22/4/2022

Across The Ocean

Working Together for a more Effective Plant Analytics Platform

Presented By:

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Who We Are

Digital Solutions

AVEVA Products

TOMONI Hub Analytics and Performance Center

Dashboard

Global Development

Early Warning Application

Next Steps

Takeaways And Questions

Who We Are

Mitsubishi Power is a power solutions brand of **Mitsubishi Heavy Industries (MHI)** – a global leader in engineering & manufacturing spanning energy, infrastructure, transportation, aerospace and defense.

MHI GROUP OPERATES IN THREE INDUSTRY SEGMENTS

Aircraft, Defense & Space

Industry & Infrastructure

Power Systems

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Who We Are – Introducing Mitsubishi Power Americas

COMPANY HIGHLIGHTS

2,300
EMPLOYEES

25+
OFFICES & FACTORIES

1,500
SUPPLIERS

1.2M
SQUARE FEET OF MANUFACTURING SPACE

21
YEARS OPERATING IN THE AMERICAS

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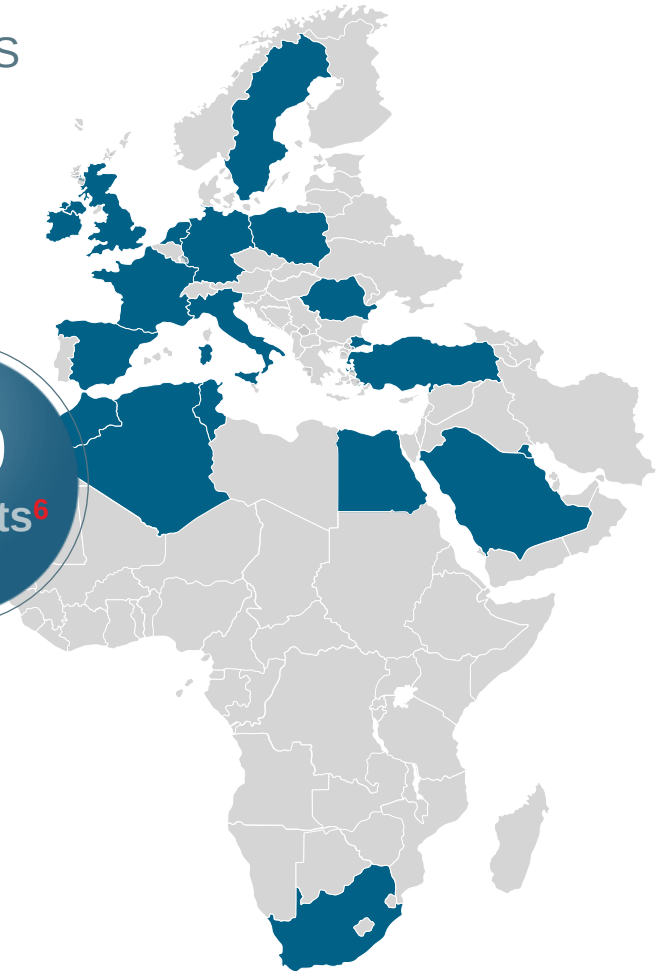
Who We Are – Introducing Mitsubishi Power Europe

COMPANY HIGHLIGHTS

15 offices

300 projects[6]

1,000 employees



6 An average number of projects per annum

OIL & GAS

Collaborative Development

MITSUBISHI POWER

Challenge

- With limited resources creating custom applications for analytics, troubleshooting, and performance management, to support the digitalization initiatives within Mitsubishi Power.

Solution

Pool Resources Across the Globe to leverage existing data infrastructure, streamline development, share best practices, and create applications that best suite the needs of our respective markets.

Benefits

- Knowledge sharing eliminates duplication of effort is evaluation
- Best Practices for use of Data Infrastructure avoids previous miscalculations or missteps in use
- Faster Delivery

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TOMONI

is the Japanese word for

"Together with…"

Think Global – Act Local

"…Together – in our Network, with our Customers!"

TOMONI™

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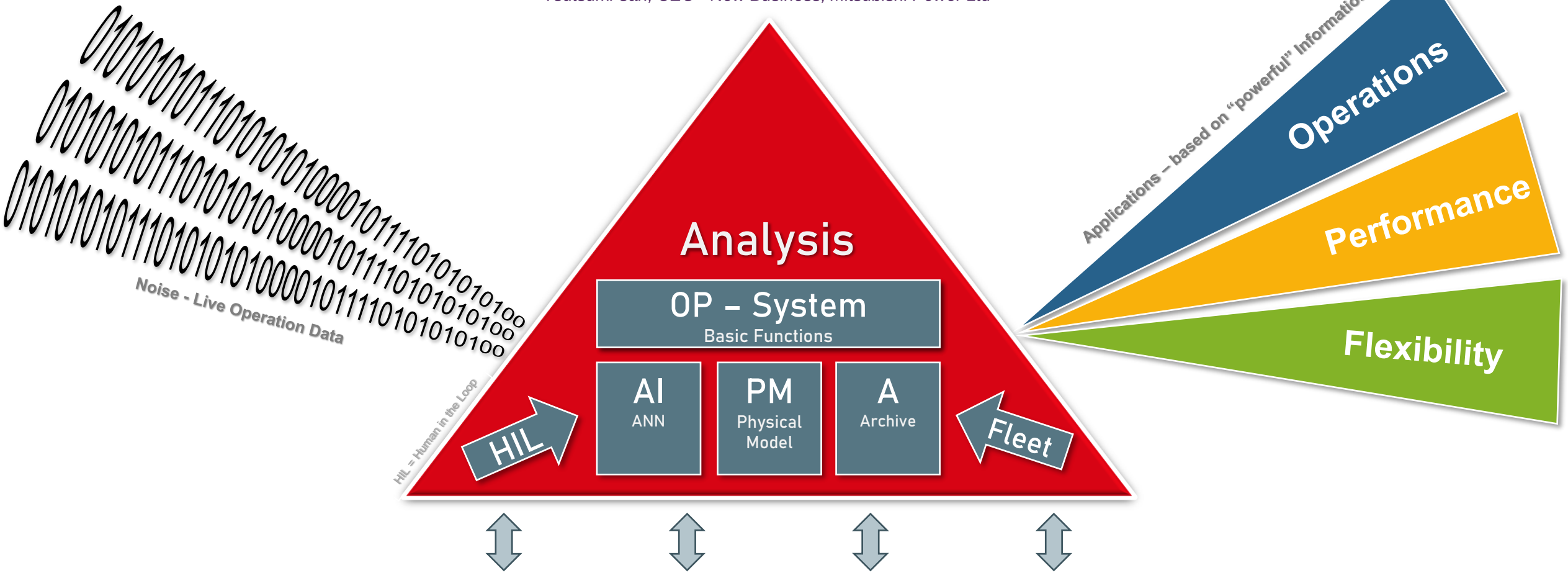
“ TOMONI takes the massive amount of data ... and transforms it from unmanageable noise into powerful information…“

Tsutsumi-san, CEO - New Business, Mitsubishi Power Ltd



Solutions Recommendation
Cooperation between MPW and Customer

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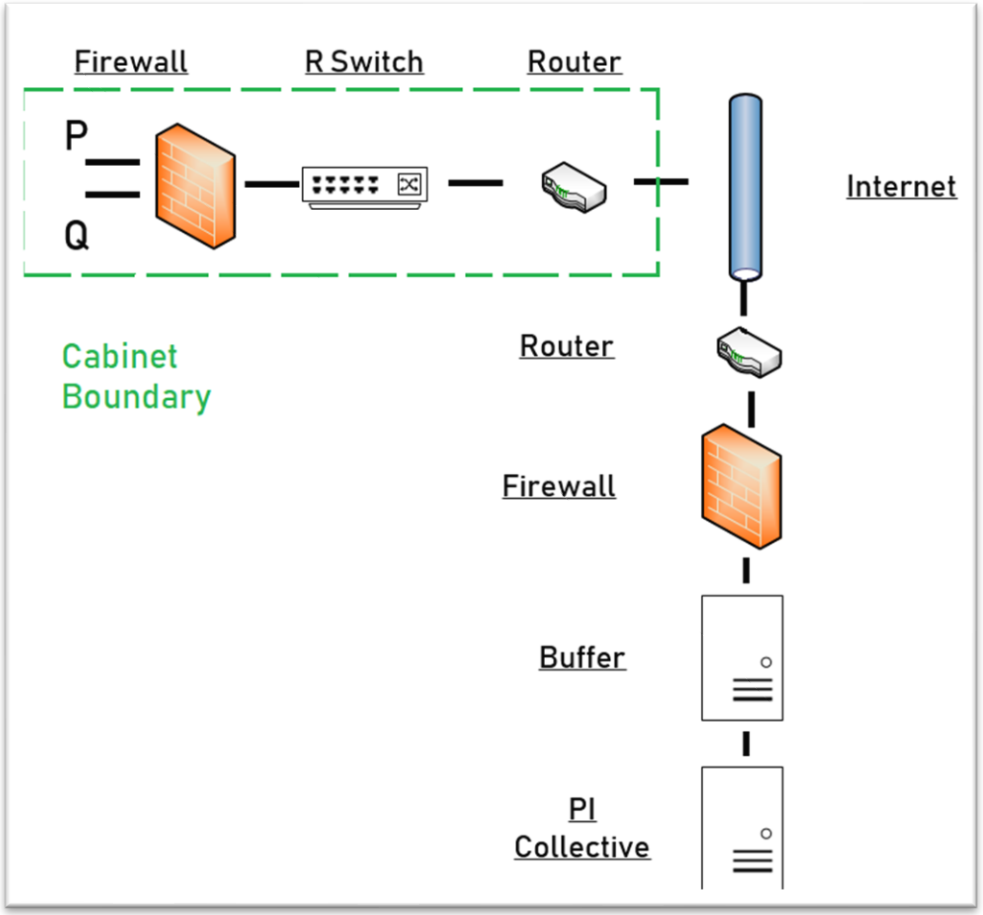
Utilizing AVEVA PI System, AF, PI Web API to Enable Development

