### OPC DAY FINLAND 2020

4.11.2020, 1.00-4.30 PM (EET) #OPCUA #OPCDAY #OPCDAYFINLAND #AUTOMAATIO



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# HELEN

# Digital Transformation in Energy Production using OPC UA

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# Wapice, the Digitalization Partner from Finland



- Transforming Industrial Companies through digitalization since 1999
- > Private ownership
- > Continuous organic and profitable growth
- > Employing +350 software experts
- > 10 office locations in Finland
- ISO 9001, ISO 14001 and ISO 27001 certified













2019 Partner of the Year Winner Application Innovation Award

# **Technology & Digitalization Services**



Analytics, AI and Big Data





Electronics Design & Embedded Systems



Internet of Things Solutions

**Cloud Solutions** 



Web and Mobile Solutions



OPC and OPC UA Solutions



Consulting



+

**Cyber Security** 



**DevOps** 







- > One of the largest energy companies in Finland
- Founded in 1909 and owned by City of Helsinki
- > Helen has over 500 000 customers throughout Finland
- Helen's district heating network covers more than 90% of buildings in Helsinki
- > Target: Carbon neutral by 2035





# Helen energy production and portfolio

- > Heat, electricity and cooling is produced in power plants and heating plants in different parts of Helsinki.
  - Highly energy efficient Combined Heat and Power (CHP) generation, where electricity and heat are produced in single process
- Energy production is supplemented from outside
   Helsinki through associated companies
- > Increasing amount of renewables
- Hydropower, Heat pump plants and Solar power plants





# WORLD'S BEST CITY ENERG

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# Digitalization of Helen Energy Services

- Trend is from bigger production units to smaller decentralized production units
- More challenging to manage and optimize energy grid operations
- Information becomes scattered

- Fast reactivity and personalized services needed in energy market.
- Transparency and predictability
   needed in controlling the energy
   flows



→ This all requires digitalization, automation and advanced analytics

# Challenges to overcome

 The information systems in different energy production units are owned and administered by several different suppliers  Need for a simple, scalable and secure connection between production units

 Expensive, vulnerable and error prone to connect everything with vendor specific systems  Must have long-term support and roadmap



# Cost savings with OPC UA architecture

- Industry 4.0 compatible solution
  - Vendor independent, Scalable, Inbuilt Security, Long-term roadmap
- The Scada systems and information architectures in different production units can be customized freely
  - As long as they talk OPC UA towards other systems
- Clear responsibilities inside the Helen Corporation between different operators, systems and interfaces
- Simple architecture
  - Easier to scale up and integrate with 3rd party systems
  - Easier to maintain and solve problems





### Create Production-grade IoT Applications Fast

Complete Internet of Things (IoT) tool suite and platform. Build first class IoT apps or business models in minutes.



Dashboards

s 🖌 Reports

Events

Cloud

Native

→ Track your KPIs, Prototype, Control, Innovate





# Solution architecture

#### > Wapice IoT-TICKET as a backbone

- > Configuration and visualization through Enterprise Manager UI
- > Big-Data database for process values
- > User and configuration information stored in relational database

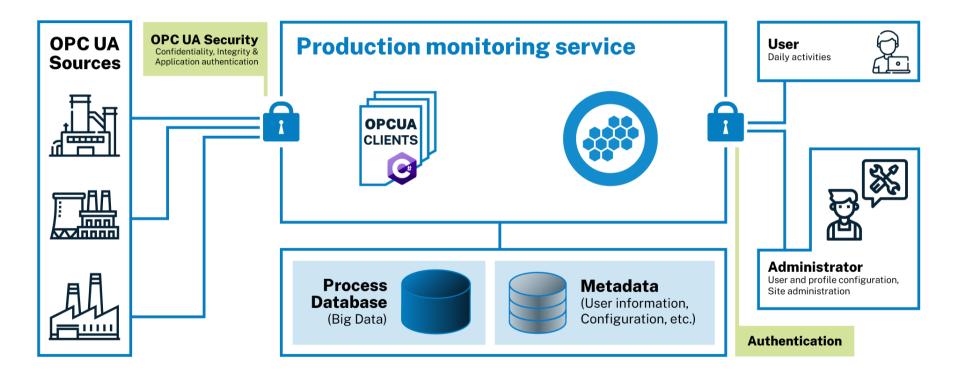
#### > OPC UA modules

- > Power factory communication using OPC UA Client(s)
- > Unified interface and aggregated data provided by OPC UA Server
- C# .NET language
- OPC DA to OPC UA wrapper and OPC UA to OPC DA proxy solutions in some places



