Xentara

EdgeKit

Software-Defined Edge

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SECURITY CLASSIFICATION: CONFIDENTIAL

# Helping you to maintain your business models integrity

"The rising power of IT into Operating Technology threatens existing business models. However, the power of IT shouldn't stay untouched but demands for an Edge-specific & OT-centric approach."
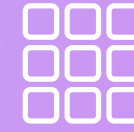
Philipp Kirschenhofer, Co-Founder

Legacy

existing PLC technology providers are sticking to legacy hardware concepts
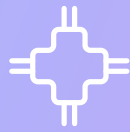
Cloud

if modernization is approached at all, the Cloud is promising to solve it all – however typical requirements of equipment providers and operators are left out

Customer

total transparency is threatening the machine builder's business model

EdgeKit: A modular, on-premise Machine & Device Operating Environment

No lock-in scenario   Any hardware, any platform, any vendor

Freedom of choice   Swap out building blocks

Extensibility   App-Store powered feature catalogue

Scalability   Scales from single core to multi-core systems

Ease-of-use   Single file configuration and low-code editors

Real-time by design   Programmed using the latest C++ features

No-cloud approach   All services, skills, modules and apps are running locally

Cloud support   Cloud connectivity can be fully configured and controlled by OEM if desired

Smart Migration & Connectivity   Build on existing I/O and field-buses as well as existing Control Logic

6 easy steps towards your modern Edge architecture

1 Start your Xentara project and specify system cycle time in µs and Xentara will maintain real-time

2 Connect your I/O

3 Build/Import your control logic & design your HMI

4 Connect Analytics & Train your AI/ML

5 Add additional value & converge with IT/Cloud

6 Ship your system on any hardware & software platform

```
"@Track": {
  "id": "RealTime Cycle",
  "uuid": "76d2ec6e-7e38-
  "threadCount": 1,
  "timers": [
    {
      "referenceTime": 0,
      "period": 100,
```
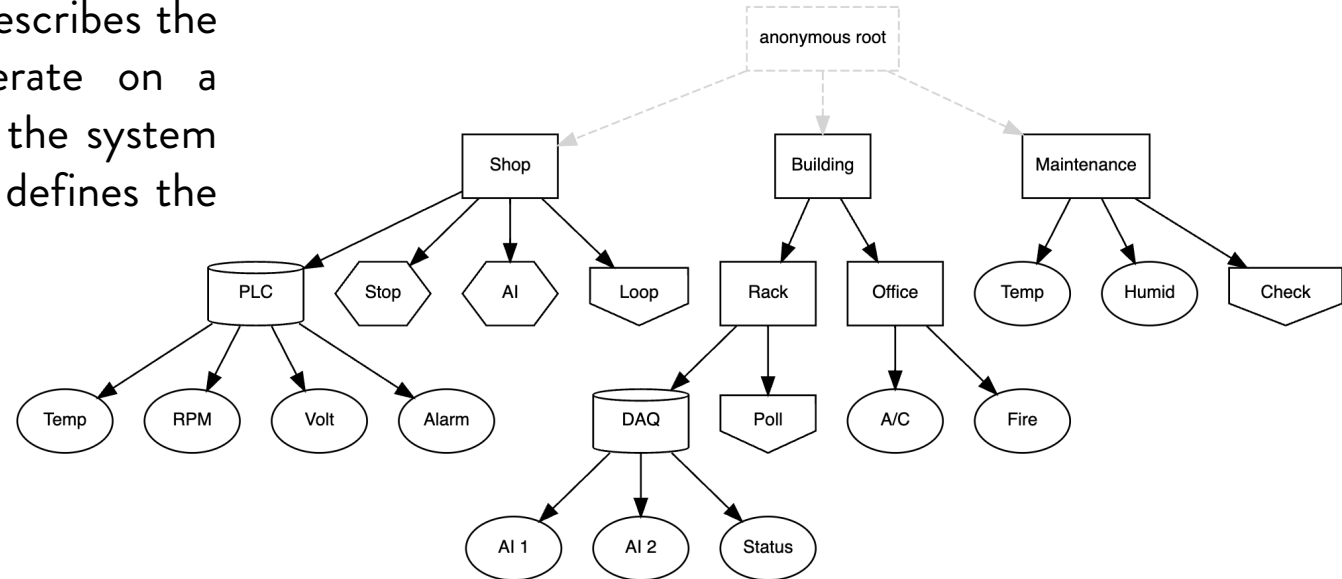
Start your Xentara project and specify system cycle time in µs and Xentara will maintain real-time

The Xentara model is a semantic model that describes the specific way in which Xentara should operate on a particular system. It contains a description of the system components Xentara should interact with and defines the functionality Xentara will provide.


```
"@Track": {
  "id": "RealTime Cycle",
  "uuid": "76d2ec6e-7e38-
  "threadCount": 1,
  "timers": [
    {
      "referenceTime": 0,
      "period": 100,
```

All Xentara elements, like data points, I/O components, and microservices are organized in a tree structure. At the root of the tree structure is an anonymous root node that represents the model. Each element in the tree (except the anonymous root node) has an ID.

