

with the grid

Anomaly detection for IoT on District Heating grids

Presentation



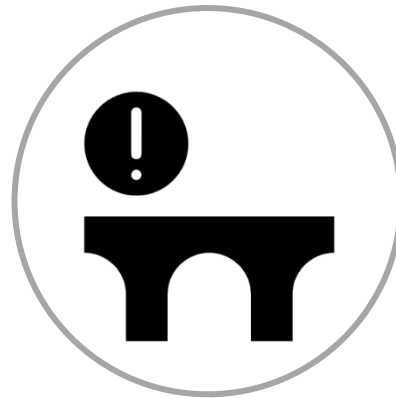
Confidential

There is a perfect storm approaching in the world of district heating

Problem



Lack of technical
personnel



Ageing assets



Paris climate
goals

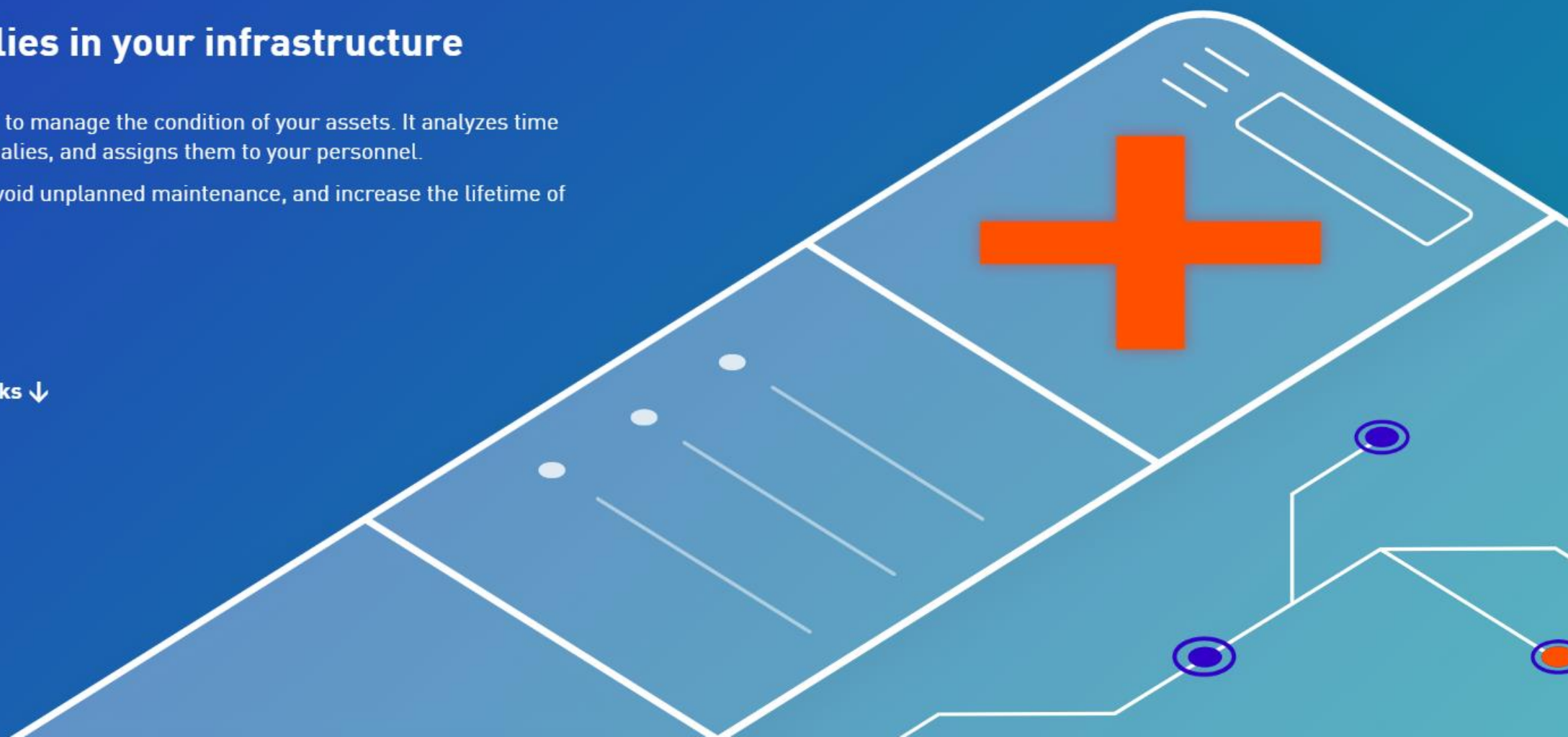
Detect anomalies in your infrastructure

We provide an application to manage the condition of your assets. It analyzes time series data, detects anomalies, and assigns them to your personnel.

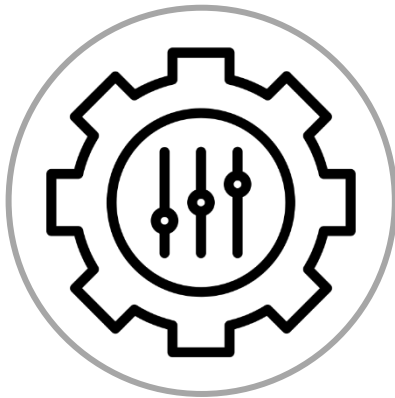
You save valuable time, avoid unplanned maintenance, and increase the lifetime of your assets.

