ESTEC

KHÓA ĐÀO TẠO CHUYỂN GIAO NỘI BỘ
HƯỚNG DẪN LẬP TRÌNH XHQ

Solution Partner
PLM
SIEMENS

ISO 9001
BUREAU VERITAS
Certification

UKAS
MANAGEMENT SYSTEMS

NỘI DUNG

1. GIỚI THIỆU CHUNG
2. KIẾN TRÚC HỆ THỐNG XHQ
3. HƯỚNG DẪN LẬP TRÌNH XHQ
4. HỎI ĐÁP VÀ KẾT LUẬN

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1. GIỚI THIỆU CHUNG

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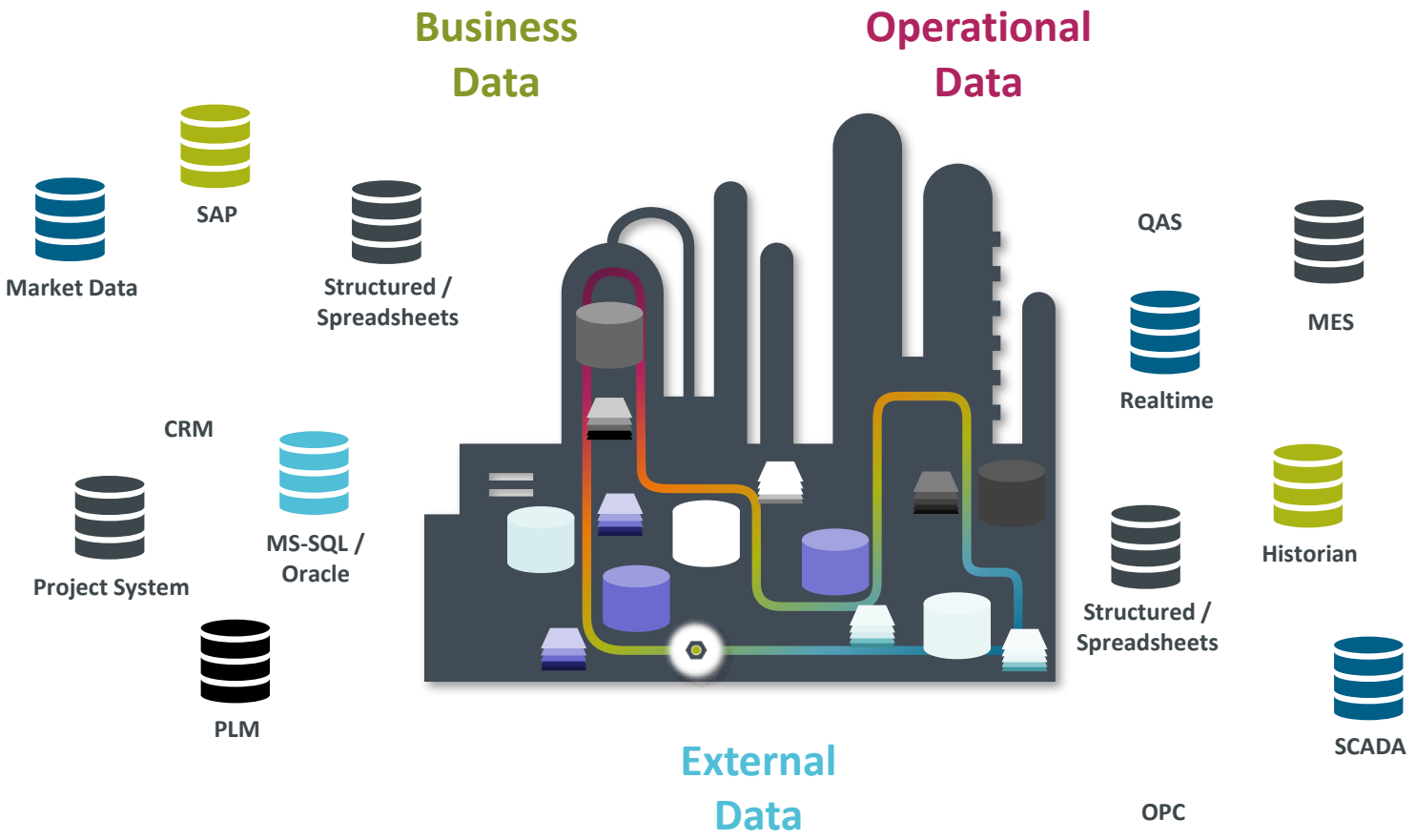
It is all about Data!

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



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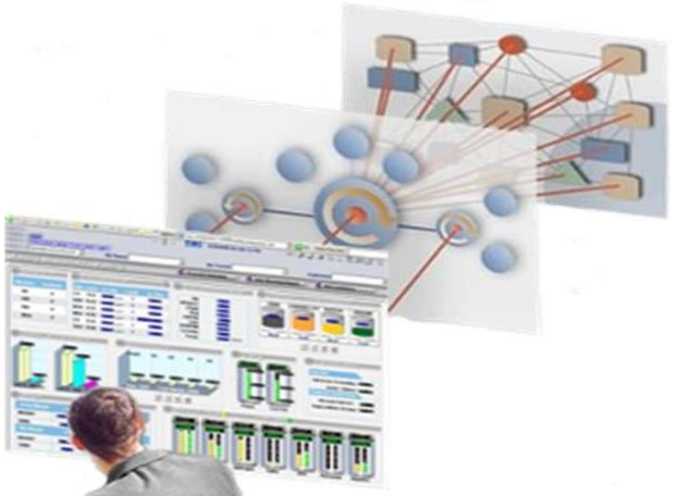
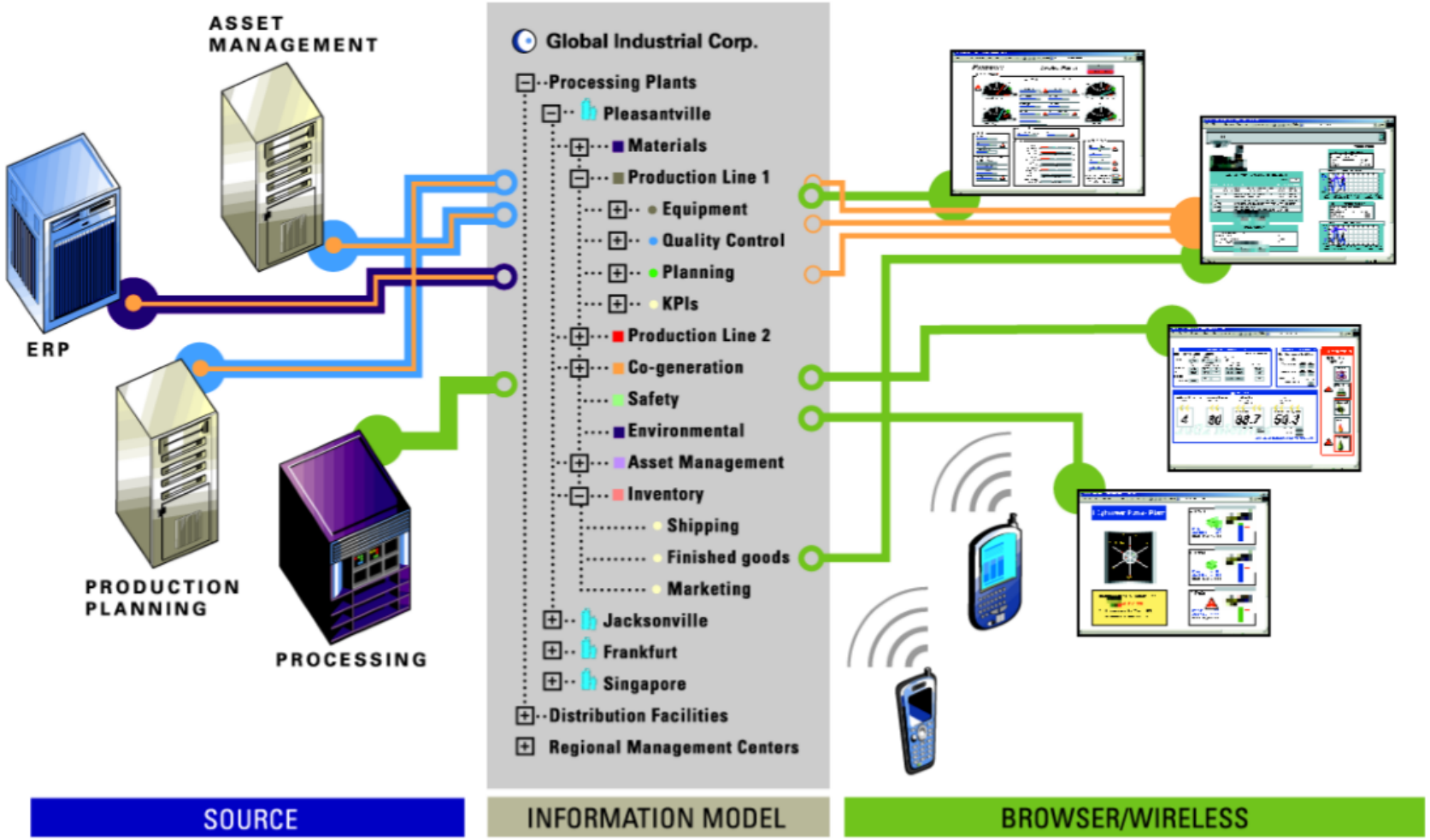
XHQ OVERVIEW





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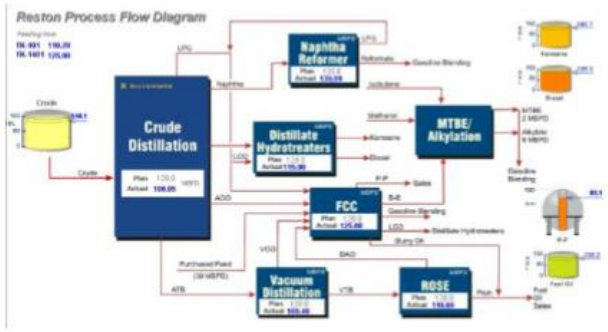
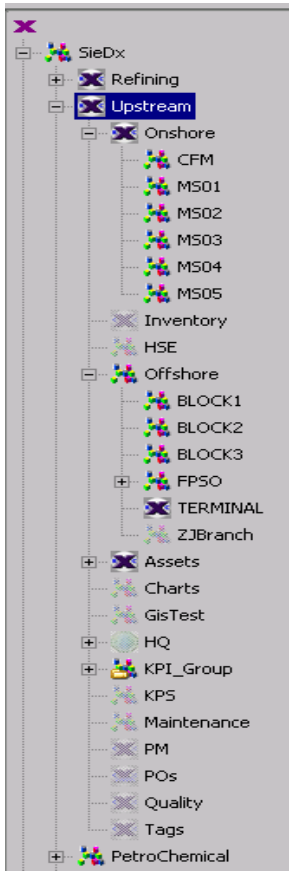
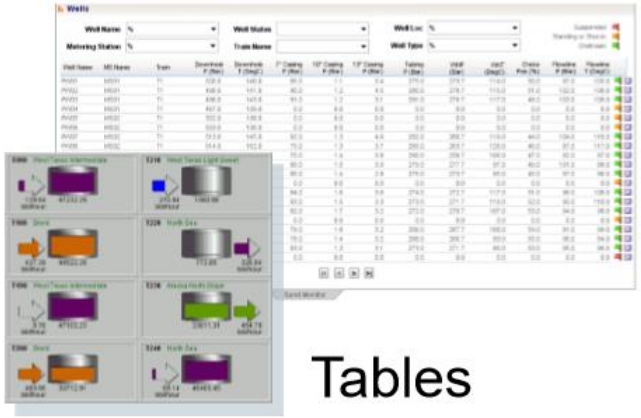
XHQ Solution Example

XHQ in action…



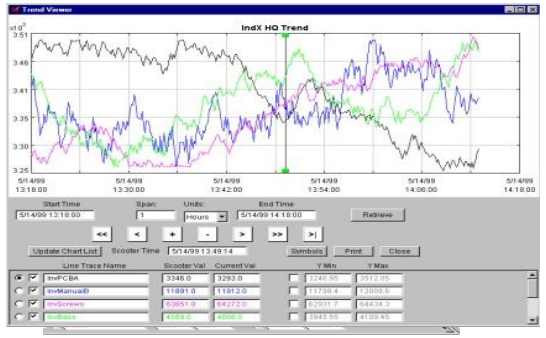
Tags

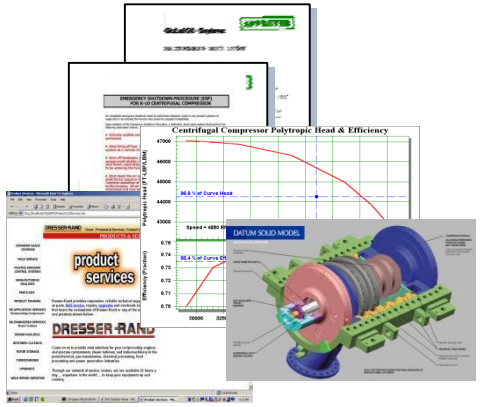




Tables

Time-series





Documents

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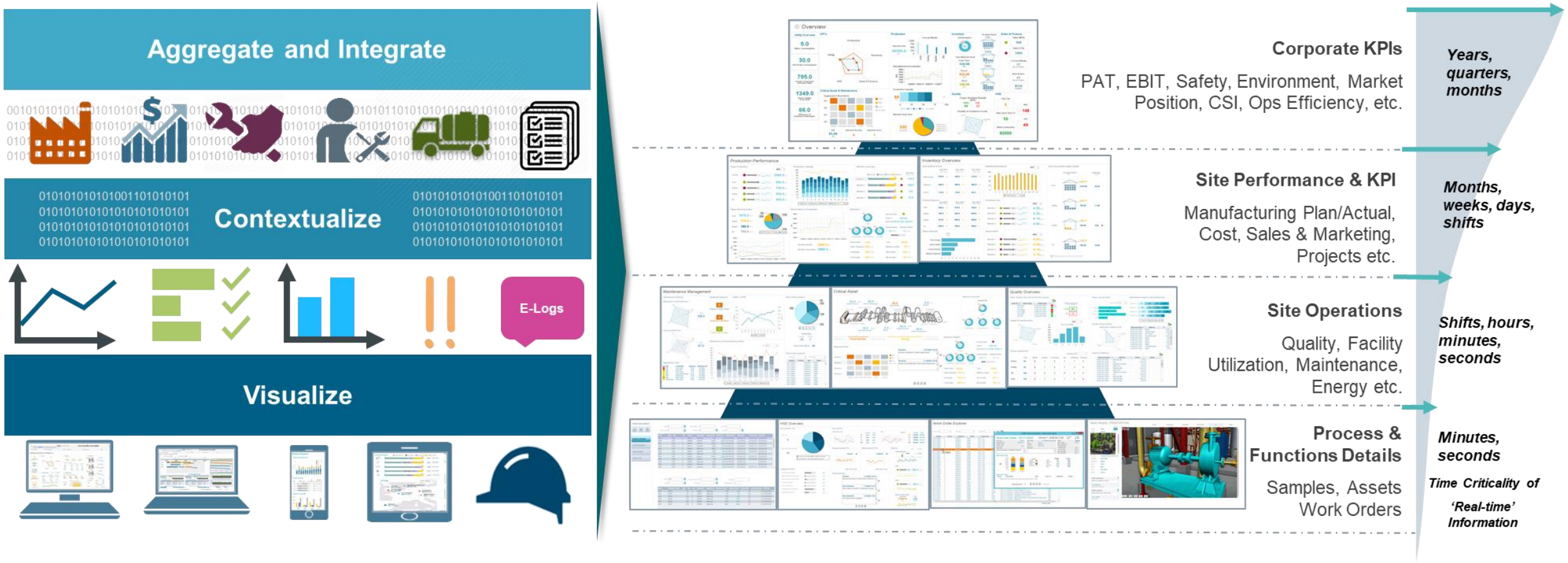
XHQ integrates Data across your Organization Transforming the Data into Right Decisions



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

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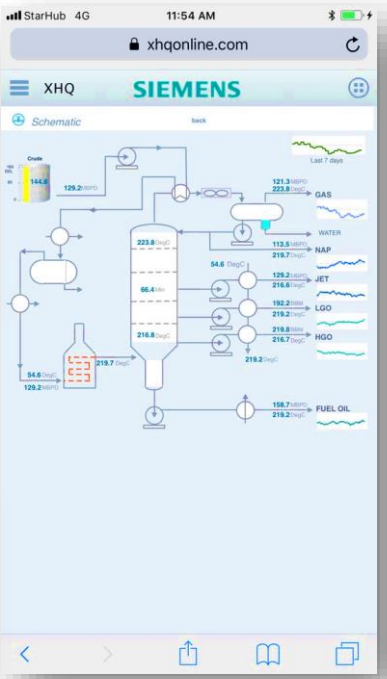
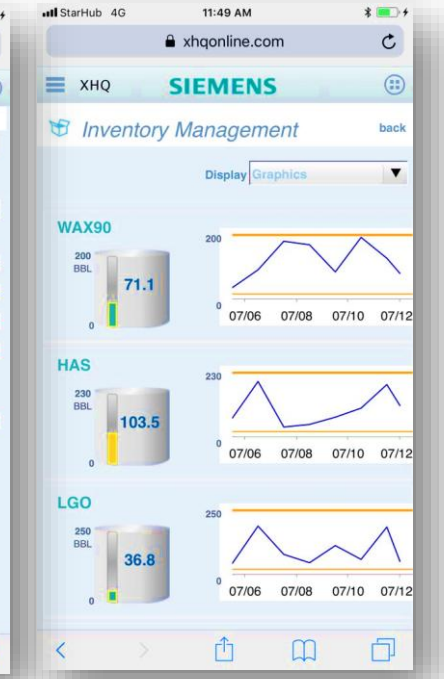
XHQ Visualization (Samples)

Command and Control Center

Interactive Plant Monitoring Screens

Using Smart Helmet (Augmented Reality based)





Mobile and laptop views

AUTOMATION & DIGITALIZATION

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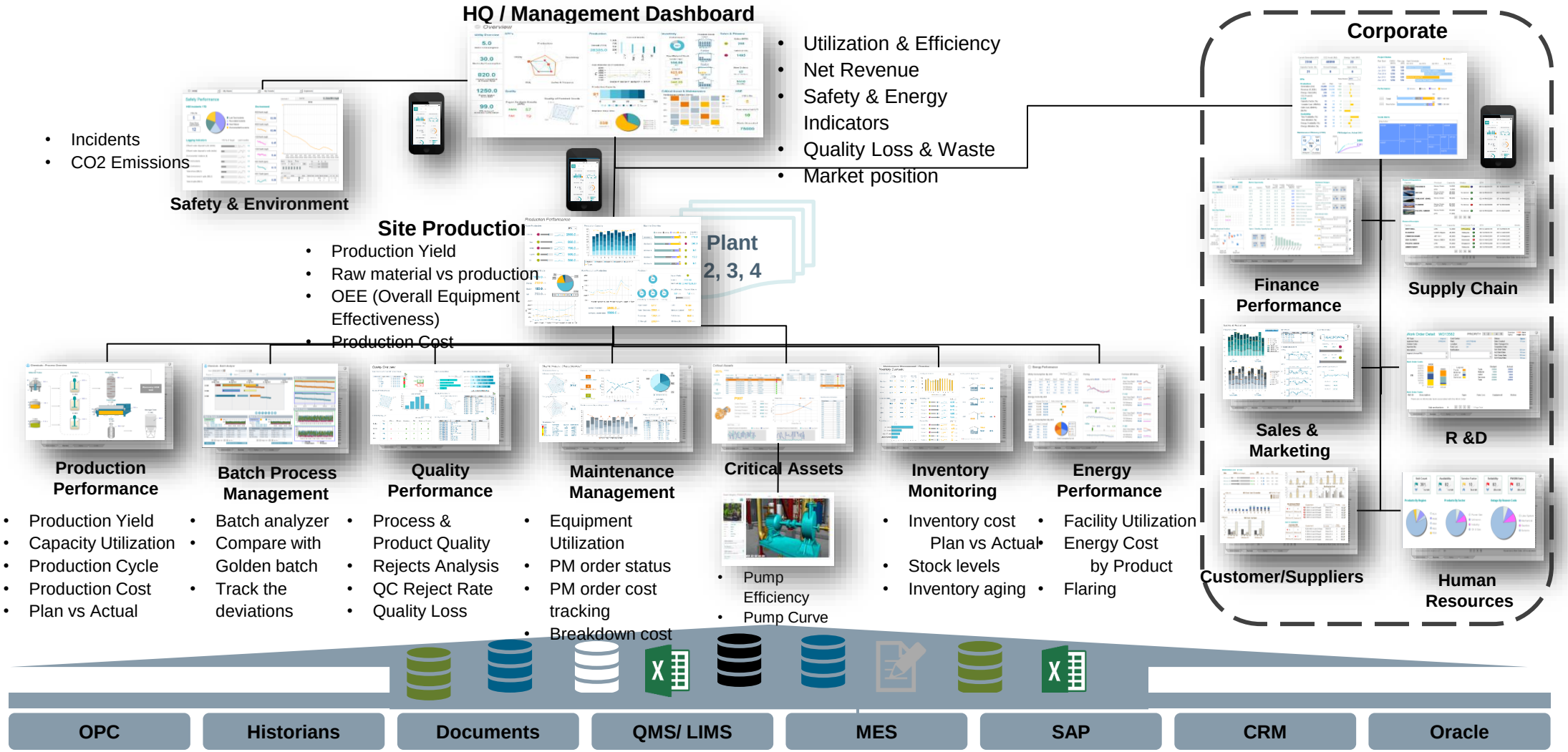
XHQ Solution: Enabling Data Driven Decisions



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2. KIẾN TRÚC HỆ THỐNG XHQ

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Technical Architecture
On-Premise or in Private Cloud

Third-party applications

- Enterprise Portals (SharePoint)
- Microsoft Office (Excel)
- BI Tools (Tableau, Power BI, Qlik, etc.)
- Reporting Tools (SQL Server Reporting Services)
- Applications (Mendix, custom, mobile, simulation)
- Analytics and Workflow Engines
- IoT Platforms (MindSphere, etc.)

Analytics

Visualization

Solution Viewer

Visual Tile Composer

Interoperability

- XHQ BI (OData)
- ADO.NET
- Web APIs (REST)
- Java APIs
- OPC UA Server

Development and Administration Tools

Best Practice Packs and Helper Tools

Performance Management

- Alert Notification Server
- Lost Opportunities and Reason Codes
- Target Management
- eLogs and Shift Reporting

Intelligence Server

- Aggregation
- Contextualization
- Caching
- Modeling
- Time Series Historization
- Auditing, Monitoring
- Authorization

Connectivity

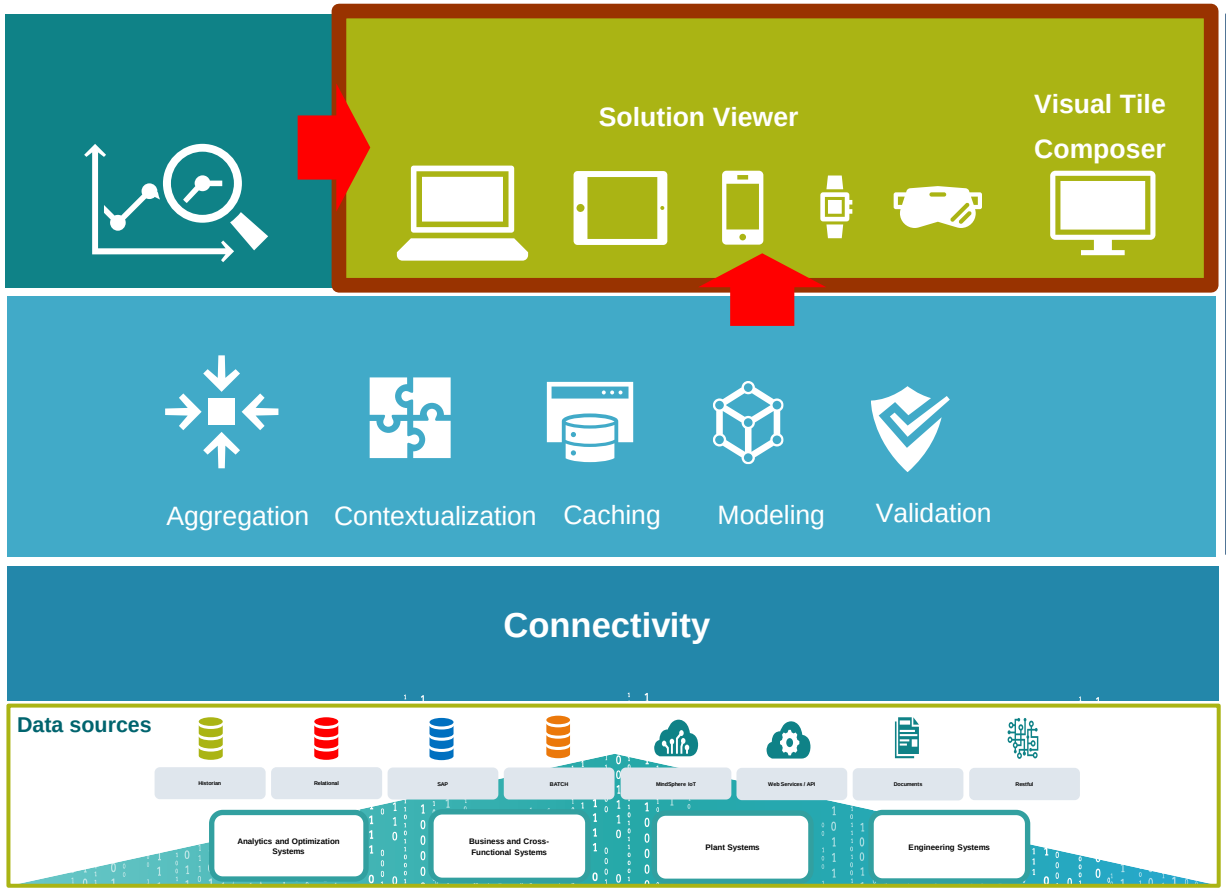
XHQ Edge, Connectors and Adaptors

Data sources

- Historian
- Relational
- SAP
- BATCH
- MindSphere IoT
- Web Services / API
- Documents
- Restful

- Analytics and Optimization Systems
- Business and Cross-Functional Systems
- Plant Systems
- Engineering Systems

UI/UX



UX

- *User Research*
- *Usability Testing*
- *Personas*
- *Low-fidelity*
- *Workflow*
- *Copywriting*
- *Interaction Design*
- *Information Architecture*

