforts are ineffective ²

