DIGITAL TRANSFORMATION

Production digitalisation at Neste


Digitalization is a strategy enabler.
It’s about using digital technologies
to build and improve Neste’s
business processes and models
for renewal, growth and efficiency.

Digitalization is about changing how we think and work. It's not about technology.

Digitalization's value is only realized when people have learned new mindsets and behaviours.

Our digital vision is to
digitalize whole Neste end-to-end value chain for new types of interactions and solutions, and unique customer, supplier and employee experiences.

Feedstock & Sustainability

Production

Back Office & Support functions

Logistics & Supply Chain

Sales and Marketing

Sustainability

Digital development is embedded in Business Units

Businesses drive digitalization in five focus areas:


Feedstock & Sustainability


Logistics & Supply Chain Management


Back Office & Supporting Functions


Production


Sales & Marketing

Development needs, value logics and KPIs

We build a common foundation for digitalization at Neste

Key technological building blocks for the foundation


Data


Digital Customership


Industry 4.0 Technologies*

Together with digital development streams, projects and teams.

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- Logistics & Supply Chain Management
- Back Office & Supporting Functions
- Production
- Sales & Marketing

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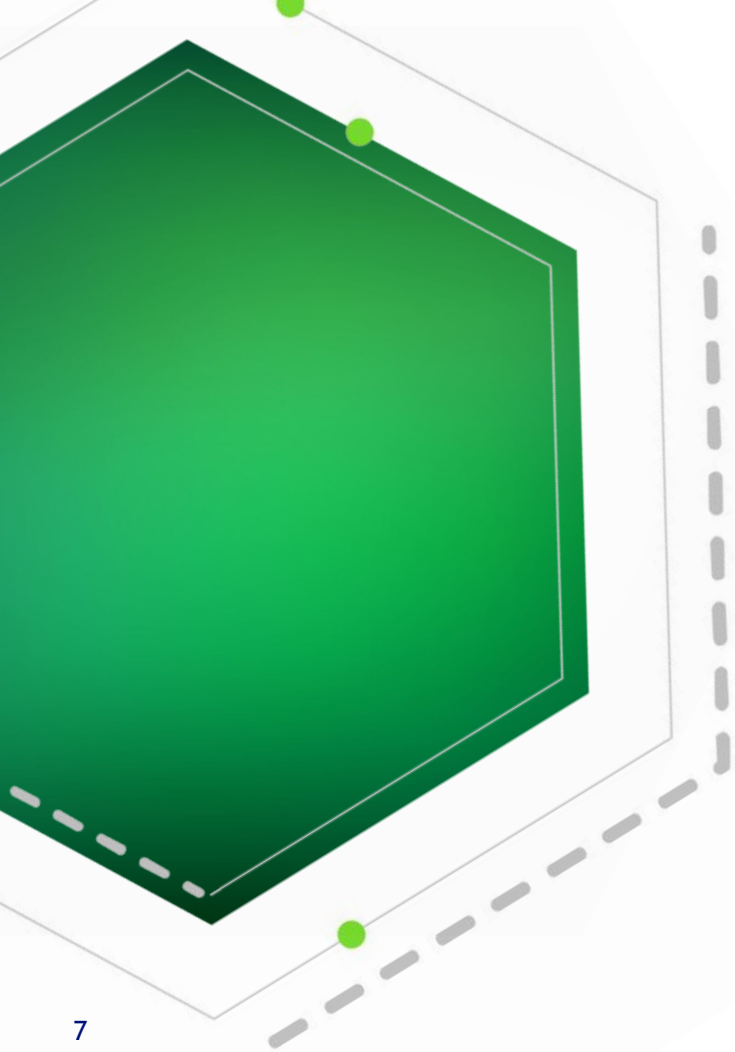
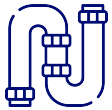


Production

Oil Products
Renewables Platform

Digital future of Production



Optimized refinery end-to-end supply chains - by developing automation, harmonizing of production, maintenance operations and the use of assets.