UI

- *Wireframe*
- *Prototype*
- *Usability*
- *Acccessbility*

- *Visual Design*
- *Interface Design*
- *Color*
- *Layout*
- *Typography*
- *Graphic*
- *Branding*
- *High-fidelity*

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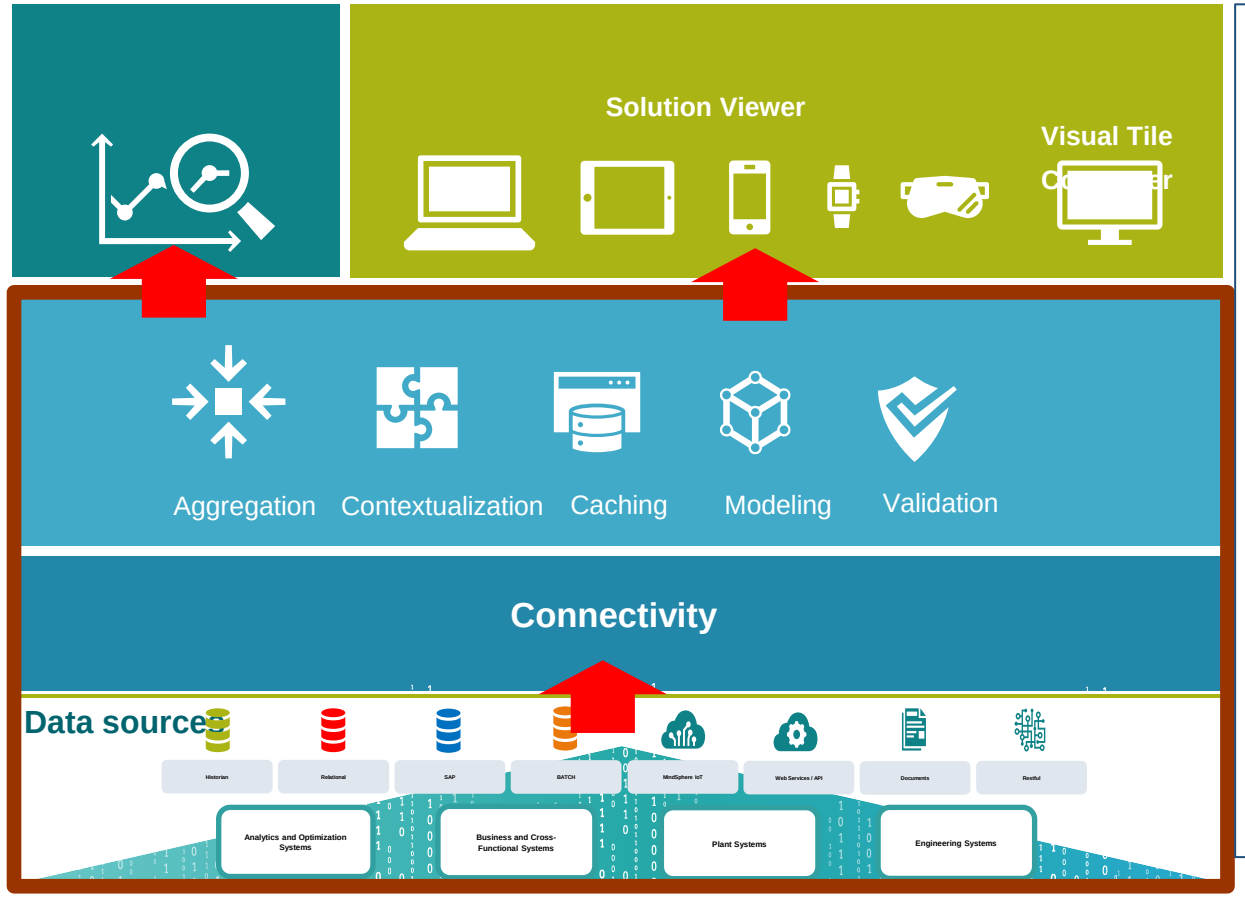
DATA



- Excellent analytical skills
- Thorough knowledge of physical database design and data structures
- In-depth understanding of data management (e.g. permissions, recovery, security and monitoring)
- Ability to recognize relationship between data elements
- Knowledge of database objects including tables, indexes, views and statistics
- Knowledge of **ETL** and **BI tools**
- Proficiency in SQL with ability to write complex SQL queries and other features
- Troubleshooting any issues that arise with new database applications, and providing solutions to implement
- Applying technical design and development skills to the creation of database programs
- Analyzing existing databases and data needs of clients to develop effective systems
- Using knowledge of specific programming languages and codes
- Following implementation processes for new database

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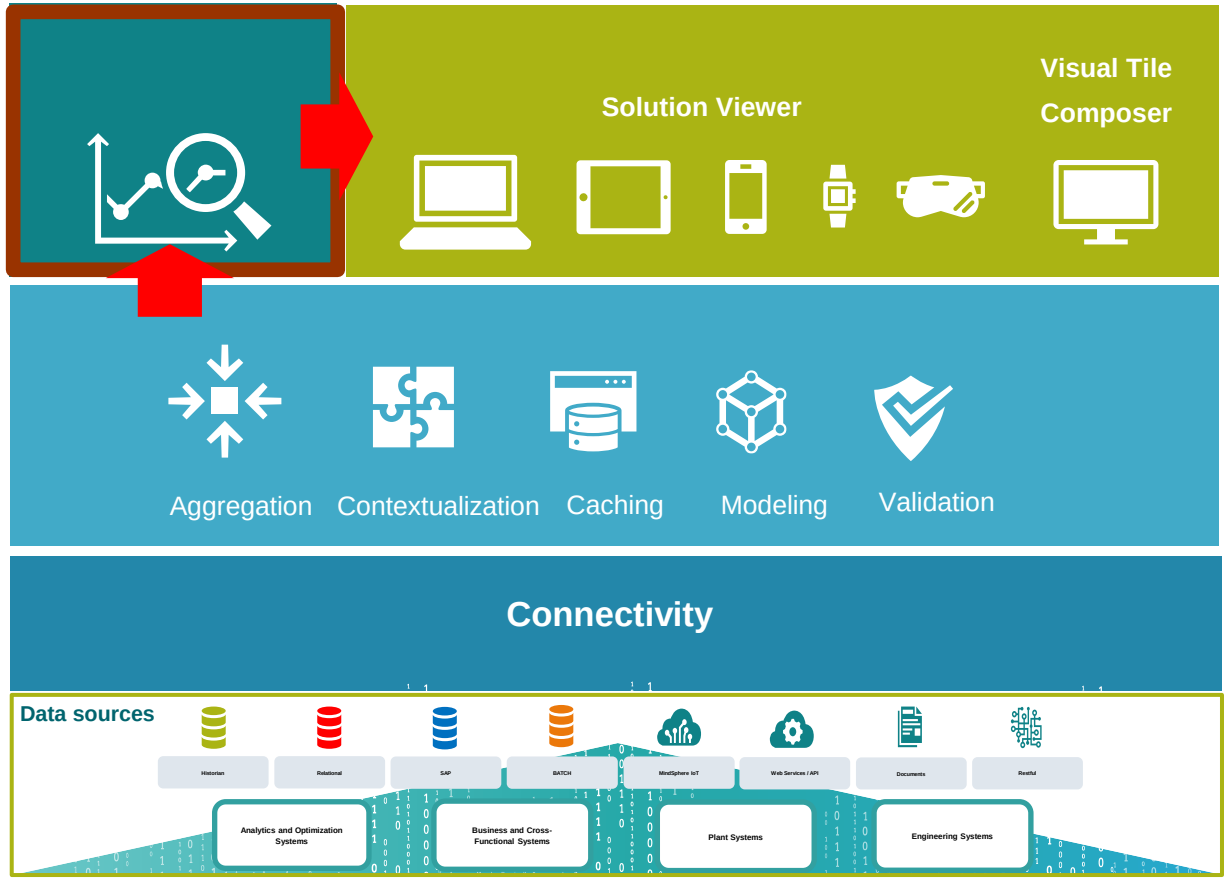
ANALYTICS/ AI



- Domain Knowledge
- Programming Languages: **Python, R, Java, C++**
- Mathematical Knowledge: **Linear algebra, Statistics, Probability, Graph**
- Machine Learning:
- Deep Learning
- Neural Network Architecture
- Big Data and Distributed Computing: **Big Data, Distributed computing**
- Signal Processing Techniques
- Shell Scripting
- Cluster Analysis
- Communication
- Decision Making
- Analytical Thinking
- Creativity

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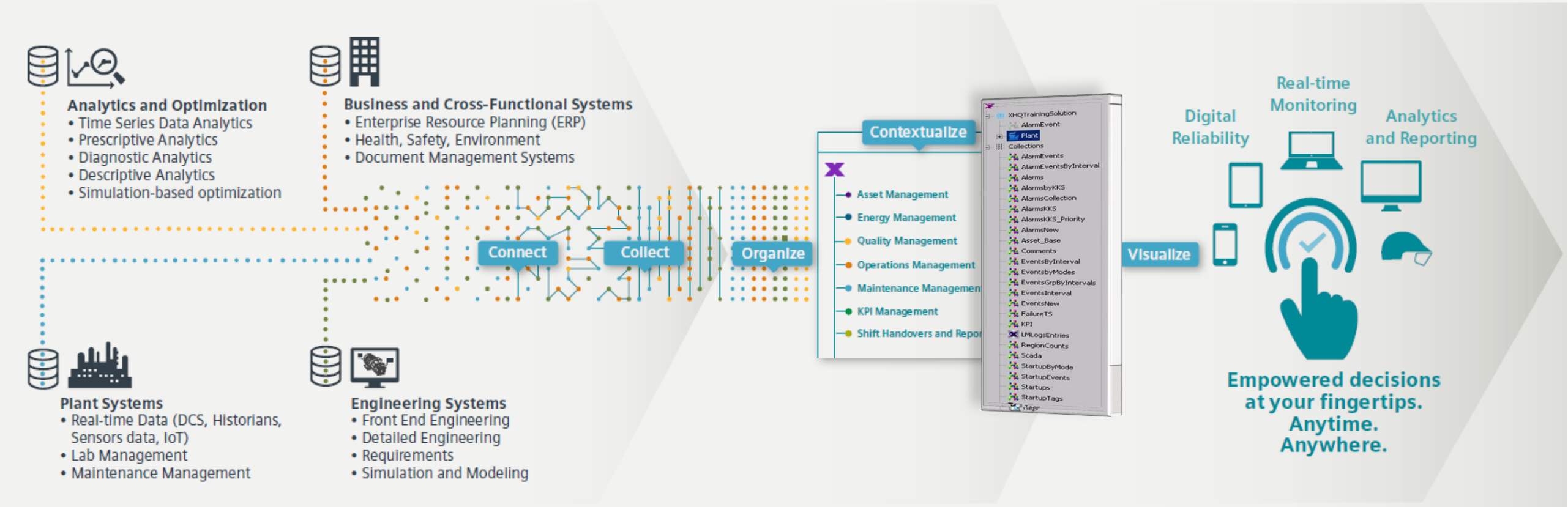
Functional Architecture
Turn data into actionable information



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

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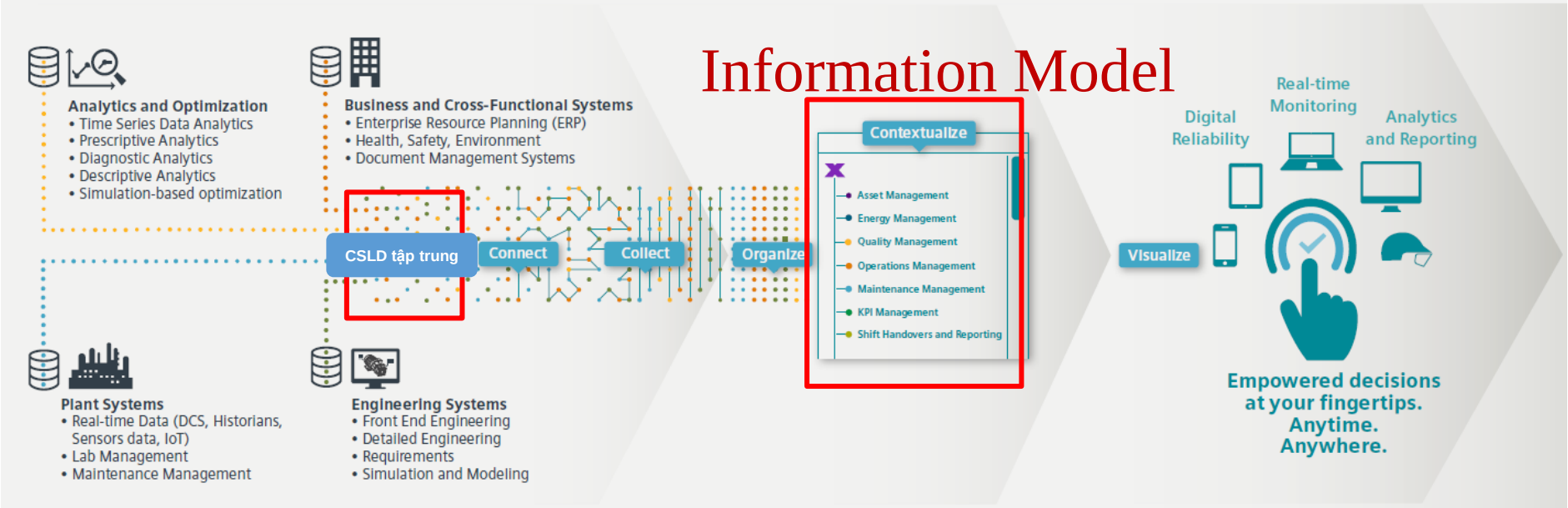
XHQ Information Model



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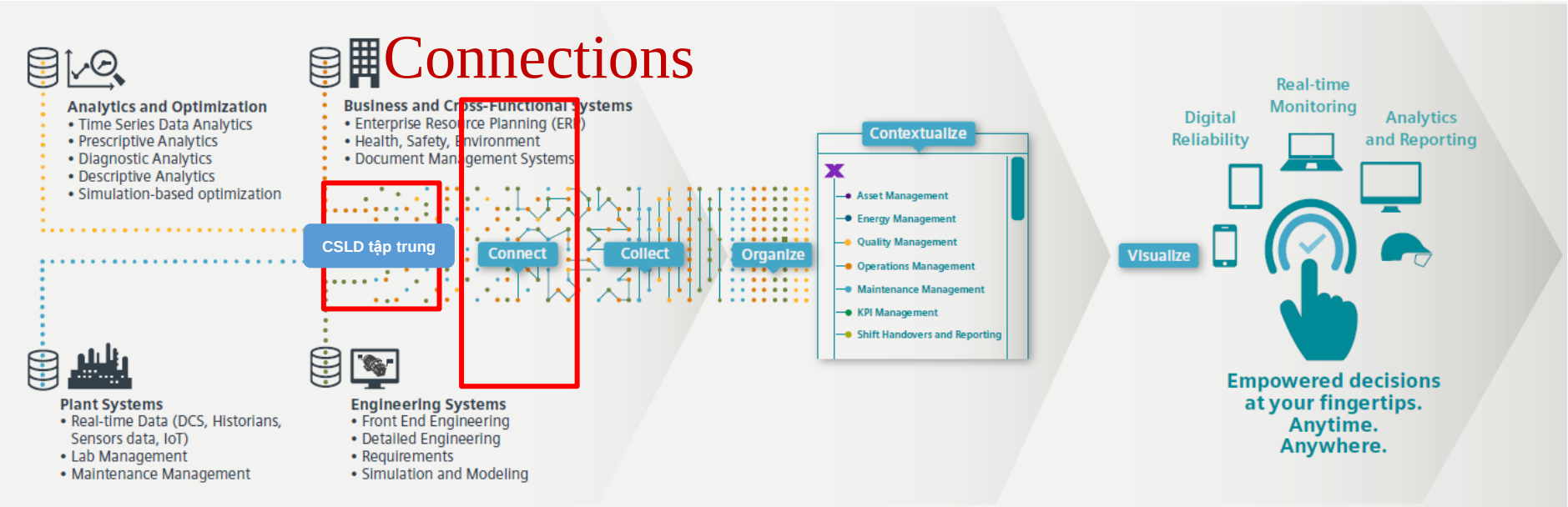
XHQ Connection



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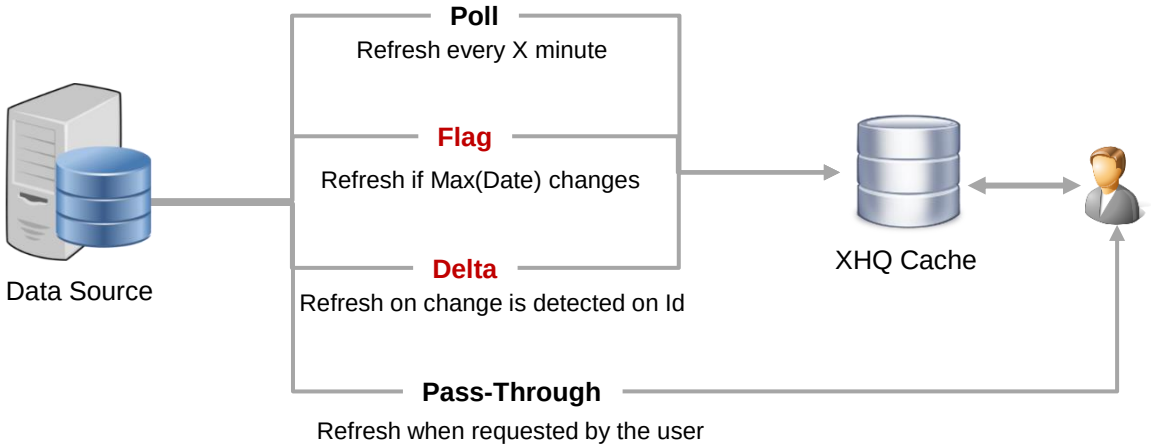
Connectivity and Integration: XHQ in-built connectors

XHQ Connectors	
▪ 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)	▪ Siemens Simatic IT Historian ▪ OSISoft PI ▪ OSI PI – AF (Asset Framework) ▪ Aspen - InfoPlus 21 ▪ Honeywell PHD Historian ▪ MindSphere IoT Connector ▪ Batch Connector • Batch 21 • PI Batch • Simatic IT Batch ▪ XHQ Tiered Solution Connector ▪ XHQ Edge

XHQ Data Polling Methods



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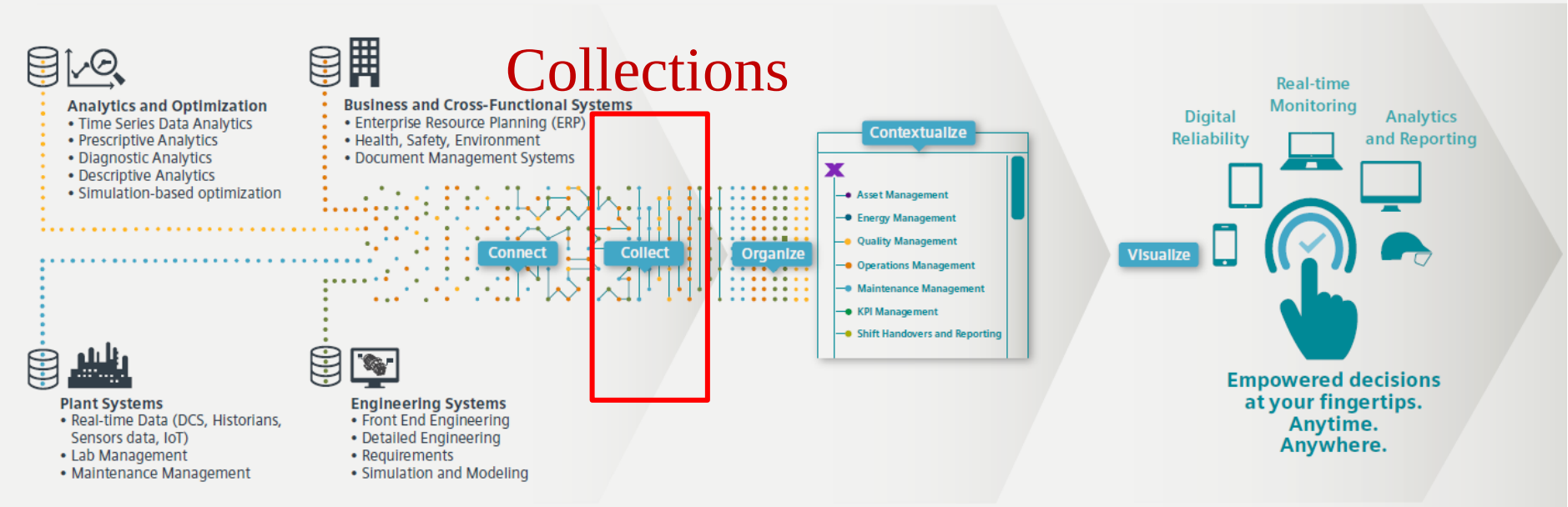
XHQ Collections



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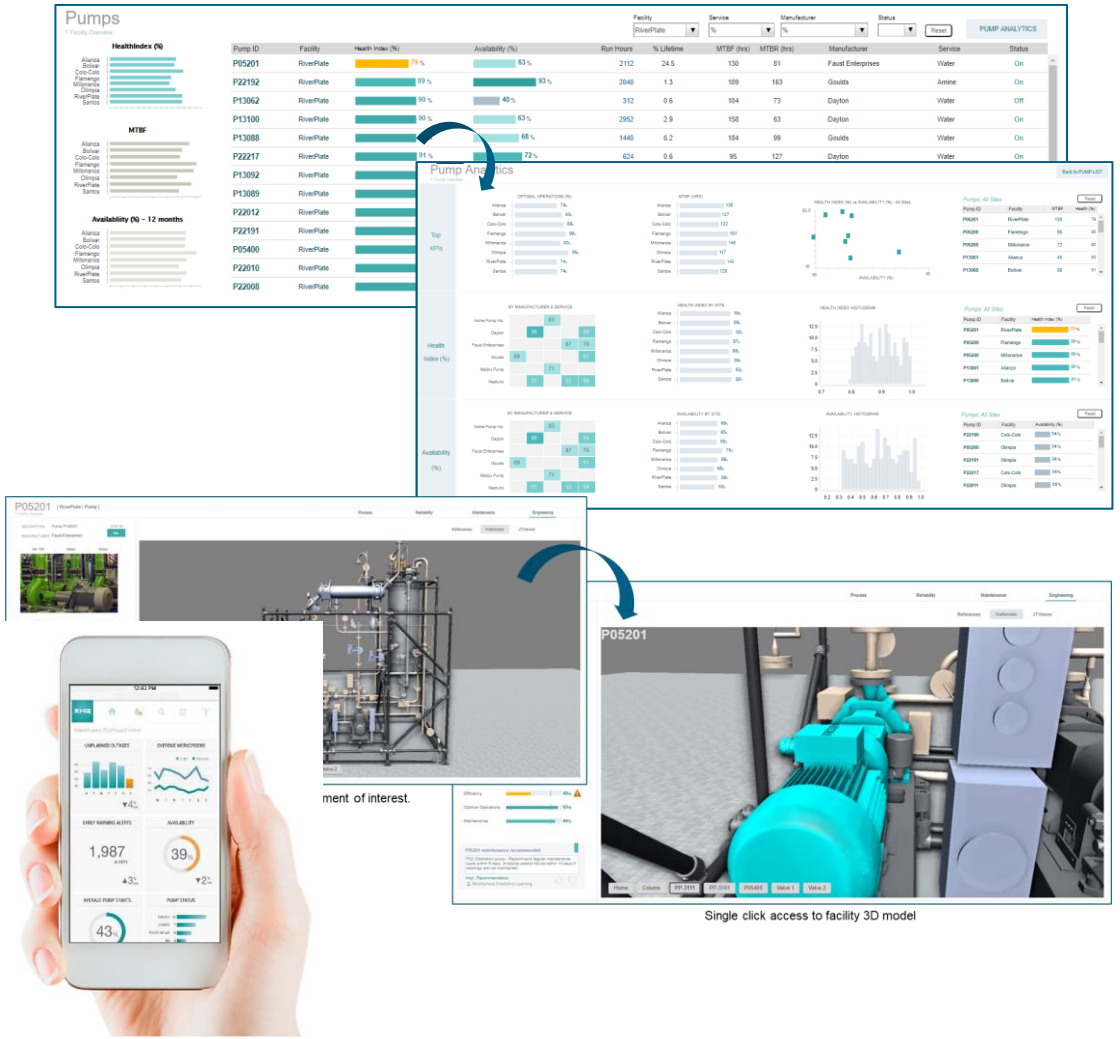
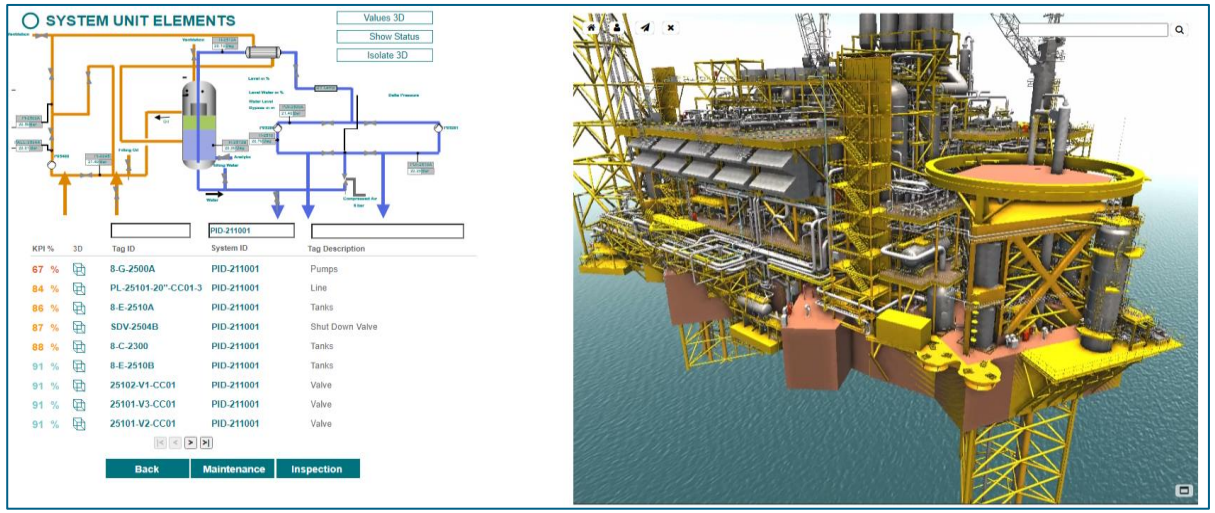
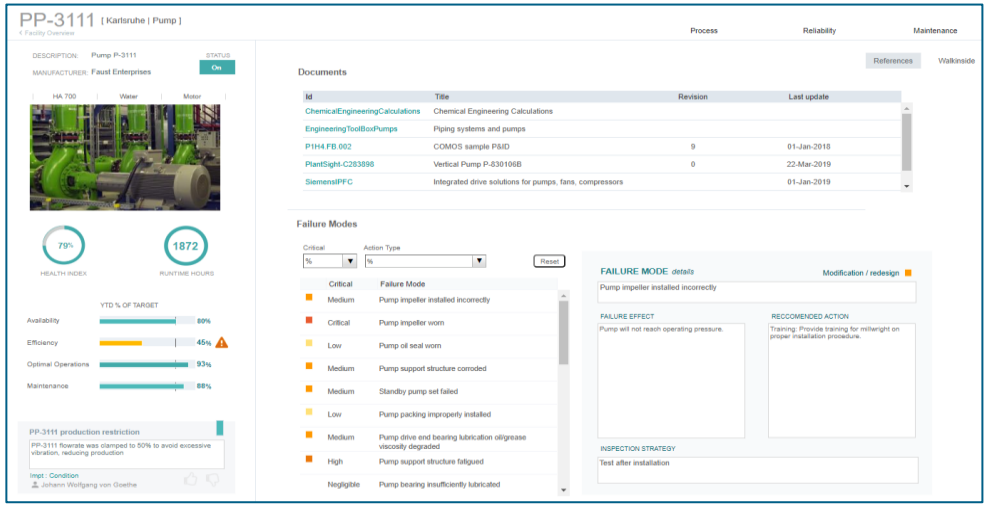
XHQ View/ Dashboard







