Teollisen internetin soveltaminen neonataaliseulonnassa

Petri Kivelä 10.03.2017
Wallac Oy
PerkinElmer Inc.

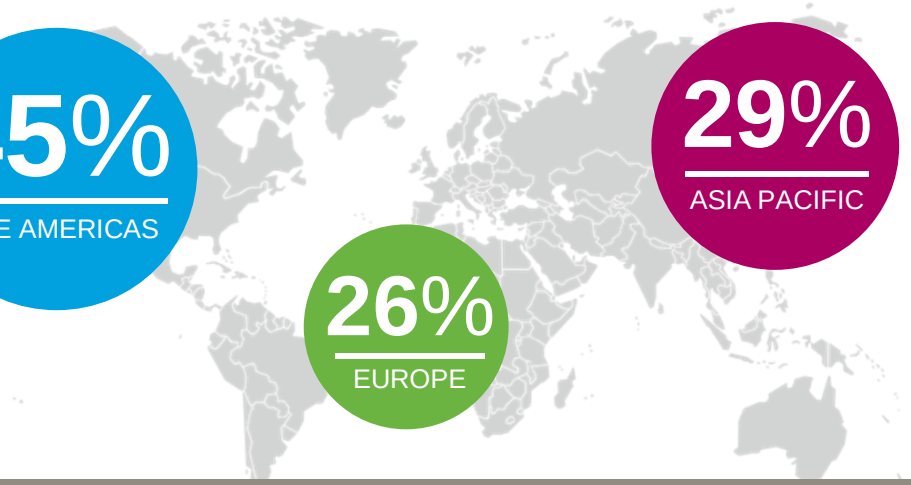
PerkinElmer At A Glance

GLOBAL TECHNOLOGY LEADER

OPERATIONS IN OVER 150 COUNTRIES

9,000 EMPLOYEES

$2.1 BILLION IN REVENUE



HEADQUARTERED: ***WALTHAM, MA***

INCORPORATED IN 1931

MEMBER OF THE S&P 500

TURKU SITE
ONE OF THE LARGEST MANUFACTURING AND R&D FACILITIES IN PERKINELMER

Centre of Excellence for Diagnostics Devices

PerkinElmer®
For the Better

PerkinElmer®
For the Better

WE CURRENTLY HELP TO SAVE 70 BABIES' LIVES EVERY DAY

In 1985

- Newborn screening starts to expand geographically
- PerkinElmer's first neonatal screening system
- DELFIA hTSH kit for congenital hypothyroidism screening

Today

- Complete solutions - assays, instruments, automation, informatics, expertise
- Supporting programs screening for several tens of disorders
- Some 500 million babies have been screened with PerkinElmer products
- Making it possible to "rescue" 70 babies every day

39M
PKI Screened Annually

25K
PKI Saved Annually

70
PKI Saved Every Day

PerkinElmer®
For the Better

COMPLETE SOLUTIONS TO MEET THE NEEDS OF NEWBORN SCREENING PROGRAMS:

- Platforms
- Assay kits
- Informatics
- Global presence
- Expertise
- Total support

PerkinElmer®
For the Better

The devices shown here are available as standalone products. When interfaced, the devices together offer optimum screening performance and efficiency.

PERKINELMER HAS AN ANSWER TO EVERY STAGE IN THE SCREENING PROCESS

1 SAMPLE COLLECTION AND PREPARATION

2 ANALYSIS AND MEASUREMENT

3 RESULT MANAGEMENT AND REPORTING

PerkinElmer®
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GSP® instrument

- **Automatic processing** of neonatal assays
- Current install base > 250 units across the world and rapidly increasing
- Maintenance and service quality and are key factors to a functional system

