

XHQ Operations Intelligence Software

XHQ Basic Development
3 days Agenda



Topics	Time Slot
Introduction to XHQ	
XHQ Information model and Architecture	09.00AM - 12.00AM
Introduction to XHQ Solution Viewer	
<i>Lunch Break</i>	12:00AM – 01:00PM
XHQ Development – Introduction	
XHQ Development - XHQ Model	
XHQ Development - Connection framework	01.00PM - 03.00PM
XHQ Development - Working with Collections	

Day 2- XHQ Basic Development Training- Work Shop



Topics	Time Slot
XHQ View Development- Concept and Approach	09.00AM - 10.00AM
<i>Hands-on Exercise</i> - Create Component (Information Model)	10.00AM - 11.45AM
<i>Hands-on Exercise</i> - Create Collection (Data source connection)	01.00PM – 04:30PM
<i>Hands-on Exercise</i> - Create View (Visualization)	
<i>Hands-on Exercise</i> - Review	04.30PM – 05:30PM

Day 3- XHQ Basic Development Training- Work Shop



Topics	Time Slot
XHQ View Development - Links <i>Hands-on Exercise</i>	09.00AM - 10.00AM
XHQ View Development - Advanced charts <i>Hands-on Exercise</i>	10.00AM - 11.00AM
XHQ Advanced charts, controls <i>Hands-on Exercise</i>	11.00AM - 12.00AM
Introduction to Mobile Development	01:00PM – 02:00PM

Topics	Time Slot
Introduction to XHQ ANS, TM and ELogs	09.00AM - 11.00AM
<i>XHQ BUT SON Project</i>	
Q&A	11:10AM – 12:00PM



XHQ: Operations Intelligence

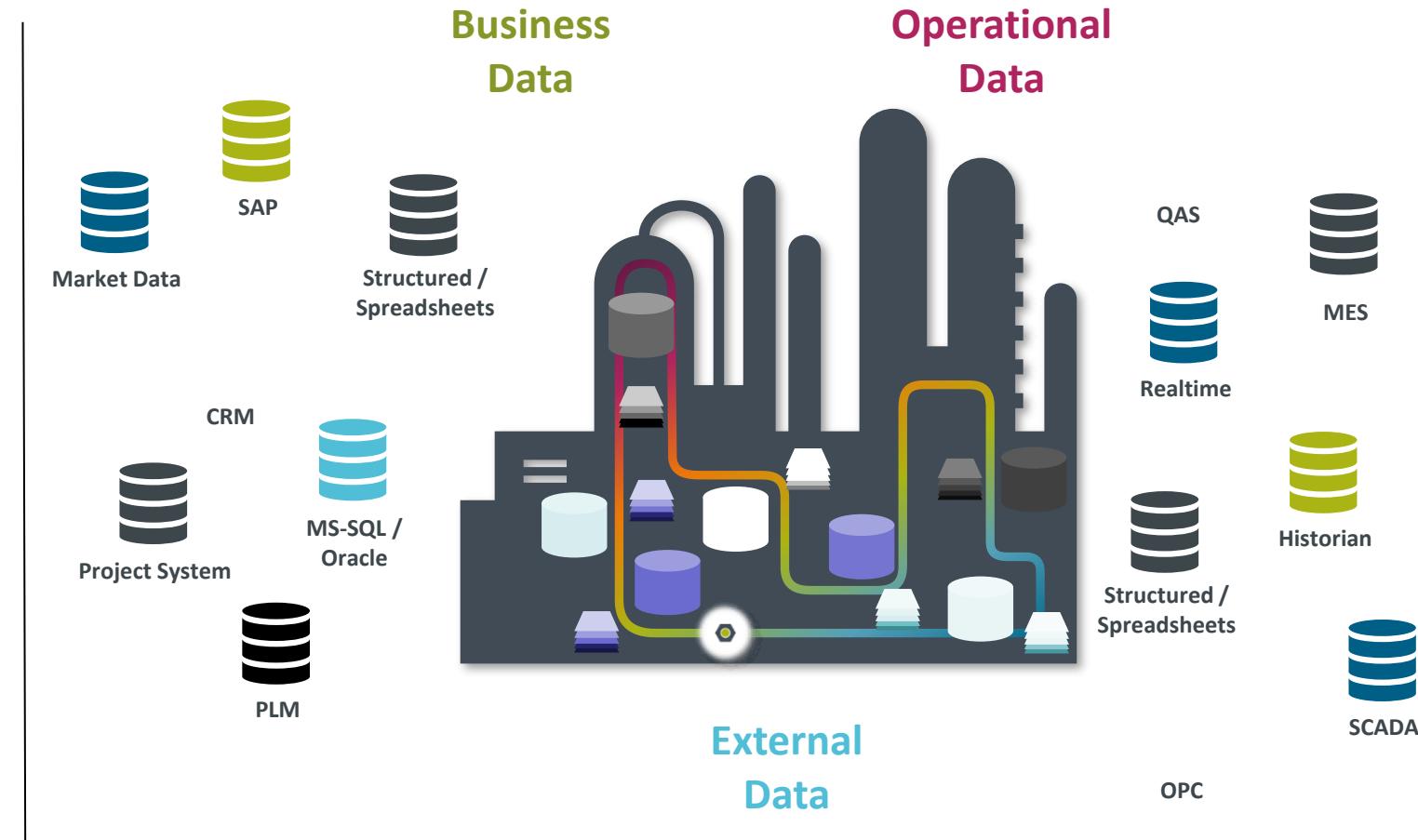
Introduction



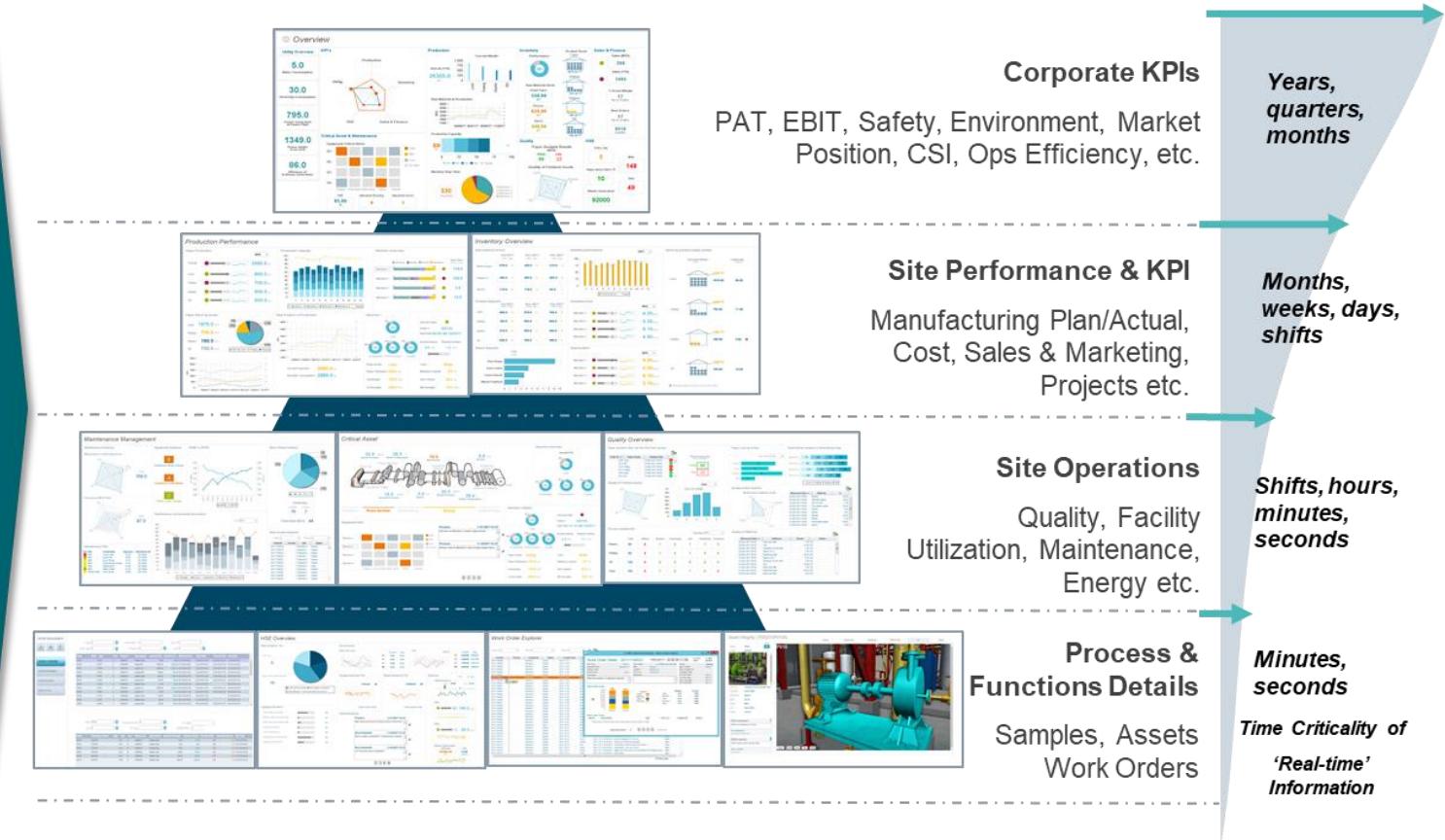
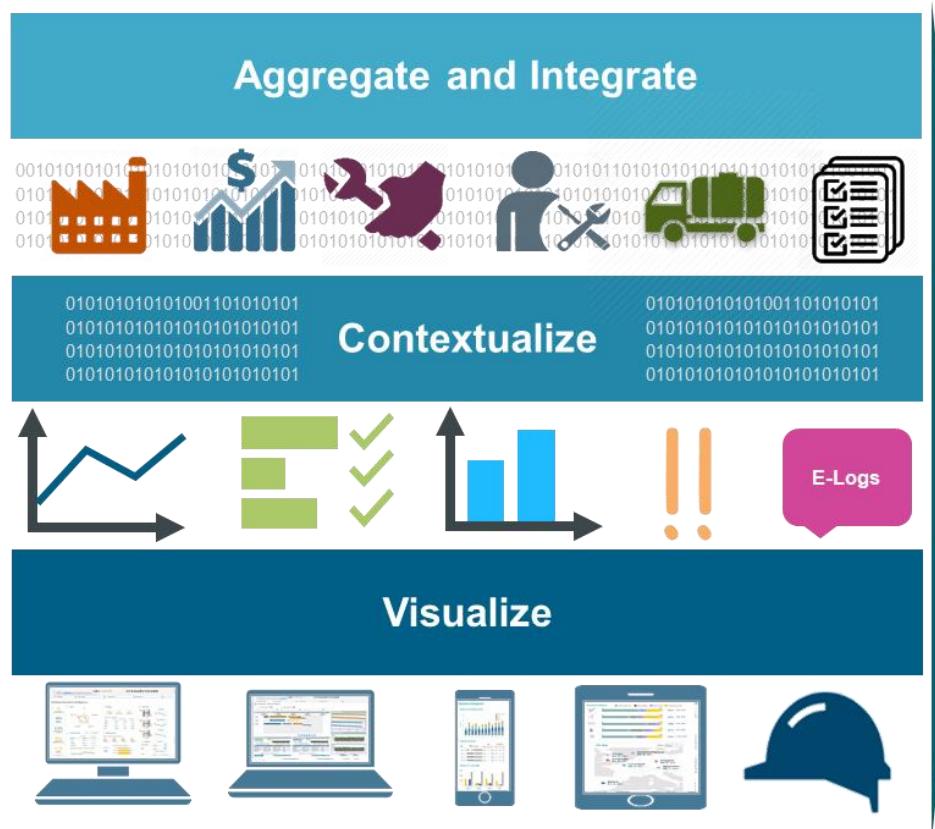
- XHQ Introduction
- Solution Architecture
- XHQ Features and Modules
- **Hands-on Exercise**
- Project References
- Use Case samples
- Solution Benefits

It is all about Data!

Data is everywhere but do you already make best use of that data?



XHQ integrates Data across your Organization Transforming the Data into Right Decisions



With real-time data integration, XHQ translates multiple data into meaningful, actionable, decision making information

XHQ Visualization (Samples)



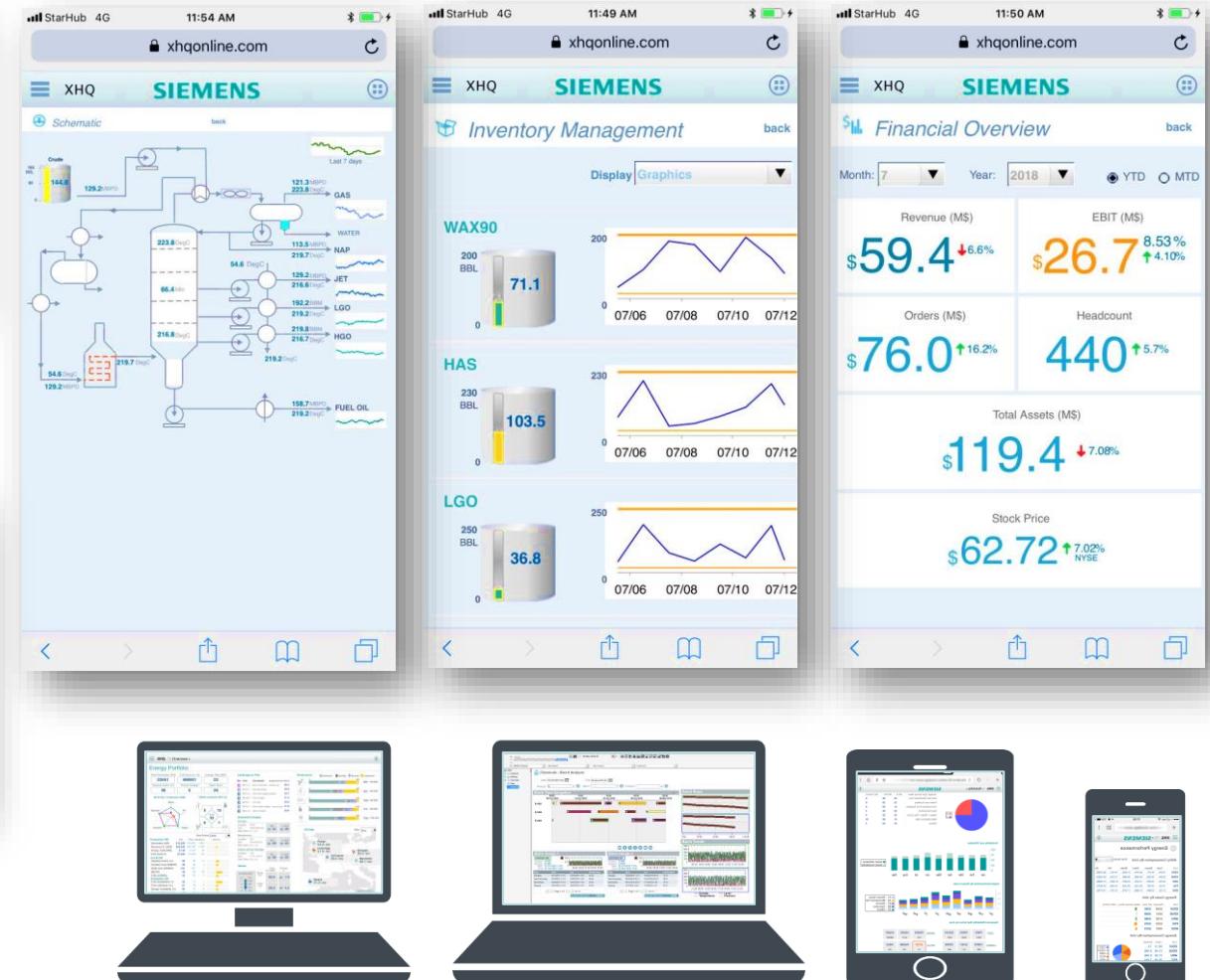
Command and Control Center



Interactive Plant Monitoring Screens



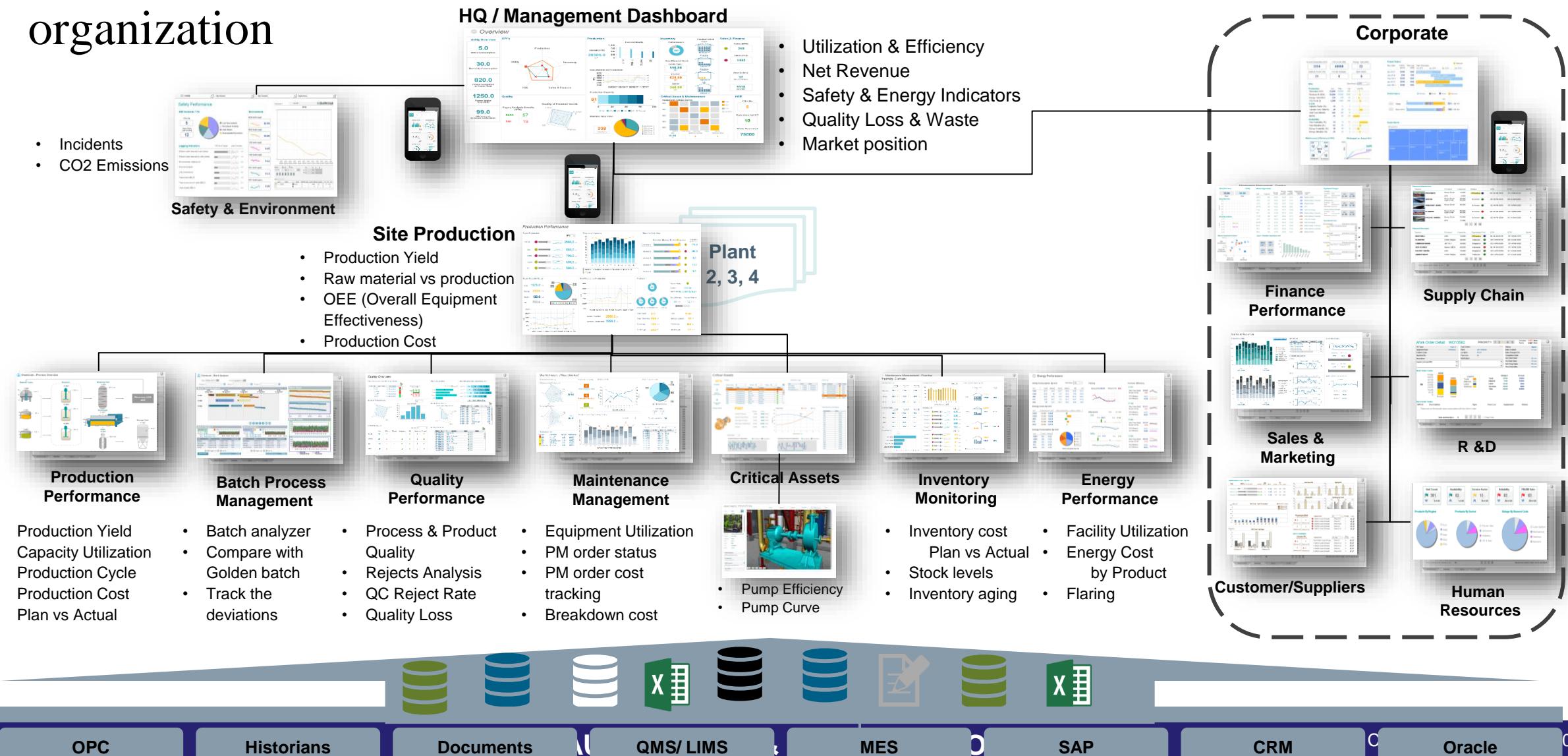
Using Smart Helmet (Augmented Reality based)