PI System



- The PI System is our foundation for data collection.
- We have several configurations but the basic concept is data is transferred to the site/remote PI Server, using either PI Interface for OPC or PI Interface for UFL.
- The data is then transferred to our PI Collective.
- This data is used by the Dashboard, Analytics tools, Our Simulator, and other custom tools.

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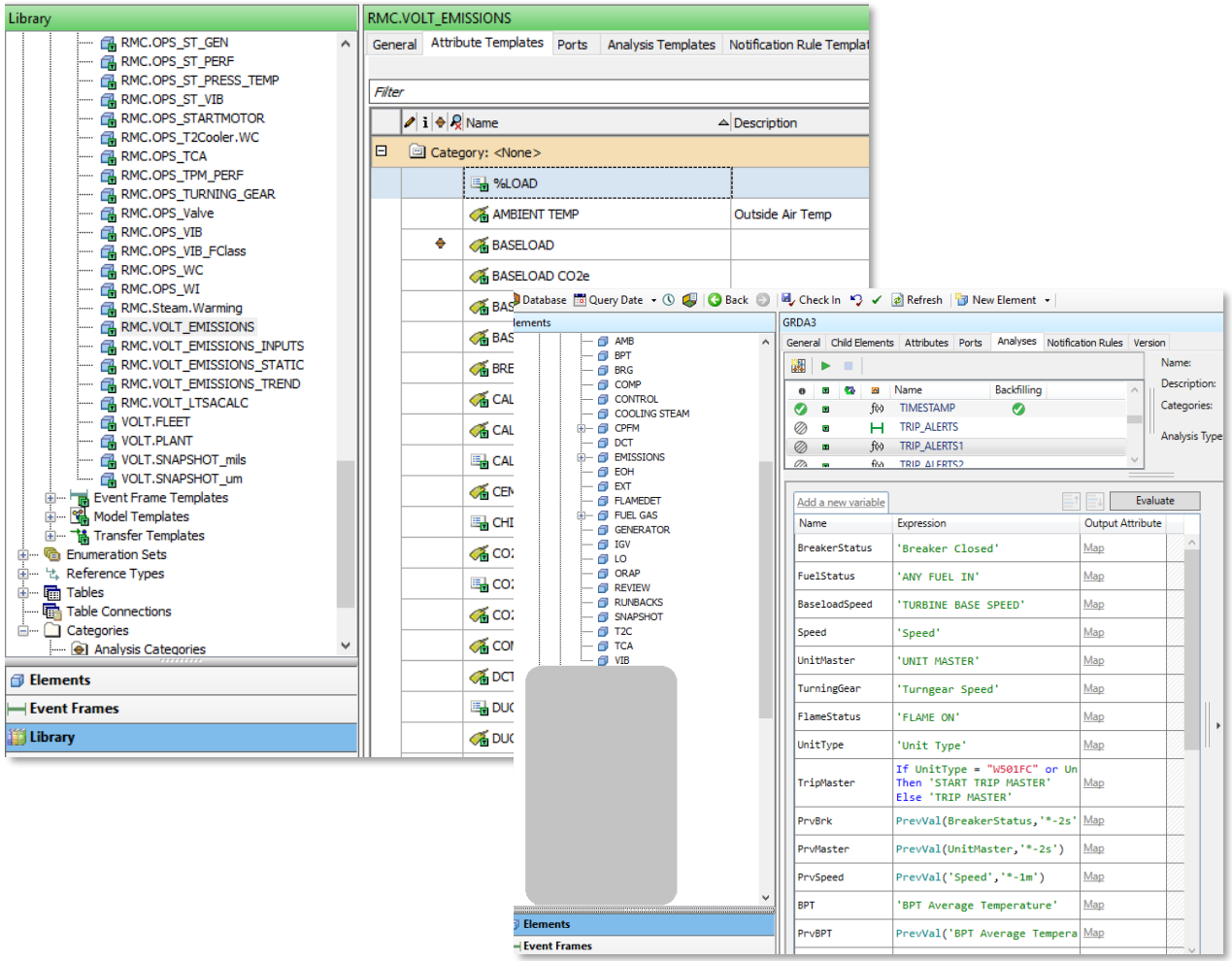
Utilizing AVEVA PI System, AF, PI Web API to Enable Development

Asset Framework

- Through a combination of Python code and Asset Framework Analysis we create Thermal Performance Calculations.
- Event Frames in Asset Framework are the foundation for the automated event notifications we have created.
- The Asset Framework structure and attributes are what we call upon as endpoints from the Dashboard. This allows us to development and application once and for similar configurations that application automatically works.



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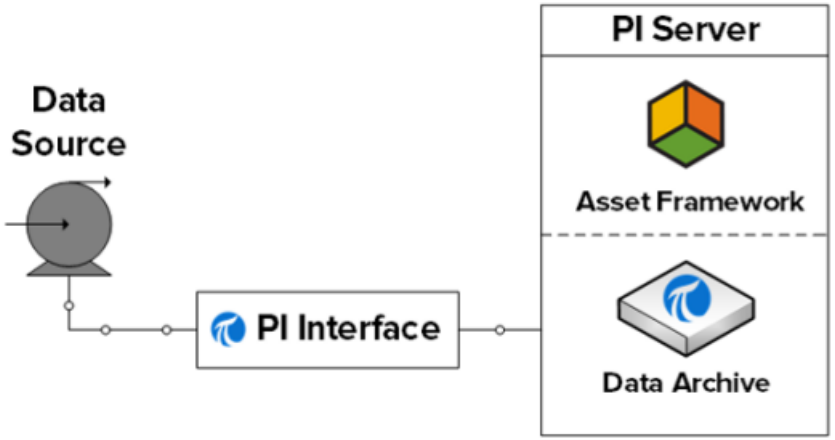
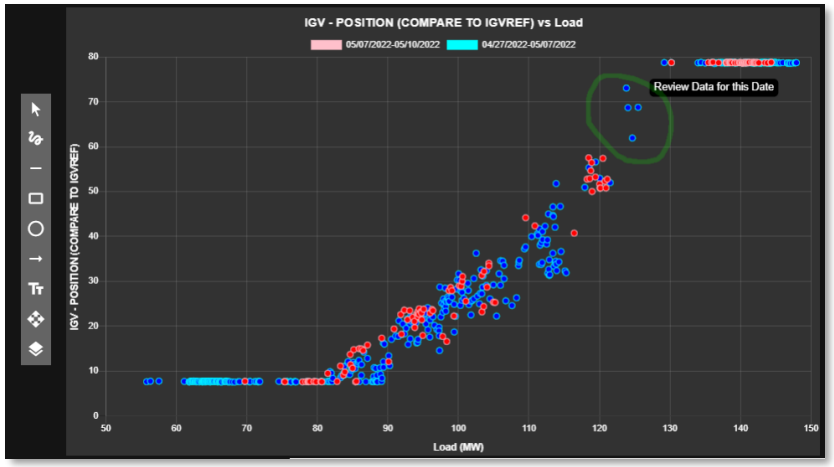
Utilizing AVEVA PI System, AF, PI Web API to Enable Development

PI Web API





- The PI Web API is a RESTful interface to the PI system. It gives client applications read and write access to their AF and PI data.
- We utilize this to call on the data in our collective.
- The Dashboard also has the ability to write values to the collective. User inputs from the UI of the Dashboard as well as backend calculations can and are written to PI.