GSP is a complex automate and provides a good target for IoT benefits

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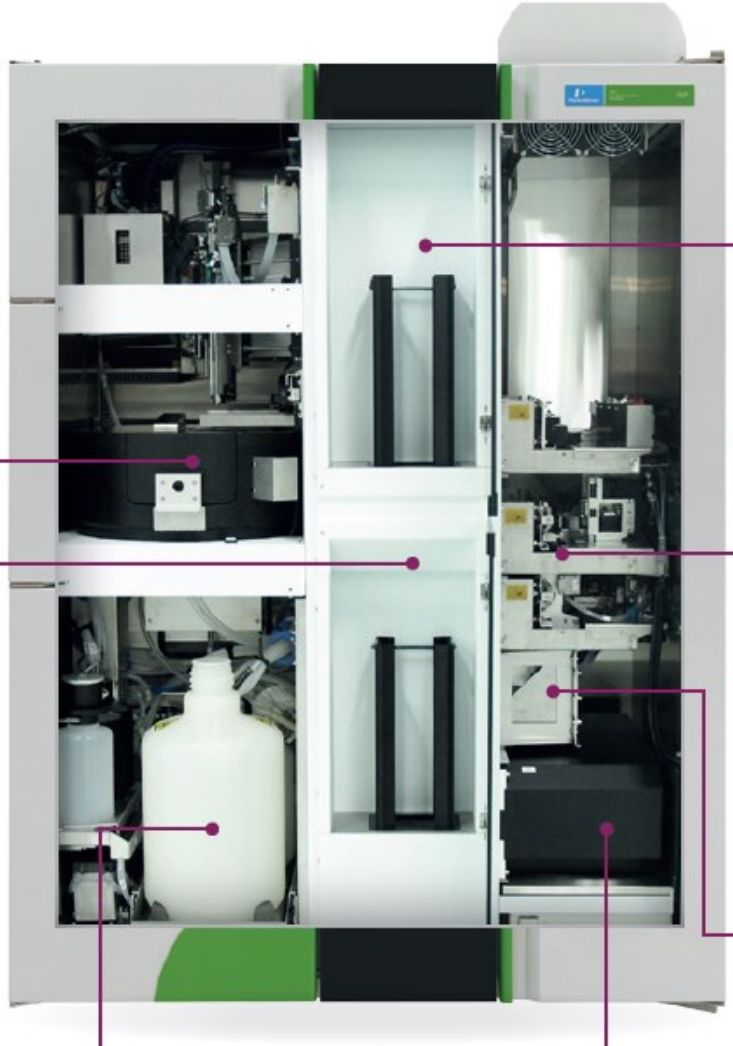
GSP® instrument

20 modules
151 various sensors



Cooled reagents storage
- Temperature controlled storage for assay reagents
- Room for 13 reagent cassettes
- Enables continuous loading

Stacker modules
- Modules used to load plates to GSP and unload them after completion of the assays
- Each stacker can hold up to 26 plates

Liquid module
- Prepares Wash solution from the Wash concentrate
- Handles the waste solutions

Measurement module
- xy-conveyer to move the plate under the measurement head
- Enables time resolved fluorescence, prompt fluorescence and absorbance measurements

Plate Manipulator
- "Elevator" for transferring plates between different modules of the GSP
- Forms the body of the instrument

Disk remover, washer and bulk dispenser

Incubator and Shakers
- Heated incubator operates at 37°C and can hold up to 12 plates
- Three non-heating shakers can each hold up to 6 plates

IoT Platform – Instrument awareness to Service engineers

Starting a new era of service

“today”: Customer contacting service with issues

“tomorrow”: Service contacting customer when something has happened

“next week”: Service contacting customer to schedule predictive service visits

Instrument status awareness

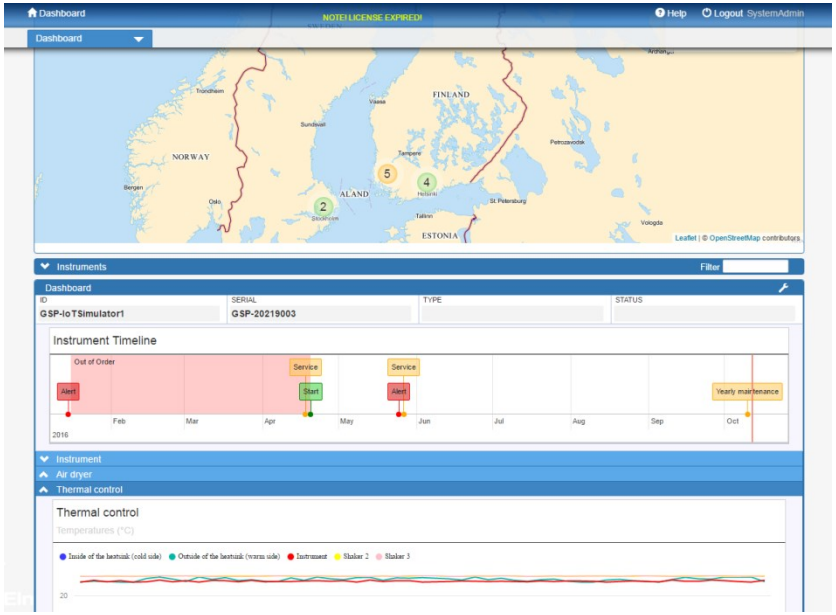
- Instrument location, version info, contact details
- Instrument service history
- Issue alerting system and instant access to log data