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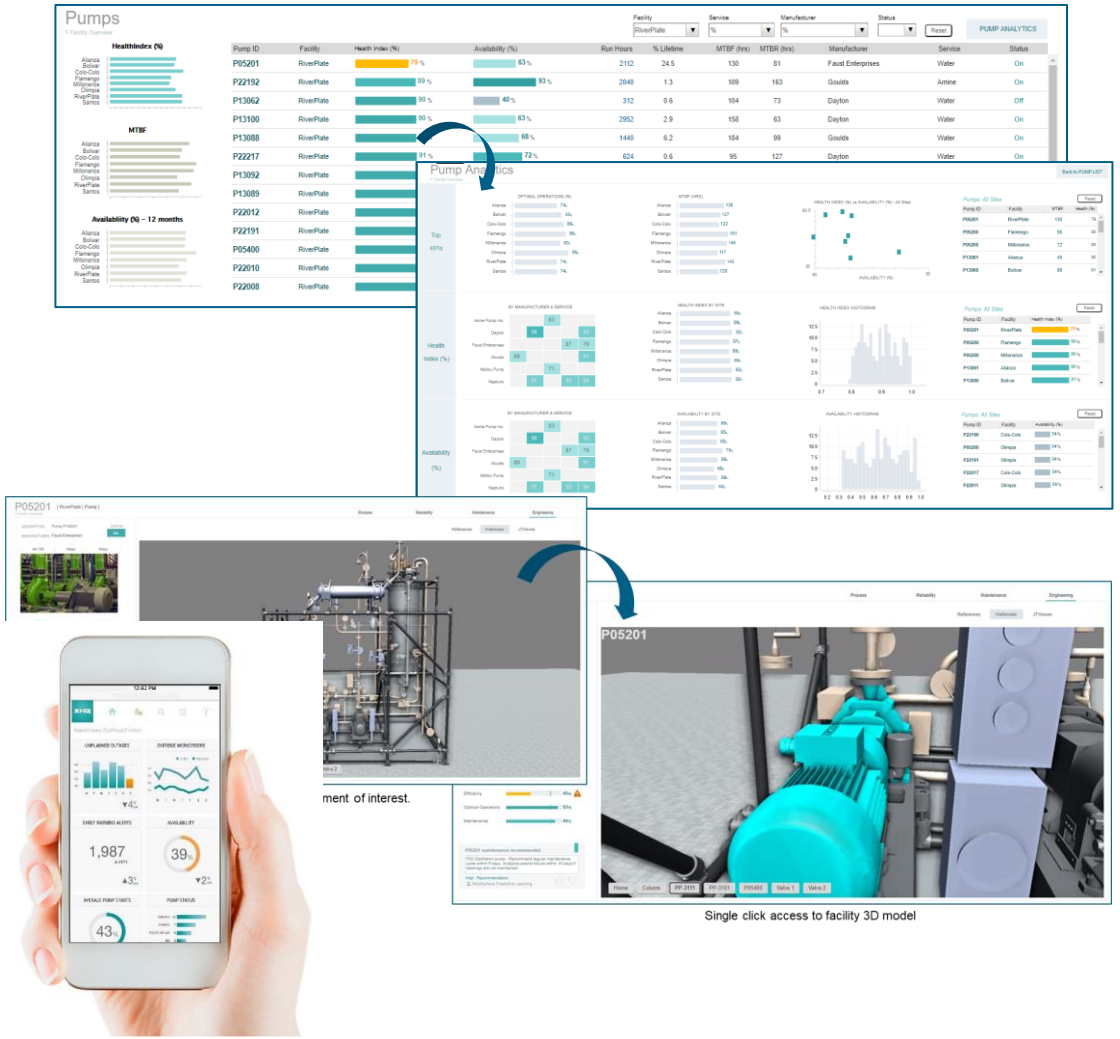
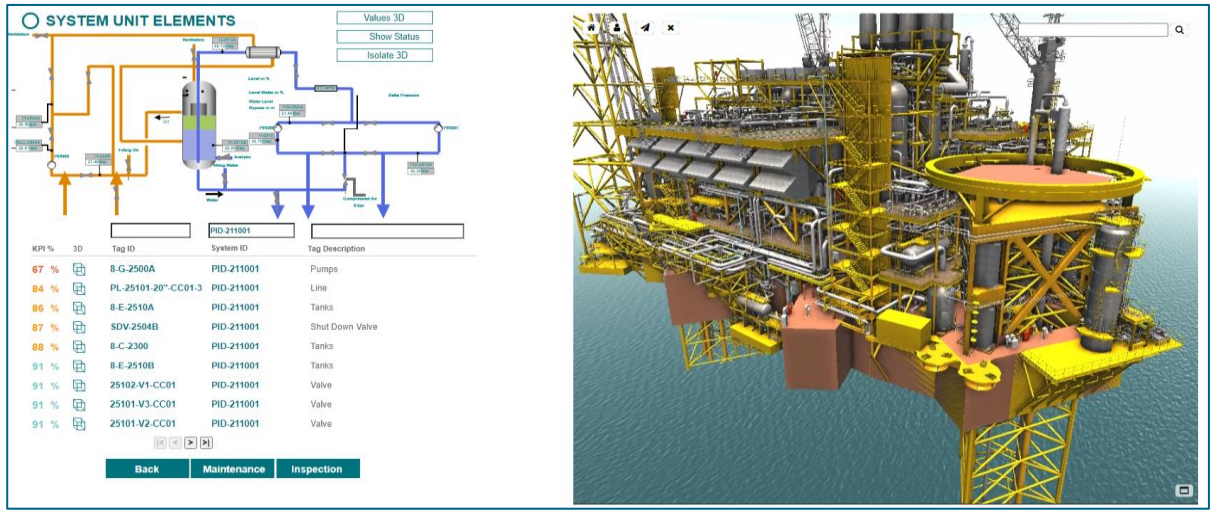
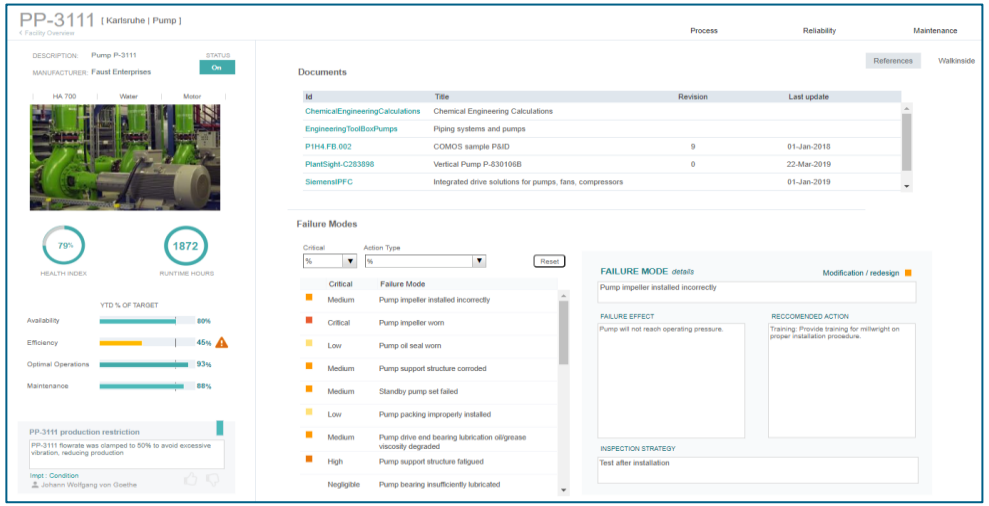
XHQ View/ Dashboard



Single click access to facility 3D model





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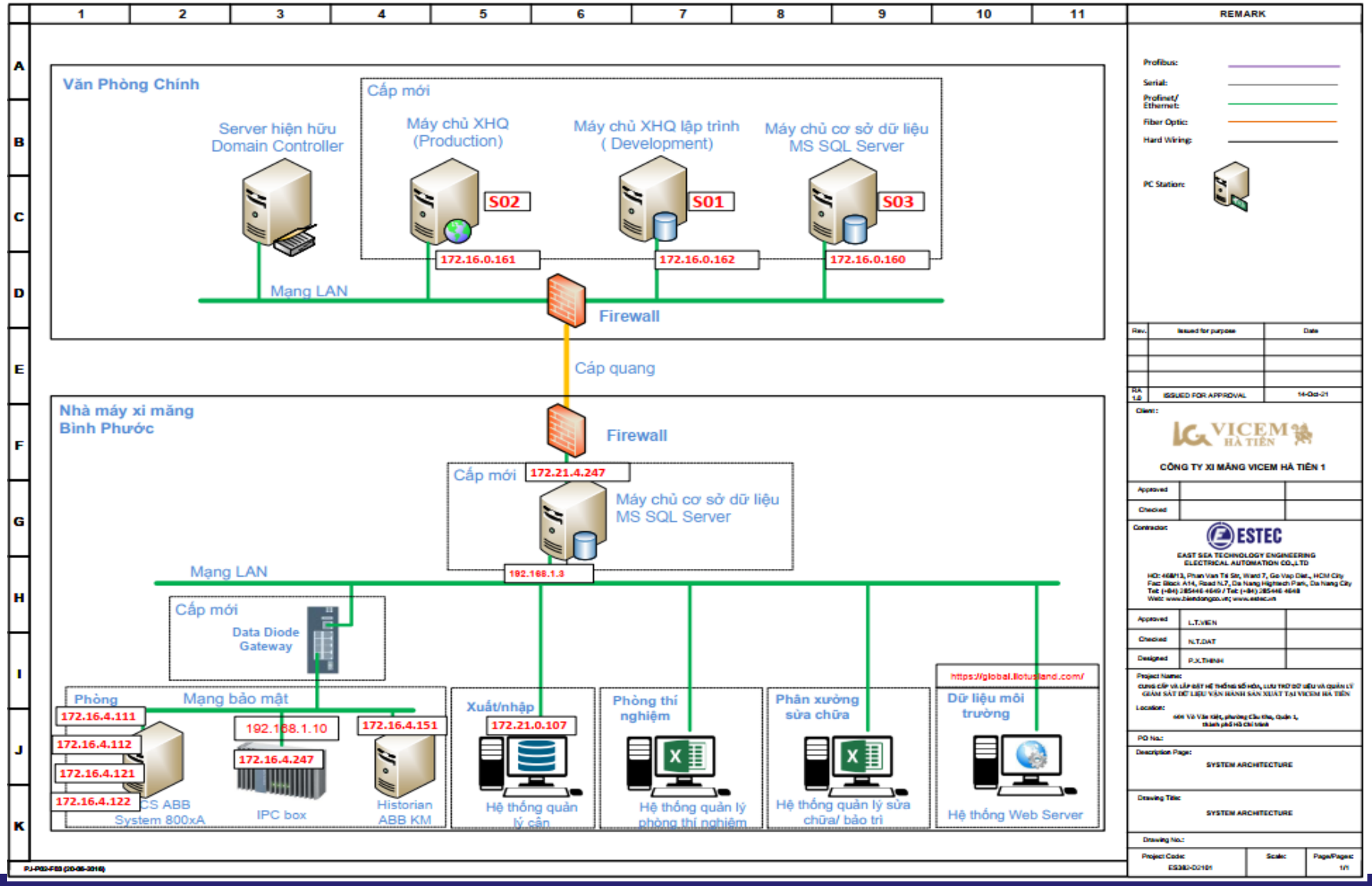
KIẾN TRÚC HỆ THỐNG



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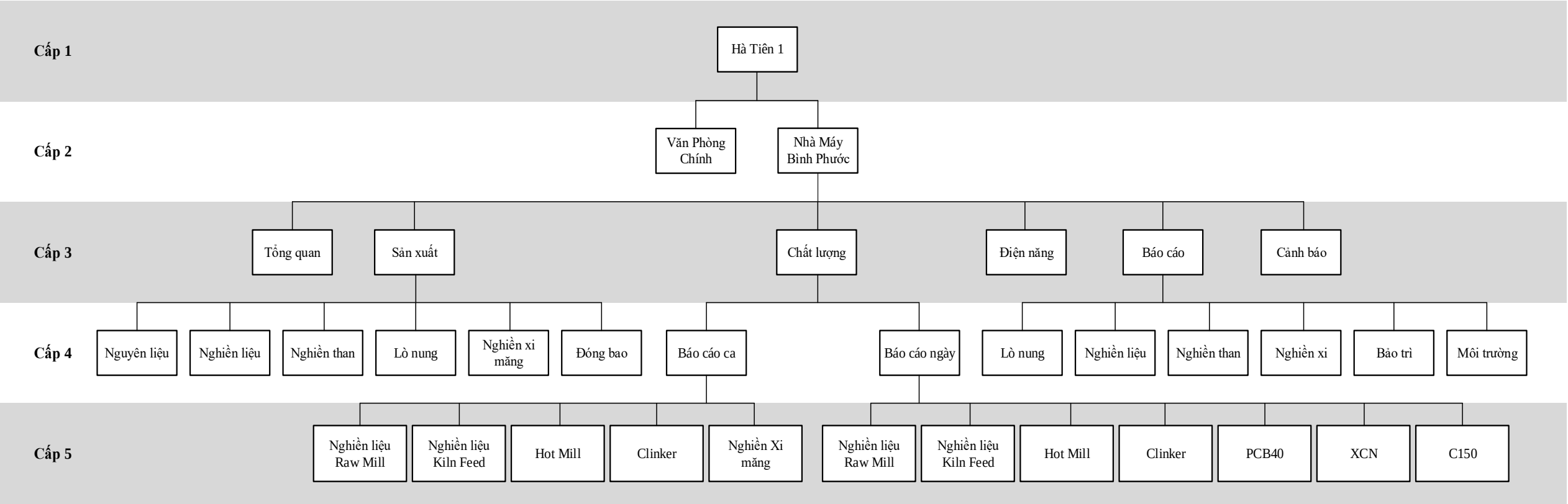
KIẾN TRÚC TỔNG QUAN TRANG MÀN HÌNH



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TRUY CẬP VÀ ĐĂNG XUẤT HỆ THỐNG

❖ Đăng nhập:

- Mở trình duyệt WEB (khuyến nghị nên dùng Google Chrome từ V77.x trở lên hoặc Apple Safari từ V12.1 trở lên).
- Trên thanh địa chỉ URL, truy cập vào địa chỉ của giải pháp: **http://SIEMENSDC/indx/sv**
- Điền thông tin người dùng và mật khẩu được cung cấp và bấm đăng nhập.
- Tùy vào phân quyền hệ thống sẽ được điều hướng đến trang thông tin tương ứng.

❖ Đăng xuất: tắt cửa sổ trình duyệt đang mở để kết thúc phiên truy cập.

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3. HƯỚNG DẪN LẬP TRÌNH HỆ THỐNG XHQ

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XHQ Basic Development Workflow

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XHQ Basic Development Workflow

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Xây dựng các đối tượng thông tin

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Xây dựng các đối tượng thông tin

Nhà máy

- KPI sản xuất
- KPI Thiết bị
- KPI Bảo trì
- KPI An toàn
- KPI Tài chính.

Nhà máy cơ khí	S_Plant
KPI sản xuất	S_Production
KPI Thiết bị	S_Equipment
KPI Bảo trì	S_Maintenace
KPI An toàn	S_Safety
KPI Tài chính	S_Finance

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Xây dựng các đối tượng thông tin

Văn phòng chính Hà Tiên 1

- *Báo cáo tổng quan*
- *Nhà máy XM Bình Phước*
- *Nhà máy XM Kiên Lương*
- *Trạm nghiền Phú Hữu*
- *Trạm nghiền Long An*
- *Trạm nghiền Cam Ranh*
- *So sánh cùng kỳ*
- *Xuất báo cáo*

Bình Phước

- *Tổng quan*
- *Sản xuất*
- *Chất lượng*
- *Sửa chữa*
- *Môi trường*
- *Cảnh báo*
- *Điện năng*
- *Quản trị KPI*
- …

- *Khai thác*
- *Nguyên liệu*
- *Nhập liệu*
- *Nghiền liệu*
- *Nghiền than*
- …

…

- …

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Tạo các thành phần

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Tạo các thành phần

Tổng quan

Tài chính

Sản xuất

Bảo trì

S_Overview

S_Finance

S_Production

S_Maintenace

C_Overview

C_Finance

C_Production

C_Maintenace

C_Equipment

C_Elog

…

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Xây dựng cây giải pháp

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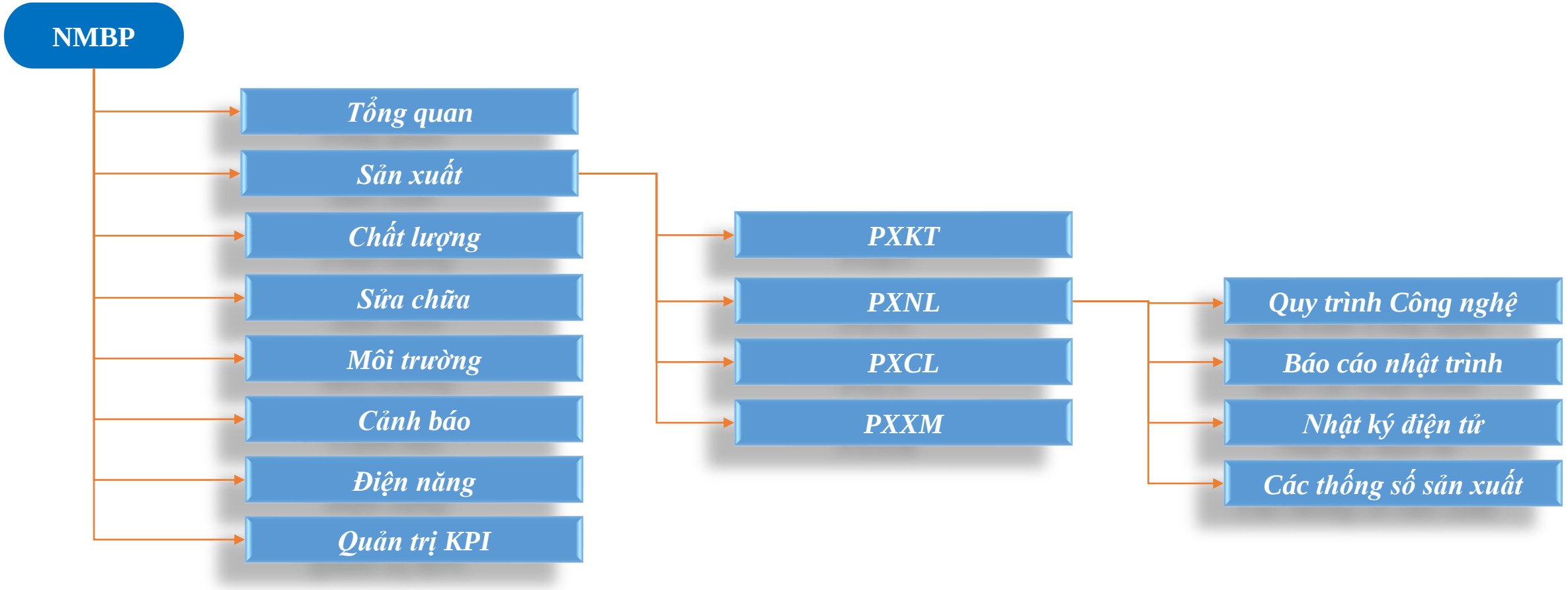

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Cấu hình các thành phần

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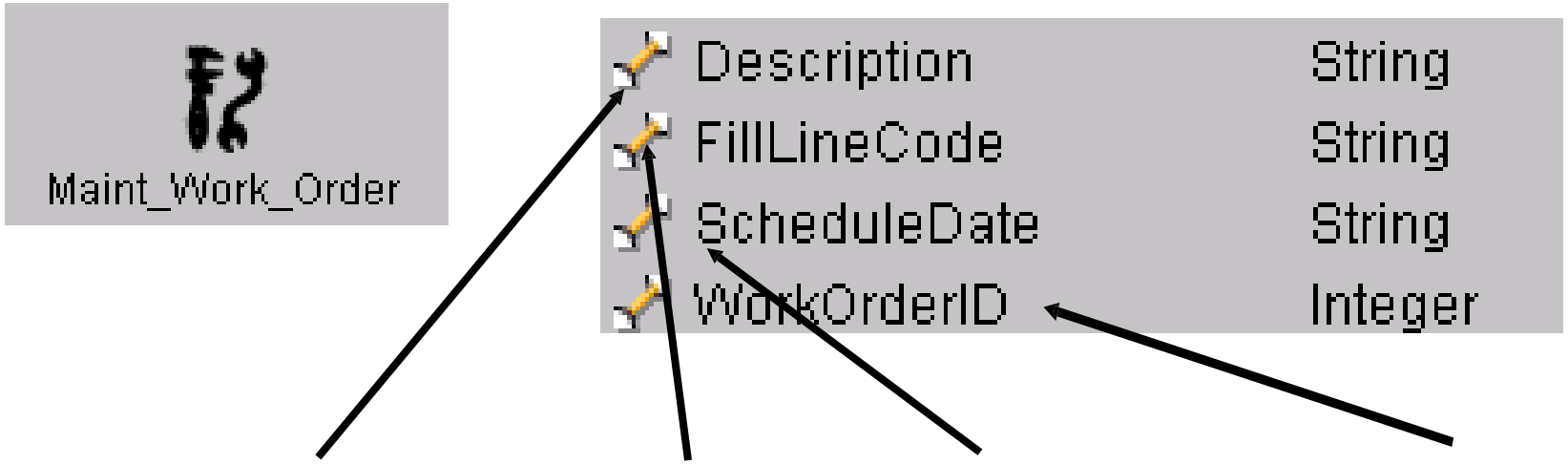
Cấu hình các thành phần



Description	FillLineCode	ScheduleDate	Status	WorkOrderID
Electrical	C	05/12/00	1	3397
Conveyor	C	05/13/00	1	3401
Packer Jam	B	05/12/00	1	3435
Sched PM	C	05/14/00	2	3488
Electrical	B	05/12/00	1	3535
Conveyor	B	05/14/00	2	3557
Filler PM	C	05/14/00	3	3572
Filler Hose	C	05/19/00	4	3573

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Xây dựng các biểu mẫu

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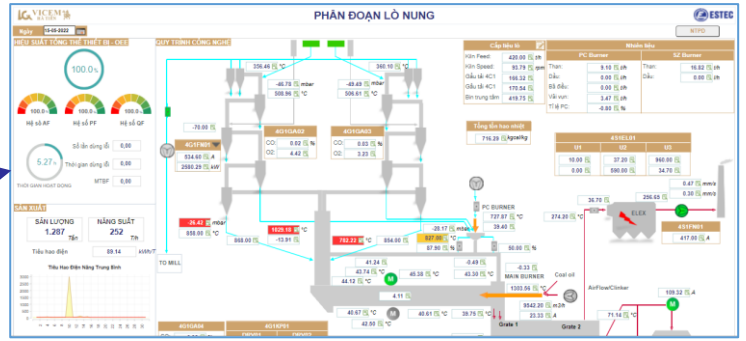
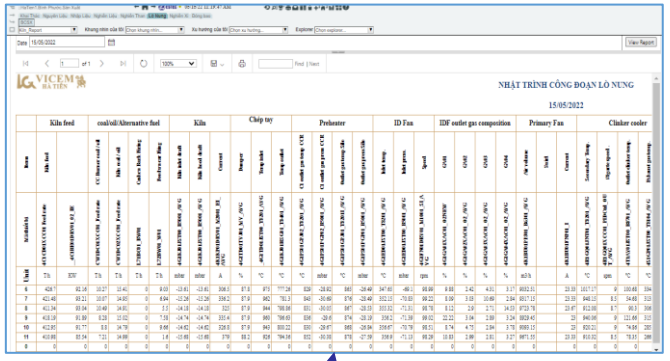
Xây dựng các biểu mẫu





NMBP

- *Tổng quan*
- *Sản xuất*
  - *PXKT*
  - *PXNL*
  - *PXCL*
    - *Quy trình Công nghệ*
    - *Báo cáo nhật trình*
    - *Nhật ký điện tử*
    - *Các thống số sản xuất*
  - *PXXM*
- *Chất lượng*
- *Sửa chữa*
- *Môi trường*
- *Cảnh báo*
- *Điện năng*
- *Quản trị KPI*