Connect your I/O

Fieldbuses, Interfaces and I/O can be configured in seconds either directly in json-Format or using Xentara Workbench

```json
{
    "$schema": "https://docs.xentara.io/xentara/schema-xentara-model.json",
    "children": [
        {
            "@Group": {
                "id": "Hardware",
                "uuid": "59fa54e8-666d-4c54-8120-01f7ae3e8648",
                "children": [
                    {
                        "@IOComponent.CoE.Bus": {
                            "id": "EtherCAT Bus",
                            "uuid": "ba5f4bc4-3903-453b-a1b1-4a14890a11e8",

                            "interface": "enp8s0",
                            "children": [
                                {
                                    "@IOComponent.CoE.Device": {
                                        "id": "EK1100",
                                        "uuid": "32b06df6-4052-410d-9e3a-dc3fdb2ff7ad",

                                        "position": 1,
                                        "slotIndexIncrement": 1,
                                        "children": [
                                        ]
                                    }
                                },
                                {
                                    "@IOComponent.CoE.Device": {
                                        "id": "EL3104",
                                        "uuid": "b5a7529f-4089-4cd0-bd11-ce96866ed60f",

                                        "position": 2,
                                        "slotIndexIncrement": 1,
                                        "children": [
                                            {
                                                "@IO.CoE.Entry": {
                                                    "id": "Input 1",
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```
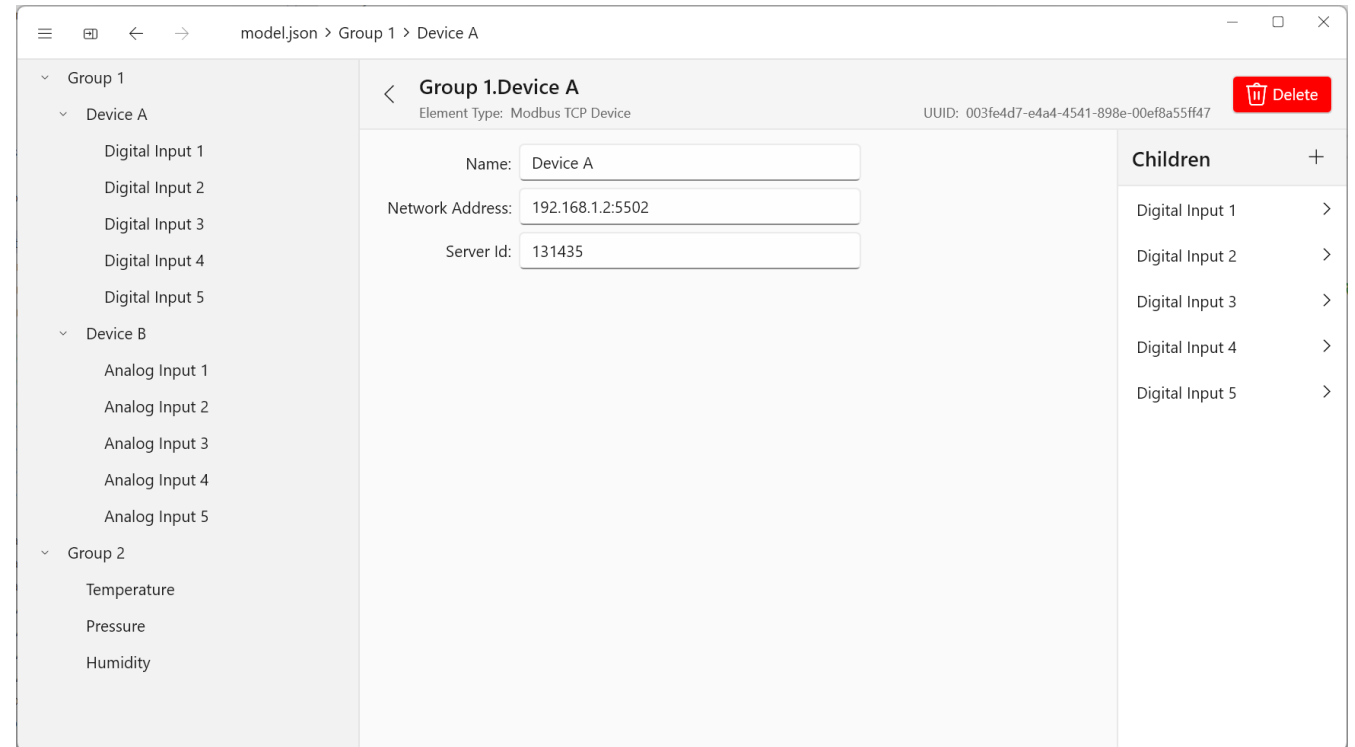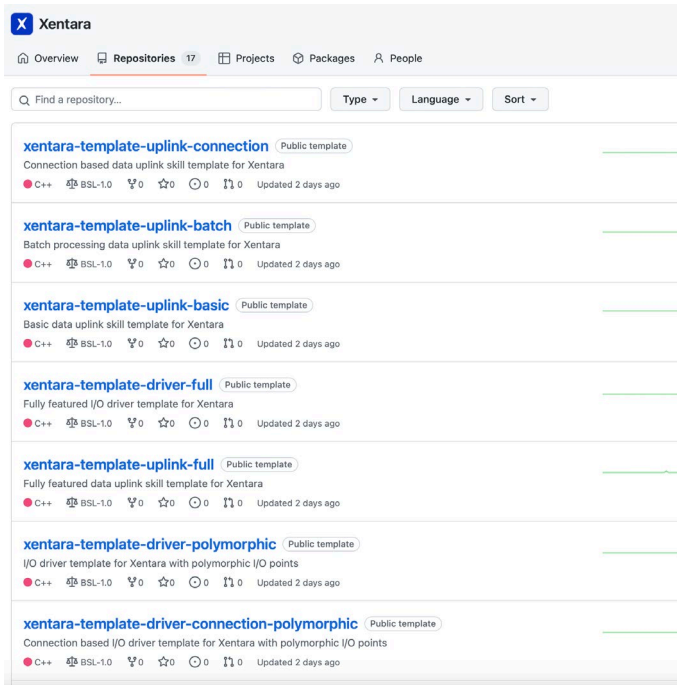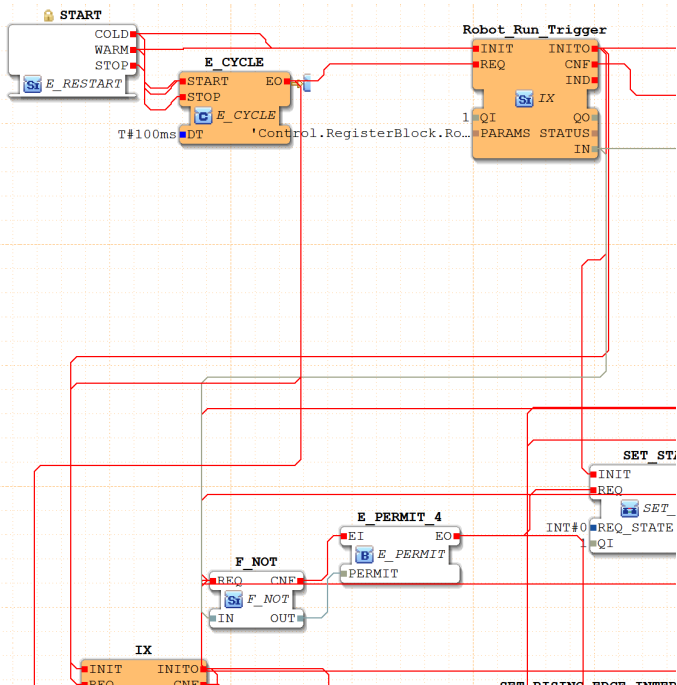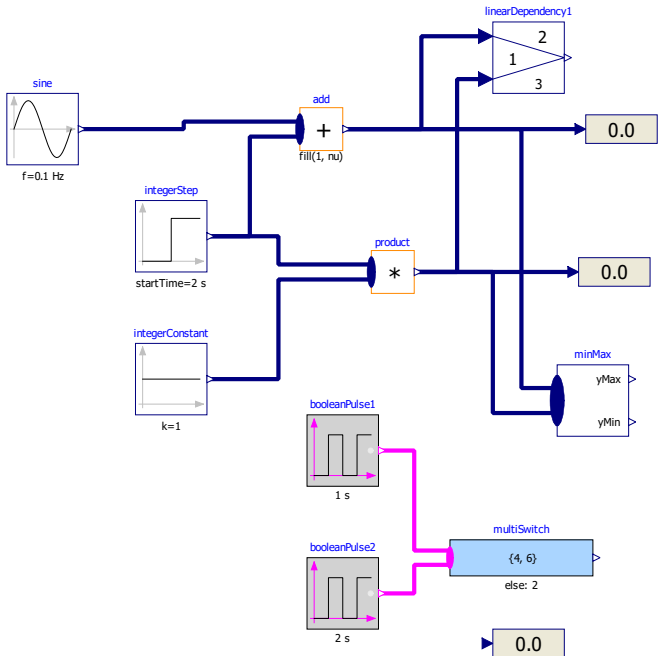
Xentara Workbench

Existing C/C++ Code can be imported into Xentara Skills using one of our 13 public templates on GitHub.

Logic can also be modeled in accordance with IEC 61499 using Eclipse Foundation's 4diac.