Predictive maintenance

- Unit failure prediction
- Components replaced during scheduled visits

A platform for future opportunities

- Automatic kit certificate downloads
- Real-time kit lot consumption
- End user notifications (waste container full, buffer level low, …)



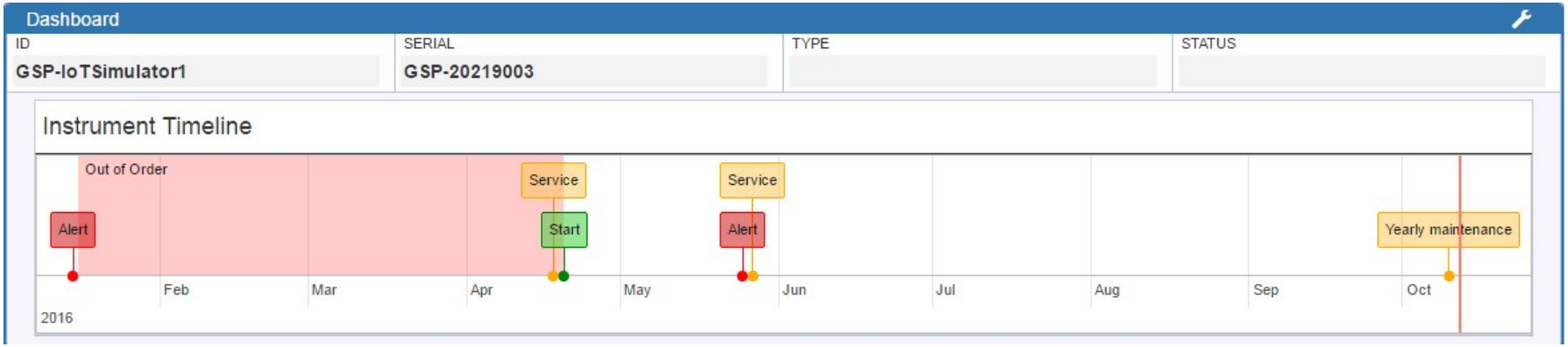
Benefits

- Increased instrument up-time
- Improved quality of service
- Provides statistical data to product development

IoT Dashboard – Instrument awareness

Instrument awareness

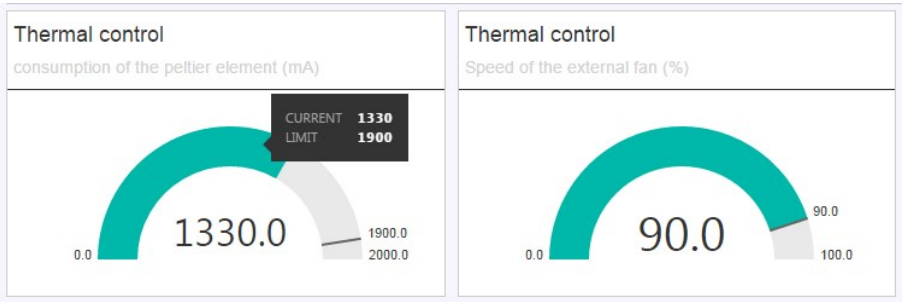
- Instruments on a map with status indicators
- Install base registry with software versions
- Service engineers see their instruments
- Timeline for service history and planned visits
- Alerts and error events listed on the timeline to aid troubleshooting