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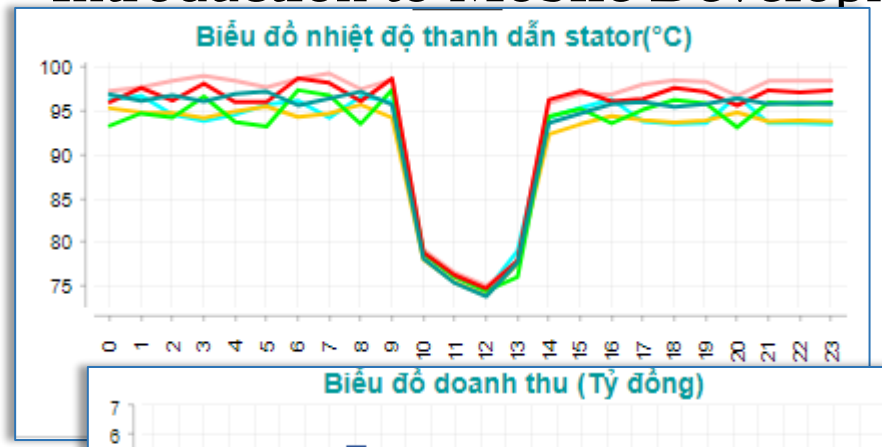
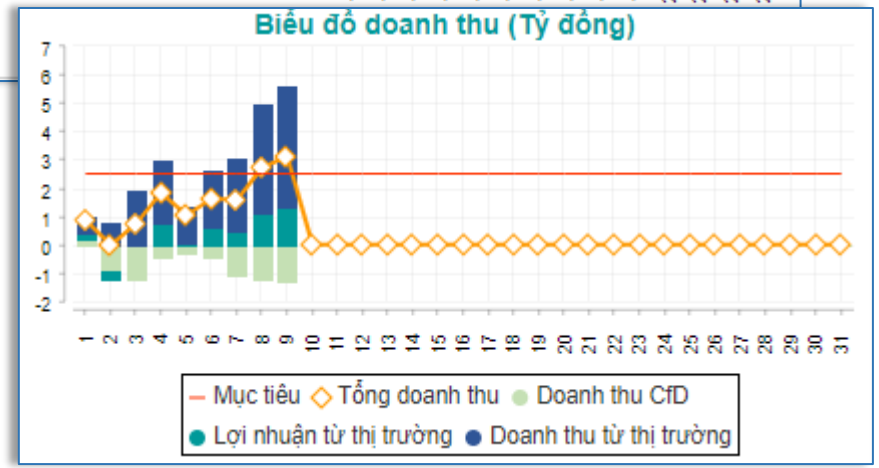
Xây dựng các biểu mẫu

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





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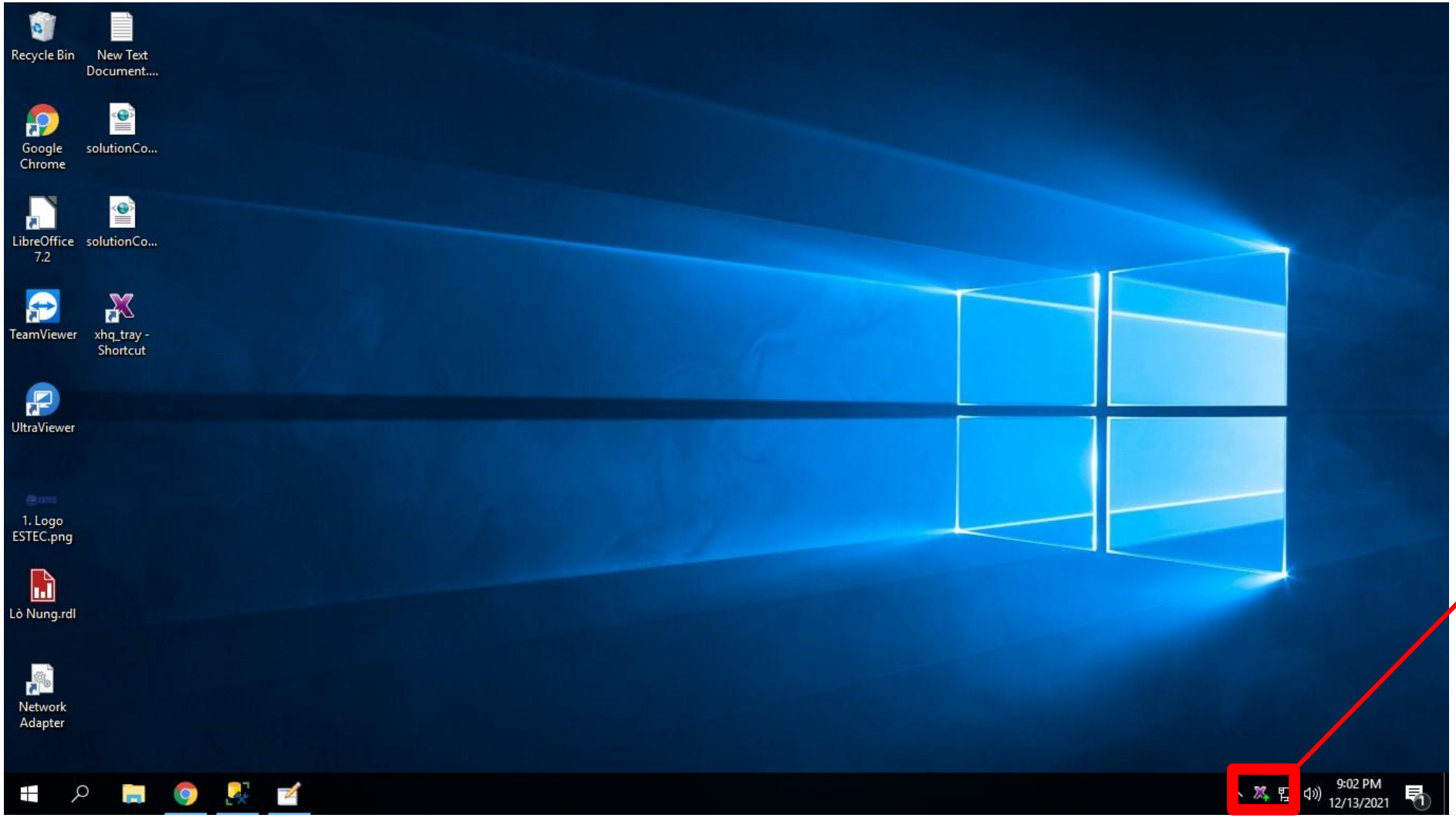
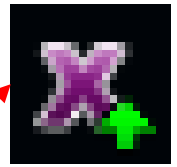
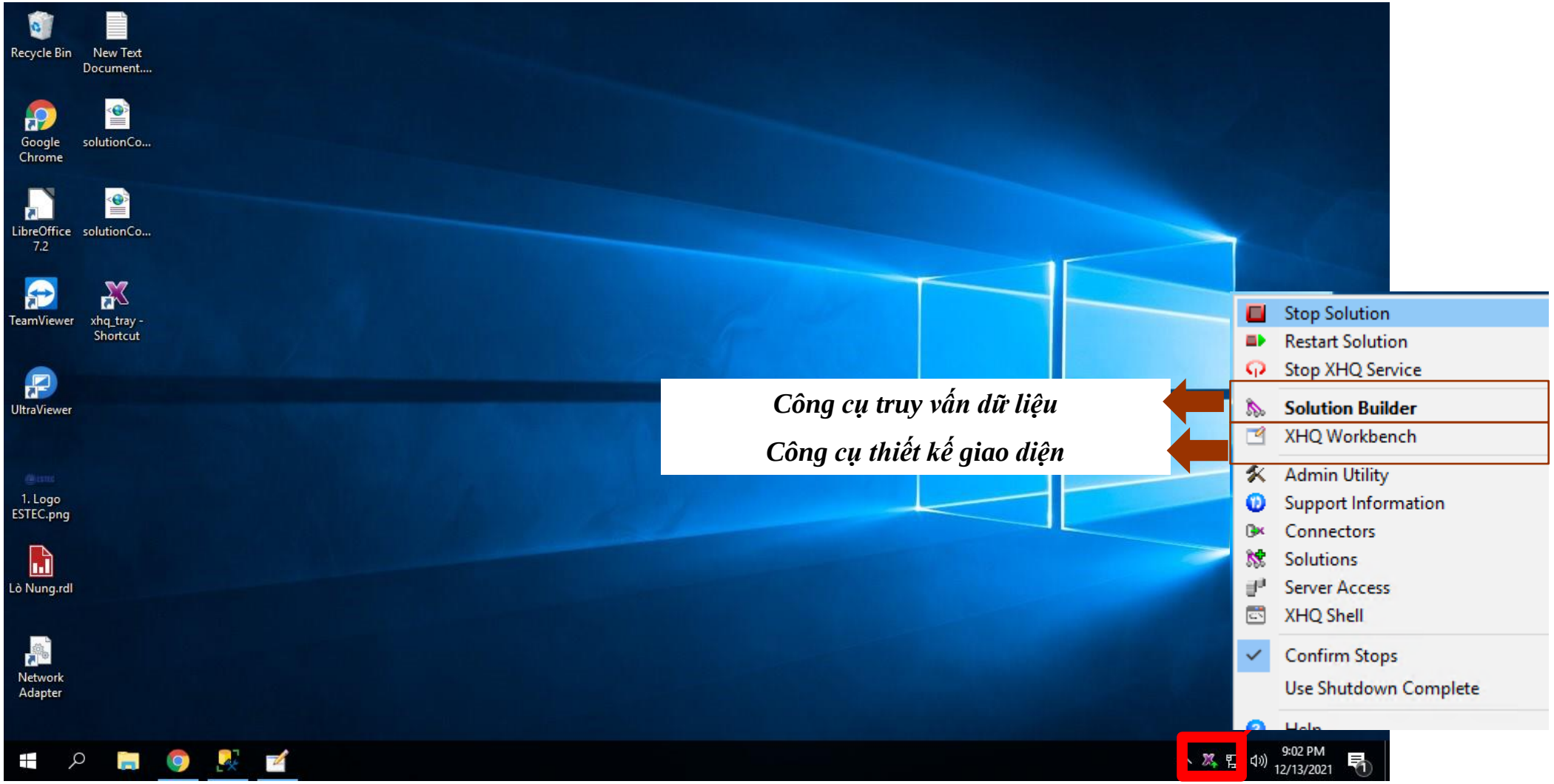
Hướng dẫn trên giao diện





Copyright @ ESTEC 2022

Hướng dẫn trên giao diện



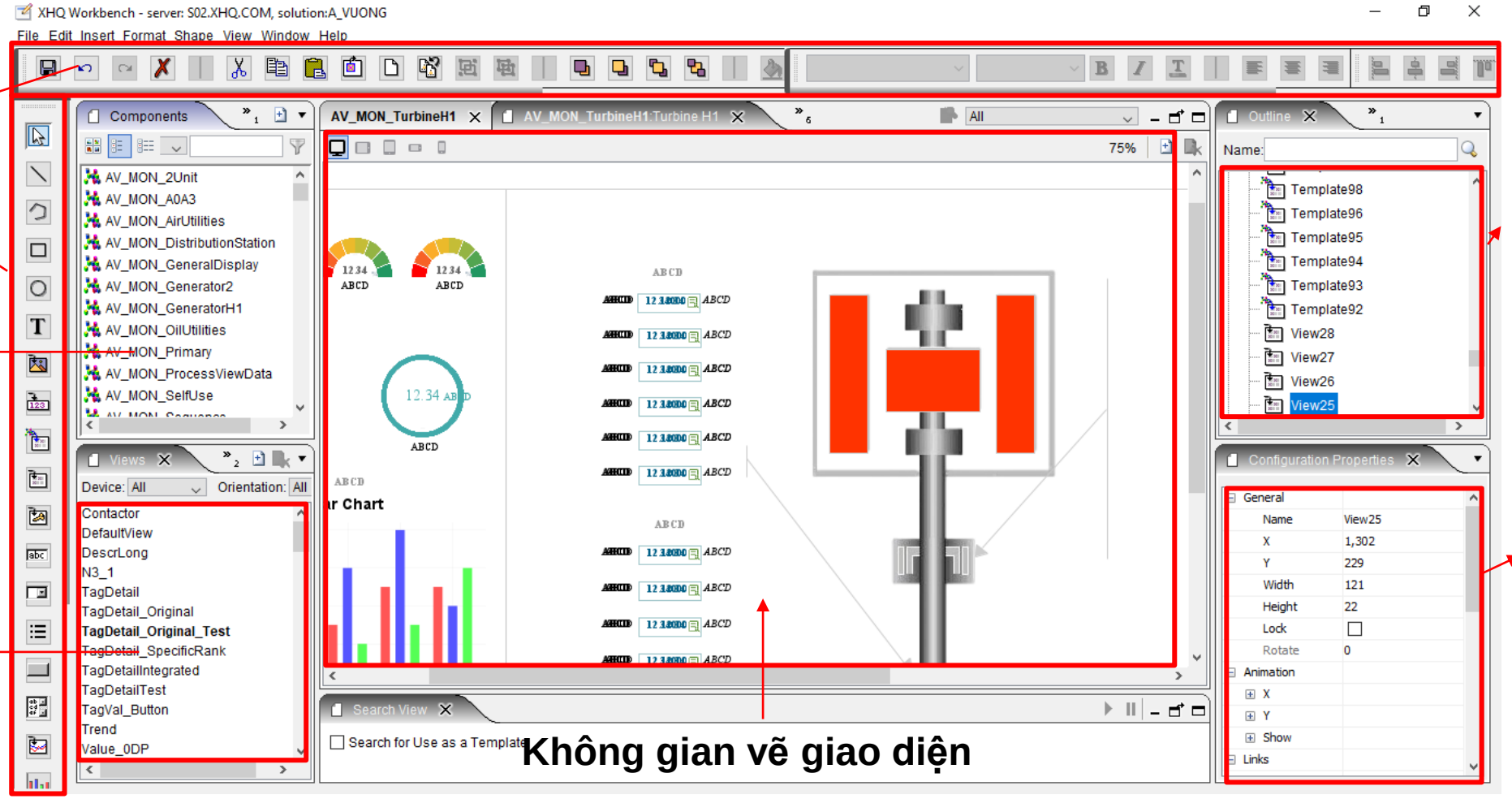
Công cụ truy vấn dữ liệu

Công cụ thiết kế giao diện

Copyright @ ESTEC 2022

Hướng dẫn trên giao diện

Giao diện công cụ Workbench: Công cụ thiết kế UI



Thanh công cụ

Component

View

Các đối tượng trong View

Các thuộc tính của đối tượng

Không gian vẽ giao diện

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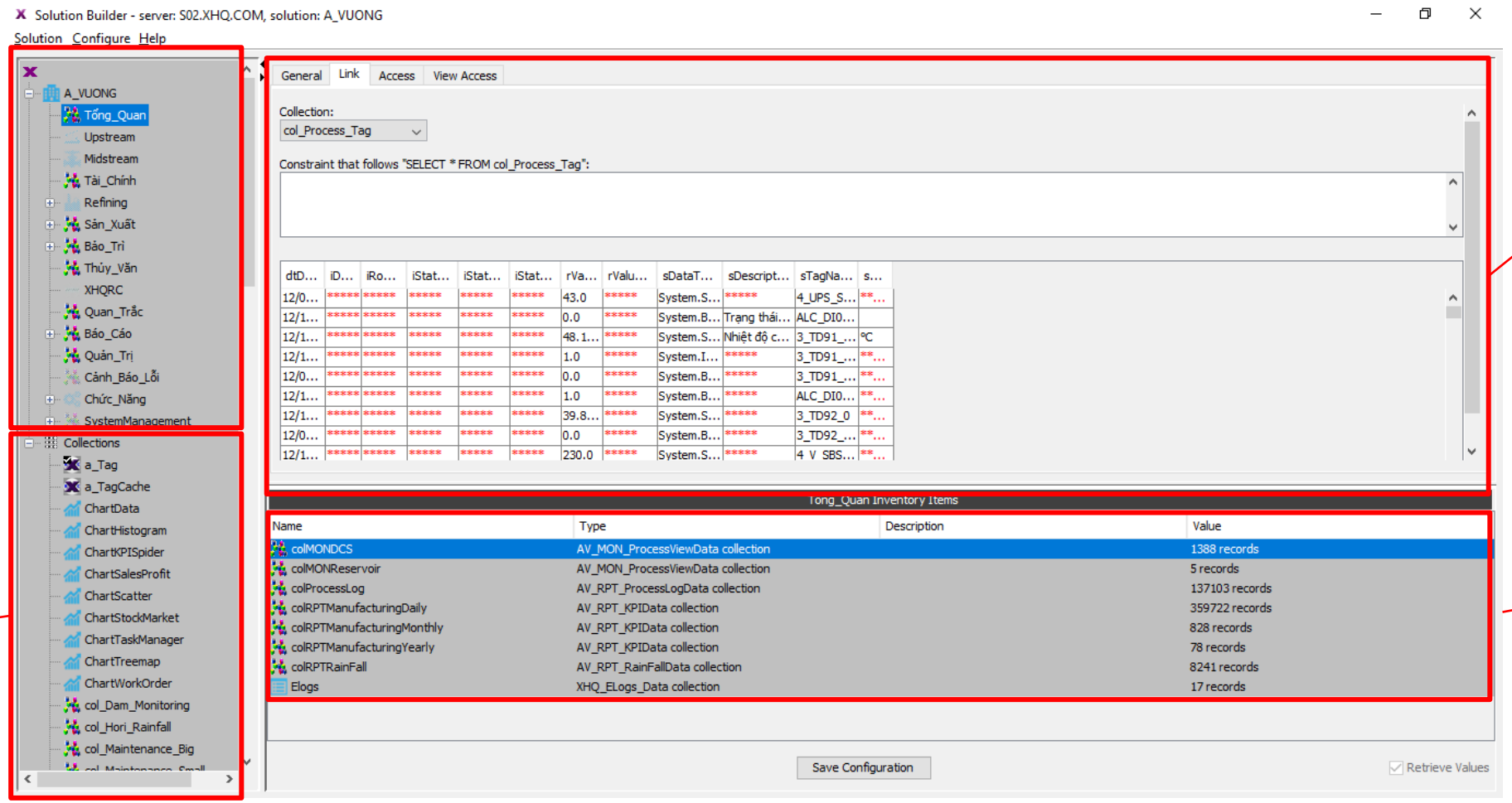
Hướng dẫn trên giao diện

Giao diện công cụ Solution Builder: Công cụ kết nối và truy xuất dữ liệu



Component

Collection

Liên kết dữ liệu

Collection
(in Workbench)

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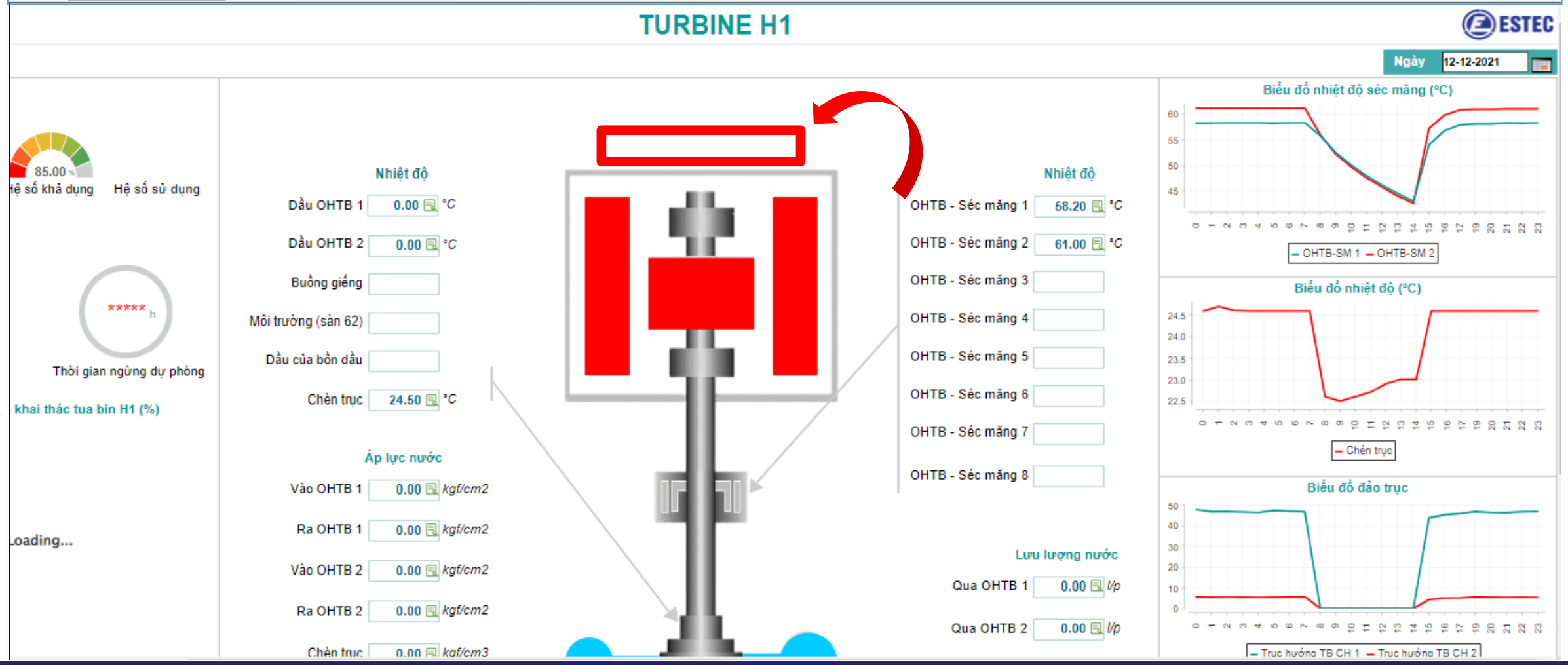
Hướng dẫn trên giao diện

Tạo và hiển thị một tín hiệu mới trên giao diện XHQ

Giao diện RunTime → Xác định vị trí cần hiển thị và tên Tag



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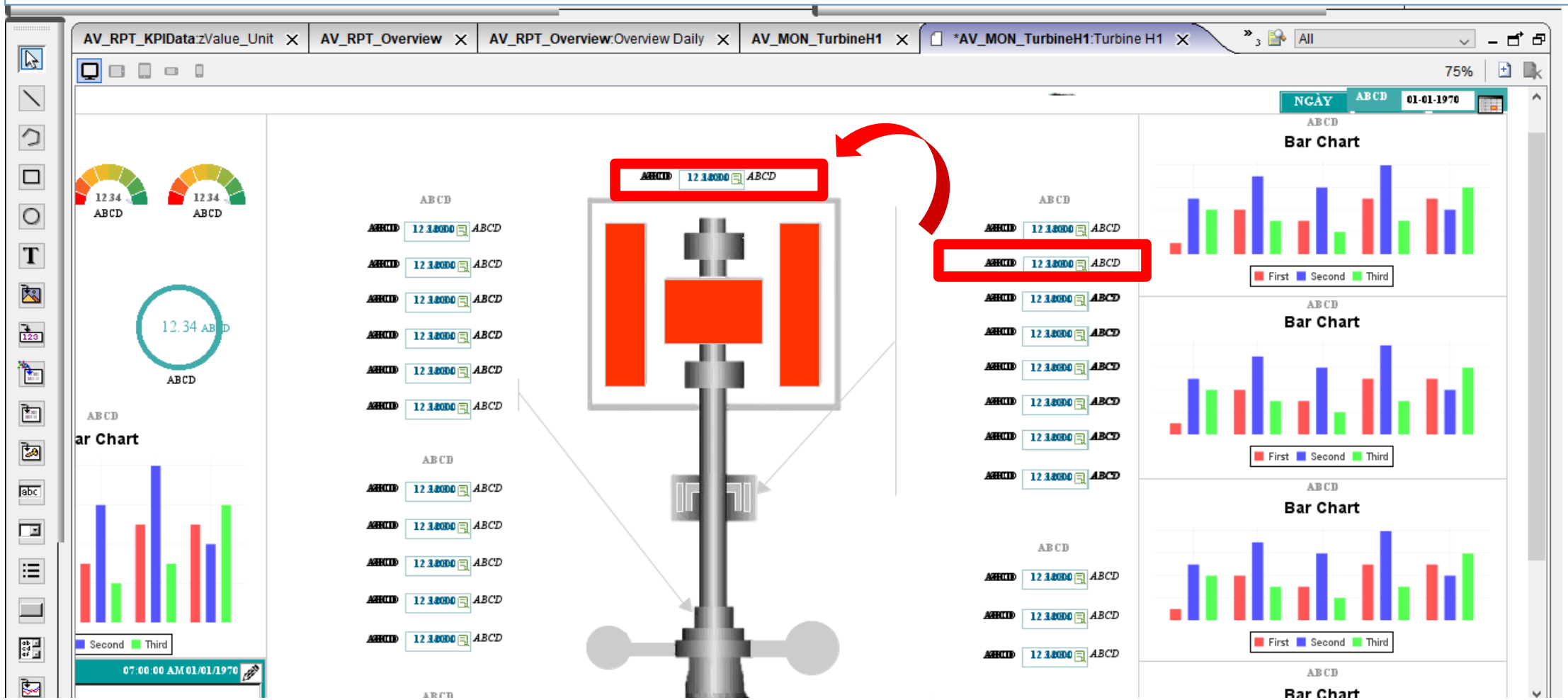
Hướng dẫn trên giao diện