A longer-term and future-oriented overview to production - wiser future investments and smarter work management based on utilized data.

Transparency and improved predictability - in production work and maintenance systems, for improved prioritization and safety.

Improved carbon efficient refining - to reduce carbon emissions intelligently.

Digitalization has a key role in intelligently optimizing OP & RP end-to-end supply chains.

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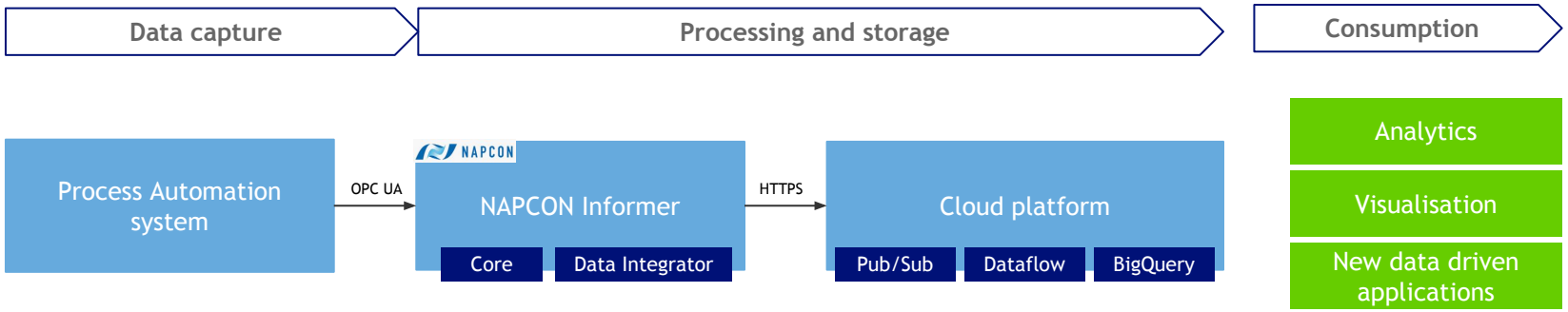
Porvoo refinery digitalisation

How we created data asset for optimization?

How we are **utilizing the asset?**

Story of **Production information platform** and **Production KPI Dashboards**

Solution Overview



1

- **Process automation systems**
- capture tag / sensor data from the production process

2

- **Core** collects data from process automation systems by using OPC UA M2M protocol and stores it locally
- **Data Integrator** provides real time data changes to **Cloud Pub/Sub** messaging service

3

- **Dataflow** processes Pub/Sub topics to Cloud
- **BiqQuery** is a serverless, highly-scalable, and cost-effective cloud data warehouse. All of the process information is stored there for further data analysis

4

- Data can be used for e.g. improved visibility, production optimization, predictive maintenance, and disruption investigations
- RP and OP production optimization MWB are the first to use the collected data

Production Information Platform

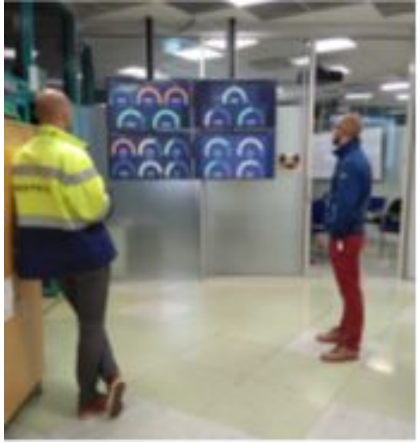
Collaboratively developed
Neste and NAPCON have implemented Process Information Platform (PIP) to Neste Oy refineries (Porvoo, Singapore, Rotterdam and Sluiskil)