[Request a demo](#)

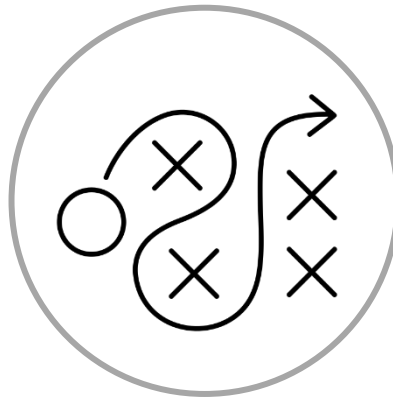
[See how withthegrid works ↓](#)



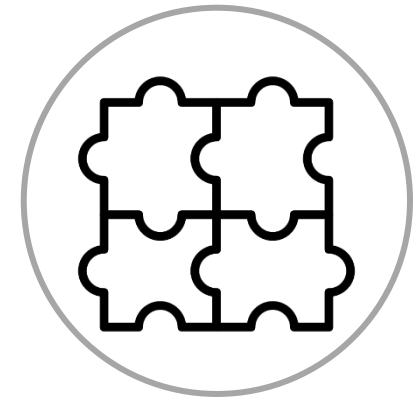
Integrating IoT in existing processes is hard



Not one size fits all



Limited flexibility

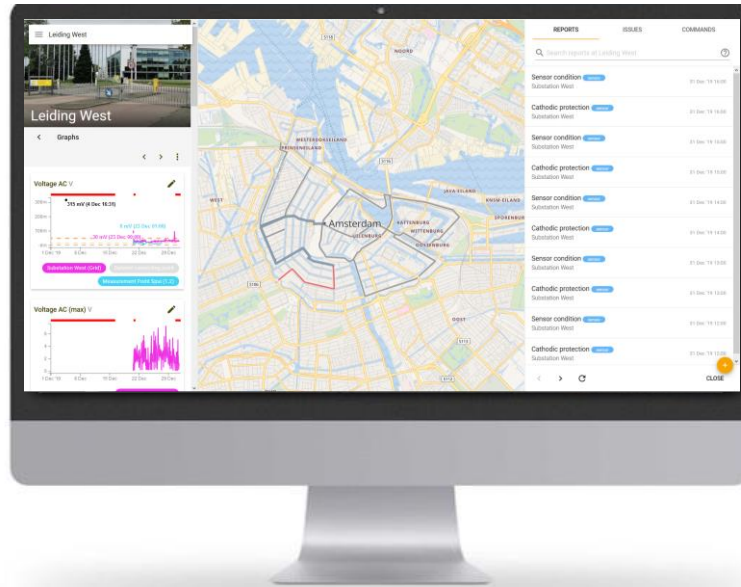


Difficult to
integrate

There are 3 critical steps to use IoT for anomaly detection

Solution

1. Connect any source of asset condition data



3. Manage the condition of any assets

2. Set up anomaly detection on any time series data and trigger workflows

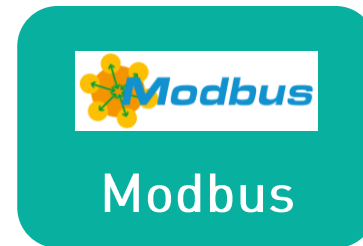
If you want you want to detect anomalies you need to be able to connect to any type of (IoT) datasource

1. Connect asset data [1/3]

Data exchange
protocols



Sensor connectivity
protocols




It can be sped up if there are already pre-existing templates


1. Connect asset data [2/3]

Solutions


[All](#) [Buildings](#) [District heating](#) [Electricity](#) [Gas](#) [Industry](#) [Roads](#) [Water](#)



Cathodic protection for buildings



Cathodic protection for pipelines



Leak detection for district heating

withthegrid IoT
Paul Mignot - Eneco test

IoT devices

- Activity
- Devices
- Commands

Configuration

- Device types
- Device authentication
- Quantities
- Report types
- Command types
- Settings

Switch IoT environment

Back to withthegrid

Search in device types

Evides suppletiemeters ITRON	4djvdl
Grondverzakkings Hudsonbank	3dxwyn
Kathodische bescherming	pyqw6y
Legionella (bijv. Teneo)	8de34d
Lekdetectie	wyv9zd
Vacuum Mobeye	vd4xdx
WOS elektriciteitsmeters	xd2rrd

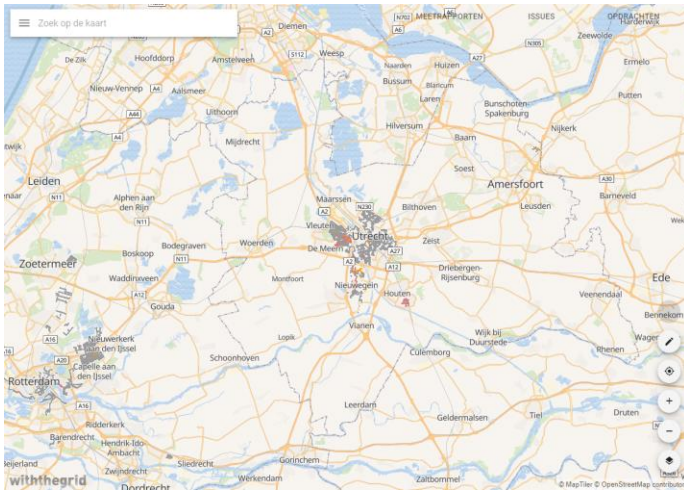
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+