Tạo và hiển thị một tín hiệu mới trên giao diện XHQ

Giao diện thiết kế → Coppy Template → Gán Tag



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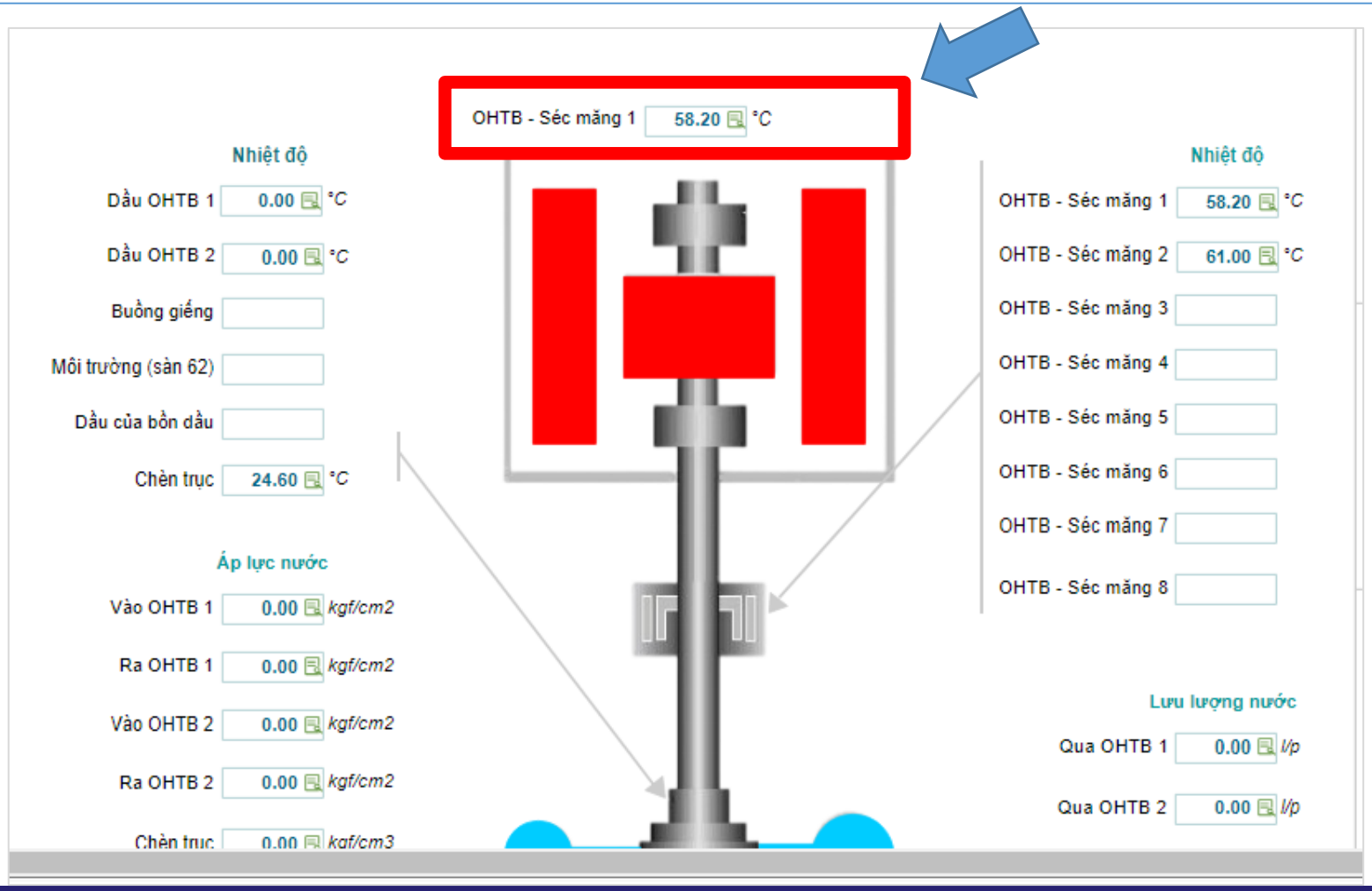
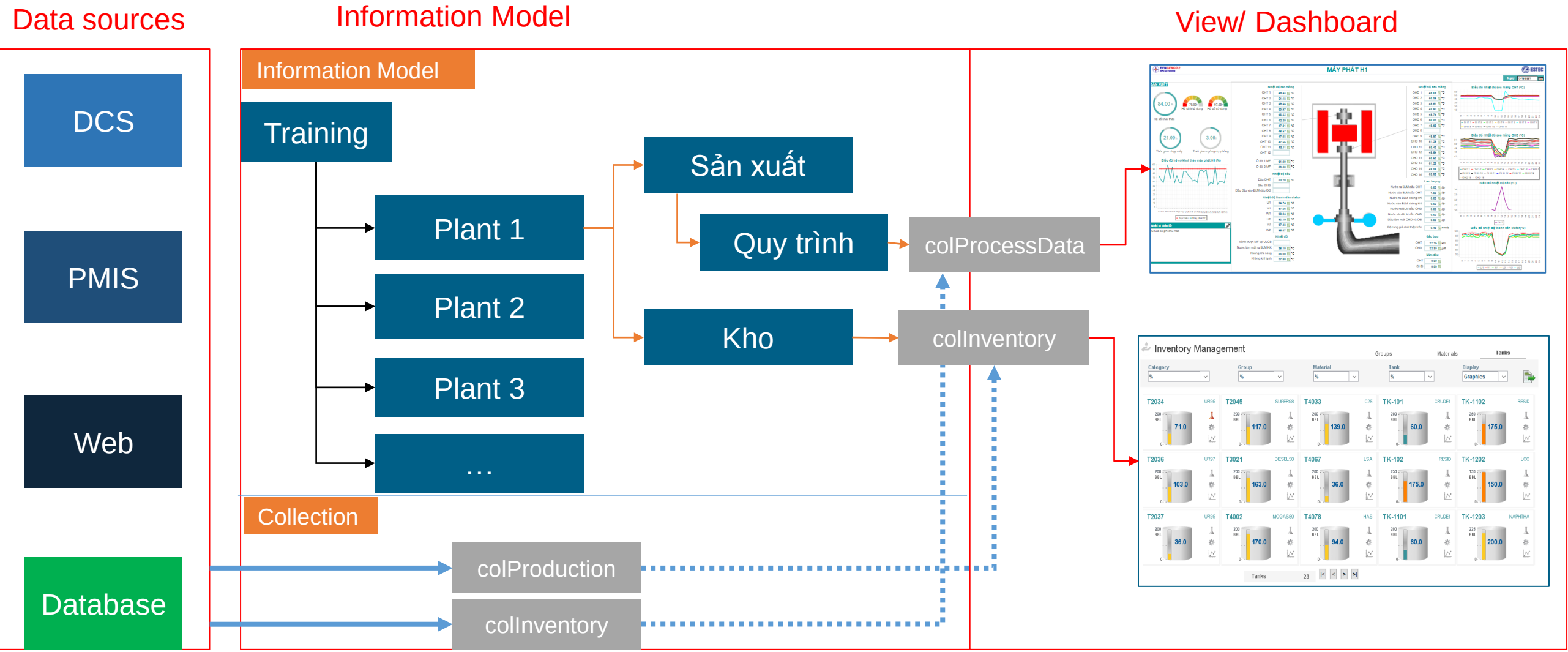
Hướng dẫn trên giao diện

Tạo và hiển thị một tín hiệu mới trên giao diện XHQ
Kết quả trên giao diện Runtime sau khi thêm



Copyright @ ESTEC 2022

Hướng dẫn kịch bản thực hành



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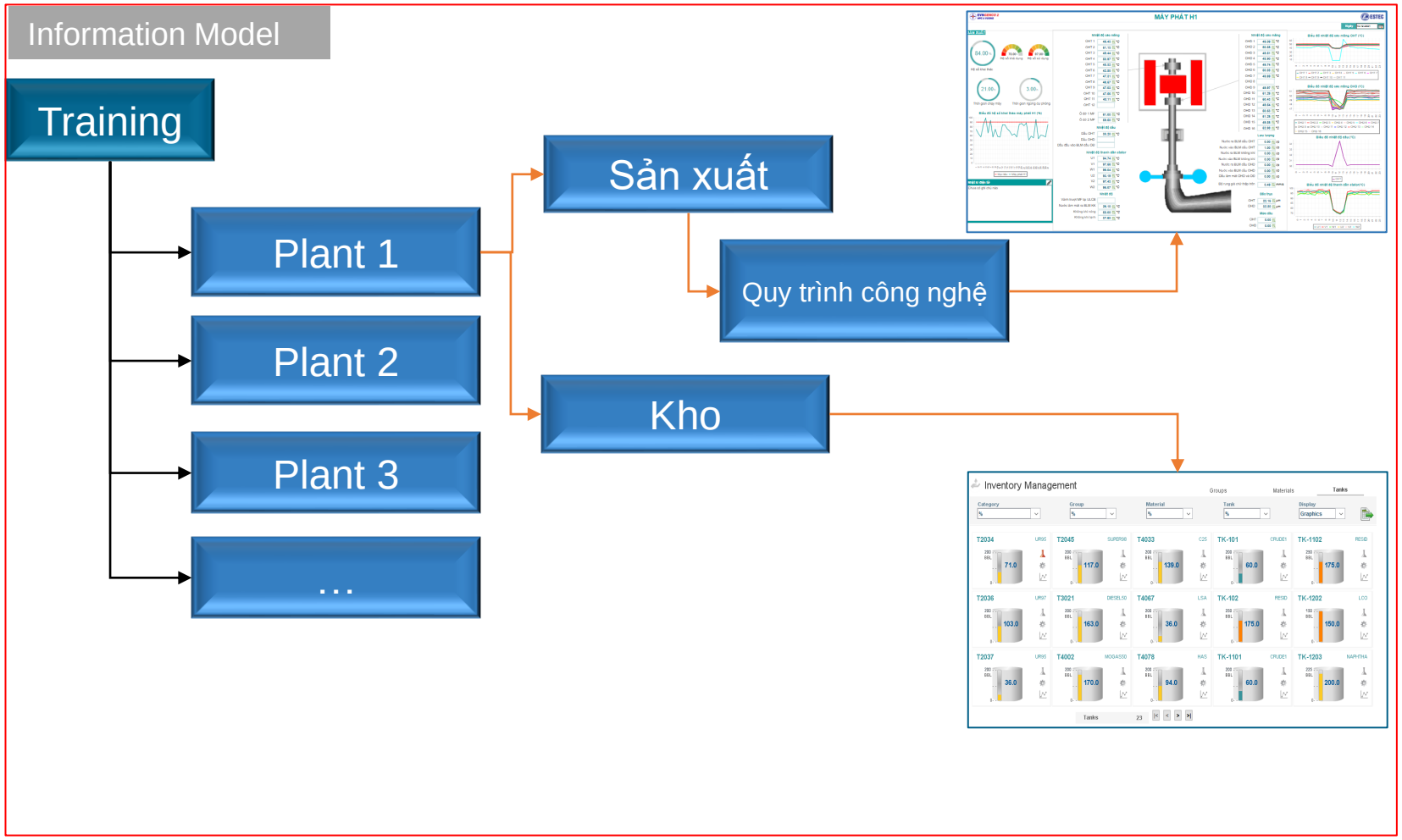
Hướng dẫn kịch bản thực hành

Information Model



Development Process

1. Tạo Page
2. Tạo S_Component
3. Tạo C_Component
4. Tạo Connection Process
5. Tạo Connection Group
6. Tạo Collection
7. Link Collection
8. Vẽ giao diện
9. Hiển thị lên trình duyệt web

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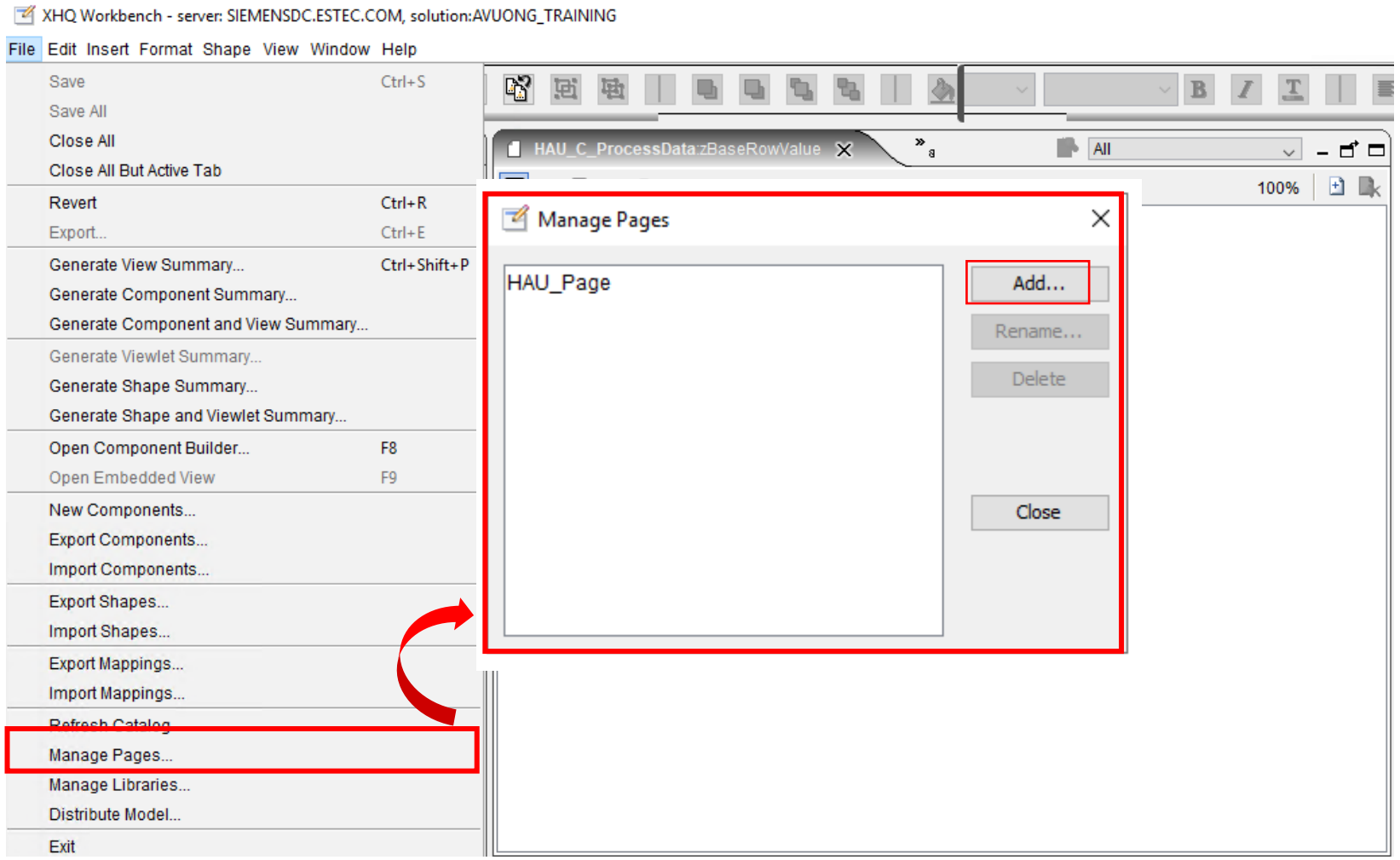
Tạo Page

- **Name_PAGE**



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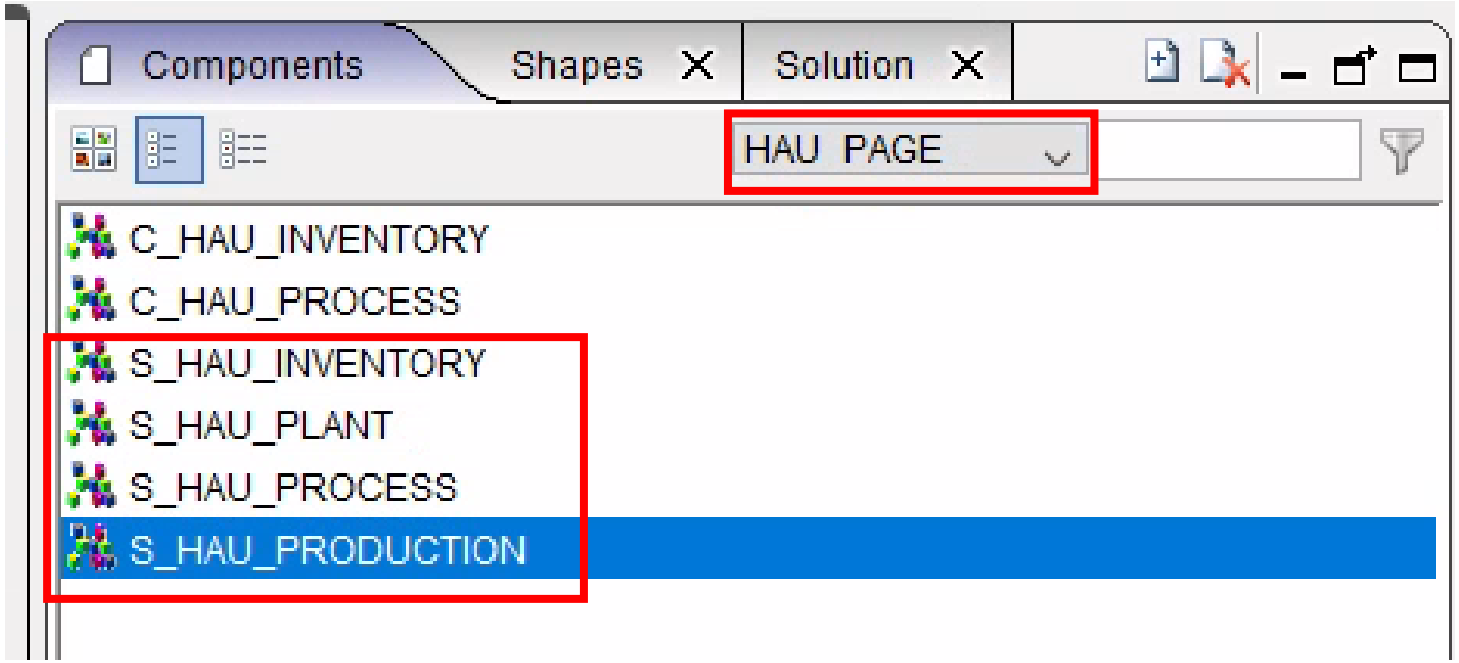
Tạo S_Component

- Name_S_PLANT
- Name_S_PRODUCTION
- Name_S_PROCESS
- Name_S_INVENTORY



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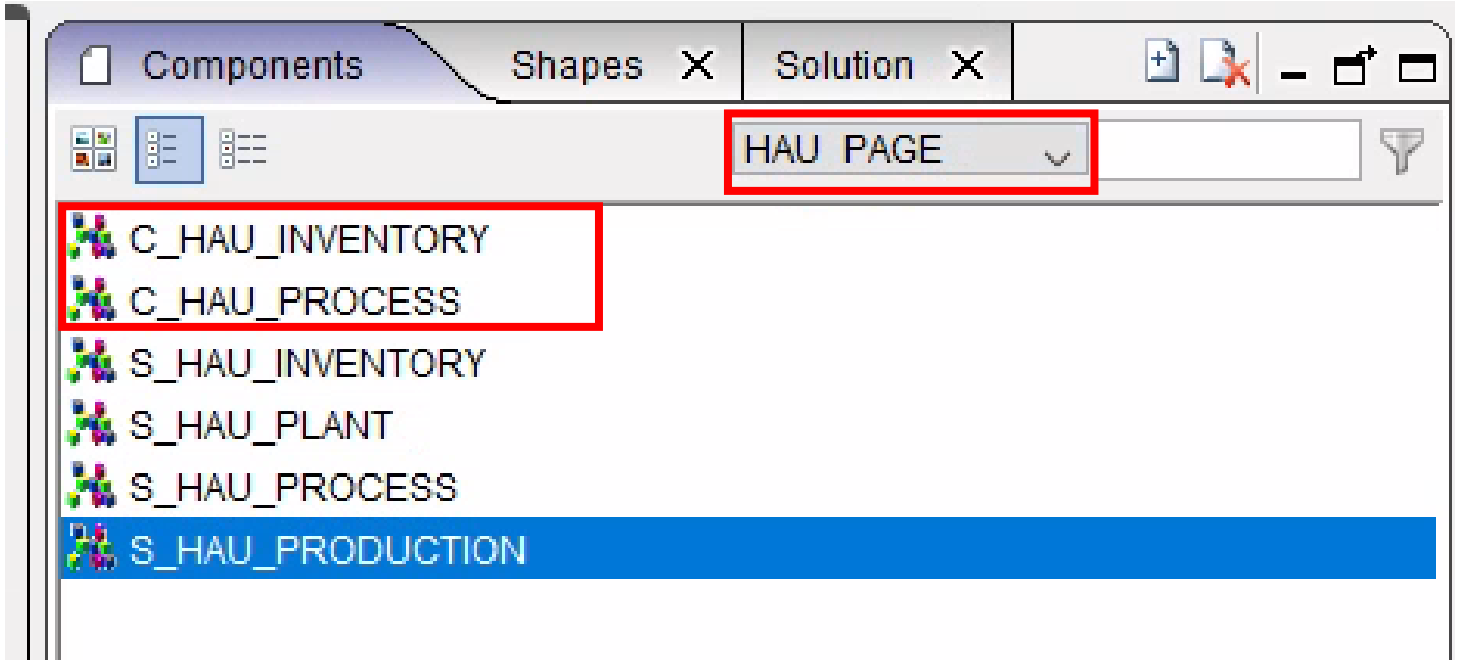
Tạo C_Component

- **Name_C_INVENTORY**
- **Name_ C_PROCESS**



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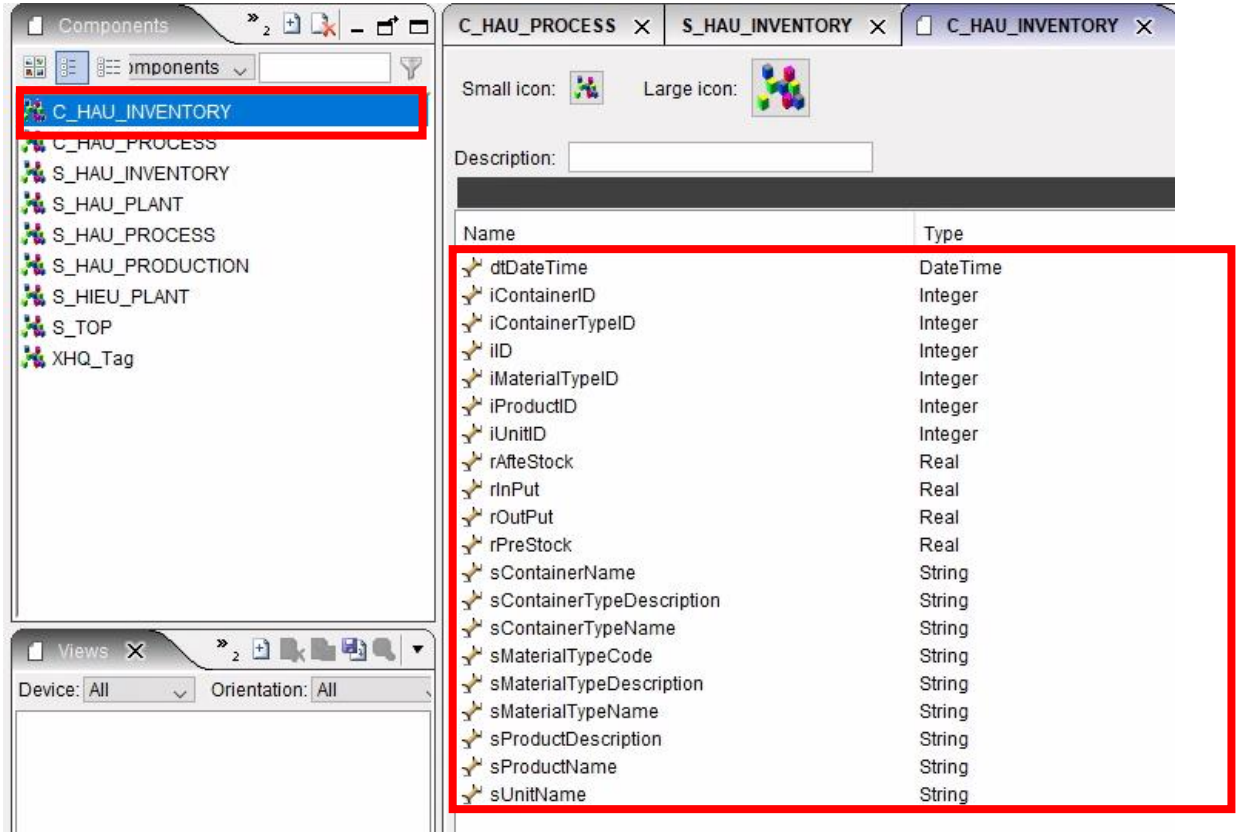
Tạo Tham số cho C_Component

- **Name_C_INVENTORY**

```sql
SELECT TOP (1000) [ID]
      ,[ContainerName]
      ,[ContainerTypeName]
      ,[ContainerTypeDescription]
      ,[MaterialTypeName]
      ,[MaterialTypeCode]
      ,[MaterialTypeDescription]
      ,[ProductName]
      ,[ProductDescription]
      ,[UnitName]
      ,[DateTime]
      ,[InPut]
      ,[OutPut]
      ,[PreStock]
      ,[AfteStock]
      ,[ProductID]
      ,[MaterialTypeID]
      ,[UnitID]
      ,[ContainerID]
      ,[ContainerTypeID]
  FROM [HAU_DB].[dbo].[v_Inventory]
```



	ID	ContainerName	ContainerTypeName	ContainerTypeDescription	MaterialTypeName	MaterialTypeCode	MaterialTypeDescription	ProductName	ProductDescription	UnitName	DateTime	InPut	OutPut	PreStock	AfteStock	ProductID	MaterialTypeID	UnitID	ContainerID	ContainerTypeID
1	1	TK-01	Tank	Bồn chứa chất lỏng	Liquid	Lq	Chất lỏng	Oils	Dầu	Lit	2022-01-08	20	30	NULL	NULL	1	2	1	1	1
2	2	TK-01	Tank	Bồn chứa chất lỏng	Liquid	Lq	Chất lỏng	Oils	Dầu	Lit	2022-01-09	20	30	NULL	NULL	1	2	1	1	1

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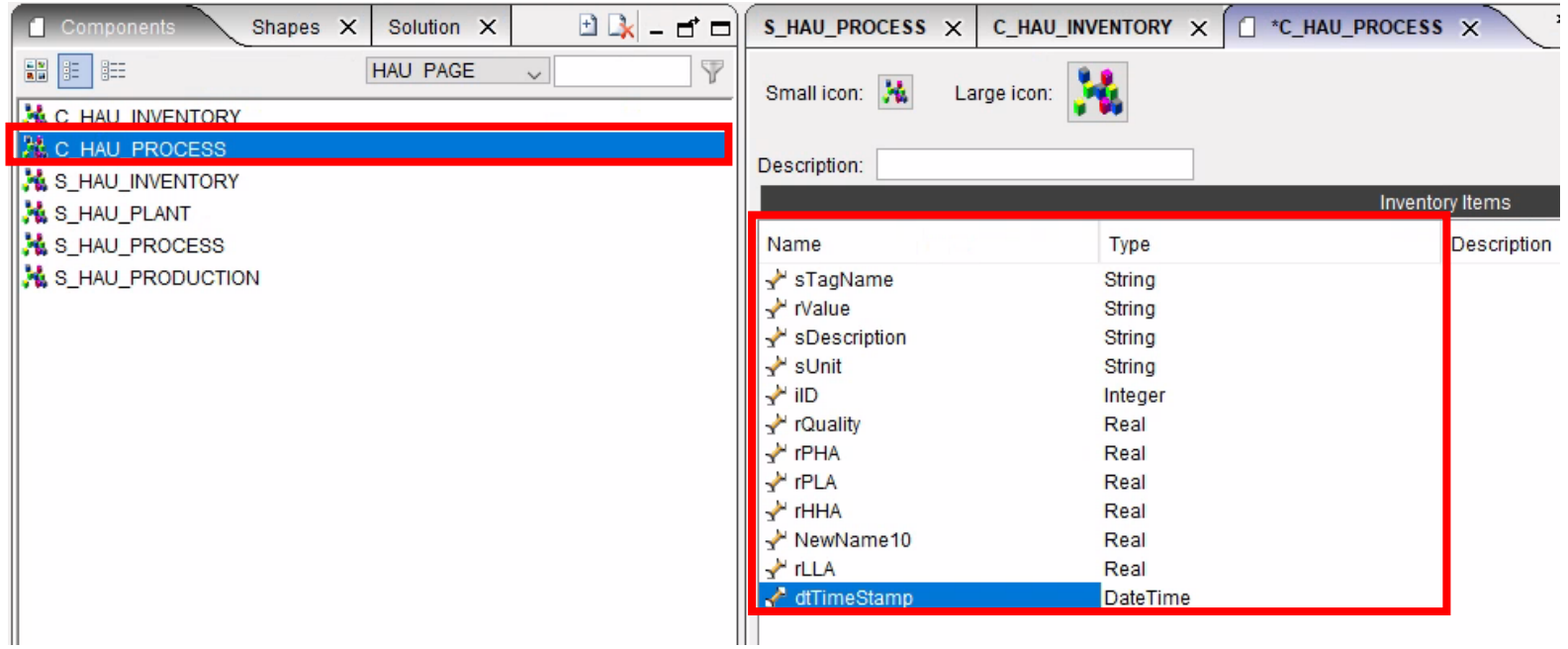
Tạo Tham số cho C_Component