Mobile and laptop views
AUTOMATION & DIGITALIZATION

XHQ Solution: Enabling Data Driven Decisions

Making Better Decisions, Anytime and Anywhere in the organization

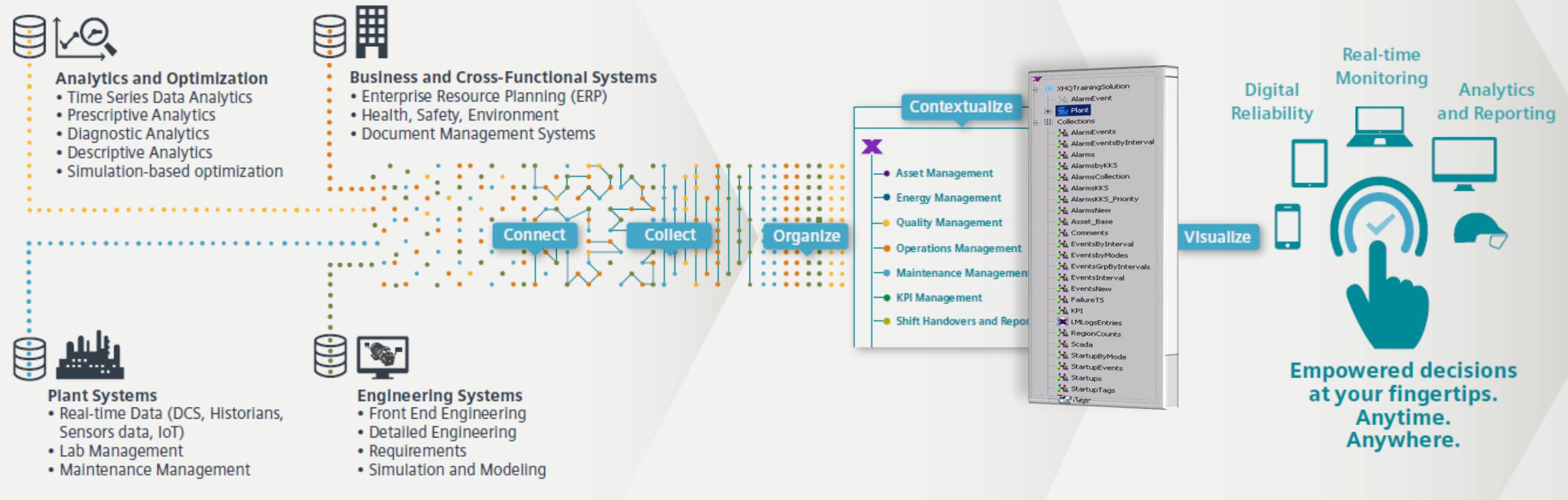




XHQ
Architecture

Functional Architecture

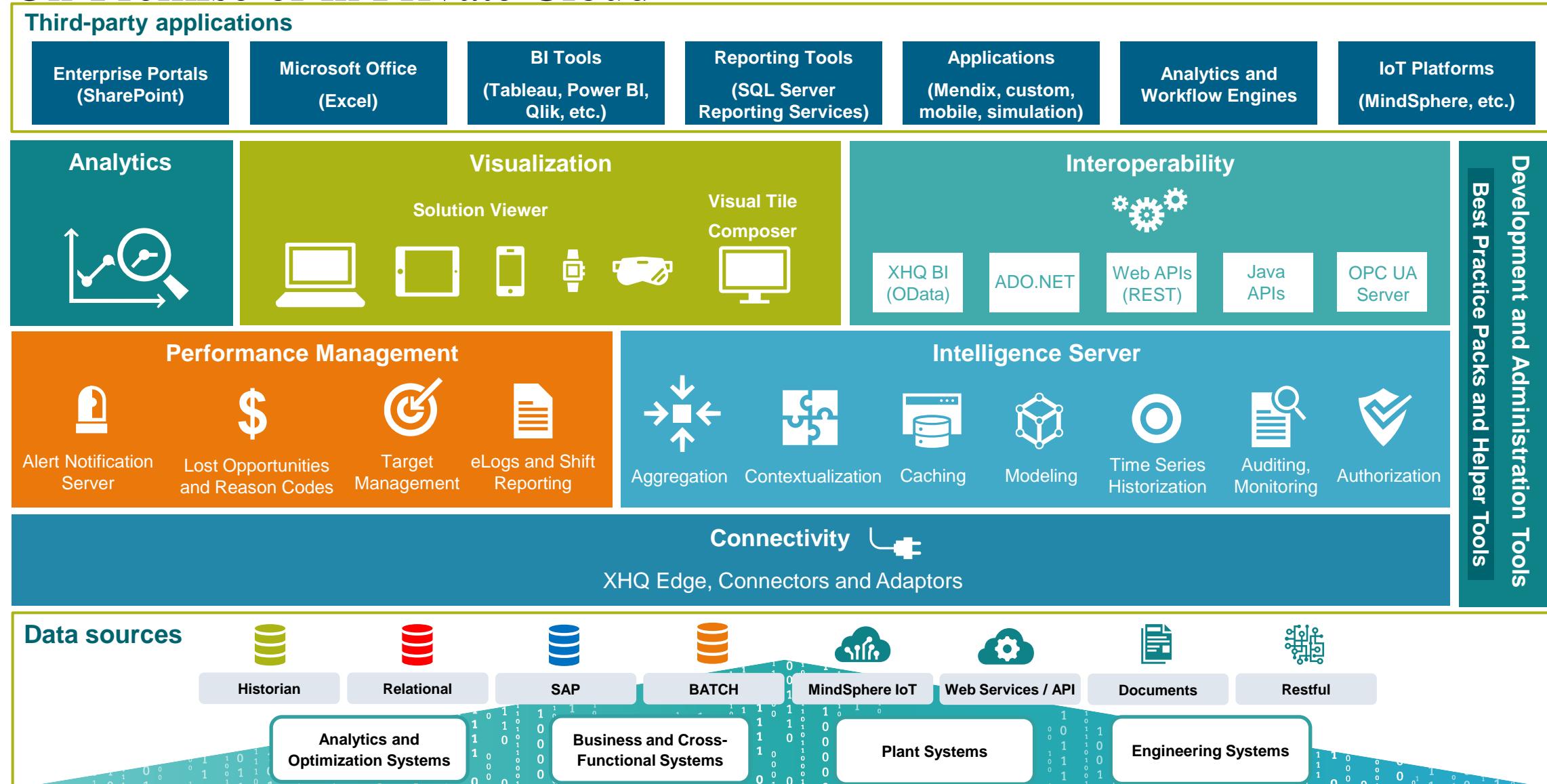
Turn data into actionable information



XHQ translates data into meaningful information in real-time to improve your operations performance

Technical Architecture

On-Premise or in Private Cloud



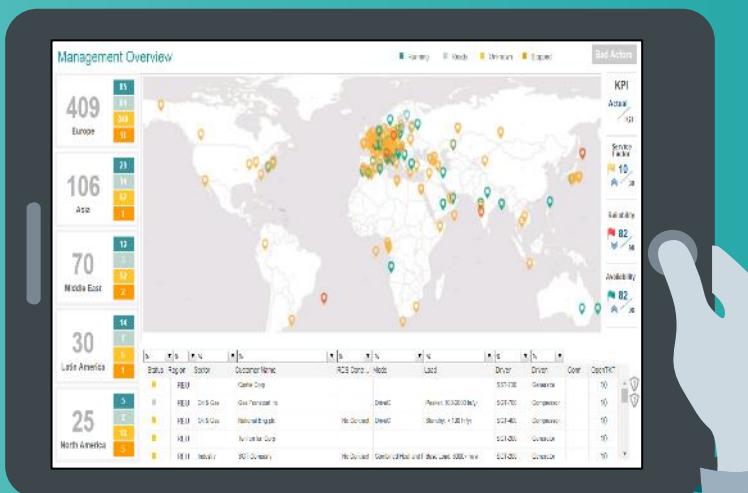


XHQ Solution Viewer

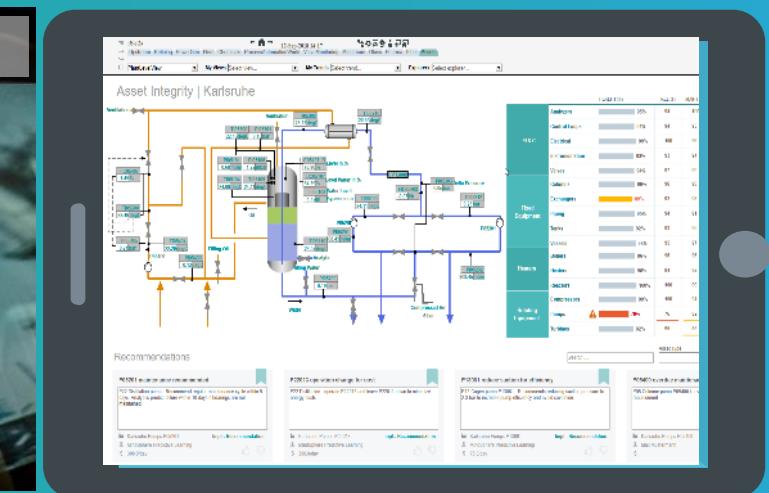
Access via Internet/Local by Tablet, Smartphone, PC,...



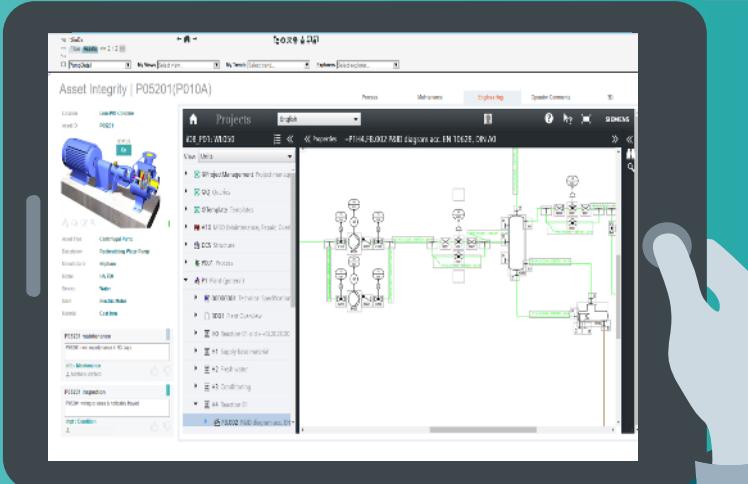
Operations Manager



Plant Manager



Plant Engineer



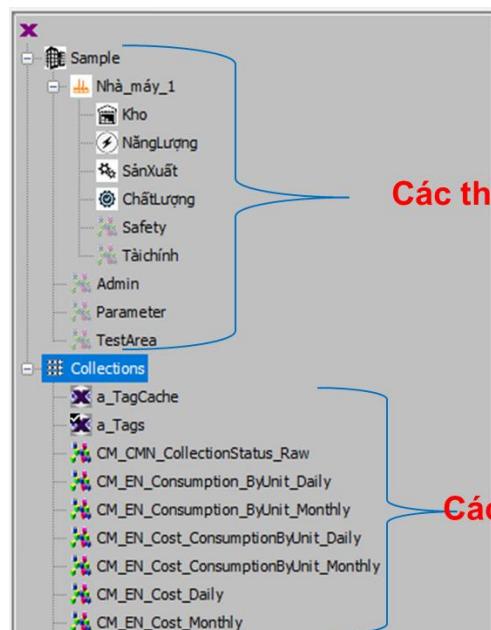
Maintenance Operator





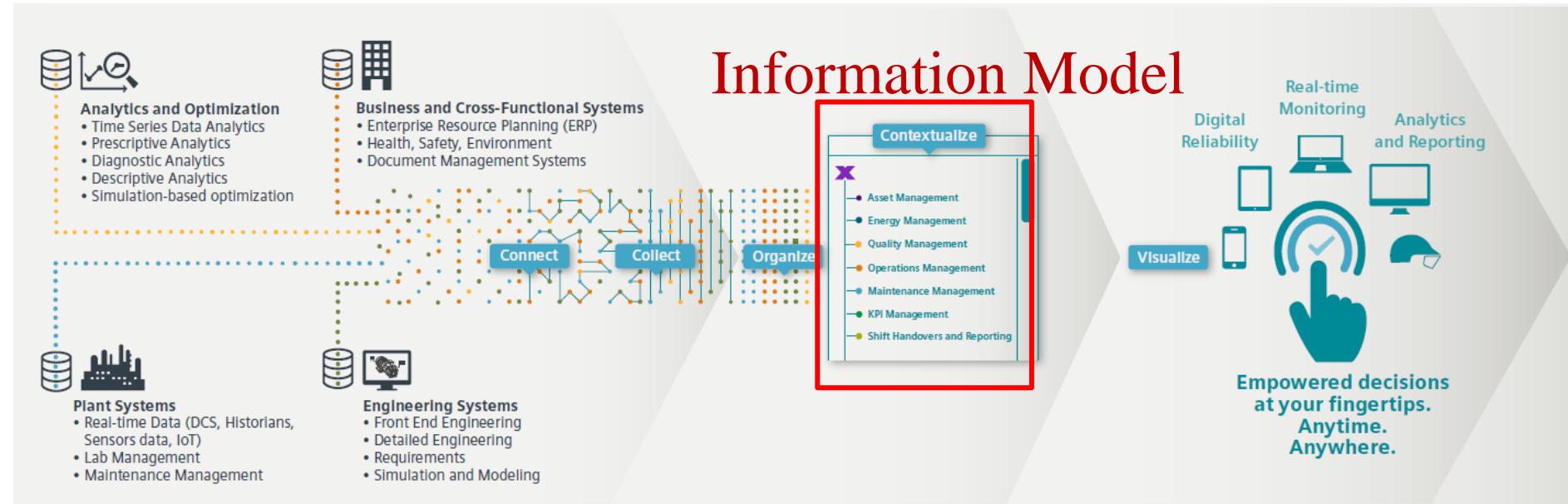
XHQ Model

XHQ Information Model



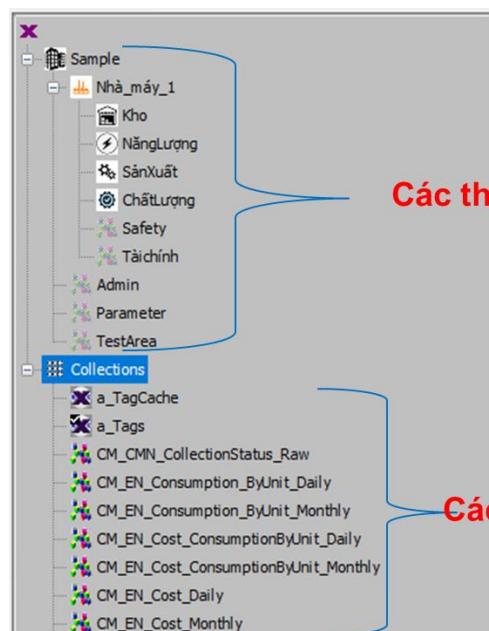
Các thành phần thông tin

Các kết nối dữ liệu



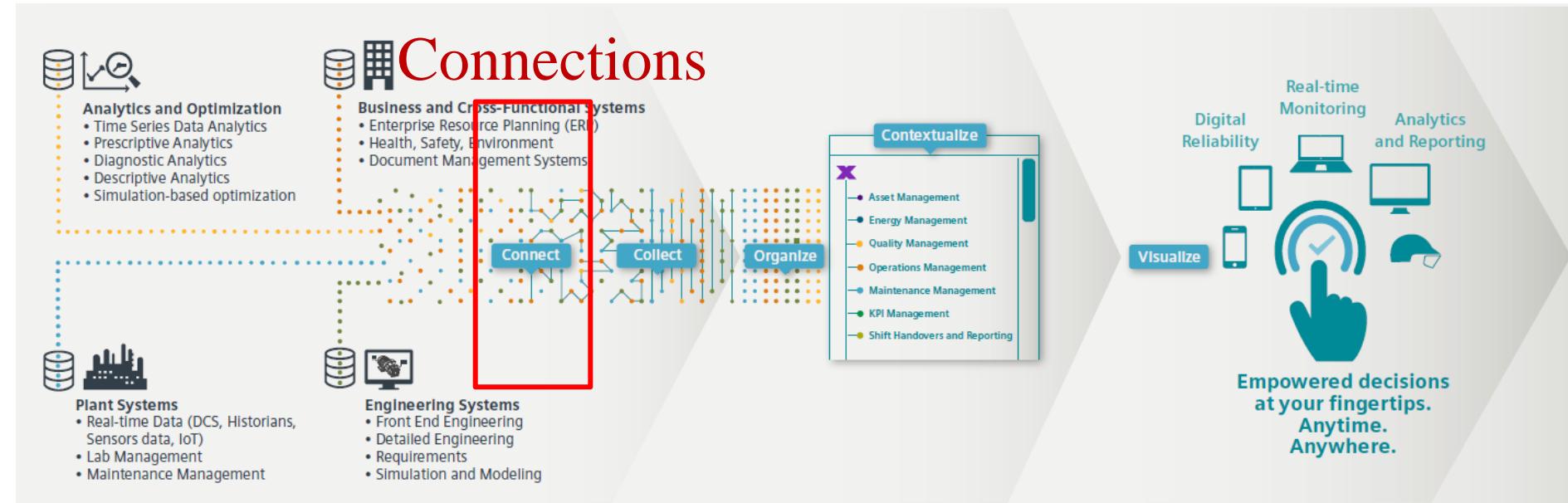


XHQ Connection Framework



Các thành phần thông tin

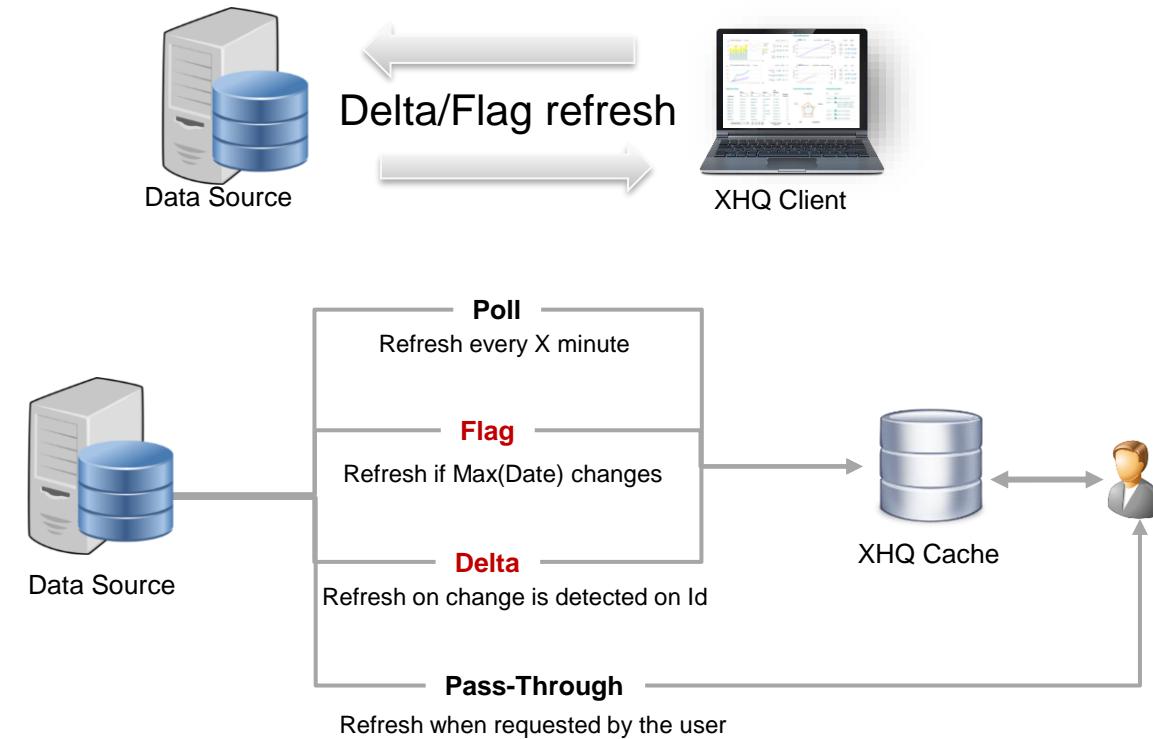
Các kết nối dữ liệu



Connectivity and Integration: XHQ in-built connectors

XHQ Connectors	
<ul style="list-style-type: none"> ▪ OPC UA ▪ ODBC (Open Database Connectivity) ▪ JDBC ▪ MS SQL Server Connector ▪ Oracle Connector ▪ SAP R/3 Server BAPI (64 bit) ▪ PostgreSQL Connector ▪ XML ▪ REST Connector ▪ Documentum ▪ Web Services ▪ SNMP (Simple Network Management Protocol) 	<ul style="list-style-type: none"> ▪ Siemens Simatic IT Historian ▪ OSIsoft PI ▪ OSI PI – AF (Asset Framework) ▪ Aspen - InfoPlus 21 ▪ Honeywell PHD Historian ▪ MindSphere IoT Connector ▪ Batch Connector <ul style="list-style-type: none"> • Batch 21 • PI Batch • Simatic IT Batch ▪ XHQ Tiered Solution Connector ▪ XHQ Edge