Logic can also be modeled in accordance with the FMI standard using one of many tools such as Matlab/Simulink
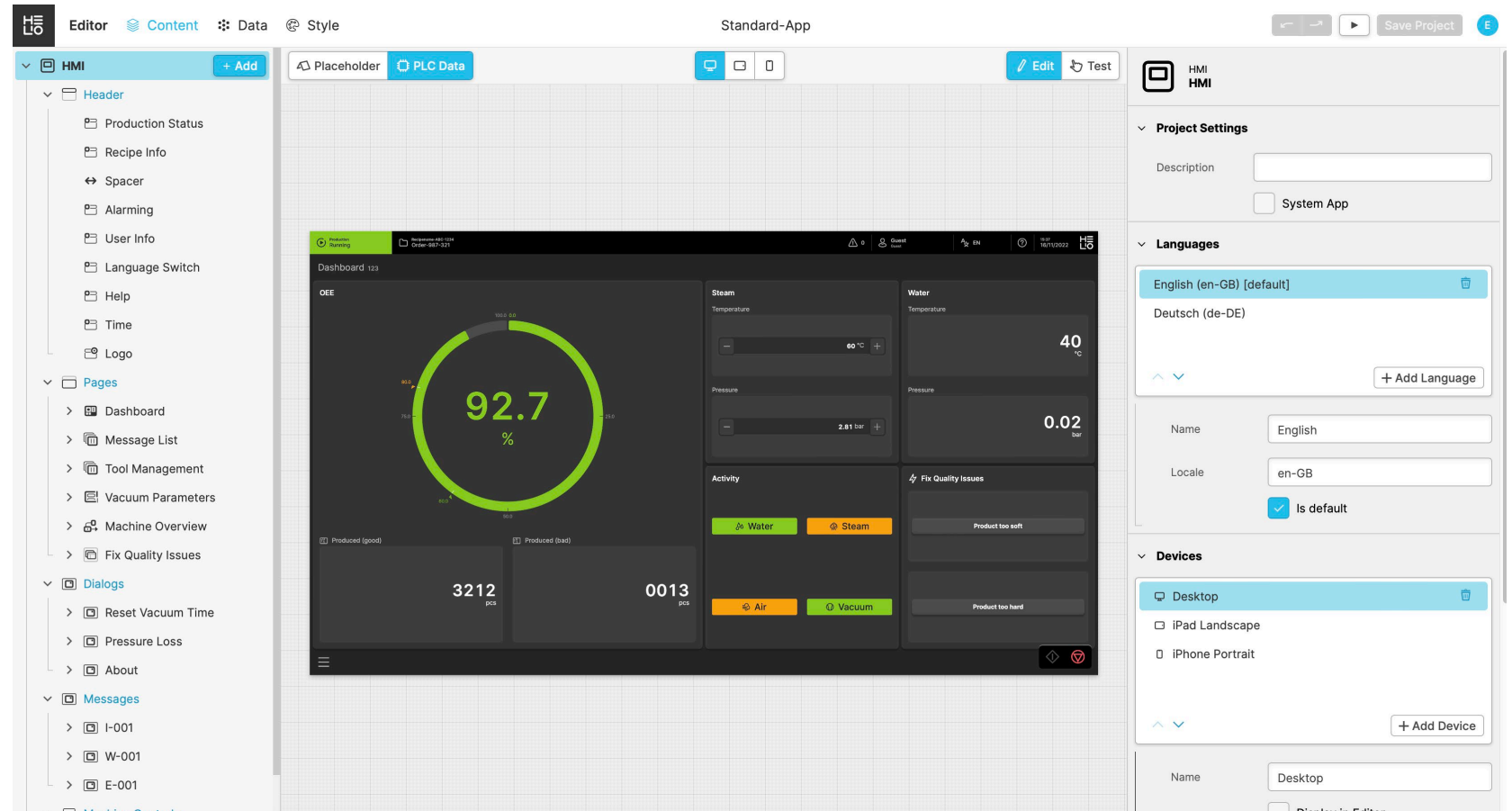
Build/Import your control logic & design your HMI

HMI can be realized using the
Helio React Front- and Backend

Connect Analytics & Train your AI/ML

Integrate trained PyTorch models directly into the Xentara runtime

Or start interacting with your data

iOS · {REST} · HULFT · Node-RED · MRstudios · NIMMSTA

Use our iOS App Framework to interact with Xentara or implement Augmented/Virtual/Mixed Reality using MRstudios capabilities for a fully immersed User Experience.
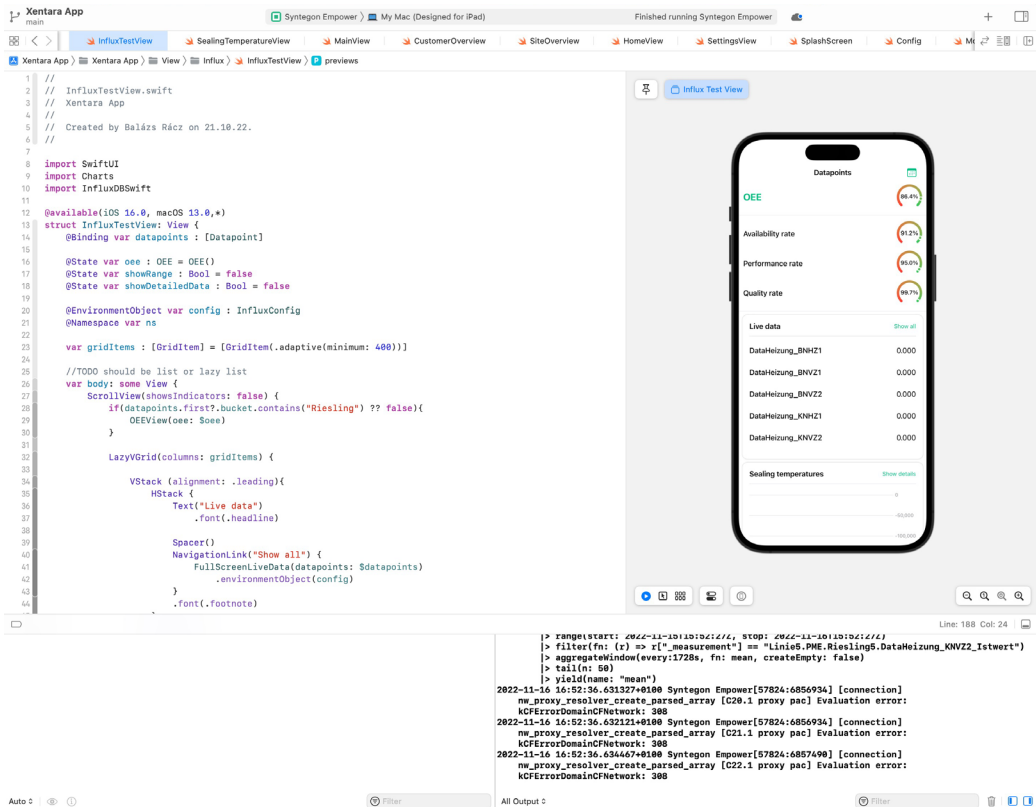
Ship your system on any hardware & software platform

Broad selection of hardware partners:

Pick your entry point!

X
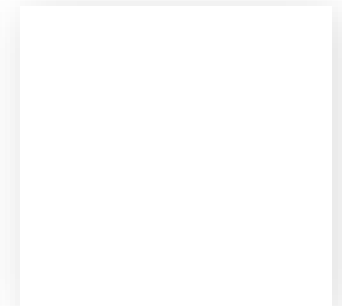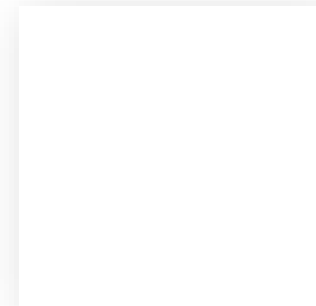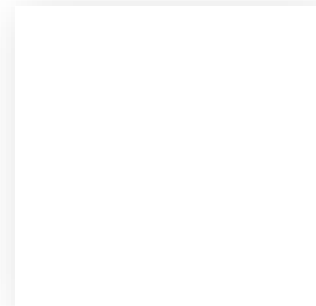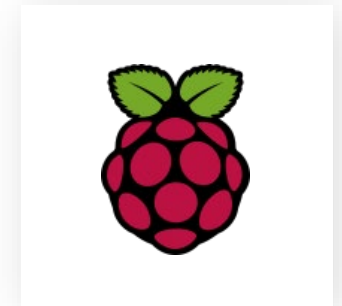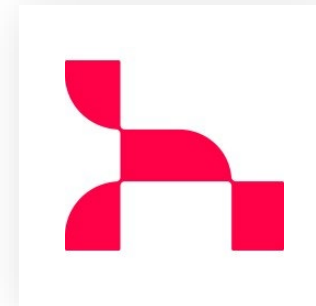
Smart Connectivity Layer

1

Data Recording

Smart Sensors & Sensor Network

Smart Actuators

Smart Tools & Operators Assistance

M2M Communication

Data to Information Layer

2

Data Processing

OEE Monitoring

Resource & Condition Monitoring

Remote Maintenance & Assistance Systems

Remote Visualization & HMI

Smart Machine Layer

3

Machine Learning enhanced Soft-PLC

Robotic Process Automation (RPA)

Resource Optimization

Predictive Maintenance

Digital Twin Enhancement

Pick your entry point!

Smart Automation Layer

4

Self-optimizing Machine

Confluent AI

Plug and Outcome Integration & Machine Configuration

Preemptive Maintenance

Smart Edge Layer

5

self-configure for resilience

self-adjust for variation

self-optimize for disturbance

Integrated Simulation & Synthesis

Smart Industry Convergence Layer

6

Self-enhancing Supply Chain

Collaborative Diagnostics, Modeling and Decision Making

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Group References & Case Studies

Case Study available
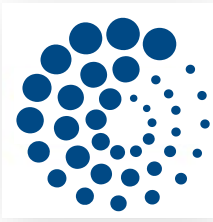
Case Study: Systemair
Fully Integrated ARM-based Edge-Control-System

24k licenses p.a.

10yr lifecycle

Residential

CUSTOMER

Systemair is a global, publicly-traded Swedish enterprise developing and marketing industrial and consumer HVAC systems.

SITUATION