- **Name_C_PROCESS**

```
SELECT TOP (1000) [TagName]
        ,[Value]
        ,[Description]
        ,[Unit]
        ,[TimeStamp]
        ,[DataType]
        ,[Quality]
        ,[PHA]
        ,[PLA]
        ,[HHA]
        ,[LLA]
        ,[ID]
  FROM [HAU_DB].[PROCESS].[Tags]
```



	TagName	Value	Description	Unit	TimeStamp	DataType	Quality	PHA	PLA	HHA	LLA	ID
1	SYL_AI0026.PHA	0	NULL	NULL	2022-04-22 13:31:34.017	System.Boolean	NULL	NULL	NULL	NULL	NULL	662
2	SYL_AI0029.PLA	0	NULL	NULL	2022-04-12 17:08:27.003	System.Boolean	NULL	NULL	NULL	NULL	NULL	700
3	1_IPB3_phaA_out	32.01678	Nhiệt độ tại khớp nối mềm sau máy cắt 901 Pha A	℃	2022-04-23 13:52:55.603	System.Single	NULL	NULL	NULL	NULL	NULL	824

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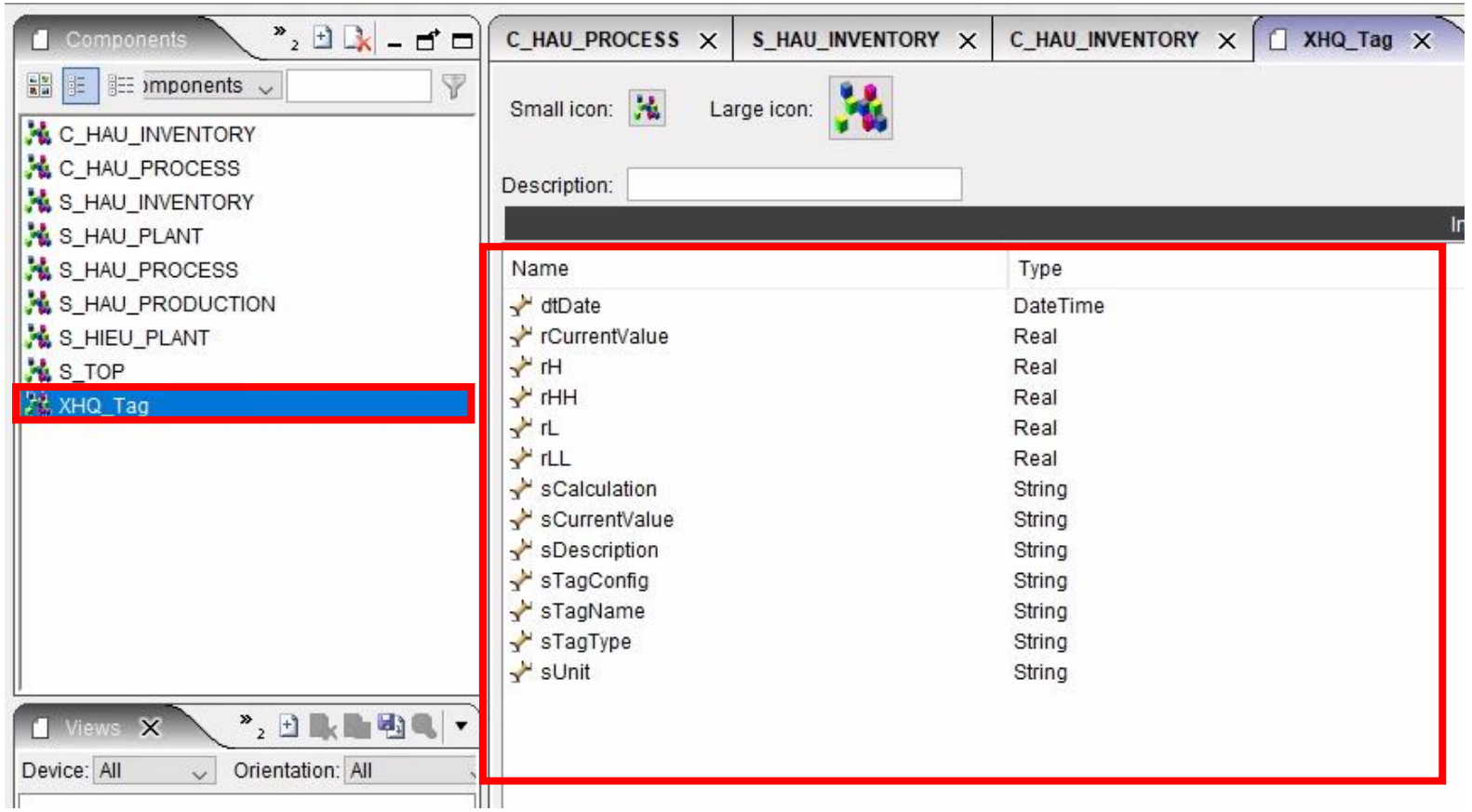
Tạo XHQ_TAG Component

- **XHQ_Tag**



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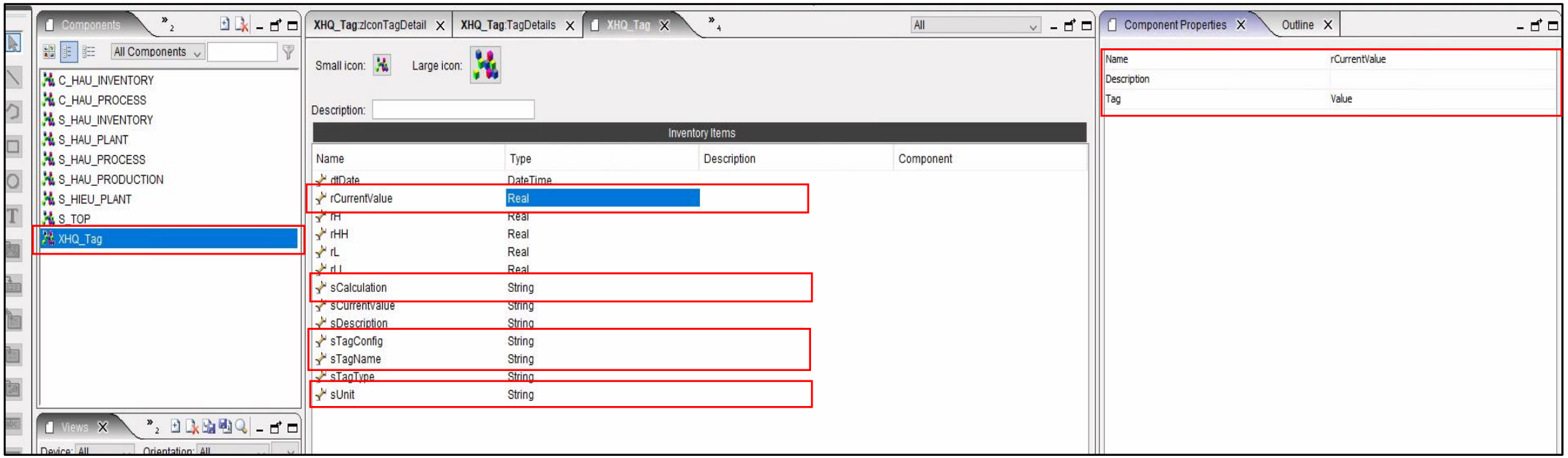
Tạo XHQ_TAG Component

- **XHQ_Tag**



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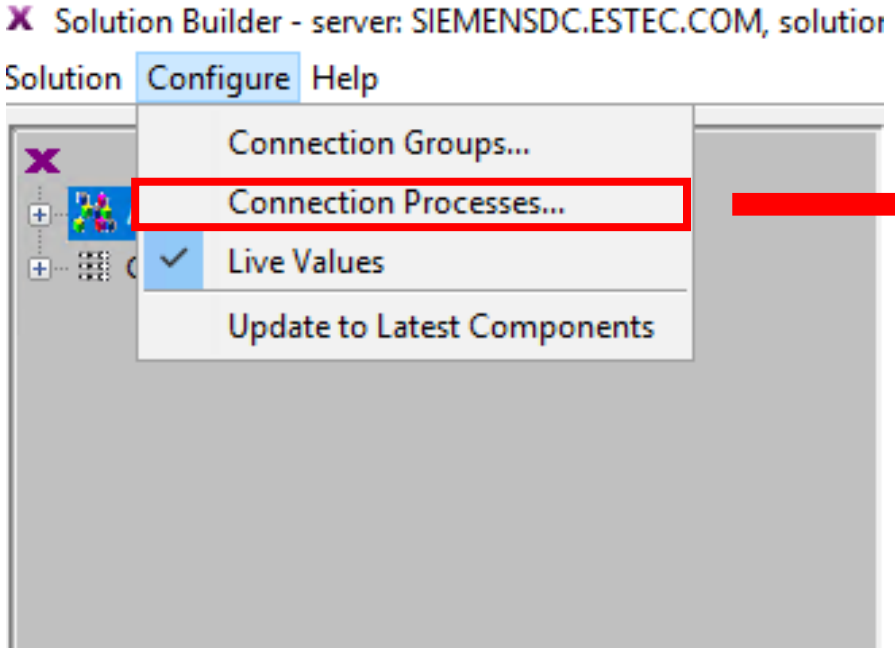
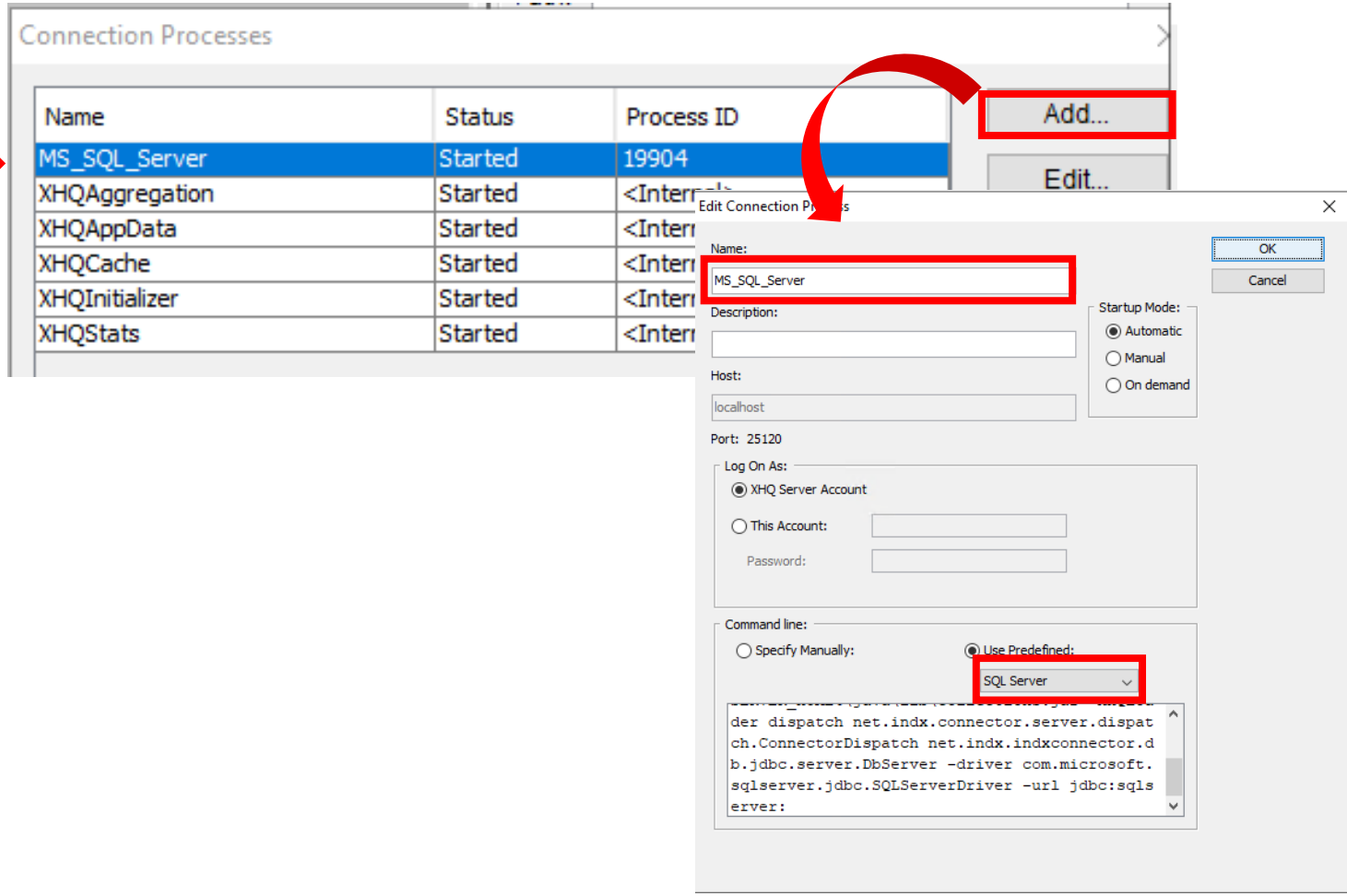
Tạo Connection Process

- **Name_MS_SQLSERVER_Proccess**





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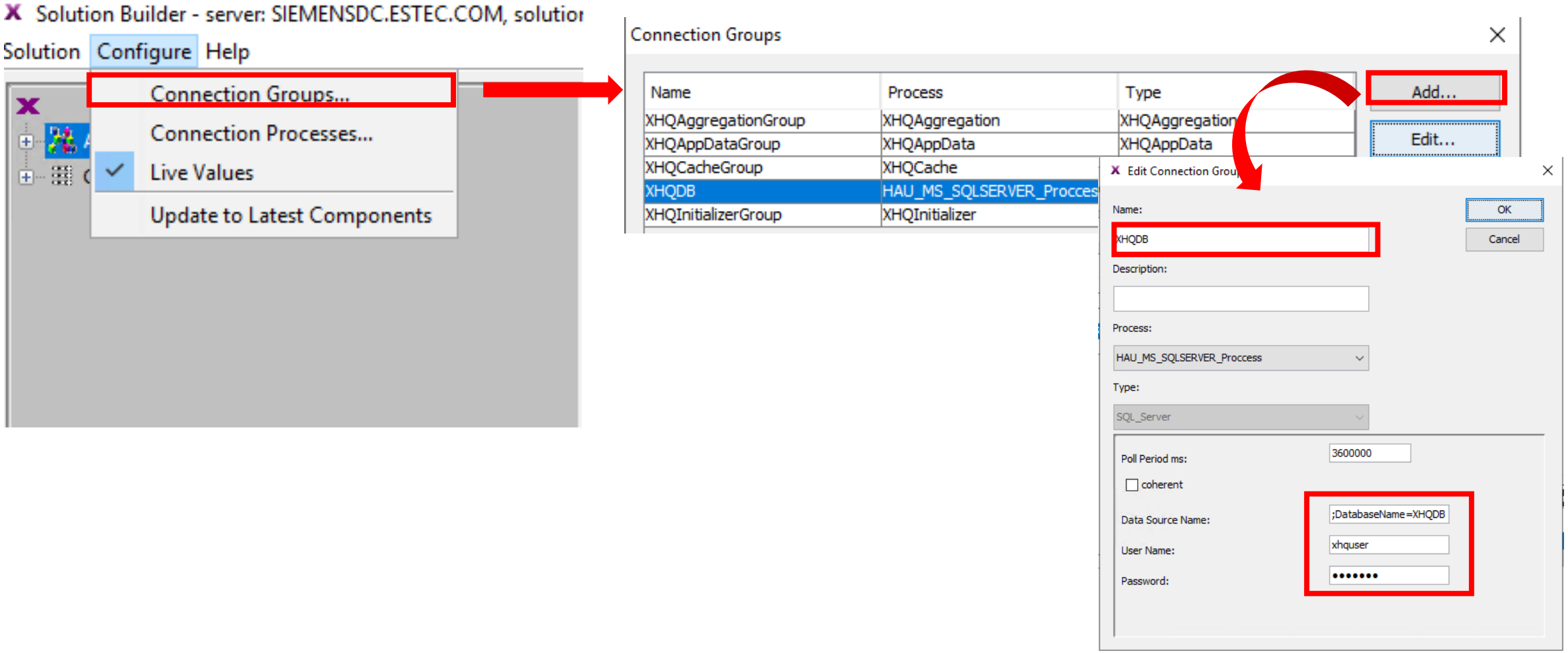
Tạo Connection Group

- **Name_MS_SQLSERVER_Group**



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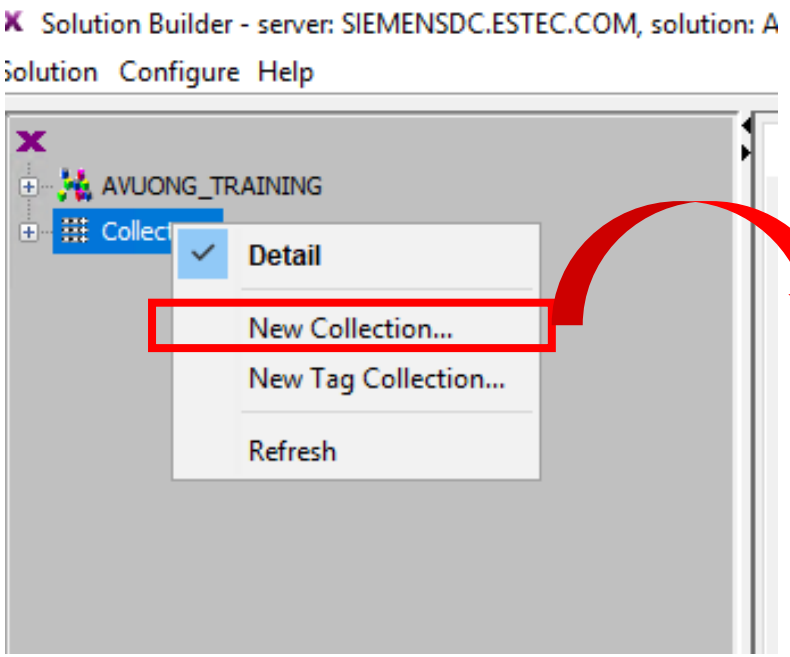
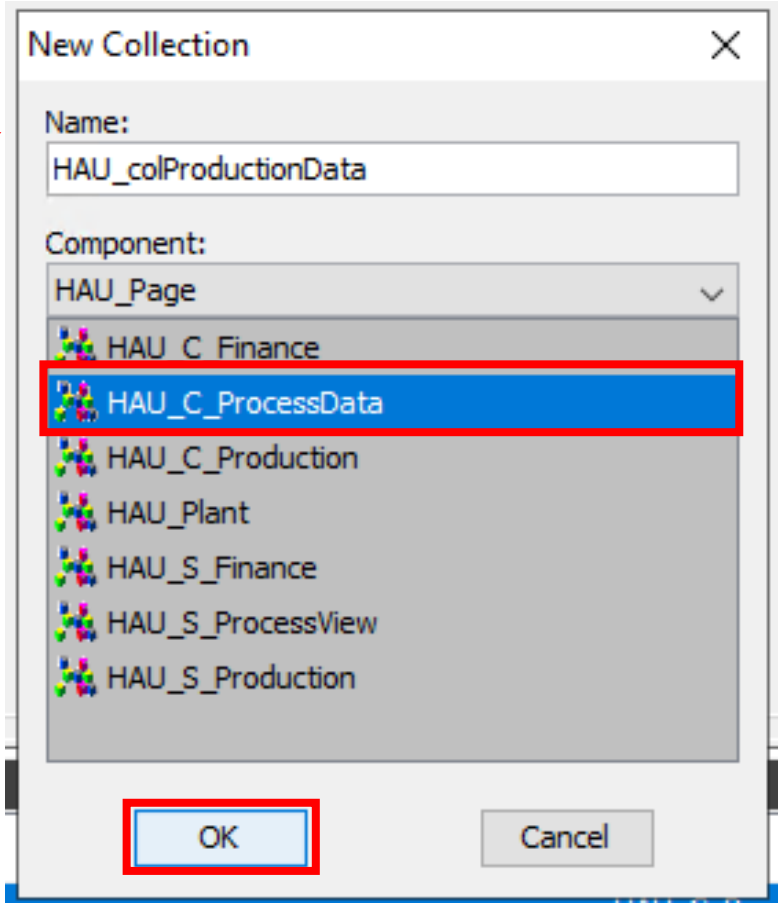
Tạo Collection

- Name_colInventory
- Name_colProcess
- TagCache
- Tag





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Link Collection

Solution Builder - server: SIEMENSDC.ESTEC.COM, solution: TRAINING

Solution Configure Help

- TRAINING
  - HAU_PLANT
    - SAN_XUAT
      - QUY_TRINH_CONG_NGHE
    - KHO
  - HIEU_PLANT
  - Collections
    - col_Inventory
    - col_Process
    - col_UoM
    - Tag
    - TagCache

General | Link | Access

Collection: col_Process

Constraint that follows "SELECT * FROM col_Process":

dtD...	iID	rHHA	rLLA	rPHA	rPLA	rQua...	rVa...	sDataT...	sDescript...	sTagNa...	s...
04/2...	662	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...
04/1...	700	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...
04/2...	824	*****	*****	*****	*****	*****	32.0...	System.S...	Nhiệt độ t...	1_IPB3_...	°C
04/2...	732	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...
04/2...	902	*****	*****	*****	*****	*****	87.5...	System.S...	Nhiệt độ c...	2_TE92_...	°C
04/2...	672	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...
04/2...	788	*****	*****	*****	*****	*****	38.4	System.S...	Nhiệt độ c...	0_Data_...	°C
04/1...	798	*****	*****	*****	*****	*****	0.0	System.B...	*****	1_alarm...	**...
04/1...	674	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...
04/1...	708	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...
04/2...	828	*****	*****	*****	*****	*****	30.4...	System.S...	Nhiệt độ t...	1_IPB3_...	°C
04/2...	776	*****	*****	*****	*****	*****	51.2	System.S...	Nhiệt độ c...	0_Data_...	°C
03/3...	906	*****	*****	*****	*****	*****	0.0	System.B...	*****	3_alarm...	**...
04/1...	680	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...
04/2...	790	*****	*****	*****	*****	*****	38.4	System.S...	Nhiệt độ c...	0_Data_...	°C
04/2...	812	*****	*****	*****	*****	*****	34.4...	System.S...	Nhiệt độ t...	1_IPB1_...	°C
04/1...	698	*****	*****	*****	*****	*****	0.0	System.B...	*****	SYL_AI0...	**...