You must know which IoT device is connected to which asset

1. Connect asset data [3/3]

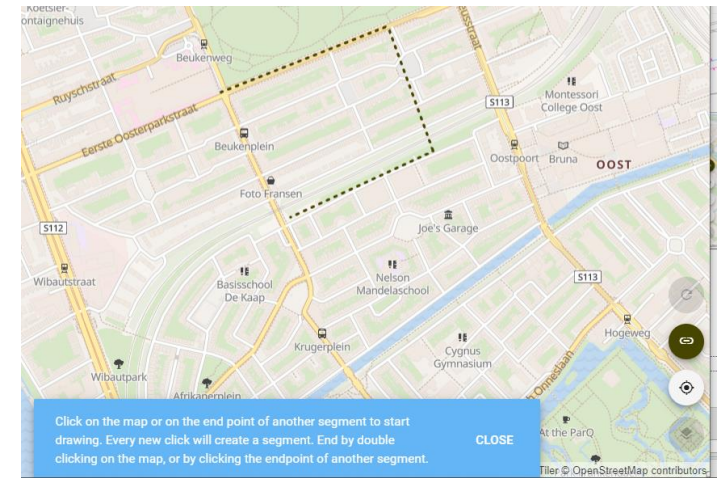
Link with GIS



Automatically load CAD drawings



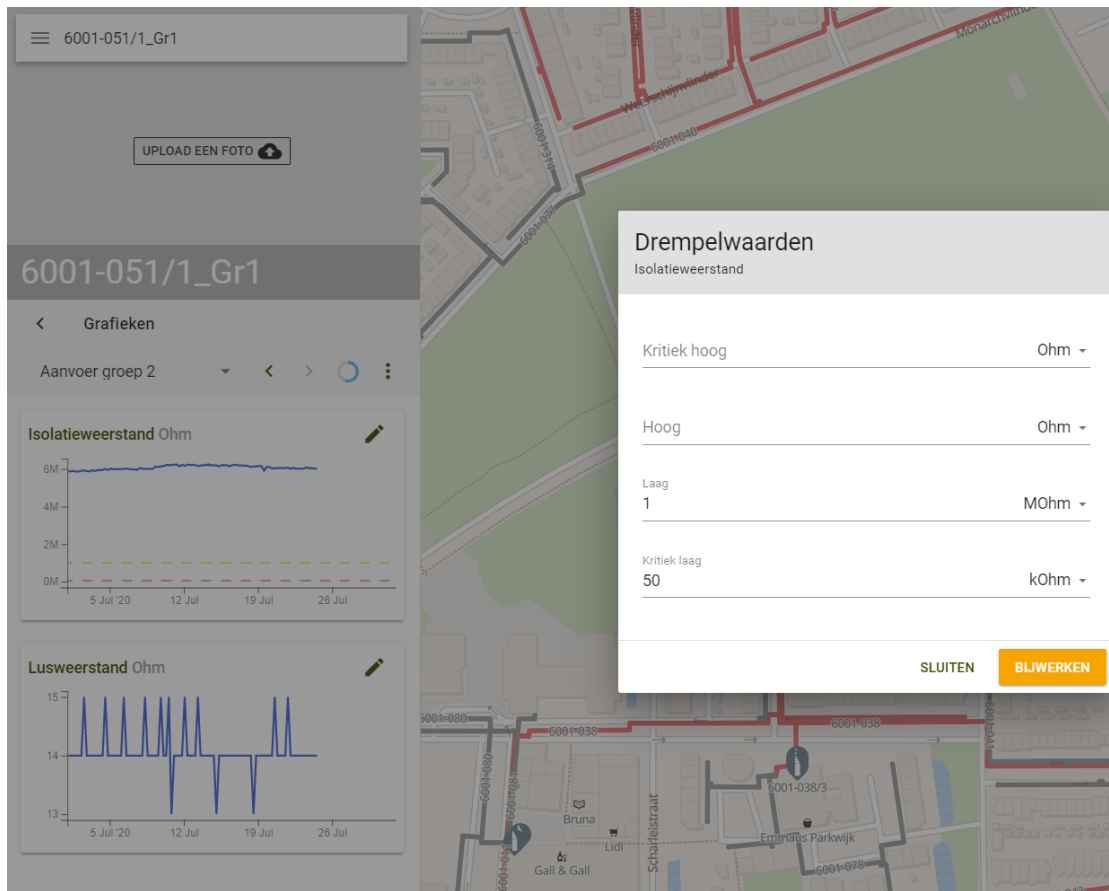
Or do it directly in the application



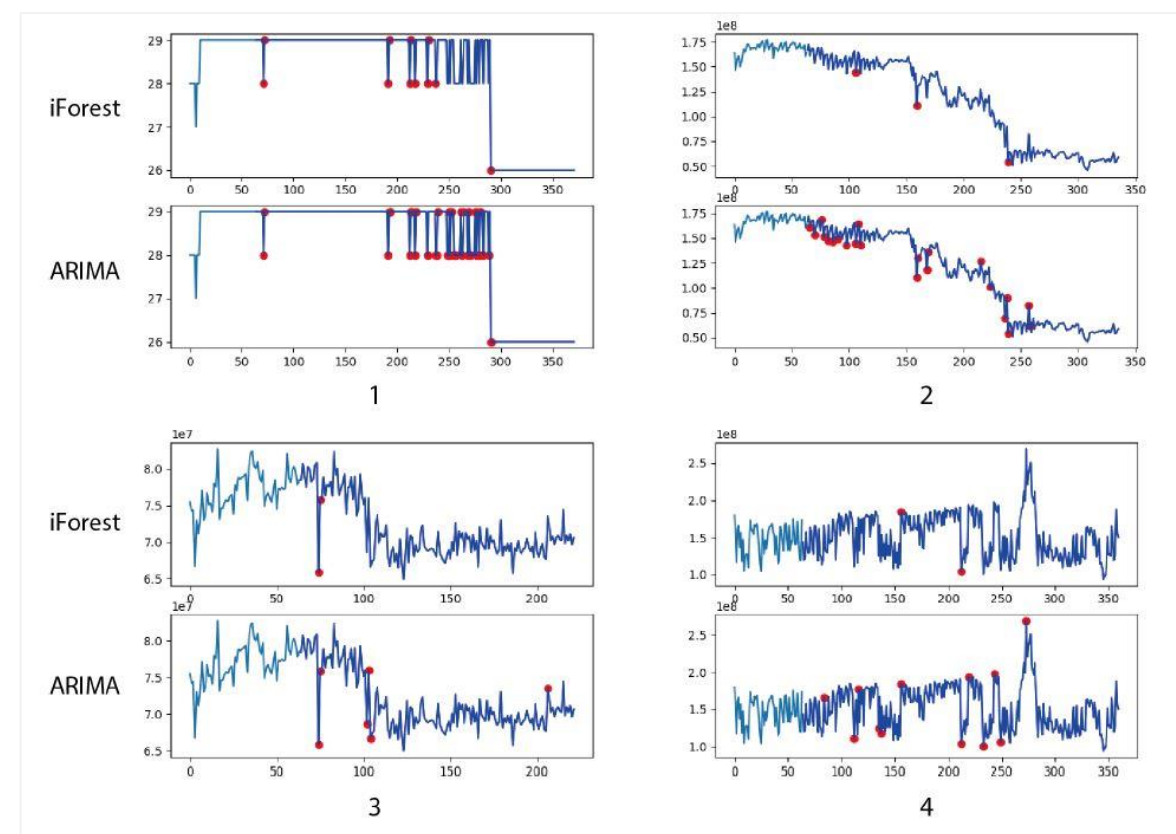
Then you can start analysing time series data with thresholds and using machine learning algorithms

2. Detect anomalies [1/4]

Apply static thresholds



...and detect anomalies using advanced algorithms



After this issues are created

2. Detect anomalies [2/4]

Meerdere metingen zijn kritiek

24 Oct '19

De volgende metingen in [Meetrapport 79k43e](#) zijn onverwacht en waren dat eerder niet:

- Isolatieweerstand van 5.0 kOhm (kritiek),
- Lusweerstand van 450 Ohm (kritiek)

Fred van Baggem

24 Oct '19

De draden van deze lus zijn in de put damstraat niet gelust omdat er een fout zit in de bruine draad van deze lus. Deze draad ligt tegen de pijp. Wordt in de gaten gehouden en is bekend.

24 Oct '19

Fred van Baggem heeft het issue gesloten

Location

[Retour lus 1 bl in 1350.45600-01](#)

Quantities

Lusweerstand (Ohm)

Isolatieweerstand (Ohm)

Type

Correct but unexpected measurements

Priority

Critical

SUBSCRIBE

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DELETE

CLOSE

These can be commented on and discussed

2. Detect anomalies [3/4]

← Batterijspanning is kritiek

Jeroen de Vries heeft een issue aangemaakt 'Batterijspanning is kritiek'

3 december 2019 om 14:26

JV

Jeroen de Vries op 3 december 2019 om 14:32

Na een controle op locatie blijkt de meting idd niet voldoende te zijn. Nader rapport volgt. Voor nu stel ik voor om extra onderzoek te doen.

Rob Everhardt heeft de titel gewijzigd van 'Batterijspanning is kritiek' naar 'Batterijspanning vertoont onregelmatig gedrag'