Due to semiconductor shortage and customer demands for modern and AI-enhanced, Energy/Resource-saving, solutions Systemair implemented Xentara on bespoke Linux-based Hardware to become the centerpiece of every modern HVAC system.

SOLUTION

- Linux-based System Architecture
- Controls realized using Xentara FMU-Skill
- Connect Skills include Apple HomeKit, BACnet, etc.

DELIVERABLES

- 24.000 new licenses issued p.a.

„Modernizing our Control-System and becoming Hardware-independent allows us for ultimate competitiveness in a very price-sensitive market."

Klaus Lang, Product Area Director Residential Ventilation

Case Study: Syntegon Smart Machines/Edge Intelligence

FOOD PACKAGING

PHARMACEUTICAL

64.000 MACHINES TO BE RETROFITTED

CUSTOMER

Syntegon (former ⊕ **BOSCH** Packaging Technology) is a leading provider of processing and packaging technology for the food & pharmaceutical industries. Syntegon employs > 6,100 people at 30 locations in > 15 countries, generates a total revenue of €1.3 Bn and has > 64,000 machines in the field.

SITUATION

Due to general market & specific customer demand, Syntegon is urged to make their equipment "industry 4.0-ready" (e.g., visualizing data out of existing PLC controls, introducing Machine Learning for process quality & efficiency control)

SOLUTION

Xentara as central platform for data acquisition (Schneider PLC, Modbus protocol), for data conversion and to integrate data visualization/analysis tools (Kibana)

DELIVERABLES

- E2E demonstrator (data acquisition, conversion, visualization, analytics, augmented reality)
- Retrofit packages for machines deployed at customer locations
- Engineering of "next gen" (Xentara-native) machine & control platform
- Xentara iOS App including AR / VR functionality
- Anomaly detection including dashboards
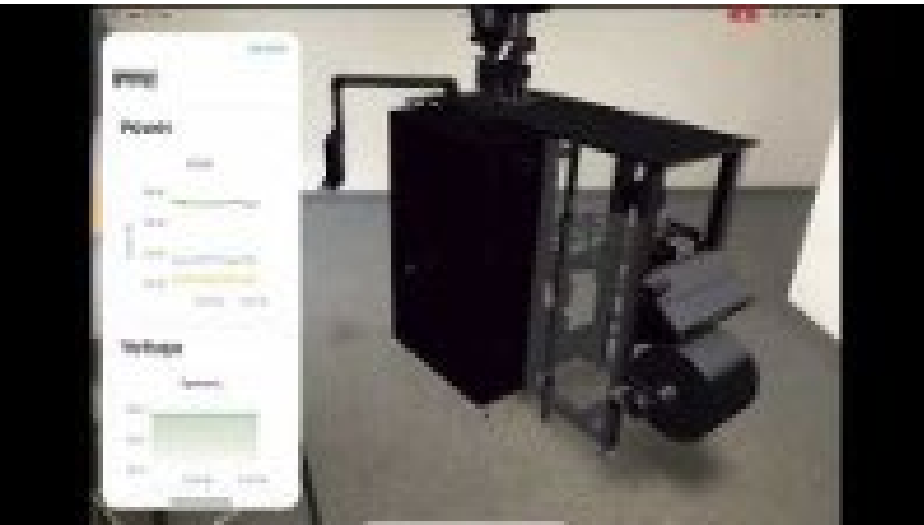
„Industry 4.0 is now reaching shopfloors. We need a scalable solution to turn real-time data into intelligence, making our machines truly smart."

Herbert Merz, VP Food Packaging

Case Study: Justech
AI-driven Assembly Cell

CPE

CALIFORNIA

CUSTOMER

Justech Precision Industry Co., Ltd., is a provider of custom-made manufacturing equipment towards the global Smartphone-industry with a particular focus on the North-American market; 12.000 cells deployed to date, 2.500 to be shipped in 2022.

