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MindSphere – Open IIoT operating system for critical infrastructure

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FINNISH INDUSTRIAL INTERNET FORUM

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- **MindSphere Industrial IoT operating system**
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  - Connectivity and security
  - MindSphere V3.0 on AWS demo
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- **Digitalization use cases from Finland**
  - Value Hacker case studies

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Today

Leading position in Electrification, Automation and Digitalization.

Employees
377,000+

Revenue
€82.9 billion

Net Income[1]
€6.1 billion

Profit margin Ind. Business
11.2%

Key figures as of Oct 2017 **1** Strategic Unit

Siemens has become a major player in digitalization

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24,500+
software engineers

A top 10
global software company

1 million+
connected assets

250+
Digital offerings incl. digital services and industrial applications

Clear focus on digitalization in R&D

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€5.6bn

Estimated R&D spending in Fiscal Year 2018

+40%

R&D spending increase from 2014 to 2017

MindSphere IIoT

MindSphere
The open industrial IoT operating system

Typical IoT Platform layers

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

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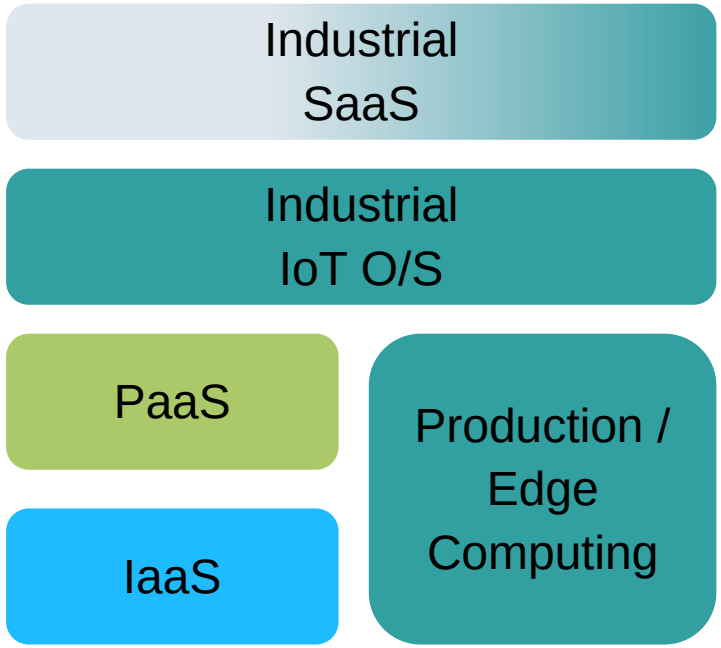
Industrial IoT Operating System



+ Digital Domain Expertise
+ Long Term Investment Protection
+ Edge Management
+ Fleet Management
+ Digital Twin integrated use case
+ No vendor Lock-in

MindSphere – Open cloud based IoT operating system

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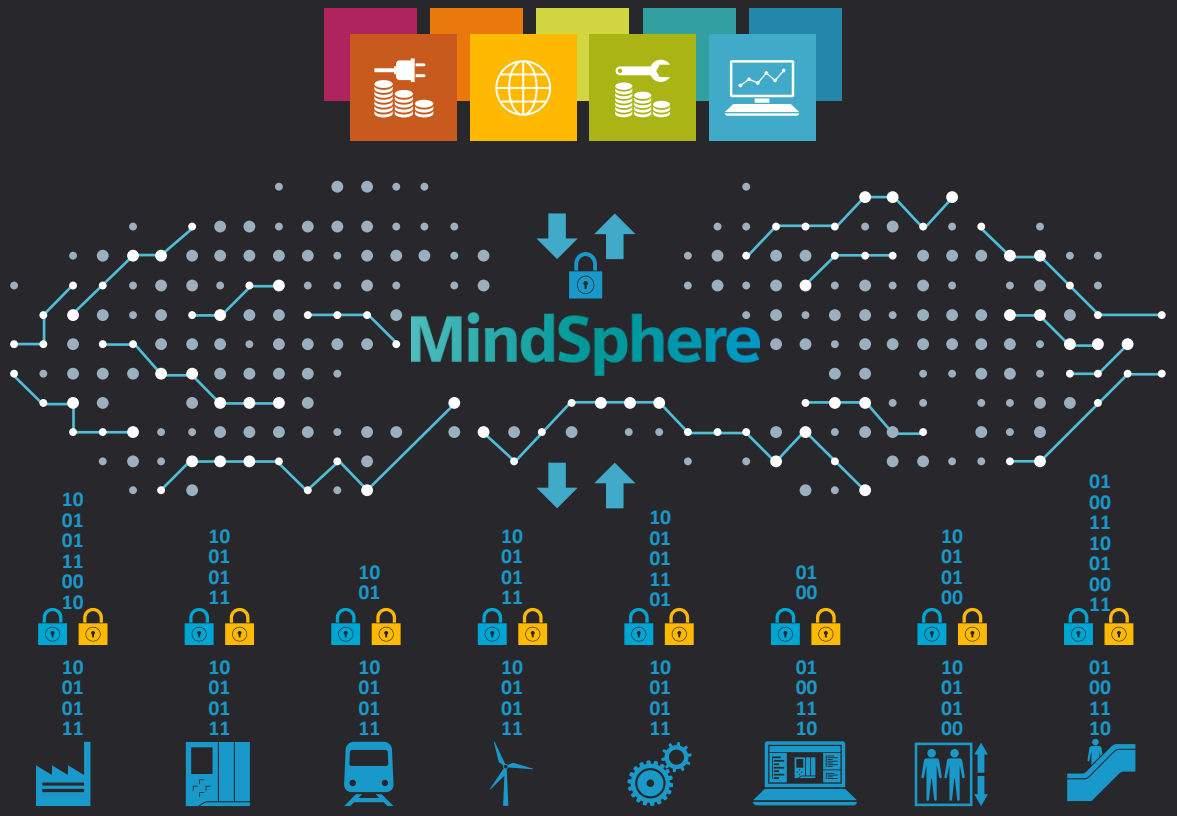