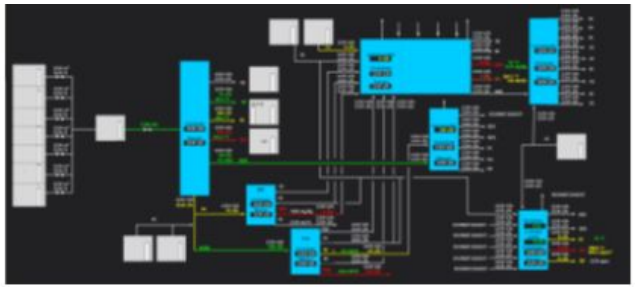
Production data aggregation
PIP integrates all the productional data from Neste's different refineries and transfers it securely with OPC UA & Cloud pub/sub to Neste cloud for BI and advanced analytics purposes.

Utilized technologies
OPC UA Certified NAPCON Informer, certified profiles:
Standard Server / Data Access Server / Method Server
Up to 80k tags / site
Cloud pub/sub & OPC UA

Production KPI Dashboards

Target: achieve more efficient running of whole plant by visualizing optimal operations and gaps between production plan and realized operations.





Economical objective

Support decision making: right information to right person at right time
Achieve more efficient running of whole plant

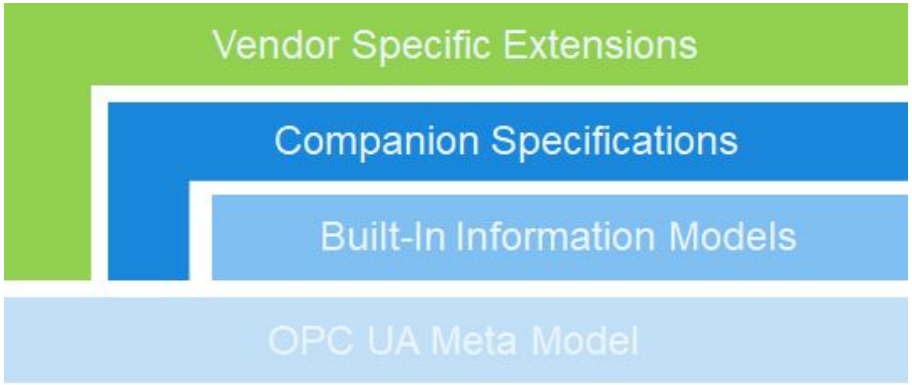
Deploys operative KPI's via Dashboards

Visualize production lines, product chains and production units performance in relation to their goals
Overall Product chains for situational awareness

OPC UA Information Models

Custom models developed for refinery analytics purposes
OPC UA communication (streaming data via PIP)
NAPCON ML & AI readiness with Information Models

OPC UA Information models



Layered architecture of OPC UA Information Models

Information Models are one of the key elements for Industry 4.0 i.e. interoperable, smart and connected production.

OPC UA Information model employs the concepts of Object Oriented Programming - inheritance, polymorphism, data abstraction and encapsulation.

OPC Foundation has developed several Information Models for tech vertical interoperability

No existing Companion Specification for Oil&Gas, but e.g. Equinor uses some ISA-95 OPC UA Companion Specification -based open source models
(https://github.com/equinor/opc-ua-information-models)

