



# Advanced Smart Grid Applications in Finland

Petteri Heinänen  
Director, Business Unit Finland  
Aidon Oy

6th of May 2015

# Aidon in brief

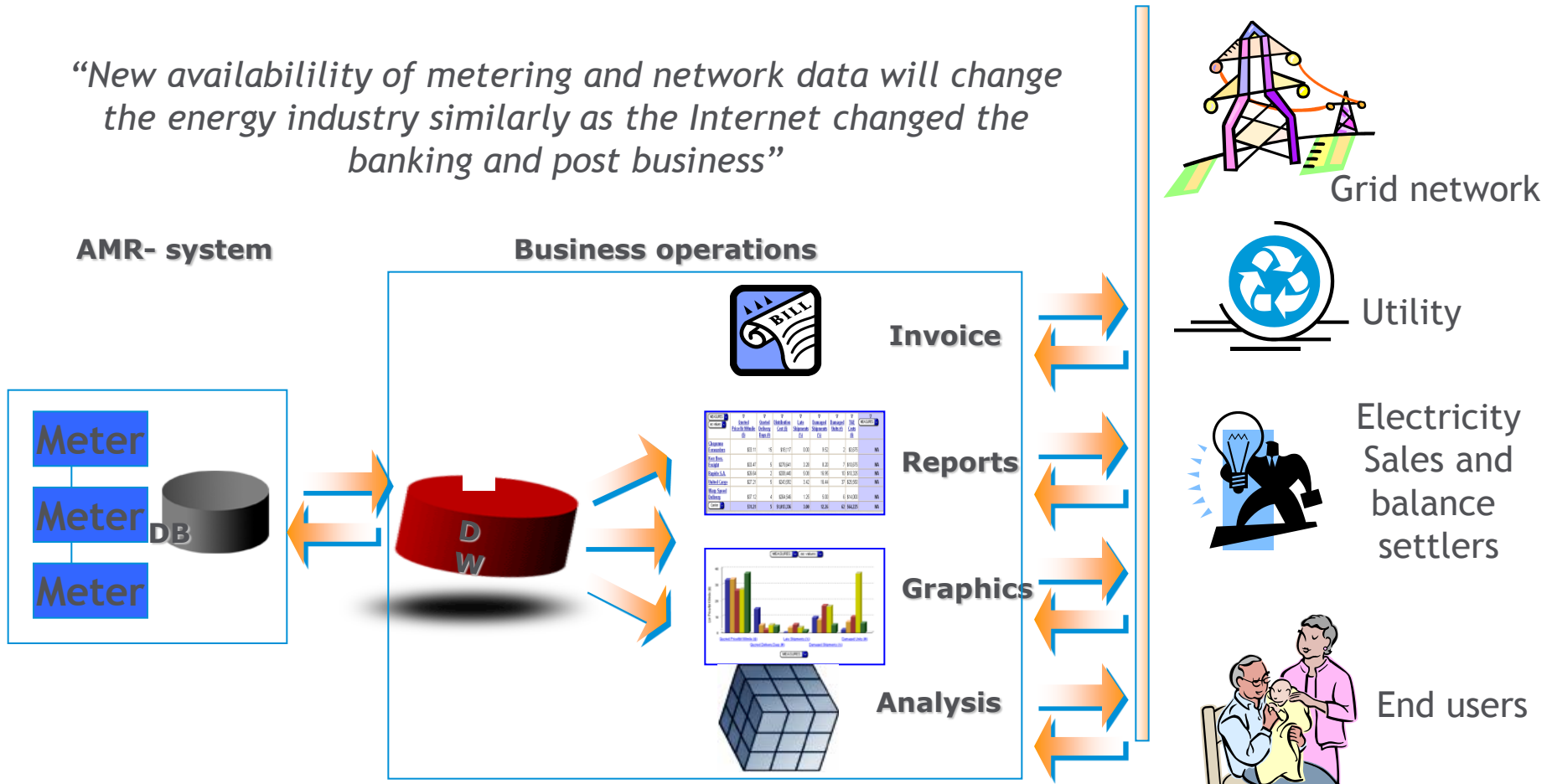
- The leading supplier of smart energy metering systems in the Nordics - **more than 1 million Energy Service Devices delivered and in operation**
- Founded in 2004 in Jyväskylä, Finland
- Offices: Jyväskylä in **Finland**, Asker in **Norway** and Täby in **Sweden**
- Aidon Customization Centre in Vantaa, Finland
- Own R&D and strong technology partnerships
- Turn-over in 2013: 16 M€
- Alder, a Nordic growth capital investor is Aidon's majority owner since August 2013. Other owners are 2VK Invest from Norway and Finnish Industry Fund from Finland