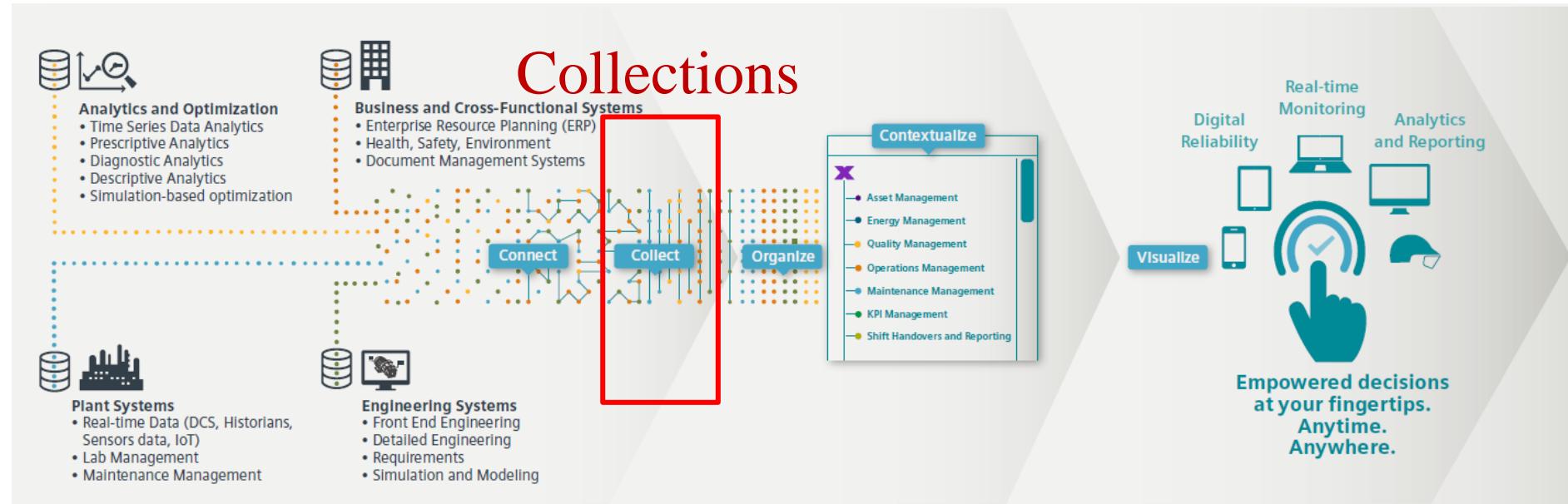
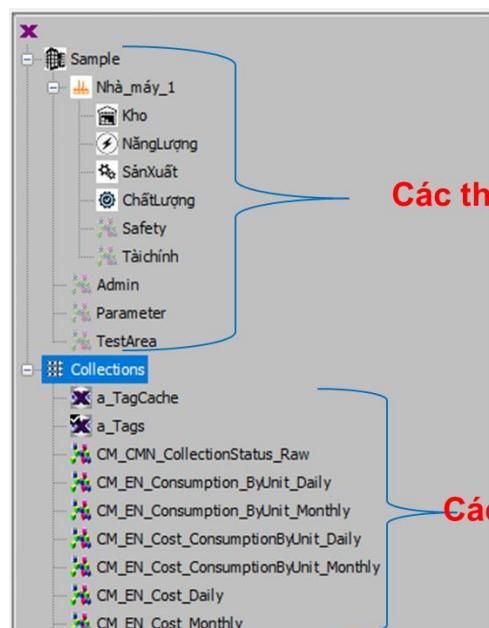
XHQ Data Polling Methods





Working with Collections

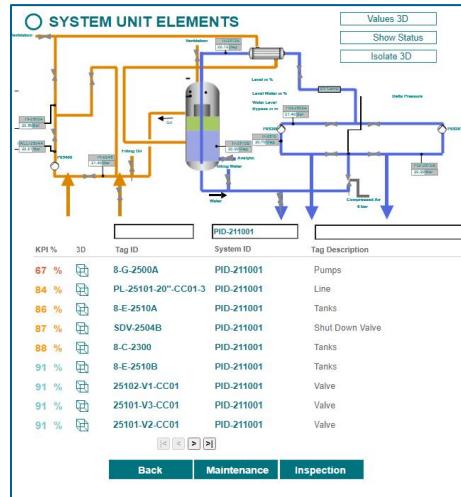
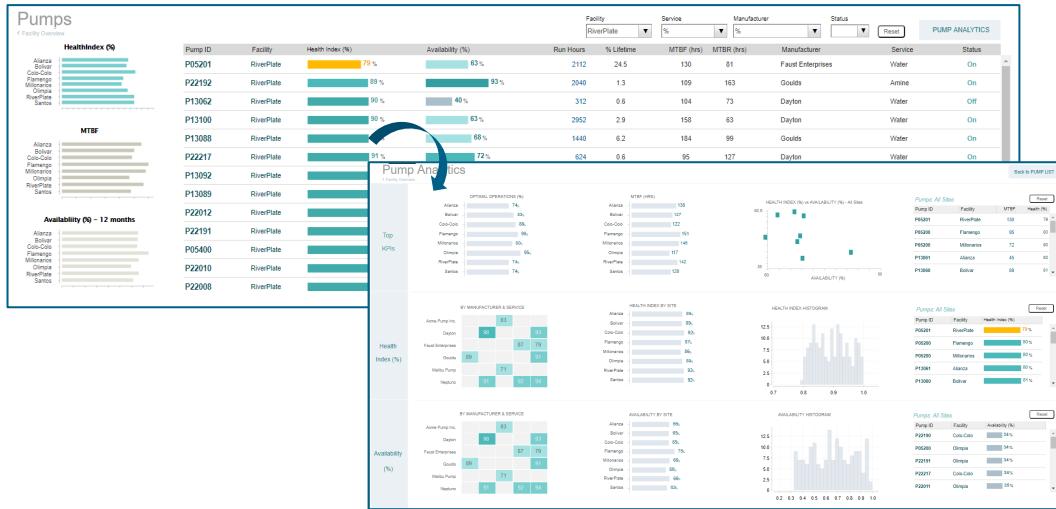
Collections





XHQ View Development

XHQ View/ Dashboard



Single click access to facility 3D model

PP-3111 [Karlsruhe | Pump]

Facility Overview

DESCRIPTION: Pump P-3111
MANUFACTURER: Fault Enterprises

STATUS: **On**

HA 700 Water Motor



79% HEALTH INDEX

1872 RUNTIME HOURS

YTD % OF TARGET Availability: 80%

Efficiency: 45% ⚠️

Optimal Operations: 93%

Maintenance: 88%

PP-3111 production restriction
PP-3111 foresight was stamped to 50% to avoid excessive vibration, reducing procedure.

Imp.: Condition  

Process Reliability Maintenance

References Walkinside

Documents

ID	Title	Revision	Last update
ChemicalEngineeringCalculations	Chemical Engineering Calculations		
EngineeringToolBoxPumps	Piping systems and pumps		
PH4.FB.002	COMOS sample P&ID	9	01-Jan-2018
PantLight.C283898	Vertical Pump P-330166B	0	22-Mar-2019
SiemensIPLFC	Integrated drive solutions for pumps, fans, compressors		01-Jan-2019

Failure Modes

Critical (%)	Action Type (%)	Reset
■ Critical	■ Failure Mode	■
■ Medium	■ Pump impeller installed incorrectly	■
■ Critical	■ Pump impeller worn	■
■ Low	■ Pump oil seal worn	■
■ Medium	■ Pump support structure corroded	■
■ Medium	■ Standby pump set failed	■
■ Low	■ Pump packing improperly installed	■
■ Medium	■ Pump drive end bearing lubrication oil/grease viscosity degraded	■
■ High	■ Pump support structure fatigued	■
■ Negligible	■ Pump bearing insufficiently lubricated	■

FAILURE MODE details ■ Modification / redesign ■

Pump impeller installed incorrectly

FAILURE EFFECT Pump will not reach operating pressure.

RECOMMENDED ACTION Training: Provide training for millwright on proper installation procedure.

INSPECTION STRATEGY Test after installation

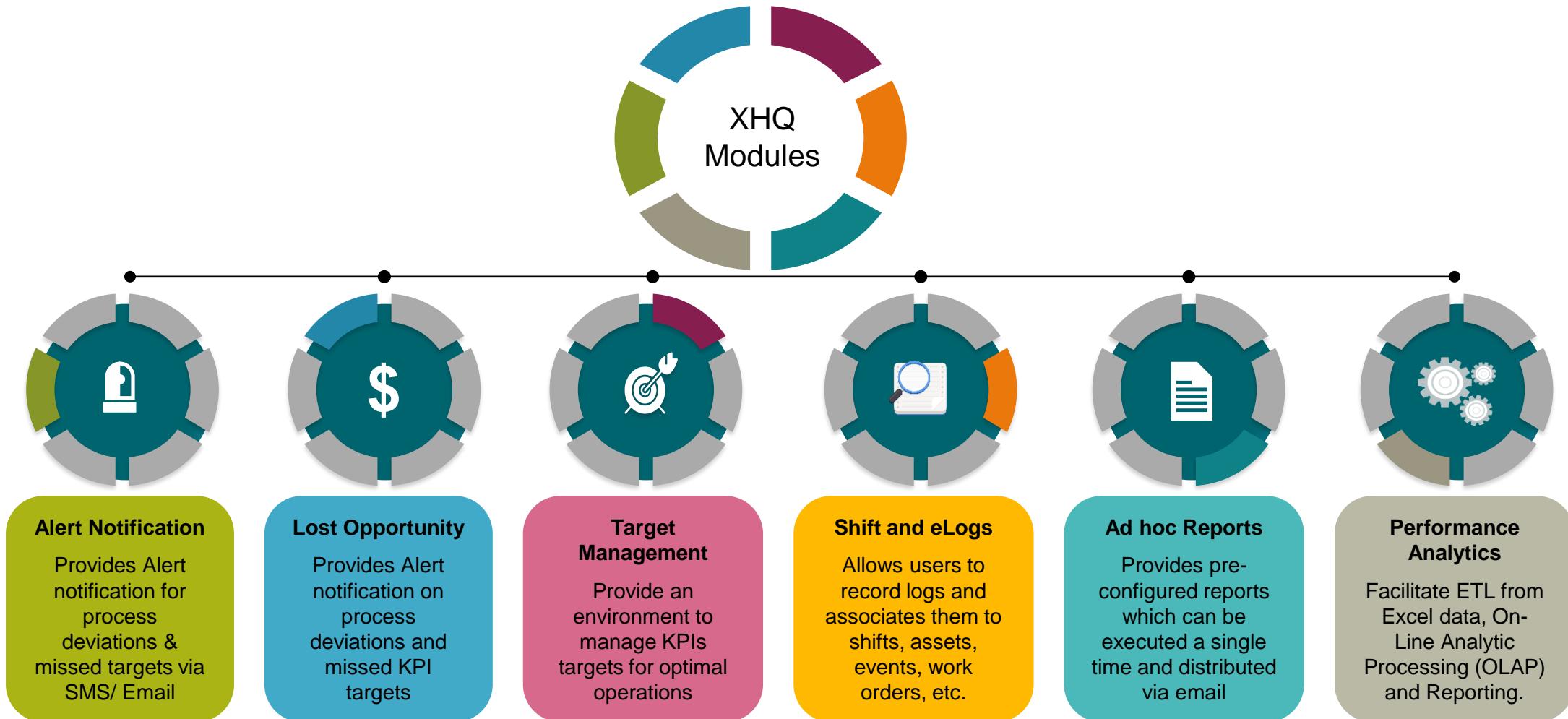


XHQ

Features and Modules

XHQ Features and Modules

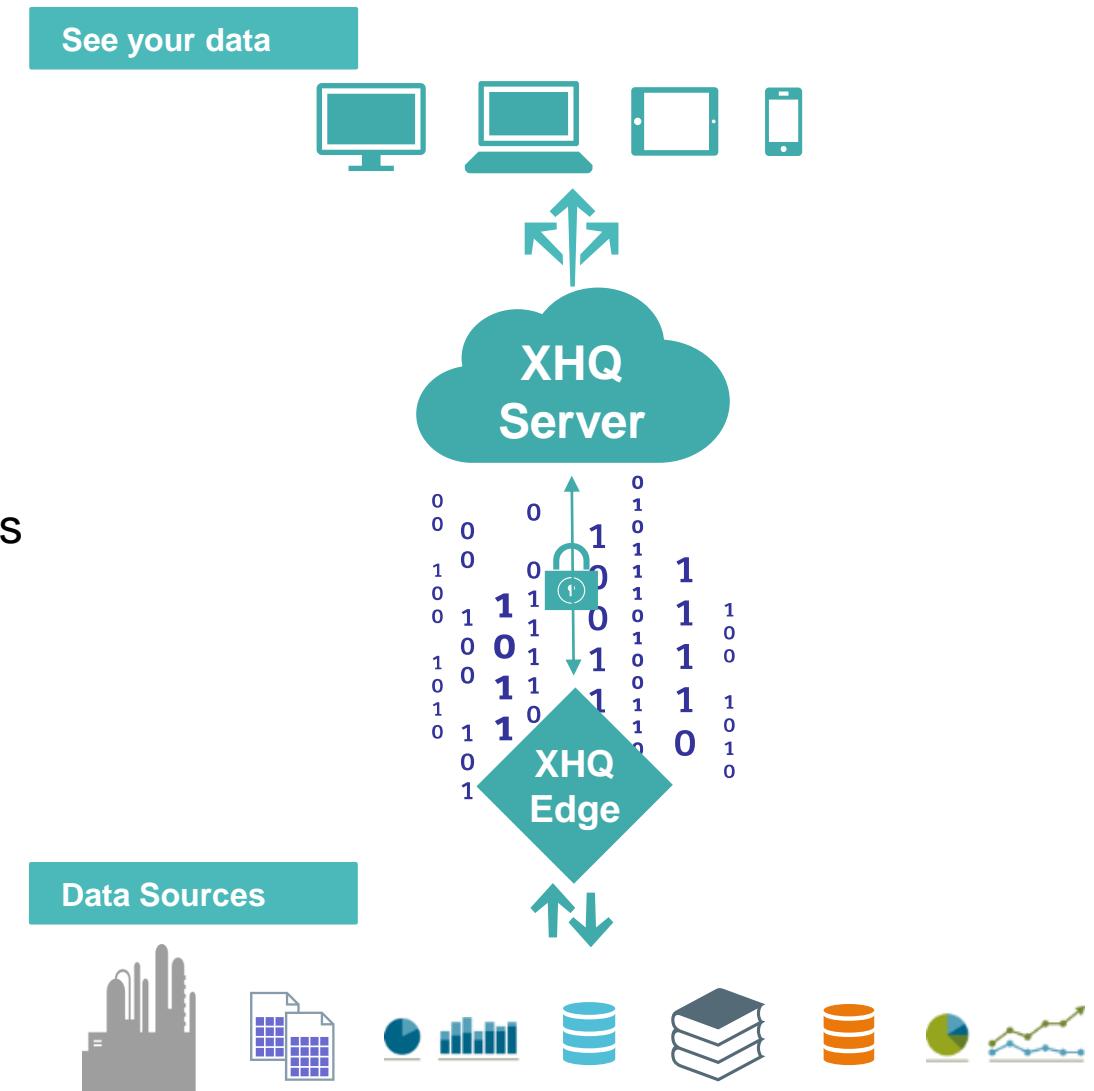
For better productivity and collaboration



XHQ in Cloud

- XHQ in private clouds (AWS and Microsoft Azure)
- Customers manage their own cloud infrastructure
- Enabled by XHQ Edge, REST connector, MindSphere integration, updated internals
- MindSphere is complementary: XHQ integrates with MindSphere data and analytics enable to new insights

- **Reduce your IT overhead – focus on your operation**
- **Faster time to value**