MindApps

- Use apps from Siemens, partners or develop your own
- Gain asset transparency & analytical insights
- Subscription based pricing model

MindSphere

- Open interface for development of customer specific apps
- Integration with 3rd party clouds and -applications
- Various cloud infrastructures: AWS, Azure, Atos, SAP, Alibaba etc. offered as public, private or on-premise

MindConnect

- Open standards for connectivity, e.g., OPC UA
- Edge computing
- Secure and encrypted data communication

Strong open ecosystem emerging around partners

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MindSphere IIoT

Connectivity and security

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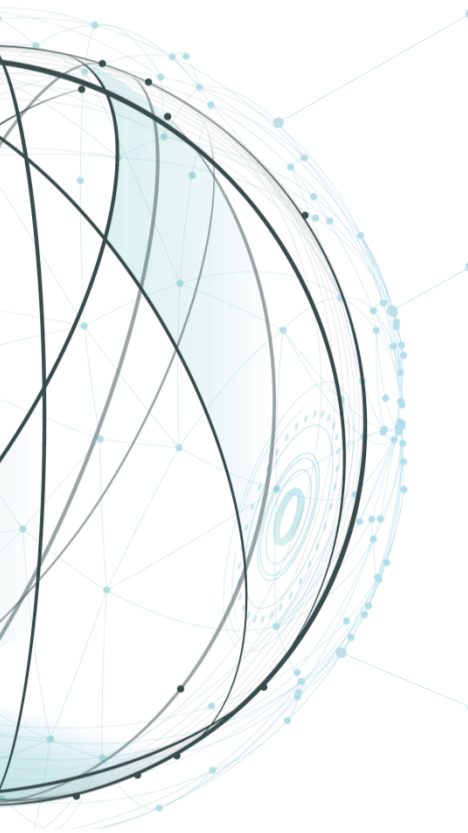

Highly scalable, cost efficient

- **Highly scalable**, **cost efficient** cloud-infrastructure based on **Cloud Foundry**

Highest security standards

- MindConnect Elements based on ICS (Industrial Controls System) Security oriented to industry standard IEC 62443
- Unique MindConnect gateways with hardened and locked Linux based OS
- MindSphere Platform IT Security oriented to industry standard ISO 27001, IEC 62443, BSI
- **Data in rest** is located on SAP datacenters that comply to all required certificates
- **Data in motion** is always at least 256 bit SSL/TLS encrypted

Maximum confidentiality

- **The customer controls these authorization levels and is the owner of this data**
- Siemens acts a data custodian

MindSphere holistic security concept

MindConnect – Easy and integrated connectivity

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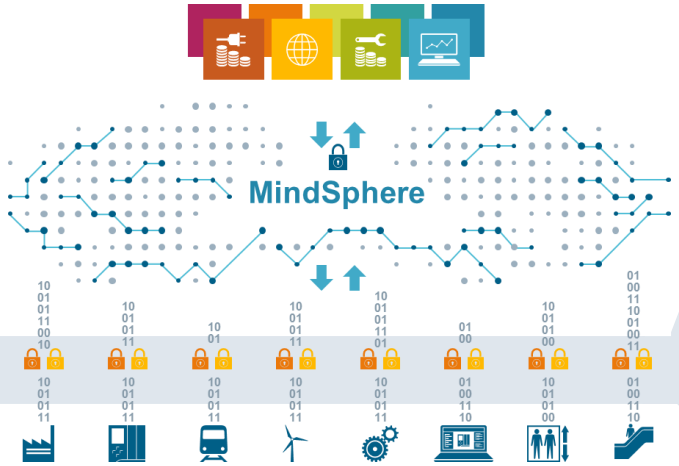