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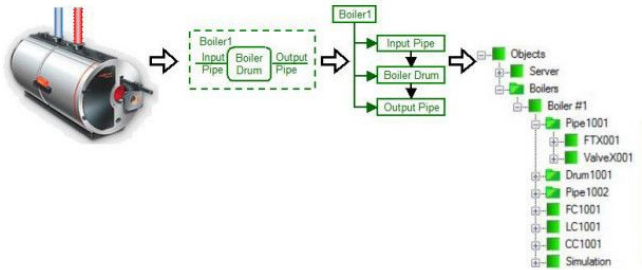
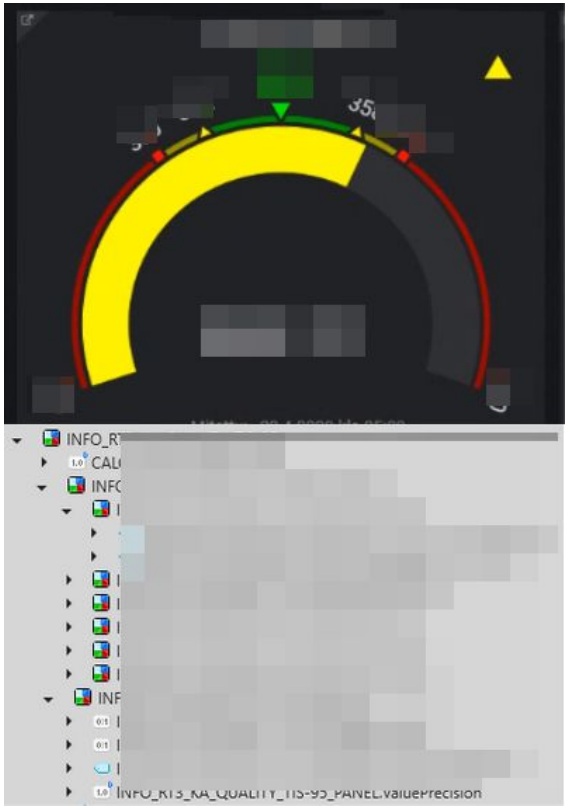
Information model benefits

Reduced engineering effort, easier extendability
Context and structure for data
Improved reusability and interoperability of solutions
Easier maintenance and change management

OPC UA - Modelling best practises white paper (OPC 11030 from OPC Foundation)





Future of Refinery operations - AI Advisor

"The future AI is supporting and augmenting human capabilities such a way that a human-AI team is stronger than either alone"

- Missy Cummings, Director, Humans & Autonomy Lab, Duke University

NAPCON has ongoing projects on a digital operator assistant, called NAPCON ADVISOR

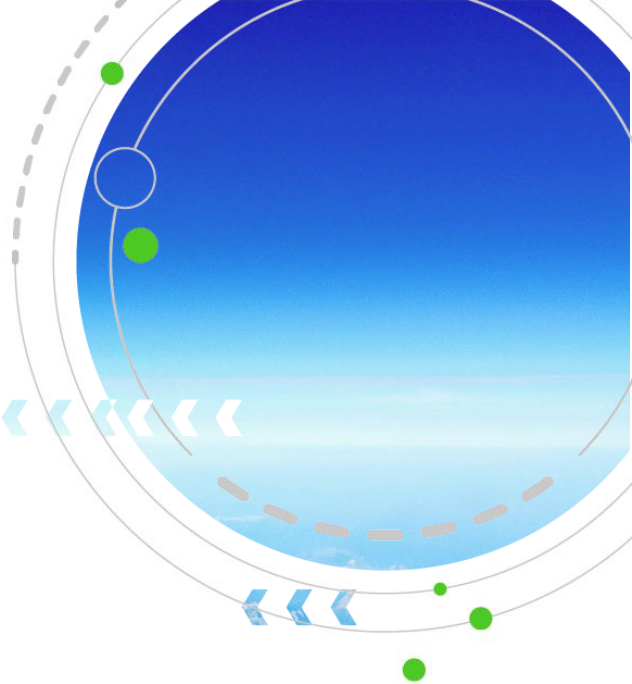
- It's goal is to help to **run entire processes optimally**
- It enhances **proactive** operation instead of reactive and alarm driven
- It is based on **machine learning** and optimization and runs on existing PIP / KPI Dashboards
- It uses developed information models
- It can support **learning** by doing
- It can supports **systematic safety development**

Upsides we are looking for:

Visibility & transparency

Faster lead-times & reactions

Practical tool to support daily management and operations via real time awareness



Efficiency & Effectiveness

You want to know more?

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Questions, comments?

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Thank you!