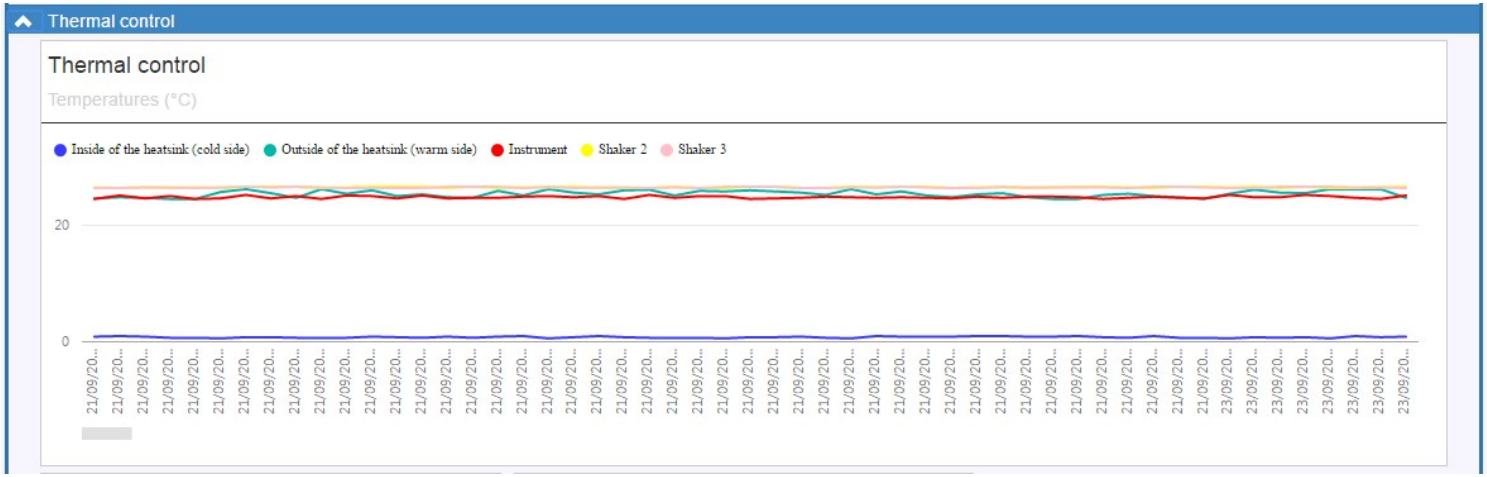


IoT Dashboard – Troubleshooting and predictive analysis

Sensor data visualization and alerting

- Sensor data analysed on the fly
- Email or SMS alerts sent when exceeding limits
- Temporal or current sensor value data visualized on interactive graphs
- Graphs and alerting limits configurable for each sensor
- Alerting with machine learning capabilities





IoT Platform - Security

Cloud based IoT* hub:

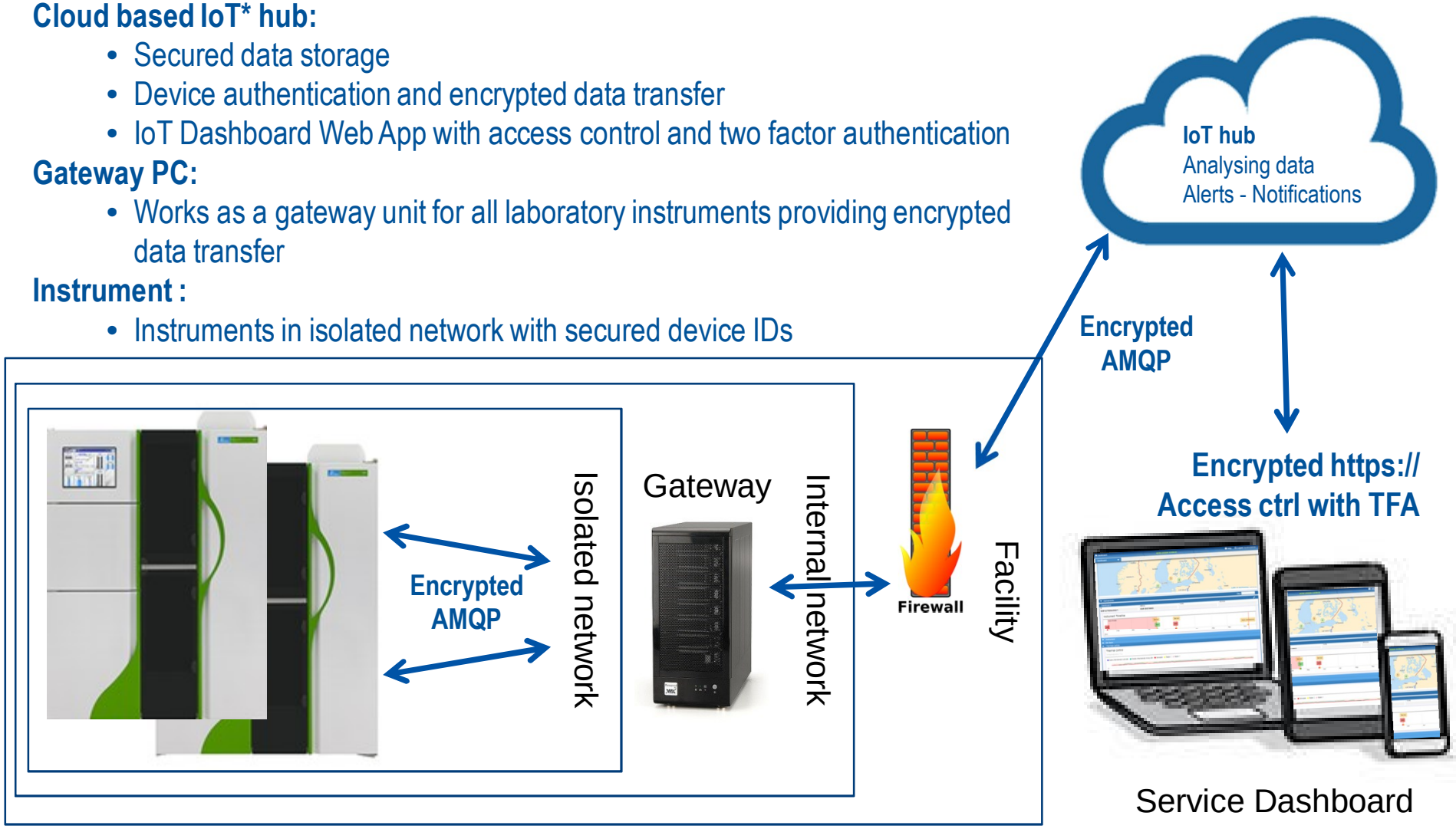
- Secured data storage
- Device authentication and encrypted data transfer
- IoT Dashboard Web App with access control and two factor authentication