QUY_TRINH_CONG_NGHE Inventory Items

Name	Type	Description	Value
colProcess	C_HAU_PROCESS collection		1616 records

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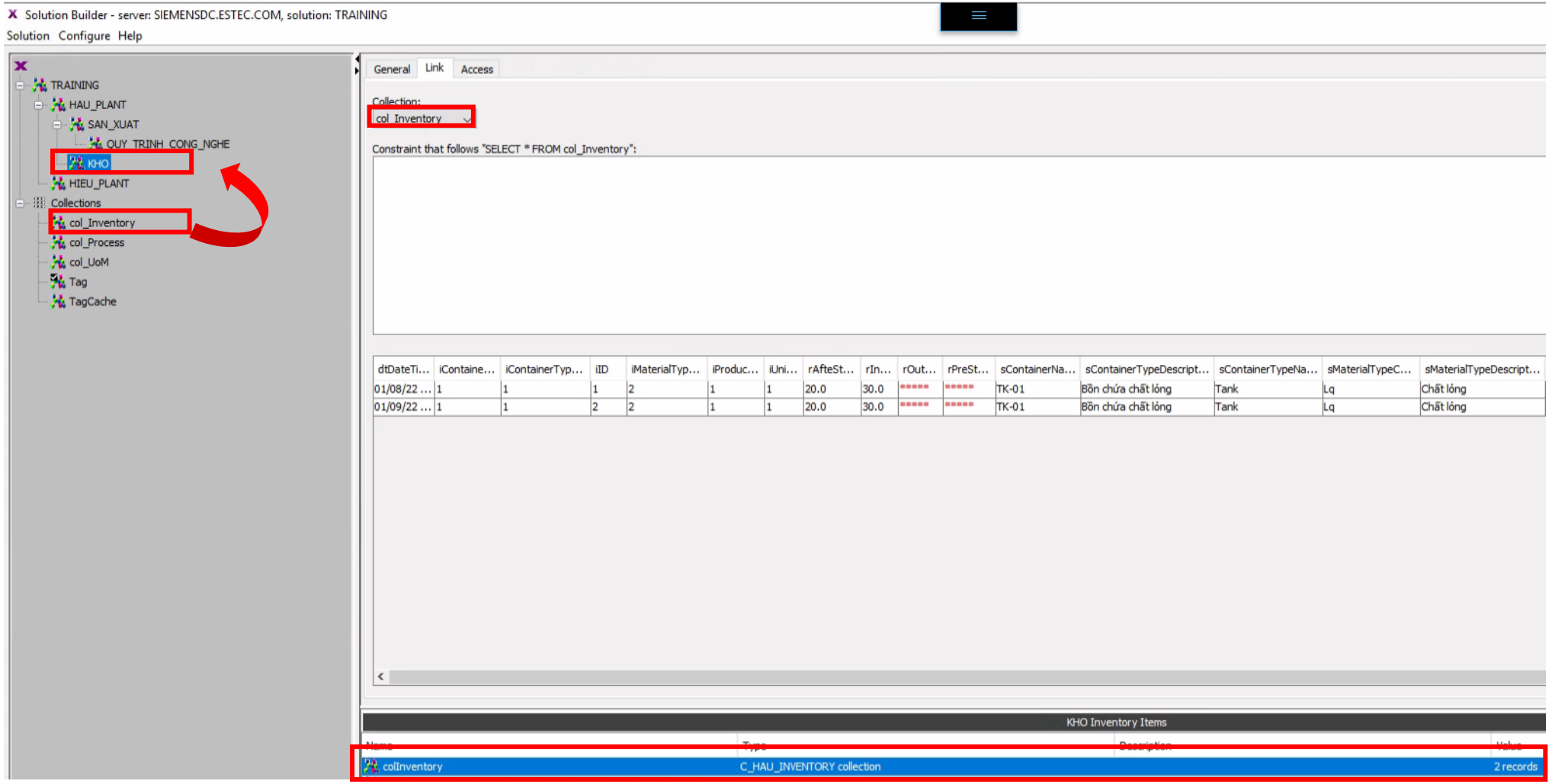
Link Collection



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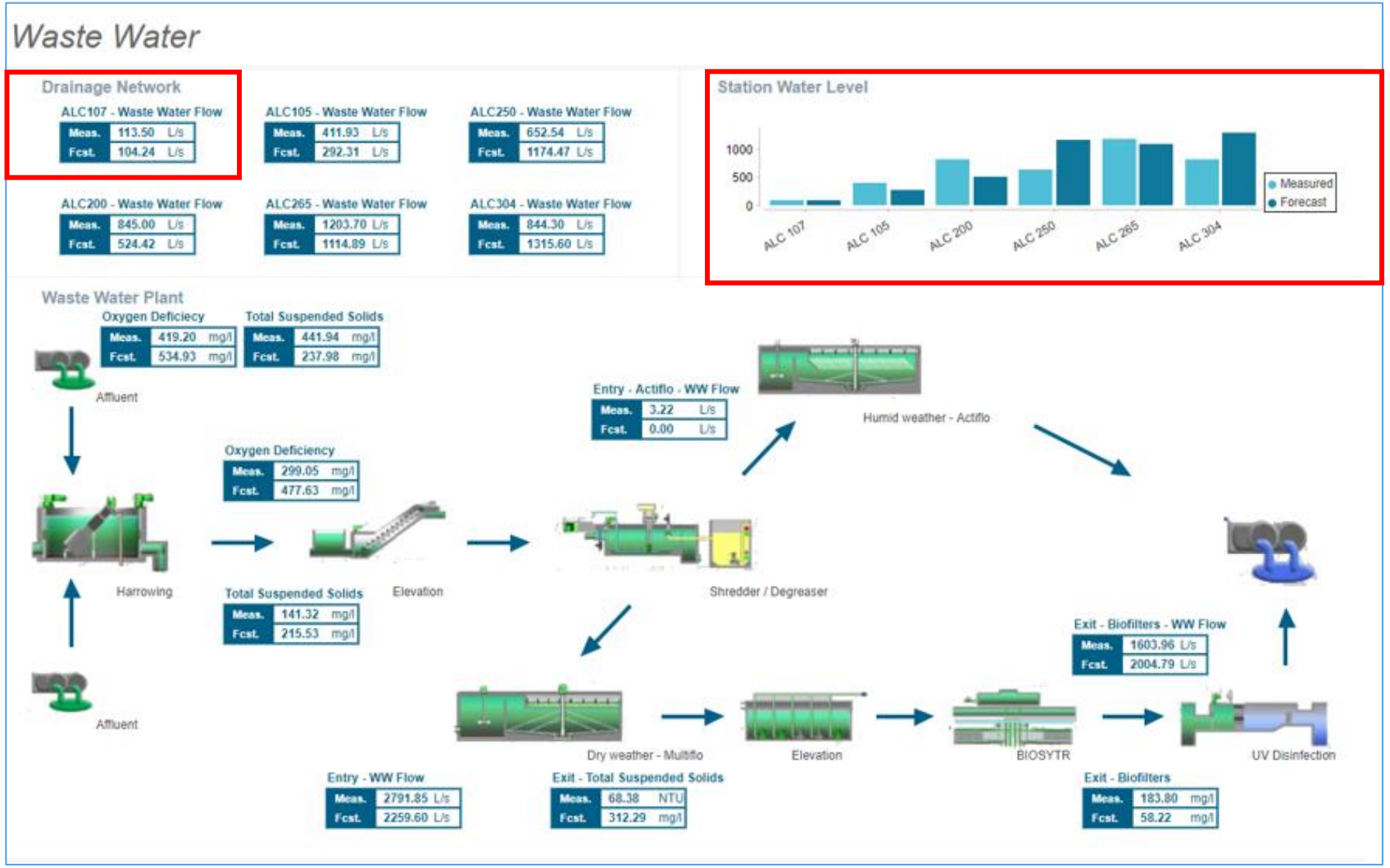
Thiết kế Dashboard/ Views

Process View Sample



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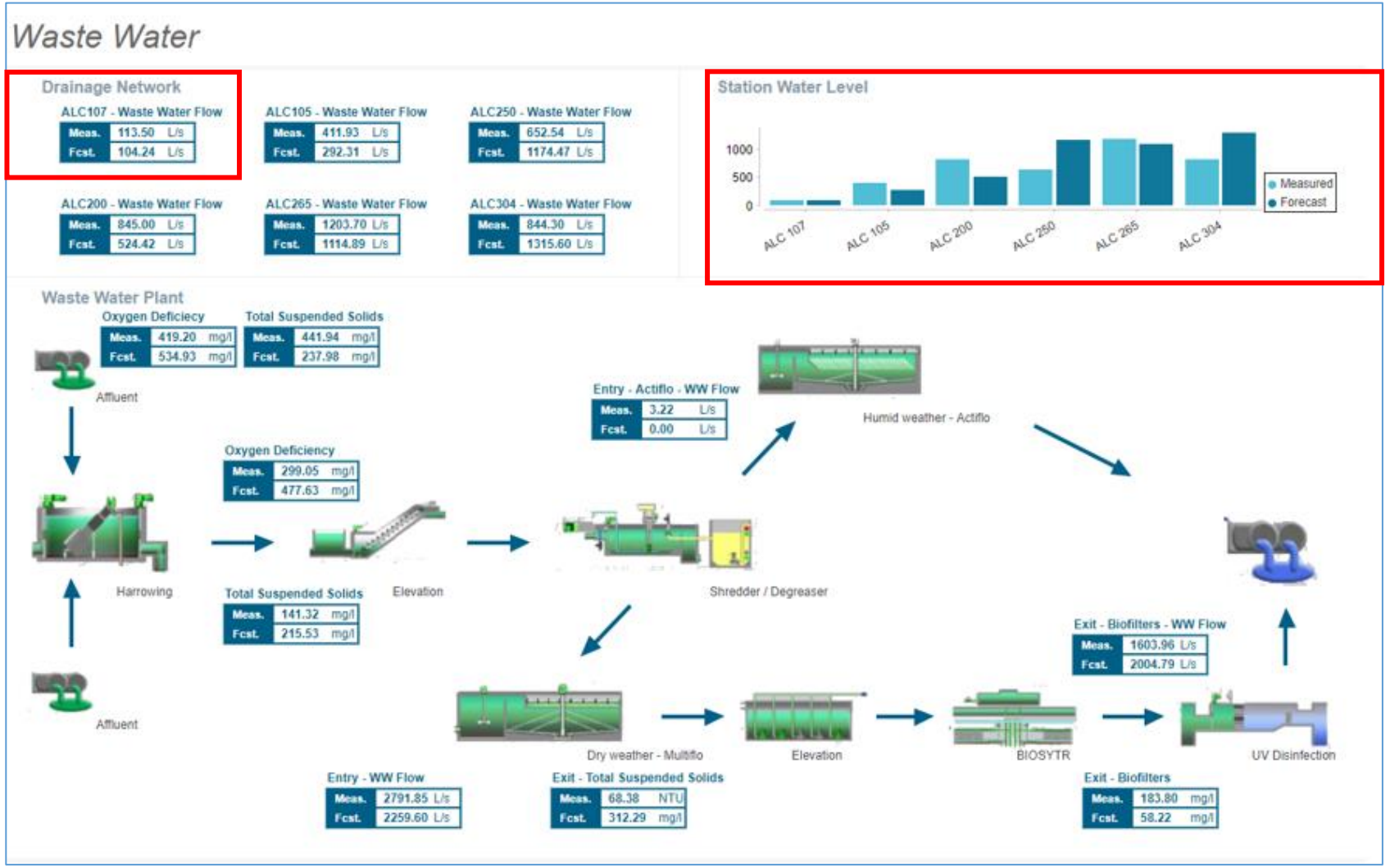
Thiết kế Dashboard/ Views

Sample Dashboard

(ProcessView)



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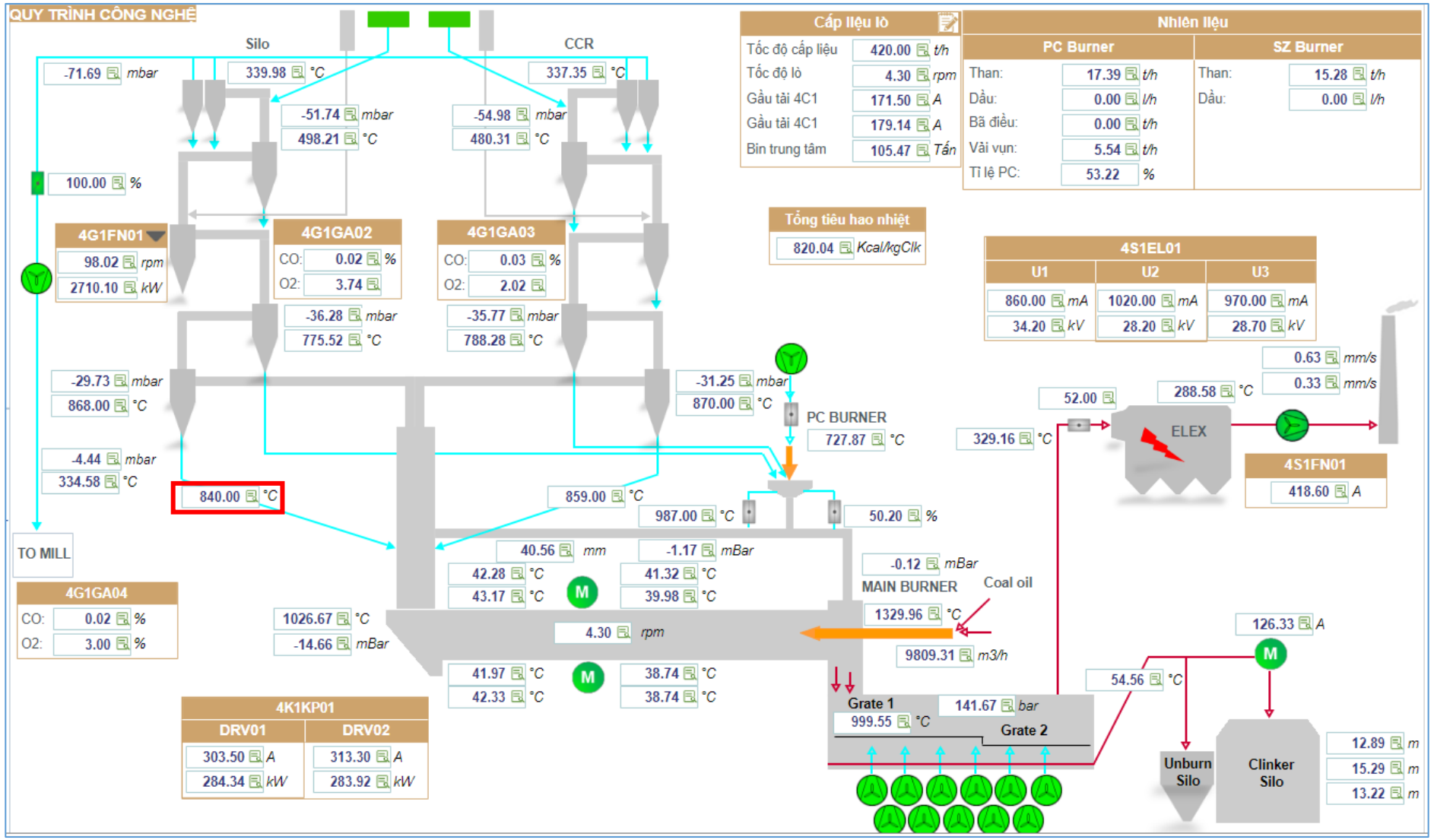
Thiết kế Dashboard/ Views

Sample Dashboard (ProcessView)



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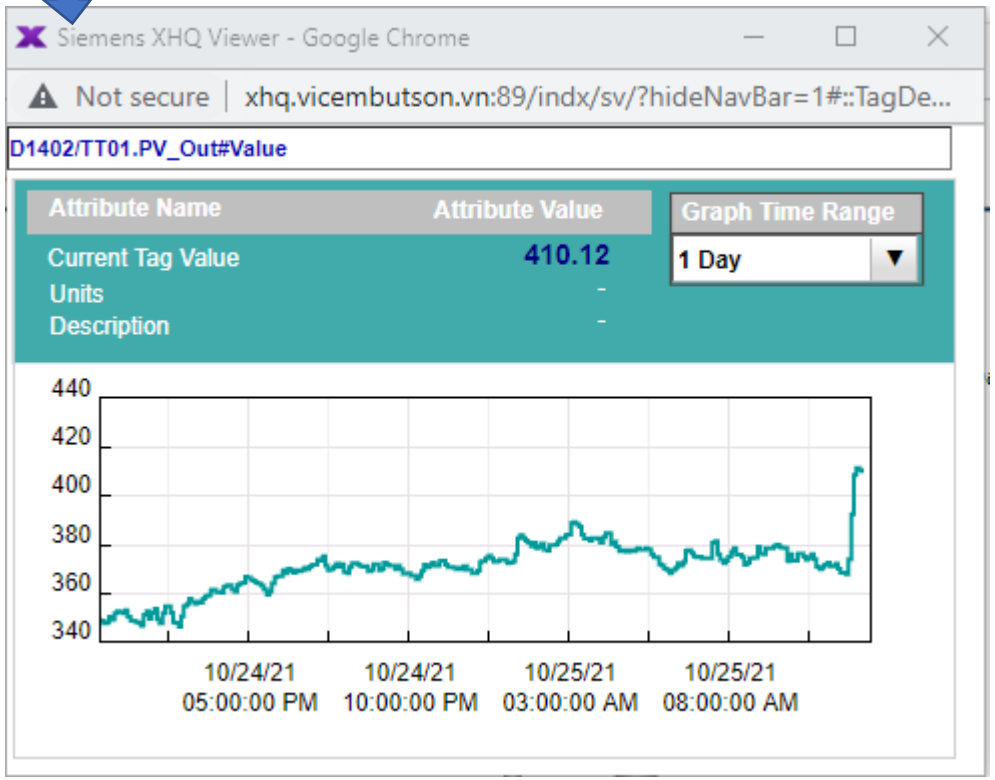
Thiết kế Flow View

Flow View: 335.90 °C

	Value		Unit
Tín hiệu lỗi:	Value		Unit
Tín hiệu bình thường:	Value		Unit
Tín hiệu cảnh báo:	Value		Unit
Tín hiệu báo động:	Value		Unit
Tín hiệu mất kết nối:	Value		Unit



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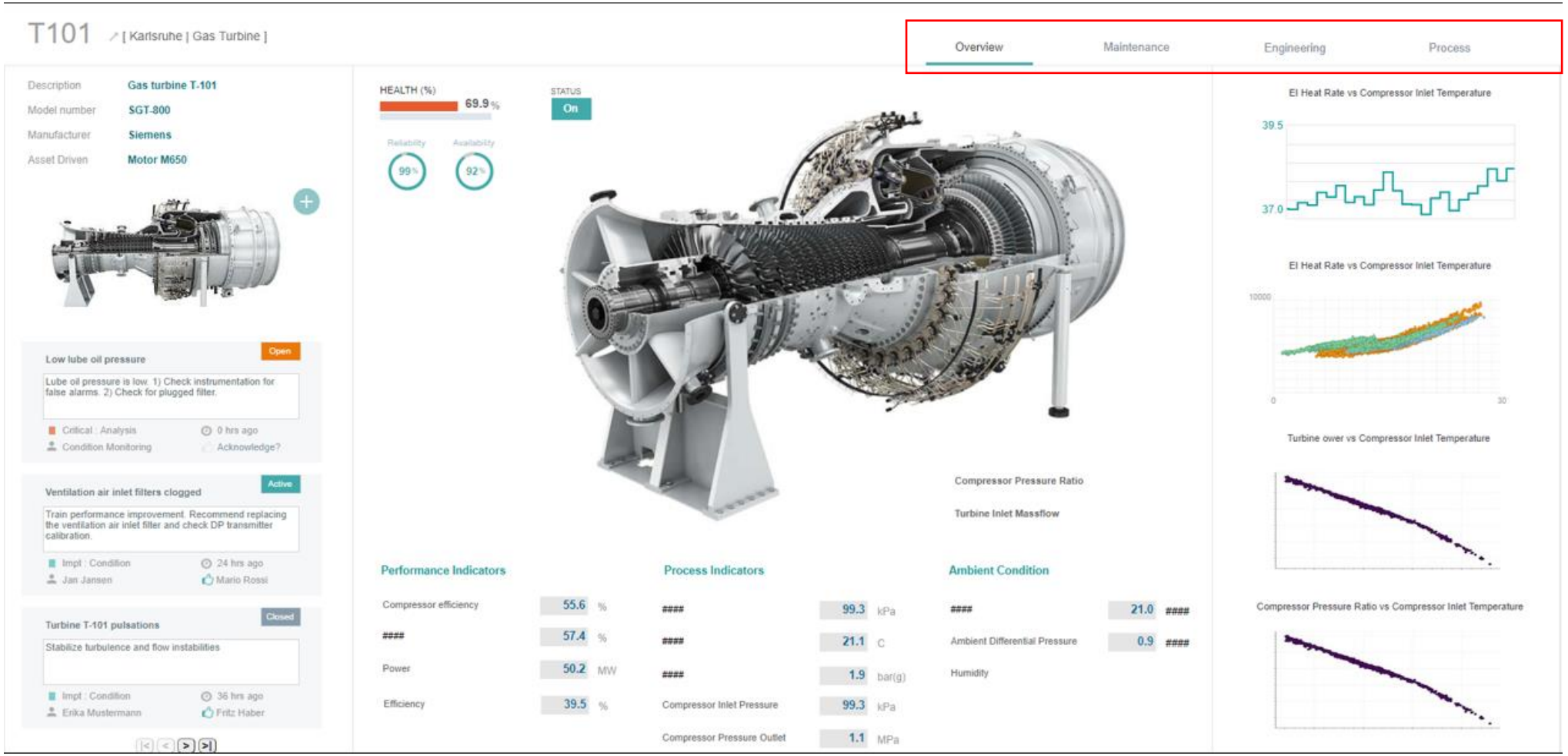
Thiết kế Template View



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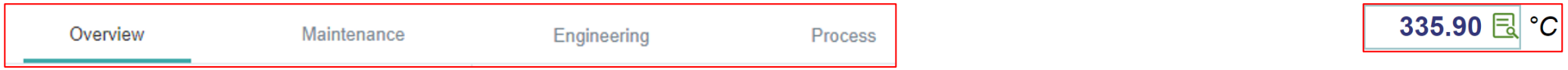
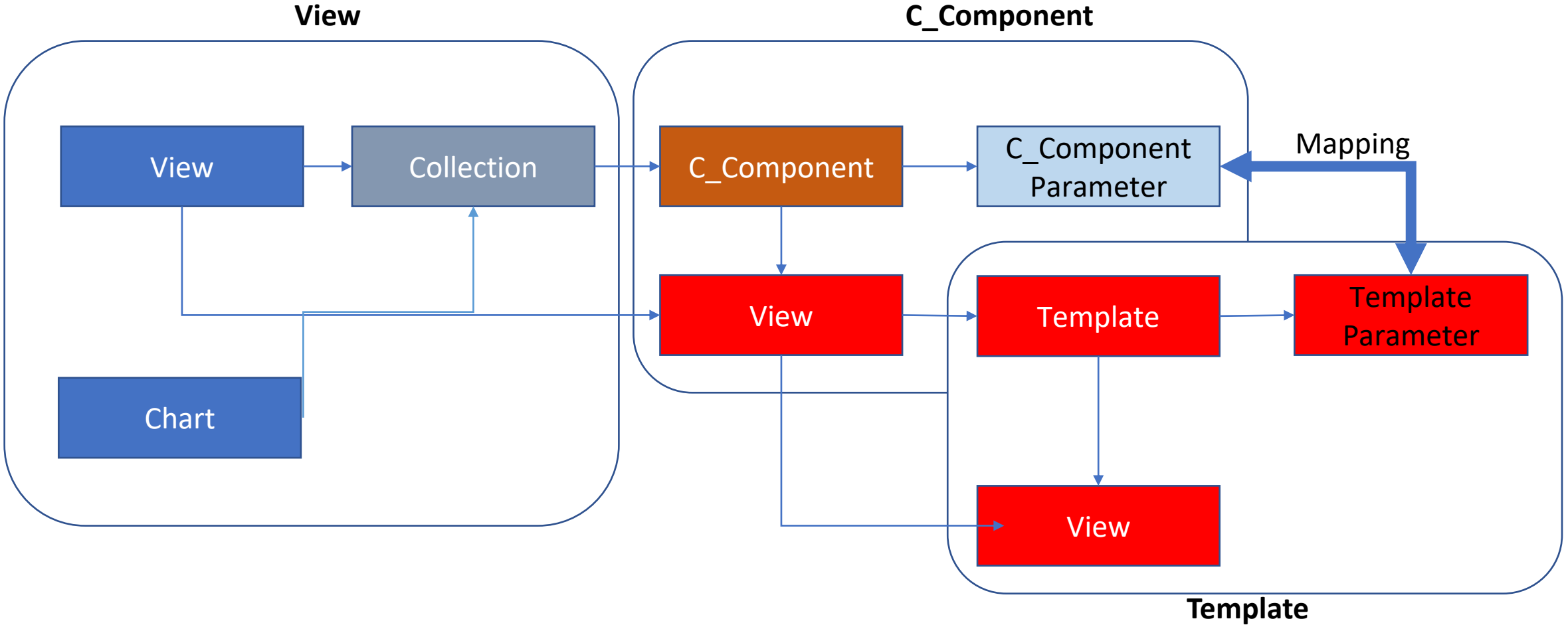
Thiết kế Template View

Template View:





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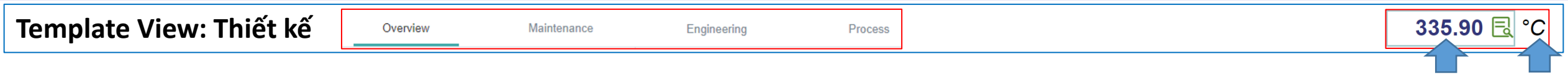
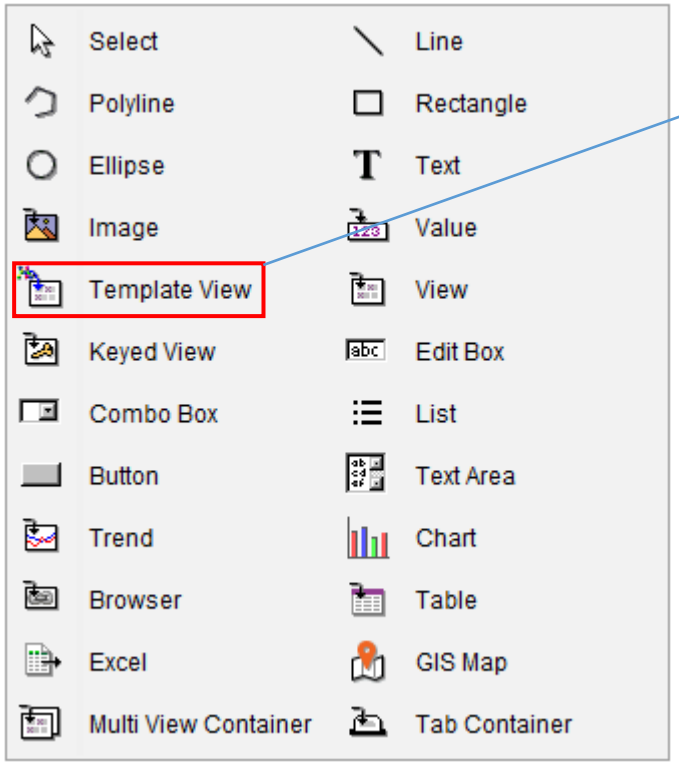
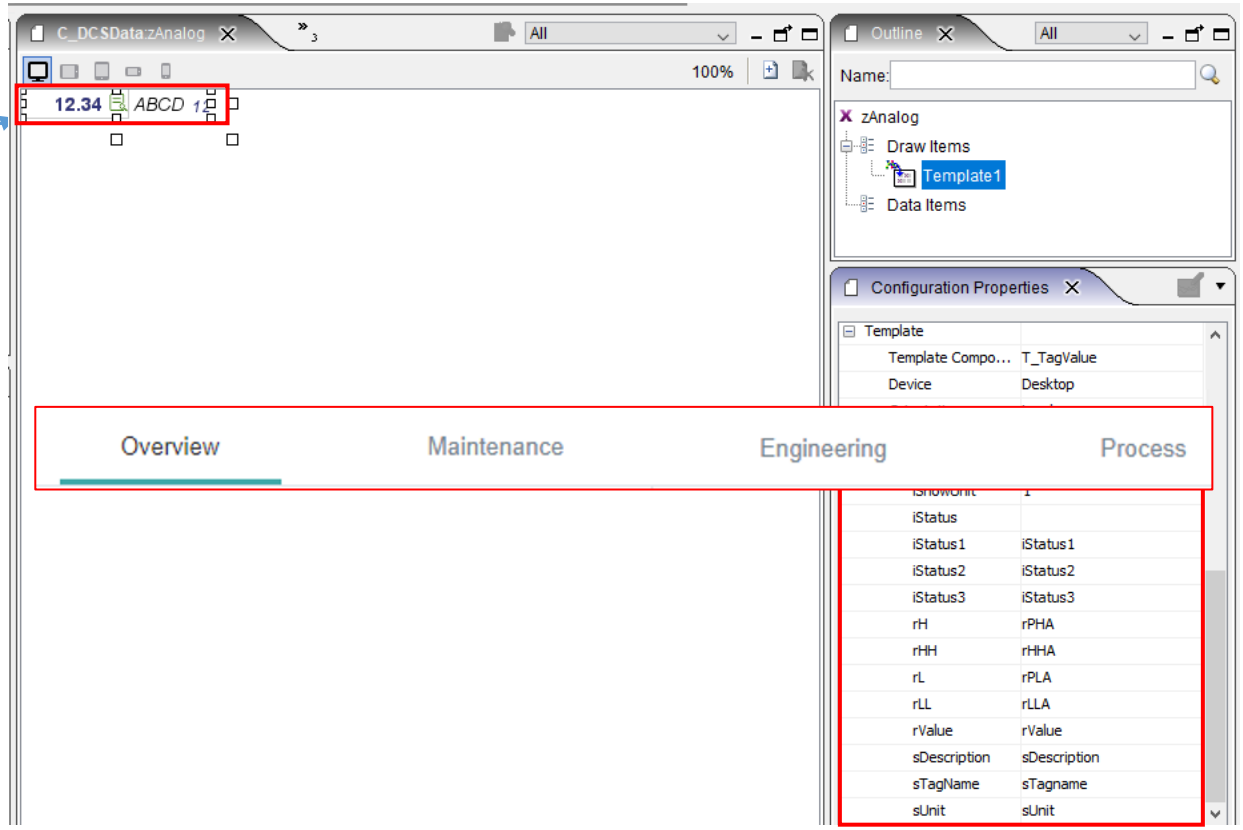
Thiết kế Template View