SITUATION

Justech's most important customer has explicitly asked for a "smart assembly cell", replacing legacy technology with "modern" hard- and software to enable AI-driven production optimization.

SOLUTION

☒ Replacement of legacy Omron PLCs with ARM-based HW to lower unit cost by 30% and 50 % improved time-to-market

☒ Xentara as real-time operating platform to abstract data and empower SoftPLC

☒ Replacement of Windows with customer-specific Unix-based Operating System for visualization and analytics

☒ Ability to offer smart solutions such as visualization, preemptive maintenance, ML/AI-driven quality control

DELIVERABLES

☒ Demonstrator machine (old vs. new) by Aug/Sep 23

☒ Roll-out plan for assembly cell MY24

„We need to enable our machines to optimize themselves constantly in real-time so that we become a true Smart Factory solution provider."

Yuxiang (Shark) Jing, Founder & CEO Justech

Case Study: Guggenberger
Modern Industrial Washing Equipment

German Engineered

Industrial

CUSTOMER

[x] Guggenberger Reinigungstechnik GmbH & Co. KG is a German medium-sized manufacturer of industrial cleaning machines founded in 1991 that primarily serves the pharmaceutical, food and automotive sectors.

SITUATION

[x] Guggenberger was looking to modernize its products, replacing costly PLCs with more affordable software-based controls and offering data driven business models ("pay-per-wash") to customers.

SOLUTION

[x] Replacement of legacy PLCs with affordable general computing hardware (cost reduction 25-30% per unit)

[x] Xentara as real-time operating platform to abstract data and enable Soft-PLC

[x] Xentara App for data visualization and machine control

[x] AI based data analytics to optimize washing cycles and reduce resource usage (energy, water, detergents) for more ecological cleaning solutions

[x] Ability to offer usage data analytics to customers, schedule predictive maintenance based on condition monitoring, and implement usage-based business models like "pay-per-wash", allowing customers more flexibility and liquidity

DELIVERABLES

[x] Xentara Connect Skill for customer specific hardware (delivered <1 month after initial agreement)

[x] Complete Machine Logic mirrored in software and Analytics Package in H2/2022