Gateway PC:

- Works as a gateway unit for all laboratory instruments providing encrypted data transfer

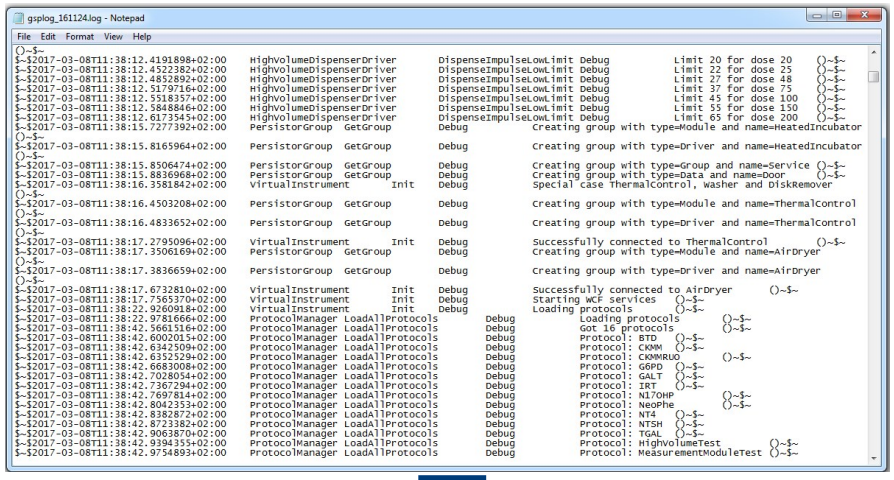
Instrument :

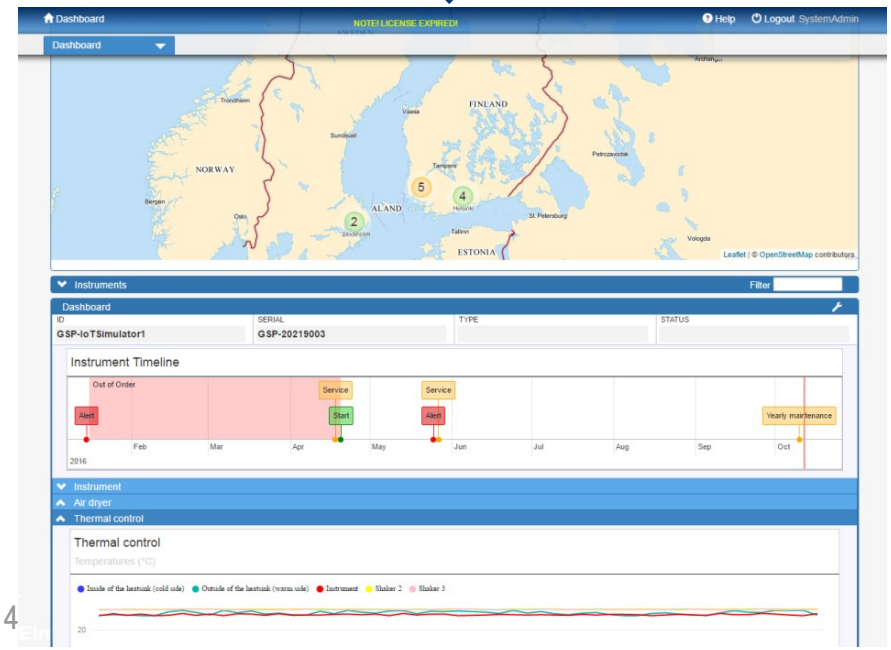
- Instruments in isolated network with secured device IDs



*The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors and connectivity to enable it to achieve greater value and service by exchanging data with the manufacturer, operator and/or other connected devices.