XHQ Development- Concept and Approach

Concept and Approach

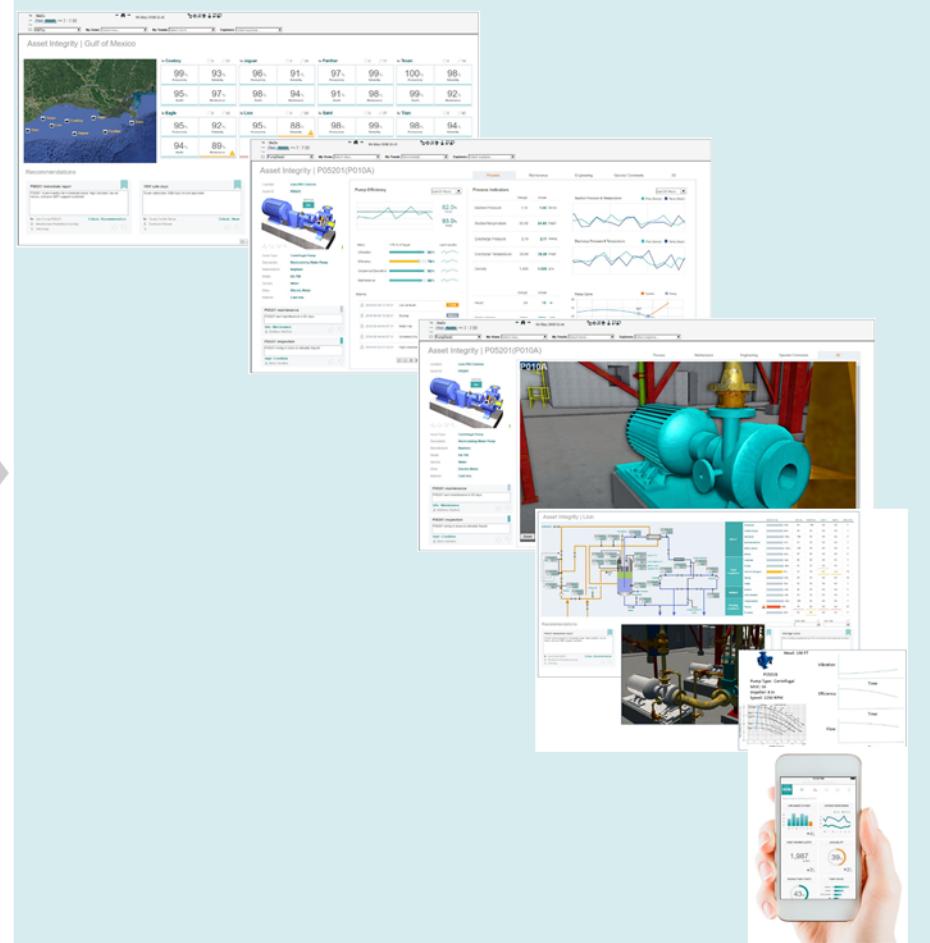
Datasources



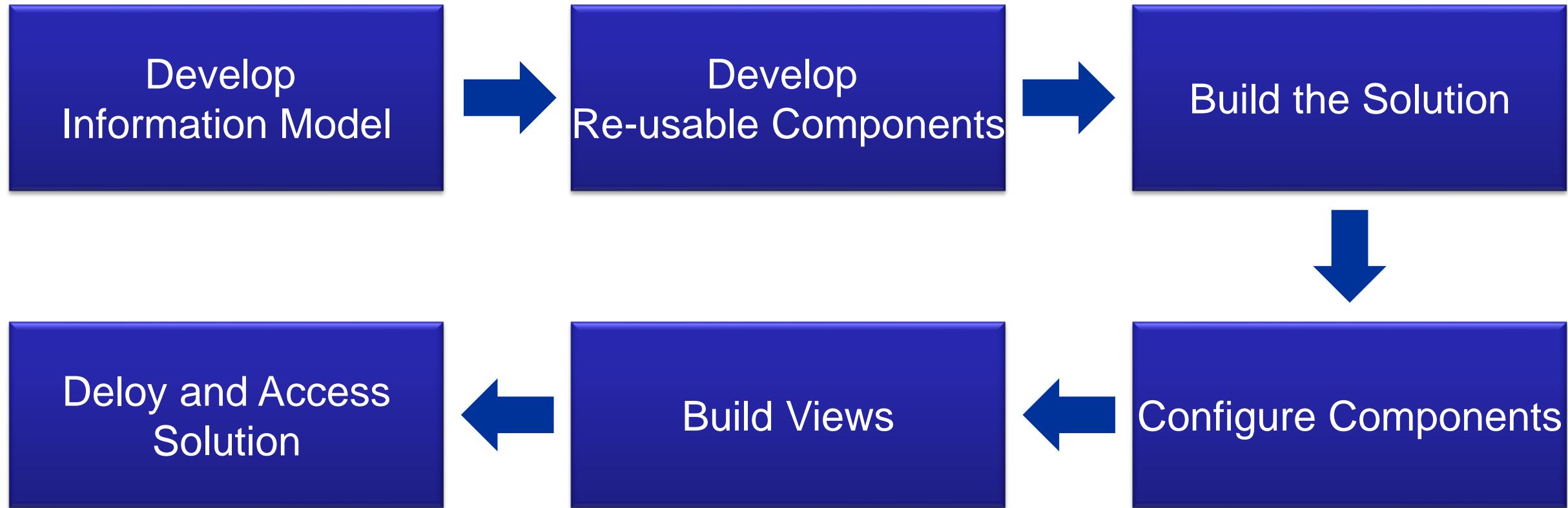
Information Model



Dashboard/ Views



XHQ Basic Development Workflow



XHQ Basic Development Workflow



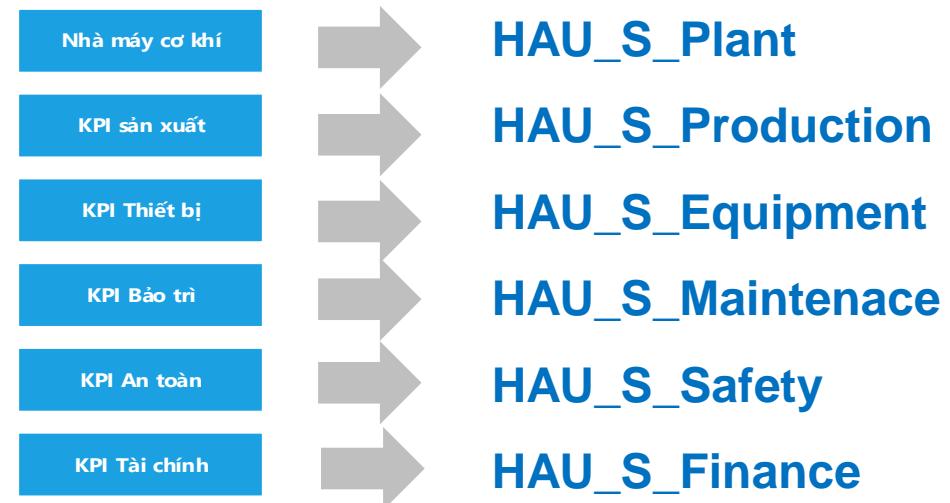
Xây dựng các đối tượng thông tin



Hands-on Exercise - Xây dựng các đối tượng thông tin

Sử dụng Workbench, tạo các đối tượng thông tin như sau:

Nhà máy cơ khí, KPI sản xuất, KPI Thiết bị, KPI bảo trì, KPI An toàn, KPI tài chính.



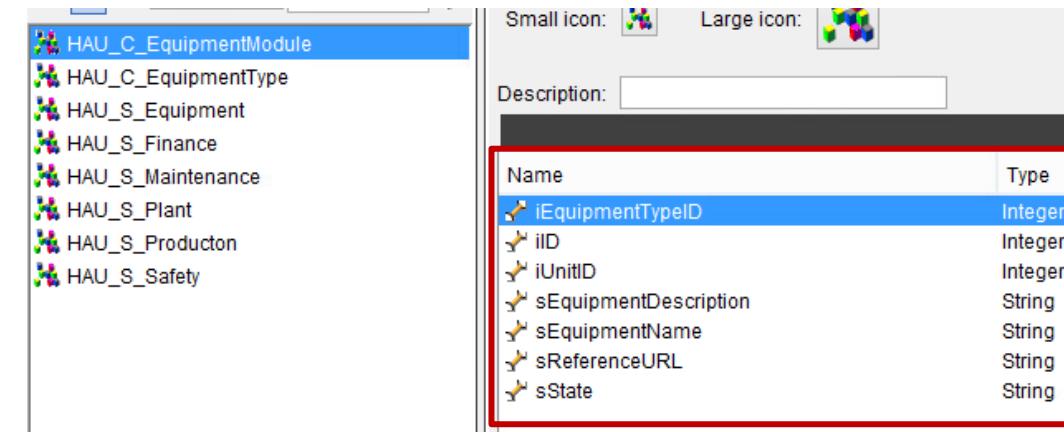
Xây dựng các đối tượng thông tin



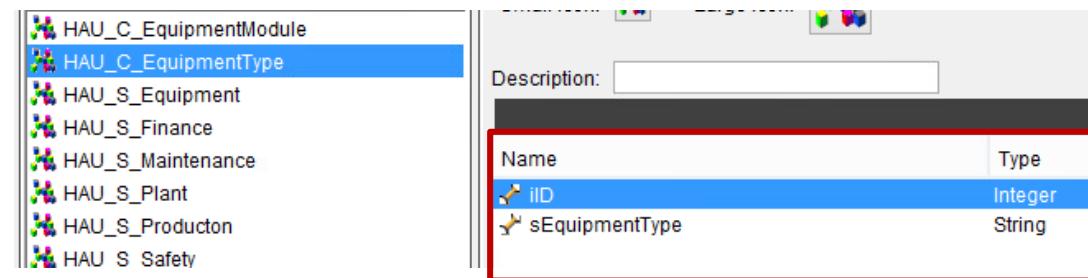
Hands-on Exercise -Xây dựng các thành phần thông tin

Sử dụng Workbench, tạo các thành phần thông tin:

➤ **HAU_C_EquipmentModule**



➤ **HAU_C_EquipmentType**



Hands-on Exercise - Xây dựng các thành phần thông tin

Sử dụng Workbench, tạo các thành phần thông tin (có thể sử dụng lại nhiều lần):

- EX_C_Data
- EX_C_Col
- EX_C_Templates
- EX_C_eLog
- XHQ RC
- XHQ RC Graphics Library
- Xtag
- ...

EX_C_Data

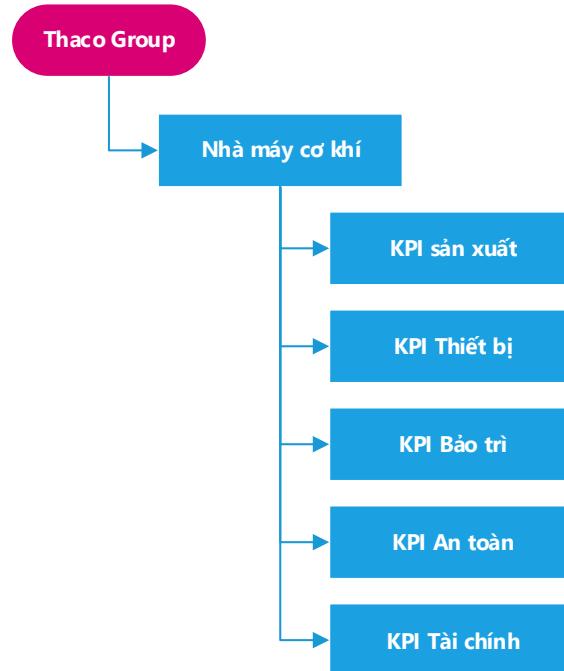
Name	Type
diDate	DateTime
iColour	Integer
iDate	Integer
iDay	Integer
iMonth	Integer
iSeq	Integer
iYear	Integer
rCost	Real
rCost1	Real
rPercent	Real
rValue	Real
sCategory	String
sCategory1	String
sCategory2	String
sCategory3	String
sCategory4	String
sCategoryF	String
sColour	String
sDate	String
sDomain	String
sLocation	String
sMonth	String
sSubCategory	String
sSubDomain	String
sTagName	String
sTagName2	String
sTagName3	String
sTagName4	String
sTagName5	String
sToolTip	String
sType	String
sUnit	String

Xây dựng các đối tượng thông tin



Hands-on Exercise - Xây dựng cây thông tin

Sử dụng Workbench, tạo cây thông tin như bên dưới



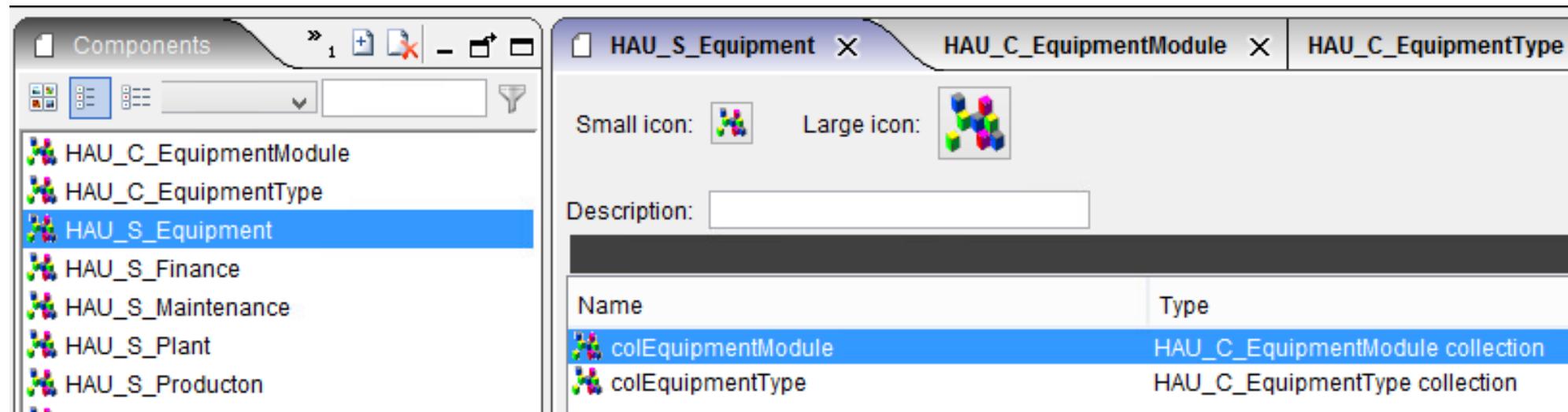
Xây dựng các đối tượng thông tin



Hands-on Exercise - Cấu hình các component

Sử dụng Workbench: Tạo đối tượng lưu trữ thông tin cho Component

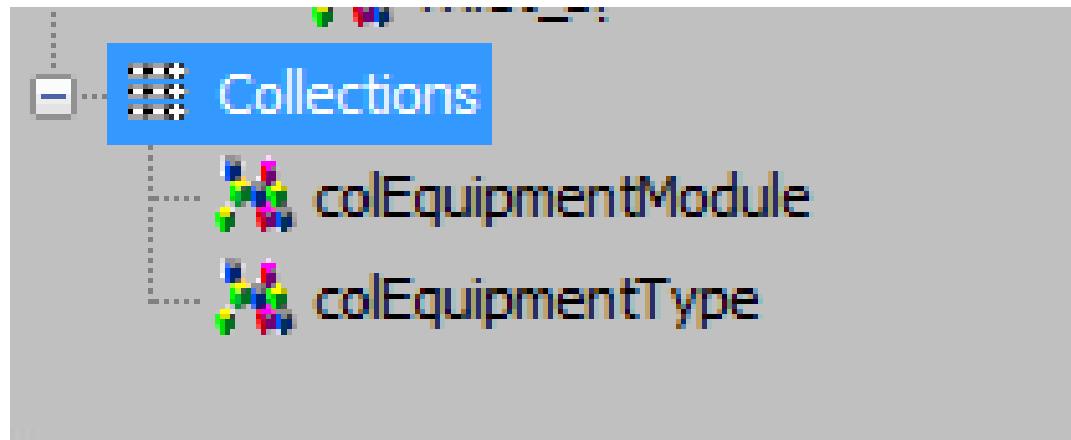
- Mở component “**HAU_S_Equipment**”
- Tạo 2 component “**colEquipmentType**” và “**colEquipmentModule**” (sử dụng existing component **HAU_C_EquipmentType** và **HAU_C_EquipmentModule**)



Hands-on Exercise - Cấu hình các component

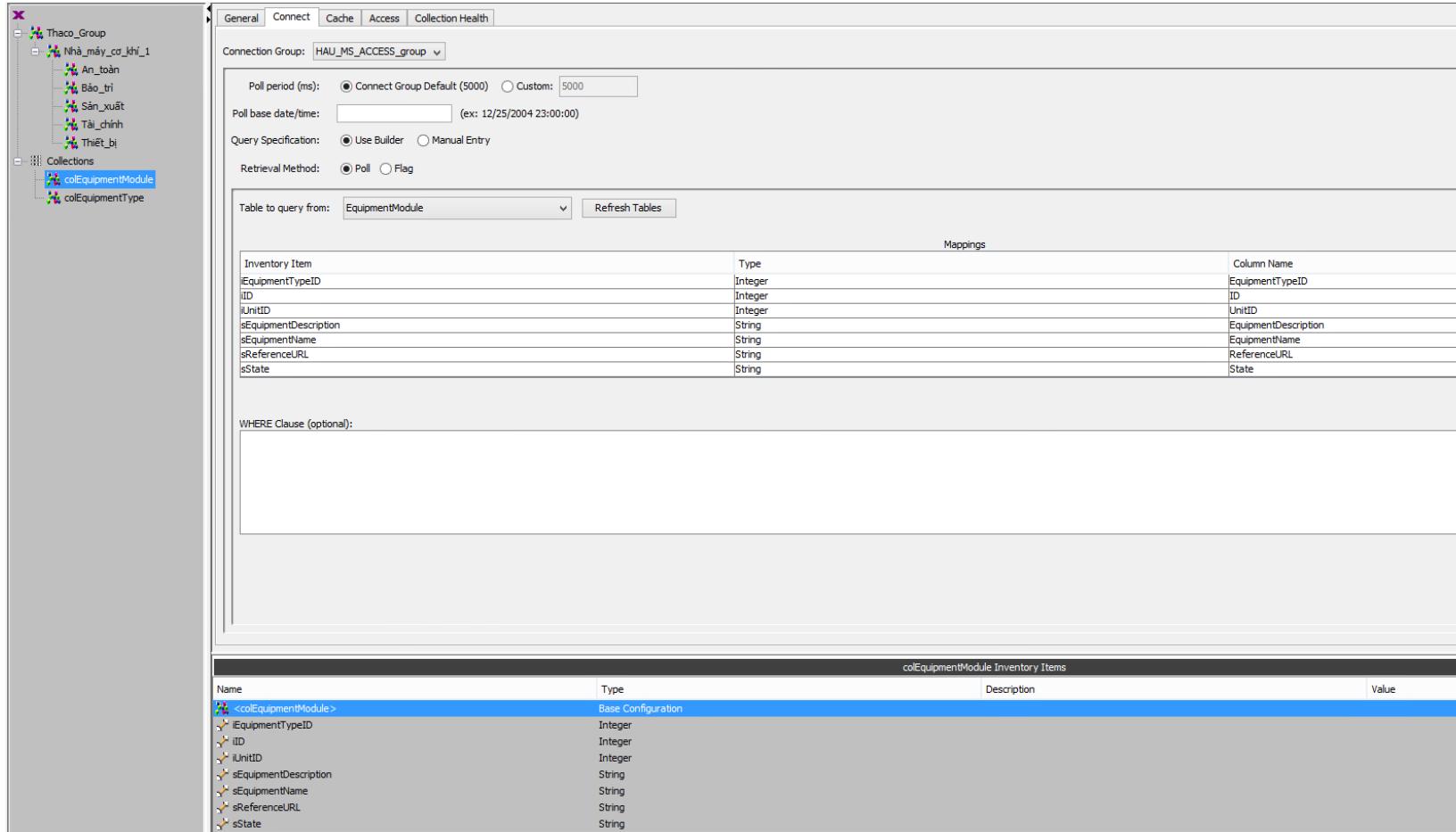
Sử dụng Solution Builder: Tạo Collection

- Tạo collection “**colEquipmentType**” dựa trên component “**HAU_C_EquipmentType**”
- Tạo collection “**colEquipmentModule**” dựa trên component “**HAU_C_EquipmentModule**”