# Finnish AMM infrastructure in brief

- 3,2 million metering points
- DSO's are responsible for the energy metering
- 99% of metering points have a AMR-meter
- The Finnish act:
  - 80% of the meters must be remotely read by the end of 2013 with hourly values.
- Aidon has delivered 850.000 Energy Service Devices (ESD) to Finland
- Customer invoicing is based on monthly real time consumption
- Internet based hourly data reporting is today available more than 2/3 of the end customers provided by the DSO's
- Remotely controlled circuit breaker is used widely

# System thinking

*“New availability of metering and network data will change the energy industry similarly as the Internet changed the banking and post business”*

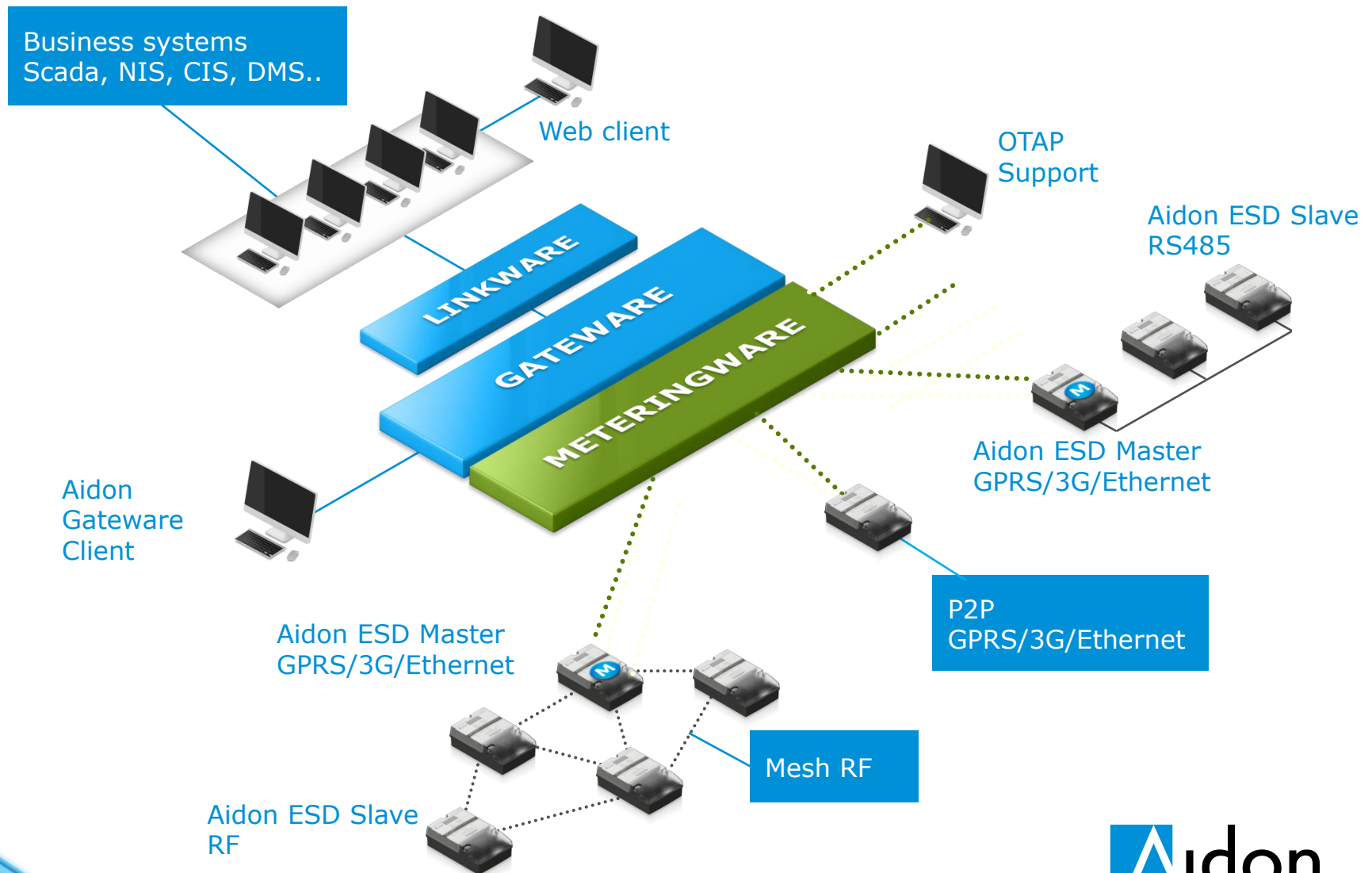


Data recipients set the requirements for the usage and availability of information

# General about PGM

- Aidon energy service devices monitor the power grid's condition and quality (PGM functionality) including distribution transformers.
- In passive mode diagnostics are done and logged. The diagnostics log can be read from the device when needed.
- In active mode the diagnostics are done and sent immediately as an alarm through the reading system to a DMS (Distribution Management System). All alarms are logged with voltage and current measurement at log record storing time.
- Same energy service device can have both active and passive diagnostics configured at the same time.
- It is possible to define an automatic circuit breaker disconnection to some diagnostics when the diagnostics limits are exceeded