4 december 2019 om 13:11

RE

Rob Everhardt op 4 december 2019 om 13:12

Jeroen de Vries

Het is slechts onregelmatigheid, voor nu oke

JV

Jeroen de Vries op 4 december 2019 om 13:56

Rob Everhardt

Oke bedankt voor het controleren

Opmerking

VERSTUUR

Locatie

Leiding 5005 in plaatsnaam >

Periode

Sinds 12 november 2019

Verantwoordelijk

Jeroen de Vries

Labels

Onderhoud

System

Onderzoek


Kritiek

On hold

Voltooid

Issue volgen

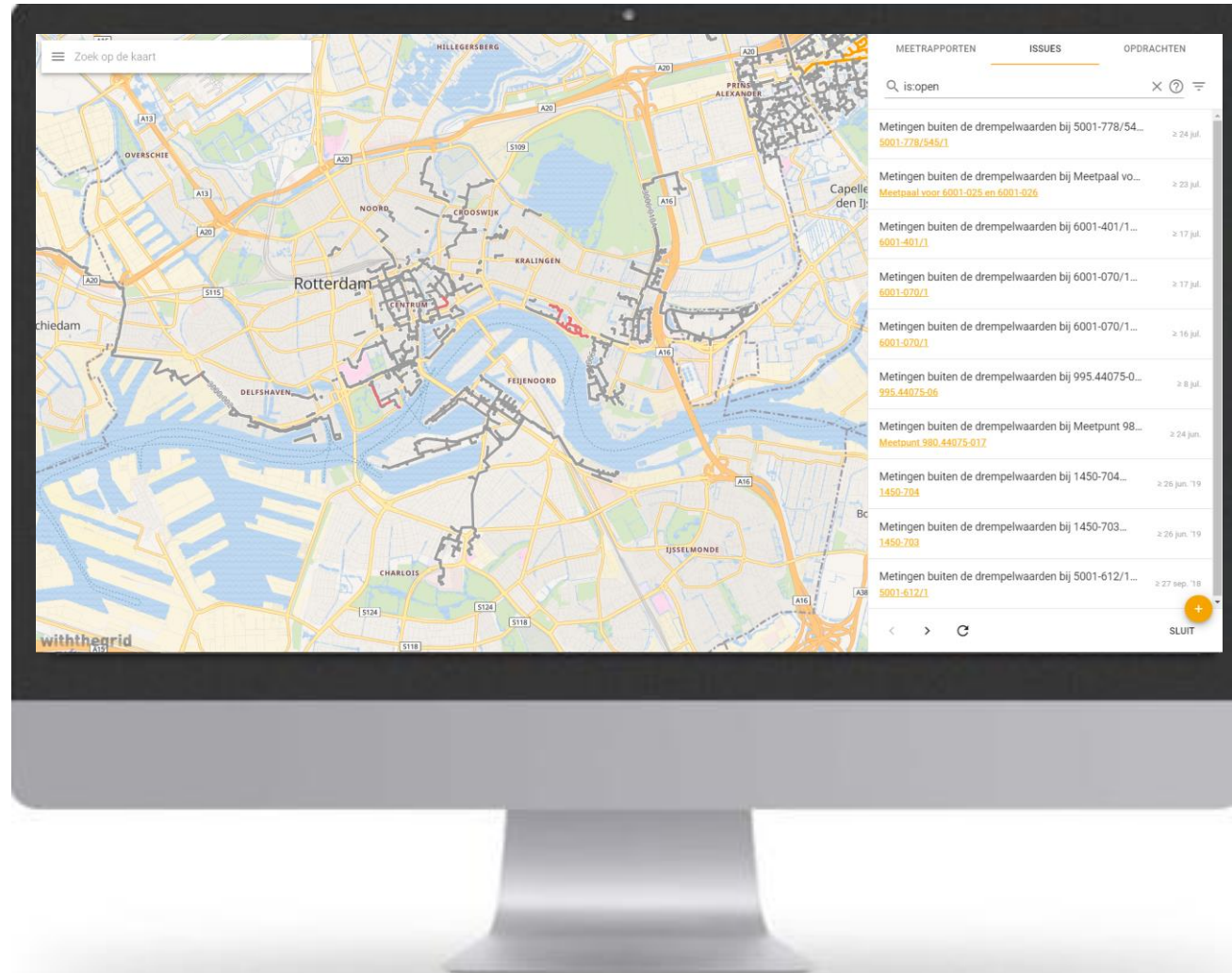
MARKEER ALS KLAAR

 LIETUVOS
ŠILUMOS TIEKĖJŲ
ASOCIACIJA

withthegrid

All observations and conclusions are stored

2. Detect anomalies [4/4]



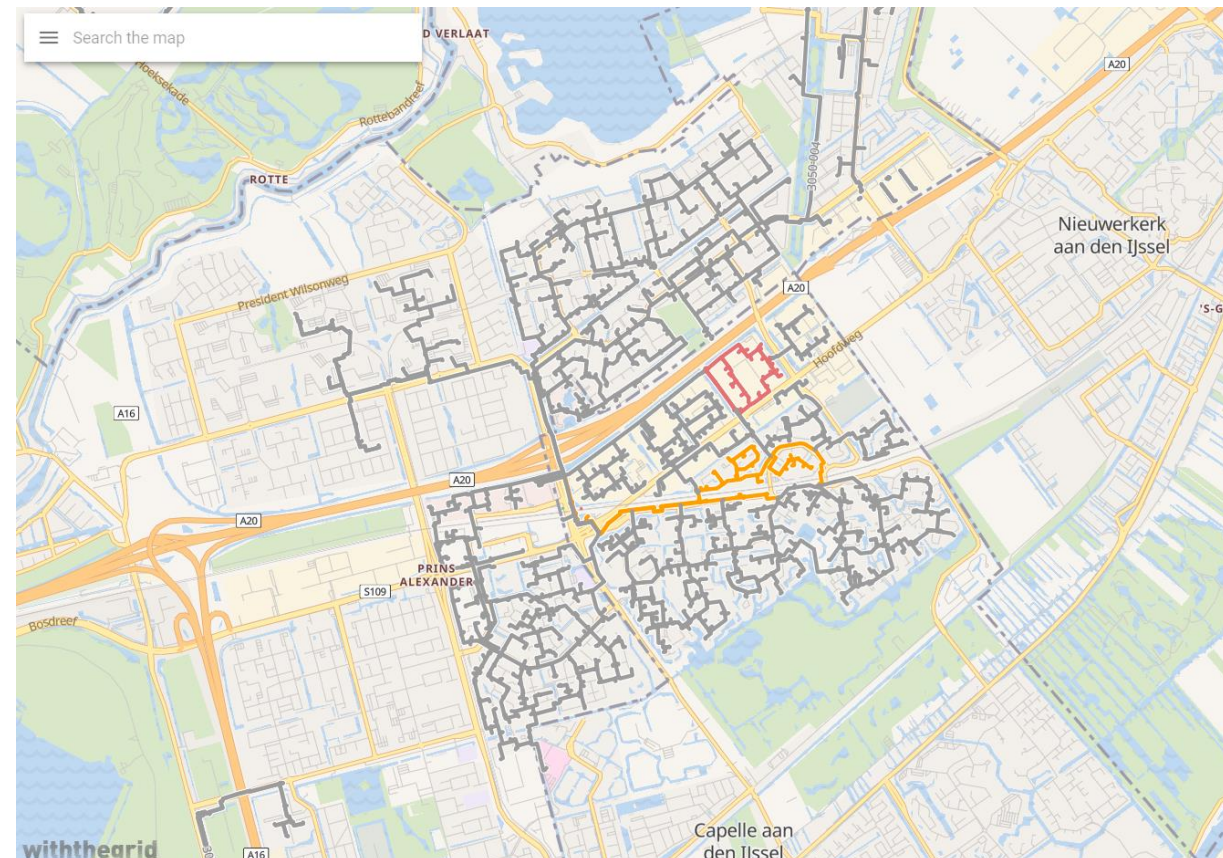
Resulting in an always up to date status of the assets