Hands-on Exercise - Cấu hình các component

Sử dụng Solution Builder: Cấu hình Collection



The screenshot shows the Solution Builder interface for configuring a collection named 'colEquipmentModule'. The left sidebar displays a tree structure under 'Thaco_Group' with nodes like 'Nhà_máy_cơ_khi_1' and 'Collections'. The main pane has tabs for General, Connect, Cache, Access, and Collection Health. Under the General tab, the 'Connection Group' is set to 'HAU_MS_ACCESS_group'. Configuration options include 'Poll period (ms)' (set to 'Connect Group Default (5000)'), 'Poll base date/time' (empty), 'Query Specification' (set to 'Use Builder'), and 'Retrieval Method' (set to 'Poll'). A 'Table to query from' dropdown is set to 'EquipmentModule'. Below this is a 'Mappings' table:

Inventory Item	Type	Column Name
iEquipmentTypeID	Integer	EquipmentTypeID
ID	Integer	ID
iUnitID	Integer	UnitID
sEquipmentDescription	String	EquipmentDescription
sEquipmentName	String	EquipmentName
sReferenceURL	String	ReferenceURL
sState	String	State

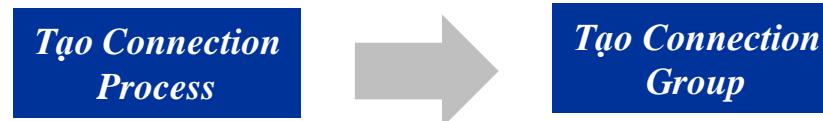
Below the mappings is a 'WHERE Clause (optional)' section. At the bottom, there is a table titled 'colEquipmentModule Inventory Items' with columns: Name, Type, Description, and Value. The table lists the properties of the 'colEquipmentModule' collection:

Name	Type	Description	Value
<colEquipmentModule>	Base Configuration		
EquipmentTypeID	Integer		
ID	Integer		
iUnitID	Integer		
sEquipmentDescription	String		
sEquipmentName	String		
sReferenceURL	String		
sState	String		

Hands-on Exercise - Tạo kết nối với nguồn dữ liệu

Sử dụng Solution Builder:

- **Tạo Connection Process:** Tạo loại kết nối/ cồng kết nối
- **Tạo Conncection Group:** Kết nối với một nguồn dữ liệu cụ thể

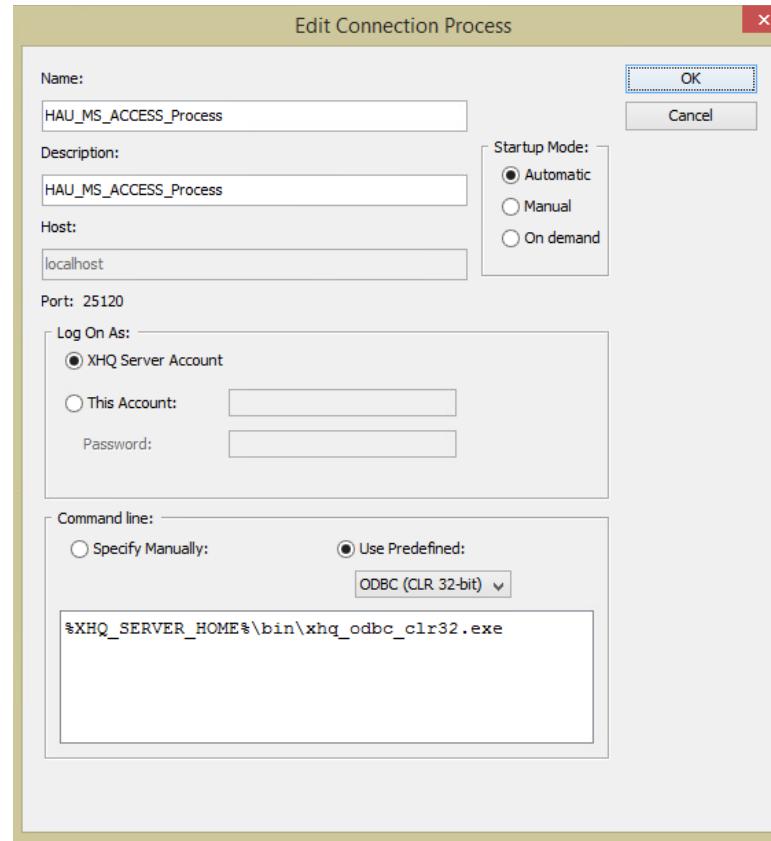


- **Tạo Connetion Process:** HAU_MS_ACCESS_Process
- **Tạo Conncection Group:** HAU_MS_ACCESS_Group

Hands-on Exercise - Tạo kết nối với nguồn dữ liệu

Sử dụng Solution Builder:

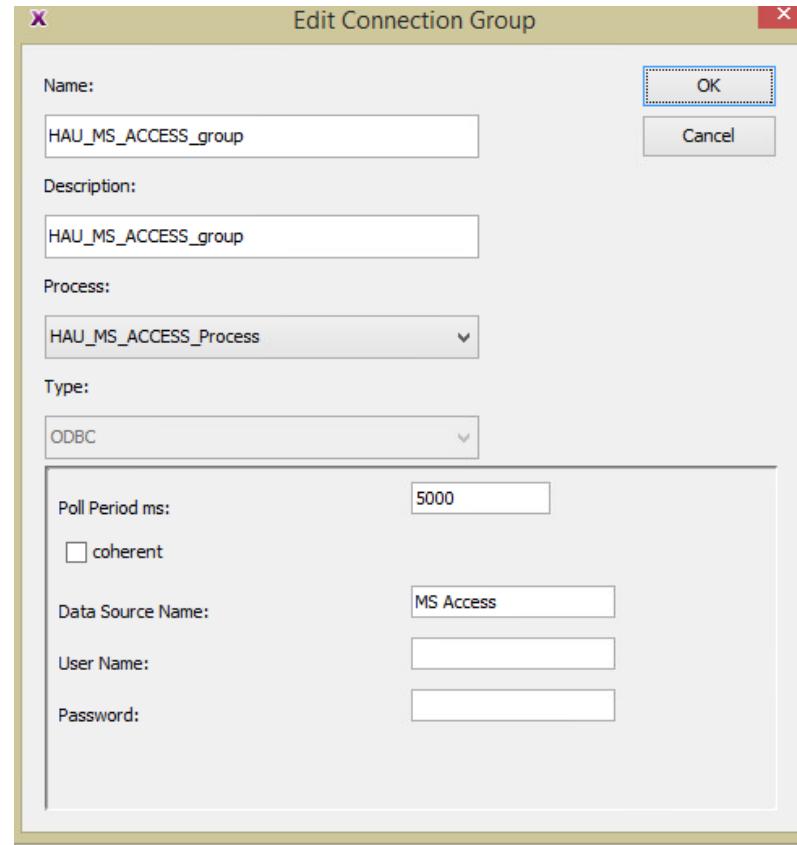
➤ Tạo Connection Process: HAU_MS_ACCESS_Process



Hands-on Exercise - Tạo kết nối với nguồn dữ liệu

Sử dụng Solution Builder:

➤ Tạo Connection Group: HAU_MS_ACCESS_Group



Xây dựng các đối tượng thông tin



Hands-on Exercise - Xây dựng các giao diện

- XHQ Advanced charts, views, table, controls, Links
- Introduction to Mobile Development



XHQ References



BÚT SƠN, HÀ NAM

Plant Information Management with XHQ

Customer benefits

- Central place for decision making across all businesses
- Increased transparency into the operations of plants
- Improved supply chain management
- Improved quality and recipe give away
- Reduced bottlenecks in the material flow
- Platform for morning plant management meeting

Corporate wide implementation of

Real-Time dashboard

KPI dashboard

-
-
-
-



Idemitsu, Japan

Plant Information Management with XHQ

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Corporate wide implementation of **Real-Time dashboard** with analytics covering the Refining & Petrochemical business. All information rolled up to Headquarters.

- 7 sites in across Japan
- 4 Refineries
- 2 Petrochemical Plants
- 1 Corporate Head-quarters (roll-up)



Japan Institute of Information Technology
JIIT Award



Minister of Economy, Trade and Industry
METI Award



Hanwha Total, South Korea

Data-Driven Decision Platform



Customer benefits

- Significant gains in plant reliability
- Improved communications between line operations and support departments
- Increased productivity
- Fast and reliable decision making
- Efficient decision making
- Proactive operation management



Global leading Chemical implemented XHQ as Single Source of Truth platform for **Daesan Petrochemical Complex with 18 plant units** including basic chemicals: ethylene, propylene, and butadiene.

Solution covers the entire value chain for the complex providing critical real-time information and KPI (Key Performance Indicators) for **Finance & Innovation, Production, Quality, Maintenance, Inventory, Tank Farm, Supply Chain, Energy & Utility.**



BASF, Germany

Real-Time Operations Platform

Customer benefits

- Real-time information visibility across the entire enterprise
- Consistent views of aggregated information
- Golden Batch Analysis
- Identification of best and worst actors
- Mechanism for broad access to key plant information



An Operations Intelligence solution with global common architecture for plant customization and usage. The implementation utilizes the **Data-Driven-Solution technique** that allows rapid rollout to individual plants.

The solution covers:

- **1300 Concurrent Users** in Ludwigshafen
- KPI Cockpit & Scorecard Dashboard
- Shift Handover Reporting
- Asset Effectiveness Reporting
- Production Cost Reporting
- **Batch Process Analysis**
- Continuous Process Analysis

Singapore Refining Company

Real-Time Operations Platform



Customer benefits

- Better operational visibility, asset utilization and plant safety
- Improved collaboration at all plant levels
- Better and faster decision making

Real-Time Operation Dashboard focusing on **Process, Production, Supply Chain & Exceptions Management**

- A mission critical tool for management and staff including Operators
- 24/7 anywhere access for complete information.
- Cross-functional Visibility across the refinery
- Restricted access to share-holders (Chevron & PetroChina) for better supply chain coordination
- Change of critical business processes – Morning Meeting, reporting, etc.

SK Corporation, South Korea

Operations Intelligence with XHQ

Customer benefits

- Fast and reliable decision making
- Information transparency and reliability
- Communicates high level goals down to line staff
- Increased productivity

[Read more](#)

- **XHQ covers** the majority of functional areas and around **70 process units** in both the refinery and the petrochemical plant, providing information for more than **1000 users**.
- The solution improved the communication between the teams and enabled better **alignment on actions and priorities**
- Staff empowered with information to make **smart decisions**





Culzean North Sea gas field - Total E&P, UK

Digital Reliability for Offshore



Customer benefits

- Access to the 3D Digital Twin – anytime from anywhere
- Real time integrated information on asset performance
- Efficient decision making
- Proactive operation management

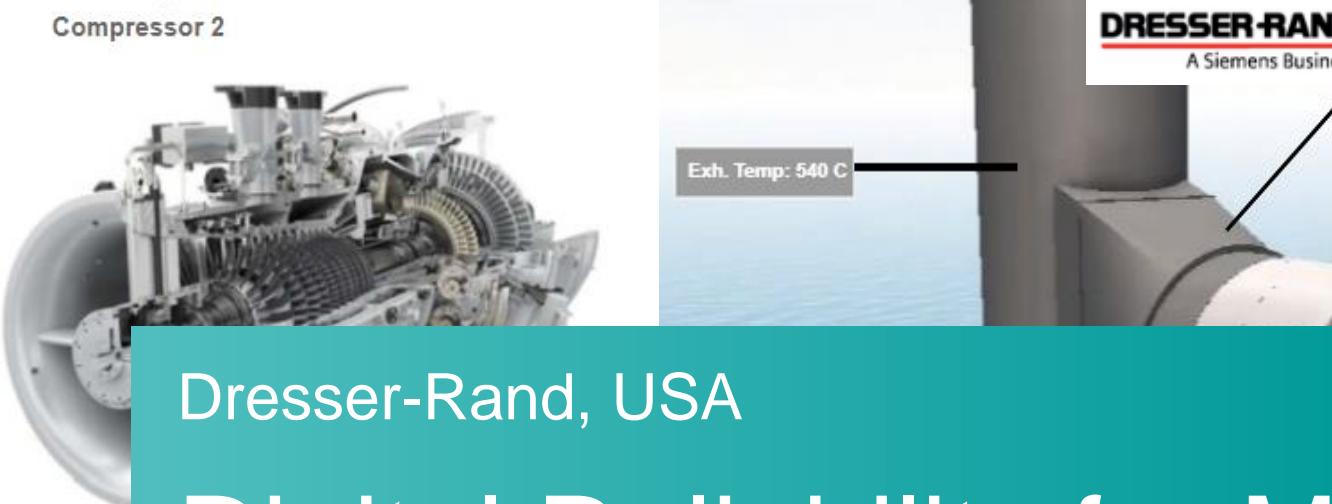
[Read more](#)

Digital Twin since EPC phase:

- **COMOS Walkinside** used as **design review** tool, saving costs in training and travel

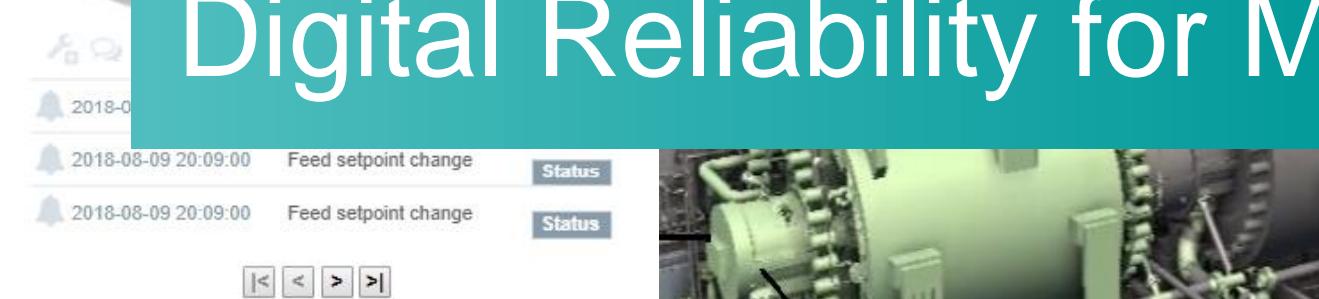
Operations phase with **Walkinside** and **XHQ**:

- Operational Intelligence Platform: access to timely data, data visualization, monitoring/alerting capabilities and access to relevant systems and support documentation
- Real-time data seamlessly integrated into maintenance and engineering data
- **Siemens Scope**: Digital Reliability: COMOS Walkinside, XHQ



Dresser-Rand, USA

Digital Reliability for Midstream



Customer benefits

- Cost saving through integration and consolidation of compressor design and operational models
- Cloud-hosted infrastructure and systems dramatically reduce system TCO to Dresser-Rand and its customers.

Separation Gas Set	OK	OK
Cooling-sealing Airsys	OK	OK



- Integration of full lifecycle Digital Twin applications in **asset portal system** for Dresser-Rand's **gas compression equipment** for midstream O&G
- Seamless cross-application **data integration and visualization** uses **equipment context** to provide user with access to **key information wherever it resides**

Siemens Scope: XHQ, COMOS, Walkinside, PlantSight, Teamcenter, JTViewer, Polarion

Partners: Bentley - AssetWise Reliability; SEEQ - analytics and other 3rd party apps



Aker BP, Ivar Aasen, North Sea

Remote Operations Center



Customer benefit

- Maximize production with 70 % less people on the platform
- Increased recovery by permanent onshore expert connectivity
- ~30 % cost savings

[Read more](#)

- Operating offshore platform **real time from onshore**
- Fully **integrated** applications
- Asset Performance Management and Safety applications
- Condition Monitoring analytics based on high quality data
- Advanced **condition based maintenance** and process control
- **XHQ** as operational intelligence application supports experts and management on making **real time decisions** in regards to safety, environment, production insights and KPI's
- Safe environment training with lifecycle process **simulation and training software**
- **Siemens Scope:** COMOS, SIMIT, SIMATIC PCS7, XHQ, Control & Safety systems, field instruments, electrical distribution and telecommunication



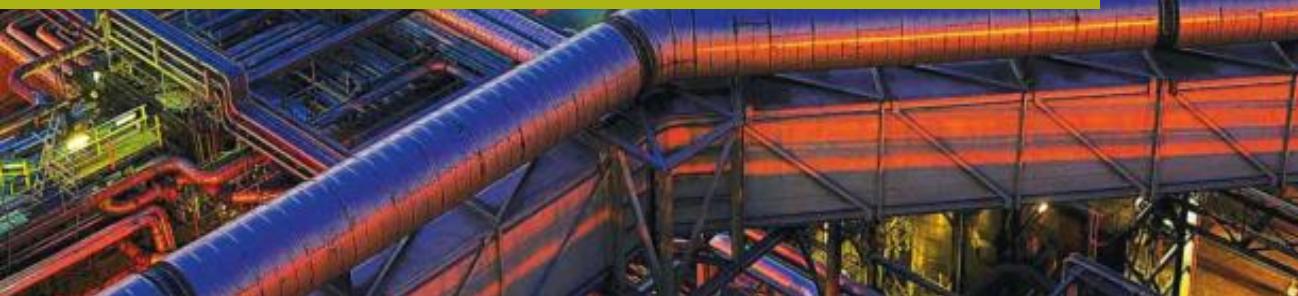
Phillips 66, USA

XHQ for Shift Operation



Customer benefits

- Increased productivity
- Increased ROI
- Fast and reliable decision making



- **XHQ** will be used as a “hub” of Phillips 66” digitalization strategy
- **6000 XHQ** users across all **13 refineries**
- Wide data **visualization & aggregation** platform
- Operational and economic **target boards**
- Operator and Shift Supervisor **handover**

Sinclair, USA

Operations Intelligence with XHQ



Customer benefit

- Better operational visibility, asset utilization and plant safety
- Improved collaboration at all plant levels
- Better and faster decision making

[Read more](#)

- An **85,000 barrels-per-day** oil refinery making propane, jet fuel, gasoline, diesel, and road asphalt
- Challenge was to develop **cross-functional operational views with real-time data** inputs
- XHQ takes information from **different systems** (e.g. monitoring corrosion, vibration, and safe limits) then **aggregates and contextualizes** it in real-time for more structured, consistent, and auditable views
- Better situational awareness and decision support

Chevron, USA

Operations Intelligence with XHQ

Customer benefits

- Better and faster decision making
- Reduced operating expenses in **8%**
- Increases facility utilization in **8.5%**
- Increased operational availability in **2.5%**
- Increased high value product production in **10.5%**
- Reduced environmental incidents in **18%**
- Reduced recordable injury rate in **39%**

[Read more](#)



- **XHQ** implementation in 11 refineries and 1 upstream field
- Provides **real-time visibility** to key operations information **across each facility**
- Wide data **visualization & aggregation** platform
- Global visibility, including the following features:
 - System Connectivity and Data Access
 - Data Integration and Aggregation
 - Data Modeling
 - Data Messaging
 - Information Contextualization and Presentation
 - Dashboards, Drill-downs, and KPIs



Bahrain Petroleum, Bahrain

Operations Intelligence with XHQ

Customer benefits

- **95% reduction** in overdue safety work orders, helping the company achieve its ultimate goal of **zero incidents** in its refineries
- Significant gains in **plant reliability**
- Improved communications between line operations and support departments

[Read more](#)



- **XHQ** used to aggregate **all relevant information** from: Real-time Process Data, Historical Process Data, Lab Results, Work Requests & Work Orders, Assets, Tank & Inventory, Incident Investigations, Behavior Based Safety, Employee & Organization, MOC's, Action Tracking, Audits, Process Alarms, Training, KPI's
- Supported enterprise pursuit of **sustainability** and **performance improvements**
- Monitoring KPIs
- Leadership accountability through governance – **operations excellence**

A tall, multi-tiered metal refinery tower stands against a clear blue sky. The tower has various platforms, ladders, and structural supports.