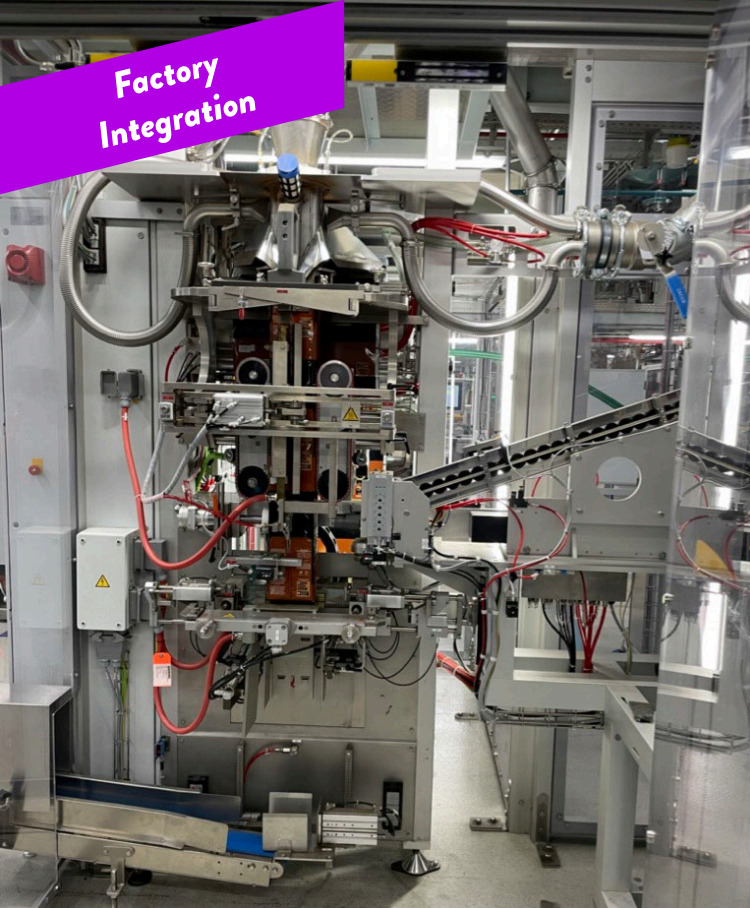
„Customer demands have changed. They want fast data analytics and new usage based business models. We can't deliver that with old PLC technology ."

Roland Maucher, Managing Director

Case Study: Tchibo
Smart Production / Total Shopfloor Convergence

Factory Integration

CUSTOMER

Tchibo is a German chain of coffee retailers and cafés. With over 1,000 shops, Tchibo is one of Germany's largest retail chains.

SITUATION

Impressed by the retrofit embedded ocean provided for third party coffee packing machines that are in use at Tchibo, the company approved a pilot program to employ the Xentara platform as the basis for shop floor connectivity and factory integration.

SOLUTION

Xentara to be used for shop floor data aggregation and preprocessing before delivering to a time series database and AI / ML instances, integration with customer MES / ERP systems, and as real-time back channel from analytics to machine controls

DELIVERABLES

- Paid consulting program
- Live dashboards for machine condition monitoring
- Retrofits of existing machines
- Connect Skills for customer specific controls and "northbound" connections

„Digitalization goes beyond the shopfloor. Data monitoring isn't enough; we need to connect the machine level directly with business intelligence."

Case Study: AVL
Real-Time Virtual-Test-Bed HiL-System

SAM 50MEUR

LAUNCH CUSTOMER

With more than 11.500 employees, AVL List GmbH is the world's largest independent engineering company for development, simulation and testing of all types of powertrain systems.

SITUATION

AVL is building a long-term strategy for Intelligent Test and Real Time Data Exploitation. A reliable and high performant platform is needed to execute this strategy.

SOLUTION

- Assessment of current Data Acquisition and Evaluation Systems
- Consultation on Real Time OSes and Real Time Data Flow Methods
- Realization of Demonstrator System for evaluation purposes

DELIVERABLES

- Xentara API description
- On-site tech demonstration for benchmarking real-time capability (data transfer speed, data model synchronization performance)
- Customer-specific PoC to integrate selected data sources/interfaces as well as AVL-specific testing tools