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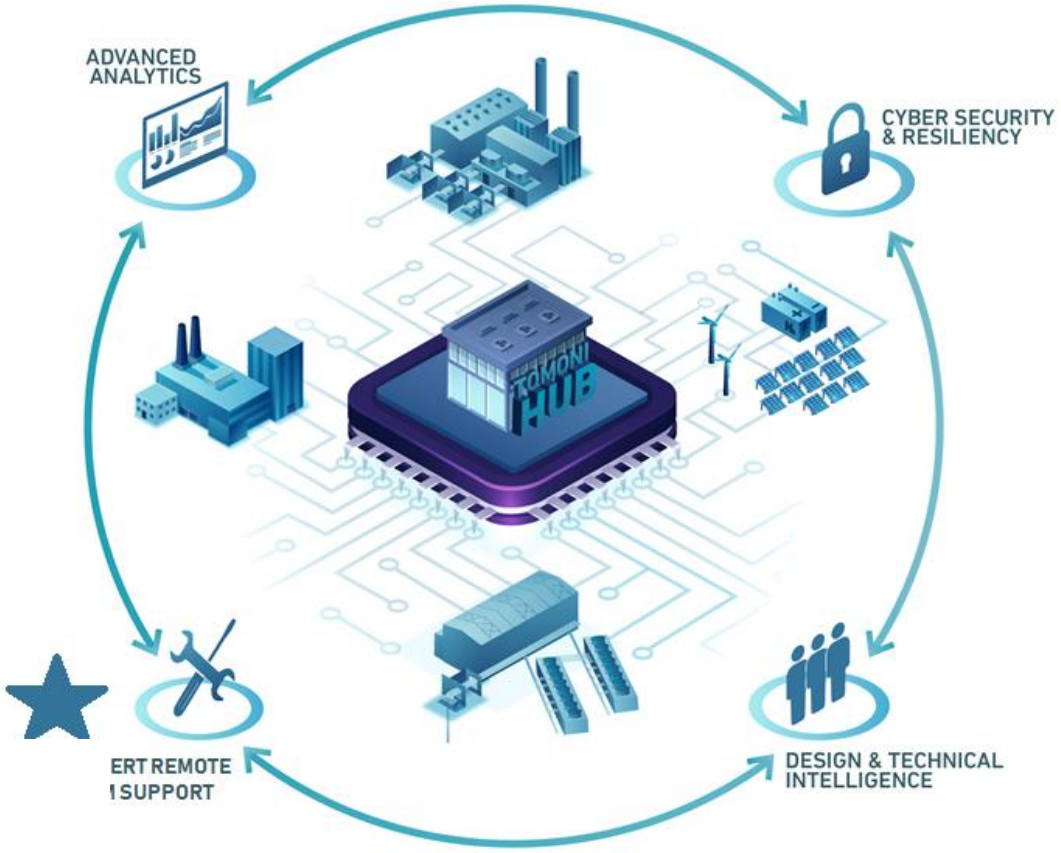
TOMONI Hub



Maximize Customer Plant Optimization

Through

System Experts and Data Analytics

To Achieve

World Class Reliability & Performance

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World Wide – TOMONI Hub Network

Duisburg (Germany) since 2021

Duisburg TOMONI Hub

Takasago TOMONI Hub

Nagasaki TOMONI Hub

Alabang TOMONI Hub

Alabang (Philippines) since 2016

Nagasaki (Japan) since 2019

Takasago (Japan) since 1999

Orlando (USA) since 2001

Orlando TOMONI Hub

Steadily increasing number of reference plants worldwide

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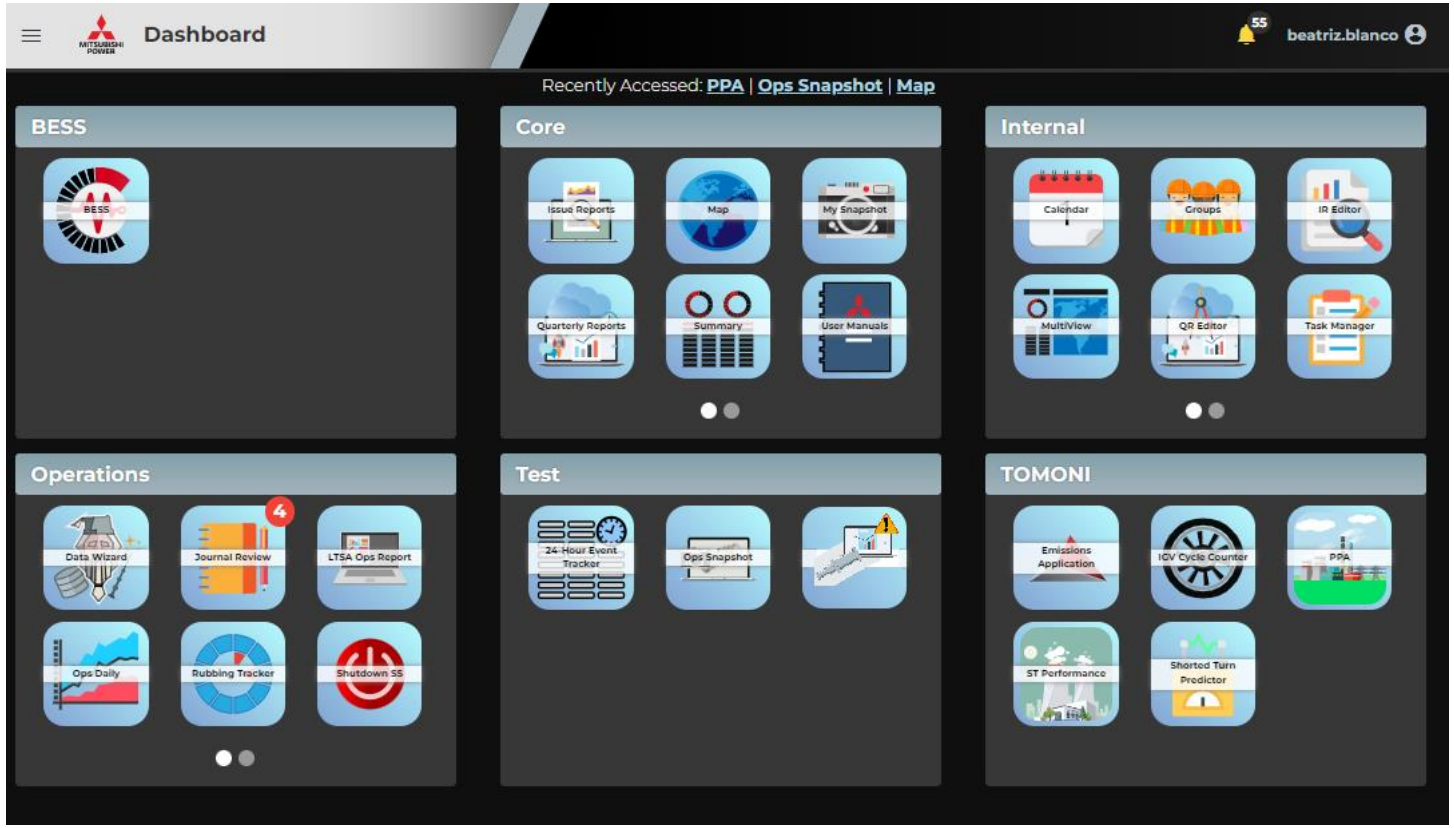
Dashboard Development to Create Custom Applications

Dashboard – Internal View



Front End:

-Angular

Back End:

-Python
-Docker
-Apache
-MySQL
-MongoDB
-ExpressJS
-RabbitMQ

Key Applications:

-Map
-Ops Snapshot
-Ops Daily
-Emissions App
-Event Tracker
-Plant Performance

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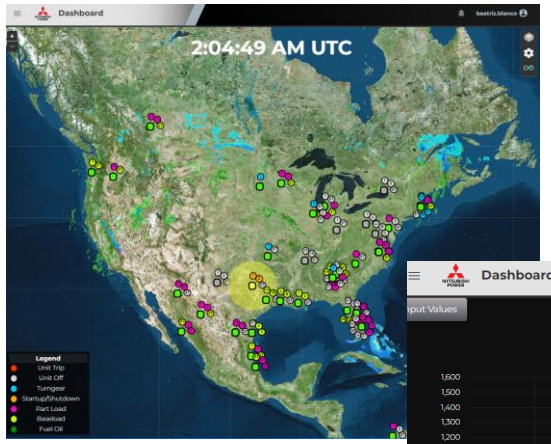
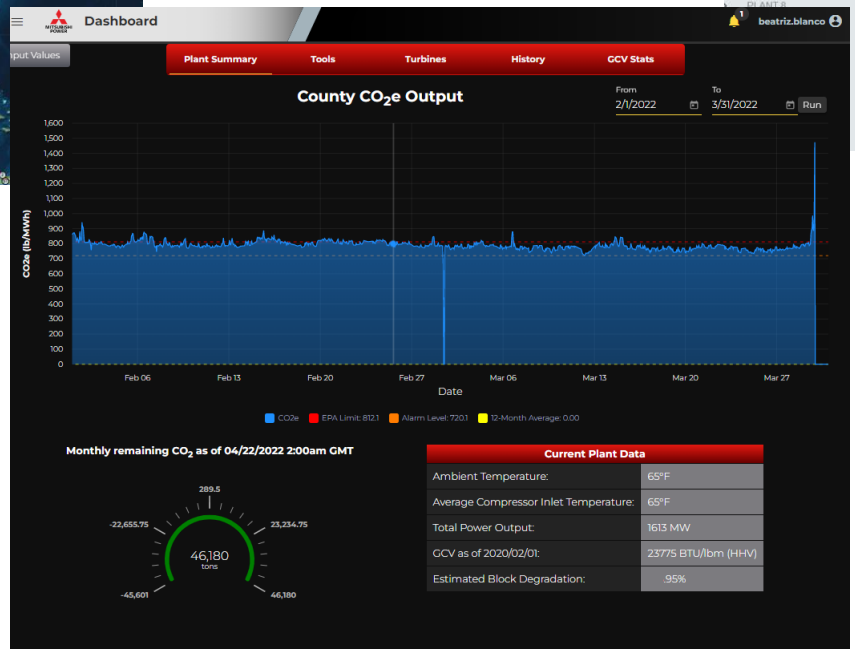
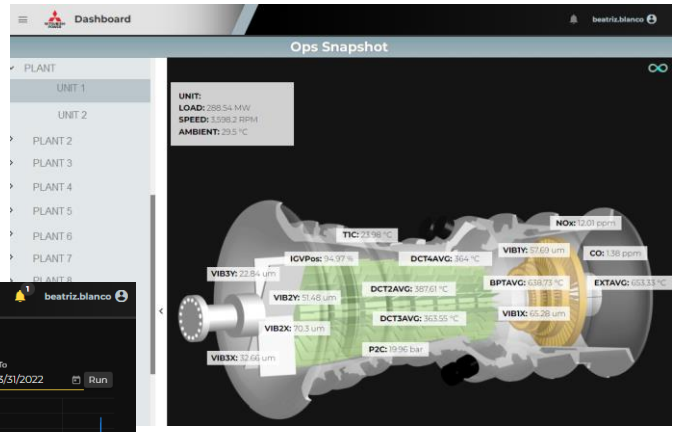
Dashboard Development to Create Custom Applications

Dashboard – Applications







Key Applications:

-Map
-Ops Snapshot
-Ops Daily
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-Plant Performance

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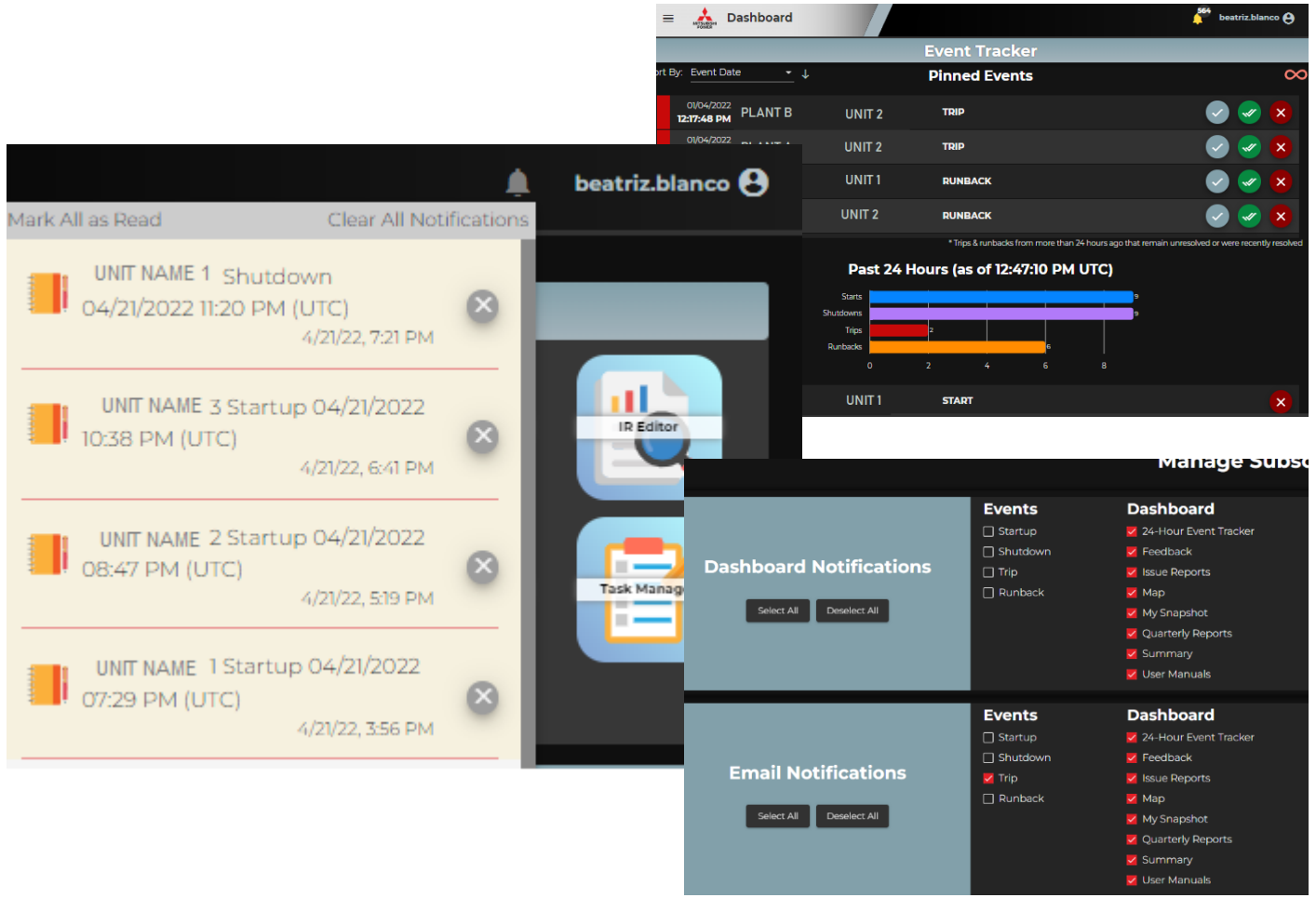
Dashboard Development to Create Custom Applications

Dashboard – Key Features

- Event Notifications based on Asset Framework Event Frames
  - Starts
  - Stops
  - Trips
  - Runbacks
- Retrieves PI Data Archive Data using PI Web API
- In App Notifications that take you to view Event Frame captured data
- Email Notifications
- Discussions



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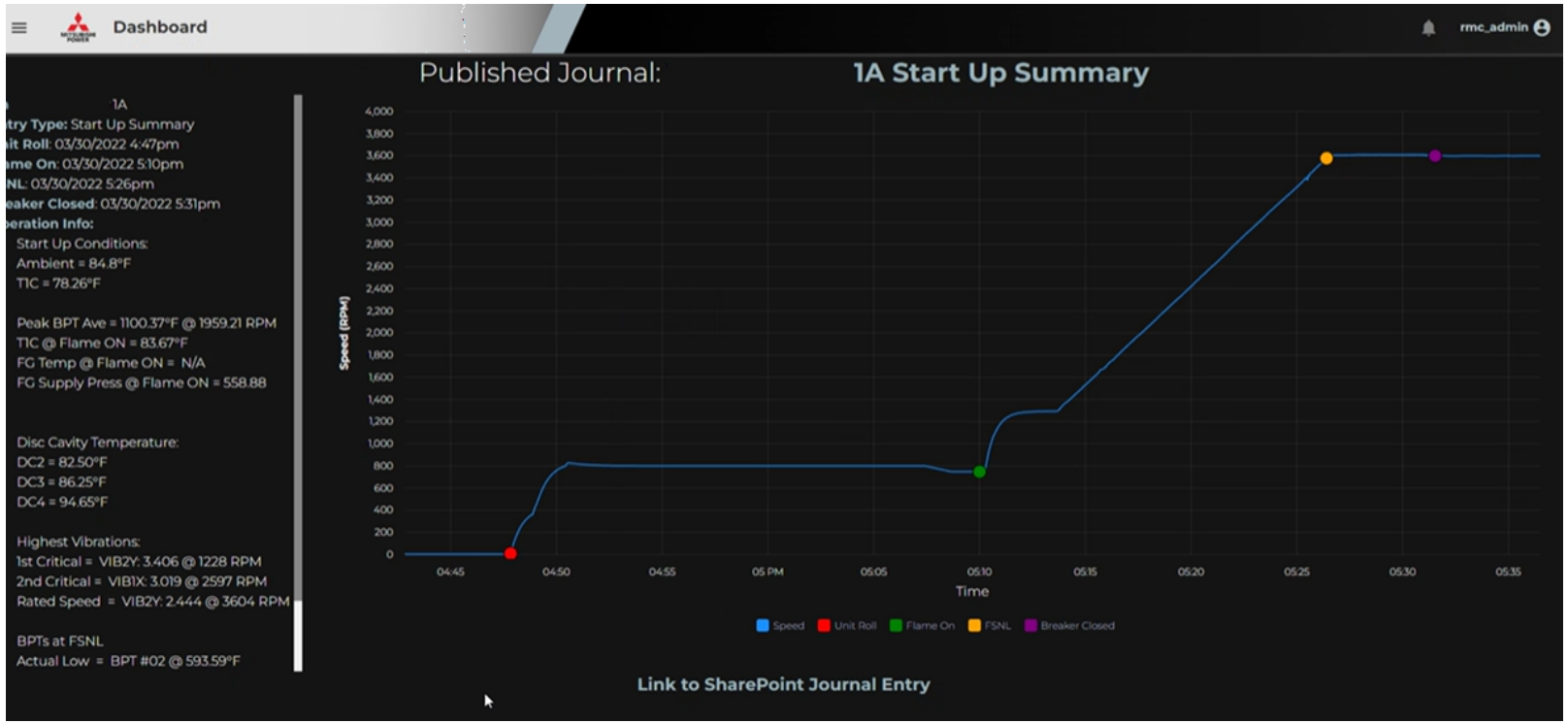
Dashboard Development to Create Custom Applications