Sinclair, USA

Operations Intelligence with XHQ



Customer benefit

- Better operational visibility, asset utilization and plant safety
- Improved collaboration at all plant levels
- Better and faster decision making

[Read more](#)

- An **85,000 barrels-per-day** oil refinery making propane, jet fuel, gasoline, diesel, and road asphalt
- Challenge was to develop **cross-functional operational views with real-time data** inputs
- XHQ takes information from **different systems** (e.g. monitoring corrosion, vibration, and safe limits) then **aggregates and contextualizes** it in real-time for more structured, consistent, and auditable views
- Better situational awareness and decision support

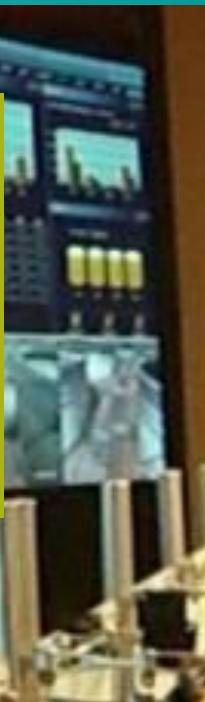


Sinopec, China

Operations Intelligence with XHQ

Customer benefits

- Identification of best and worst actors
- Improved supply chain management
- Reduced bottlenecks in the material flow
- Increased transparency into the operations of subsidiaries
- Central place for decision making across all businesses



- Headquarter solution integrating **48 subsidiaries and 100+ IT applications** (historians, LIMS, Plan-Scheduling, ERP, etc.)
- Visualizes the entire **supply chain in real-time** and enables central coordination of diverse expert teams in case of emergency
- Real-time **Key Performance indicators (KPI) and Key Operating Parameters (KOP)** to:
 - Better manage the supply chain
 - Reduce bottlenecks in the material flow
 - Increase transparency into the operations of subsidiaries



SABESP, Brazil

Supply Operational Control System



Customer benefits:

- Solution benefits 24 million+ people in Greater São Paulo or 65% of the population of the state
- Real-time centralized facility information monitoring
- Fast access to critical decision making information

Brazilian water and waste management company owned by São Paulo state

XHQ: key enabler to 'SCOA' project (Supply Operational Control System) and it manages the processes of adduction and storage of treated water from the water treatment plants to the reservoirs

- Acted as single source for all the critical information
- Improved Situational Awareness and decision making
- Improved the labor productivity
(2.1 employees per 1,000 connections, indicating a high level of labor productivity)



Rolls Royce, Singapore

XHQ: Knowledge Based Manufacturing



Customer benefits:

- Improved the project progress visibility and execution
- Improved Customer satisfaction Index
- Fast access to critical decision making information

Site: Rolls-Royce's Wide Chord Fan Blade manufacturing facility in Singapore

XHQ: key enabler to 'Knowledge Based Manufacturing' project in the Advance Manufacturing Lab. Provides visual analytics for Robotics operations, Health safety and Environment, Quality and Audit, Tech Lab Project Performance and Customer Satisfaction Index.

- Better Situational Awareness and decision making
- Accurate and real time data insight into the different operations and enabled the users to be more proactive



SAESL, Singapore

Platform for Engineering and Warehouse



Customer benefits:

- Reduced cycle time for the Engineering request and workflow execution
- Improved the parts and components stock transparency

Site: World's largest Trent engine MRO facility supporting both in-house and global component repair demand

XHQ: Operations Intelligence platform for Engineering, Inspection and Warehouse operations. Individual department's critical information are rolled up to CEO.

- CEO Dashboard visualizing comprehensive real time information for the site
- Solution maps the entire Engineering and Inspection workflow to provide better insight and highlight the bottlenecks



A Pharmaceutical Company: the Factory of the Future Concept

Demonstrating the “art of the possible”

- XHQ: key enabler to 'Digitalization' journey
- Solution: in Research & Development (R&D), focusing on operation optimization in Batch Production, Quality, Equipment Efficiency, Facility Utilization and Projects
- Single source for all the critical site information
- Improve Situational Awareness and decision making
- Support Strategic goals
 - Zero Harm
 - Zero Waste
 - Zero Incidents
- Provide an innovative and immersive



Collins Aerospace, Singapore

XHQ for Shop floor performance



Customer benefits:

- Improve the DTM (Days to Manufacture)
- Enabling the Data Driven Decisions across the organization
- Improve the cross functional collaboration and response

World's largest suppliers of aerospace, demonstrating the "art of bringing the business and manufacturing intelligence together"

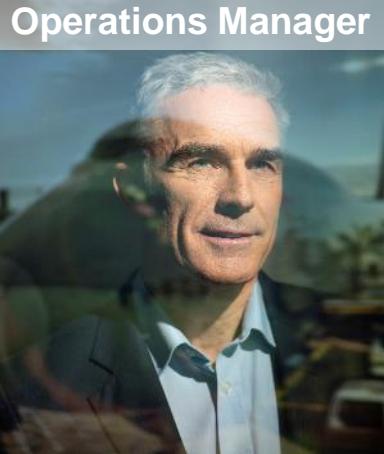
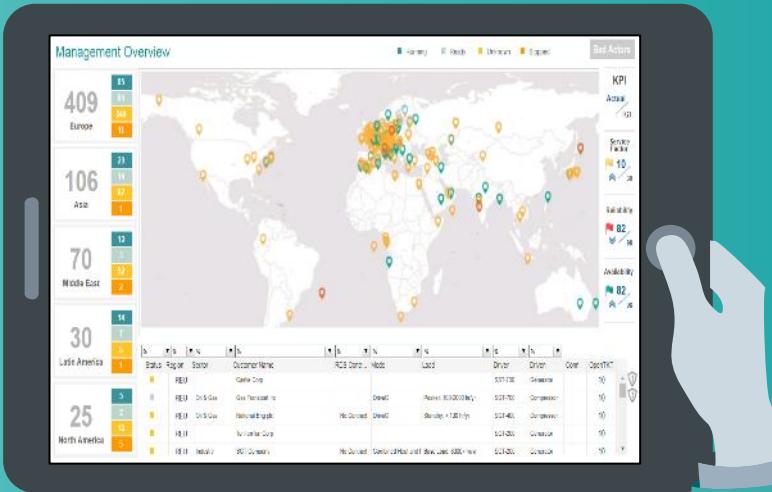
- XHQ: key enabler to 'Digitalization' journey
- XHQ Solution: Provides Order Tracking, Shop floor Performance, Quality and Scrap Management
- Provide single version of truth across the organization
- Important tool used in morning management and shift handover meetings
- Provide an innovative and immersive operator work



XHQ Use Case Samples

Role-based personalized information

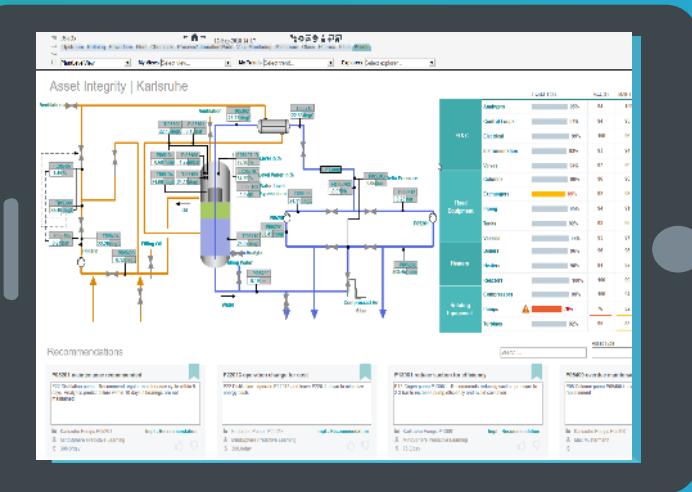
Insights to everyone for better collaboration

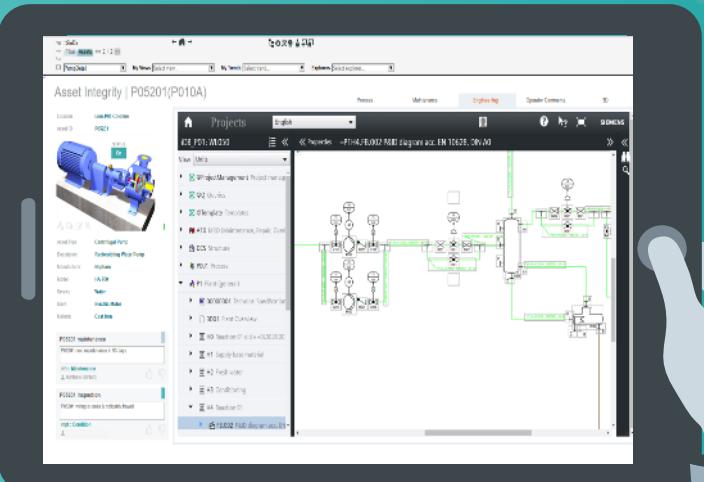
The dashboard shows a world map with location markers and regional statistics:

- Europe: 409
- Asia: 106
- Middle East: 70
- Latin America: 30
- North America: 25

Below the map is a table with columns: Status, Region, Sector, Customer Name, RCS Control Node, Land, Order, Client, Cost, Options.

The dashboard displays a process flow diagram for a plant in Karlsruhe, showing various pipes, valves, and components. It includes a table of asset integrity data and a section for "Recommendations".

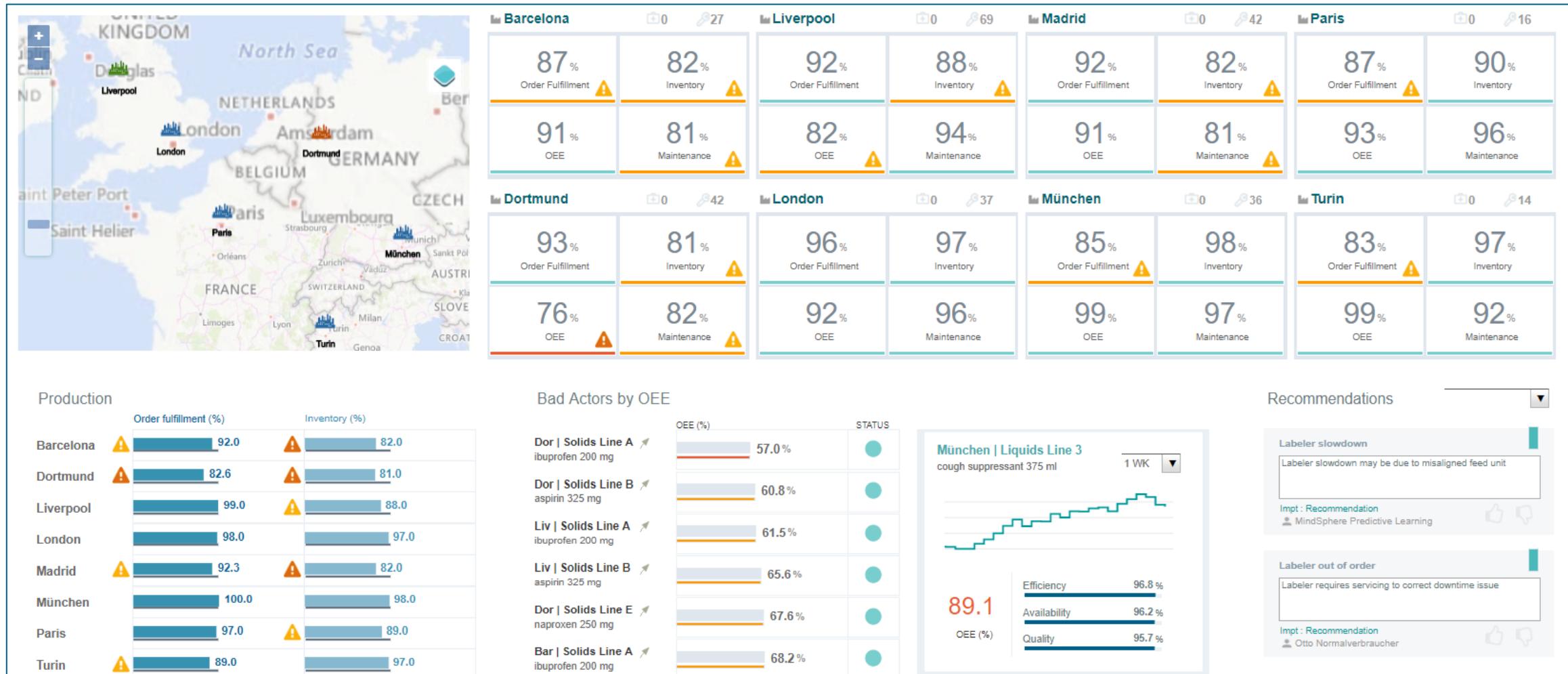
The screen shows a 3D model of a pump and a piping system. The left sidebar lists projects and tasks, including "P05201(P010A)" and "P05202". The main area displays a detailed piping and instrumentation diagram (P&ID) with various valves, pumps, and sensors.




The interface shows a 3D model of a large industrial vessel labeled "T101". It includes tabs for "Operational Data", "Maintenance History", and "Work Orders". A "Work Order" card is visible on the right, detailing tasks like "Check insulation" and "Check pressure gauge".

HQ Performance View

Benchmarking the facilities across the geography



Facility Performance View

Comprehensive critical plant information

Facility **Dortmund** ▾

Energy Efficiency

93%

1.5%

OEE - All Lines

76.0%

-0.7%

Inventory KPI (%)

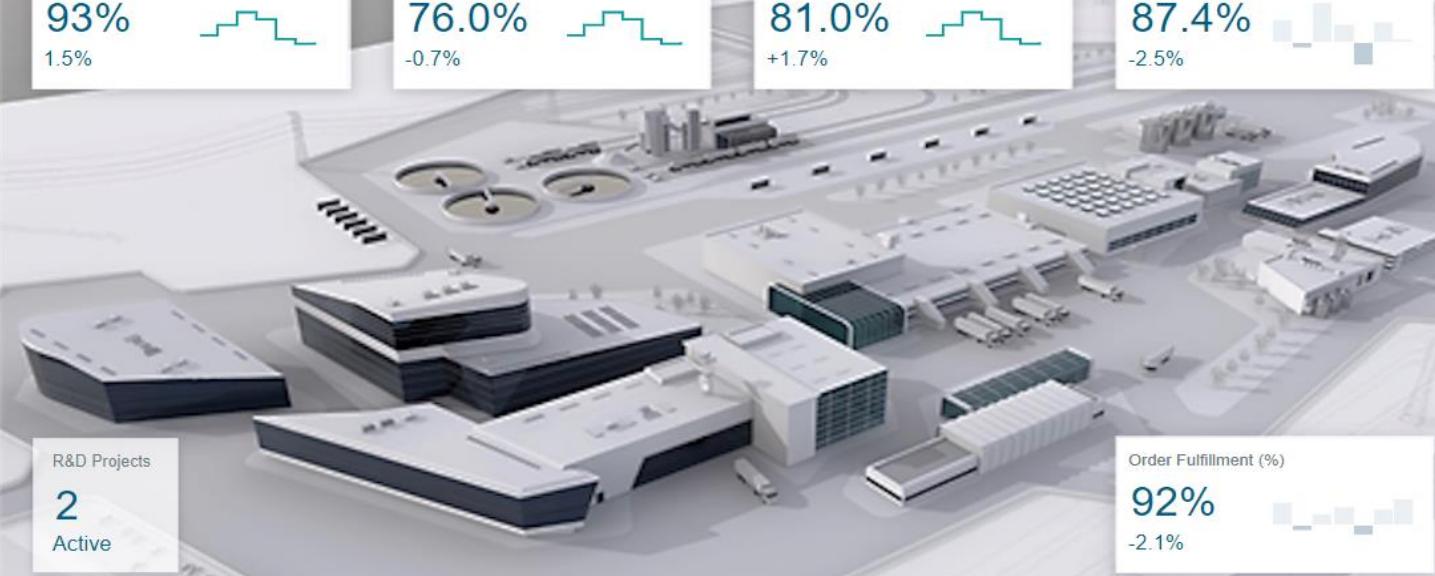
81.0%

+1.7%

In Process Control (IPC)

87.4%

-2.5%



R&D Projects

2

Active

Order Fulfillment (%)

92%

-2.1%

Inventory

MAT ID	TGT	QTY	DEV
120495	6500	500	
120621	200	-150	
136415	9925	-75	
136495	6	0	
139011	42	6	

Order Fulfillment (%)

Order Type	FERT	PACK	UMPA
	2	1	9
	1	1	10
	4	5	8

Planned ●
 Started ■
 Finished □

In Process Control (%)

Category	Procedures	Alarms	Adv Control	SPC	Product Quality	Food Quality
DEV	High	Medium	Low	Medium	High	Medium
MANU	Medium	High	Medium	High	Medium	High
QC	Medium	Low	Medium	Medium	Medium	Medium

Line	Liquids Line 1	Liquids Line 2	Liquids Line 3	Liquids Line 4	Liquids Line 5	Solids Line A	Solids Line B	Solids Line C	Solids Line D	Solids Line E
Energy & Utilities	100%	100%	100%	100%	79%	48%	53%	69%	91%	92%
Formulation & Finishing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Packaging	100%	100%	100%	100%	100%	97%	87%	94%	94%	93%
Individual Packaging Lines	79%	74%	89%	91%	88%	56%	60%	68%	69%	67%