IoT Platform summary





Benefits for Service

- Faster failure resolution
- Clarity for troubleshooting – root cause visualization
- Order correct parts for the service trip
- Tools for Predictive maintenance

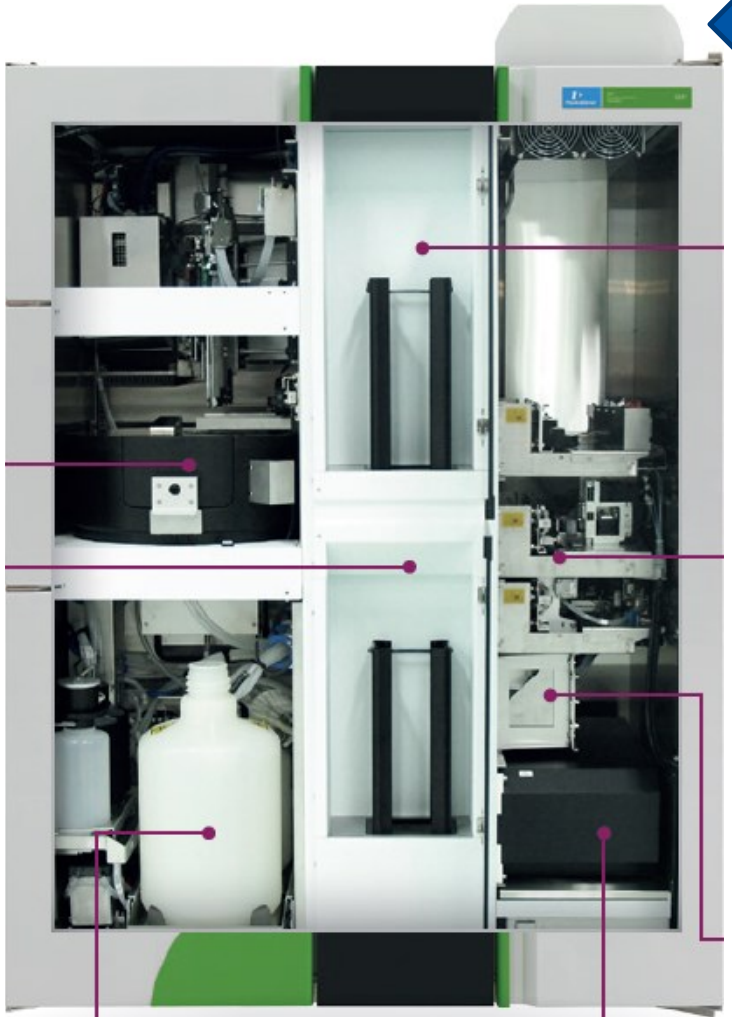
How will it help our customers?

- Increased instrument up-time
- Less instrument failures

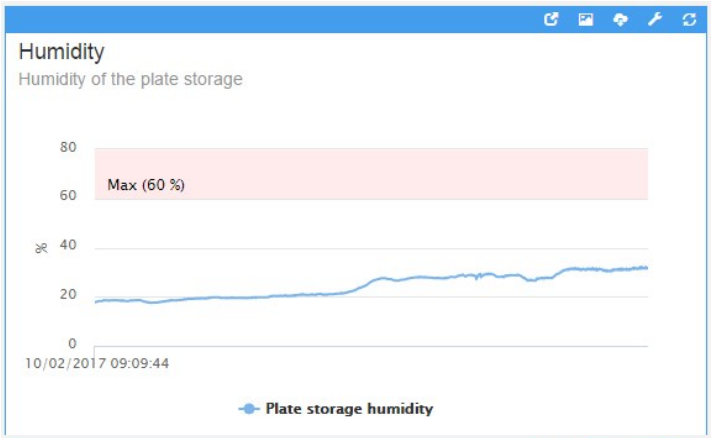
What does it mean to us?