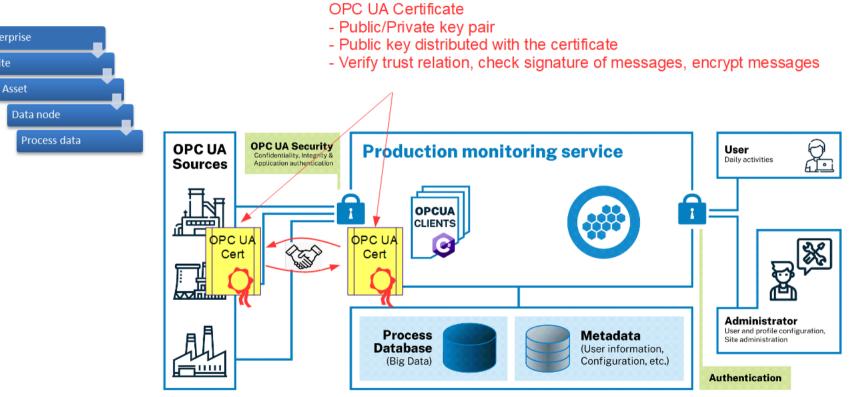


# Secure OPC UA Client connections

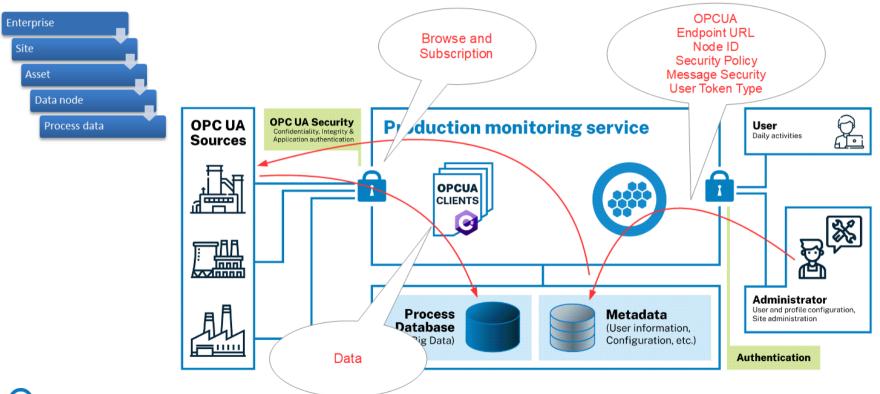


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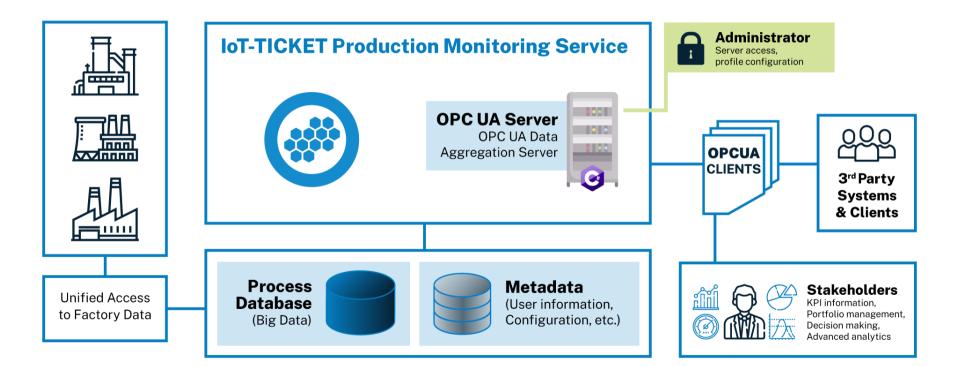
## Secure OPC UA Client connections



## Secure OPC UA Client connections



# **OPCUA Server Data Aggregation**





# **OPC UA Data and Services**

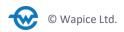
- > Quality and status information
  - > Immediate feedback about source system
  - > Is data valid?
- Source and server timestamps
  - > System delays can be monitored and tracked
- > Events
  - For example, when admin adds or removes measurement points event notifies external OPC UA clients
  - > Address space updated automatically!



### Performance monitoring

- > 24/7 monitoring of system and network performance
   Constantly monitors
- > OPC UA Endpoint communication
- > Data storage performance (disk space, DB commits, ...)
- > Application performance (cpu load, memory, ...)
- SMS and email based alarms
  - Problems identified and made known immediately
  - > Alarm message already contains the initial indication of the problem source





# High availability by design

- The fault tolerance is achieved through multiple levels of redundancy
  - OPC UA redundancy
  - Application redudancy
  - Database redundancy
  - (Network redundancy)
- > No single point of failure
  - One component (application, machine, network) crash does not paralyze the whole system
  - Updating software, problem solving, etc becomes easier
- OPC UA makes this easier by providing redundancy in protocol level!





# Summary

- > With OPC UA achieved a simple and future proof architecture
- OPCUA and IoT-Ticket platform support each other in best ways
- > Streamlined processes  $\rightarrow$  clear responsibilities
- > Allows Helen to focus on core business and value creation





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# Thank you! BECKHOFF NAPCON