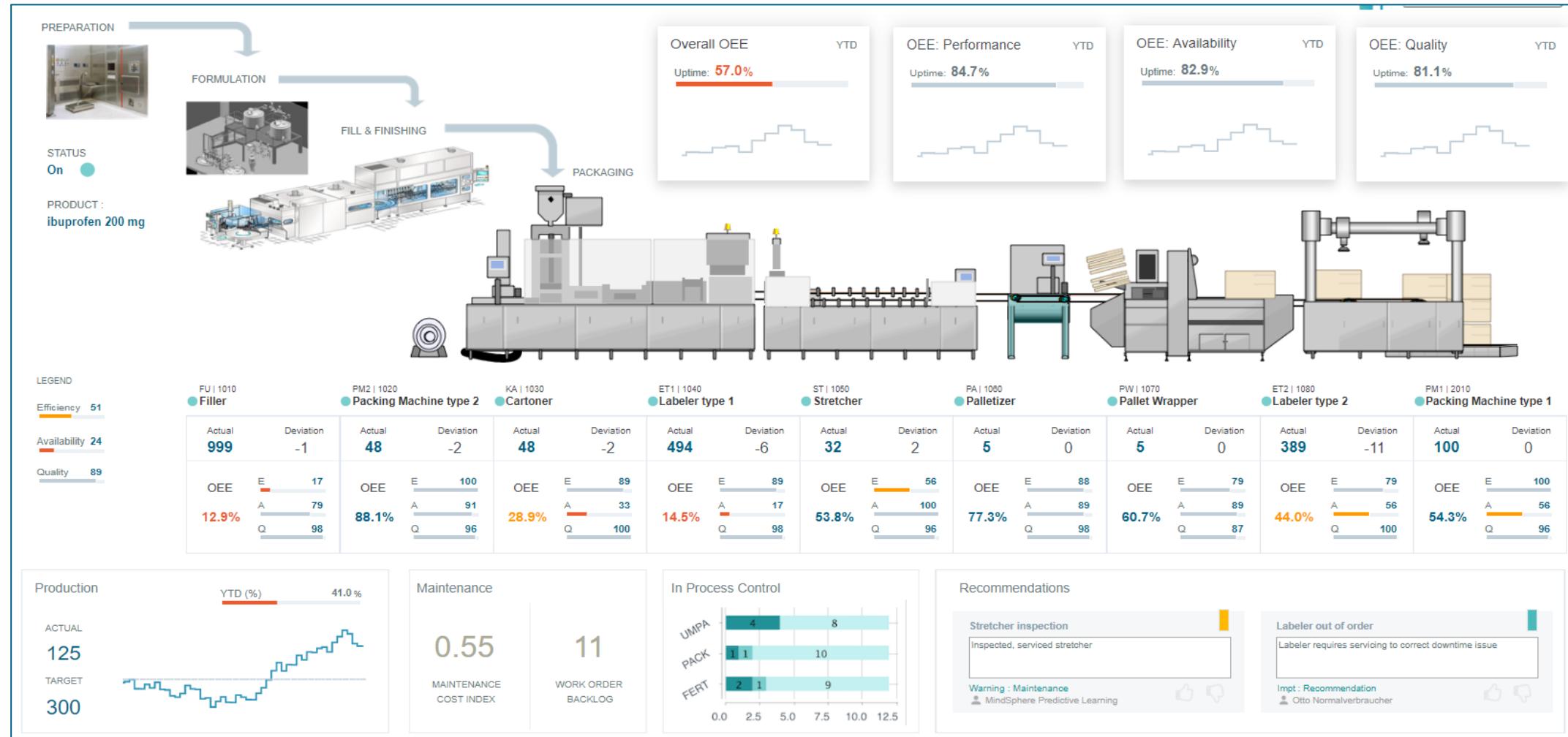
Page 75

AUTOMATION & DIGITALIZATION

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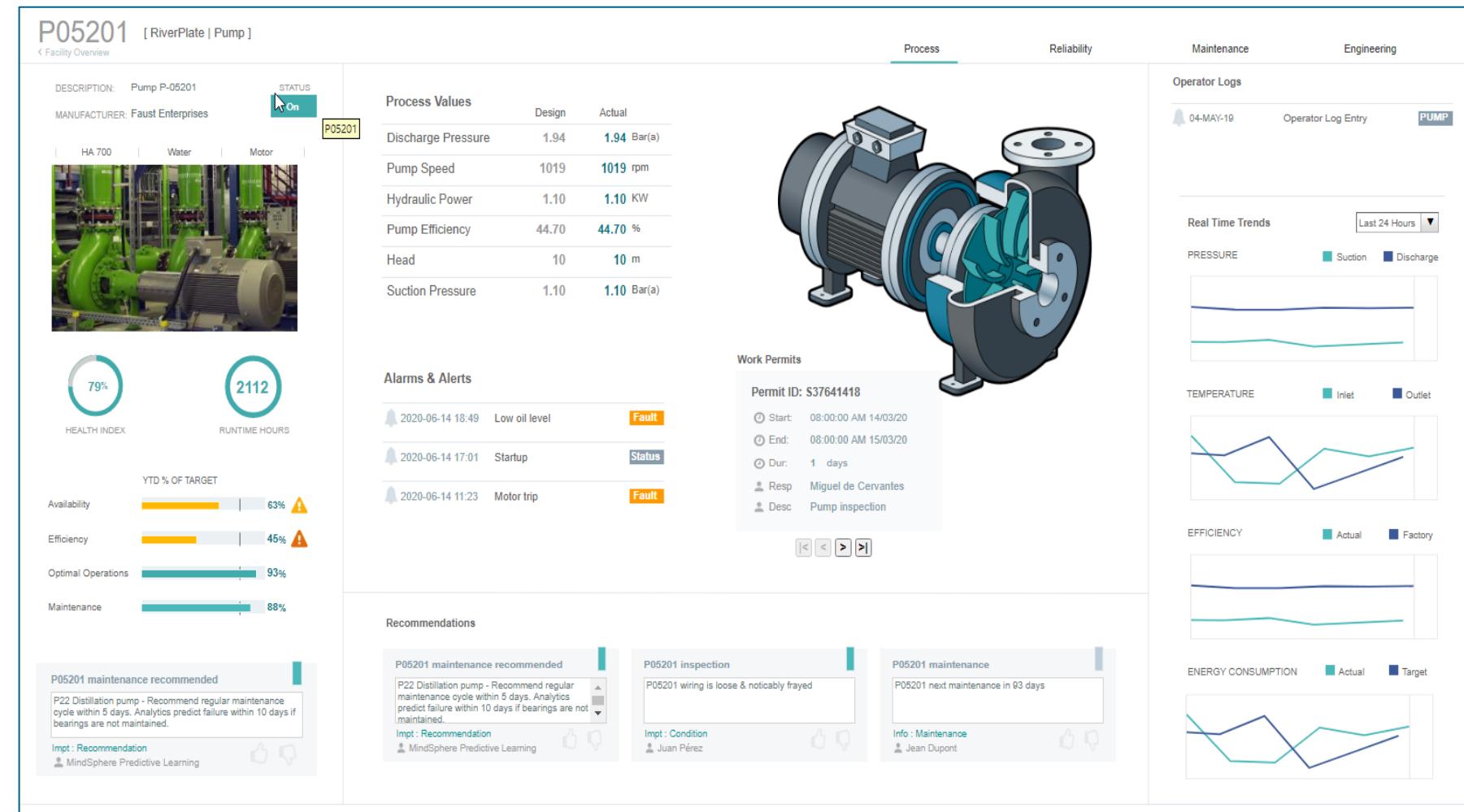
Production Line Performance View (OEE)

Drill down to machine performance



Critical Assets Integrity and Conditioning Monitoring (Sample Use Case)

- 360° view on key assets
- Performance / Maintenance / Costs
- Engineering Drawings & Inspection Scheduling
- Capture undocumented knowledge
- Provides Remote Diagnostic
- Easy access to all equipment information
- Historical performance and maintenance analysis
- Equipment Life Cycle Cost analysis



Drill down to Equipment category Pump Analytics: Sample Use Case

Pumps

Facility Overview

HealthIndex (%)

Site	Health Index (%)
Alianza	85%
Bolivar	88%
Colo-Colo	82%
Flamengo	85%
Millonarios	83%
Olimpia	86%
RiverPlate	84%
Santos	87%

MTBF

Site	MTBF
Alianza	138
Bolivar	127
Colo-Colo	122
Flamengo	151
Millonarios	146
Olimpia	117
RiverPlate	142
Santos	120

Availability (%) - 12 months

Site	Availability (%)
Alianza	85%
Bolivar	88%
Colo-Colo	82%
Flamengo	85%
Millonarios	83%
Olimpia	86%
RiverPlate	84%
Santos	87%

Pump ID **Facility** **Health Index (%)** **Availability (%)** **Run Hours** **% Lifetime** **MTBF (hrs)** **MTBR (hrs)** **Manufacturer** **Service** **Status**

Pump ID	Facility	Health Index (%)	Availability (%)	Run Hours	% Lifetime	MTBF (hrs)	MTBR (hrs)	Manufacturer	Service	Status
P05201	RiverPlate	79 %	63 %	2112	24.5	130	81	Faust Enterprises	Water	On
P22192	RiverPlate	89 %	93 %	2040	1.3	109	163	Goulds	Amine	On
P13062	RiverPlate	90 %	40 %	312	0.6	104	73	Dayton	Water	Off
P13100	RiverPlate	90 %	63 %	2952	2.9	158	63	Dayton	Water	On
P13088	RiverPlate	90 %	68 %	1440	6.2	184	99	Goulds	Water	On
P22217	RiverPlate	91 %	72 %	624	0.6	95	127	Dayton	Water	On
P13092	RiverPlate	92 %	73 %	1200	2.9	150	60	Dayton	Water	On
P13089	RiverPlate	93 %	74 %	1080	2.9	150	60	Dayton	Water	On
P22012	RiverPlate	94 %	75 %	960	2.9	150	60	Dayton	Water	On
P22191	RiverPlate	95 %	76 %	840	2.9	150	60	Dayton	Water	On
P05400	RiverPlate	96 %	77 %	720	2.9	150	60	Dayton	Water	On
P22010	RiverPlate	97 %	78 %	600	2.9	150	60	Dayton	Water	On
P22008	RiverPlate	98 %	79 %	480	2.9	150	60	Dayton	Water	On

PUMP ANALYTICS

Facility: RiverPlate | Service: % | Manufacturer: % | Status: ▾ | Reset | Back to PUMP LIST

Pump Analytics

Facility Overview

Top KPIs

OPTIMAL OPERATIONS (%)

Site	Optimal Operations (%)
Alianza	74%
Bolivar	83%
Colo-Colo	88%
Flamengo	90%
Millonarios	80%
Olimpia	95%
RiverPlate	74%
Santos	74%

MTBF (HRS)

Site	MTBF (Hrs)
Alianza	138
Bolivar	127
Colo-Colo	122
Flamengo	151
Millonarios	146
Olimpia	117
RiverPlate	142
Santos	120

HEALTH INDEX (%) vs AVAILABILITY (%) - All Sites



Pumps: All Sites

Pump ID	Facility	MTBF	Health (%)
P05201	RiverPlate	130	79
P05200	Flamengo	95	80
P05200	Millonarios	72	80
P13061	Alianza	45	80
P13060	Bolivar	89	81

Top KPIs

Health Index (%)

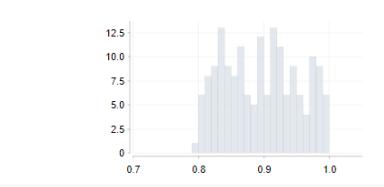
BY MANUFACTURER & SERVICE

Manufacturer	Service	Health Index (%)
Acme Pump Inc.	Dayton	83
Dayton	Acme Pump Inc.	98
Dayton	Goulds	93
Faust Enterprises	Dayton	87
Faust Enterprises	Goulds	79
Goulds	Dayton	89
Goulds	Goulds	91
Malibu Pump	Dayton	71
Malibu Pump	Goulds	92
Neptuno	Dayton	91
Neptuno	Goulds	94

HEALTH INDEX BY SITE

Site	Health Index (%)
Alianza	89%
Bolivar	89%
Colo-Colo	92%
Flamengo	87%
Millonarios	86%
Olimpia	89%
RiverPlate	92%
Santos	92%

HEALTH INDEX HISTOGRAM



Pumps: All Sites

Pump ID	Facility	Health index (%)
P05201	RiverPlate	79 %
P05200	Flamengo	80 %
P05200	Millonarios	80 %
P13061	Alianza	80 %
P13060	Bolivar	81 %

Availability (%)

BY MANUFACTURER & SERVICE

Manufacturer	Service	Availability (%)
Acme Pump Inc.	Dayton	83
Dayton	Acme Pump Inc.	98
Dayton	Goulds	93
Faust Enterprises	Dayton	87
Faust Enterprises	Goulds	79
Goulds	Dayton	89
Goulds	Goulds	91
Malibu Pump	Dayton	71
Malibu Pump	Goulds	92
Neptuno	Dayton	91
Neptuno	Goulds	94

AVAILABILITY BY SITE

Site	Availability (%)
Alianza	66%
Bolivar	65%
Colo-Colo	65%
Flamengo	75%
Millonarios	66%
Olimpia	60%
RiverPlate	68%
Santos	62%

AVAILABILITY HISTOGRAM



Pumps: All Sites

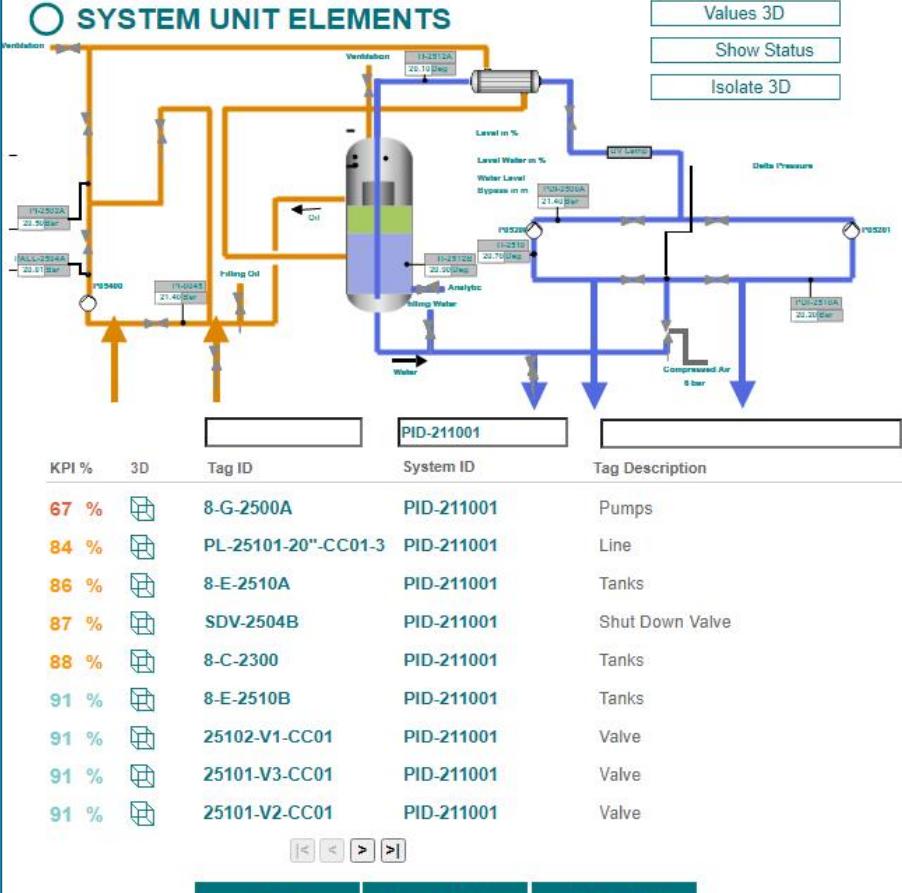
Pump ID	Facility	Availability (%)
P22190	Colo-Colo	34 %
P05200	Olimpia	34 %
P22191	Olimpia	34 %
P22217	Colo-Colo	34 %
P22011	Olimpia	35 %

XHQ provides complete list of Pumps in the facility sorted by Health index. User can drill down to a Pump with bad actors to perform the analytics.

Creating a Digital Twin Environment

Navigate from Process view to 3D view

SYSTEM UNIT ELEMENTS



KPI %	3D	Tag ID	System ID	Tag Description
67 %		8-G-2500A	PID-211001	Pumps
84 %		PL-25101-20"-CC01-3	PID-211001	Line
86 %		8-E-2510A	PID-211001	Tanks
87 %		SDV-2504B	PID-211001	Shut Down Valve
88 %		8-C-2300	PID-211001	Tanks
91 %		8-E-2510B	PID-211001	Tanks
91 %		25102-V1-CC01	PID-211001	Valve
91 %		25101-V3-CC01	PID-211001	Valve
91 %		25101-V2-CC01	PID-211001	Valve

[Values 3D](#)

[Show Status](#)

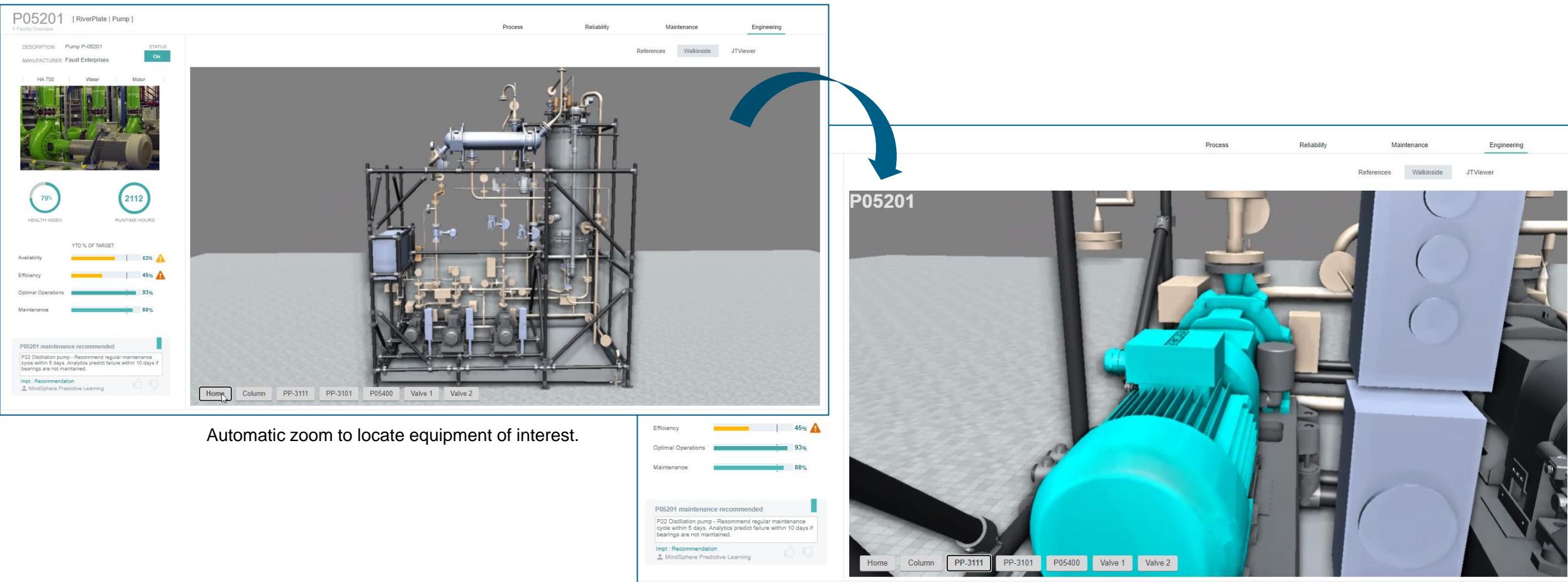
[Isolate 3D](#)

[Back](#) [Maintenance](#) [Inspection](#)



Asset Detail

3D Facility View with COMOS Walkinside



P05201 [RiverPlate | Pump]

Facility Overview

DESCRIPTION: Pump P-05201 STATUS: On

MANUFACTURER: Faust Enterprises

HA 700 Water Motor

79% HEALTH INDEX 2112 RUNTIME HOURS

YTD % OF TARGET

Availability 63% Efficiency 45% Optimal Operations 93% Maintenance 88%

P05201 maintenance recommended
P22 Distillation pump - Recommend regular maintenance cycle within 5 days. Analytics predict failure within 10 days if bearings are not maintained.

Impt: Recommendation MindSphere Predictive Learning

Home Column PP-3111 PP-3101 P05400 Valve 1 Valve 2

Process Reliability Maintenance Engineering

References Walkinside JTViewer

Automatic zoom to locate equipment of interest.

Efficiency 45% Optimal Operations 93% Maintenance 88%

P05201 maintenance recommended
P22 Distillation pump - Recommend regular maintenance cycle within 5 days. Analytics predict failure within 10 days if bearings are not maintained.