Asset conditions [1/2]

Enriched overview of issues

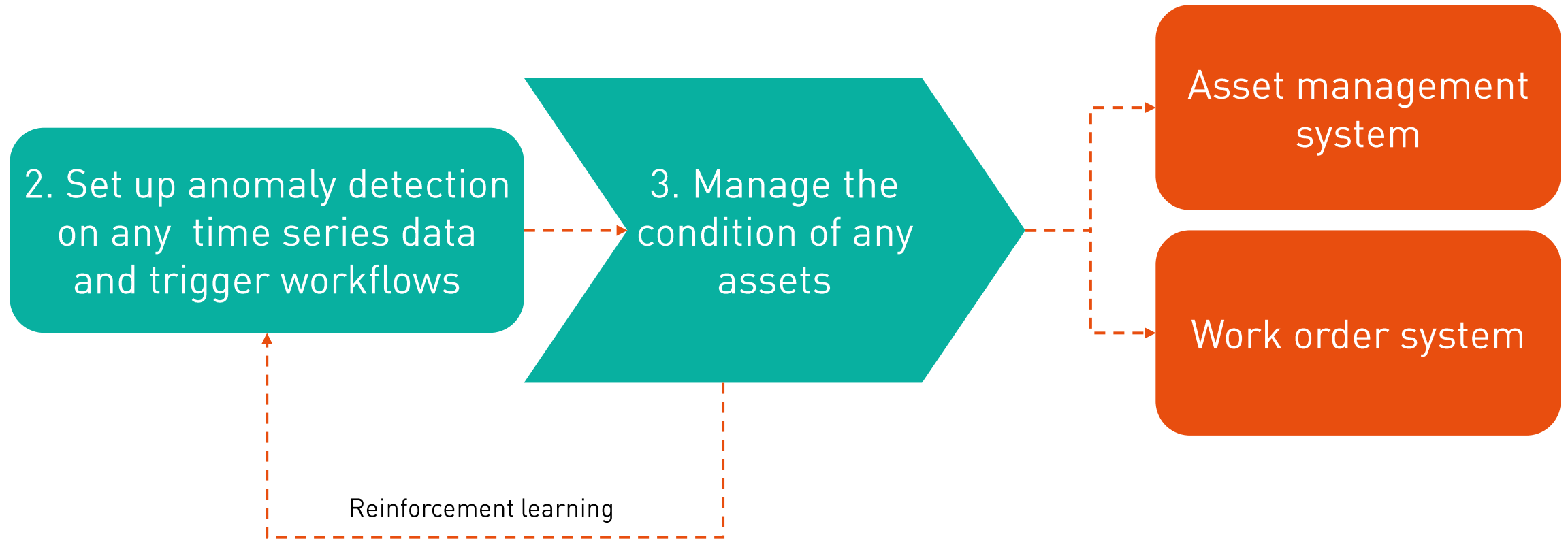
MEETRAPPORTEM	ISSUES	OPDRACHTEN
Q is:open		
Metingen buiten de drempelwaarden bij 6001-401/1...	6001-401/1	≥ 17 jul.
Metingen buiten de drempelwaarden bij 6001-070/1...	6001-070/1	≥ 17 jul.
Metingen buiten de drempelwaarden bij 6001-070/1...	6001-070/1	≥ 16 jul.
Metingen buiten de drempelwaarden bij 995.44075-06...	995.44075-06	≥ 8 jul.
Metingen buiten de drempelwaarden bij Meetpunt 980.4...	Meetpunt 980.44075-017	≥ 24 jun.
Metingen buiten de drempelwaarden bij 1450-704...	1450-704	≥ 26 jun. '19
Metingen buiten de drempelwaarden bij 1450-703...	1450-703	≥ 26 jun. '19
Metingen buiten de drempelwaarden bij 5001-612/1...	5001-612/1	≥ 27 sep. '18
Metingen buiten de drempelwaarden bij 1450-829/1...	1450-829/1	≥ 24 jul. '18

Overview of issues on the map



On basis of this actions can be undertaken

Asset conditions [2/2]