MindConnect Main Characteristics:

- Dedicated IoT Connectors with **MindConnect Nano, MindConnect IoT2040**
- MindConnect **embedded** in standard Siemens industrial products, e.g. SINUMERIK and RUGGEDCOM
- **MindConnect Software, APIs** and **Libraries** for own integration into assets / devices

Key MindSphere Connectivity Suite Features

1 Dedicated **IoT Connectors MindConnect Nano** and **MindConnect IoT2040**

2 MindConnect **embedded Agents** in standard Siemens industrial products

3 **MindConnect Software** for every further product, including 3rd-party

MindConnect SW
Windows / Linux

MindConnect Lib

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STEP 1 CONNECT

Get MindSphere user account, receive and integrate Connector Box into machine / equipment

STEP 2 CONFIGURE

Configure data acquisition, connectivity and Visual Analyzer via MindSphere

STEP 3 GO

Monitor e.g. health status of all assets and drill into details using MindApp Fleet Manager

MindAccess User enables customers to get started quickly

MindSphere IIoT
Offering and selected MindApps

MindSphere Offerings
Designed to grow with your business

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MindAccess IoT Value Plan

Use MindSphere applications based on ingested data – without development experience

Available in S, M, L

- Data ingest & storage
- Productive tenant
- Asset management
- User management
- Report on asset data
- Connect to almost every asset
- Access to MindSphere Store

MindAccess DevOps Plan

MindAccess Developer Plan

Develop applications on a test system

Available in S, M, L

- Cloud Foundry developer space
- Developer test tenant
- Basic APIs, including analytics
- Test asset and user management
- Developer data storage
- Developer cockpit

MindAccess Operator Plan

Operate applications on a productive system and offer via MindSphere Store

Available in S, M, L

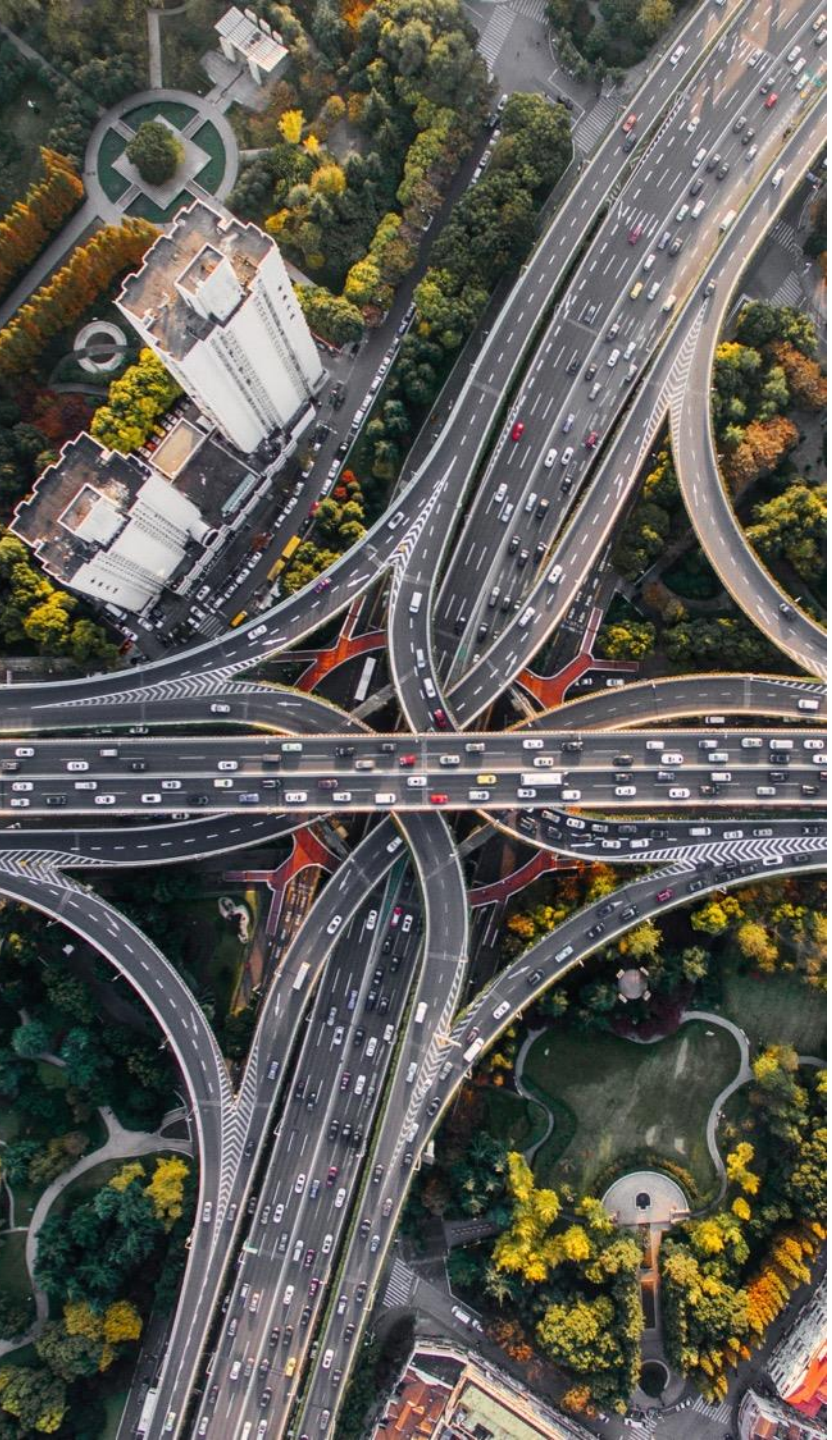
- Cloud Foundry productive space
- Productive tenant
- Basic APIs, including analytics
- Operator cockpit
- Access to MindSphere Store