Dashboard – Event Frame to SharePoint Entry



- Event Frames referencing Asset Framework capture key event data.
- That data is populated in an application in the dashboard, and the TOMONI Hub Engineer with the click of a button can automatically publishing that information to SharePoint.
- Office365 connector

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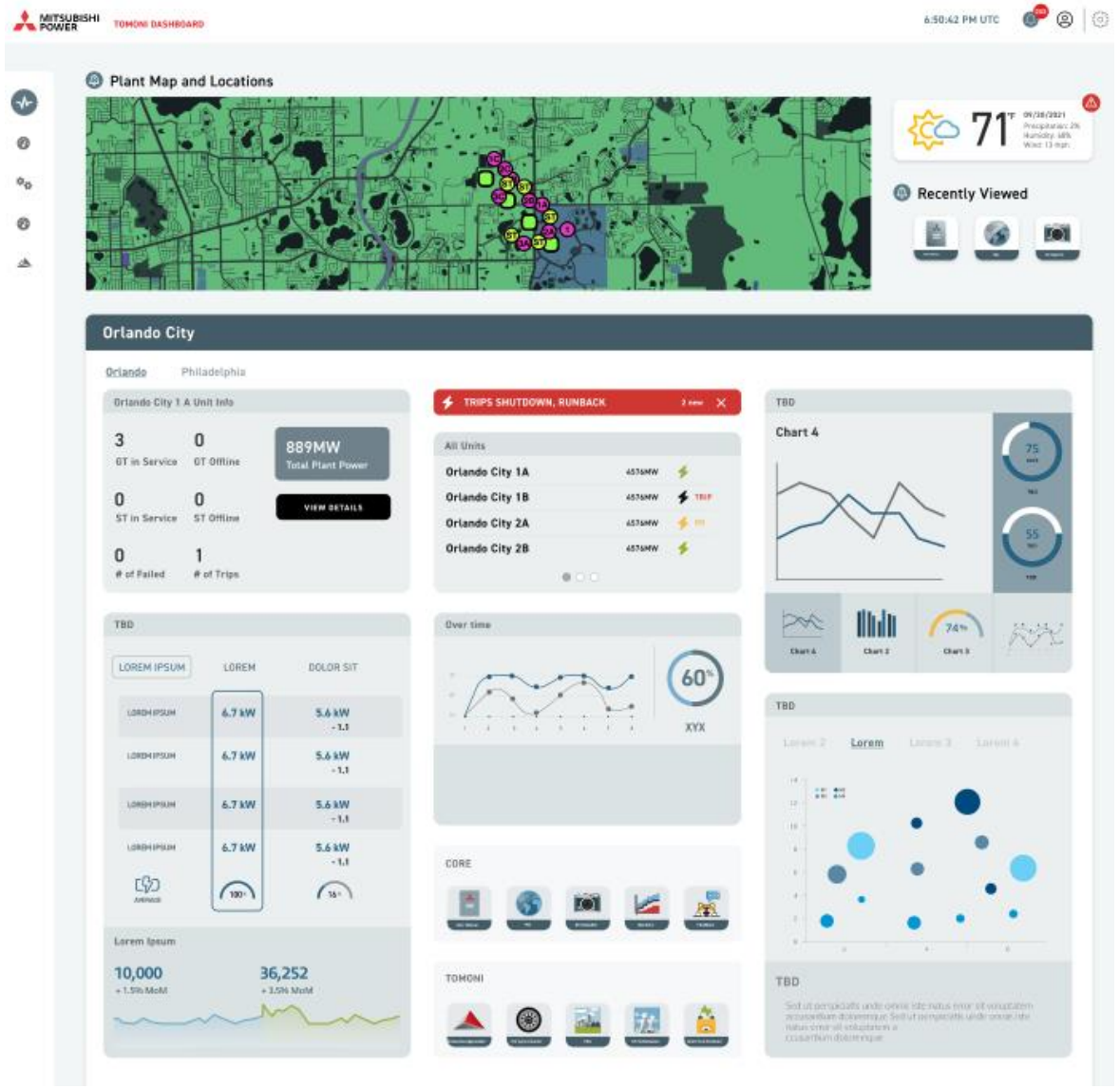
Future Development

Dashboard – Plant Base Operational View
– Continued Collaboration

Key Future Applications:

- Thermal Performance > Real Time Thermal Performance Monitoring > Notifications
- Total Plant Performance > Real Time Power Block Thermal Performance > Notifications
- Plant Health > Plant Indicators > Reliability
- Journal Automation > Event Capture > Insights



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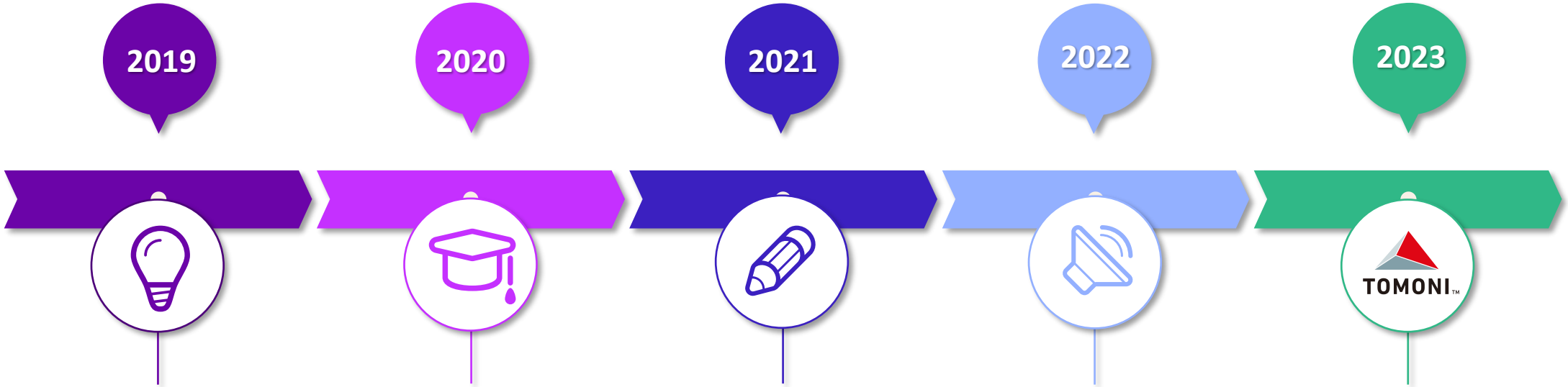
Development Roadmap EU



Idea

Expand and Adapt
TOMONI
Under R&D Conditions
to Europe

Build Plan

Initial Plan Established
Funding from
Local Government
Addressed and acquired

Do It

Test IT Infrastructure Est.
AVEVA PI – Infrastructure
Up & Running
1st Customer Connected

Marketing

Pro-Active
Sales Approach Start
Collaborating
USA / JPA

Expansion

Customer Portal & Apps
Aligned and Implemented
Approach New- and
Existing Customer

Mitsubishi Power Europe GmbH and its predecessors have installed more than 1,500 boilers world wide…
The basis for a huge market potential for Intelligent Optimization Solutions in “Steam Power” ….