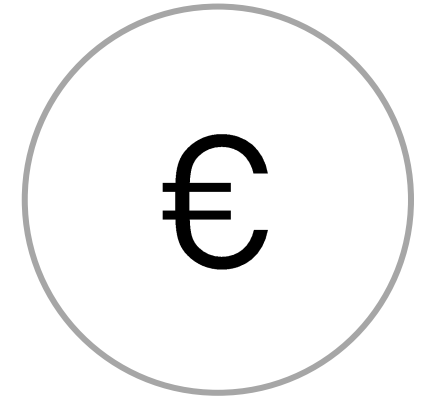
This has measurable impacts



Higher efficiency



Lower risk profile

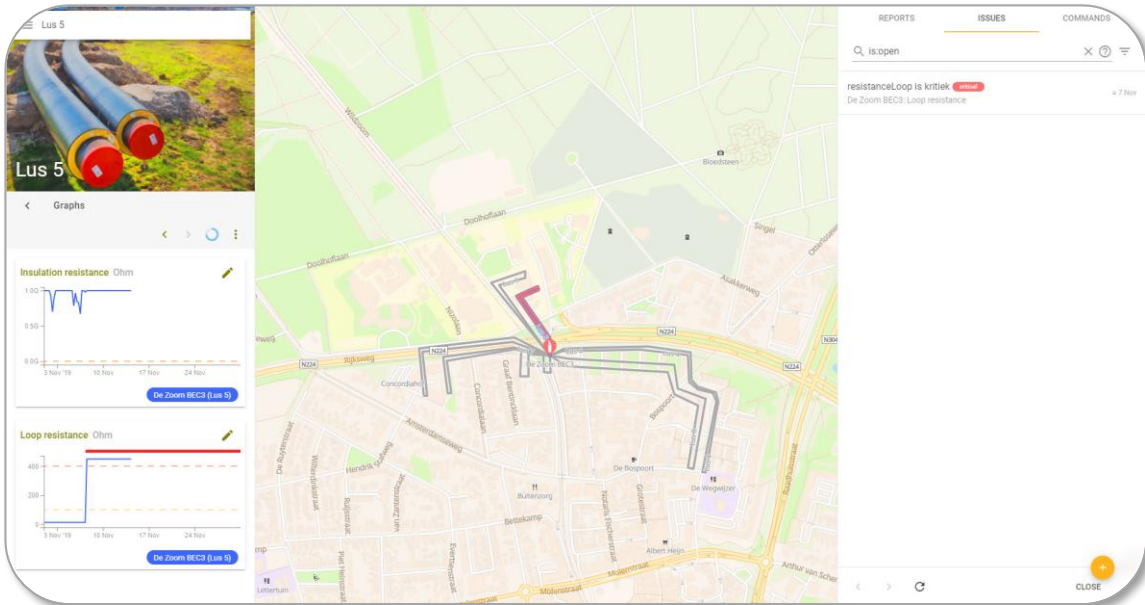


Lower costs

Benefits
(depending on
use case):

- 75% reduction in inspection work
- 25% reduction in administrative work
- 2% asset lifetime extension
- 20% reduction in damages

Use case: leak detection for district heating

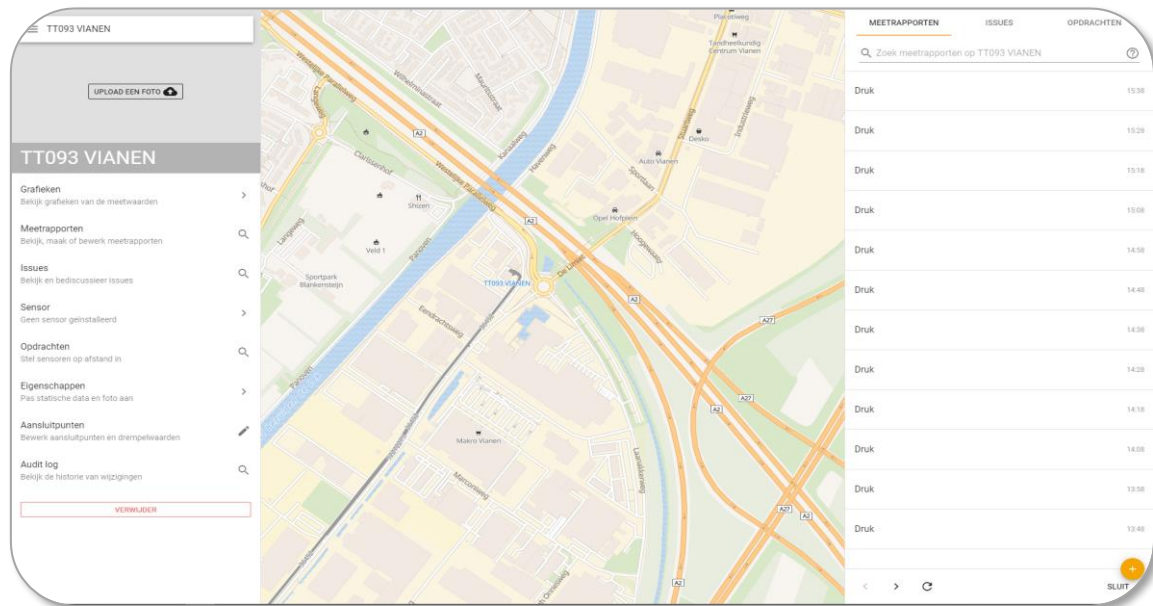


Benefits

- 80% manhour reduction for inspections
- 25% mahour reduction for administrative processes
- Early detection of damages + lower damage costs

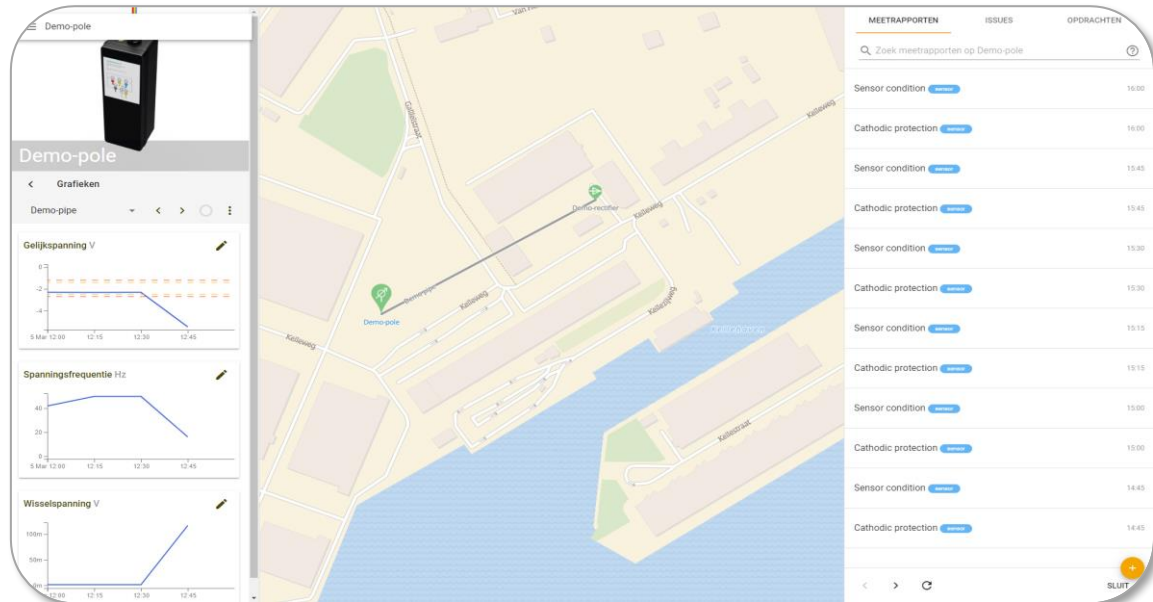
Use case: Vacuum monitoring for district heating