Impt: Recommendation MindSphere Predictive Learning

Home Column PP-3111 PP-3101 P05400 Valve 1 Valve 2

Process Reliability Maintenance Engineering

References Walkinside JTViewer

P05201

Single click access to facility 3D model

Asset Integrity

Integrate engineering and Operations documents

PP-3111 [Karlsruhe | Pump]

Facility Overview

DESCRIPTION: Pump P-3111
MANUFACTURER: Faust Enterprises STATUS: On

HA 700 Water Motor



79% HEALTH INDEX 1872 RUNTIME HOURS

YTD % OF TARGET

Availability: 80% Efficiency: 45% (⚠)

Optimal Operations: 93% Maintenance: 88%

PP-3111 production restriction: PP-3111 flowrate was clamped to 50% to avoid excessive vibration, reducing production

Imp.: Condition Johann Wolfgang von Goethe

Documents

ID	Title	Revision	Last update
ChemicalEngineeringCalculations	Chemical Engineering Calculations		
EngineeringToolBoxPumps	Piping systems and pumps		
P1H4.FB.002	COMOS sample P&ID	9	01-Jan-18
PlantSight-C283898	Vertical Pump P-830106B	0	
SiemensIPFC	Integrated drive solutions for pumps, fans, compressors		

Failure Modes

Critical %	Action Type %
Critical	Action Type
Medium	Pump impeller installed incorrectly
Critical	Pump impeller worn
Medium	Pump oil seal worn
Medium	Pump support structure corroded
Medium	Standby pump set failed
Low	Pump packing improperly installed
Medium	Pump drive end bearing lubrication oil/grease viscosity degraded
High	Pump support structure fatigued
Negligible	Pump bearing insufficiently lubricated

FAILURE MODE details: Pump impeller installed incorrectly
FAILURE EFFECT: Pump will not reach operating pressure.

INSPECTION STRATEGY: Test after installation

Link and navigate to all the relevant engineering and operation documents: P&ID, SOP, etc.

- **Navigate to** engineering documents (COMOS), electrical drawings and other operations documents

PP-3111 [Karlsruhe | Pump]

Facility Overview

DESCRIPTION: Pump P-3111
MANUFACTURER: Faust Enterprises STATUS: On

HA 700 Water Motor



79% HEALTH INDEX 1872 RUNTIME HOURS

YTD % OF TARGET

Availability: 80% Efficiency: 45% (⚠)

Optimal Operations: 93% Maintenance: 88%

PP-3111 production restriction: PP-3111 flowrate was clamped to 50% to avoid excessive vibration, reducing production

Imp.: Condition Johann Wolfgang von Goethe

Documents

Projects English

iDB_P01: WL039

View Units Owner: H4

FB.002 P&ID diagram acc. EN 10628, DIN 28430-1

FB.003 P&ID diagram acc. EN 10628, DIN 28430-1

A10 Reactor unit

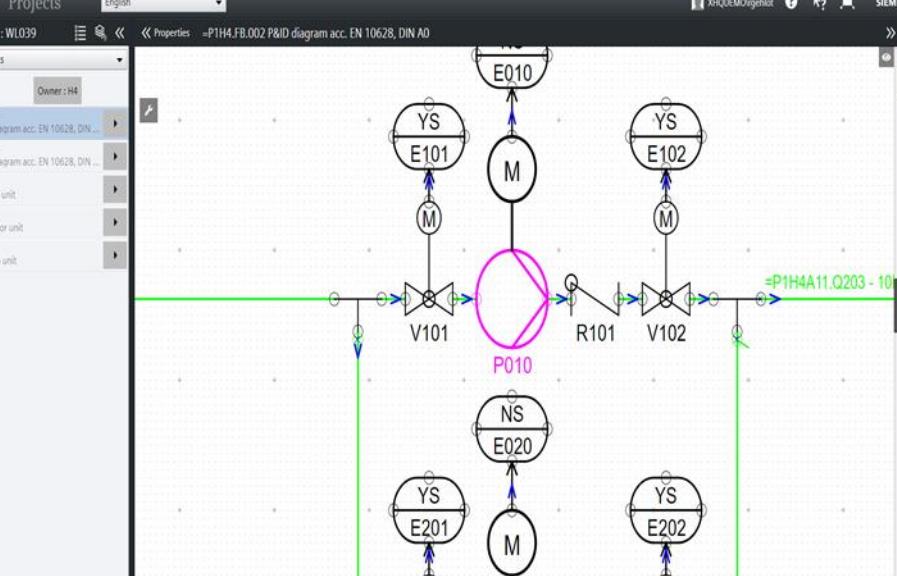
A11 Separator unit

A12 Column unit

=P1H4A11.Q203 - 10

Path

Navigation icons: Navigate to ID, Document list, Navigate to object, Documents, Documents below, Upload P&ID document

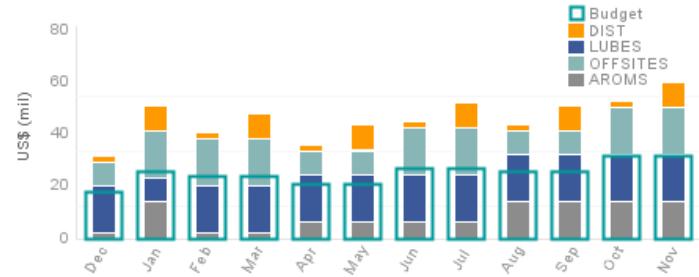


COMOS P&ID

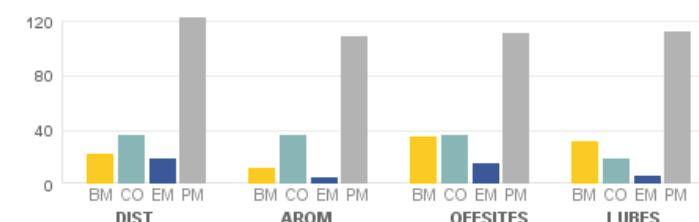
Maintenance Management (Sample Use Case)



Maintenance Performance Management



Plant Area	MTD (% of Budget)	Jan			Fiscal Year		
		MTD %	/ MTD	/ BGT	YTD %	/ YTD	/ BGT
DIST		80.3%	8	200 	27%	650	2400
AROM		93.8%	7	150 	28%	520	1800
OFFSITES		100.2%	15	300 	23%	850	3600
UTILS		85.8%	30	700 	25%	2150	8400



Overall Maintenance Status by WO Type

	# Open	# Aged	# Overdue	# Backlog	# BM	# PM
DIST	9	0	0	0	13	24
AROMS	12	5	4	5	0	11
LUBES	11	0	12	0	0	9
UTILS	12	24	0	19	4	6
OFFSITES	6	0	12	21	23	12

Recent Breakdown Work Orders

Breakdown Maint Critical Equipment		Equipment	All Sites	Priority	Detail
DIST	LUBES	P-2001A/B/C-Crude Oil Pump	OffSh-Site1	1	
AROM	OFFESTES	P-2001A-Crude Oil PumpA	OffSh-Site1	1	
		P-2002A-Crude Oil PumpA	OffSh-Site1	1	
		P-2003A-Crude Oil PumpA	OffSh-Site1	1	
		P-2001B-Crude Oil PumpB	OffSh-Site1	1	

Safety Equipment Maintenance

Overdue PM Safety Equipment		Equipment	All Sites	Days Overdue	Details
5 DIST	1 LUBES	W-1432	OffSh-Site1	2	
		W-1431	OffSh-Site1	2	
		W-1430	OffSh-Site1	2	
3 ABCM	2 REPAIRS	W-1429	OffSh-Site1	2	
		W-1428	OffSh-Site1	2	

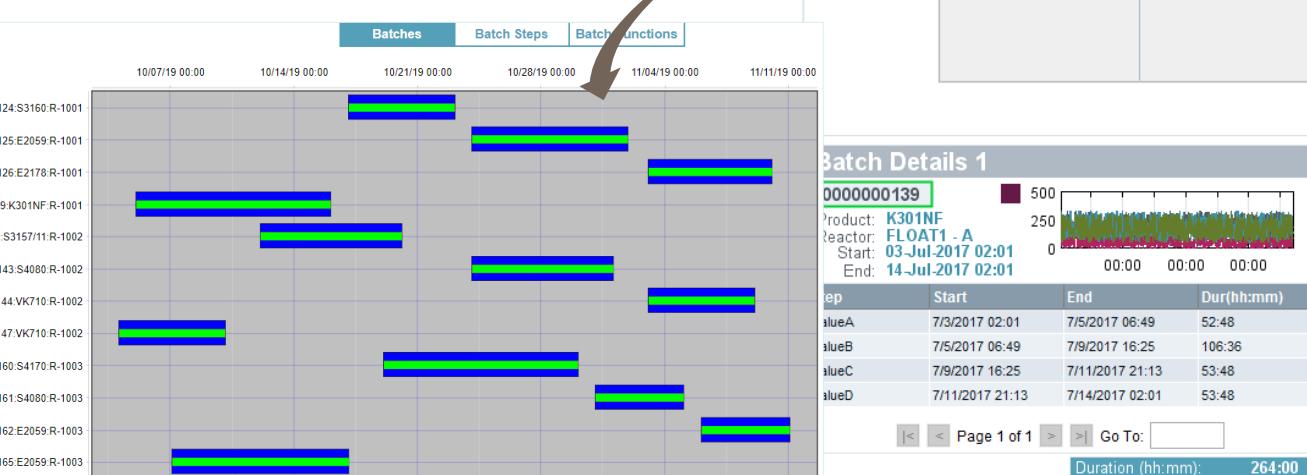
The screenshot displays the AMWorkOrderRIS application interface, which includes several key components:

- Work Orders by Status:** A grid showing counts for Critical WO (0), Missed WO (1), Overage (0), and AW-Resources (0). Below this, another grid shows Unscheduled (2) vs Scheduled (0), Aged (1) vs AW-Materials (0).
- Work Requests:** A table listing Work Requests (WR ID) with columns for Type, Description, Duration (Dur), and Start Date.
- Work Orders: Corrective Maintenance:** A table listing Work Orders (WO ID) for corrective maintenance, including Inspect tasks for pump field test and standard pump wear check.
- Work Orders: Preventative Maintenance:** A table listing Work Orders (WO ID) for repair tasks, such as seal leak and fix/replace seal and bearing.
- CM VS PM Ratio:** A chart comparing the number of corrective (CM) and preventative (PM) maintenance requests.
- Work Permits:** A section showing a permit ID (S83252499) and details about a pump inspection task.
- Spares Parts:** A table listing spares parts with columns for Part Number, Manufacturer, Model, Description, and Available quantity.
- Work Order Details (WO13578):** A detailed view of a specific work order, including:
 - Pricing:** Priority 1, Aging 1075 days, Overdue 1088 days.
 - Equipment:** WO Type: Replace, Equipment Num: CPR024A.
 - Cost Center:** Cost Center: UPSTREAM, Plant: FPSO, Location: 24.
 - Description:** Failed Motor.
 - Notifications:** A list of notifications.
 - Work Order Costs:** A stacked bar chart showing budget and actual costs for labor, material, tools, and services.
 - Budget vs Actual:** A table comparing budgeted and actual costs across categories.
 - Work Order Tasks:** A table showing tasks associated with the work order, indicating none are present.
- Sub workorders:** A summary showing 0 sub workorders.

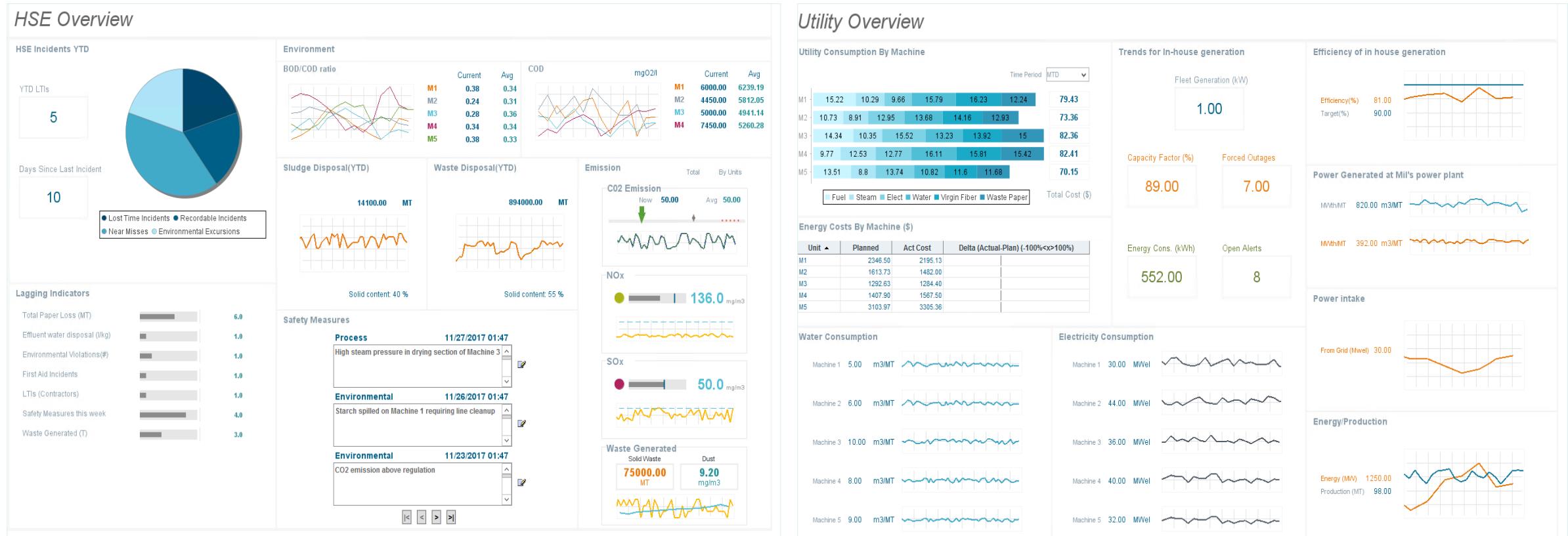
XHQ Batch Analyzer

Golden Batch Use Case

- Impregnation batch tracking
- Compare step times vs. golden batch
- Track deviations
- Assign gap reasons



HSE & Utility Performance (Sample Use Case)



Inventory Management (Sample Use Case)

- Real time Inventory Overview
- Product Quality and Certification information
- Tank Cleaning Schedule
- Historical Tank process data trending



Sales & Finance

Integrate the corporate functions

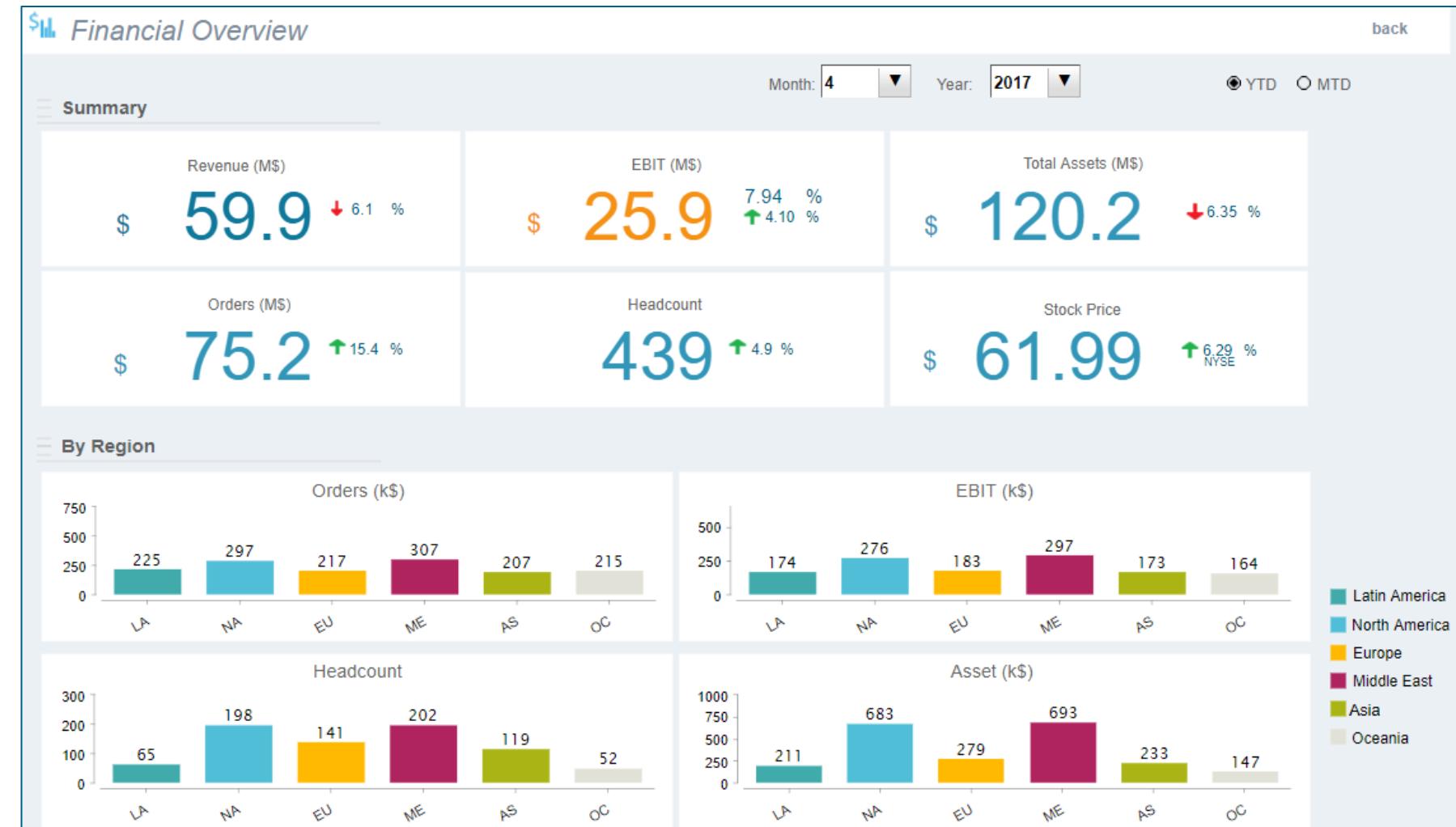
- Corporate data Integration
- Sales and Commercial KPIs Tracking
- Historical analysis of CAPEX & OPEX
- Sales performance Plan vs Actual
- Analysis with Benchmarking
- Drill down to site specific details



Finance Performance

Integrate the corporate functions

- Company's commercial performance view
- YTD improvement
- Regional Performance
- EBIT
- Orders Intake
- Detailed P & L





XHQ Solution Benefits

Demonstrated Customers Benefits

Real-Time Holistic View



Access to all information



8%

Reduction in the
operating costs

Correlate & Benchmark Data



Information in context



9%

increase in
facility utilization

Drill Down for root-cause Analysis



Empowered decisions



2.5%

increase in operational
availability



11%

increase in
production

Demonstrated Customers Benefits



- **Visibility improves the bottom line**
- **See Operations in a new way to grow your top line**
- **Drive collaboration with data visibility at all levels**

What secrets can your data reveal?

- Empowered decisions
- Information in context
- Access to all information

XHQ Solution Benefits

Enabling Data Driven Decisions

Empower Decision Support

- Analyze data from a variety of operations and business sources
- Gain a new perspective driven by new data correlations
- Critical and meaningful information for decision-making

IT- OT Convergence

- Single platform for all the data aggregation and integration
- Contextualize data for new insights across all business processes
- Foster cross-functional visibility & collaboration

Improve Efficiency

- Access operating costs across the entire value chain
- Visualize production, quality, energy, engineering and assets
- Visibility improves the bottom line
- Monitor environmental, health and safety information
- Gather operational intelligence by modeling streaming, event and transaction data



IT: Information Technology
 OT: Operational Technology



Q&A