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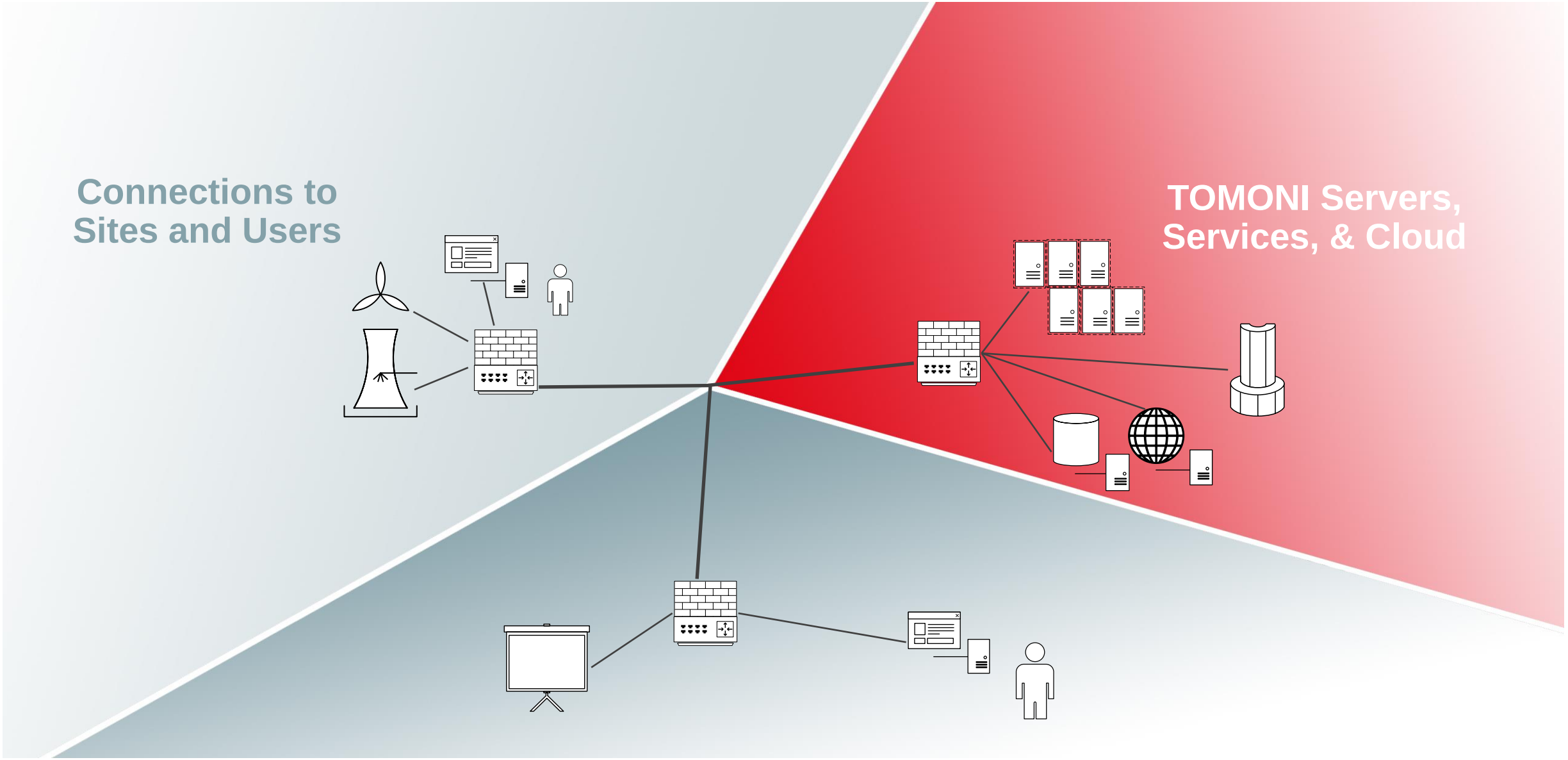
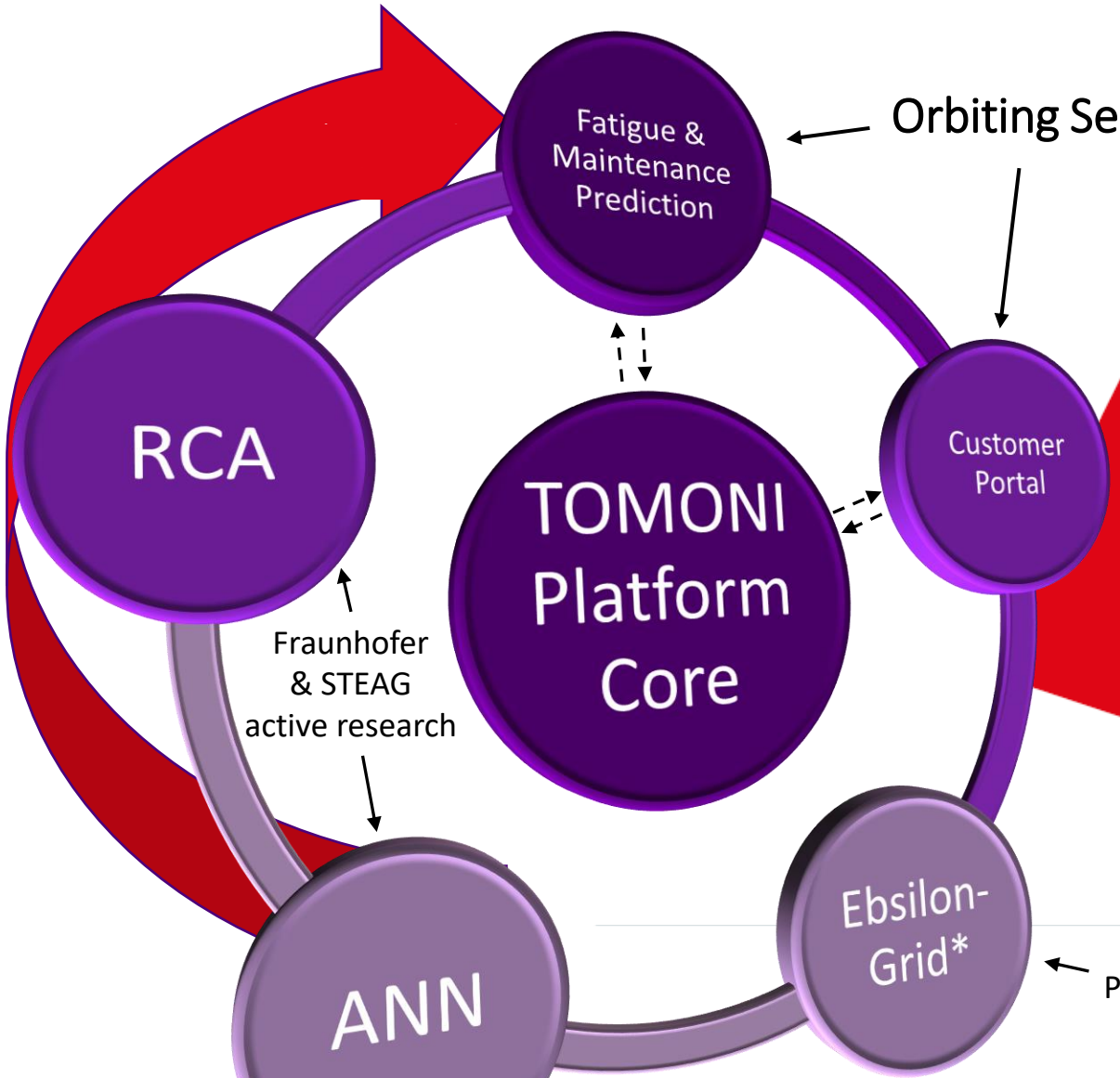
EU Development