Additional Offerings

Components	Connectivity	Apps	Upgrades	Services

MindSphere IIoT

Use cases



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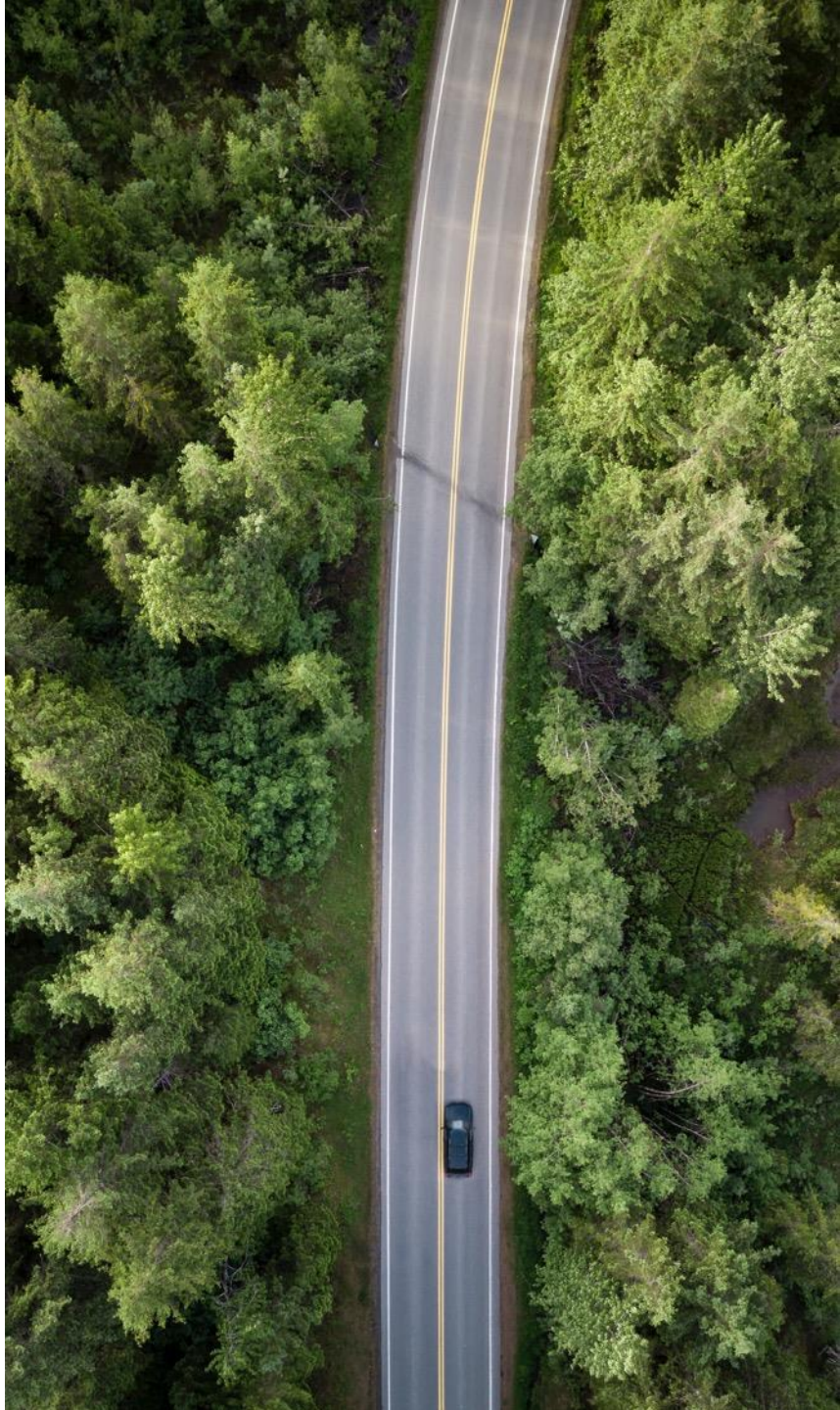
VALUE HACKER.