# Aidon System Architecture to PGM



# Integration to DMS System

- Alarming service points highlighted
- If the fault location can be inferred, network can be colored to show possible fault location

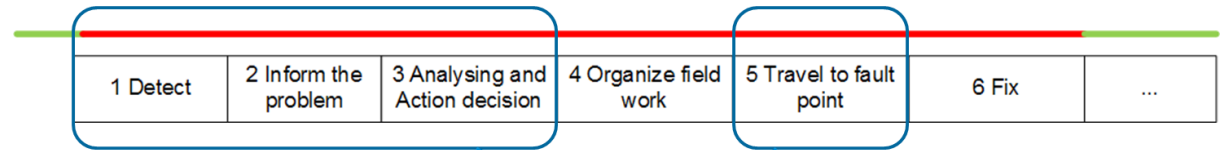


# Power Grid Monitoring PGM with AMM

- Fault situation monitoring
  - Neutral wire broken
  - Medium voltage wire broken
  - Blown fuse (missing phase)
  - High voltage alarm
  - Low voltage alarm
  - Phase order alarm
- Supplied electricity quality monitoring
  - Various voltage quality measurements (also based on EN50160)
  - Power outages
  - Blown fuse (missing phase)
  - Log event by default, similar to power outages
  - Momentary voltages and currents
- Contractual electricity usage monitoring
- These features are already in daily use:
  - Savon Voima Verkko: 60.000 ESD's with PGM software (ABB DMS)
  - Vantaan Energia: 14.000 ESD's with PGM software (Tekla DMS)
  - Lahti Energia: 22.000 ESD's with PGM software (ABB DMS)
  - Oulun Seudun Sähkö: 20.000 ESD's with PGM software (ABB DMS)
  - etc.



# PGM helps in ...



Aidon PGM enhances

1 Detect

- Detect
  - Wide range of measurements
  - Root cause detection

2 Inform the problem

- Inform the problem
  - Real-time alarms
  - Push technology

3 Analysing and Action decision

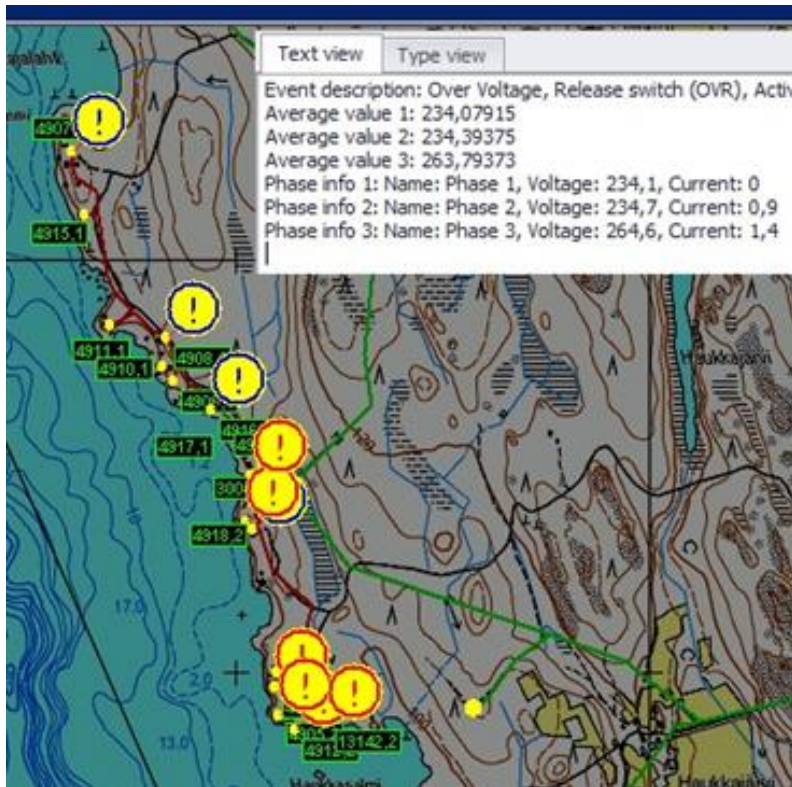
- Analysing and action decisions (e.g. using DMS)
  - Data fusion
    - Measurement from several devices
    - Data from several sources
  - Root cause + measurement
  - Situational awareness by coverage

5 Travel to fault point

- Travel to fault point
  - Enhanced analyses directs to fault point

Reduced time leads to cost reduction

# Example: Case Overvoltage in DMS



- KSAT has ~10 000 meters integrated with DMS 600
- Overvoltage alarm from several meters in 1 LV network
- Voltage in 1 phase high ~264 V
- Reason: Transformer was struck by lightning and partly damaged
- This would not have been noticed without AMR alarms in DMS



**Thank you!**