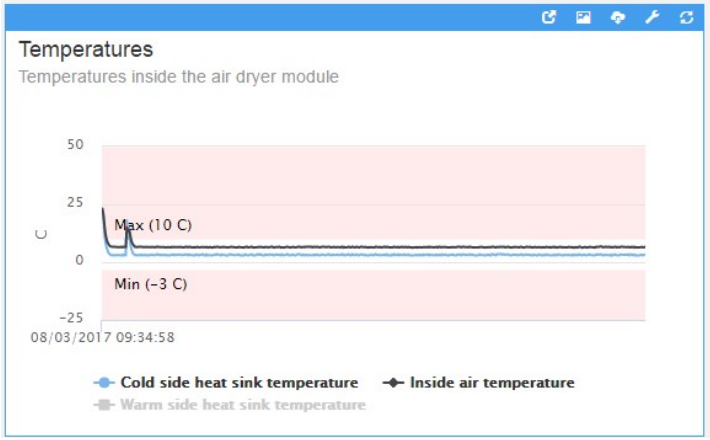
- Reduced maintenance costs, less travel expenses.
- Provides feedback to R&D => improved product quality
- Increased customer satisfaction
- Future platform for many

Air dryer – Peltier based humidity control unit

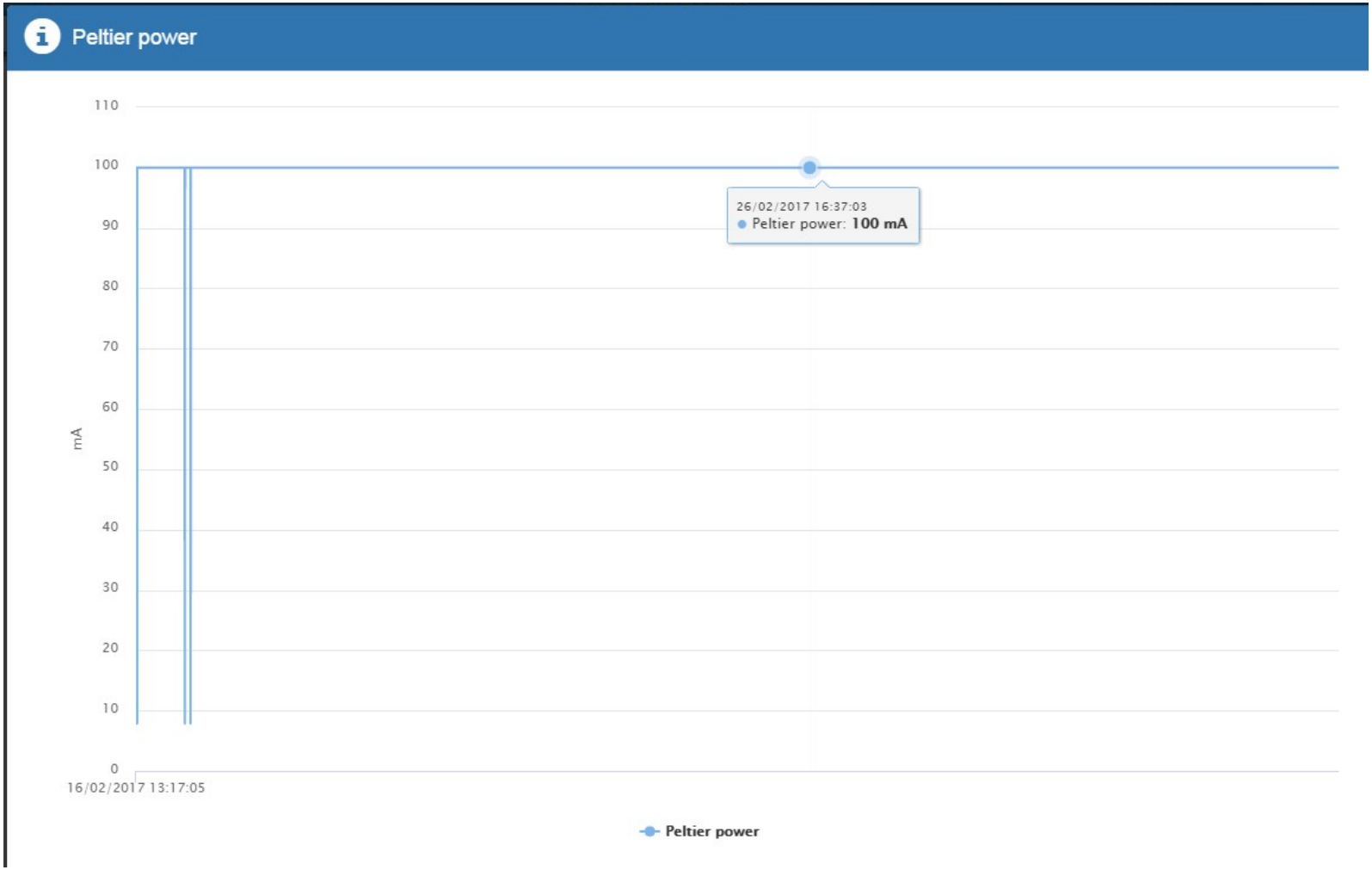


Air dryer

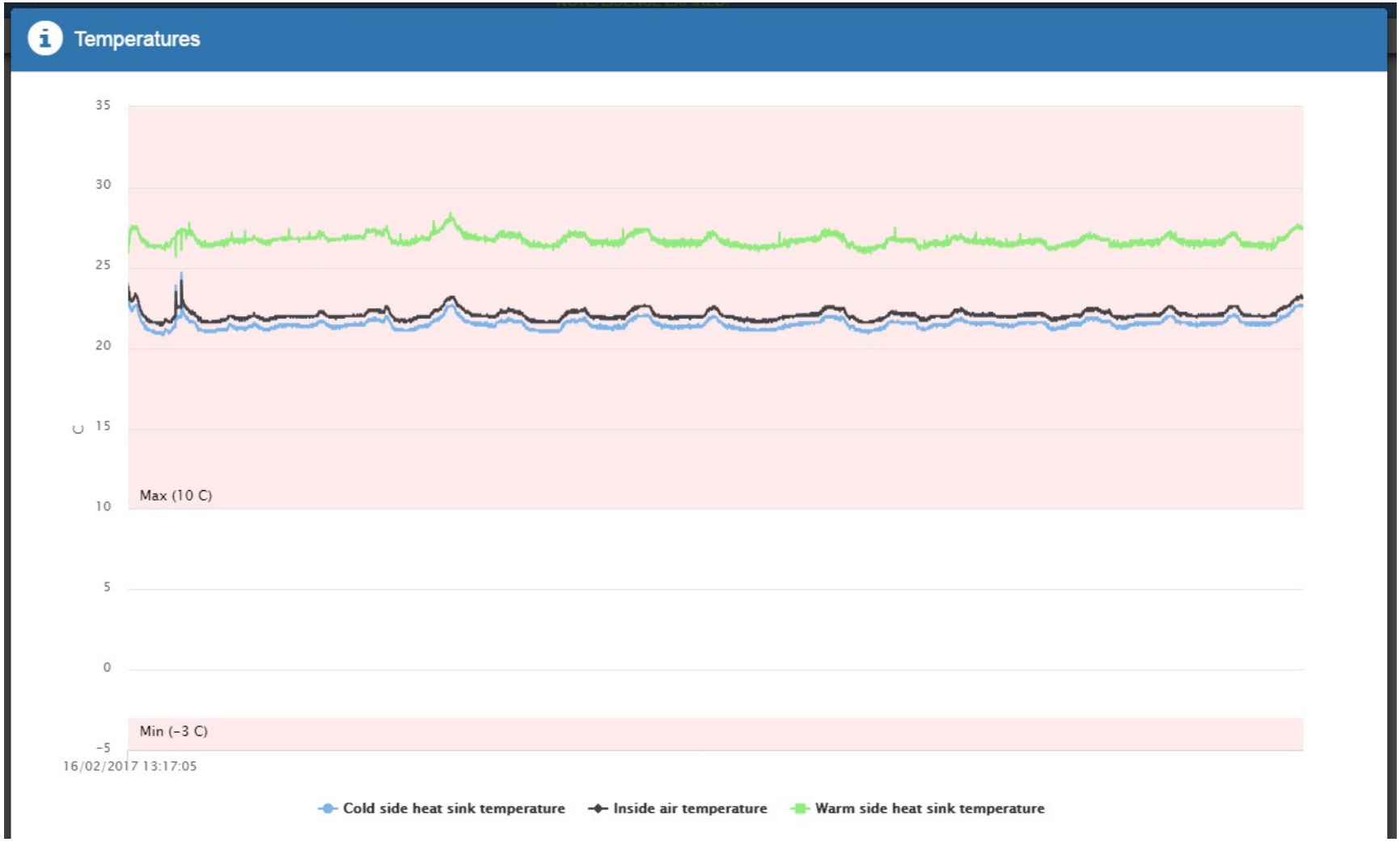




Air dryer - Symptom



Air dryer - Problem



Air dryer – Preventive maintenance

Complications

- Air humidity and temperature in plate storage increase
- Affects screening assay quality

Predictive indicators

- Peltier power reaching 100% power cycle
- Temperature sensors: ambient, hot side / cool side ratio
- Email or SMS alerts sent when exceeding limits

Action

- Email or SMS alert sent to service engineer when exceeding limits

IoT Platform