EU Development

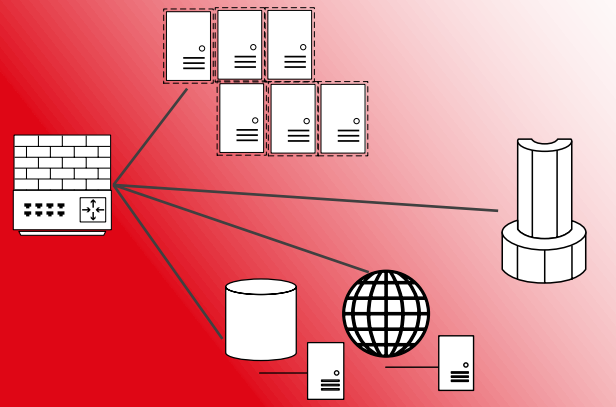


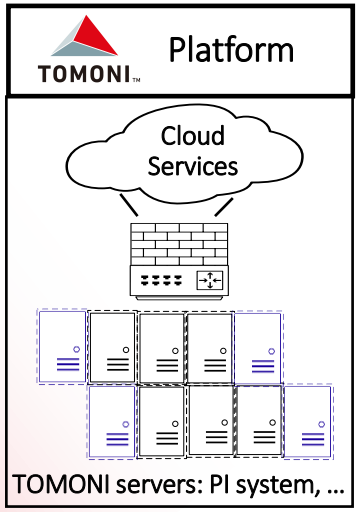
Orbiting Services

Fraunhofer & STEAG active research

Provided by STEAG

TOMONI Servers, Services, & Cloud



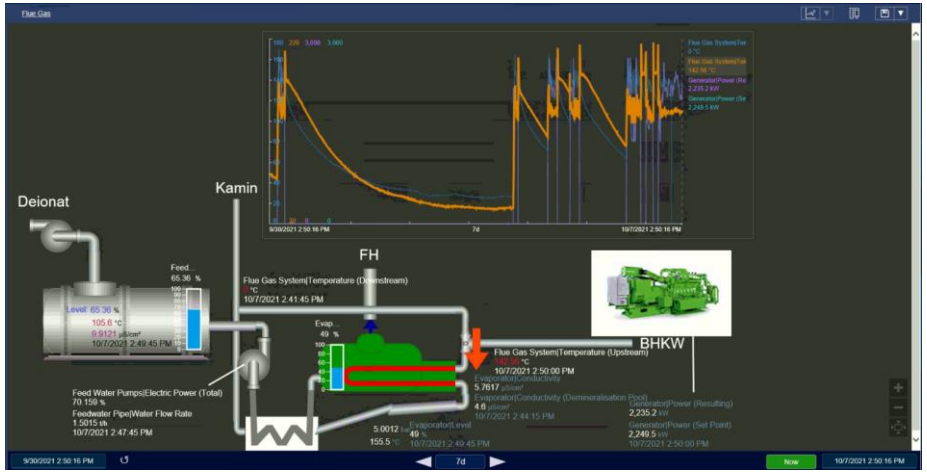


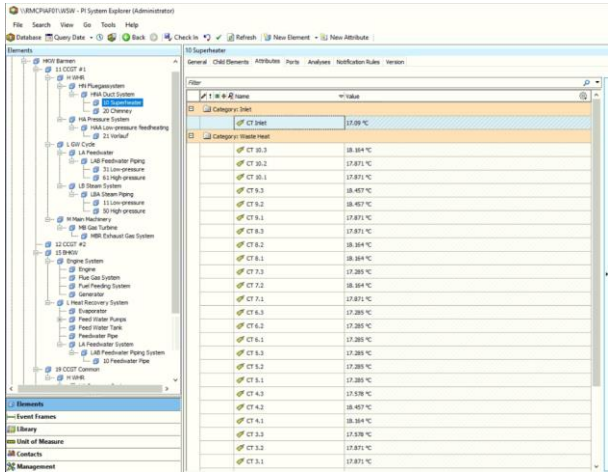
*or other physical models

EU Development

Plant Mirror – Signal Mapping, Modeling & Dashboards

- Total Plant Monitoring (TPM) Approach
- Variety of Plants: CCGT, BESS, Waste to Energy, SOFC, Electrolyzers, Heatpumps, Industrial Power Plant Solutions, …
- Signal Mapping -> Tags, Elements, Templates
- Analysis Models, Dashboards, Trends





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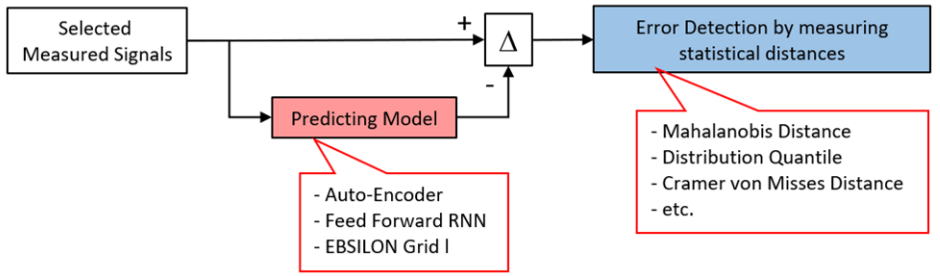
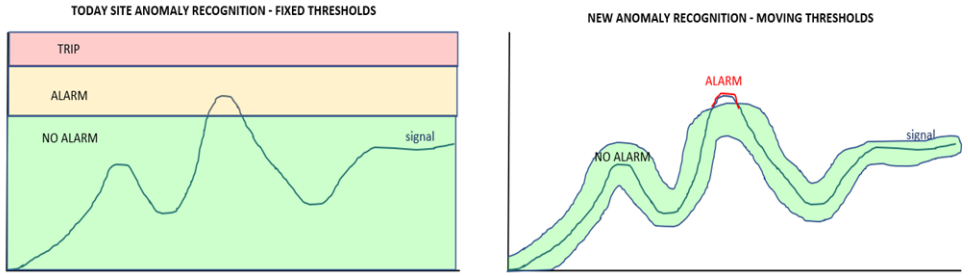
EU Development

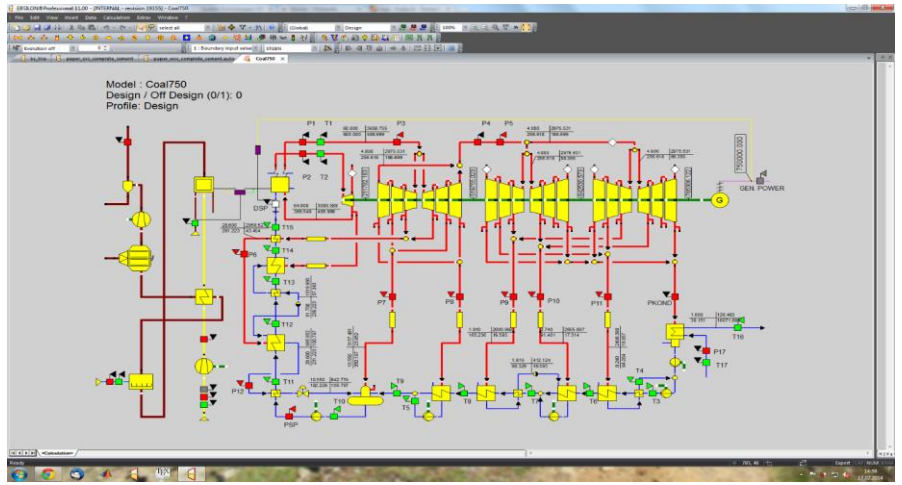
Early Warning – Anomaly Detection (AD) and Root Cause Analysis (RCA)

- Web Applications and Services built on a Service Oriented Architecture (SOA)
- “Plug-In” mechanism to support different models for AD and RCA
- Model development based on historical data as well as on simulated data
- Using physical models and artificial neural networks (ANN)
- Solutions developed via the government-funded R&D project “Digitales Service Center” (NRW funded project EFO 0010 A)

This is done under the NRW funded project EFO 0010 A under progress.nrw – innovation.