Creates business value.



From customer strategy to measurable business value

Value Hacker is an agile approach to discover value-add based on digital solutions .

Focus is in co-creation to tailor best solutions and achieve customer buy-in at an early stage.

Value Hacker is based on outcome economy – we succeed when our customers succeed.

Data-driven decision-making is key.

Value Hacker Case Studies
IoT Platform

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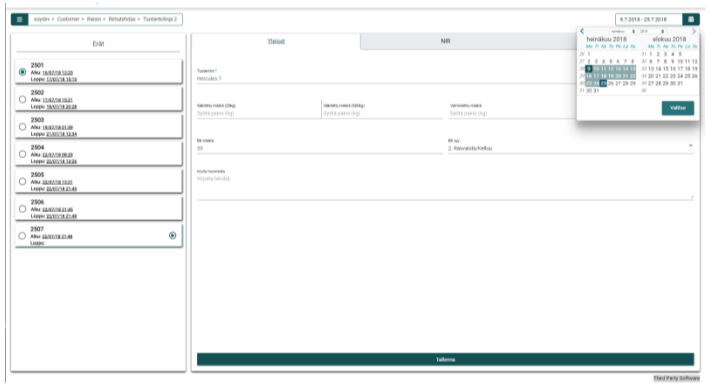

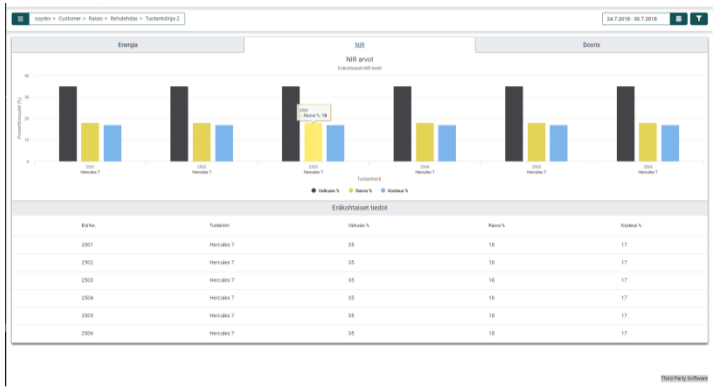

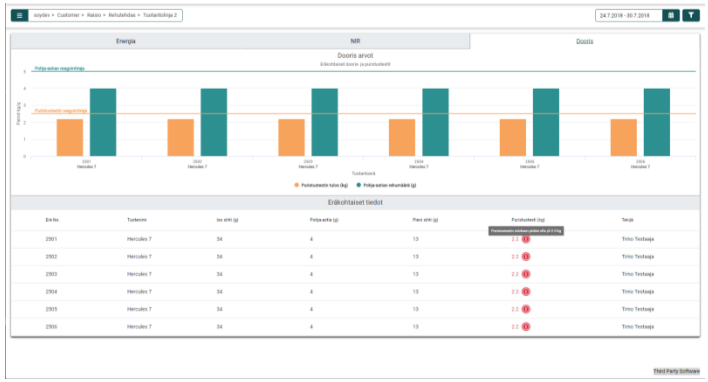

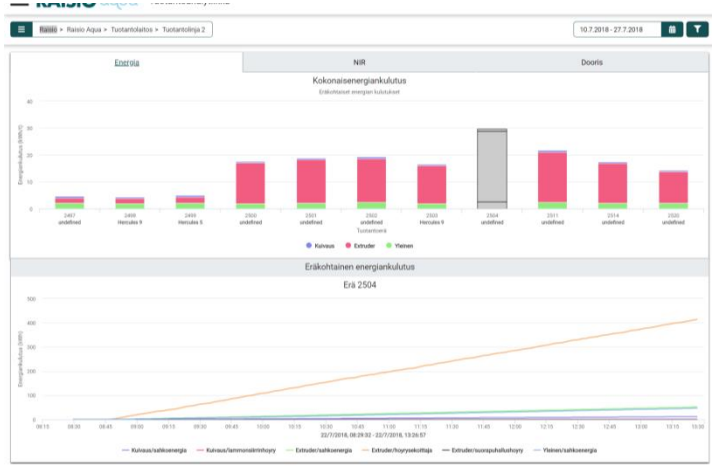

Customer description:

- A producer for agricultural industry

Project description:

- Phase 1: PoC implementation of a common IoT platform as a digital service connecting the feed production to Customer's feeding systems.