°Warmtebedrijf Rotterdam



Use case: Cathodic protection for steel pipelines

°Warmtebedrijf Rotterdam



Benefits

- 80% manhour reduction for inspections
- 25% mahour reduction for administrative processes
- Early detection of damages + lower damage costs

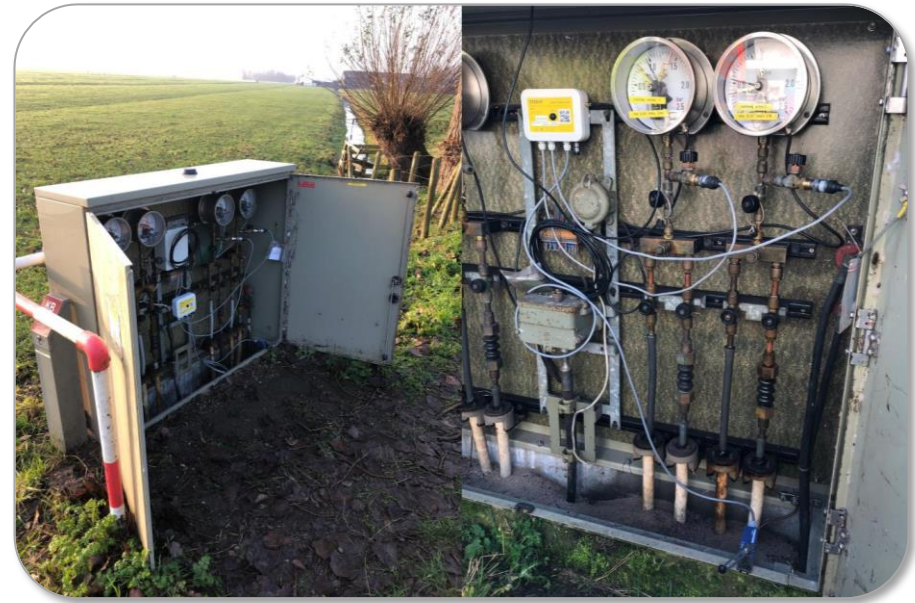
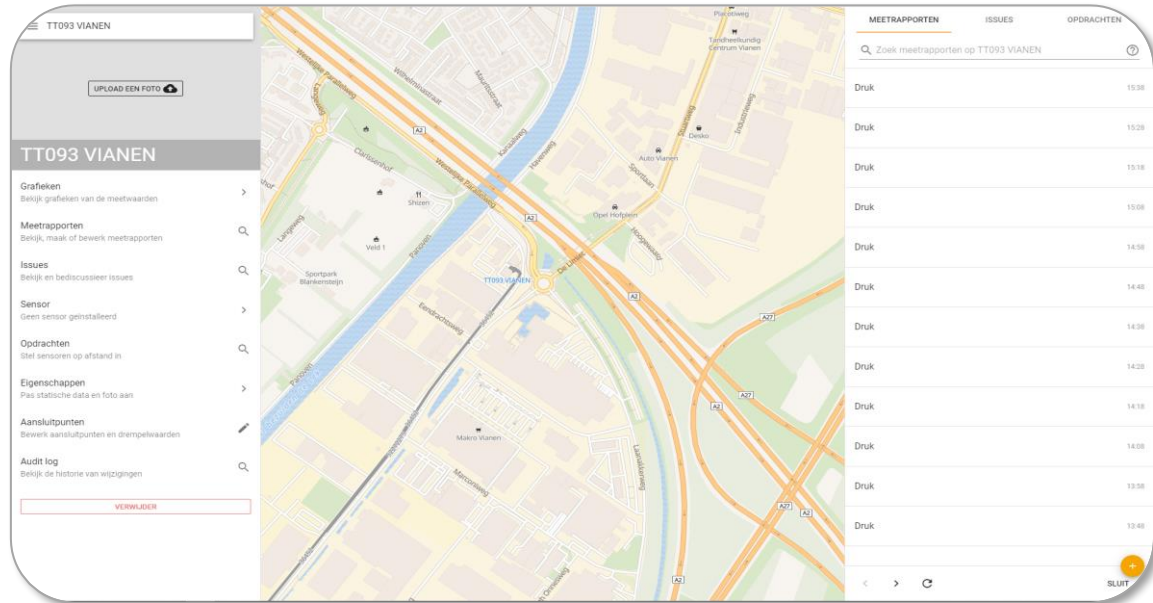
Use case: Temperature and humidity in substations



Benefits

- Higher asset quality
- Detection of abnormal temperature and humidity spikes (leaking water etc.)

Use case: oil pressure for electricity cables



Benefits

- Higher asset quality
- Earlier detection of damages + lower damage costs

Why IoT anomaly detection for District heating:

- Reduced CAPEX
- Reduced OPEX
- Lower risk profile
- Higher grid quality



Thank you!

Paul Mignot

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