„Xentara," for the first time, allows us to access thousands of data points from distributed systems under test in real-time."

Dr. Wolfgang Puntigam, Global Business Unit Head

Case Study: Continental
KIFaBS (KI-based factory OS)

Research Program

3 MEUR VALUE

Bavarian Ministry funded

CUSTOMER

Continental is the world's second largest Automotive supplier, employing more than 236.000 employees at 561 sites in 58 countries. The specific plant in scope is Regensburg, where Continental's Interior and Chassis & Safety group performs research, engineering and production work, employing 8.000 employees.

SITUATION

- Continental's efforts to introduce Industry 4.0 concepts are severely slowed down by fragmentation and complexity of existing HW / SW / application landscapes.
- A "blueprint" is required to guide further Smart Factory concepts & roll-outs.

SOLUTION

- Regensburg plant chosen as "showcase factory" to test and implement a state-of-the-art KI-driven factory operating system
- Formation of research & project consortium and application at Bavarian's Ministry of Economics to secure funding

DELIVERABLES

- Grant application including description of technical concept and definition of work packages by consortium members
- Implementation, publication and commercialization proposal

"We urgently need an operating platform for all of our 430 factories and engineering sites."

Dr.-Ing. Hüseyin Erdogan, Head of Technology & University projects

Case Study: Saint Jean Industries Brownfield Quality Improvement

Automotive

10 global factories

CUSTOMER

▪ Saint Jean Industries is a French turnkey product supplier providing aluminum parts for automotive and aeronautics customers.

SITUATION

▪ Due to increasing market pressure and growing customer demands, SJI wanted to improve their quality control processes. Former attempts at acquiring QC data from existing PLC controls had failed.

SOLUTION

▪ Analysis of current production and QA processes

▪ Identification of existing interfaces and data streams

▪ Consultation on data-based QA Implementation

DELIVERABLES

▪ Xentara core

▪ Profibus Interface for Xentara-based Edge Controllers

▪ Machine Learning Interface for local QA-Analysis

„We never thought it would be possible to so easily generate and semantically process data from our existing production facilities and machines."