Value Proposition:

- Production cost savings (energy etc.)
- New digital service offering (online reporting etc.)
- Phase 2: Further IoT development, Value Hacker consultancy and performance based development ventures.

Value Hacker Case Studies
Virtual Commissioning

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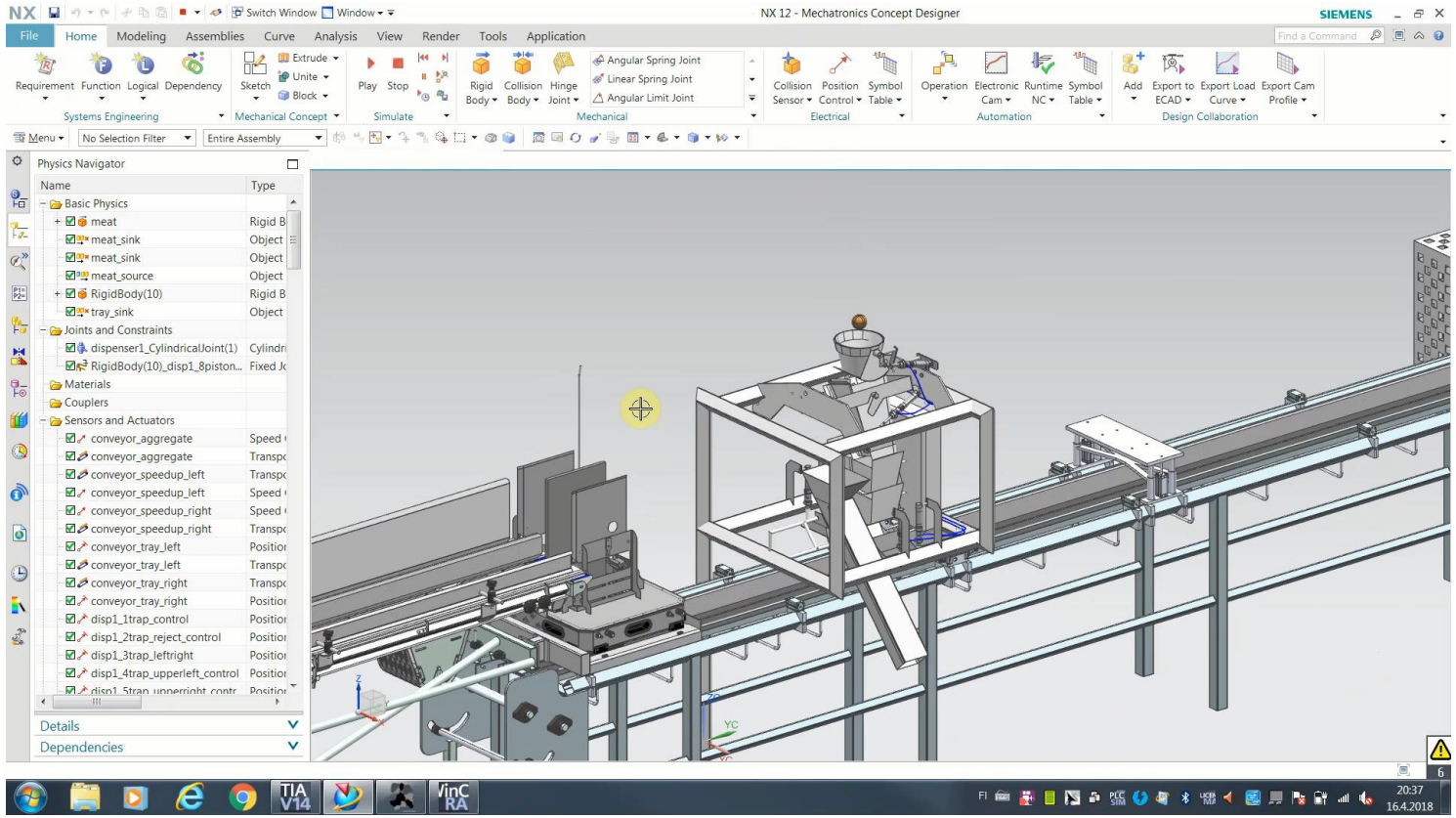

Customer description:

- A large F&B producer in Finland and the Nordic/Baltic countries

Project description:

- Modernization of the Customer's meat packaging line during a 4 day planned shutdown
- Virtual commissioning / validation (MCD)

Value Proposition:

- Tens of errors were found and corrected in the PLC code with MCD before commissioning
- A new, more efficient operating method was validated for the packaging machine
- On-time successful commissioning and further development of closed loop PLM with MindSphere has been started.