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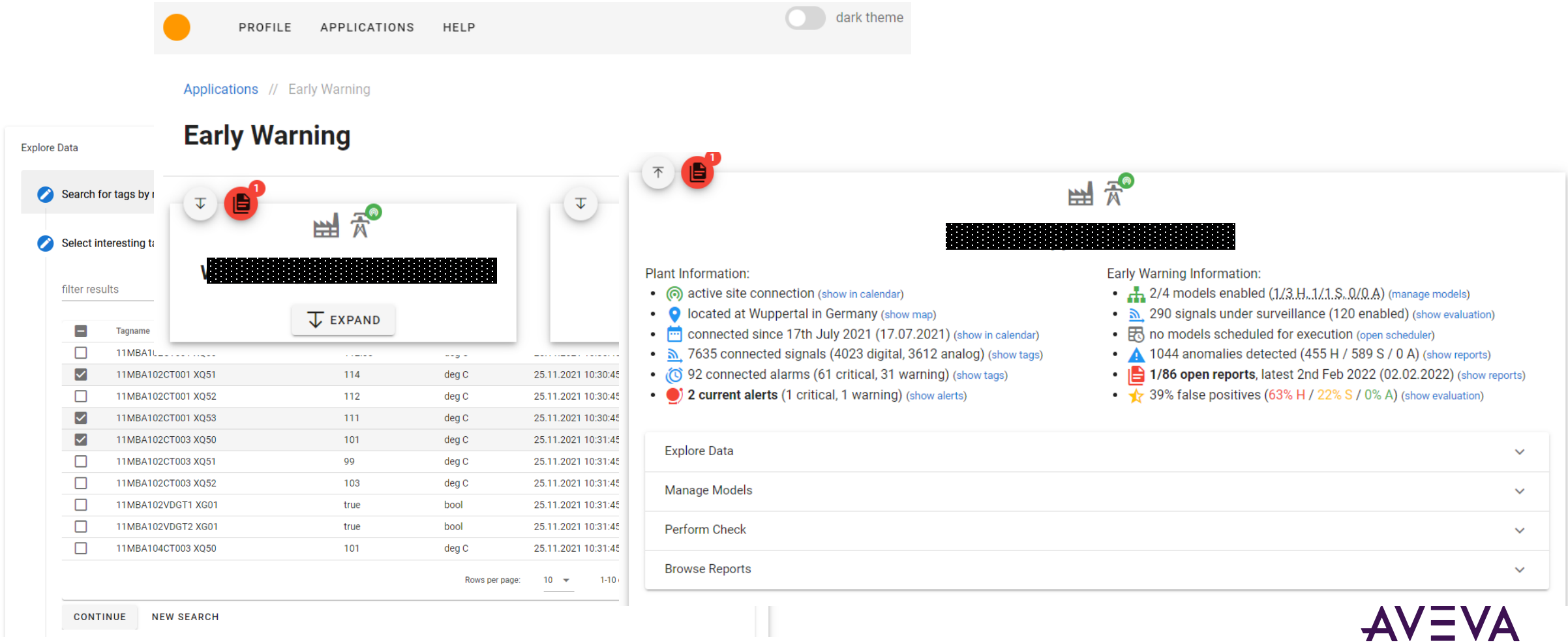
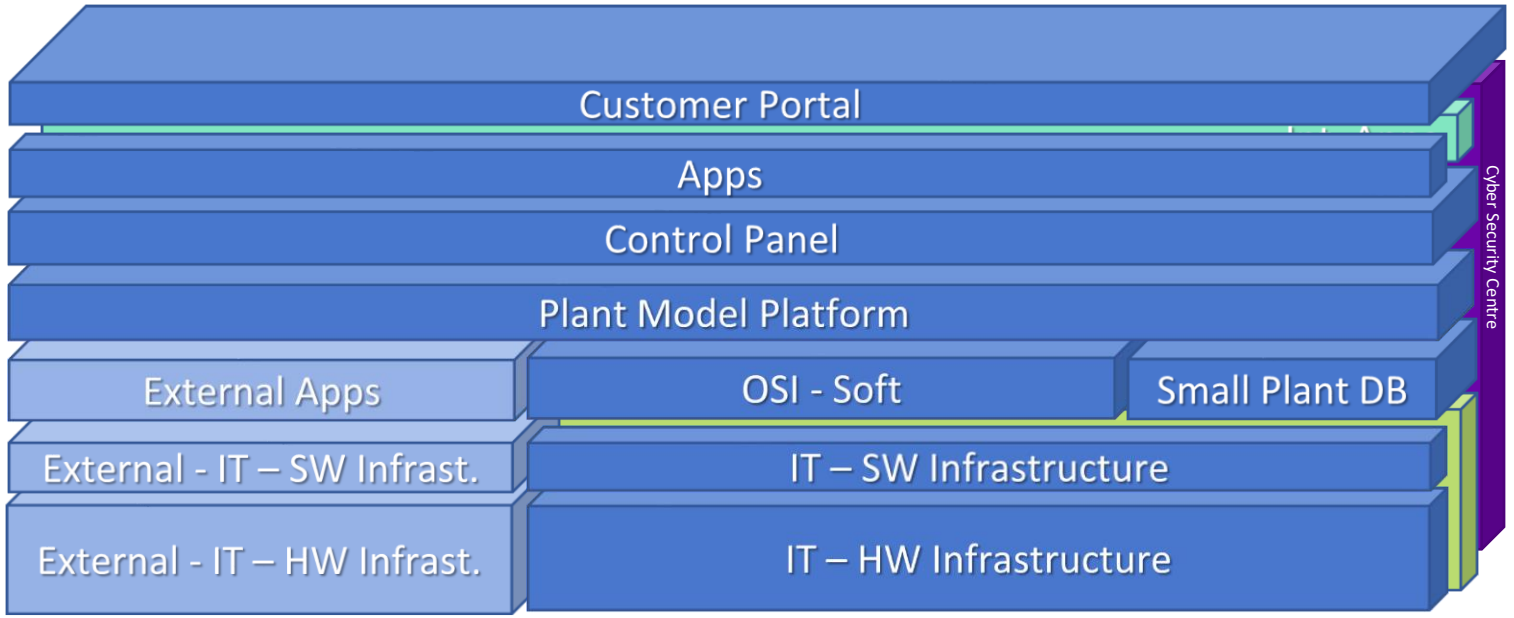
EU Development

Early Warning – Prototype Application



EU Development

Advanced Analysis Platform Development and Web Portal Integration



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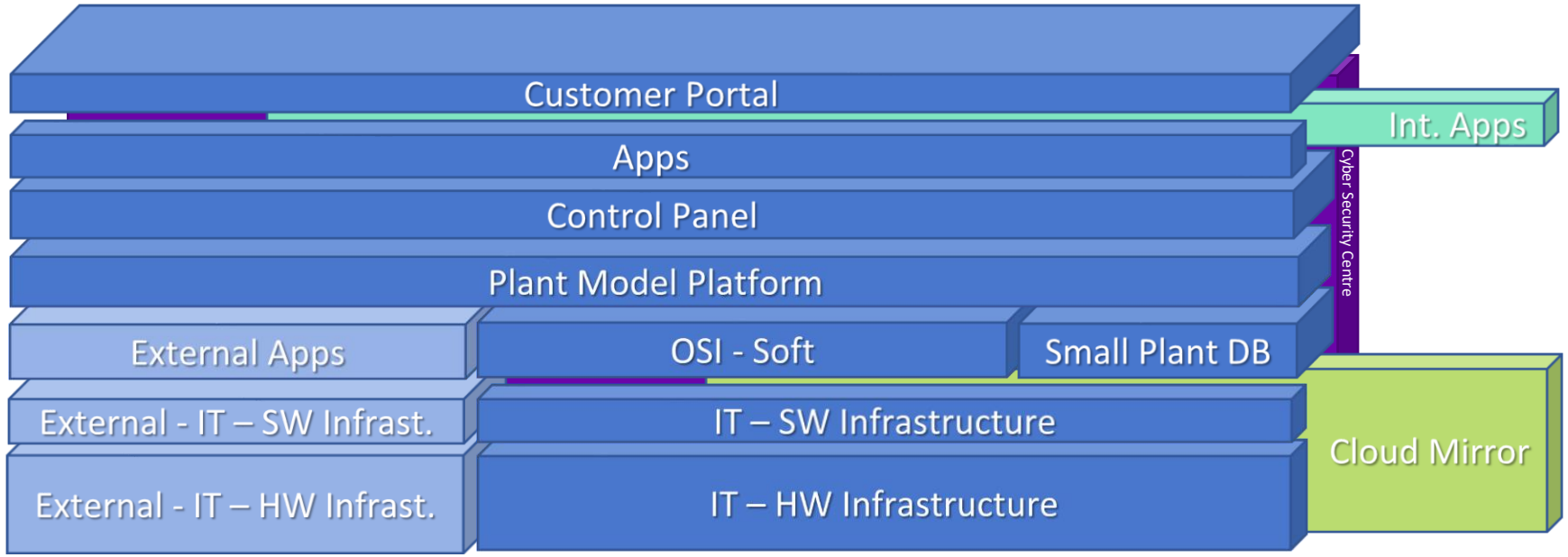

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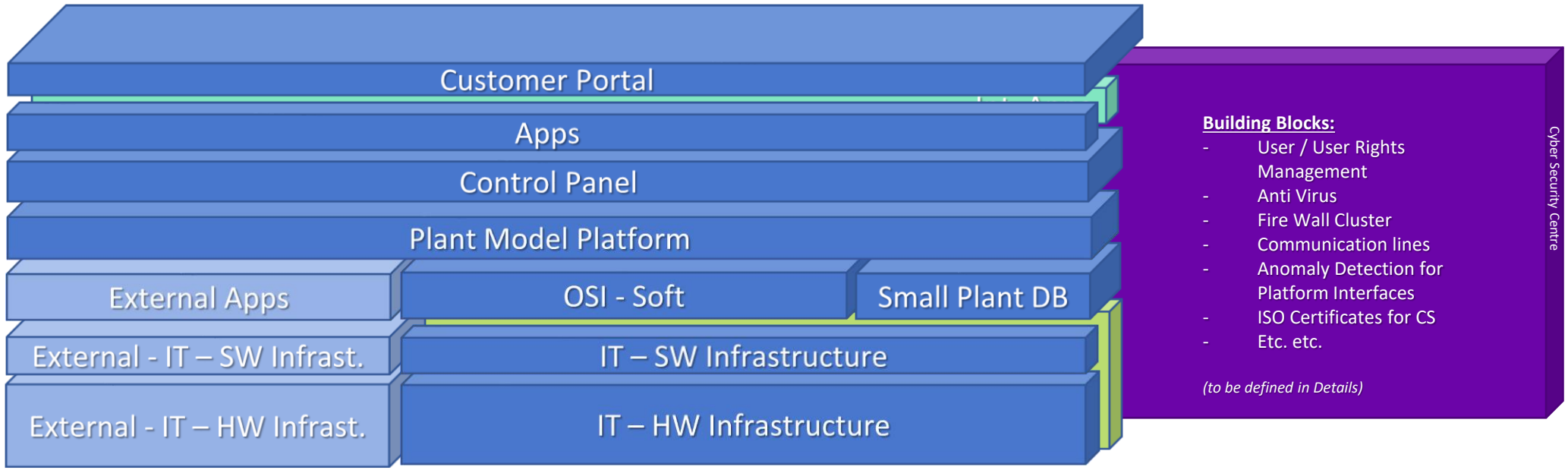
Advanced Analysis Platform Development and Web Portal Integration



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Questions?

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- State your name and company

Please remember to…

Complete the survey!

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