Template View: Thiết kế







Template Parameter

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Table

Table: Runtime

Tên Tag | Mô tả | Đơn vị

Tên tag	Giá trị	Đơn vị	Mô tả	Báo động mức thấp	Cảnh báo mức thấp	Cảnh báo mức cao	Báo động mức cao
GHC_MAI0004	0.00	%	% mở van cung NO 1				
GHC_MAI0005	0.00	%	% mở van cung NO 2				
GHC_MAI0006	0.00	%	% mở van cung NO 3				
ALC_DI0077	0.00		22 Kv CB Remote/local				
ALS_343ASR.DI1	1.00		343ARS_NOTUSE				
ALS_343ASR.DI0	0.00		343ARS_USE				
GHC_MDI0030	0.00		AIR HORN OFF, = 1 vàng, = 0 xám				
GHC_MDI0029	0.00		AIR HORN ON, = 1 vàng, = 0 xám				
U2C_DI0363	0.00	kgf/cm2	Ap lực nước chèn trục				
U1C_DI0363	0.00	kgf/cm3	Ap lực nước chèn trục				
U2C_DI0369	0.00	kgf/cm2	Ap lực nước ra bộ làm mát dầu OHTB số 1				
U1C_DI0369	0.00	kgf/cm2	Ap lực nước ra bộ làm mát dầu OHTB số 1				
U1C_DI0370	0.00	kgf/cm2	Ap lực nước ra bộ làm mát dầu OHTB số 2				
U2C_DI0370	0.00	kgf/cm2	Ap lực nước ra bộ làm mát dầu OHTB số 2				
U1C_DI0367	0.00	kgf/cm2	Ap lực nước vào bộ làm mát dầu OHTB số 1				
U2C_DI0367	0.00	kgf/cm2	Ap lực nước vào bộ làm mát dầu OHTB số 1				
U2C_DI0368	0.00	kgf/cm2	Ap lực nước vào bộ làm mát dầu OHTB số 2				
U1C_DI0368	0.00	kgf/cm2	Ap lực nước vào bộ làm mát dầu OHTB số 2				
ALC_DI0033	1.00		Bơm CWP1				
ALC_DI0039	1.00		Bơm CWP1 REMOTE/LOCAL				
ALC_DI0035	1.00		Bơm CWP2				

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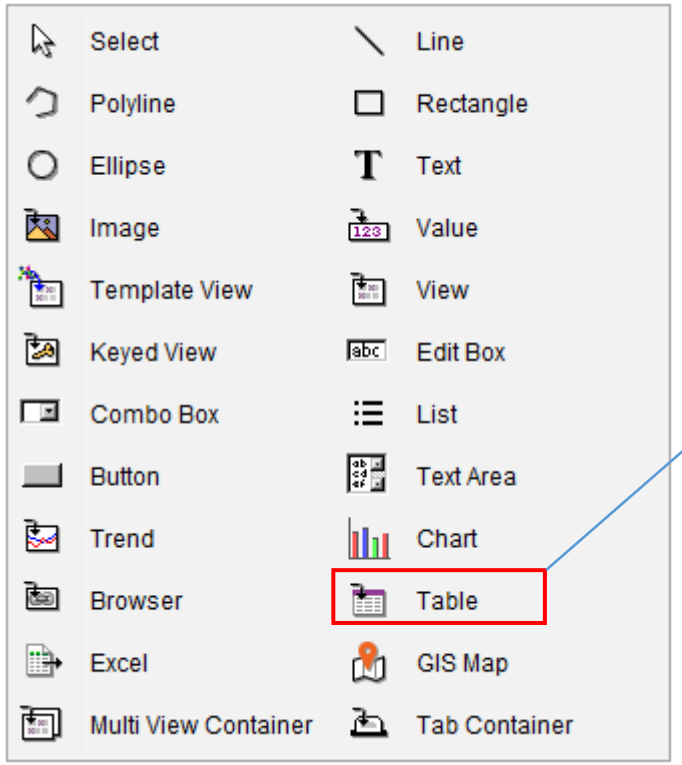
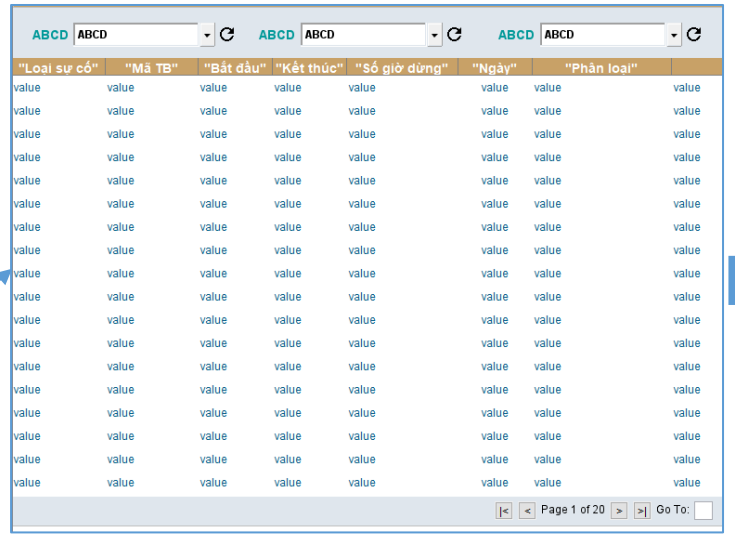
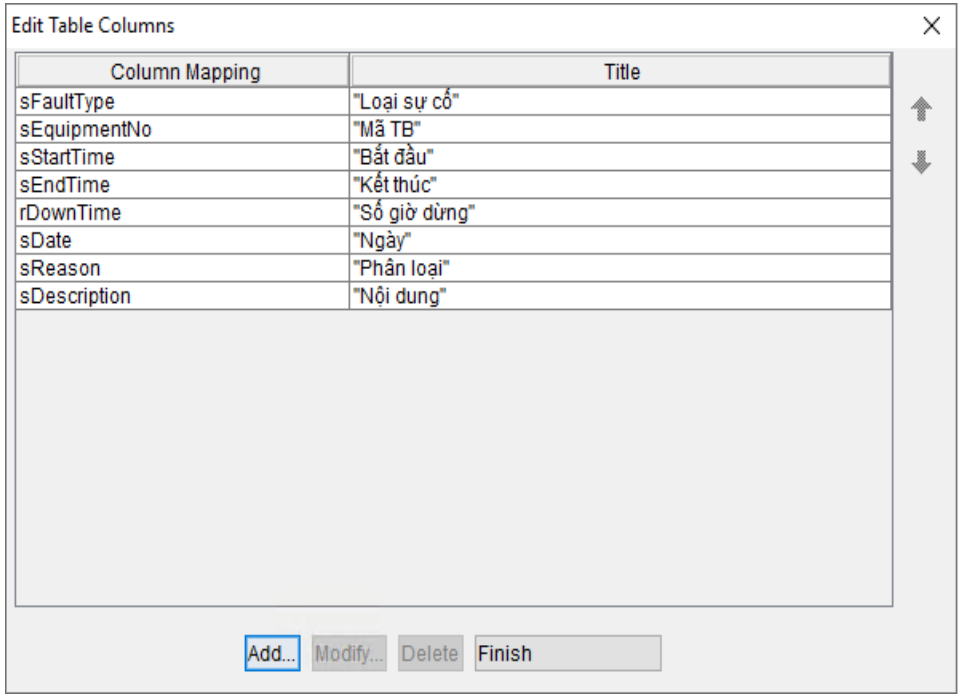
Table

Table: Thiết kế







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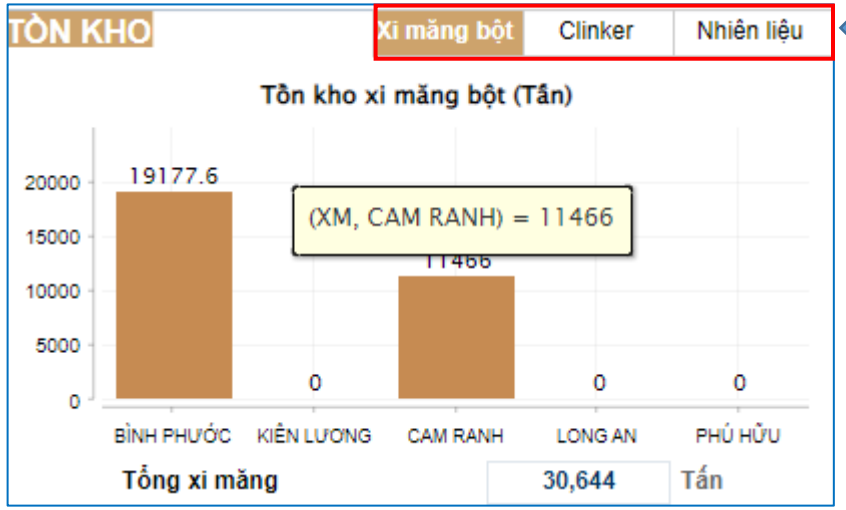
Thiết kế Controls/Tab

TAB:



Controls/Tab

Template View

View *(Popup)*

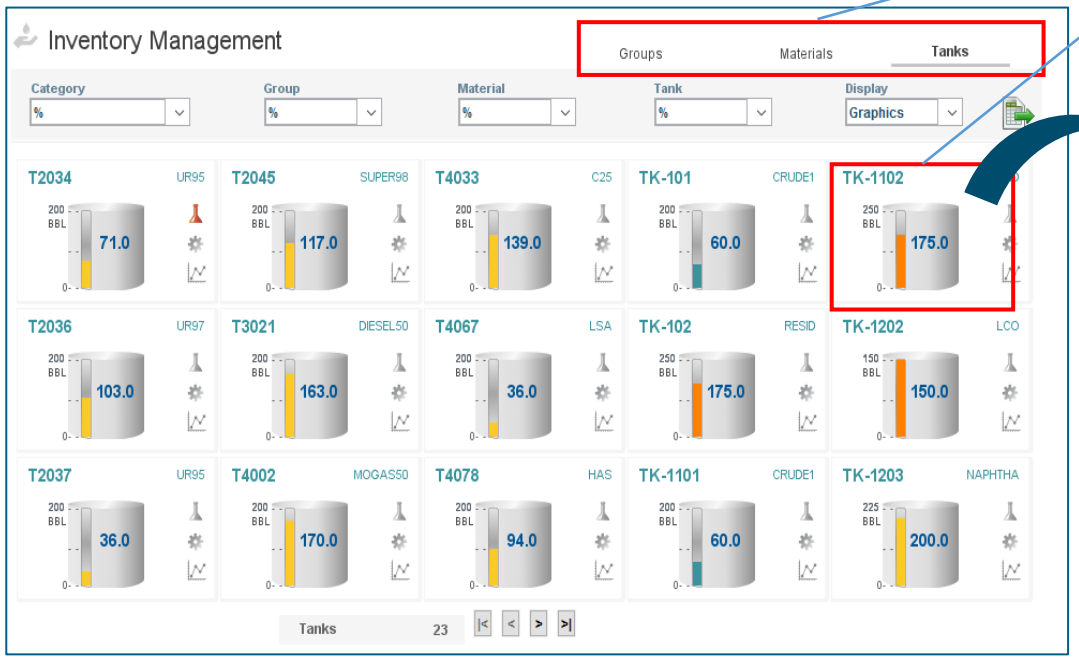


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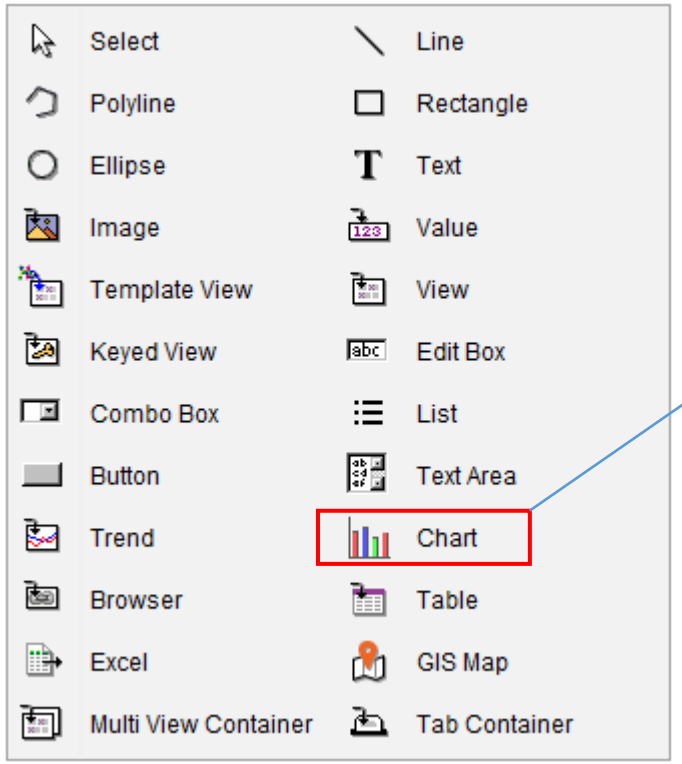
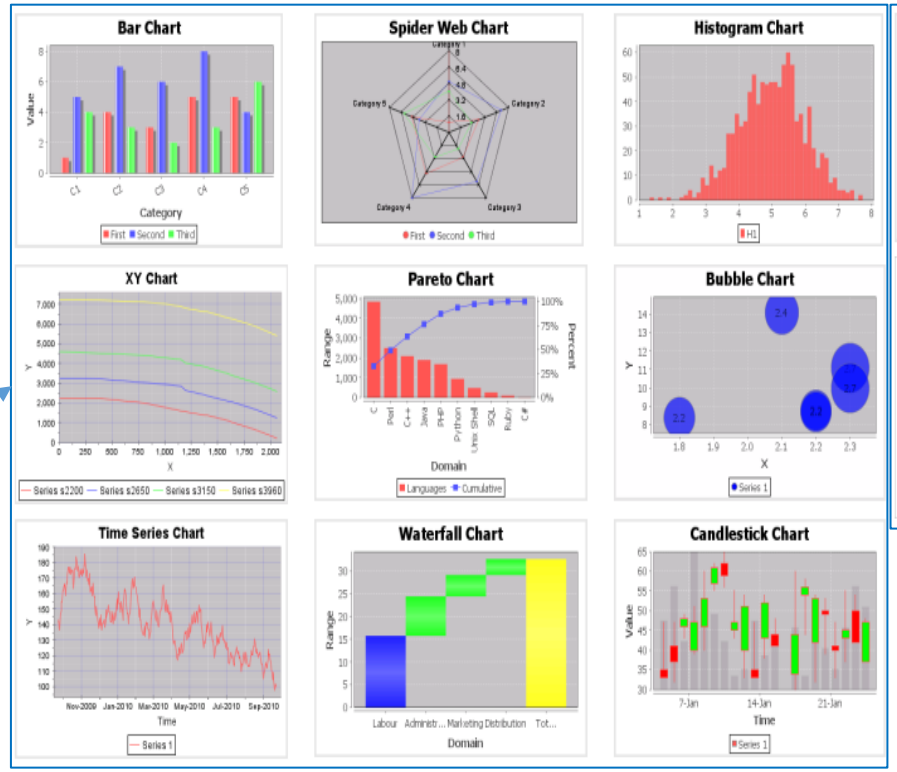
Chart

Chart: Design





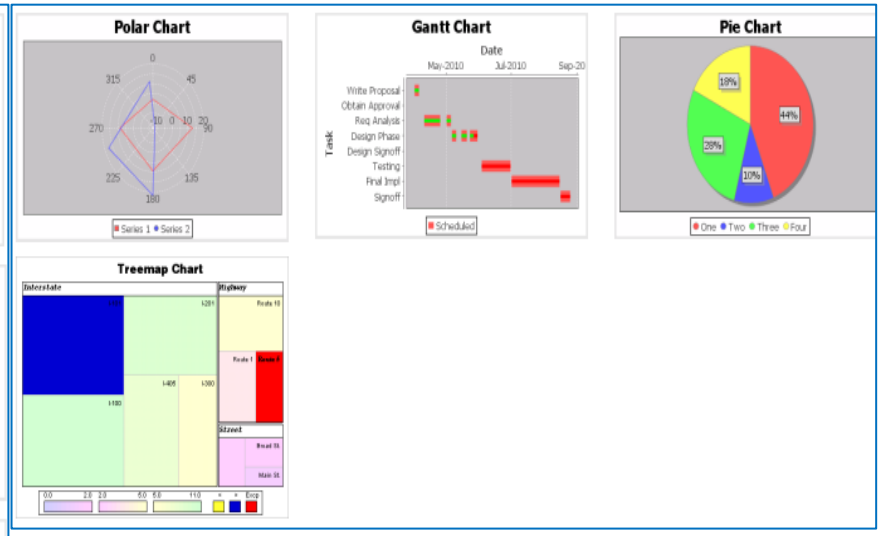


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Chart

Chart: Runtime

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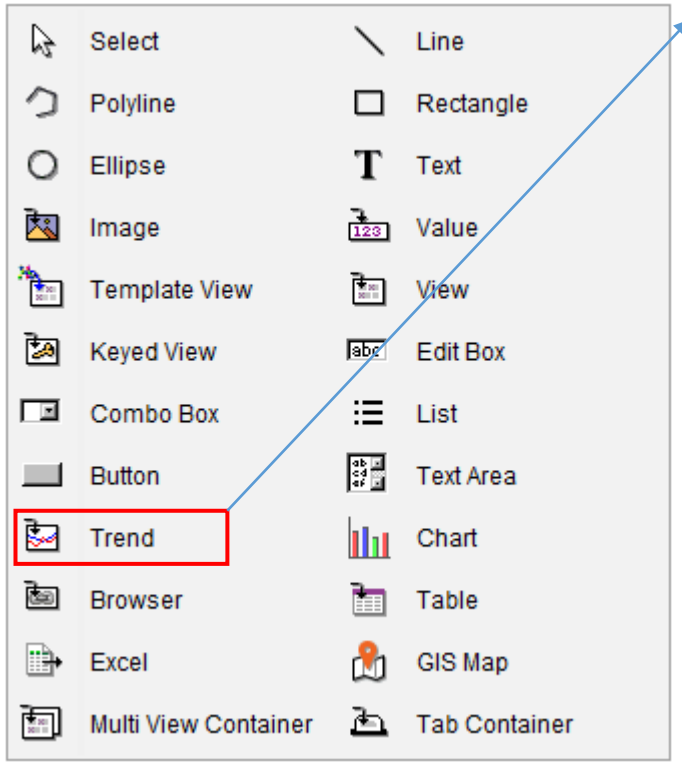
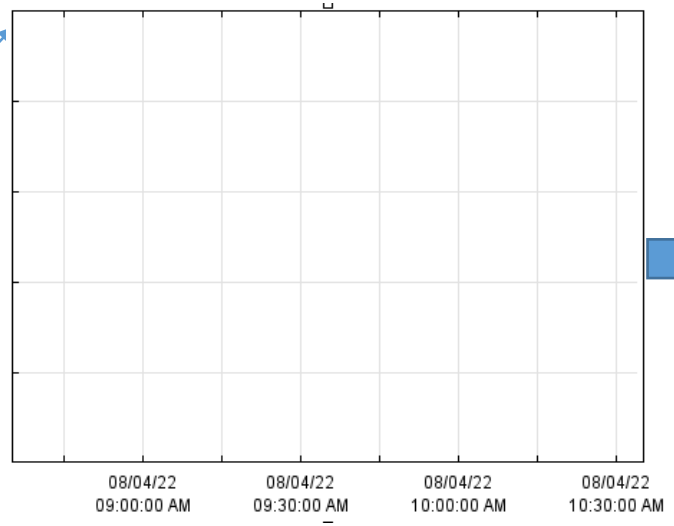
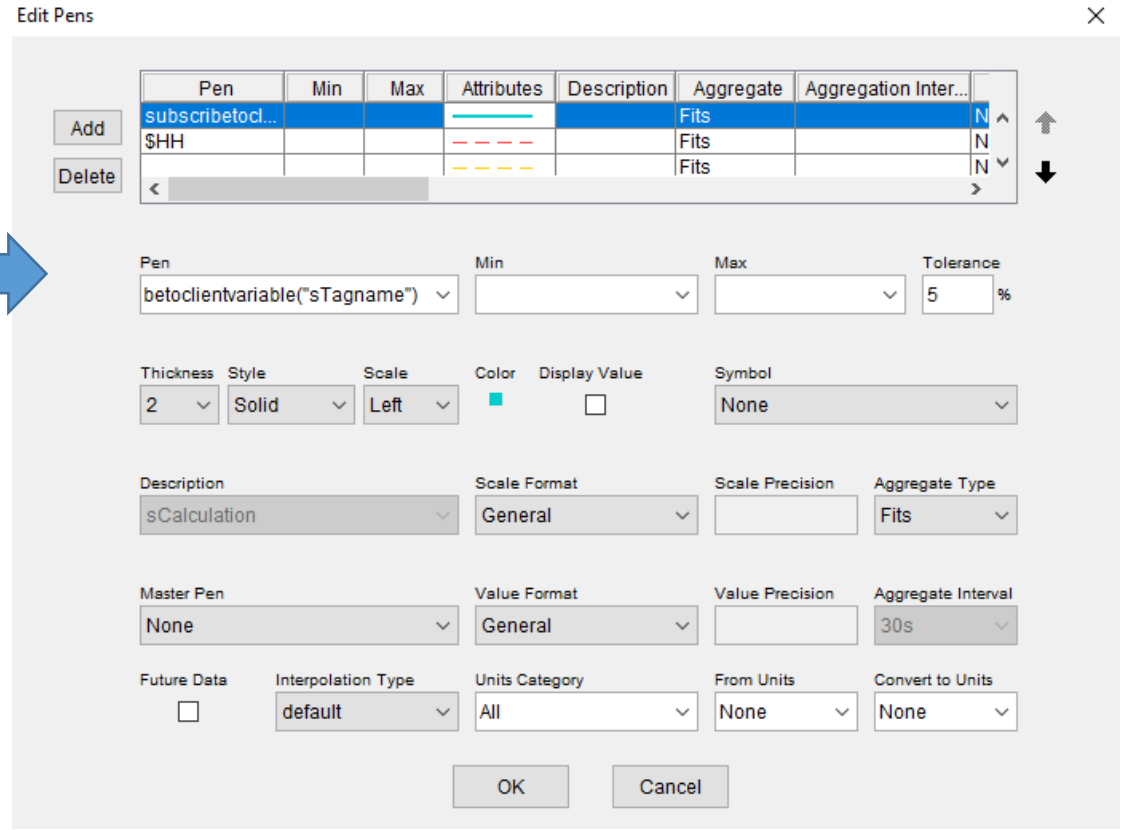
Trend

Trend: Design







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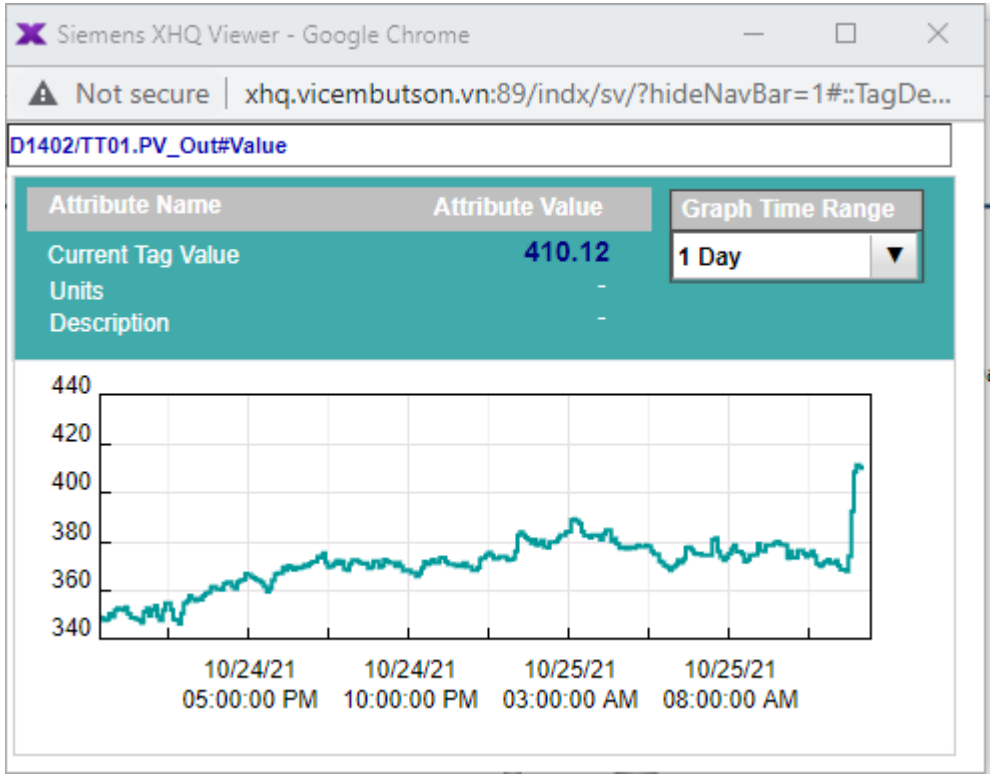
Trend

Trend: Runtime



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AUTOMATION & DIGITALIZATION

THANK YOU!

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