Value Hacker Case Studies
Predictive Maintenance

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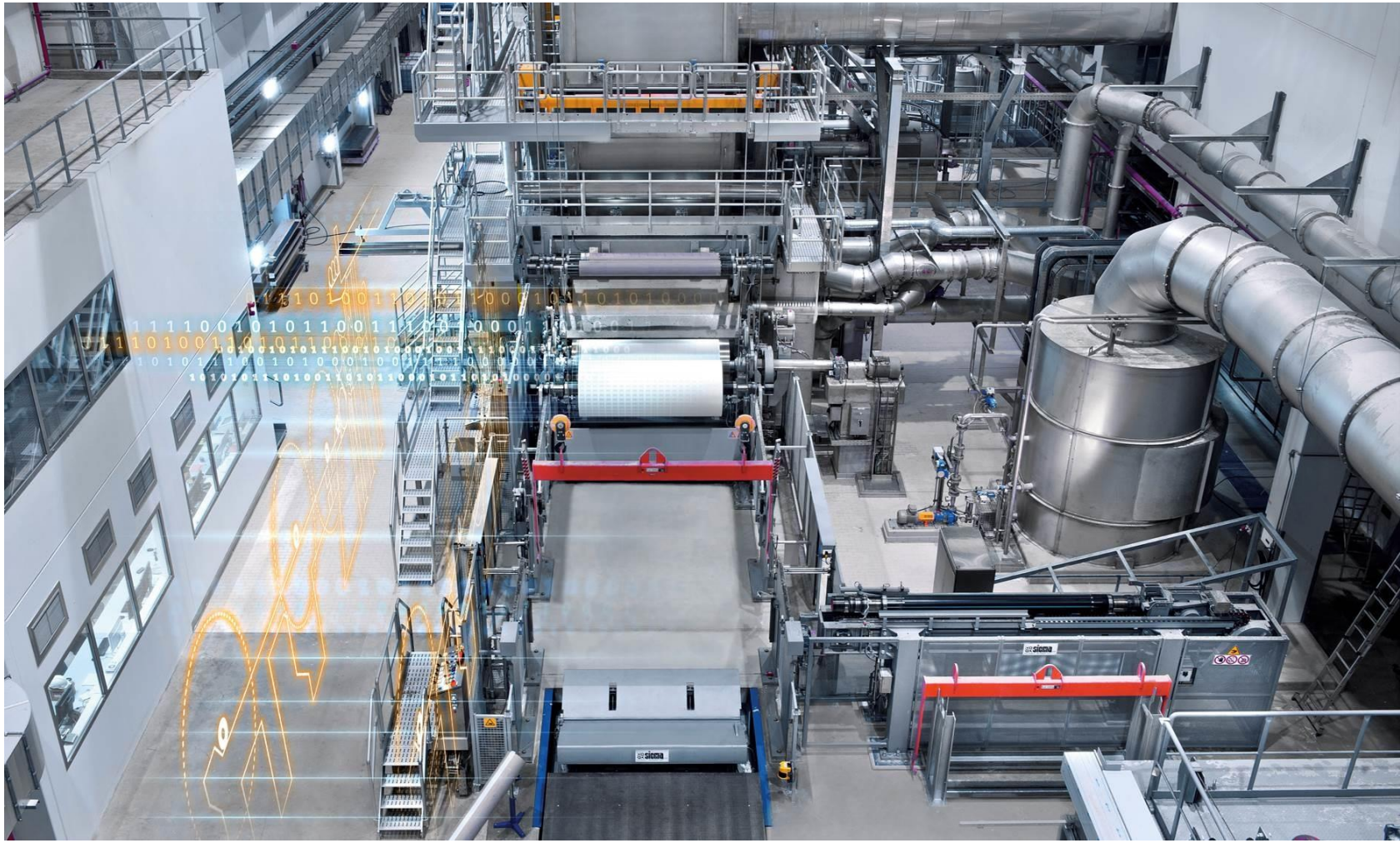
Customer description:
- A paper winder with an ongoing automation modernization project from ABB to Siemens

Project description:
- Siemens and a data-analytics partner have agreed to develop a PoC predictive analytics system in parallel to the modernization project. Objective is to increase the production speed of the machine and predict paper breaks based on collected data. LOI for Performance Contract under negotiations.