Emile di Serio, President

Case Study: KEWAZO
Robotic Control Unit

German Startup

11 Startup and Industry Awards won

CUSTOMER

KEWAZO offers intelligent robotic hoists for construction and industrial sites. We improve safety, welfare, and profitability in construction.

SITUATION

Scaffolding is one of the world's most difficult and dangerous manual construction jobs. With the help of Automation and AI, KEWAZO overtakes the dangerous logistics processes to deliver maximum efficiency.

SOLUTION

- Xentara as unified and highly reliable platform as a software-based central control unit for robotics and motion control
- Development environment for independent enhancement of Skills

DELIVERABLES

- Paid consulting and enabling program, Onboarding Workshop
- Xentara License Package

„Controlling robots in such a dangerous job means keeping track of a lot of data. Xentara's real-time core helps us deliver safety and security."

Eirini Psallida, Co-Founder / Electrical Engineering

Management Team

Philipp Kirschenhofer [in]
Co-Founder & Managing Director
Sales, Customer Success & Tech Operations

- 16+ yrs High-Tech Consulting in New Product Introduction, Supply Chain and Production Process Troubleshooting
- 12+ yrs Entrepreneurship
  - Consulting (KFS GROUP GmbH)
  - Software (Enforce Quality GmbH, liquidated)
  - Electronic Components (Holitech Europe GmbH, exit, sold)
- 4 yrs China & 2 yrs North America
- Automotive & Communication Industry

Michael Schwarz [in]
Co-Founder & Managing Director
Strategy, Finance, People

- 12+ yrs Top Mmgt Consulting in Innovation, Sales, Market Entry, BPR
- 12+ yrs Director in Networking, Communication & Collaboration
- 5+ yrs Entrepreneurship
  - Smart City (exit, sold)
  - IP management
- 2 yrs North America
- Automotive, Aerospace, Industrials, High Tech
- Angel Investor & Advisor to start-ups in IoT, B2B & Sports

Robert Schachner [in]
Co-Founder & CTO
Research, Tech

- 29+ yrs Smart Factory Solutions and Embedded Computing Applications, over 300 projects executed
- 26+ yrs Entrepreneurship
  - Software (exit, sold)
- Lecturer at University of Applied Sciences Rosenheim "Methods of Real-Time Communication"
- Member of VDI standardization committee VDI/VDE 2657 (Middleware in Automation Technology)