Value Proposition:
- Increased rate of production
- Lower maintenance requirement
- A structured IoT platform and data model enabling continuous development



Value Hacker Case Studies
Performance contract

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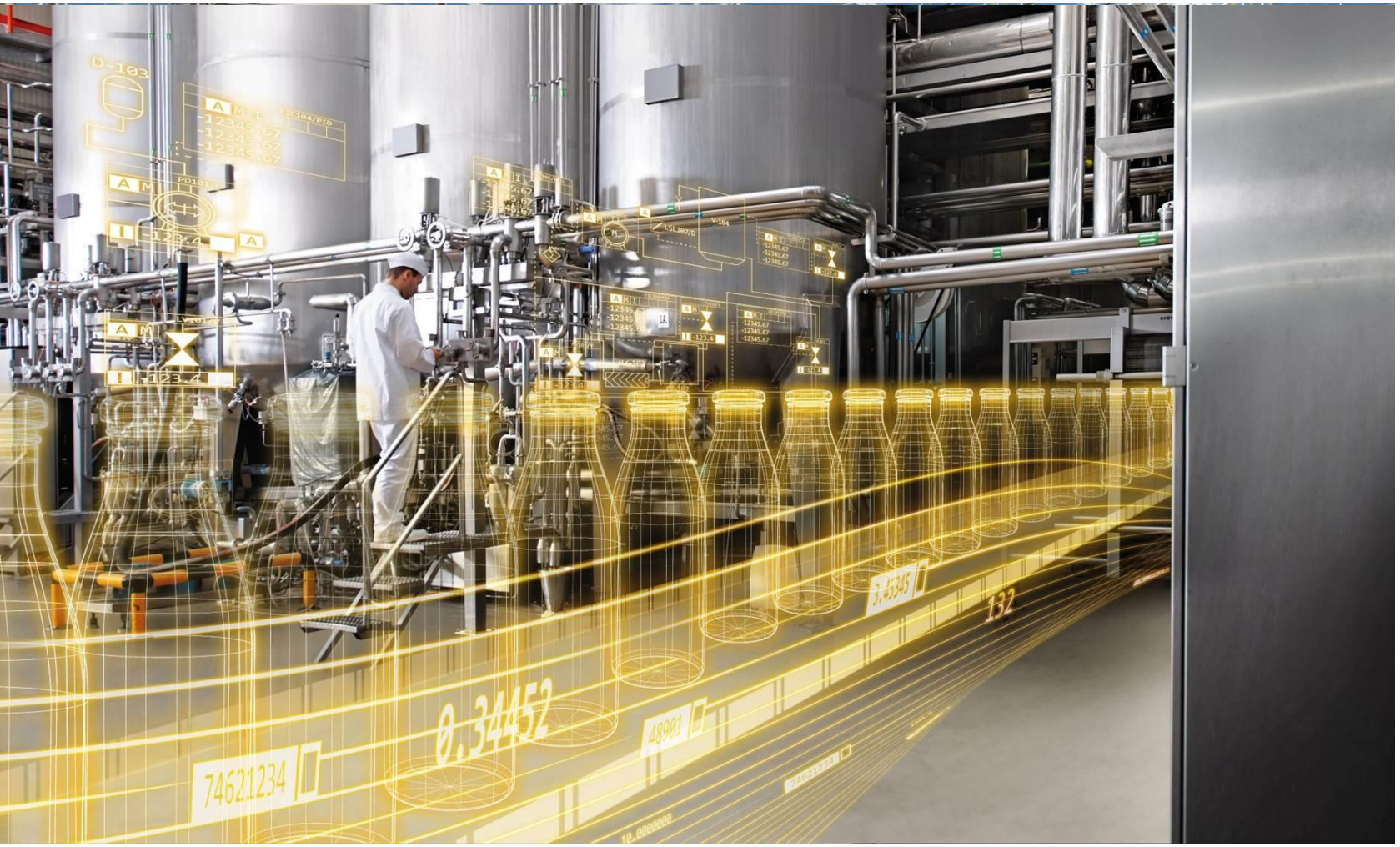

Customer description:

- A large global food & beverage manufacturer

Project description:

- A 4-year cooperation and development contract with Siemens for improving production efficiency [EUR/kg] KPI

Value Proposition:

- All digitalization services are financed by Siemens and implemented as turnkey by Siemens
- The parties share the benefits of KPI improvement
- Net cash flow positive project for Customer

Contact Information

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